WOODPECKERS
of the
WORLD

Lester L. Short
WOODPECKERS
OF THE WORLD

Lester L. Short
Woodpeckers of the World

by

LESTER L. SHORT

with color plates by George Sandström

Delaware Museum of Natural History
Greenville Delaware

MONOGRAPH SERIES NUMBER 4
WOODPECKERS OF THE WORLD
by Lester L. Short
Curator and Professor
American Museum of Natural History
New York, New York 10024, USA

Library of Congress catalog number 79-53793
DMNH Monograph Series No. 4

Distributed worldwide by Foris Publications:
Box C-50, Cinnaminson, NJ 08077 USA
Box 509, 3300 AM, Dordrecht, Holland

Editorial production and design by Weidner Associates, Inc., Cinnaminson, NJ
08077. Manufactured in the United States of America.

Copyright © 1982 by the Delaware Museum of Natural History. All rights
reserved. No portion of this book may be reproduced, transmitted, or stored in
any form or by any means, electronic or mechanical, including photocopying,
recording, or storage in any information retrieval system, without written
permission from the publisher.
DEDICATION

To today’s tropical field biologists — may their numbers be augmented and their efforts enhanced that they might continue to overcome mire, tangle, dust, mechanical failures, and often bureaucracy in the quest for new knowledge that otherwise would be lost to mankind, as tropical environments and faunas disappear before our eyes.
ABOUT THE AUTHOR

Born and raised in New York State, the author developed an interest in birds at the age of six years. He received his doctorate from Cornell University, where he commenced his woodpecker studies in 1955. Since that time, woodpeckers have been a major feature of his researches, reflected in many of his 140 published scientific papers. His studies have taken him to all continents but Antarctica and to over 60 countries. He has observed and studied about two thirds of the world’s woodpeckers.

A Fellow of the American Ornithologists’ Union and a member of many ornithological and other societies, Dr. Short is also a member of the International Ornithological Committee, secretary of the American Ornithologists’ Union’s Committee on Nomenclature and Taxonomy, and secretary of the Pan-American Section of the International Council for Bird Preservation. He has been at the American Museum of Natural History since 1966, where he presently serves as chairman and curator in the Ornithology Department. He is also an adjunct professor on the graduate faculty of the City University of New York.

Married to Kenyan ornithologist and bioacoustician Jennifer Horne, the two recently have been studying woodpeckers and the related barbets and honey guides in East Africa, as well as other birds in Australia. When not undertaking field studies, they reside in Greenwich, Connecticut.
# TABLE OF CONTENTS

LIST OF COLOR PLATES ...................................................... xi
ACKNOWLEDGMENTS ................................................................. xv
FOREWORD ........................................... xvi

**PART ONE—BIOLOGY OF THE WOODPECKERS: FAMILY PICIDAE** ........................................... 1

- Introduction ................................................................. 3
- Terminology ................................................................. 4

**Plumage and Structure** .......................................................... 7
- Woodpeckers Defined .......................................................... 7
- Color Patterns ................................................................. 8
- Sexual Dichromatism and Other Forms of Sexual Dimorphism .......... 11
- Juvenal Plumages ............................................................. 14
- Molt ................................................................. 15
- Structure and Adaptations .................................................. 16
- Ground-adapted Woodpeckers ................................................. 18

**Behavior** ................................................................. 21
- Foods and Feeding ............................................................ 21
- Aggressiveness and the Pair Bond ........................................... 23
- Territoriality and Sociality .................................................... 24
- Nesting ................................................................. 25
- Instrumental Signals .......................................................... 27
- Visual Signals and Displays .................................................. 29
- Vocalizations ................................................................. 30
- Interspecific Behavior .......................................................... 32

**Zoogeography, Evolution, and Systematics** ............................................... 35
- Woodpecker Zoogeography .................................................... 35
- History and Evolution of Woodpeckers ........................................ 38
- Hybridization ................................................................. 39
- Relationships and Classification ................................................. 41
- Classification of the Picidae .................................................. 49

**PART TWO—SPECIES ACCOUNTS** ............................................... 57

**Jyninae** ................................................................. 59
- Northern Wryneck (*Jynx torquilla torquilla*) ........................................ 59
- Rufous-necked Wryneck (*Jynx torquilla ruficollis*) ......................... 63

**Picumninae** ................................................................. 67
- Speckled Piculet (*Picumnus innominatus*) ......................................... 67
- Bar-breasted Piculet (*Picumnus aurifrons*) ....................................... 69
- Lafresnaye’s Piculet (*Picumnus lafresnayi*) ....................................... 71
- Golden-spangled Piculet (*Picumnus exilis*) ......................................... 73
- Ecuadorean Piculet (*Picumnus sclateri*) ........................................... 74
- Scaled Piculet (*Picumnus squamulatus*) ........................................... 75
- White-bellied Piculet (*Picumnus spilogaster*) ................................... 77
- Guianan Piculet (*Picumnus minutissimus*) ......................................... 78
<table>
<thead>
<tr>
<th>Species</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spotted Piculet (Picumnus pygmaeus)</td>
<td>80</td>
</tr>
<tr>
<td>Speckle-chested Piculet (Picumnus steindachneri)</td>
<td>81</td>
</tr>
<tr>
<td>Varzea Piculet (Picumnus varzeae)</td>
<td>82</td>
</tr>
<tr>
<td>White-barred Piculet (Picumnus [cirratus] cirratus)</td>
<td>83</td>
</tr>
<tr>
<td>White-wedged Piculet (Picumnus [cirratus] albosquamatus)</td>
<td>87</td>
</tr>
<tr>
<td>Rusty-necked Piculet (Picumnus fuscus)</td>
<td>88</td>
</tr>
<tr>
<td>Rufous-breasted Piculet (Picumnus rufiventris)</td>
<td>89</td>
</tr>
<tr>
<td>Tawny Piculet (Picumnus fulvescens)</td>
<td>90</td>
</tr>
<tr>
<td>Ochraceous Piculet (Picumnus limae)</td>
<td>91</td>
</tr>
<tr>
<td>Mottled Piculet (Picumnus nebulosus)</td>
<td>92</td>
</tr>
<tr>
<td>Plain-breasted Piculet (Picumnus castelnau)</td>
<td>93</td>
</tr>
<tr>
<td>Fine-barred Piculet (Picumnus subtilis)</td>
<td>94</td>
</tr>
<tr>
<td>Olivaceous Piculet (Picumnus [olivaceus] olivaceus)</td>
<td>95</td>
</tr>
<tr>
<td>Grayish Piculet (Picumnus [olivaceus] granadensis)</td>
<td>98</td>
</tr>
<tr>
<td>Chestnut Piculet (Picumnus cinnamomeus)</td>
<td>99</td>
</tr>
<tr>
<td>African Piculet (Sasia africana)</td>
<td>100</td>
</tr>
<tr>
<td>Rufous Piculet (Sasia [ochracea] abnormis)</td>
<td>102</td>
</tr>
<tr>
<td>White-browed Piculet (Sasia [ochracea] ochracea)</td>
<td>103</td>
</tr>
<tr>
<td>Antillean Piculet (Nesoctites micromegas)</td>
<td>105</td>
</tr>
<tr>
<td>Picinae</td>
<td>108</td>
</tr>
<tr>
<td>White Woodpecker (Melanerpes candidus)</td>
<td>108</td>
</tr>
<tr>
<td>Lewis' Woodpecker (Melanerpes lewis)</td>
<td>110</td>
</tr>
<tr>
<td>Guadeloupe Woodpecker (Melanerpes herminieri)</td>
<td>113</td>
</tr>
<tr>
<td>Puerto Rican Woodpecker (Melanerpes portoricensis)</td>
<td>115</td>
</tr>
<tr>
<td>Red-headed Woodpecker (Melanerpes erythrocephalus)</td>
<td>118</td>
</tr>
<tr>
<td>Acorn Woodpecker (Melanerpes formicivorus)</td>
<td>124</td>
</tr>
<tr>
<td>Red-fronted Woodpecker (Melanerpes [cruentatus] cruentatus)</td>
<td>131</td>
</tr>
<tr>
<td>Yellow-fronted Woodpecker (Melanerpes [cruentatus] flavifrons)</td>
<td>134</td>
</tr>
<tr>
<td>Gold-naped Woodpecker (Melanerpes [cruentatus] chrysauchen)</td>
<td>136</td>
</tr>
<tr>
<td>Black-cheeked Woodpecker (Melanerpes [cruentatus] pucherani)</td>
<td>139</td>
</tr>
<tr>
<td>White-fronted Woodpecker (Melanerpes cactorum)</td>
<td>141</td>
</tr>
<tr>
<td>Hispaniolan Woodpecker (Melanerpes striatus)</td>
<td>143</td>
</tr>
<tr>
<td>Jamaican Woodpecker (Melanerpes radiolatus)</td>
<td>146</td>
</tr>
<tr>
<td>Gold-cheeked Woodpecker (Melanerpes chrysogenys)</td>
<td>148</td>
</tr>
<tr>
<td>Gray-breasted Woodpecker (Melanerpes hypopolius)</td>
<td>150</td>
</tr>
<tr>
<td>Red-crowned Woodpecker (Melanerpes rubricapillus)</td>
<td>151</td>
</tr>
<tr>
<td>Hoffman's Woodpecker (Melanerpes [carolinus] hoffmannii)</td>
<td>155</td>
</tr>
<tr>
<td>Gila Woodpecker (Melanerpes [carolinus] uropygialis)</td>
<td>157</td>
</tr>
<tr>
<td>Gold-fronted Woodpecker (Melanerpes [carolinus] aurifrons)</td>
<td>160</td>
</tr>
<tr>
<td>Red-bellied Woodpecker (Melanerpes [carolinus] carolinus)</td>
<td>165</td>
</tr>
<tr>
<td>Great Red-bellied Woodpecker (Melanerpes [carolinus] supercilias)</td>
<td>170</td>
</tr>
<tr>
<td>Yellow-bellied Sapsucker (Sphyrapicus [varius] varius)</td>
<td>173</td>
</tr>
<tr>
<td>Red-naped Sapsucker (Sphyrapicus [varius] nuchalis)</td>
<td>176</td>
</tr>
<tr>
<td>Red-breasted Sapsucker (Sphyrapicus [varius] ruber)</td>
<td>178</td>
</tr>
<tr>
<td>Williamson's Sapsucker (Sphyrapicus thyroideus)</td>
<td>179</td>
</tr>
<tr>
<td>Cuban Green Woodpecker (Xiphiidiopticus percussus)</td>
<td>184</td>
</tr>
<tr>
<td>Fine-spotted Woodpecker (Campethera [nubica] punctuligera)</td>
<td>186</td>
</tr>
<tr>
<td>Table of Contents</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td>Bennett's Woodpecker <em>(Campethera [nubica] bennettii)</em></td>
<td>188</td>
</tr>
<tr>
<td>Nubian Woodpecker <em>(Campethera [nubica] nubica)</em></td>
<td>192</td>
</tr>
<tr>
<td>Golden-tailed Woodpecker <em>(Campethera [notata] abingondi)</em></td>
<td>194</td>
</tr>
<tr>
<td>Knysna Woodpecker <em>(Campethera [notata] notata)</em></td>
<td>196</td>
</tr>
<tr>
<td>Green-backed Woodpecker <em>(Campethera [maculosa] cailliautii)</em></td>
<td>197</td>
</tr>
<tr>
<td>Little Green Woodpecker <em>(Campethera [maculosa] maculosa)</em></td>
<td>200</td>
</tr>
<tr>
<td>Tullberg's Woodpecker <em>(Campethera tullbergi)</em></td>
<td>201</td>
</tr>
<tr>
<td>Buff-spotted Woodpecker <em>(Campethera nivosae)</em></td>
<td>202</td>
</tr>
<tr>
<td>Brown-eared Woodpecker <em>(Campethera caroli)</em></td>
<td>204</td>
</tr>
<tr>
<td>African Ground Woodpecker <em>(Geocolaptes olivaceus)</em></td>
<td>205</td>
</tr>
<tr>
<td>Little Gray Woodpecker <em>(Dendropicos elachus)</em></td>
<td>207</td>
</tr>
<tr>
<td>Speckle-breasted Woodpecker <em>(Dendropicos poecilolaemus)</em></td>
<td>208</td>
</tr>
<tr>
<td>Gold-mantled Woodpecker <em>(Dendropicos [abyssinicus] abyssinicus)</em></td>
<td>209</td>
</tr>
<tr>
<td>Cardinal Woodpecker <em>(Dendropicos [abyssinicus] fuscescens)</em></td>
<td>210</td>
</tr>
<tr>
<td>Gabon Woodpecker <em>(Dendropicos gabanensis)</em></td>
<td>211</td>
</tr>
<tr>
<td>Sterling's Woodpecker <em>(Dendropicos stierlingi)</em></td>
<td>214</td>
</tr>
<tr>
<td>Bearded Woodpecker <em>(Dendropicos namaquae)</em></td>
<td>216</td>
</tr>
<tr>
<td>Yellow-crested Woodpecker <em>(Dendropicos [pyrrhogaster] xantholophus)</em></td>
<td>219</td>
</tr>
<tr>
<td>Fire-bellied Woodpecker <em>(Dendropicos [pyrrhogaster] pyrrhogaster)</em></td>
<td>221</td>
</tr>
<tr>
<td>Elliot's Woodpecker <em>(Dendropicos elliotii)</em></td>
<td>222</td>
</tr>
<tr>
<td>Gray Woodpecker <em>(Dendropicos [goertae] goertae)</em></td>
<td>224</td>
</tr>
<tr>
<td>Olive Woodpecker <em>(Dendropicos [goertae] griseocephalus)</em></td>
<td>226</td>
</tr>
<tr>
<td>Temminck's Pygmy Woodpecker <em>(Picoides [maculatus] temminckii)</em></td>
<td>228</td>
</tr>
<tr>
<td>Philippine Pygmy Woodpecker <em>(Picoides [maculatus] maculatus)</em></td>
<td>229</td>
</tr>
<tr>
<td>Brown-capped Woodpecker <em>(Picoides moluccensis)</em></td>
<td>231</td>
</tr>
<tr>
<td>Brown-backed Woodpecker <em>(Picoides obsoletus)</em></td>
<td>234</td>
</tr>
<tr>
<td>Japanese Spotted Woodpecker <em>(Picoides [kizuki] kizuki)</em></td>
<td>236</td>
</tr>
<tr>
<td>Gray-capped Woodpecker <em>(Picoides [kizuki] canicapillus)</em></td>
<td>238</td>
</tr>
<tr>
<td>Lesser Spotted Woodpecker <em>(Picoides minor)</em></td>
<td>242</td>
</tr>
<tr>
<td>Streak-bellied Woodpecker <em>(Picoides [macei] macei)</em></td>
<td>246</td>
</tr>
<tr>
<td>Stripe-breasted Woodpecker <em>(Picoides [macei] atratus)</em></td>
<td>250</td>
</tr>
<tr>
<td>Brown-fronted Woodpecker <em>(Picoides [macei] auriceps)</em></td>
<td>251</td>
</tr>
<tr>
<td>Yellow-crowned Woodpecker <em>(Picoides mahattensis)</em></td>
<td>253</td>
</tr>
<tr>
<td>Arabian Woodpecker <em>(Picoides dorae)</em></td>
<td>255</td>
</tr>
<tr>
<td>Rufous-bellied Woodpecker <em>(Picoides hyperythrus)</em></td>
<td>256</td>
</tr>
<tr>
<td>Crimson-breasted Woodpecker <em>(Picoides cathpharius)</em></td>
<td>259</td>
</tr>
<tr>
<td>Brown-throated Woodpecker <em>(Picoides darjellensis)</em></td>
<td>261</td>
</tr>
<tr>
<td>Middle Spotted Woodpecker <em>(Picoides medius)</em></td>
<td>263</td>
</tr>
<tr>
<td>White-backed Woodpecker <em>(Picoides leucotos)</em></td>
<td>267</td>
</tr>
<tr>
<td>Himalayan Woodpecker <em>(Picoides [major] himalayensis)</em></td>
<td>272</td>
</tr>
<tr>
<td>Sind Woodpecker <em>(Picoides [major] assimilis)</em></td>
<td>273</td>
</tr>
<tr>
<td>Syrian Woodpecker <em>(Picoides [major] syriacus)</em></td>
<td>275</td>
</tr>
<tr>
<td>White-winged Woodpecker <em>(Picoides [major] leucopterus)</em></td>
<td>280</td>
</tr>
<tr>
<td>Great Spotted Woodpecker <em>(Picoides [major] major)</em></td>
<td>281</td>
</tr>
<tr>
<td>Checked Woodpecker <em>(Picoides [mixtus] mixtus)</em></td>
<td>289</td>
</tr>
<tr>
<td>Striped Woodpecker <em>(Picoides [mixtus] lignarius)</em></td>
<td>291</td>
</tr>
<tr>
<td>Ladder-backed Woodpecker <em>(Picoides [scalaris] scalaris)</em></td>
<td>292</td>
</tr>
<tr>
<td>Species</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Nuttall's Woodpecker (Picoides [scalaris] nuttallii)</td>
<td>297</td>
</tr>
<tr>
<td>Downy Woodpecker (Picoides pubescens)</td>
<td>301</td>
</tr>
<tr>
<td>Red-cockaded Woodpecker (Picoides borealis)</td>
<td>308</td>
</tr>
<tr>
<td>Strickland's Woodpecker (Picoides stricklandi)</td>
<td>314</td>
</tr>
<tr>
<td>Hairy Woodpecker (Picoides villosus)</td>
<td>318</td>
</tr>
<tr>
<td>White-headed Woodpecker (Picoides albolarvatus)</td>
<td>328</td>
</tr>
<tr>
<td>Three-toed Woodpecker (Picoides tridactylus)</td>
<td>331</td>
</tr>
<tr>
<td>Black-backed Woodpecker (Picoides arcticus)</td>
<td>338</td>
</tr>
<tr>
<td>Scarlet-backed Woodpecker (Veniliornis callonotus)</td>
<td>344</td>
</tr>
<tr>
<td>Yellow-vented Woodpecker (Veniliornis dignus)</td>
<td>345</td>
</tr>
<tr>
<td>Bar-bellied Woodpecker (Veniliornis nigriceps)</td>
<td>346</td>
</tr>
<tr>
<td>Smoky-brown Woodpecker (Veniliornis fumigatus)</td>
<td>347</td>
</tr>
<tr>
<td>Little Woodpecker (Veniliornis [passerinus] passerinus)</td>
<td>348</td>
</tr>
<tr>
<td>Dot-fronted Woodpecker (Veniliornis [passerinus] frontalis)</td>
<td>350</td>
</tr>
<tr>
<td>White-spotted Woodpecker (Veniliornis spilogaster)</td>
<td>351</td>
</tr>
<tr>
<td>Blood-colored Woodpecker (Veniliornis sanguineus)</td>
<td>352</td>
</tr>
<tr>
<td>Yellow-eared Woodpecker (Veniliornis [affinis] maculifrons)</td>
<td>353</td>
</tr>
<tr>
<td>Red-stained Woodpecker (Veniliornis [affinis] affinis)</td>
<td>354</td>
</tr>
<tr>
<td>Golden-collared Woodpecker (Veniliornis [affinis] cassiiti)</td>
<td>356</td>
</tr>
<tr>
<td>Red-rumped Woodpecker (Veniliornis [affinis] kirkii)</td>
<td>357</td>
</tr>
<tr>
<td>White-throated Woodpecker (Piculus leucaemus)</td>
<td>358</td>
</tr>
<tr>
<td>Yellow-throated Woodpecker (Piculus flavigula)</td>
<td>360</td>
</tr>
<tr>
<td>Golden-green Woodpecker (Piculus [chrysochloros] chrysochloros)</td>
<td>361</td>
</tr>
<tr>
<td>White-browed Woodpecker (Piculus [chrysochloros] aurulentus)</td>
<td>362</td>
</tr>
<tr>
<td>Golden-olive Woodpecker (Piculus [rubiginosus] rubiginosus)</td>
<td>363</td>
</tr>
<tr>
<td>Gray-crowned Woodpecker (Piculus [rubiginosus] auricularis)</td>
<td>366</td>
</tr>
<tr>
<td>Crimson-mantled Woodpecker (Piculus rivolii)</td>
<td>367</td>
</tr>
<tr>
<td>Black-necked Flicker (Colaptes atricollis)</td>
<td>369</td>
</tr>
<tr>
<td>Spot-breasted Flicker (Colaptes [punctigula] punctigula)</td>
<td>370</td>
</tr>
<tr>
<td>Green-barred Flicker (Colaptes [punctigula] melanochloros)</td>
<td>372</td>
</tr>
<tr>
<td>Northern (Common) Flicker (Colaptes auratus)</td>
<td>375</td>
</tr>
<tr>
<td>Fernandina’s Flicker (Colaptes fernandinae)</td>
<td>381</td>
</tr>
<tr>
<td>Chilean Flicker (Colaptes pitius)</td>
<td>382</td>
</tr>
<tr>
<td>Andean Flicker (Colaptes rupicola)</td>
<td>384</td>
</tr>
<tr>
<td>Campo Flicker (Colaptes campestris)</td>
<td>387</td>
</tr>
<tr>
<td>Rufous Woodpecker (Celeus brachyurus)</td>
<td>390</td>
</tr>
<tr>
<td>Cinnamon Woodpecker (Celeus loricatus)</td>
<td>393</td>
</tr>
<tr>
<td>Waved Woodpecker (Celeus [undatus] undatus)</td>
<td>395</td>
</tr>
<tr>
<td>Scaly-breasted Woodpecker (Celeus [undatus] grannicus)</td>
<td>396</td>
</tr>
<tr>
<td>Chestnut-colored Woodpecker (Celeus [elegans] castaneus)</td>
<td>398</td>
</tr>
<tr>
<td>Chestnut Woodpecker (Celeus [elegans] elegans)</td>
<td>399</td>
</tr>
<tr>
<td>Pale-crested Woodpecker (Celeus [elegans] lugubris)</td>
<td>401</td>
</tr>
<tr>
<td>Blond-crested Woodpecker (Celeus [elegans] flavescens)</td>
<td>402</td>
</tr>
<tr>
<td>Cream-colored Woodpecker (Celeus flavus)</td>
<td>404</td>
</tr>
<tr>
<td>Rufous-headed Woodpecker (Celeus spectabilis)</td>
<td>405</td>
</tr>
<tr>
<td>Ringed Woodpecker (Celeus torquatus)</td>
<td>407</td>
</tr>
<tr>
<td>Helmeted Woodpecker (Dryocopus galeatus)</td>
<td>409</td>
</tr>
</tbody>
</table>
Black-bodied Woodpecker (Dryocopus [pileatus] schulzi) ............... 410
Lineated Woodpecker (Dryocopus [pileatus] lineatus) ................... 412
Pileated Woodpecker (Dryocopus [pileatus] pileatus) ................... 417
White-bellied Woodpecker (Dryocopus javensis) ....................... 423
Black Woodpecker (Dryocopus martius) ................................. 428
Powerful Woodpecker (Campephilus pollens) ............................ 432
Crimson-bellied Woodpecker (Campephilus haematogaster) ............ 433
Red-necked Woodpecker (Campephilus rubricollis) ...................... 435
Robust Woodpecker (Campephilus robustus) ............................... 436
Pale-billed Woodpecker (Campephilus [melanoleucos] guatemalensis) 437
Crimson-crested Woodpecker (Campephilus [melanoleucos] melanoleucos) 440
Guayaquil Woodpecker (Campephilus [melanoleucos] gayaquilensis) 444
Cream-backed Woodpecker (Campephilus leucopogon) .................... 445
Magellanic Woodpecker (Campephilus magellanicus) ..................... 446
Ivory-billed Woodpecker (Campephilus [principalis] principalis) .... 448
Imperial Woodpecker (Campephilus [principalis] imperialis) ........... 452
Banded Red Woodpecker (Picus miniaceus) ................................. 453
Crimson-winged Woodpecker (Picus [chlorolophus] puniceus) ......... 455
Lesser Yellow-nape (Picus [chlorolophus] chlorolophus) ............... 458
Checker-throated Woodpecker (Picus [mentalis] mentalis) ............... 461
Greater Yellow-nape (Picus [mentalis] flavinucha) ....................... 464
Laced Woodpecker (Picus vittatus) ..........
Sooty Woodpecker (*Mulleripicus funebris*) ........................................... 531
Great Slaty Woodpecker (*Mulleripicus pulverulentus*) ......................... 533
PART THREE—COLOR PLATES ............................................................... 537
PART FOUR—REFERENCES AND INDEX .............................................. 641
References ......................................................................................... 643
Index to English and Scientific Names ................................................. 665
LIST OF COLOR PLATES

1. Two species of wrynecks (Jynx) .............................................. 539
2. Five species of piculets (Picumnus) ........................................... 540
3. Six species of piculets (Picumnus) ........................................... 541
4. Six species of piculets (Picumnus) ........................................... 542
5. Six species of piculets (Picumnus) ........................................... 543
6. Three species of piculets (Sasia) ............................................. 544
7. Antillean Piculet (Nesoctites micromegas) .............................. 545
8. White and Lewis' woodpeckers (Melanerpes candidus, M. lewis) . 546
9. Guadeloupe and Puerto Rican woodpeckers (Melanerpes herminieri, M. portoricensis) ......................................................... 547
10. Red-headed Woodpecker (Melanerpes erythrocephalus) .............. 548
11. Acorn Woodpecker (Melanerpes formicivorus) ........................... 549
12. Red-fronted Woodpecker (Melanerpes cruentatus) ..................... 550
13. Yellow-fronted and White-fronted woodpeckers (Melanerpes flavifrons, M. cactorum) ................................................................. 551
14. Black-cheeked and Gold-naped woodpeckers (Melanerpes pucherani, M. chrysaeus) ................................................................. 552
15. Hispaniolan and Jamaican woodpeckers (Melanerpes striatus, M. radiolatus) ................................................................. 553
16. Gold-cheeked and Gray-breasted Woodpeckers (Melanerpes chrysogenys, M. hypopolius) ................................................................. 554
17. Red-crowned Woodpecker (Melanerpes rubricapillus) ............... 555
18. Five woodpeckers of the Melanerpes carolinus superspecies ....... 556
19. Races of Gold-fronted and Great Red-bellied woodpeckers (Melanerpes aurifrons, M. superciliaris) ......................................................... 557
20. Yellow-bellied Sapsucker (Sphyrapicus varius) ......................... 558
21. Red-breasted and Red-naped sapsuckers (Sphyrapicus ruber, S. nuchalis) ................................................................. 559
22. Williamson's Sapsucker (Sphyrapicus thyroideus) ...................... 560
23. Cuban Green Woodpecker (Xiphiidopius percussus) ..................... 561
24. Three species of the Campethera nubica superspecies ............... 562
25. Two woodpeckers of the Campethera notata superspecies .......... 563
26. Two woodpeckers of the Campethera maculosa superspecies ....... 564
27. Tullberg's Woodpecker (Campethera tullbergi) ......................... 565
28. Buff-spotted and Brown-eared woodpeckers (Campethera nivosa, C. caroli) ................................................................. 566
29. African Ground and Bearded woodpeckers (Geocolaptes olivaceus, Dendropicos namaquae) ................................................................. 567
30. Little Gray and Speckle-breasted woodpeckers (Dendropicos elachus, D. poecilolaemus) ................................................................. 568
31. Gold-mantled and Sterling's woodpeckers (Dendropicos abyssinicus, D. stierlingi) ................................................................. 569
32. Cardinal Woodpecker (Dendropicos fuscescens) ......................... 570
33. Gaboon Woodpecker (Dendropicos gabonensis) ........................... 571
34. Two woodpeckers of the Dendropicos pyrrhogaster superspecies ... 572
35. Elliot's Woodpecker (*Dendropicos elliottii*) .......................... 573
36. Two woodpeckers of the *Dendropicos goertae* superspecies .......................... 574
37. Temminck’s Pygmy and Brown-backed woodpeckers (*Picoides temminckii, P. obsoletus*) .......................... 575
38. Philippine Pygmy Woodpecker (*Picoides maculatus*) .......................... 576
40. Three sympatric Asian pied woodpeckers .......................... 578
41. Japanese Spotted and Lesser Spotted woodpeckers (*Picoides kizuki, P. minor*) .......................... 579
42. Gray-capped Woodpecker (*Picoides canicapillus*) .......................... 580
43. Three woodpeckers of the *Picoides macei* superspecies .......................... 581
44. Yellow-crowned and Arabian woodpeckers (*Picoides mahrattensis, P. dorae*) .......................... 582
45. Rufous-bellied Woodpeckers (*Picoides hyperythrus*) .......................... 583
46. Three species of pied woodpeckers .......................... 584
47. White-backed Woodpecker (*Picoides leucotos*) .......................... 585
48. Four species of the *Picoides major* superspecies .......................... 586
49. Great Spotted Woodpecker (*Picoides major*) .......................... 587
50. Two woodpeckers of the *Picoides mixtus* superspecies .......................... 588
51. Ladder-backed and Nuttall’s woodpeckers (*Picoides scalaris, P. nuttallii*) and hybrid .......................... 589
52. Downy Woodpecker (*Picoides pubescens*) and hybrid .......................... 590
53. Red-cockaded and White-headed woodpeckers (*Picoides borealis, P. albolarvatus*) .......................... 591
54. Strickland’s Woodpecker (*Picoides stricklandi*) .......................... 592
55. Hairy Woodpecker (*Picoides villosus*) .......................... 593
56. Three-toed and Black-backed woodpeckers (*Picoides tridactylus, P. arcticus*) .......................... 594
57. Scarlet-backed and Smoky-brown woodpeckers (*Veniliornis callonotus, V. fumigatus*) .......................... 595
58. Yellow-vented and Bar-bellied woodpeckers (*Veniliornis dignus, V. nigriceps*) .......................... 596
59. Two species of *Veniliornis passcrinus* superspecies .......................... 597
60. White-spotted and Blood-colored woodpeckers (*Veniliornis spilogaster, V. sanguineus*) .......................... 598
61. Four woodpeckers of the *Veniliornis affinis* superspecies .......................... 599
62. White-throated Woodpecker (*Piculus leucolocranus*) .......................... 600
63. Yellow-throated Woodpecker (*Picus flavigula*) .......................... 601
64. Two species of the *Piculus chrysocloros* superspecies .......................... 602
65. Two woodpeckers of the *Piculus rubiginosus* superspecies .......................... 603
66. Crimson-mantled Woodpeckers (*Piculus rivolii*) .......................... 604
67. Black-necked Flickers (*Colaptes atricollis*) .......................... 605
68. Two flickers of the *Colaptes punctigula* superspecies .......................... 606
69. Subspecies and hybrids of Northern Flickers (*Colaptes auratus*) .......................... 607
70. Fernandina’s and Chilean flickers (*Colaptes fernandinae, C. pittius*) .......................... 608
71. Andean and Campo flickers (*Colaptes rupicola, C. campestris*) .......................... 609
72. Rufous and Helmeted woodpeckers (*Celeus brachyurus, Dryocopus galeatus*) .......................... 610
73. Three small species of *Celeus* .......................... 611
74. Four woodpeckers of the *Celeus elegans* superspecies .......................... 612
75. Cream-colored and Rufous-headed woodpeckers (*Celeus flavus, C. spectabilis*) .......................... 613
76. Ringed Woodpeckers (*Celeus torquatus*) .......................... 614
77. Three woodpeckers of the *Dryocopus pileatus* superspecies ........................................ 615
78. White-bellied and Black woodpeckers (*Dryocopus javensis, D. martius*) ......................... 616
79. Powerful and Crimson-bellied woodpeckers (*Campephilus pollens, C. haematogaster*) ........ 617
80. Red-necked and Robust woodpeckers (*Campephilus rubricollis, C. robustus*) ................. 618
81. Three species of the *Campephilus melanoleucos* superspecies .......................................... 619
82. Cream-backed and Magellanic woodpeckers (*Campephilus leucopogon, C. magellanicus*) ...... 620
83. Ivory-billed Woodpecker (*Campephilus principalis*) .......................................................... 621
84. Imperial Woodpecker (*Campephilus imperialis*) ............................................................... 622
85. Three species of Asian green woodpeckers ............................................................................ 623
86. Two species of the *Picus mentalis* superspecies ................................................................. 624
87. Laced and Streak-throated woodpeckers (*Picus vittatus, P. xanthopygaecus*) .................... 625
88. Three Eurasian green woodpeckers ....................................................................................... 626
89. Red-collared and Black-headed woodpeckers (*Picus rabieri, P. erythropygaecus*) .............. 627
90. Gray-faced Woodpecker (*Picus canus*) .................................................................................. 628
91. Olive-backed and Lesser Flame-backed woodpeckers (*Dinopium rafflesii, D. benghalense*) 629
92. Two species of the *Dinopium javanense* superspecies ......................................................... 630
93. Greater Flame-backed and Black-rumped woodpeckers (*Chrysocolaptes lucidus, C. festivus*) 631
94. Other subspecies of Greater Flame-backed Woodpecker ...................................................... 632
95. Bamboo Woodpecker (*Gecinulus grantia*) ........................................................................... 633
96. Okinawan Woodpecker (*Sapheopipo noguchii*) ................................................................. 634
97. Maroon and Bay woodpeckers (*Blythipicus rubiginosus, B. pyrrhotis*) ............................. 635
98. Orange-backed Woodpecker (*Reinwardtippicus validus*) ..................................................... 636
99. The three species of *Meiglyptes* .......................................................................................... 637
100. The two species of *Hemicircus* ......................................................................................... 638
101. The three species of *Mulleripicus* ..................................................................................... 639
ACKNOWLEDGMENTS

I am especially grateful to the officials of the American Museum of Natural History, particularly Director Thomas Nicholson, ex-President Gardner D. Stout, and President Robert Goelet, and to all of my colleagues there for their support and for providing a virtually ideal situation in which research can thrive. The chairman of the Department of Ornithology, first Dean Amadon, then Wesley E. Lanyon, my colleagues and friends, were fully supportive and encouraged me in every facet of my woodpecker studies and in my efforts to produce this book. Walter J. Bock has helped and stimulated me through many discussions, and the classification used herein is that worked out with him over the past 15 years, with some recent modifications of mine at the species level.

John E. duPont appeared at my office one day several years ago, inquired about my work on the book, then surprised me with an offer to sponsor it through the Delaware Museum of Natural History. His characteristic “let’s get going” attitude and his unstinting support have made this book possible. John offered me the services of his artist, George Sandström, to produce the 101 paintings depicted in the book. Not only is he a fine artist, but working with George has been a pleasure. Far from discouraging criticism, he openly welcomed all my comments and suggestions; the results may be judged by the reader — I am more than satisfied! Marianna Neighbour and Mae Lackner typed several drafts of the manuscript, ever cheerfully and quickly.

Much of the thrust of the book relates to new information I acquired in the field on five continents. These investigations, so vital, were successful through the efforts of friends, colleagues and officials in a dozen countries. I cannot mention them all, but I would be remiss if I did not express my thanks in this way to my field assistants and companions, Richard S. Crossin and John J. Morony, Jr., and to D. R. Wells, B. Biswas, A. Kemp, H. Winkler, D. Blume, J. F. M. Horne, G. R. Cunningham-van Someren, J. T. Marshall, Jr., C. Olrog, and D. Goodwin. My colleagues at the American Museum of Natural History assisted me in many ways, such as suggesting places to seek certain species, providing tape-recordings, and establishing contacts; I thank Mary LeCroy, Ben King, G. Stuart Keith, James C. Greenway, Jr., Eugene Eisenmann, John Farrand, Jr., Jean Delacour, John Bull, and David Ewert for their help.


The curators and assistants at the many museums visited were most hospitable and helpful; I especially thank D. Snow, I. Galbraith, and D. Goodwin for assistance at the British Museum (Natural History), where I conducted lengthy studies. Landowners, managers, villagers, and other local persons were of course enormously helpful, and I regret that I cannot cite them individually.
Finally, the financial support of various institutions, agencies, and individuals enabled me to conduct field and museum studies away from New York, studies responsible for much of the content herein. I am grateful for such assistance from the United States National Science Foundation, the Frank M. Chapman Memorial Fund, the Leonard C. Sanford Fund, the National Geographic Society, R. Goelet, the International Council for Bird Preservation, the Council of the Scientific Staff of the American Museum of Natural History, the Edward John Noble Foundation, and the American Philosophical Society.
FOREWORD

The woodpeckers, numbering about 200 species and found on all the major land masses except Australia, are a prominent and conspicuous family of birds both to the ornithologist and to the general public. Over the entire North Temperate region, woodpeckers, with a few exceptions, are among the very few small birds that are entirely nonmigratory. The woodman or sportsman, braving the snow and cold of midwinter, hears the staccato calls of woodpeckers and is cheered by them.

As the name implies, most woodpeckers find their food by pecking and digging in wood to expose grubs and ants. Gradually, one supposes, as their beak and skull became adapted over the ages to this way of life, they began first to enlarge and then to excavate the tree burrows or cavities in which they nest — and roost. That some woodpeckers can construct a deep cavity in the hard wood of a living tree, one with an entrance as round as though outlined with a compass, is quite as remarkable as the ability of primitive man to fell trees with a stone axe! These cavities are at a premium; and woodpeckers must often contest possession with small owls, starlings, and squirrels that would appropriate them.

Pessimists sometimes prophesy that insects in general and ants in particular will eventually overrun this planet. Woodpeckers may prove to be man’s best ally in forestalling such a grim fate. They are among the few birds that relish ants and consume large quantities of them, disregarding the formic acid that these insects secrete. The woodpecker’s tongue is extremely long and extensible — well adapted for probing the cells of an ant nest.

Woodpeckers are thus of more than usual interest and significance to the scientist, to the wildlife ecologist, and to the general public. It is not surprising that a number of studies have considered one or another of the species of the family Picidae or that anatomists have investigated the modifications of their skull for withstanding service as a virtual jackhammer. But most of this research has been in the northern hemisphere; the rich and varied woodpecker fauna of tropical America and southeastern Asia has been neglected. Into this void stepped Dr. Lester L. Short, whose fascination with this group began as a graduate student at Cornell University, where he investigated the genetic interactions of eastern and western populations of the woodpecker known as the Flicker. He extended these studies to cover the general biology and morphology of other North American woodpeckers. After joining the staff of the American Museum of Natural History in 1966 and finding at his disposal an unrivaled collection of the woodpeckers of the world, Dr. Short was in a position to launch a worldwide study of these birds. His field work has taken him over much of South America, Africa, India, and southeastern Asia, even to distant Okinawa, where lives a woodpecker threatened with extinction. Thwarted only in an attempt to visit Cuba some years ago, he has seen in life all but one of the genera of woodpeckers, and most of the species. He has published no fewer than 45 preliminary scientific papers, some of book length, before and during the 15 years this project has required.

At this juncture Dr. John Eleuthère duPont, founder and president of the Delaware Museum of Natural History, impressed by Short’s efforts, offered to publish the resulting monograph and, what is more important in this age of escalating costs, to provide an artist and to ensure sufficient plates, eventually 101 in number, to portray all of the species in
their natural colors. The success of artist George Sandström’s labors will be evident to anyone who leafs through the plates. They permit an efficient comparison of woodpeckers, particularly of closely related species, often grouped on the same or in adjacent plates, from all quarters of the globe; they are an integral part of this treatise.

With such an admirable juxtaposition of scientist, publisher, and artist, this volume will at once become the definitive work on this family of birds. Details may and will be added, but Dr. Short’s treatise will remain the standard reference for many decades.

Dean Amadon
22 June 1979
Part One

Biology of the Woodpeckers: Family Picidae
INTRODUCTION

I have been investigating facets of the biology of woodpeckers (avian family Picidae) for more than 20 years, and this book, a semitechnical "handbook" of woodpeckers of the world, is the culmination of my research efforts. Woodpeckers, numbering some 198 species, are a colorful, interesting, and conspicuous element of the avifauna of all continents but Australia and Antarctica. I have been fortunate in being able to study in the wild on five continents 138 species representing 26 of the 27 woodpecker genera (Xiphiidiopicus of Cuba yet eludes me). This family has been treated on a worldwide basis only once previously, by Malherbe in his 1861–1862, four-volume folio Monographie des Picidées, lavishly published in a small number of sets and now rarely available at some $12,000 to $15,000. The present volume treats all of the world's woodpeckers, and all are illustrated in color. Emphasis is placed particularly upon behavior and taxonomy. The book is based upon my own researches, coupled with an attempt to summarize from the literature the significant information on all aspects of woodpeckers.

Woodpeckers are of great interest because of their unusual habits, including their excavating in trees for food and their unique drumming. My own interest in them stems from their representing a microcosm of the entire Class of birds (Aves). For, just as birds acquired certain specializations that enabled them to radiate (i.e., to evolve diverse groups of genera and species), so woodpeckers, through the array of specializations that evolved relating to their woodpecking endeavors, have radiated and spread. They now occupy not only a variety of forests and woodlands, but savannas, desert scrub, and even treeless grasslands. Perusal of the plates and of the sections on habits of various woodpeckers will give the reader some appreciation for the remarkably diverse adaptations of these highly specialized birds.

For each species I have provided these headings: a Range Summary in several words; Diagnostic Features, including comparison with closely similar species; a Description, in considerable detail, taking into account geographical and individual variation and emphasizing sexual features; Distribution and Habitat, in as much detail as information and space would permit; Behavior, or, for most species, a more complex breakdown into such headings as Comfort Movements, Foraging Habits, Voice, Displays, Interspecific Interactions, Breeding, Roosting, and Migration; Taxonomy (relationships of species and systematics of subspecies); and specific References (these and other references cited are listed in the terminal References). Because of the number of species and plates included, concentration has of necessity been on the species accounts. Space has been minimal for a general discussion aspects of woodpecker biology, and I have but briefly sketched certain major facets in this introductory chapter. I hope to prepare a treatise covering these topics in greater detail at a later time.

It is my fervent desire to stimulate additional research on woodpeckers. The reader perusing the species accounts will rapidly note the species for which information is sparse (see, e.g., many species of Picumnus). The disappearance of vast areas of forest, plus other human-induced factors, is taking a grim toll among the world's avifauna. Species such as the magnificent Mexican Imperial Woodpecker may be gone today; the Ivory-billed Woodpecker hangs on by a fine thread in Cuba. The Okinawan Woodpecker numbers no more than a hundred or so individuals. The Helmeted Woodpecker has not been reported in South America in
nearly 20 years. Some of the sparseness of detail, thus, is accounted for by the rarity of some species. Any stimulation this book may provide to others who may add to our knowledge of woodpeckers, and thus contribute to their preservation, will be full compensation for my efforts in producing it. Notwithstanding that such knowledge will be beneficial, it must be noted that the often needless destruction of forests is the main threat to woodpeckers and to most animals that are rare or inhabit a limited range. To the extent that we thoughtlessly let this destruction continue, we will deserve damnation down through the ages to come, if there will be humans in existence.

TERMINOLOGY

Some terms used in the text may not be familiar to all readers, and they are defined or explained here.

FEATHERS

On the bird itself, the wings contain several kinds of feathers that propel the bird in flight, being those feathers reaching the rear margin of the feathered wing. Collectively these feathers are called "flight feathers" and are composed of well-defined types: the primaries, of which there are 10 in woodpeckers, numbered from the innermost (number 1) to the foreshortened outermost (number 10); 10 to 13 secondaries, numbered from the outermost to the innermost; and the secondaries, a variable number close to the base of the wing. The primaries attach to the "hand" or manus at the end of the wing, the secondaries attach to the wrist and the ulna bone of the wing (on the ulna of woodpeckers the attachment points are raised, giving this bone a unique appearance), and the secondaries attach about the elbow region. The long tail feathers used in flight are called rectrices. There are eight of these in Sasia africana, but typically there are 12, with the outer pair much reduced and often differing in color pattern from other rectrices (Sasia abnormis, S. ochracea, and Campephilus pollens have 10 rectrices).

EXTERNAL PARTS

Parts of the external bird are labeled in virtually all ornithology textbooks and in the common field guides. Two commonly used terms in woodpeckers are the malar patch, or "moustache" area leading backward from the lower bill, and the nuchal or nape patch, a discrete area often distinctly set forth in pattern, behind the hindcrown. The lores are located in front of the eyes, between them and the bill. The superciliary refers to a line, often distinctly marked, over the eye and ear coverts. The nasal tufts are the often-erectile feathers that are at the inner base of the upper bill and cover the nostrils in most woodpeckers.

MEASUREMENTS

Measurements used in the text are as follows: (a) wing length is the chord of the folded wing from the wrist joint (which is the most anterior point of the folded wing) to the tip of the longest flight feather; (b) tail length is measured from the skin base of the two central feathers to the tip of the longest tail feather; and (c) bill length is the straight line distance from the exposed skin base of the culmen (the culmen is the line or ridge along the top of the bill; hence, this measurement is called the exposed culmen of the bill) or the length of the gonys (the ridge extending from the juncture of the two halves or rami of the lower bill to its tip on the ventral margin of the bill) or the length from the nostril (from anterior end
of nostril slit to tip of bill). All measurements are in metric units, usually millimeters (10 millimeters form a centimeter, and 25.4 millimeters or 2.54 centimeters equal 1 inch). Weights are usually in grams, 28 of which equal an ounce.

**TAXONOMIC TERMS**

Some taxonomic terms are used frequently. *Taxon* is a purposely indefinite word, like a pronoun, that depends for its meaning on the context in which it is used. A taxon is a taxonomic unit of any kind that merits a scientific name or designation, i.e., anything from a subspecies to species, genus, family, etc. In context its meaning is clear; it can be used as a synonym for the groups being discussed, such as subspecies, to avoid endless repetition of "subspecies", or it can be purposely vague as to whether a species or subspecies is involved when there is uncertainty as to which category it represents. Monotypic, always referring to the next category below that of its noun, means that there is but one of that unit within the category represented by the modified noun. For example, a monotypic genus implies that only one species is recognized in that genus (however, at the lowest level, that of species, it means literally that there is only one taxonomically recognized form within the species; hence, there are *no* subspecies). Polytypic usually is employed only with species and indicates that there are two or more subspecies within the species so modified. A superspecies is a group of two or more species that are very closely related (nearest relatives), usually occupy allopatric (separate) ranges, and may hybridize to some degree if their ranges should meet (see Amadon, 1966). The species of a superspecies are termed allospecies. Parapatric species are allopatric, but their borders meet; i.e., there is contact between them. Sympatric and sympatry refer to the occurrence together in the same habitat of two (or more) species. Subspecies groups (also called megasubspecies; see Amadon and Short, 1976) are clusters of subspecies (or possibly a single subspecies) that form an entity so distinct within a species as to approach the level of being a species in their own right, but on various grounds are judged not to have achieved that level.

**BEHAVIOR**

Behavioral terms are used in the sense of the ethological school of animal behavior. Agonistic behavior is aggressive behavior in the sense that the animal shows simultaneously the tendency to attack or threaten and the tendency to flee or escape, although other tendencies, e.g., to approach for breeding, etc., may be present as well. A display is a genetically based, usually stereotyped posture or movement, or combination of these (in a broad sense vocalizations too are displays and often are combined with visual aspects into a single display complex) that serves to communicate a message about an animal's state, intent, or motivation. These concepts are not fully understood, yet they have great heuristic value in the interpretation of a bird's behavior.

**SIZE**

Finally, there is a special set of adjectives used in the section on diagnostic features to characterize the size of each species. These adjectives are capitalized, and they refer to size as indicated by weight, namely: Tiny, up to 15 grams; Little, 16 to 45 grams; Small, 46 to 95 grams; Medium, 96 to 175 grams; Large, 176 to 275 grams; and Very Large, over 275 grams.
ENGLISH NAMES

In regard to the English names used herein, I tried to employ the standard, well-used names as much as possible. Where changes were deemed necessary, I followed the precepts of such concerned persons as E. Eisenmann, B. King, and K. Parkes, keeping the names as short as possible and favoring names that are descriptive (of the bird, its habits, or distribution) over those that are less meaningful. The major aim of my approach was to give each species a name unique on a worldwide basis. Some established names have been modified. The Wryneck is here the Northern Wryneck, distinguishing it from its southern (African) relative. The Gray-headed Woodpecker, a very widespread and variable species, is here called the Gray-faced Woodpecker, for only the sides of the head are gray or grayish in all races. I use Northern Flicker rather than Common Flicker for *Colaptes auratus*—other flickers, e.g., the Campo Flicker, are as common, whereas “Northern” conveys the idea of the northern distribution of *auratus*, the only North American flicker outside Cuba. The very widely used Old World name of the Three-toed Woodpecker (*Picoides tridactylus*) is used for the species usually called the Northern Three-toed Woodpecker in North America. The “Arctic Three-toed Woodpecker” (*P. arcticus*) of North America, not Arctic anyway, is here the Black-backed Woodpecker. The “three-toed” designation is unnecessary, there are other three-toed woodpeckers without such designation, and “Black-backed” has been used in the literature. As a final example, some have called the species resulting from merger of the *arizonae* and *stricklandi* groups of *Picoides stricklandi* the Brown-backed Woodpecker, but this name has long usage in the Old World literature for the African *Picoides obsoletus*; I use Strickland’s Woodpecker for *stricklandi*. 
Woodpeckers form one of several families in the avian order Piciformes. This order is characterized by its zygodactyl toe arrangement (two toes facing forward, two backward), special arrangements of the toe tendons and leg muscles, lack of basipterygoid processes in the skull, syrinx with one pair of tracheobronchial muscles, presence of 14 cervical vertebrae, lack of down feathers in adults, hole-nesting habits, and the laying of white eggs (see, e.g., van Tyne and Berger, 1976). There are two suborders of Piciformes. One contains the jacamars (Galbulidae) and puffbirds (Bucconidae), New World groups about whose relations with the remaining Piciformes there is today much question. The other suborder, the Pici, differs from the jacamar-puffbird group in many ways (e.g., single, left carotid artery; lack of caeca and hypocleidium; presence of an oil gland in most species; having a long gall bladder, etc.).

Within the suborder Pici I consider all families rather closely related, and I do not treat superfamilies. The families are the barbets (Capitonidae), their specialized derivatives the toucans (Ramphastidae) and honey-guides (Indicatoridae), and the woodpeckers (Picidae). The barbets occur in the tropics of Asia, Africa, and South America and generally are brightly patterned species with a deep and often broad bill, pointed at the tip. They feed on fruits to a great degree, although some are at times insectivorous and others may be rather omnivorous. The toucans occur only in the New World tropics and have enlarged, hornbill-like bills used in fruit eating. The several species of honey-guides are found in Africa and Asia and are remarkable in that they are brood parasites (i.e., lay their eggs in other birds' nests for foster parents to rear them), and they feed on beeswax and honey, some species "guiding" large mammals, including man, to honey sources to expose these for the birds.

The woodpeckers differ from the barbets and their relatives in their straight and often chisel-tipped bill; pelvic muscle arrangement; bifurcate manubrium of the sternum; presence of (weak) transpalatine processes of the skull; unusually long, hard-tipped and extensible tongue; thicker bony skull; and in many other ways, including their tree-foraging habits and drumming signals. There are three subfamilies of the Picidae, namely the Jynginae (two species of wrynecks), the Picumninae (27 species of piculets), and the Picinae (169 species of true woodpeckers). The wrynecks occur only in the Old World (Eurasia and Africa); the piculets are found in tropical Asia, Africa, and, mainly, in the American tropics; and woodpeckers are found in Eurasia, Africa, and throughout the wooded parts of the Americas. The wrynecks have been considered by some as a separate family on the bases of their unspecialized, pointed bill; smooth tongue bearing no bars; soft-textured plumage and distinctive nightjarlike plumage pattern; and some other features. They do not excavate their own holes, as do piculets and woodpeckers, but nest in natural cavities. Although they are undoubtedly distinctive, I believe that wrynecks shared an ancestor in common with woodpeckers and piculets, and thus I see nothing to be gained from separating them as a family. The piculets are of small size and their tail feathers are soft and not used in climbing, but their behavior, including drumming, is very woodpeckerlike and to my knowledge no one has questioned their inclusion in the Picidae.
The true woodpeckers, Picinae, are larger than the piculets. The tail is somewhat to strongly modified by hardening of the shafts (rachis) and even the feather vanes (barbs), and it is appressed against the bark during progression and other activities (e.g., drumming). The tarsal sheath has a different structure, and there are other minor differences from piculets and wrynecks. The family Picidae has a fossil history dating back only to the Pliocene of North America and the Pleistocene of North America and Eurasia (Brodkorb, 1971); they are apt to prove at least somewhat older than Pliocene when more fossils have been unearthed.

Thus, a woodpecker is a zygodactylous, hole-nesting bird with a rather straight, often chisel-tipped bill and a long, extensible tongue. The young are born blind and naked after a short incubation period. Except for one or two species, they are closely associated with arboreal vegetation of some sort.

A few words might be said about the size of woodpeckers. They range in weight from about 7 grams in the smallest piculets (e.g., Picumnus squamulatus, P. aurifrons probably, and Sasia abnormis) possibly to about 700 grams (i.e., over 1½ pounds, but the greatest weight actually recorded for any species is 563 grams for a Mulleripicus pulverulentus) in Campephilus imperialis. In wing length the range extends from 44 millimeters in Picumnus aurifrons to 313 millimeters in Campephilus imperialis, which may reach nearly 2 feet in length. For those who might be interested, the largest woodpeckers are in the following order: (1) Largest by far is the Mexican Imperial ivorybill (Campephilus imperialis) of unknown weight but certainly attaining a pound and a half. (2) Unquestionably second is the bulky southeastern Asian Great Slaty Woodpecker (Mulleripicus pulverulentus), reaching 563 grams. (3) Third probably is the North American Ivory-billed Woodpecker (Campephilus principalis), one of which was reported to weigh a pound (448 grams). (4) Fourth, at 285 to 378 grams and perhaps weighing as much as the Ivorybill in far northern areas, is the Black Woodpecker (Dryocopus martius) of Eurasia. (5) Fifth is the Magellanic Woodpecker (Campephilus magellanicus) of southern South America, at 276 to 363 grams. (6) Sixth, and possibly attaining the same size as large Black Woodpeckers, is the White-bellied Woodpecker (Dryocopus javensis) of eastern and southern Asia, at 156 to 347 grams (this species varies greatly in size geographically, and in Korea it is the same size as the Black Woodpecker, but we have weights from there for neither). (7) Seventh, at 240 to 341 grams, is the Pileated Woodpecker (Dryocopus pileatus) of North America.

COLOR PATTERNS

Woodpeckers exhibit marked patterning of plumage coloration and diverse combinations of color. Patterns may be obscure but usually are complicated, with discrete elements, especially about the head (see sections on behavior and sexual dichromatism). In the course of picid evolution, patterns of sexual dichromatism frequently seem to have been modified to become species recognition features (e.g., the malar patch in Picus). Complex patterns with many possible variations may facilitate individual recognition. Despite the many plumage patterns found in the family, particular groups of patterns are restricted to certain groups. Indeed, the very complexity of picid plumage patterns makes them useful in determining phylogeny, for convergence in details of these patterns appears highly unlikely (Short, 1976). As a corollary of this view, markedly similar patterns are presumed to indicate relationship; they occur through lack of divergence, or parallelism, and not by convergent evolution.
The concentration of plumage patterning involving species and sexual differences about the head is related to the behavior of woodpeckers. Most picids "hug" the bark quietly when danger threatens; hence the upperparts generally are barred or colored so as to enhance concealment appropriate to the nature of their habitat (forested vs. open country). The head is faced toward the tree, and head markings are inconspicuous in such circumstances. During displays and encounters, the head (and crest) markings become prominent and function behaviorally in various ways. Concealed patterns of the rump and wings, and the underwings and undertail surfaces, also normally inconspicuous, are visible in displays or flight.

Parallelism in plumage patterns is one remarkable feature of the Picidae. An explanation for this parallelism lies in "social mimicry" (Moynihan, 1968; Cody, 1969). Sympatric species representing closely related genera may come to resemble each other or, more likely, retain features of their common ancestor. In most cases these situations involve similarly sized species, one representing a genus of more specialized "excavators" and the other a genus of generalized tree-surface foragers. This particularly is prevalent in Asia (Short, 1973b). Tanner (1942) demonstrated that the specialized Campephilus principalis and less specialized but related Dryocopus pileatus employ similar foraging techniques, but they emphasize opposite extremes of the foraging spectrum. During the breeding period, any or all foraging methods might be used to secure food in relative proximity to the nest site, unless some special foraging mode is distinctly advantageous. Thus, two species of woodpeckers similar in size might severely compete if they nested in proximity to each other. The parallel evolution of similar patterns would be favored by selection if the species occupied mutually exclusive territories. Thus, an intruder of the "look-alike" species would be treated by an individual of the other species as if it were conspecific, at least when it is sufficiently near to be visually recognizable.

Such parallelism is possible when the species involved are so closely related as to enable the parallelism, yet are sufficiently distantly related as to preclude interspecific hybridization. Thus, species representing distinct but related genera tend to fulfill these requirements. Even within a genus, species representing different groups may show such parallelism, as seen in the Hairy and Downy woodpeckers (Picoides villosus and P. pubescens, respectively). By and large, the known situations agree with this hypothesis. That is, congeneric species are either markedly different in plumage pattern or they are allopatric, while the intergeneric "mimetic" species are sympatric and resemble each other rather closely. Known or suspected situations of this type involve these pairs of genera: Meiglyptes-Hemicircus, Dryocopus-Campephilus, and Dinopium-Chrysocolaptes.

Patterns of various types often show some reduction and modification, but they usually seem to retain some of their characteristics. However, a group showing a certain pattern, say a malar stripe, is more apt to contain species lacking such a mark than to contain species in which the pattern or marking is entirely replaced by some nonassociated pattern; e.g., a malar stripe is not apt to be replaced by a submalar stripe or a forecrown patch. On the other hand, simple patterns on the body plumage are highly modifiable, as in the case of barring, streaking, and spotting of the underparts. These may grade into each other, even within the same species (see Picumnus cirratus and Colaptes melanchloros). Likewise, a pattern of dorsal barring may become obsolete, leaving a large patch (e.g., Celeus flavus); or the barring may be obscured by brown, black, green, or red coloration. The last two colors appear in the body plumage of some groups but are totally lacking in others. A red (rarely yellow) abdominal patch marks most of the genus Dendroicos, part of Picoides, Geocolaptes, and most species of the melanerpine assemblage. Other groups exhibit some red ventrally, but it
is not pronounced on the abdomen. Although green coloration might be thought to occur
because of convergence in various tropical genera, it is notably lacking in tropical forms of
the melanerpine group (found only in the West Indian Melanerpes striatus, to a degree in M.
radiolatus, and in Xiphiidiopicus percuttus).

The campetharine and colaprine assemblages exhibit a pattern of yellow (rarely reddish)
shaft color that seems to have been lost in most groups of woodpeckers. This feature unites
all African woodpeckers (except Picoides obsoletus and Sasia africana), and traces of it are
found in a few primitive species of the related genus Picoides (P. maculatus, P. temminckii).
In the New World it is shared by all species of Colaptes, some species of Piculus, and Venili-
ornis dignus. It is lacking in other woodpeckers and in the Capitonidae.

Mention should be made of the unique, caprimulgiformlike plumage patterns of wry-
necks (Jynx spp.). The two extant species are very closely related and they probably exhibit
a specialized (derived) pattern. This is suggested by indications of more normal barring in
their juvenile plumages. Another unique pattern is the three-striped tail markings of piculets
of the genus Picumnus, unlike those of any other picids, and of uncertain function.

Atypical patterns for the family are those found in the melanerpine group. These wood-
peckers exhibit wholly different facial patterns, iridescence, large bare skin areas, pink
coloration (Melanerpes lewis), peculiar marking of the central rectrices, and other features
that make them the most distinctive picine group. Some of these patterns resemble those of
the Capitonidae.

Patterns assumed to be primitive (i.e., characteristic of ancestral picids) in the Picidae
include the following: crown spotting, ventral barring and spotting, yellow shaft color,
presence of malar stripes, crown and forehead patches, and perhaps green dorsally. Many of
these have been lost in more specialized picids, although they sometimes have reappeared
secondarily. The general resemblance among the African campetharine and New World
colaprine woodpeckers (compare, e.g., Campethera with Piculus and Colaptes, and Dendro-
picos with both Veniliornis and Picoides) is thought to be the result of their close relation-
ship, rather than of convergence. It is noteworthy that Southeast Asian picids do not con-
verge in pattern upon African and New World forms, hence tropical habitats per se
have not resulted in convergence of tropical woodpeckers. The plumage resemblance of
“Micropterus” brachyurus to New World species of Celeus likewise is the result of the close
congeneric relationship of these woodpeckers. The plumage patterns of Sapheopipo noguchii
are typical of the tribe Picini and differ greatly from plumages of species of Picoides; its
relationships are with the former group, not with Picoides as Goodwin (1968) has suggested.

Some genera of woodpeckers, notably Celeus, are very uniform in plumage patterns;
whereas others, such as Melanerpes, have very diverse patterns. Even in the latter cases, how-
ever, certain elements of the pattern are sufficiently stable (e.g., the white-marked central
tail feathers in Melanerpes) to enable us to evaluate relationships. In such instances juvenile
plumage patterns (see later section) may provide useful clues.

It is fortunate for the taxonomist that such a structurally uniform group as the Picidae
exhibits diverse patterning of the plumage and so many discrete elements of patterns, for
these can be employed successfully in evaluating woodpecker relationships. This is not to say
that anatomy and other characters ultimately will not prove important, but only that the
state of our knowledge concerning them at present does not allow a full appreciation of
problems of their convergence, divergence, and parallelism; also, functional studies of such
characters simply are lacking.
SEXUAL DICHROMATISM
AND OTHER FORMS OF SEXUAL DIMORPHISM

Most woodpeckers are sexually dichromatic. Patterns of sexual dichromatism tend to be
persistent in this group, functioning behaviorally, of course, and affording a taxonomically
useful character complex. Noble (1936) demonstrated clearly the role of the presence (male)
or absence (female) of the malar stripe in sexual recognition in flickers (Colaptes auratus).
Related to this function and perhaps more important from an evolutionary standpoint is the
sexual orientation of agonistic behavior relating to territorial behavior in woodpeckers.
Agonistic encounters between individuals usually involve members of the same sex, and
males are dominant over females at all seasons (except in breeding season in some species) in
some, if not all species (Kilham, 1965; Lawrence, 1967; Short, 1971f). Thus, sexual recogni-
tion in woodpeckers is a trenchant factor involved intricately in their social behavior
throughout the year and not, as in many birds, simply effective only at the time of pair
formation. The importance of sexual dichromatism to woodpecker behavior undoubtedly is
enhanced by the largely sedentary habits of the great majority of picids. It is probably sig-
nificant also that not only the pattern specifically effecting sexual recognition but the entire
head pattern of most woodpeckers is complex. The diverse markings of the face and entire
head, combined with the sexual recognition feature, appear to facilitate individual identifi-
cation. This may in turn serve to lessen the frequency or intensity of chance agonistic en-
counters between individual woodpeckers with a history of knowledge of one another,
important in these sedentary and highly territorial birds.

The most widespread patterns of sexual dichromatism in the Picidae involve the malar
stripe (“moustache”) and the crown patch (including forehead, midcrown, and nape or
nuchal patch). Sexual differences involving one or the other, or occasionally both of these
features, are common to many diverse woodpeckers; both are found in primitive as well as
more advanced species.

Among the less specialized woodpeckers of the colaprine, campetherine, meiglyptine,
and picine assemblages, the use of the malar stripe in sexual recognition is almost universal.
In species of these groups males have a partial, complete, or even expanded malar stripe
colored black, black and red, or red; females lack a malar or have a malar stripe of another
color (e.g., black when male’s is red, or streaked or spotted when that of the male is black,
etc.). Sexual dichromatism involving a crown patch or nuchal patch is also found in certain
of the genera of generalized woodpeckers, e.g., Campethera, Piculus, Celeus, and Picus.
A basic pattern shared by some of these with the Picumninae and some Capitonidae is the
occurrence in males of a partial or complete red crown patch that is lacking in females; the
latter may have simply black or otherwise unmarked crowns, but often they possess white
crown spots. Frequently, similar spots underlie the red of the male’s crown, or the red patch
of the male is reduced anteriorly such that the forehead and forecrown are spotted like the
entire crown of the female. Among the Piciniae this pattern or one derived therefrom is
found in some species of Campetitena among the generalized woodpeckers, while it also
appears in more specialized woodpeckers of the genera Dendropicos, Picoides, Veniliomis,
Hemicircus and, in modified form, in Dinopium and Chrysocolaptes. In the first three of
these six specialized genera it may represent an unmodified condition inherited from ances-
tral woodpeckers. The crown spot pattern of sexual dichromatism appears to have evolved
secondarily in Hemicircus (the related Mulleripicus exhibits a peculiar head spotting not
differing between the sexes) and in Dinopium and its derivative Chrysocolaptes.
The evolution of sexual dichromatism in woodpeckers has involved: (1) the reduction, or even elimination of a pattern, especially in highly social species; (2) the separation of a pattern into two or three separate derivative patterns; (3) a shift from one type of pattern to a new unique pattern or to some ancestral pattern evolved secondarily; (4) the expansion of a pattern; and (5) the compounding of patterns, with a newly evolved (primary or secondary) pattern or patterns added to the original pattern. The evolution of sexual dichromatism largely has proceeded from the two basic patterns already introduced, namely from the malar stripe pattern and the crown patch pattern.

Reduction in the pattern of sexual dichromatism has occurred in several groups, notably in the melanerpine assemblage and among species of Colaptes. The sexes are alike in color because of a reduction of pattern in Melanerpes lewis among the melanerpine group. They appear to have lost crown or other pattern features by which sexual recognition was achieved in their ancestors. It is noteworthy that melanerpine woodpeckers are among the most social of the Picidae. Their sociality extends to communal roosting (Skutch, 1943, 1948). Such intimate, year-round social behavior undoubtedly facilitates individual recognition and reduces the need for sexual recognition as such. Among flickers (Colaptes) there is a reduction of the malar stripe in males of C. fernandinae, C. rupicola and C. pitius, although sufficient evidence of the pattern remains to enable the observer to discriminate the sexes at very close range. These species also are moderately to strongly (C. rupicola) social.

Separation of a pattern into several related patterns is best exemplified by the evolution of Picoides from Dendropicos. Species of Dendropicos exhibit sexual dichromatism with regard to the crown patch. Males may have a full or reduced (nape or nuchal) red or rarely yellow patch which is absent (replaced by other colors, typically the normal color of the upperparts but occasionally by black or by spotting) in females. Picoides exhibits similar variation, but the red of the male’s crown usually is restricted to patches (e.g., only the crown-forehead or crown or nuchal area). In three species (P. canicapillus, P. borealis, P. lignarius) the red nuchal patch is further restricted to form only a red mark at each side (in males, lacking in females). In some species (e.g., P. nuttallii, P. scalaris) there is a tendency toward the spotted crown condition found in Campethera, but not Dendropicos. One species, P. medius, essentially has lost its sexual dichromatism; males tend to have a slightly brighter red, and more extensive patch, but females are closely similar. The great variation in Picoides probably reflects active speciation occurring currently within this widespread group and selection favoring divergent sexual markings functioning to limit hybridization (see, e.g., Short, 1971f, regarding P. nuttallii and P. scalaris). Nevertheless, this variation involves but one basic pattern, which has been fractionated to result in a diversity of patterns of sexual dichromatism.

Shifts in patterns of sexual dichromatism have occurred frequently, especially when two or more patterns occur together. For example, in the viridis group of Picus, P. rabieri exhibits sexual differences in crown color and malar color; P. viridis has the crown colored similarly in both sexes, but the malar stripes are different. The subspecies vaillantii of P. viridis, vocally and behaviorally like that species, has malar stripes identical in the sexes but differs in crown color, being red in males. The closely related P. canus has the malar stripes reduced and identical in both sexes, but the crown is red only in the male. The evolution of a crest has resulted in a change in patterns of sexual dichromatism in the Picus-Dinopium assemblage. The ancestors of Picus resembling Celeus probably were crested and a few less specialized species of Picus (miniaceus, puniceus) are crested, but the crest is not utilized as a feature of sexual dimorphism in either genus. The considerable development of the crest in Dinopium
and *Chrysocolaptes*, while not involved in sexual dichromatism, has been accompanied by a radical shift in the pattern of this sexual dichromatism. The malar stripe has diminished in importance in these two genera, an ancient pattern (see Picumninae) of female crown spotting has reappeared, a new and conspicuous crown-crest pattern (red versus gold) has evolved, and the crown pattern of *Picus* is modified to accentuate the nuchal (= crest area) in various species of *Dinopium* and *Chrysocolaptes*.

The expansion of a pattern has occurred many times. In *Mulleripicus* the red of the malar stripe has expanded in two species (*junebris, fulvus*) to include the orleal area and facial area in general (in males). Various species of *Celeus* have the red of the malar stripe similarly expanded, especially into the subocular region; one species (*brachyurus*) evolved a new pattern by loss of the red in the malar stripe following its extension into the subocular region, so that males differ from females only in possession of a red subocular patch.

There are many instances of compound patterns of sexual dichromatism, some of these involving what might be termed a “super extension” of coloration, as when the red of the malar stripe or face extends over the greater part of the head (*Campephilus* spp.). Perhaps the extreme of such an extension is found in *Reinwardtipicus validus*, males of which have red to gold from the head extending over much of the upperparts and underparts; females lack this coloration. The most complicated array of patterns of sexual dichromatism occurs in *Campephilus*. Short (1970c) has discussed the evolution of red head patches, all-red heads, and the various crests in this genus. Accentuation of the female’s crest in some species of that group has led to the male possessing a longer (black) crest than the male and to the interesting occurrence of the female pattern of certain species in males of another species, and vice versa.

Sexual dichromatism is lacking among woodpeckers in *Jynx* (both species), *Melanerpes erythrocephalus, M. herminieri, M. lewis, Sphyrapicus ruber, S. nuchalis* (essentially sexually monochromatic), and *Picoides medius* (essentially sexually monochromatic). The evolution of the wrynecks (*Jynx*) is so little known that the manner of attaining its sexual monochromatism is uncertain. Two of the other species (*Melanerpes herminieri* and *M. lewis*) have apparently lost their crown patch (or other) ancestral pattern of sexual dichromatism, as noted above. The other three melanerpine species (*M. erythrocephalus* and the two species of *Sphyrapicus*) are sexually monochromatic by virtue of an extension of the red of the crown (and throat) of their presumed ancestors to obscure or nearly obscure their head patterns. Both sexes in these species have completely red or almost completely red (*S. nuchalis*) heads. Both sexes of *Picoides medius* have a red crown, and the ancestor of this species almost certainly exhibited a sexual difference in crown color. It is significant that five of the six picine species that are sexually monochromatic are melanerpine. As discussed earlier, species of this group are highly social, a fact which probably relates to the occurrence of sexual monochromatism within it.

The most complex patterns and the most diverse patterns of sexual dichromatism generally occur in large genera with numerous sympatric species (e.g., *Campephilus* and *Picoides*). Some such genera, notably *Veniliornis* and *Dendrocygna*, exhibit relatively less variation in such markings. Species of genera with a limited number of patterns of sexual dichromatism tend to be strikingly marked and quite different in coloration of their body plumage, whereas species of those genera exhibiting a greater number of patterns of sexual dichromatism tend to differ less in other ways. *Celeus* might appear to be an exception, since species of this genus largely differ sexually by virtue of malar stripes, and yet they appear superficially very uniform in overall coloration (rufous, black, whitish). However, sympatic
species of this genus differ markedly in the location of black, white, or rufous patches and in their pattern of barring (e.g., unbarred versus barred), as well as in size and in the structure of the bill.

As a corollary of this discussion it follows that differences in patterns of sexual dichromatism should prove significant in terms of interactions between populations. A clear difference in such patterns between related forms would seem to pose a great problem for their interbreeding. For example, only limited interbreeding occurs within the superspecies Sphyrapicus varius among S. varius, S. nuchalis, and S. ruber. These woodpeckers are very similar in overall coloration, but their differences in head markings are significant. S. varius is sexually dichromatic (red throat in males, white throat in females). In S. nuchalis the sexes are virtually alike (both with a red throat), and a nuchal patch is present in both sexes. S. ruber is entirely red headed, and the sexes are alike. These differences probably relate to critical but as yet unreported behavioral differences; at any rate, they may account for the fact that hybridization among them is limited. On the other hand, the differences among the somewhat color divergent auratus, cafer, and chrysoides subspecies groups of Colaptes auratus simply involve color replacement with retention of a single basic pattern of sexual dichromatism; these forms freely interbreed wherever they meet (Short, 1965a). Where significant differences exist in patterns of sexual dichromatism between woodpeckers, as among Sphyrapicus varius, S. ruber, and S. nuchalis and between Campephilus melanoleucus and C. gayaquilensis, it seems prudent to consider these as separate species pending investigation of their behavior and possible interactions.

There are of course other features of sexual dimorphism, and these are noted in the species accounts. I have alluded earlier to crest shape, and this is one element of some forms of sexual dichromatism. Male woodpeckers usually are slightly to moderately larger than females, although reversal of this pattern occurs. Selander and Giller (1963) and Kilham (1965) have demonstrated that the sexes in certain woodpeckers exhibit differences in foraging behavior. These are correlated with differences in the length and width of the bill (Selander and Giller, 1963; Selander, 1966) and in tail length (Short, 1970b). In some species (e.g., Picoides nuttlallii and P. borealis) females tend to have longer tails than do males; and females of some piculets, notably Nesoctites micromegas, are larger than males. Differences between the sexes are especially pronounced when few or no other woodpeckers occur sympatricky. In such cases the sexual differences in bill length may be as great as or greater than that found between related species (e.g., the sexual difference in bill length within Picoides scalaris in Baja California exceeds that found between the related P. pubescens and P. nuttlallii in California [Short, 1971f]). Undoubtedly this form of sexual dimorphism has played a role in the evolution of woodpeckers, but it is as yet unclear what this role is.

**JUVENAL PLUMAGES**

Goodwin (1968) effectively discussed juvenile plumages of woodpeckers, providing a firm basis for taxonomic if not functional consideration of these plumages. I will confine my remarks to the clarifying and emphasizing of some of Goodwin's points.

Goodwin (1968) as well as Voous (1947) noted that juvenile plumage patterns may resemble "a previous stage in the species' evolutionary history" (Goodwin, 1968, p. 14). In this I strongly concur, although recognizing that features of the juvenile plumage, of course, are subjected to selection. Juvenile plumages often can be utilized to great advantage
when problems of taxonomic relationship arise. The peculiar juvéal plumes of sapsuckers (Sphyrapicus, spp.), for example, strongly indicate the melanerpine affinity of that genus. The tendencies toward ventral barring and streaking, barring on the outer rectrices, and barring on the backs of Picoides pubescens and P. villosus, along with other features, suggest their relationship with other (North American) “ladder-backed” Picoides. Also, the pattern of the juvéal outer (reduced) rectrices often is different from that of the adult and may be suggestive of relationship.

The views expressed by Goodwin (1968, p. 15) concerning the function of sexual markings in juvéal woodpeckers were developed independently by Short, and they are important for an understanding of such patterns. We consider that juvéal patterns of sexual dichromatism in woodpeckers may relate directly to the aggressive nature of these birds. This aggressiveness, as noted by Goodwin, is even prevalent among young siblings in the nestling cavity. With four, five, or even seven young in a brood, the nestling females, being on the average smaller than the males, are benefited by possessing malelike plumage markings. This is clearly shown in the auratus group of the flicker Colaptes auratus, in which juvéal females have malar patches resembling those of juvéal and adult males. The juvéal females gradually acquire the adult female pattern after leaving the nest, tan feathers growing in to obscure and rather quickly obliterate the black feathering, which is molted. Likewise, the tendency for juvéal woodpeckers to have more red on their crown than adults, sex for sex, or a different pattern of red there can be explained by observations (Short, 1972b), suggesting that the red nuchal mark of flickers is used in appeasement. In picids lacking a crest, especially, the red of the crown and nape is not usually visible to the antagonist of an attacking bird, which sees its opponent’s head front-on, with bill outstretched. However, the nuchal or hinder crown red can be made evident by the lowering of the head, or by turning the head away from an antagonist by a presumably submissive bird. On the other hand, species having a crest or an all-red head in adult males may have the red color functional in reverse, that is, incorporated into the aggressive aspect of agonistic displays. In such cases it may be selectively advantageous for the young to tend in head pattern toward the female, or at least to have less red on the head than adult males. This might serve to lessen hostility of adults toward the young, advantageous because the young woodpeckers may attain adult size before the parents have lessened active territorial defense. Distinctively marked immature birds thus may be able to move about more freely than if they had adult markings. Such functional attributes of coloration of the juvéal plumage must be considered along with the general tendency of this plumage to retain features of ancestral adult plumages that subsequently have been lost, replaced, or modified in the adults.

An obvious problem in using juvéal plumages taxonomically is that rarer species tend to be represented in collections by few or no juvéal birds; and, if present, the specimens often are incorrectly sexed. Another significant feature of the juvéal plumage, not alluded to by Goodwin (1968), is the outermost primary, which is longer and broader in juvéal woodpeckers than it is in adults.

**MOLT**

The replacement of feathers is an annual event in the lives of adult woodpeckers. Unlike the woodpeckers and wrynecks, young piculets do not have a complete postjuvéal molt. This molt commences in the nestling stage of many woodpeckers, which have abbreviated
first or first and second juvenal primaries that are shed, the new primaries of the adult plumage coming in before the young birds leave the nest (Chapin, 1921; Sibley, 1957). The progress of the postjuvenal molt varies greatly, occasionally requiring six months or longer to complete (e.g., in sapsuckers, Sphyrapicus, which have the most distinctive juvenal plumage of any woodpecker except perhaps the related Melanerpes erythrocephalus). In a few species (e.g., some Picoides) some juvenal wing covert feathers are not molted until the following year after hatching, i.e., until the next annual molt.

Details of the molt of woodpeckers were provided by the Stresemanns (1966, pp. 415-424). One of the adaptations of woodpeckers relating to their tree-climbing habits and affecting molt is the molt of the rectrices. The usual tail molt patterns, if not irregular, are from the outer pair inward or from the central pair outward. In most woodpeckers the first feathers molted from the tail are the second pair from the center. The molt proceeds outward to the outermost pair and finally ends with the central pair. Since the central pair are the longest and strongest of the rectrices, this means that the central pair are maintained while the other feathers are being lost or regrowing. When the small outermost feathers are shed, and regrowth begins, and after the other lateral feathers have grown to their full size, the central pair are shed. This schedule allows maximum (if somewhat reduced) efficiency of use of the tail in its support function during the period of molt. A few woodpeckers of the genera Picus, Dinopium, Campethera, and Celeus, representing rather generalized picids, molt from the outermost pair inward to the central pair. The creepers of the genus Certhia, which also use their tail for support, have a tail molt similar to that of the majority of picids.

The annual molt is often protracted. Apparently, tropical woodpeckers in most forest areas have a long breeding season. Since the molt is coordinated with and timed to follow breeding, early nesting birds may be in full molt when late nesters are just beginning their breeding activity. These species are nonmigratory and must forage daily in the usual manner; hence, a gradual, long molt interferes with their activities less than would a fast but full molt.

**STRUCTURE AND ADAPTATIONS**

Woodpeckers structurally are very similar, as one would expect of a group specialized for a certain type of existence. Early attempts at classification of woodpeckers reflected studies (e.g., Burt, 1930) of specialization, resulting in a simple linear arrangement of relatively generalized to specialized woodpeckers (this faulty "morphoclinal" approach is still reflected in the most recent classifications of the family). In fact, from generalized ancestors probably of a group ancestral to both woodpeckers and barbets arose a number of more or less generalized groups of woodpeckers; from these have evolved several independent lines of specialized woodpeckers (see Bock, 1963; Short, 1974f). These specialized woodpeckers include the melanerpine Sphyrapicus, campetheric Picoides, campepheline Campephilus, and picine Chrysocolaptes, Blythipicus, and Reinwardtipicus.

The modifications of woodpeckers associated with their specialized way of life are many and affect all aspects of their biology. Nonstructural adaptations include their mode of locomotion on flat surfaces, their climbing and flying, their ability to excavate in live wood (a few barbets occasionally may do so; see Short, 1973c), and their drumming signal communications. These relate to structures, of course, and in most of these aspects they differ from all other birds, including others that may forage somewhat similarly.
Structural modifications cannot be more than mentioned in passing. The yoke-toed feet are an apparent adaptation, but studies and photographs have shown that many woodpeckers, particularly the specialized woodpecking species, actually extend the rear toes around into the forward 180 degree plane, so that all four toes are directed anteriorly. The zygodactyl foot, then, is not in itself a specialization for climbing but for perching (Bock and Miller, 1959). So unimportant is the hallux (first, inner rear) toe that it has been lost in one group of piculets (Sasia), in the generalized picid genus Dinopium, and in two groups of more specialized woodpeckers (Picoides, Gecinulus). The bill is of strong bone overlain with a hard, horny covering (ramphotheca) that in most woodpeckers forms a vertical chisel-tip of the bill; although barbets and some other birds are able to peck wood, they do so clumsily and are not able to neatly chisel out a deep excavation in live wood nor to scale bark from trees (parrots are an exception to the latter, but do so very differently from picids). The shock of wood pecking and drumming is severe and has been the cause of much, often silly or erroneous interpretation and even cartoons (e.g., woodpeckers with headaches). The bill structure is adapted to spread the shock force, and there is a direct correlation between the amount of pecking into hard wood and the shape of the bill, especially the size of the chisel tip, the straightness of the bill, and the width of the bill across the nostrils and elsewhere; more wood-pecking species have a straighter, more chisel-tipped, and broad bill that especially is broad between the nostrils. The nostrils themselves are covered by feathers in all strongly wood-pecking species and, indeed, in most woodpeckers (the generalized wrynecks and Celeus are major exceptions). This covering keeps out wood powder and pieces; the more specialized picids have the nostrils reduced to long slits under a ridge at the sides of the bill, further protecting the opening. The front of the skull over the base of the upper bill forms the nasofrontal hinge. This hinge area is infolded, with a major indentation of bone resulting in all strongly wood-pecking picids. The spread of the forces of pecking through the bill, the action of the nasofrontal hinge, the action of muscles on the hinge area and in the entire head-neck region, and even the action of the body, leg, and tail muscles (see Short, 1973d, fig. 23) effectively counteract and dissipate the force of pecking and form an efficient “machine” for wood-pecking activities.

The pygostyle bone and tail vertebrae are expanded to allow attachment of large muscles that are used to appress and manipulate the tail, so important in climbing and wood pecking, at least of medium and large woodpeckers. The legs are short, the toes long and curved, and these are important also in the movements of woodpeckers. Winkler and Bock (1976) have discussed the matter of climbing movements and forces acting on the climbing woodpecker.

The tongue of woodpeckers is modified by being greatly elongated and extensible, with modified muscles that extend along the hybrid horns and allow protrusion of the tongue. The length of the tongue and its extensibility vary, but in many species the hyoid horns are so long as to curl around the back and top of the head and, in species with a very long tongue, either around and into the right orbit or into the right nostril. Thus the tongue can be extended into a cavity for some distance, often greater than the length of the bill, to obtain insects. The tongue also has variously arranged projections or barbs about its tip that help to pull in the insects. Further, the sublingual salivary glands are modified and, in many species, are much enlarged to secrete a sticky, gluelike fluid that coats the tongue and, with the tongue barbs, forms an efficient insect-catching device. Captive flickers and other woodpeckers use the tongue frequently as they explore their cages, constantly curling the tongue about the wire mesh and into cracks and crevices, presumably attempting to sense movement of insects or to pick up bits of fruit or debris. The tongue apparatus enables
plumage to be highly efficient; after rapid excavation of a hole and penetration of an insect tunnel, the bird can perch quietly with little effort exerted in probing the tongue back and forth in the tunnel system from the single hole, thus minimizing the amount of excavating that is necessary.

Another adaptation of woodpeckers that might be mentioned is their general "toughness," particularly their thick skin, a trait shared with the Indicatoridae. Woodpeckers are sturdy birds, very tenacious of life and difficult to kill relative to other birds comparable in size. Those who have skinned woodpecker specimens are aware of how thick and tough the skin is. It is tempting to think of the "toughness" generally as an overall result of their strong muscle and bone adaptations to woodpecking, and the toughness of their skin, as in the case of the Indicatoridae, as an adaptation to limit effects of bites by the insects (especially ants) upon which woodpeckers prey. These do seem logical and likely.

In view of these and other adaptations, one might ask the reason for the success of woodpeckers in uniquely exploiting their niche. One must assume that the ancestral woodpecker could excavate a nesting cavity in earth or trees (although wrynecks do not do so). This in itself is a significant factor in their success, for newly excavated holes are less apt to be known to local predators and undoubtedly are more sanitary than old, previously used holes (the debris in old holes supports a considerable microfauna, elements of which probably are not healthy for birds). Holes generally provide a rather safe roosting site and a somewhat stable environment (the roosting or nesting birds are less susceptible to rain and other weather effects than are birds in the open, and the temperature and humidity fluctuate less in the hole). Regardless of whether or not the ancestral woodpecker excavated its cavity, early woodpeckers soon must have done so. But the adaptations we have just discussed are not necessary for the excavation of a hole in rotting wood.

I do not believe that selection acted to enhance the adaptation of woodpeckers nesting in rotten wood to allow them to excavate in less-rotten or even live wood. Rather, the likely insectivorous diet of early woodpeckers and the selection for them to exploit the food source of bark and wood insects by pecking and probing probably were responsible for the gradual evolution of their specializations. Once able to excavate into wood efficiently to secure food, woodpeckers secondarily were able to carve holes out of live wood. These capabilities had beneficial side effects; e.g., subsurface bark foraging provided a means of securing food even in winter when most insectivorous birds have to shift their diets or migrate, and excavation in live wood lessens the risk of usurpation of the nest hole or roost hole by larger, hole-seeking birds, since the hole cannot be enlarged so easily as a hole in rotten wood (Short, 1979). Further, evolution of an array of variously specialized and less-specialized picids of divergent sizes permitted sympathy of numbers of woodpeckers that can coexist, at least in diversified forests. All of these factors, but especially their hole-nesting capability and their special bark-foraging technique that partly removes woodpeckers from competition with bark-surface foraging birds of other kinds, are responsible for their broad distribution in temperate as well as tropical regions and for the considerable number of picid species.

**GROUND-ADAPTED WOODPECKERS**

If woodpeckers are arboreal specialists, how can it be that some species feed on the ground, and a few of these may even live in treeless grasslands? I have attempted to answer this question in several publications (see Short, 1971c, 1971g). In brief, the terrestrial habits
of some woodpeckers are the result of secondary adaptation. Most ground-foraging woodpeckers eat ants, and many of the ants are arboreo-terrestrial in habits. If conditions permit more adaptation for existence in open country, as for example if the birds become isolated in an area in which trees gradually lessened in frequency over time, and eventually disappeared, selection would favor nesting in banks or termite mounds rather than trees, because the trees would become scattered and the population could occupy more area by nesting other than in trees. Locomotion by hopping would be less efficient than walking if the grass were sufficiently sparse to allow considerable open ground.

Other developments in the ground foragers are loss of skull specialization, such as the bony infolding of the frontal area; loss of the chisel-tip of the bill in favor of a pointed bill; narrowing of the bill; and the angle of the foramen magnum—that is, the position of the skull is more on a plane with (horizontal to) the body and less at a right angle to the body than in wood-pecking picids. All ground-feeding species eat ants and have the long, extensible tongue and large sublingual salivary glands of ant-eating arboreal species. Possibly a shortening of the tail may mark terrestrial picids.

Ground-foraging woodpeckers tend to lose strong patterning of the head and to be brown or gray or green and barred. Flashmarks, such as a pale or white rump patch, commonly occur. The sexes are less strongly dimorphic in color. Several of the species are semisocial, and one (Colaptes rupicola) nests in colonies. Sociality may be favored in an open, essentially uniform environment. Movements such as wing flicking, which can be seen at a distance, are frequent. Vocalizations of terrestrial picids are more yelping and carry farther than those of related arboreal woodpeckers. Such calls carry through the often windy atmosphere much better than lower pitched calls that vary over a greater frequency range.

All of these adaptations of course come from more typically woodpeckerlike conditions. We might ask in what ways being woodpeckers prepared the ground woodpeckers for such an existence. Certainly ant-foraging habits and related structures were an asset. In fact, the array of foraging adaptations of woodpeckers enables them to forage effectively on the ground by pecking, probing, and even excavating. Moreover, the ability to excavate a nest in a bank or earth structure other than a tree favors terrestriality; for, as we have seen, hole nesting has some advantages over nesting in the open. It appears then that wood-pecking habits and adaptations, far from being a handicap to would-be terrestrial woodpeckers, have benefited them or "preadapted" these species for ground foraging.

Terrestrially adapted picids are especially Geocolaptes olivaceus, Colaptes rupicola, and C. campestris, to a lesser degree Colaptes auratus, C. fernandinae, C. pityus, C. melanochloros, Picus viridis, P. canus, P. squamatus, and P. avokera, and to some extent such species as Campethera bennettii, C. nubica, Colaptes atricollis, C. punctigula, and other Picus.
BEHAVIOR

Picid behavior has long been the subject of attention by ornithologists and others, but only in comparatively recent years have there been any comparative, truly rigorous investigations. Data are available mainly from North American woodpeckers (see Lawrence, 1967, and the various works of Kilham listed in the references) and from European species (see the works of Blume, Ruge, and Winkler cited in the references; see also Sielmann, 1959). Through a concerted effort over the past decade, I have attempted to glean information about tropical American, African, and Asian picids (see citations in the references), but much remains to be learned. Indeed, for some genera (e.g., Picumnus, Veniliornis) not one species is well known, and other genera (e.g., Celeus, Meiglyptes, Mulleripicus) are barely better known. Even in cases that present a volume of information, the species studied are not fully representative of the entire genus involved (well-studied species of Melanerpes, Picoides, Colaptes, Picus, and Dryocopus do not include the tropical species most apt to be primitive within these genera). It is hoped that the behavioral accounts in the text will convey the need for appropriate behavioral studies of certain species.

Despite the uneven behavioral data available, I have covered, and indeed have emphasized, behavior throughout the book. Some facets of behavior, interesting in themselves, also are of use taxonomically, such as degree of sociality (Melanerpes, Colaptes), type of drumming signal (Dryocopus, Campephilus), and nature of vocalizations (Picoides, Colaptes). Data from the literature are utilized whenever they seem reasonable, and their observational basis is more than anecdotal.

FOODS AND FEEDING

Although to most people the thought of foraging woodpeckers instantly brings to mind their pecking into the wood of trees for insects, in fact woodpeckers feed very diversely. Essentially all woodpeckers will eat berries or other fruits when such foods are available, and Northern Flickers (Colaptes auratus) may survive the winter in the northern fringe of their winter range by subsisting entirely on fruit for a considerable period of time. The melanerpine woodpeckers especially are prone to eat fruits, acorns, and seeds. The Acorn Woodpecker (Melanerpes formicivorus) is to a large degree dependent upon acorns much of the year, and in season these are a major food source for M. lewis, M. erythrocephalus, M. carolinus, and others. At least two species of the melanerpine group (Melanerpes candidus, M. uropygialis [see species accounts]) readily eat honey. Sapsuckers of the melanerpine group subsist on sap for much of the spring and early summer; and species of Picoides, especially P. hyperythrus but also others, and occasionally other picids utilize sap. None of these are so systematic in excavating and tending pits for the sap as are the sapsuckers. In the northern hemisphere many species eat suet placed out for them. A few woodpeckers may prey on other birds: Picoides major enlarges openings of holes of smaller birds to get at their young, on occasion, and Melanerpes erythrocephalus and Picus flavinucha may seize and eat nestling birds. Most of the data on foods of woodpeckers are scattered in diverse publications. The early, comprehensive review, treating North American picids, was that of Beal (1911).
Most woodpeckers do feed on insects much of the time. These insects may be as diverse as lepidopterous larvae in the ground; ants on the surface, within trees, or in the ground; wood-boring beetle larvae; or winged hymenopterous insects seized in the air by flycatching. More specialized wood-pecking picids secure more of their food by excavating or bark scaling and probably take substantially more wood-boring beetle and other boring larvae than do less specialized species. Even the specialized woodpeckers are opportunistic to some extent and may seize surface insects that they chance upon, pick an insect from the air, or forage for fruits. It seems evident to me that the wood-excavating specialization is a form of added insurance, “guaranteeing” the woodpecker, to the extent that a given species is specialized for woodpecking, a source of food at all seasons and available to it at an expenditure of energy. This source and the excavating mode of foraging are especially important in the critical “off-season” (e.g., winter in temperate areas, dry season in monsoonal tropical regions). Less specialized wood-pecking species must depend upon their excavating ability, however great or poor, to secure food when other sources and means are unavailable, or they must depart the region. In more rigorous, northern parts of the Downy Woodpecker’s (Picoides pubescens) range, this species is unable to secure sufficient food in winter and migrates farther south; but the sympatric, sturdier, more specialized Hairy Woodpecker (P. villosus) is able to subsist over winter by excavating. Nevertheless, the subsurface insects in northern forests may reach such low population levels that even such specialists as the three-toed pied woodpeckers, Picoides tridactylus and P. arcticus, must move, usually southward, to more favorable situations.

Drastic shifts in foraging and foods are documented for many woodpeckers, among them (see the species accounts) the sapsuckers, Acorn Woodpecker, Lewis’ Woodpecker, Red-bellied Woodpecker, and Great Spotted Woodpecker. I have shown (Short, 1971f) that as many as four sympatric species of pied woodpeckers—the Downy, Hairy, Nuttall’s, and Ladder-backed woodpeckers—that differ considerably in their ecology (foraging sites, trees utilized, preferred portions of the habitat utilized) may forage identically when food is superabundant, in this case the many insects abounding about emergent new leaves of trees in the spring in southwestern North America. Some species, notably the three-toed pied woodpeckers, may concentrate in numbers locally over a period of several years when buildup of certain insect populations reaches epidemic proportions (e.g., after fires that leave standing many dying and dead trees suitable for nesting).

Foraging modes used to secure insects vary. Excavating is the epitomy of specialized woodpecker activities, being the repetitive tapping and hard pecking required to carve holes into dead or live wood. The manner of doing this varies somewhat. Generally, blows are delivered slightly from each side alternately or with a series of blows from one angle alternating with a series from the opposite side, thus tending to chisel out a piece of wood. At other times the blows are directed straight down onto the wood. Species such as the three-toed pied woodpeckers and various members of the genera Dryocopus and Campephilus, among others, scale bark off dead or dying trees by powerful, laterally directed, almost prying blows, adroitly delivered to particular points that, once freed, allow large pieces of bark to be pried off. Tapping is one or several lighter blows of the type needed to break through thin or rotten wood, or to break a piece of bark. Probing may be in a simple probing movement under bark, into a crevice, or amid leaves; or it may be a pecking probe, delivered with force. The bill often is used in the manner of a hoe to break up and toss aside leaf litter, moss, epiphytes, or other debris in trees; to tear apart very rotten wood; or by ground foragers to break into ant tunnels in the earth. Gleaning is the simple act of picking insects
BEHAVIOR from the bark or foliage. Obviously in their lives spent so close to the tree surface it would be inefficient for woodpeckers not to pick up easily secured surface insects (and spiders, etc.) of all kinds, and hence virtually all woodpeckers glean at times. However many of the generalized and the less specialized woodpeckers of more or less specialized groups such as Picoides actually glean most of the time.

Ant foraging (and this includes termites, for general purposes, although ants and termites are not closely related) is accomplished by many woodpeckers and by about half of the tropical picids. Most species secure these insects in trees, either at the surface or (e.g., species of Celeus) by picking into chambers and “tonguing” the ants from their exposed tunnels. About a dozen species regularly or entirely forage on the ground for ants, and these are specialized in tending to walk rather than hop, as well as in other ways. Ant foraging is highly advantageous for nesting woodpeckers because it permits adults to secure easily and in a single site or few sites very large numbers of prey, especially nutritious ant eggs (and pupae and larvae), fed to the young by regurgitation over long intervals. Woodpeckers that regurgitate food to the young visit the nest far less often than do other species, thus affording less attraction of predators to the nest site. At the opposite extreme, fruit eaters and “omnivores” such as melanerpine species make many trips to the nest each hour; possibly related to this fact is the degree of sociality and communal nesting among these woodpeckers: this ensures virtually continuous surveillance and protection of the nest, so conspicuous by virtue of the repeated visits of adult birds.

AGGRESSIVENESS AND THE PAIR BOND

Woodpeckers generally are resident, permanently territorial birds occurring in pairs or singly. They are well known to be rather aggressive (see, e.g., Lawrence, 1967), at least intraspecifically, a feature shared with the related barbets (e.g., ground barbets of the genus Trachyphonus are highly aggressive). At any time encounters may occur between adjacent territorial birds or between a wandering (usually subadult) bird and a territorial woodpecker. These encounters usually are unisexual; that is, males attack intruding males, and females attack intruding females. Males usually are dominant over females. Unlike most birds, in which sexes and individuals are “recognized” only in the breeding season, sexual recognition and individual recognition (reaction to a mate differs from that to another bird of that sex) tend to occur throughout the year in woodpeckers. Not only do encounters occur with considerable frequency within picid species, but interspecific encounters, especially with other woodpeckers, also are frequent.

There appear to be several reasons for the aggressiveness of woodpeckers. Intraspecifically, the specialization of woodpeckers and requirements for certain trees in which to forage systematically mean that the birds must be spaced, each bird or pair having access to a sufficient number of appropriate feeding trees and to trees suitable for roosting and nesting. Those woodpeckers that are social and can congregate in numbers have feeding habits (eating diverse plant and animal foods, as in melanerpine species, or numerous ants clustered in large terrestrial colonies) that are atypical of the family. Interspecific aggression is accounted for to some degree by the specialization of woodpeckers generally, and thus the similar requirements of different sympatric woodpecker species, especially those similar in size. Another and perhaps more important factor is the competition for roosting and nesting holes among the many hole-using species (mammals as well as birds; Short, 1979). Here the woodpeckers
have the advantage of being able to excavate a new cavity if one is lost, but sites favorable
for this may be few or clustered in few areas, resulting in strong competition. If wood-
peckers were not aggressive, they would have a difficult time retaining any of the holes that
they excavate.

Woodpeckers have many features such as crests and intricate markings about the head as
well as complex movements, that are used in aggressive displays. These enable the birds to
communicate very precisely their state of “aggressiveness” of the moment and thus give an
indication of what they are likely to do next. During an encounter minor changes in aggres-
sive and other tendencies are expressed by shifts in displays. Indeed the display repertoire,
including vocalizations, seems almost unduly large for the needs of these territorial birds.
One wonders if perhaps the ancestral woodpecker was a social or semisocial species requiring
these nuances; hence, part of what we see in woodpeckers may be a carryover from a more
social past.

Pair formation activities in woodpeckers are very difficult to distinguish from normal
aggressive interactions, and courtship displays, other than a few special flight and nest-
demonstration displays, are rare. It seems that a female woodpecker acts in these ways to
secure a mate: (1) she intrudes upon the male’s territory, following him about; (2) she lacks
male markings, hence does not elicit the strongest aggressive reaction of the male; (3) her
aggressive displays in confrontation with the male emphasize appeasement, rather than
threat aspects, thus lessening the male’s aggressiveness; (4) by her persistence in following
the male, coupled with her lack of male markings and submissive displays, she gradually is
accepted by the male; and (5) she strengthens this acceptance by reacting strongly to any
intruding female, driving her away, and by “inciting” the male by her presence and by dis-
plays whenever he becomes involved in an encounter with an intruding male. Difficulties of
forming a pair are diminished greatly when the birds involved were paired the previous year
(e.g., in some pied woodpeckers the sexes may occupy adjacent winter territories and over-
lap gradually to form the pair’s territory again in late winter) or when a mate is lost during
the egg-laying or incubation periods (or occasionally after the young have hatched). In such
circumstances mating may occur within a day. Many tropical and some temperate species
maintain the pair-bond either tightly (the birds are almost always found in pairs) or loosely
(vocal contact maintained, birds constantly move in contact through their joint territory)
throughout the year.

**TERRITORIALITY AND SOCIALITY**

Woodpeckers generally maintain individual or pair territories throughout the year. Few
data are available on territory size, which varies greatly, somewhat in relation to the size of
the woodpecker. The larger woodpeckers require a square mile or more for their activities.
However, the nature of the habitat affects greatly the size of the territory. An old eastern
North American woodland with many large trees may support a pair of Hairy Woodpeckers
in 40 or 50 acres, but an open western juniper woodland territory of the same species may
be more nearly a mile square.

Under certain habitat conditions territories may be compressed drastically, such that the
woodpeckers almost form a “colony.” In these cases nesting sites may be concentrated and
foraging areas dispersed. Examples are woodland edges with many dead trees adjacent to
good terrestrial foraging areas for *Colaptes auratus*; flooded or burned dead trees in concen-
tration adjacent to extensive forest for *Picoides arcticus*; and narrow, dense bottomland with
nesting sites adjacent to scattered trees in semiopen country for *Picoides nuttallii*. In such cases the pairs may defend small areas immediately around the nesting tree, their time foraging away from the area being too great to permit larger territories.

In the piculets and many tropical woodpeckers the young birds remain for a lengthy period with their parents, sometimes until the start of the next breeding season. The territory thus must be large enough to support a family. Temperate species generally show independence of the young shortly after fledging, and indeed summer is marked by an increased level of interactions as independent young birds are forced from their home territory and transgress territories of other, often still breeding adults.

Some degree of sociality is found among the piculets and woodpeckers, but not among the wrynecks, although there is presumptive evidence from abnormally large wryneck clutches that two females occasionally may lay eggs in the same nest. The piculets are social to the degree that, in at least some species, both adults of a pair roost together in the nest, or in a roosting hole, and that a pair and their young may continue to roost together for a long time after nesting. No colonial or communal nesting is known in the piculets, however.

In woodpeckers the male seems to remain alone in the nest to incubate at night, and he remains at night with the nestlings, at least until they approach the age of fledging. The female requires a roosting hole of her own. Some species are social nesters, especially including several species of *Melanerpes* and *Colaptes*. Pairs of *Geocolaptes olivaceus* may nest near one another, and a helper bird sometimes may be present with a pair at a nest. *Colaptes rupicola* nests in pairs but in a colony of several or many nests in a bank. Such banks are widely scattered, and the birds forage on the ground; thus they fly out from the nest to feed in all directions. *Melanerpes striatus* is the most colonial of the woodpeckers, up to 20 or more nests being located in a single dead tree. Some pairs have territories of their own and do not nest colonially, others nest in loose association, and still others in colonies. As far as is known each pair nests separately, defending only its own nest hole and perhaps a nearby perch. In *Melanerpes cruentatus* and *M. formicivorus* sociality reaches its peak among picids, for several to many individuals may be involved at one nest, or individual birds may attend at two or more nests that are situated close together. Most of the groups seem to represent family groups of adults and their young of previous years, but there is some movement of individuals between groups. Such a group of Acorn Woodpeckers has a group territory, with defended storage (for acorns) areas, roosting areas, a nesting area, and foraging areas. All members of the group participate in defense, nesting, and storing; and all share the stored acorns.

Gatherings of woodpeckers sometimes occur at optimum feeding sites, and, particularly, the few migratory woodpeckers may migrate in loose flocks. Chief among these are the Northern Flicker and Lewis' Woodpecker.

**NESTING**

There are many facets of nesting behavior of woodpeckers, only a few of which can be touched upon here. Either sex may select the spot for the excavation. Both sexes may perform the excavating, or one or the other may predominate. The hole can be fully excavated rapidly, in some cases in a week or less, but usually over a longer period. Most species excavate a new hole yearly, but a few, such as the Great Spotted Woodpecker and occasionally the Northern Flicker, use old holes or nest boxes. The wrynecks excavate no cavity but use natural cavities in trees, nest boxes, or old swallow or other holes in banks.
The site selected may be typical in height for a species, but most species are opportunistic and may nest high or low, wherever a suitable site is found. A few species, such as *Melanerpes rubricapillus*, regularly excavate on the underside of a branch or stub, as do many barbets. Various picids excavate nests in trees, stubs, cacti, fence posts, buildings, and earthen banks. At least several species of *Celenus* and *Campephilus*, as well as *Piculus chrysochloros*, excavate nests in the carton-nests of arboreal ants or termites. The size of the stub or limb relates to the size of the species in smaller picids, perhaps precluding competition from larger birds. Typically, an entrance hole is cut and a tunnel is made into the center of the stem; the birds then excavate a dropping tunnel and construct a large chamber at the bottom. The entry usually is little larger than the woodpecker’s body, and the woodpeckers often seem to encounter difficulty in entering or leaving the nest. Large species seem to construct proportionately larger openings. Some woodpeckers, such as *Campephilus* species, typically make oval or eye-drop shaped openings; in others they are irregular. Small species usually make rather round holes. Modifications about the opening characterize the Black-backed Woodpecker, which usually scales bark from about its nest entrance, and the Red-cockaded Woodpecker, which digs into the pine tree over its nest opening, causing resin to flow about the mouth of the hole, and the resin is kept flowing. This may afford protection against some predators. The depth of the nest is variable but is greater in large species. No nesting material is used (wrynecks may put grass inside their cavities), but wood chips are left on the bottom of the nest, and these may be augmented by some work by incubating or brooding adults.

The eggs are rather round and white and are proportional in size to the size of the bird. Some woodpeckers, if not most, and the wrynecks are indeterminate layers—an egg will be laid each day until the clutch is complete, and removal of an egg each day causes the female to continue, with records of as many as 40 eggs laid by a *Jynx torquilla* and 71 eggs (in 73 days) by a *Colaptes auratus*. The clutch normally is few, up to three eggs, in tropical picids, but reaches seven or up to 11 in temperate species.

The incubation period is very short, and the nestling period correspondingly long in woodpeckers. Incubation typically is 11 to 14 days in smaller picids, and may be up to three weeks in very large species. Both sexes incubate, the male at night and both sexes alternately by day. In some piculets and a few species of *Melanerpes* the female also is in the nest at night. Often the male predominates in diurnal incubation. The stints of incubation vary greatly. Large picids spend long periods on the eggs, up to four or more hours in *Campephilus* and several hours in *Dryocopus*. Most species spend an hour or so at a time on the eggs. Small tropical species may changeover frequently and spend considerable time away from the nest. Melanerpine species shift very frequently, and in highly social melanerpines (Acorn Woodpeckers) the changeovers may occur every few minutes.

The young hatch blind and naked and may not open their eyes until nine days of age. Hatching usually occurs over a period of 24 hours or less. The newly hatched nestlings are brooded by both adults alternately for up to a week or more. The young beg weakly at first, but soon loudly; the amount of calling seems to vary from species to species, typically being almost constant in some, whereas evident in others only when a parent is nearby. Both parents bring food, the predominance of feeding varying within species. A tendency for the female to lessen her feeding rate and to cease feeding toward the end of the nestling period is noted in a number of species. Growth rates are given in the species accounts for a few woodpeckers. (In fact, the data on nesting generally are sparse, and for well over half the species we do not know incubation or fledgling periods; and only for a handful of species do we have information on postfledging behavior and relations of the adults and young.)
Excreta apparently are consumed by the parents for the first few days, then they are removed (they are covered by a tough sac) more or less frequently by the parents after feeding. The male seems to predominate in nest sanitation. The nest is maintained clean until the last few days before fledging in most picids, but in some melanerpine species the nest is fouled and not kept clean (in fruit-feeding species especially). The young of some species hiss loudly, apparently in defense, if an intruder appears at the nest. As the young grow, they begin to move about; and when partly feathered and having the eyes and ears opened, they eventually are able to reach the opening of the nest. The adults enter the nest to feed them until that time. When the young are numerous, and especially as they come to the entrance, considerable difficulty is encountered by the parents in entering the nest, and even in feeding, for the young shove and push and peck aggressively, even at the parent. The nestling period is 18 to 35 days or longer in various species.

As noted previously, ant-foraging species feed the young by regurgitation, appearing at the nest only once or twice an hour for feeding. In most species, however, feeding is at a rapid rate, especially in the morning and especially in temperate areas in the morning. Rates of 12 to 25 times per hour are recorded for many moderate-sized and small species. The greatest rate is achieved when the young are approaching their size at leaving the nest. Mortality may be high in the nestling stage if food happens to be scarce, such that only a few birds fledge.

After fledging, the young tend to scatter and are very vulnerable for the first few days. Generally they do not return to the nest, but in piculets and some melanerpine woodpeckers the parents may lead the young back into the nest for the night. Until the young are several months old and can find or excavate a roosting hole, they roost in the open, where they are subject to predation. In some species the adults seem to split the young among them, one or two young following each parent. In many cases the number of fledglings quickly is reduced to one or two birds. The youngsters call loudly when hungry or when the parent appears. When the young are close together, the loudest, most persistently calling bird usually is fed first. As just noted, most young woodpeckers are soon independent of their parents. Data are needed on this critical period, particularly in regard to help given by adults in food finding: Are ant foragers at an advantage, easily leading the young to ant hills or nests and simply demonstrating to them the mode of securing ants? Information is also needed as to sibling interactions and sibling-adult interactions: The young often are differently marked sexually from adults; what are the effects of this difference?

Renesting attempts following failure of the initial or a subsequent attempt are common and may be forced by death of a mate or, more likely, usurpation of the nest by some other species. Indeed, this last may occur repeatedly, hence some reportedly “long” breeding seasons. Second nestings are rare.

**INSTRUMENTAL SIGNALS**

Drumming is the characteristic instrumental signal of woodpeckers, and it is known in most species of woodpeckers and in some piculets (but not wrynecks). As far as we know, drumming as a signal is confined to woodpeckers and piculets, but it may prove that some barbets tap or drum in communication*. Although drumming is to a considerable extent species specific, it has relatively few parameters of variation, hence is not ideal for species

*Short and Horne (unpubl.) found the barbet *Lybius leucocephalus* does so.
recognition (Winkler and Short, 1978). Drumming of certain types may be diagnostic, as the drum taps of *Campephilus* species, the spaced cadence of drums of species of *Sphyrapicus*, and the rapid speed-up of that of *Celeus brachyurus*. Drumming frequently elicits interspecific responses, and not only of closely related species but of other woodpeckers as well.

Variation in drumming involves the power of the blows, their tempo, and their duration, as well as the rate of the bouts. Some species start fast, then slow down; others reverse this; and some have paired beats within a burst. A species may drum in brief bouts, repeated frequently, and another may give long bursts at greater intervals. Individual and seasonal variation also occurs. Part of this is due to the resonance of the substrate — some woodpeckers will drum anywhere, most select dead stubs or other resonating sites, and some have specific drumming sites used regularly and scattered about the territory. Longer bursts may typify the early breeding season, when territories are being established (or reestablished) and mates selected. In some species loss of a mate late in the season may cause the partner to initiate drumming again in the manner of birds early in the season. The sexes may differ somewhat in drumming, both in terms of the drumming itself (different tempo, females may drum weakly) or in the amount of drumming (e.g., females much less). Young birds may drum at several months of age.

Drumming may serve many functions. Certainly it has to do with the establishment and maintenance of a territory and in the attraction of a mate. It is to some degree "self-assertive"; that is, it means "I am a woodpecker (perhaps "of such and such species") in good condition on my home ground" (see Winkler and Short, 1978). For members of a pair, and probably adjacent territorial owners, it can be a localization signal: "Here I am." It also carries information of another type, namely about the environment, for drumming indicates the presence of a drumming site, usually dead wood, and thus perhaps a potential for a nest site. In this respect it differs strikingly from the songs of other birds, which do not convey information about aspects of the environment (Winkler and Short, 1978). Some of its functions may be similar to that of "song," but I do not think the two signals are equivalent. Most woodpeckers, in fact, have a series call that is more nearly equivalent, in some cases, to bird song, i.e., of passerine birds.

Other than drumming, or perhaps considered a form of drumming, are various demonstration tapping sounds. These usually are slow and not loud, and they are associated with an active or prospective nest site. One sex or the other may tap, or both may tap, either together or in response. In some melanerpinine woodpeckers an incubating bird taps inside the hole in response to the approach or tapping of its mate, and changeover then occurs.

Another form of nonvocal auditory communication is poorly known but probably is widespread in woodpeckers. This is wing rustling, noise made by the wings under certain circumstances. Some species (*Colaptes*) seem to make such a noise when flushed, perhaps as a warning or alarm signal to others nearby. In other cases (*Picoides*) it may be employed during flight displays or by a woodpecker landing in the nesting tree as a signal of its approach to the mate in or about the nest or to the young inside the nest. The sounds are low, the signal is given rapidly, and the birds are in motion — all factors contributing to the difficulty in studying them. It is possible that there are even softer sounds that serve as signals in some displays in which the wings are flicked or moved by perched woodpeckers. Such sounds may be discernible at close range to a mate or antagonist in an encounter. There are no data clearly demonstrating the existence of these signals, but observations suggest their occurrence and a need for study of this matter.
VISUAL SIGNALS AND DISPLAYS

Woodpeckers employ diverse visual signals, including displays (see Short, 1970a, fig. 3; 1971f, figs. 20–22; 1972b, fig. 24). Some of these are simple, such as the white rump patch of many species of open areas—the patch is displayed whenever a woodpecker flies and presumably serves as a mark for other conspecific birds to note and follow, or as a warning mark (“danger”). Many postures, coupled with movements or not, are simple displays. Erection of the crown or crest feathers, which often bear sexual recognition features, usually indicates a threat. Bill Directing is a frequent display, the bill being reached toward and pointed at an antagonist. The head may be turned in a stilted manner, showing off certain facial markings in a display.

On a tree the alert posture of a woodpecker that is disturbed is marked by a raising of the head and neck and the leaning outward from the tree of the foreparts of the body. The bird, being on the side of the tree, often will lean outward to one side, head and neck extended, then to the other side, in a manner unique to woodpeckers. From such movements may have come the Swinging Display, a side-to-side swinging of the body with the head and bill in one or another plane from low, with the head bent down; to forward with the bill pointing at an opponent (akin to Bill Directing); to high, with the bill pointed nearly upward. There may be variation in the side-to-side dimension. The Swinging Display is aggressive, and its elements and movements are related to the intensity of threat. In its threatening aspect the side-to-side movements are shallow, most emphasis being to the front, toward an antagonist. The bill and head are held in the forward horizontal plane. More submissive aspects involve wide swinging with the head held very high or very low. Most groups of woodpeckers have some form of Swinging Display, of greater or lesser importance.

To a basic display such as the Swinging Display may be added other displays, postures, movements, and vocalizations. Bill Directing and Crest Raising displays often accompany Swinging Displays. The tail may be spread and turned so that the underside is directed first from one side, then the other, in time with the swinging of the body, in a Tail Spreading Display. Bowing or Bobbing displays also occur, the head being alternately lowered and raised. Various calls may be employed. The complex Swinging Display of the Northern Flicker (Colaptes auratus) involves all of these except Crest Raising. As the body and head swing from side to side, the head is bobbed up and down, the bill and head moving in a figure 8. At the horizontal position the bill is directed straight at an opponent. The tail, in this case bright yellow or orange below, is spread and the underside flashed from side to side at the opponent; a Wicka Call (“wik-a-wik-a-wik-a”) is emitted in time with the movements. Such a display complex is seen when two antagonists are evenly matched and highly motivated, as when confronting each other on the border of their adjacent territories.

Wing Flicking and Wing Spreading displays are common also, especially in woodpeckers with patterning (and most bear distinctive wing patterns) in the wings. The pied woodpeckers (Picoides) may couple wide lateral spreading of the often zebra-striped wings with elements of Swinging and Tail Spreading displays (see Ladder-backed and Nuttall’s woodpeckers).

Flight displays also occur, but these are difficult to compare or treat in detail because the movements are so rapid. A fluttering, mothlike display is found in species of Picoides. Some such displays typify chases between birds of the opposite sex during pair formation and are among the few courtship displays of woodpeckers. They function also in aggression.
(a Flutter Aerial Display as a bird lands may become a Wing Spreading Display) and perhaps in inciting a mate engaged in an encounter by its displaying partner flying overhead.

Other displays occur that are less general in occurrence. The Northern Wryneck has a death-feigning display in which it lies limply, "playing dead." Courtship feeding occurs in some woodpeckers (e.g., Dinopium rafflesii, various melanerpine species), the female perhaps begging and the male placing food in her bill (barbets also perform courtship feeding). A snake-striking aggressive display, with a hiss and striking movement with the bill held open is known in the Rufous-necked Wryneck. Nestling woodpeckers also hiss and spread their bills in response to an intrusion.

Displays are generally similar among woodpeckers and wrynecks, although far more data are needed on many woodpecker groups and, especially, on the piculets (virtually lacking are descriptions of displays and courtship activities of piculets). However, the plumage characters associated with the displays and the form of the displays vary considerably and must play an important role in communication of signals and in the nature of the response. Threat displays are used interspecifically, and in cases in which the patterns are similar and the display itself is similar, the reactions also may be similar (e.g., see Ladder-backed and Nuttall's woodpeckers).

**VOCALIZATIONS**

Woodpeckers have a number of vocalizations used in different circumstances. Some species are quiet and others conspicuous by virtue of their frequent, loud calls. Many woodpeckers' voices are known through casual notation of one or two sounds by a single observer, perhaps long ago. Modern investigations of avian vocalizations are based upon recordings of various calls and notes. These are studied and compared with the use of a sound spectrograph or other such machine. The relative intensity of a call, its pitch or frequency, and temporal changes in these over time are recorded on a sonagram, from which time and frequency measurements can be made. Analyzable recordings are available for fewer than half the woodpeckers. It is not possible to study the vocal repertoir of an entire picid genus, although preliminary studies along these lines have been conducted by Short (1972b, for Colaptes, five of eight species represented by recordings) and by Winkler and Short (1978, for Picoides, the largest picid genus; tape recordings were available for 24 of 33 species). Many important but soft or infrequently uttered calls are unreported, let alone recorded on tape.

Winkler and Short (1978) discuss 18 more or less distinct vocalizations known in species of Picoides. Their discussion stresses the interpretation of vocalizations in terms of these aspects: (1) descriptions of the calls and their context, (2) functions of the calls, (3) motivation of the calls, and (4) the meaning of the calls to the bird. Not all call types are found in every species, but data from those that are well known suggest that most species of pied woodpeckers have most of the types in their repertoires. To give an idea of the variations encountered in a single genus, a list of these types follows: Call Note, Scolding Call, Double Call, Rattle Call, Short Rattle Call, Mistle Thrush Call, Mutter Call, Kweek Call, Wicka Call, Twitter Call, Wad Call, Soft Notes, Distress Trill, Chirp Call, Loud Chirp Call, Squeak Call, Screech Call, and Distress Cry. Some of these are functionally and structurally closely related, e.g., Wicka, Twitter, and Wad Calls; and others are restricted in use to young birds (the Chirp and Loud Chirp calls are begging calls of the nestlings and fledglings, and the Squeak Call also is used by young birds only).
With the framework provided by this investigation, some of these categories of vocalizations might be considered in a bit more detail. Rattle-like or piercing calls, series of loud notes, are found in many woodpeckers. Termed Long Calls for some species, these long and sometimes (e.g., *Blythipicus pyrrhotis*) complex calls carry far and can serve a number of functions, such as territorial proclamation and location of a mate. They are usually distinctive for each species and may also serve as a distant species recognition character.

Wherever species of the same genus are found sympatrically, their somewhat similar Long Calls or Rattle Calls tend to vary markedly in tempo or pitch.

Call Notes are found in many picids and serve in various ways. Usually they are single, but they may be double, or the call “note” may be a fast series of notes (as in *Dendropicos fuscens*). The single notes may be uttered in a loose series. Their sound is not so loud and penetrating as the Long Call, and they are employed as location notes and may indicate a low level of aggression or alarm. The Call Notes usually are species specific, but some may sound to our ears very similar, as for example the Peek Call of the Hairy Woodpecker and the Pit Call of the sympatric Downy Woodpecker.

Some calls are given all year, such as Rattle Calls and Call Notes; and others, such as the Kweek Call, are of restricted seasonal occurrence. The Kweek Call of pied woodpeckers is aggressive, but with sexual implications. It is uttered during the breeding season, in conflicts, but also during interactions between members of a pair (it may precede copulation, see species account of Hairy Woodpecker). Modified versions serve other functions, as the Kweek Call of the Middle Spotted Woodpecker. This pied woodpecker, sympatric with larger and smaller congeners, unlike them does not drum. The Kweek Call is the loudest and most conspicuous vocalization of the Middle Spotted Woodpecker, and it serves as an advertisement, proclamation of territory, aggressive vocalization, and in other ways; but it mainly may be appeasing in function, serving to reduce aggression to permit sexual behavior (Winkler and Short, 1978). In pied woodpeckers females employ the Kweek Call more often than males. The Squeak Call also appears to lessen aggression, in this case being uttered by young birds to reduce aggression (permitting close approach and feeding) in their parents.

Calls often are associated, *inter se*, and one call may elicit another call (or drumming) in response. Call Notes, Long Calls, Rattle Calls, and drumming frequently are associated. Intermediate calls or mixed calls (containing parts of two different calls) are not uncommon, as Rattle-Kweek calls. Some species have highly modified calls; the Rattle Call of most pied woodpeckers is a series of nearly identical notes, but the Black-backed Woodpecker has evolved a complex Rattle Call, termed the Scream-Rattle-Snarl Call, that, as the term indicates, has three quite different parts. In this species an elaborate visual display complex accompanies the call, which is aggressive in function. Some calls assume different functions, replacing one another. As an example, some, especially small species of *Picoides*, give Rattle Calls commonly in place of Call Notes that are employed under similar circumstances by larger congeners.

Many calls of woodpeckers are delivered as circumstances warrant, and not from particular sites. Like drumming, however, some calls are often uttered from certain favored perches. This holds for some Rattle Calls and Long Calls and for the peculiar Pee-bee Call of the Crimson-winged Woodpecker and the Peew Call of its close relative the Lesser Yellow-nape. The last two species perch in the top of a tree, raise the head vertically, and give the call, over and over, most often early and especially late in the day. Particular sites are used in turn, during consecutive bouts or at intervals. A territorial proclamation function is likely for this call.
Throughout the text, vocalizations are discussed by referring to the time aspect in seconds or milliseconds (a millisecond is 1/1000 of a second) and by giving the frequency (pitch) aspect in kilohertz. One kilohertz (kHz) is equivalent to one kilocycle per second or 1000 Hertz.

**INTERSPECIFIC BEHAVIOR**

Under interspecific behavior I include chiefly interpicid behavior and exclude predation and casual interactions with other species. As discussed earlier, all hole-nesting species to some extent are aggressive toward one another, since they compete or are subject to competition for their own holes. Squirrels of various kinds are competitors for woodpecker holes. Starlings (Sturnidae) frequently are strong competitors for the holes of woodpeckers, and other such avian competitors include some species of these diverse groups: kestrels (Falconidae), owls (Strigidae), ducks (Anatidae), parrots (Psittacidae), rollers (Coraciidae), hornbills (Bucerotidae), wood-hoopoes (Phoeniculidae), toucans (Ramphastidae), barbets (Capitonidae), tyrant flycatchers (Tyrannidae), Old World flycatchers (Muscicapidae), woodcreepers (Dendrocolaptidae), cotingas (Cotingidae), swallows (Hirundinidae), thrushes (Turdidae), and possibly tits (Paridae). The woodpeckers’ reactions to some of these, at least, may be the result of individual experience. It is unquestionable that various of these competitors adversely affect woodpecker populations, and there is evidence of this in the case of the Starling (*Sturnus vulgaris*) and the Acorn Woodpecker (see species accounts).

Despite the strong competition from other birds, if there are sufficient holes, or after the woodpecker excavates another hole for itself after losing one, a competitor species and a pair of woodpeckers may nest successfully within a few meters of one another in the same tree. Thus, when the pressure of securing a nesting cavity is removed, the competitor species ceases to bother the woodpeckers, which then can ignore the other species (they do not closely approach one another’s nests). This is to be expected, because it is inefficient for both species to continue interacting aggressively, and it may attract predators if they do so.

Interactions with other woodpeckers are diverse. There are cases of large woodpeckers effectively rendering unusable the nest of a small picid, even though that nest was not potentially usable by the larger bird (see *Picus punicus* and *Dryocopus javensis*). During the breeding season drumming and even the calls of one woodpecker may elicit a response (drumming or a call) of another, often not congeneric species (I have observed that Nubian Woodpeckers and Cardinal Woodpeckers sometimes react to calls of the barbets *Tricholaema melanoccephala* and *Trachyphonus erythrocephalus* in Kenya). Interactions of a more direct type occur about nesting sites. A Black-backed Woodpecker attacked the closely related Three-toed Woodpecker and, as well, Hairy Woodpeckers (also related rather closely), Northern Flickers, and Tree Swallows (*Tachycineta bicolor*) that came near the nest tree. Larger woodpeckers ordinarily are dominant over smaller species, except that the latter may be able to drive a larger intruder from their nesting cavity.

Not all competitive interactions relate to nesting or roosting holes. Gray-capped Woodpeckers (see species accounts) were systematically kept from foraging on the trunk and major branches of trees in India by larger Streak-bellied Woodpeckers (Short, 1975b). This amounts to a forced apportionment of the foraging habitat. Other forms of competition may be pervasive. One spring, in a botanically simple riverine situation in Baja California, I encountered, amid a densely packed population of Nuttall’s Woodpeckers, a pair of Hairy
Woodpeckers that apparently had straggled out of their normal range. Hairy Woodpeckers are larger than, and dominant over, Nuttall’s Woodpeckers; and their territories are much larger. In attempting to set up a territory in this particular situation, the Hairy Woodpecker pair, although individually successful victors in encounter after encounter with Nuttall’s Woodpeckers, met so many of the latter, and were engaged so frequently and persistently, as to be prevented from establishing a satisfactory territory.

Closely related woodpeckers, especially, may engage in repeated and lengthy interactions, and they may be interspecifically territorial. This is true of Nuttall’s and Ladder-backed woodpeckers in southwestern North America, where they hybridize to a limited degree. On the other hand, the less closely related Green-barred and Campo flickers of South America occasionally are involved in an association benefiting the former (Short, 1969). The Campo Flicker is a terrestrially adapted, semisocial species, whereas the Green-barred Flicker is more arboreal and solitary, but it feeds to some extent on the ground. It often chooses to associate on the ground with feeding groups of Campo Flickers, which are more adept at detecting and evading predators in open terrain. I know of other instances of association among more typically arboreal picids, involving association of a smaller with a larger species (e.g., African Dendropicos fuscescens with D. namaquus).

Closely related species, especially those representing the same genus, are more apt to interact than are distantly related species representing genera of, say, different tribes. Species that are congeneric or that represent nearly related genera of the same tribe are, of course, more apt to resemble one another in pattern and to share similar foraging abilities. Cases of interaction between species representing different but related genera are described in the species accounts for Meiglyptes tristis and Hemicircus concretus, Dinopium benghalense and Chrysocolaptes lucidus, and Dryocopus lineatus and Campephilus guatemalensis (also C. melanoleucos). Convergences between species of supposedly distantly related picid genera (Cody, 1969) simply are not substantiated by the available data (see appropriate species accounts; see also Murray, 1977).

Elsewhere I have described (Short, 1978) diverse direct and indirect interactions and competitive effects among 13 sympatric woodpeckers representing 10 genera, and species varying in size from Tiny to Very Large (in the size categories I have defined earlier). The conclusions were that (1) very specialized wood-pecking species were of very different sizes (hence interactions are minimal); (2) similarly sized species tend to have very different habits; and (3) congeneric species either differ in size and to some degree in habits or, if similar in size, they differ structurally and in their places and modes of foraging.
WOODPECKER ZOO GEOGRAPHY

Woodpeckers occupy the Americas, Africa, Eurasia, and southern Asia, including southeastern Asian islands east to the Philippines and Celebes (Sulawesi). There are no woodpeckers on the Antarctic continent nor in treeless Arctic regions. They do not reach Madagascar and indeed failed to reach major islands any great distance from the mainland. Woodpeckers extend along the Indonesian chain of formerly connected islands to the Celebes, as well as to the Philippines. They (two species) have reached the Andaman Islands, Formosa (Taiwan), and Okinawa in the Ryukyu Islands, as well as various major and some minor islands of the West Indies. They are also found in the Bahamas Islands.

The distribution of species in the various genera, of the genera, and of the major subgroups (subfamilies, tribes) of woodpeckers is shown in Table 1. The totals are not necessarily equivalent to the number of species per genus because there are several species occurring well into two regions and listed for both. The regions are the Palearctic (Europe and northern Asia), the Nearctic (North America, including highlands of Middle America), the Oriental (Asia south of the Black and Caspian Seas, the Himalayas, central China, and Japan), the Ethiopian (sub-Saharan Africa), and the Neotropical (lowland Middle America, the West Indies, and South America).

It will be seen that the Neotropical Region has by far the greatest number of species, with the Oriental Region second. Africa and North America have about the same number of species. Only the tribe Meiglyptini of the eight major groups is restricted to one region, the Oriental Region. However, note that the Melanerpini are restricted to the two American continents, and the Picini to the Oriental and Palearctic regions. The preponderance of the species of Picumninae is in the Neotropical region, although the group reaches southern Asia and Africa. The Colaptini, basically a Neotropical group, reaches North America and the Oriental Region (only one species in each).

In terms of likely origin, nothing can be said of the Jynginae because there are but two species. The Picumninae appear to be Neotropical in origin, as both tribes of the subfamily are represented there. The Melanerpini could be considered Neotropical in origin, but North America, particularly southern North America, is not ruled out. The Colaptini would seem American, especially Neotropical, but relations with Ethiopian Campetherini and occurrence of an Oriental species suggest an origin in the Old World. Only the Campetherini occur in all five regions, but this is due to the single cosmopolitan genus Picoides; three of the four genera are restricted to the Ethiopian Region, and all four occur there, making that its likely area of origin. The Campephilini are Neotropical in origin, one of the two genera essentially being Neotropical; the other, with half its species there (including one, Dryocopus galeatus, that tends very strongly toward Celeus of the Colaptini), seems likely too to have originated there. The Picini are Oriental in origin (again, one species, Picus miniaceus, tends toward Celeus, strongly suggesting derivation of the Picini from that genus of the Colaptini). Finally,
<table>
<thead>
<tr>
<th>Genus</th>
<th>Palearctic</th>
<th>Nearctic</th>
<th>Oriental</th>
<th>Ethiopian</th>
<th>Neotropical</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Jynxae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jynx</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Picumninae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picumnus</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Sasia</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Nesocites</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Melanerpiini</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melanerpes</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Sphyrapicus</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Xiphidiopicus</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Campetheriini</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campethera</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Geocolaptes</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Dendropicos</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Picoides</td>
<td>7</td>
<td>9</td>
<td>15</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Colapini</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veniliornis</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Piculus</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Colaptes</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Celeus</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td><strong>Campephilini</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dryocopus</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Campephilus</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td><strong>Picini</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picus</td>
<td>3</td>
<td>0</td>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dinopium</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Chrysocolaptes</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Gecinus</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sapheopipo</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Blythipicus</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Reinwardtipicus</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Meiglyptini</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meiglyptes</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hemicircus</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mulleripicus</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>12</td>
<td>24</td>
<td>50</td>
<td>26</td>
<td>88</td>
</tr>
</tbody>
</table>
as noted earlier, the Meiglyptini are entirely Oriental in distribution. The origin and evolution of these groups will be discussed in the next section.

Using the size categories described on page 5, I plotted the distribution of the size categories (see Table 2). Again several species overlap, so the total is not exactly 198 species.

<table>
<thead>
<tr>
<th>Zoogeographical Region</th>
<th>Size Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tiny</td>
</tr>
<tr>
<td>Palearctic</td>
<td>0</td>
</tr>
<tr>
<td>Nearctic</td>
<td>0</td>
</tr>
<tr>
<td>Oriental</td>
<td>3</td>
</tr>
<tr>
<td>Ethiopian</td>
<td>1</td>
</tr>
<tr>
<td>Neotropical</td>
<td>22</td>
</tr>
<tr>
<td>Totals</td>
<td>26</td>
</tr>
</tbody>
</table>

Several striking points emerge. Small woodpeckers are the most numerous class on all continents, regardless of the number of species per region. At least one Very Large woodpecker occurs on all continents except Africa. For the three smaller size categories, Africa (Ethiopian Region) shows figures roughly comparable to those of the Oriental Region, befitting its tropical environments; but it totally lacks all three of the larger categories.

Using percentages of occurrence of the categories in the different regions and employing the Small category as a median, it is clear that still smaller categories predominate over larger ones in the Ethiopian and Neotropical regions, whereas larger categories predominate in the Nearctic, Palearctic, and Oriental regions. Finally, using average figures for weights, we find that woodpeckers in the various regions average as follows: Palearctic, 115 grams; Nearctic, 106 grams; Oriental, 95 grams; Ethiopian, 56 grams; and Neotropical, 79 grams. The low figure for the Neotropical Region is accounted for by its array of piculets of the one genus *Picumnus*. If one allows the Neotropical Region a number of piculets proportionate to that number in the smaller piciflora of the Oriental Region, i.e., putting but five or four species in the Tiny column and eliminating 17 or 18 piculets, then the average size for the Neotropical woodpeckers is about 95 grams, identical to that of the Oriental Region. We may conclude that temperate northern areas average fewer, larger woodpeckers; the tropical areas of Asia and the Americas have more woodpeckers, but averaging smaller than in temperate regions; and tropical Africa has only smaller woodpeckers.

The reasons for the size gradation of large to smaller woodpeckers from temperate to tropical regions relate to the ecogeographic rules; i.e., in colder regions animals of larger average size are energetically and physiologically more efficient than smaller animals of the same general type. The reasons for Africa's lacking large woodpeckers are not totally clear. Only the one picine group, the Campetherini, plus the Picumninae and Jynginidae are represented in Africa. Why other groups have not reached Africa is a moot point, but the groups that are there do not achieve Large or Very Large size (the Eurasian *Picoides leucotos* is
the only campetherine species that reaches a size greater than Small — namely, Medium). The Colaptini, related to the Campetherini do attain Medium size regularly in the Americas, however; and a derivative of the Colaptini, the Campephilini regularly attain Large and Very Large sizes. Hence, one must seek an explanation for the lack of large-sized picids in Africa and, indeed, the small numbers of picids in Africa. The great number of barbets in Africa compared with Asia and South America may have something to do with the sparseness of the African picifauna (Short, 1971a). Other factors, such as the repeated restriction of forest regions of Africa, the presence of potential “replacement” forms (perhaps to some extent such groups as wood-hoopoes that might compete), and the presence of effective, large nesting-site competitors (especially the hornbills), may be involved and remain to be investigated.

HISTORY AND EVOLUTION OF WOODPECKERS

Many questions remain to be answered about the origin, history, and evolution of woodpeckers. The oldest acceptable fossils of bonafide picids are not very old (Pliocene), and it is clear that the family is much older, probably dating from the early Tertiary. Present-day woodpeckers are too specialized as a group to give us much of an idea of what the ancestor was like. I surmise that woodpeckers originated from one or possibly several related groups of “proto-barbets” early in the Tertiary. What these earliest woodpeckers were like is difficult to say, but perhaps they resembled to some extent the generalized Nesoclitites micromegas, a peculiar, large piculet with a stance and manner of perching and vocalizations (antiphonal duetting) similar to those of barbets. Or they may have resembled somewhat the modern tinker-barbets (Pogoniulus) of Africa (nothing like these barbets now exists in the New World). The wrynecks must have been an early offshoot of this line. The more specialized picuets formed another such offshoot. Among the earliest of true woodpeckers probably were the ancestors of the Melanerpini, the Campetherini and the Colaptini. As these groups evolved, diverged, and spread, the Meiglyptini and then the Picini and Campephilini, which contain the most specialized woodpeckers, evolved.

Where did these events transpire? In the absence of fossil evidence no clear-cut answer can be given. The evidence available suggests a New World origin of the family, with early invasion of the Old World by ancestral wrynecks (which may prove to be derived from an ancestor not greatly unlike Nesoclitites) and by early Colaptini and Campetherini (early representatives of the former could have given rise to the Campetherini in Africa). It is conceivable that the earliest Campetherini occurred throughout the Old World, along with Colaptini, and that these were replaced later by the Meiglyptini, by the more specialized Picini, and eventually also by campophiline and advanced campetherine (Picoides) groups.

There are numerous gaps and difficulties with these interpretations. Africa is an enigma: Why have so few picid groups reached there, why are there so few species there, and how did a bird such as the ancestor of Sasia africana reach Africa, without other accompanying Picidae? Whatever the answers to these questions, the African woodpeckers show no close relationship to other Old World Picidae with the exceptions of Sasia africana (to Asian Sasia), Jynx ruficollis (to Eurasian J. torquilla), and Picoides obsoletus (to cosmopolitan Picoides, a campetherine derivative). Another problem is the evolution of the Melanerpini and the history of this group. There is no question about this being a New World group, but did it give rise, or rather did its ancestor give rise, to the Colaptini? Other than to that group it
appears to show no close relationships with other Picidae. The plumage patterns and strong social behavior of the Melanerpini are barbetlike and were largely lost in other derived groups of Picidae.

Other than Picoides, which is cosmopolitan, three groups share American and Asiatic ranges. Each of these groups is represented by only one species in southern Asia but is well distributed and more speciose in the Americas. Only one of the three occurs in Eurasia as well. These groups are Picumnus of the Picumninae (Picumnus innominatus), Dryocopus of the Campephilini (Dryocopus javensis), and Celeus of the Colaptini (Celeus brachyurus). Behaviorally and structurally these species seem properly placed in their respective genera. Among the Picumninae, Sasia, with three species, has an Afro-Asian distribution; it too may be a derivative of New World Picumnus. Picumnus innominatus shares plumage characters, including the derived tail pattern, with Picumnus; and its behavior resembles the behavior of Neotropical Picumnus. It probably represents a relatively old connection or passage around Beringia to Asia (this infers a North American occurrence, for which fossil evidence should be sought). Dryocopus, derived from Celeus in the Americas, could be relatively as old (early Pliocene?) as Picumnus in the Old World. The occurrence of Dryocopus martius in Eurasia and the resemblances of both javensis and martius to the American pileatus group of that genus suggest movement of the ancestor to the Old World from North America. Other than Sasia as possibly derived from Picumnus, neither Picumnus nor Dryocopus appears to have been involved in the evolution (from their ancestors) of any other Old World species. Celeus on the other hand seems to have given rise directly to Picus, and from that base to all the Picini. The Meiglyptini also appear to have been derived from some ancestral group of Colaptini. These points suggest an older occurrence in Eurasia of Celeus or pre-Celeus. It is conceivable, despite this, that C. brachyurus itself is recently arrived in Asia from North America, but there is no evidence to support this other than its close resemblance in structure, plumage, and behavior to modern Neotropical species of Celeus. Among the Picini, Picus minimus clearly shows similarities to Celeus, although not directly to C. brachyurus. Other Picini superficially resemble Celeus in having reverted to a rusty coloring, but they (Blythipicus) are different structurally and behaviorally, being more advanced derivatives of the Picini. Among the Meiglyptini the genus Meiglyptes seems somewhat similar to Celeus in structure, habits, and behavior, although again, this genus does not particularly resemble Celeus brachyurus. Possibly the radiation of the Picini resulted in elimination of all Celeus species in Asia other than the ancestor of the slightly aberrant C. brachyurus.

HYBRIDIZATION

Interbreeding or interspecific hybridization reflects the often local breakdown of reproductive isolating mechanisms when species are involved. Species which hybridize in nature usually are members of the same superspecies; i.e., they are closely related ("next of kin"). Their hybridization occurs in a zone of contact, or a zone of overlap in which both parental species must occur. Rarely hybridization involves distantly related species. Intraspecific hybridization between distinctive populations of a species reflects the former geographic isolation of the populations involved and a secondary contact where they meet to form a hybrid zone. These views were discussed in detail elsewhere (Short, 1969a).

Distinct races or groups of races (subspecies and races are synonyms) that hybridize are known in Picumnus cirratus, Campethera cailliayi, Dendropicos fuscucus, D. gabonensis,
D. elliotii, D. goertae, Piculus rubiginosus, Colaptes melanochloros, C. auratus, C. rupicola, C. campestris, Celeus elegans, and Dinopium benghalense. In most of these, distinct hybrid zones are documented. Hybridization between two of the three groups that hybridize in Colaptes auratus form a vast hybrid zone extending from Oklahoma to Saskatchewan and west through British Columbia. From this zone, introgression, or the flow of genes representing the extreme forms, takes place from Atlantic to Pacific coasts (Short, 1965a). Hybrids also occur sympatrically between two extreme forms or morphs of the species Melanerpes cruentatus. The black-headed morph of this species long was considered a separate species, Melanerpes rubrifrons. The situation is peculiar in that the morphs are only semidiscrete; sometimes intermediates occur, and otherwise only the extremes occur together (they are identical except for head pattern; the white superciliary stripe and connected golden yellow and white nape patch of cruentatus is lacking in the rubrifrons morph).

Hybridization to varying degrees occurs among members of superspecies. These have allopatric but parapatric ranges, or they may overlap slightly, with occasional hybridization. The allospecies involved are: Picus cirratus and P. albosquamatus; Melanerpes hoffmannii and M. aurifrons, and also M. aurifrons and M. uropygialis (all three are in the same super-species); Sphyrapicus varius and S. nuchalis, and in the same superspecies S. varius and S. ruber, and S. nuchalis and S. ruber; Campephaga maculosa and C. cailliattii; Picoides assimilis and P. syriacus, and in the same superspecies P. syriacus and P. major, and P. leucopterus and P. major; Picoides scalaris and P. nuttallii; Vireonis passerinus and V. frontalis (see species accounts): Celeus elegans and C. lugubris; and Dryocopus schulzi and D. lineatus.

Rarely hybrids occur among more distantly related, often widely sympatric species. Examples are the few (or one) known hybrids of Sphyrapicus nuchalis and S. thyroideus, Picoides leucotos and P. major, Picoides nuttallii and P. pubescens, Picoides villosus and P. scalaris, and Picus viridis and P. canus. It is uncertain to what extent Picumnus varzeae hybridizes with P. cirratus; these conceivably could form a superspecies, or they may fit in the same category as other examples in this paragraph.

Hybridization occurs because reproductive isolating mechanisms either are nonexistent or ineffective (hence the interbreeding is between conspecific populations) or because usually effective isolating mechanisms maintaining species have broken down, for one reason or another. In the case of the latter situation, the breakdown of normally effective isolating mechanisms, the two species also must be genetically closely similar or no hybrids can occur (or if they did occur, they would not develop to adulthood). Most known hybrids between species that are not closest relatives are adult specimens. Although not numerous, their very occurrence raises the question of the efficacy of natural selection in weeding out less fit individuals, such as these hybrids. Some effects of hybrid vigor may be responsible for this apparent laxity of natural selection. For example, a hybrid between distantly related species may be very aggressive (and thus compete well with individuals of both parental species) but be incapable of successful breeding.

In the case of hybridization between closely related species forming a superspecies, it is evident from their close relationship that they are likely to be very compatible genetically. Since their isolating mechanisms presumably had developed only recently, and may not be completely effective, it is easy to understand why hybrids occur when such close relatives meet. Other factors promoting hybridization between allospecies of superspecies that come into contact are: (A) the two species meet at the borders of their ranges where neither may be fully adapted environmentally; hence, hybrids to some degree may represent genetic combinations of both that are unique to the hybrids and to some extent prove beneficial in
the particular environment in which the hybrids occur; and (B) one of the two species, again because both are at the extreme borders of their ranges, may be less common; hence, the pressure of breeding needs may force an individual of one species to accept as a mate an individual of the other species, resulting in hybrid offspring. Reproductive isolating mechanisms usually are a reflection of underlying genetic incompatibilities. Regardless of the reasons for the occurrence of these interspecific hybrids, and the possible beneficial attributes they may have, so long as their reproductive capabilities are lower than those of their parental species the trend will be toward evolution in those species of more effective isolating mechanisms that will reduce and ultimately eliminate hybridization (or render it so rare as to be inconsequential, i.e., in the category of rare hybrids just noted between more distantly related species).

RELATIONSHIPS AND CLASSIFICATION

The scheme of classification and relationships of woodpeckers put forth here is largely new; it is based upon two decades of researches of my own and with my colleagues Walter J. Bock and Hans Winkler. Previous schemes, and the major arrangement of Peters (1948), are based upon relatively superficial morphological studies that arranged woodpeckers into a "morphocline" of increasing specialization, as I have noted earlier. It was tacitly assumed that there had been but one woodpecker line consistently evolving ever more specialized woodpeckers. Such a view is not in accord with our knowledge of evolutionary processes, and it is not supported by diverse facts about woodpeckers that may be brought to bear on this matter. Rather, it seems that early, generalized woodpeckers gave rise to several groups, from each of which independently there arose more specialized, derivative groups (Short, 1974f). This was demonstrated to a degree by W. J. Bock (1963) and by Short (1971a, 1971g) and was suggested in mainly behavioral treatises of Short (1970a, 1970c, 1971f, 1973a, 1973d, and 1974d). Not all of the aspects of the systematics of woodpeckers at all levels can be elucidated here, but some basic points must be made.

At this point I place more reliance on external morphology and behavior rather than on other data (see Short, 1976), because we have the bases for evaluating functionally features of external morphology and behavior, and thus we can place a taxonomic valence upon them. In contrast, we cannot do this for anatomical studies that simply tabulate traits and the presence or absence of features, with no functional analyses, nor can we effectively employ biochemical and other techniques whose development is such as to yet preclude evaluation of functional and possibly convergent parameters. Without functional data it is particularly difficult to apply anatomical information (e.g., see Goodge, 1972) to the taxonomy of a structurally uniform and specialized group such as woodpeckers, which are likely to show much "microconvergence" internally. To a degree it is possible to work upward, from the species level to the level of the genus in appraising generic relationships.

Some indication of the use of external morphological characters in elucidating woodpecker relationships is provided by the following examples. *Picumnus innominatus* of Asia shares with Neotropical *Picumnus* a unique pattern of laterally convergent white stripes and a center white stripe in the tail. The uniqueness of this derived pattern is strong evidence for the close taxonomic affiliation within *Picumnus* of this species. Intermediate between genera, and connecting genera and even tribes, are: (1) *Dryocopus galeatus*, intermediate in
head pattern between *Celeus* and *Dryocopus*, having the bare nostrils of *Celeus* and other markings and structures intermediate between, or tending toward, one or the other genus (it almost could be placed in *Celeus* as well as *Dryocopus* and thus connects the Colaptini and Campephilini); (2) *Picus miniaceus*, intermediate between *Celeus* and *Picus* (and thus Colaptini and Picini), showing the head pattern and bill structure, as well as some habits (quiet demeanor, foraging long at one site, some calls) of *Celeus*, coupled with body patterns of *Picus* and some calls of that genus; and (3) *Picoides temminckii* and *maculatus*, having yellow shaft color traces and bill structure tending toward African *Dendropicus*, as well as patterns of the head resembling *Picoides*. Other examples are less spectacular; e.g., *Dinopium rafflesii* tends toward *Picus* in plumage, and *Sapheopipio* shows tendencies toward both *Picus* and *Blythipicus*. Anatomists and others have ignored these obvious indicators of relationship.

A word might be said about convergence in plumage characters. I am quite prepared to accept convergences (essentially unrelated or very distantly related species come to look very similar for one of several reasons, such as common environmental selection pressures or social mimicry), but I have yet to find a proven case of convergence in birds that involves minute details of pattern, including sexual markings. Rather, close similarities belie descent and relatedness, and it is up to those who would dispute this to provide evidence that resemblances are due to factors other than relationships. Similarities in pattern such as those of *Macronyx* of Africa with *Stumella* of the Americas* are of an order different by many degrees from those involving head and body patterns between, say, *Dinopium javanense* and *Chrysocolaptes lucidus*. There is no a priori reason to expect convergence to affect behavior, such as complex displays and vocalizations, except in special cases such as flocking calls in social groups of birds. Close resemblance in plumage features, external structures, displays, vocalizations, and other behavior patently calls for relationship and genetic similarity as the underlying cause.

The classification presented in the next section now will be discussed at two levels, that of subfamilies, tribes, and genera and, briefly, that at the species level, which largely is treated in appropriate species accounts.

No linear arrangement of taxa at any systematic level can be fully satisfactory because evolution does not operate to produce such an arrangement. At the level of subfamilies, I place the wrynecks first, although they certainly are specialized in many ways, because they are less specialized than piculets or woodpeckers in foraging and other ways. It is not to be inferred from the classification that wrynecks gave rise to piculets and woodpeckers. The piculets again are specialized, but less so than the woodpeckers, hence their position. The specialized Picinæ is last.

Within the Jynginae and Picumninæ there are few problems at higher taxonomic levels. Effectively, the two wrynecks form a single zoogeographic species. In the Picumninæ I have (Short, 1974d) separated the Antillean Piculet from the other piculets in a tribe of its own, the Nesoctitini, because of the peculiar habits and structures of that piculet, which shows no close relationships with the others. Indeed, *Nesoctites* may represent a relict of an early picid group that is only indirectly related to the other piculets, placed in Picumninæ. At the generic level I merge African *Verreauxia* into *Sasia* because of its close relationship to Asian *S.*

*Both have a black ventral V on a yellow or red background; but there are, after all, only a finite number of such pattern possibilities.
ochracea and abnormis, as shown by similarities in its structure and juvenile plumage. The African species, in contrast to its Asian relatives, has four toes; but the hallux is thin and weak, and the number of toes simply is not a significant generic trait.

The Picinae are arranged in six tribes. In the section on History and Evolution of Woodpeckers (see p. 38) I treated the origin of these tribes. It remains to discuss the sequence of the tribes, the genera to be included in each tribe, and the arrangement of genera within tribes.

The sequence of Melanerpini, Campetherini, Colaptini, Campephilini, Picini, and Meiglyptini is based upon presumed primitive-derived sequences. The last, and especially the first, of these six tribes are well set off from the others; and their precise placement in a linear sequence is affected by the need to maintain other tribes that are closely related in positions reflecting this. Thus the Campetherini and Colaptini are closely related, and the Campephilini and Picini are derivatives of the Colaptini. One could argue that the Melanerpini ought to go after the Colaptini, but that would split the Colaptini from its derivatives, or that the generalized Meiglyptini should follow the Colaptini, but the same objection holds. Very often in linear arrangements one has to proceed along one line to its end, then go back and commence or pick up another line, and that is the case here.

The inclusion of genera in the tribes is of course based upon their relationship to one another. The wrynecks and piculets present no problems. Among the piculets, Sasia and Picumnus are much more alike structurally and in plumage and behavior than is Nesocites to either. The last genus stands well apart from the other piculets and merits tribal recognition.

The Melanerpini are a rather closely knit group, well set off from other woodpeckers. The genera of this tribe have been discussed previously (Short, 1970a, 1974d; Short and Morony, 1970). I have no doubt whatsoever that sapsuckers (Sphyrapicus) are melanerpine and that Xiphidiopicus, as well as Melanerpes striatus, falls in this assemblage. The number of supposed genera merged into Melanerpini is dictated by the rather close relationship of all the species I have included within that genus, the gradation through the "Tripsurus" complex of extremes within Melanerpis, and the much greater distinctions of Sphyrapicus and Xiphidiopicus. Recognition of other, ill-defined "genera" separated out from Melanerpis would obscure the distinctiveness of Sphyrapicus and Xiphidiopicus, with Melanerpis the well-defined groups of the Melanerpini.

The Campetherini are another well-knit group, although showing close ties with the Colaptini. Problems within the tribe chiefly revolve about the number of genera to be recognized. I agree (Short, 1970a; 1980) with Goodwin (1968) that the African woodpeckers, aside from the piculet and wrynecks (also excluding Picoides obsoletus), are more closely interrelated than any of them is to woodpeckers outside Africa. There has been no question concerning Campethera as a genus containing the species I have assigned to it, but I note that C. caroli is as divergent from the C. nubica complex as are elements of Dendropicos that have been treated as separate genera. The genus Dendropicos contains 12 species (only two more than Campethera) that have been placed in as many as six different genera. The supposed genera are more or less well-defined species groups not of generic rank. One connecting link between species groups is D. stierlingi, which shows characteristics of both the namaquus and fuscescens groups. A final matter is inclusion in Campetherini of Picoides, which I feel is a derivative of Dendropicos. Rather than putting Picoides in a tribe of its own, which would be monotypic, relationships are best shown by placing Picoides in the Campetherini. Species of Picoides that tend strongly toward Dendropicos and seem to represent primitive Picoides are P. temminckii and P. maculatus (if these two were the only species of Picoides they
likely would be included by taxonomists in *Dendropicus*). Resemblances of *Picoides* with Neotropical *Veniliornis* are superficial, although they could reflect to a degree the common ancestry of Colaptini (*Veniliornis*) and Campetherini (*Picoides*), as probably do similarities among all of *Dendropicus*, *Picoides*, and *Veniliornis*.

The Colaptini are rather well marked, showing resemblances (shaft color, head markings including black loral mark of juveniles, and vocal and other behavior) with the Campetherini and containing a genus (*Celeus*) that could be separated into a tribe of its own (this situation is like that of *Picoides* within the Campetherini). Again, it better serves the purpose of indicating relationship to place *Celeus* within the Colaptini than by itself outside it. As just noted, *Veniliornis* shows some resemblance in pattern (plus size and relative degree of specialization of the bill and tail) to *Picoides*, which is related to *Veniliornis* only through the stem of the Campetherini – the resemblances could be convergences or parallelism or both. There have been no recent attempts to subdivide *Veniliornis*. Through *V. nigriceps* and *V. dignus*, *Veniliornis* grades into less specialized, more variable *Piculus*, which has been divided into "Chloronerpes" and *Piculus*, but not in recent decades. Within *Piculus* the two subgroups show tendencies toward *Veniliornis* (*Piculus, sensu stricto*) and *Colaptes* ("Chloronerpes" subgroup). *Piculus rivolii* and the *P. rubiginosus* superspecies closely resemble flickers (*Colaptes*) in head pattern, as well as in vocalizations and displays (Short, 1972b). *Colaptes* differs from *Piculus* mainly in its terrestrial feeding habits, its larger size, its less specialized wood-pecking skull, and its being noisy and conspicuous. The green or forest flickers (*C. punci
gula* and *C. atricollis*) are most like species of *Piculus*; *C. auratus* and *C. fernandinae* are intermediate; and *C. rupicola* and *C. campestris* are more social and terrestrial, with louder, piercing vocalizations. *Celeus* probably arose from an ancestor in common with the ancestor of the *Piculus* line that led to *Colaptes*. Among *Colaptes*, *C. fernandinae* (once placed in the monotypic genus "*Nesoceleus*") shows resemblance to *Celeus* in pattern and bare nostrils; and the *chrysocloros* group of *Piculus*, in its rusty tendencies, wing pattern, and nesting habits (nests in carton nests of ants), resembles *Celeus*. The last genus shows remarkable plumage uniformity but great structural diversity for a picid genus (e.g., compare *Celeus brachyurus*, *C. undatus*, *C. flavescens*, *C. flavus*, and *C. torquatus*).

The next tribe, the Campephilini, contains the genera *Dryocopus* and *Campephilus*. Of these, *Campephilus* is more specialized for pecking wood, but the group as a whole contains the most specialized of large woodpeckers, *D. martius* in its way being much like a large *Campephilus*. Goodwin (1968) separated the four American species of *Dryocopus* from the two Eurasian species (*martius* and *javanensis*), retaining *Dryocopus* for the last two and placing the former four in with the smaller species of *Campephilus* in the genus *Phloeoceastes*. Although I believe that this action is incorrect, it does emphasize the close relationship of *Dryocopus* and *Campephilus* (those who do not feel American *Campephilus* is related to *Dryocopus* will search in vain for any other New World group remotely close to *Campephilus*). The Old World *martius* and *javanensis* do differ somewhat from their American congener’s, but *Dryocopus pileatus* surely is their closest relative. As mentioned previously in the section on evolution and history, *Dryocopus galeatus* of South America is almost perfectly intermediate between *Celeus* and *Dryocopus*, clearly indicating the derivation of the Campephilini. The species of *Campephilus* often are separated in two (*Phloeoceastes* and *Campephilus*) or three (plus *Ipocrantor* for the southern temperate *C. magellanicus* “genera,” but such splitting is untenable and requires further splitting of equally separable subgroups within *Phloeoceastes* (Short, 1970c). I have shown in the last-mentioned publication that the big “ivorybills,” northern *C. imperialis* and *C. principalis* and southern *C. magellanicus*, evolved independently
from different lines of smaller *Campephalus* species. This further emphasizes the desirability of including all of them within the same genus.

The Picini contain an array of Old World, mainly Asian genera interrelated through the base-group of least specialized species comprising the genus *Picus*, which in turn is directly related to *Celeus* (*Picus miniaceus* is nearly intermediate between *Picus* and *Celeus* in plumage patterns and is intermediate in behavior). The 13 species of *Picus* have not been split into separate genera in recent years and form a monophyletic assemblage. *Dinopium* contains three-toed and four-toed species (they have been generically subdivided on the basis of number of toes, but *shori* has either three or four toes!) related through *D. rafflesii* to *Picus* and through this species and *Gecinus* to *Blythipicus* and *Reinwardtippicus*. *Chrysocolaptes*, patterned much like *Dinopium*, is related closely to it as shown by behavior, including vocalizations, as well as by details of plumage (see Short, 1973d; those who doubt this should ask what Asian group other than *Dinopium* could possibly be related to *Chrysocolaptes*). In my work with Walter Bock, evidence from plumage characters showed "*Chrysocolaptes* validus not to be related to *C. lucidus* and *C. festivus*; this was later corroborated by behavioral studies (Short, 1973d, and the latter studies plus further morphological investigation (Short, 1976) rather strongly ally *validus* to *Blythipicus*. For the time being it is removed from *Chrysocolaptes* and placed alone in *Reinwardtippicus. Gecinus* (Short, 1973d), *Sapeheoipio* (Short, 1973a), *Blythipicus* (Short, 1973d), and *Reinwardtippicus* clearly are derived from generalized Picini much like present-day species of *Picus* or *Dinopium rafflesii*.

The last tribe, the Meiglyptini, seems to represent an old radiation in Asia, predating the evolution of advanced Picini. The genera of this tribe, *Meiglyptes*, *Hemicircus*, and *Mulleripicus*, are in appearance and movements unlike all other woodpeckers in a way that is difficult to express. All are bulky in the body and have a thin, long neck with a somewhat small head. They exhibit patterns and structures unique in woodpeckers (fine, spotted head markings in *Hemicircus* and *Mulleripicus*, white crown in *Hemicircus*, back gland in *Hemicircus* [Bock and Short, 1971]), and some of their displays and vocalizations are unusual (Short, 1973d). *Meiglyptes* is the least specialized among them and resembles *Celeus* to a degree in patterns of plumage and habits (Short, 1973d); patterns such as the crown-crest pattern of *Hemicircus concretus* adult males and juveniles and the extended malar pattern of *Mulleripicus* also are suggestive of *Celeus*. *Hemicircus* is more specialized for pecking wood than *Meiglyptes*; but it forages similarly to an extent, shows some resemblance in behavior, and has similarities in plumage, as well as in the general shape and appearance traits just noted. *Mulleripicus* contains large species that appear like overgrown *Meiglyptes*, but they have forsaken the generally secretive habits of *Meiglyptes*. Often *Mulleripicus* is placed near *Dryocopus* in classifications, but I find that the behavior of *M. pulverulentus*, including foraging habits, general appearance, sociality, all vocalizations, and displays, are completely unlike those of *Dryocopus*, of which I have observed five species and studied three species (Short, 1973d).

At higher taxonomic levels there remains to be discussed only the sequence of genera in the tribes. *Sasia* follows *Picumnus* in the Picumnini mainly because of the loss of a toe in the group and the bare skin about the eye, but I do not feel strongly about this arrangement. In the Melamernini, *Sphyrapicus* obviously is a specialized derivative of *Melanerpes* and follows it; *Xiphidiopicus* is distinct, but likely a derivative of an ancestral species of *Melanerpes* (it does not represent a pre- *Melanerpes* line, but may be a derivative of such). In the Campetherynini the generalized *Campethera* precedes derivative *Geocolaptes* and more specialized *Dendropicos*, and *Picojides* follows *Dendropicos*, from ancestors of which it evolved.
The Colaptini are somewhat anomalous in their arrangement because I have placed the rather specialized *Veniliornis* first; it perhaps could as well go after *Piculus* and *Colaptes*, but it ties in with *Piculus*, and I believe *Colaptes* to be a derivative of *Piculus*, thus the linear order *Veniliornis–Piculus–Colaptes* (the reverse would leave *Celeus* in an odd position away from its likely *Piculus–Colaptes* relatives). *Celeus* comes last because I believe it to be a derived line within the group and because of its connections with the following Campephilini and Picini.

The Campephilini are simple, the *Dryocopus–Campephilus* sequence being the only one possible, given the specialized nature of *Campephilus* and derivation of the tribe through *Dryocopus* from a *Celeus*-like ancestor. Within the Picini there can be no argument about *Picus*'s preceding the other genera, for it is the base-genus of the tribe, derived from a *Celeus*-like ancestor. The lines leading from *Picus* are *Dinopium–Chrysocolaptes*, *Gecinulus*, *Sapheopipo*, and *Blythipicus–Reinwardtipicus*. Of these, *Gecinulus* and *Sapheopipo* are likely to be derivatives of the line leading to *Blythipicus*; hence, these should precede and be associated with *Blythipicus–Reinwardtipicus*. It is not important whether the *Dinopium–Chrysocolaptes* sequence precedes or follows the *Gecinulus–Sapheopipo–Blythipicus–Reinwardtipicus* line, but I place it first after *Picus* because *Dinopium* rafflesii is very *Picus*-like. *Chrysocolaptes* is the specialized genus of the *Dinopium* line and must follow less specialized *Dinopium*. Both *Gecinulus* and *Sapheopipo* are somewhat specialized. They do not directly connect *Picus* with *Blythipicus*, and either could precede or follow. I use this sequence because *Sapheopipo* shows more resemblances to *Blythipicus* than does *Gecinulus*, although some of the resemblances may be due to parallelism. *Blythipicus* is more specialized for wood pecking (modified tail, sturdy bill) than either *Gecinulus* or *Sapheopipo*. *Reinwardtipicus* follows *Blythipicus* because it appears to be derived from it.

The sequence of the Meiglyptini proceeds from the small *Meiglyptes* that most resemble *Celeus*, through small *Hemicircus* (specialized but related directly to *Meiglyptes*), to large, peculiar *Mulleripicus* (the reverse sequence is implausible, *Mulleripicus* and *Hemicircus* being more specialized than *Meiglyptes*).

The relationships of the species are discussed under each species, the question indirectly or directly in mind being "What is the closest relative?" of each species. At the level of species a few words might be said about sequences of species in some of the genera, especially the large genera (the sequence of species in small genera usually is made clear in the discussion of the species in the species accounts).

Of all groups of the Picidae, the picilets are least known, and I have less confidence in the sequence of *Picumnus* than in any other sequence. In *Picumnus* I have used information suggested to me in correspondence from Kenneth Stager, who studied the genus for many years but has not published his findings. Nevertheless, I departed from some of his suggested arrangements, as I place less reliance on simple bar and spot markings than does he. Asian *P. innominatus* more resembles the *aurifrons* group of *Picumnus* than any other, and this group is presented first. The array of nine species of the *cirratus* group (*P. sclateri* through *P. albosquamatus* [see next section]) is a monophyletic unit and comes next, with the evolving, widespread superspecies containing *albosquamatus* and *cirratus* terminating that group. Next come some possibly closely related species (*fuscus* through *nebulosus*), rather distinct in pattern in a group in which such distinctiveness is uncommon. The species *castehtau*, *subtilis*, *olivaceus* and *granadensis* form a group, with the widespread, submontane *olivaceus* superspecies listed last. Large, distinctive *cinnamomeus* is last in the genus.

*Melanerpes* presented problems: I consider the barred-backed Central and North Amer-
ican "Centurus" group as the most recently evolved species group in the genus. The distinct species of the genus are related not to this "Centurus" subgroup, but to the formicivorus-erythrocephalus group; and they (M. candidus, lewis, herminieri, cactorum, and striatus) are scattered about the Americas. Also, the derived genera Sphyrapicus and Xiphidiopicus show resemblances to the formicivorus group of Melanerpes, which therefore is likely to be older than the Centurus subgroup. The species chrysogenys, hypopolius, and rubricapillus appear to represent a "clinal" array of precursors of the carolius superspecies, the culmination of this "Centurus" line. In addition, the "Tripurus" group, which is a superspecies (M. cruentatus and its allospecies), tends away from the formicivorus group and toward the "Centurus" group in the sequence cruentatus-flavifrons-chrysaecuen-pucherani. The overall sequence reflects these views. The need to keep closely related species near one another results in some of the more distinct species being placed at the beginning (candidus and lewis) and in the center (striatus, radiolatus, and cactorum) of the sequence.

Campethera is arranged from the more generalized, rather open country (even partly terrestrial) species (punctuligera and allies) to the more specialized, distinctive, and forest-dwelling tuldbergi, nivosus, and caroli. The sequence in Dendropicos reflects the existence of a base-group (D. fuscens and allies) of somewhat generalized species followed by stierlingi which connects the fuscens group and nanuquus-xantholophus-pyrhogeaster (specialized woodpeckers), then the distinctive elliotii and the goertae superspecies; the last two groups I believe to be independently derived from a fuscenslike ancestor (Short, 1980).

I have published on Picoides (see especially Short, 1971f, 1973d, 1974c; Winkler and Short, 1978) relationships. The American group is monophyletic and, including the specialized three-toed woodpeckers, is placed last. The sequence within that group of 11 species (mixtus to arcticus in the list) is from less specialized to more specialized species, the latter also showing reduced barring in the plumage, in general. (It was the "primitive," ladder-backed group that reached South America and seemingly is being replaced, especially in northern forests, by derivative species.) The Old World Picoides begin with the species most resembling Dendropicos; they conclude with the red-bellied group (maeoi through major in the list), which apparently evolved after earlier forms lacking the red belly had reached the Americas. The terminal group of the red-bellied complex is the superspecies P. major. Except for P. minor of the "primitive" group, Palearctic species of Picoides are the successful radiating species of the major group and its antecedents, P. medius and P. leucotos. Somehow isolated species whose exact placement is especially tentative are obsoletus, which is representative of the "primitive" group, and hyperythrus, a specialized sap-sucking member of the red-bellied group.

The sequence in Colaptes has been mentioned earlier. That of Veniliornis and Piculus is from more generalized, often somewhat isolated species to more specialized, widespread, and actively speciating groups (superspecies). In Celeus the structurally less specialized, smaller species come first; Celeus loricatus and the undatus superspecies most closely resemble Asiatic brachyurus. Peculiar flavus follows the elgans superspecies. Specialized spectabilis and torquatus, paralleling Dryocopus in their bill structure and other specializations, are last.

Within Campephilini the sequence of Dryocopus begins with Celeuslike D. galeatus, proceeds through the pileatus superspecies, and ends with javensis, then martius. Of the two Old World species, tropical javensis more nearly resembles D. pileatus in vocalizations than does martius. To some extent the two large Eurasian Dryocopus are the counterparts in the
Old World of New World *Campephilus*. In *Campephilus* the sequence commences with somewhat Dryocopus-like *C. pollens*, then *haematogaster* and *rubricollis*, through *robustus* to the *melanoleucos* superspecies, thence to *leucopogon*, *magellanicus*, and the big ivorybills. As noted earlier, *magellanicus* and the *principalis* superspecies were derived independently; they appear side-by-side because of the usual problems of linear sequencing. I believe (Short, 1970c) *magellanicus* to have been derived from the *melanoleucos* group through the ancestor of *C. leucopogon*, whereas the *principalis* superspecies evolved directly from the ancestor of the *melanoleucos* superspecies in northern Middle America.

The sequence of species in all genera of the Picini except *Picus* is the result of relationships expressed within the species accounts; in each case less specialized species tending more toward *Picus* than other congeners, precede more specialized, derived species. The sequence for *Picus* starts with *P. miniaceus*, which tends toward *Celeus*, and then follow the related *chlorolophus* and *mentalis* superspecies. The remaining species comprise a single group, commencing with Asian “primitive” species *vittatus* and *xanthopygaeus* and leading through *squamatus*, *awokera*, and *viridis*, on the one hand, and, with side branches to *rabieri* and *erythropygius*, to *canus* on the other. The *viridis* group shows a fragmented range, with isolates in western Eurasia (*viridis*, especially the race *vaillantii* in northwestern Africa), in Japan (*awokera*), and south-central Asia (*squamatus*). *Picus canus* evolved after *viridis* and its relatives; it spread through the central part of the ancestral *viridis* range and is widespread from Europe to Japan and south into Asia as far as Sumatra.

The final tribe, the Meiglyptini, contains three small genera offering no major problems of sequencing. *Meiglyptes* commences with *tristis* and *jugularis*, which most resemble *Hemicircus*, within which *H. catente* seems to be the more derived species. All of the species of *Mulleripicus* are closely related, but *pulverulentus* seems to be the species most strongly derived.

I conclude this section with mention of the endangered and threatened species of Picidae, insofar as is known, hoping that by calling attention to them I will stimulate efforts to preserve them. Endangered are: (1) the possibly extinct Imperial Woodpecker, *Campephilus imperialis*, with few questionable reports of one bird over the past two decades; (2) the Ivory-billed Woodpecker, *Campephilus principalis*, known certainly only from a few pairs in eastern Cuba; and (3) the Okinawan Woodpecker, *Sapheopipo noguchii*, of which somewhat under 200 birds probably exist on Okinawa. These species are distinctive and every attempt must be made to save them.

Species that I consider rare and worthy of special studies to determine their exact status, but also meriting immediate efforts at preservation, are Stierling’s Woodpecker, *Dendropicos stierlingi*, of southeastern Africa (very rare in collections and not reported recently)* and the Helmed Woodpecker, *Dryocopus galeatus*, of southeastern Brazil and perhaps adjacent Paraguay and Argentina (unreported in 20 years, rare in collections, and existing, if it does, in a rapidly deteriorating environment due to continual removal of forests).

Known to be uncommon to rare, and deserving protection and study, is the Red-cockaded Woodpecker, *Picoides borealis*, of southeastern North America (diminishing and usually designated “endangered,” but found over a wide range and easily protected through appropriate management of forests).

Finally, data are needed concerning the following species, which seem to me rare or uncommon and possibly threatened, or which occur in a small area in low numbers:

*Apparently not threatened (Short and Horne, 1981).*
(1) *Picumnus fulvescens*, known only from a few specimens in Brazil; (2) *P. limae*, likewise rare in collections and little known, from Brazil; (3) *P. castelnau*, restricted in range (northwestern South America) and few in numbers in collections; (4) *P. subtilis* of northwestern South America, also little known and rare in collections; (5) *Melanerpes herminieri*, restricted to forests on volcanic slopes in populated Guadeloupe; (6) *Picoides dorae* of the hills of western Saudi Arabia, requiring trees in an often treeless area, of unknown numbers; (7) *Colaptes femandinae* of Cuban savanna areas, numbers unknown, possibly threatened by land-use practices; (8) *Celes spectabilis* of eastern Peru, eastern Ecuador, and (one specimen) Brazil, very rare in collections and known from only a half dozen or so localities; and (9) *Picus rabieri*, an Indochinese species reportedly rare in the 1930s, certainly rare in collections, and of uncertain status following the recent war in that region.

**CLASSIFICATION OF THE PICIDAE**

**Jyninae**

- Jynx
  - *Jynx torquilla*
  - *Jynx ruficollis*  
  Northern Wryneck
  Rufous-necked Wryneck

**Picumninae**

- Picumnini

- *Picumnus*
  - *innominatus*
  - *aurifrons* (inc. *borbae*)
  - *lafresnayi* (was *aurifrons lafresnayi*)
  - *exilis* (inc. *nigropunctatus*)
  - *sclateri*
  - *squamulatus*
  - *spilogaster* (inc. *leucogaster, pallidus*)
  - *minutissimus*
  - *pygmaeus*
  - *steindachneri*
  - *varzeae*
  - *cirrus* (inc. *temminckii*)
  - *albosquamatus* (inc. *guttifer, asterias*)
  - *fuscus*
  - *rufiventris*
  - *fulvescens*
  - *limae*
  - *nebulosus*
  - *castelnau*
  - *subtilis*
  - *olivaceus*
  - *granadensis*
  - *cinnamomeus*

- *Speckled Piculet*
- *Bar-breasted Piculet*
- *Lafresnaye’s Piculet*
- *Golden-spangled Piculet*
- *Ecuadorean Piculet*
- *Scaled Piculet*
- *White-bellied Piculet*
- *Guianan Piculet*
- *Spotted Piculet*
- *Speckle-chested Piculet*
- *Varzea Piculet*
- *White-barred Piculet*
- *White-wedged Piculet*
- *Rusty-necked Piculet*
- *Rufous-breasted Piculet*
- *Tawny Piculet*
- *Ochraceous Piculet*
- *Mottled Piculet*
- *Plain-breasted Piculet*
- *Fine-barred Piculet*
- *Olivaceous Piculet*
- *Grayish Piculet*
- *Chestnut Piculet*
Sasia
africana (Verreauxia)

Nesoctitini
Nesoctites
micromegas

Nesoctites

Picinae
Melanerpini
Melanerpes
candidus (Leuconerpes)
lewis (Asyndesmus)
herminieri
porトリciensis
erythroceplalus
formicivorus

[craentatus (inc. rubrifrons)
flavifrons
chrysauchen
pucherani
cactorum (Trichopicus)
striatus
radiolatus
chrysogenys
hypopolius
rubricapillus

[hoffmauni (was aurifrons hoffmauni)
uropygialis (was hypopolius uropygialis)
aurifrons
carolinus

[superclariar is (inc. caymanensis)

Sphyrapicus

[variis

[uuchalis (was v. uuchalis)
rub（was v. ruber)
tlyroides

Xiphidiopicus

[persuuss

Campetherini
Campethera

[punctuliger
bennettii

[nubica

Sasia africana (Verreauxia)

Nesoctitini
Nesoctites
micromegas

African Piculet
Rufous Piculet
White-browed Piculet

Antillean Piculet

White Woodpecker
Lewis' Woodpecker
Guadeloupe Woodpecker
Puerto Rican Woodpecker
Red-headed Woodpecker
Acorn Woodpecker
Red-fronted Woodpecker
Yellow-fronted Woodpecker
Gold-naped Woodpecker
Black-cheeked Woodpecker
White-fronted Woodpecker
Hispaniolan Woodpecker
Jamaican Woodpecker
Gold-cheeked Woodpecker
Gray-breasted Woodpecker
Red-crowned Woodpecker
Hoffmann's Woodpecker
Gila Woodpecker
Gold-fronted Woodpecker
Red-bellied Woodpecker
Great Red-bellied Woodpecker

Yellow-bellied Sapsucker
Red-naped Sapsucker
Red-breasted Sapsucker
Williamson's Sapsucker

Cuban Green Woodpecker

Fine-spotted Woodpecker
Bennett's Woodpecker
Nubian Woodpecker
Golden-tailed Woodpecker
Knysna Woodpecker
Green-backed Woodpecker
Little Green Woodpecker
Tullberg’s Woodpecker
Buff-spotted Woodpecker
Brown-eared Woodpecker
African Ground Woodpecker

Little Gray Woodpecker
Speckle-breasted Woodpecker
Gold-mantled Woodpecker
Cardinal Woodpecker
Gaboon Woodpecker
Sterling’s Woodpecker
Bearded Woodpecker
Yellow-crested Woodpecker
Fire-bellied Woodpecker
Elliott’s Woodpecker
Gray Woodpecker
Olive Woodpecker

Temminck’s Pygmy Woodpecker
Philippine Pygmy Woodpecker
Brown-capped Woodpecker
Brown-backed Woodpecker
Japanese Spotted Woodpecker
Gray-capped Woodpecker
Lesser Spotted Woodpecker
Streak-bellied Woodpecker
Striped-bellied Woodpecker
Brown-fronted Woodpecker
Yellow-crowned Woodpecker
Arabian Woodpecker
Rufous-bellied Woodpecker
Crimson-breasted Woodpecker
Brown-throated (Darjeeling) Woodpecker
Middle Spotted Woodpecker
White-backed Woodpecker
Himalayan Woodpecker
Sind Woodpecker
Colaptini

Veniliornis
callonotus
dignus
nigriceps
fumigatus
[passerinus
fronitalis
spilogaster
sanguineus
[maculifrons
[affinis (inc. chocoensis)
cassini
[kirkii

Piculus
leucolaemus (inc. simplex)
flavigula
[chrysochloros
[aurentius
rubiginosus (inc. aeruginosus)
[auricularis
rivolii

Colaptes
atrificollis (Chrysoptilus)
[punctigula (Chrysoptilus)
melanochloros (inc. melanolaimus;
Chrysoptilus)
auratus (inc. cafer, chrysoides)
fernandinae (Nesoceles)
pitius
rupicola
campestris

Syrian Woodpecker
White-winged Woodpecker
Great Spotted Woodpecker
Checked Woodpecker
Striped Woodpecker
Ladder-backed Woodpecker
Nuttall's Woodpecker
Downy Woodpecker
Red-cockaded Woodpecker
Strickland's Woodpecker
Hairy Woodpecker
White-headed Woodpecker
Black-backed Woodpecker
Scarlet-backed Woodpecker
Yellow-vented Woodpecker
Bar-bellied Woodpecker
Smoky-brown Woodpecker
Little Woodpecker
Dot-fronted Woodpecker
White-spotted Woodpecker
Blood-colored Woodpecker
Yellow-eared Woodpecker
Red-stained Woodpecker
Golden-collared Woodpecker
Red-rumped Woodpecker
White-throated Woodpecker
Yellow-throated Woodpecker
Golden-green Woodpecker
White-browed Woodpecker
Golden-olive Woodpecker
Gray-crowned Woodpecker
Crimson-mantled Woodpecker
Black-necked Flicker
Spot-breasted Flicker
Green-barred Flicker
Northern Flicker
Fernandina's Flicker
Chilean Flicker
Andean Flicker
Campo Flicker
**Celeus**

- *brachyurus* (Micropternus)
- *loricatus*
- *undatus*
- *grammicus*
- *castaneus*
- *elegans* (inc. *jumana*, *immaculatus*)
- *lugubris* (was *flavescens lugubris*)
- *flavescens*
- *flavus*
- *spectabilis*
- *torquatus*

**Campephilini**

**Dryocopus**

- *galeatus*
- *schulzi*
- *lineatus* (inc. *erythrops*)
- *pileatus*
- *javensis*
- *martius*

**Campephilus**

- *pollens* (Phloeoceastes)
- *haematogaster* (Phloeoceastes)
- *rubricollis* (Phloeoceastes)
- *robustus* (Phloeoceastes)
- *guatemalensis* (Phloeoceastes)
- *melanolecus* (Phloeoceastes)
- *gayaquilensis* (was *melanolecus gayaquilensis*; Phloeoceastes)
- *leucopogon* (Phloeoceastes)
- *magellanicus*
- *principalis*
- *imperialis*

**Picini**

**Picus**

- *miniaceus* (was *mineaceus = miniatus*)
- *punicus*
- *chlorolophus* (inc. *chlorogaster*)
- *mentalis*
- *flavinucha*
- *vittatus* (inc. *viridanus*)
- *xanthopygaenus* (= *myrmecophoneus*)
- *squamatus*
- *awokera*
- *viridis* (inc. *vaillantii*)

Rufous Woodpecker
Cinnamon Woodpecker
Waved Woodpecker
Scaly-breasted Woodpecker
Chestnut-colored Woodpecker
Chestnut Woodpecker
Pale-crested Woodpecker
Blond-crested Woodpecker
Cream-colored Woodpecker
Rufous-headed Woodpecker
Ringed Woodpecker

Helmeted Woodpecker
Black-bodied Woodpecker
Lineated Woodpecker
Pileated Woodpecker
White-bellied Woodpecker
Black Woodpecker
Powerful Woodpecker
Crimson-bellied Woodpecker
Red-necked Woodpecker
Robust Woodpecker
Pale-billed Woodpecker
Crimson-crested Woodpecker
Guayaquil Woodpecker
Cream-backed Woodpecker
Magellanic Woodpecker
Ivory-billed Woodpecker
Imperial Woodpecker

Banded Red Woodpecker
Crimson-winged Woodpecker
Lesser Yellow-nape
Checker-throated Woodpecker
Greater Yellow-nape
Laced Woodpecker
Streak-throated Woodpecker
Scaly-bellied Woodpecker
Wavy-bellied Woodpecker
Green Woodpecker
rabieri
erythropygius
canus
Dinopium
rafflesii
shorii
javanense
benghalense
Chrysocolaptes
lucidus
festivus
Gecinulus
grantia (inc. viridis)
Sapheopipo
noguchii
Blythipicus
rubiginosus
pyrrhotis
Reinwardtipicus
validus
Meiglyptini
Meiglyptes
tristis
jugularis
tukki
Hemicircus
concretus
canente
Mulleripicus
fulvus
funebris (inc. fuliginosus)
pulverulentus
Red-collared Woodpecker
Black-headed Woodpecker
Gray-faced Woodpecker
Olive-backed Woodpecker
Himalayan Gold-backed Woodpecker
Common Gold-backed Woodpecker
Lesser Flame-backed Woodpecker
Greater Flame-backed Woodpecker
Black-rumped Woodpecker
Bamboo Woodpecker
Okinawan Woodpecker
Maroon Woodpecker
Bay Woodpecker
Orange-backed Woodpecker
Buff-rumped Woodpecker
Black and Buff Woodpecker
Buff-necked Woodpecker
Gray and Buff Woodpecker
Heart-spotted Woodpecker
Fulvous Woodpecker
Sooty Woodpecker
Great Slaty Woodpecker
The totals are 27 genera and 198 species, the latter representing 150 biogeographic species (which are superspecies plus those species that are not members of superspecies). The 32 superspecies that are treated contain 81 species. Thus nearly 41 percent of the 198 species are allospecies (see Amadon, 1966) of superspecies.

Genera recognized by Peters and synonymized here are:

- Asyndesmus = Melanerpes
- Chrysoptilus = Colaptes
- Dendrocopos = Picoides
- Leuconerpes = Melanerpes
- Mesopicos = Dendroctics
- Micropterus = Celeus

The following species, accepted by Peters (1948), have been reduced to subspecific status or synonymized (see under the respective species in the second column):

- Picumnus borbae
- Picumnus leucogaster
- Picumnus pallidus
- Picumnus asterias
- Picumnus pumilus
- Picumnus guttifer
- Picumnus tenminckii
- Melanerpes rubrifrons
- Melanerpes caymanensis
- Campethera permista
- Campethera taeniolaema
- Dendropticos lugubris
- Dendropticos (Polipicus) johnstoni
- Picoides (Dendropticos) wattersi
- Picoides (Dendropticos) arizonae
- Veniliomis chocoensis
- Piculus simplex
- Piculus aeruginosus
- Colaptes cafer
- Colaptes chrysoides
- Celeus jumana
- Celeus immaculatus
- Dryocopus erythropus
- Picus chlorogaster
- Picus viridanus
- Picus vaillantii
- Gecinus viridis
- Mulleriopicus fuliginosus

The following genera and species, not recognized by Peters (1948), but herein recognized, are:

- Reinwardtipicus for Chrysocolaptes validus
- Picumnus lafresnayi was P. aurifrons lafresnayi
- Picumnus elitis salvini includes P. nigropunctatus, described as new species
*Picumnus fulvescens*, new species

*Picumnus spilogaster* was synonym of *P. minutissimus*

*Picumnus subtilis*, new species

*Melanerpes hoffmannii* was *M. aurifrons hoffmannii*

*Melanerpes uropygialis* was *M. hypopolius uropygialis*

*Sphyrapicus ruber* was *S. varius ruber + S. v. daggettii*

*Sphyrapicus nuchalis* was *S. varius nuchalis*

*Celeus lugubris* was *C. flavescens lugubris*

*Campephilus gayaquilensis* was *C. melanoleucos gayaquilensis*

The following nomenclatural changes or decisions should be noted:

*Picus miniaceus* for *P. mineaceus* (= *P. "miniatus"")

*Picus xanthopygaeus* for *P. myrmecophoneus*
Part Two

Species Accounts
The 198 species of Picidae are discussed here in the order indicated in the last section on classification (see Part One, page 49). The species accounts contain sections and information as discussed in the Introduction to Part One. Superspecies are indicated by brackets about the specific name of the allospecies described first in a particular superspecies, following Amadon (1966); each allospecies of the superspecies bears this bracketed designation between its generic and specific names. Full citations for scientific names used herein are contained in Peters (1948); see also the last subsection of the Introduction (page 55), following the classification, for changes from Peters (1948) in this monograph. Each genus is listed with a brief descriptive statement following it, indicating some of its attributes, distribution, and number of species contained.

SUBFAMILY JYNGINAE

Genus *Jynx* Linné

The two closely allied species of wrynecks are distinguished by their relatively soft plumage, patterned in caprimulgiformlike browns, grays, black, and white; a relatively short bill pointed at the tip and strongly curved along the culmen; nostrils that are only partly covered by feathering; a long, soft tail showing no hardening or stiffening of the barbs and rachis; and typical zygodactyl feet of the order. The very distinctive plumage of these birds is unlike that of any other picid. The two extant species must be regarded as unspecialized, passerine-like picids, well isolated from the remainder of the family but with a derived plumage pattern. Their habits are somewhat like those of ant-feeding, generalized woodpeckers, but they do not seem in any way ancestral to the true woodpeckers. The two species occupy Eurasia and Africa.

NORTHERN WRYNECK

*Jynx* [torquilla] *torquilla*

Color Plate 1

Range Summary. Eurasia and northern Africa.

Diagnostic Features. Little, weight 30 to 45 grams (torquilla, perhaps mixed with himalayana), wing length 75 to 94 millimeters. The peculiar, nightjarlike (Caprimulgidae) pattern of peppered and blotched markings on a brown background and its size are diagnostic. Throat and malar areas barred brownish black, usually on a cinnamon to buff background; barred and spotted below on a buffy white background. Dark line through eye. Often seen on ground.

Description. Bill pointed, very narrow across nostrils, culmen curved. Above brown, tinged grayish to rusty, with diverse markings: a line of one to several broad black marks in center, to crown, bordered by pale, sometimes white area along scapulars; fine black spots, often elongate on shafts, or streaks without lateral extensions; fine white peppering throughout, forming white margins to some dark marks; fine, dark pepperlike spots or spot-bars; and often vague barring at bases or tips of feathers, especially on rump, which is colored like the back but is often paler. Uppertail coverts as back. Wings as back, or browner and more rusty,
often with large white spots on coverts; flight feathers brown with broad buffy to rusty bars; below fully barred buff and brown. Outer primary very short in adults; ninth (outer large) primary distinctly notched near tip of inner vane, forming a notch or slot (function unknown) with an indented outer vane of the eighth primary (seventh sometimes slightly indented). Shafts dull white below, horn-colored to brown above. Tail as back, but often darker with four to seven widely separated black bars, bordered by broader whitish and gray-brown or rusty brown bars; below paler, but similar; tail unmodified, soft; shafts not rigid as in woodpeckers. Tail/wing ratio diverse, 0.68 to 0.90. Crown and nape similar to back with central black marks reaching rear and emphasizing fine, dark, white spot-bordered bars. Narrow white line over eye, barred finely with black; ear coverts with brown line in center, breaking on neck, and bordered by buffy white, brown-barred feathers; lores, under eye, and malar area white to buff, finely barred brown. Sides of neck as throat, but often with brown streak forming a line to rear of malar area; throat white, mixed white and buff or buffy cinnamon with fine brown bars. Below variable, buffy white usually tinted more buffy on breast and often sides; usually finely to moderately barred on breast; sides and flanks barred, bars often with strong shaft streaks forming “crosses.” Abdomen unmarked whitish or marked with small crosses or even bars; undertail white with brown bar-crosses, often with broader borders of buffy or gray-brown.

Sexual features: Sexes alike. Immatures similar to adults but darker above with more barring; outer primary much longer than in adults; barring below more even, less streaking effect; tail with fewer dark bars; nestlings with large, rough “heel” pad. Eyes brown; legs and feet brown to gray-green. Bill horn brown, nape yellowish, mouth lining pinkish.

Distribution and Habitat. Eurasia from British Isles and Scandinavia entirely across Siberia and south discontinuously to northern Algeria, Sicily, Turkey, Kashmir, Sikang, Szechwan, and Hokkaido, Japan. Migrates south for the winter to central Africa (Cameroon, Uganda), India, Burma, Hainan, and all of Japan. It tends to be local in distribution, perhaps reflecting a need for suitable nesting cavities, and there are gaps in its range. Frequents open areas in diverse forests and woodlands, orchards and cultivated areas, and parks. It occurs up to 3300 meters in the Himalayan Mountains (Ali and Ripley, 1970).

Foraging Habits. Wrynecks feed generally on ants of various species, obtained chiefly on the ground. Ants of the genera Formica, Lasius, Pheidole, and Camponotus are taken by the birds as they hop about. Some food is secured in bushes and trees (especially in the foliage) entirely by gleaning. The wryneck is agile and has a remarkably flexible neck. The bird twists its neck greatly and employs its long tongue in extracting insects from crevices. Foods other than ants include insects such as weevils, various beetles, moths, spiders, and fruits (elderberries) in late summer and fall. Up to 500 ants have been found in one stomach, and breeding birds take billfuls of ants (adults and pupae, eggs, larvae) to their young. Occasionally wrynecks engage in flycatching, obtaining insects on the wing. In trees the Northern Wryneck usually perches crosswise, and it clings to the bark at times without appressing the tail, although it sometimes uses the tail for support (Witherby, et al., 1938).

Voice. Rarely the Northern Wryneck drums, woodpeckerlike, but weakly, slowly, and not audible at any distance (Witherby, et al., 1938; Schneider, 1961). Various vocalizations have been reported. A woodpeckerlike, nasal series of up to 18 or so “kwee” notes is given frequently in the spring and (unpaired birds) into the summer; it apparently functions as a song in proclaiming a territory and in attracting a mate. A “peculiar rattling note” (Witherby, et al., 1938, p. 293) occurs during displays between adults. When alarmed, a series of up to five
notes may be given by a wryneck, being a “shrill, quick-repeated and rather nasal chewn, chewn, chewn” (Ali and Ripley, 1970, p. 171) or brief “tuck” notes (Witherby, et al., 1938). Nesting wrynecks are well known for their snakelike hissing calls uttered when they are disturbed within their nesting cavity; this vocalization may serve to deter some potential predators.

Displays. The name wryneck refers to its “extraordinary twistings and contortions of neck” (Witherby, et al., 1938, p. 293) in displays when disturbed at the nest. The display involves the raising of the head and bill, with erect crown and forehead feathers and with a side-to-side swinging and twisting of the neck, “apparently an agonistic posture” to deter enemies (Ali and Ripley, 1970, p. 171). No vocalization accompanies this display. Similar displays occur between antagonists which face one another and “throw back heads, and shake them up and down with bills wide open, displaying pink inside” (Witherby, et al., 1938). The head may be allowed to hang in a limp condition during the display, and at an extreme the head is twisted and shaken about. A rattleslike call may accompany such a display. Various authors refer to the wryneck’s feigning of death, hanging limply with the eyes closed. When landing, the Northern Wryneck frequently flicks its wings, apparently in alarm. Except for the head-swinging movements and wing flicking, the wryneck’s behavior differs from that seen in woodpeckers, but comparative studies are needed.

Interspecific Interactions. Competition for holes suitable for nesting is severe for Northern Wrynecks, and they may “take possession of the nests of other hole breeders, destroying their eggs or young and often ejecting nest material” (Peale, 1973, p. 68). The literature on this subject is cited by Peale, who lists five tits (Parus), a nuthatch (Sitta europaea), a thrush, two flycatchers, the Starling (Sturnus vulgaris), the House Sparrow (Passer domesticus), the Tree Sparrow (P. montanus), and the Great Spotted Woodpecker (Picoides major) as species displaced from their nests by wrynecks. Fights over the nests may be severe, even leading rarely to the death of one or both combatants. Nest disturbance may exceed the nesting demands of the wryneck, for Löhrl (1940) found that one individual destroyed 14 clutches of other birds during one season.

Breeding. On their return from migration, Northern Wrynecks seek natural cavities, holes excavated by other species, or nest boxes in which to lay their eggs. Rarely they excavate their own nests (Åbro, 1962) or use crevices in buildings, earthen banks, or walls. Apparently both sexes seek a suitable cavity, and a bird finding such a site calls repeatedly, attracting its mate to it (Ruge, 1971a). Copulation occurs frequently before and during egg laying and often takes place after the female lays an egg and flies to a nearby perch (Peale, 1973). No nesting material is used in the cavity. Wrynecks are indeterminate layers, usually laying five to 14 white eggs, but if one egg is removed daily after laying, the female can be induced to lay up to 40 or more eggs (Witherby, et al., 1938). Nesting commences in late April and lasts well into July and even August, for two broods occasionally are raised, and rarely even three (Arnhem, 1960). Eggs are laid daily, usually in the morning, until the clutch is complete. Incubation commences usually when the clutch is complete, but sometimes, especially in second broods, it starts before the last egg is laid. The incubation period is 12 or 13 days, and both sexes incubate (male at night?). Nestlings remain in the nest for approximately 21 days (Sutter, 1941) before fledging. Sutter illustrated the remarkable, large “heel pad” found on very young wrynecks’ tarsi. The young are brooded by the adults at first, but later they maintain a tight cluster, with heads in the center. Ants form the main food and are carried by the bill full to the nestlings by both parents at regular intervals. Klaver (1964) found that
adult wrynecks fed stones, sand, bone splinters, and chitinous parts of ants to the young, and he suggested that some of these aid in digestion and that the bone provides calcium and phosphorus. Large particles are regurgitated by the nestlings. Feces are not removed (eaten by adults?) until the young are about 7 days old, but then both adults carry away the fecal sacs unless the brood is too large for them to enter the nest readily. A second clutch may be laid occasionally even when the young of the first clutch are still in the nest. After fledging, the young are fed frequently by both adults for a considerable period. The postjuvenal molt is complete except for the secondary feathers of the wings, and it terminates at about 13 weeks of age. Adults molt in August to October, either before or before and during the fall migration; Biswas (1961) reported some molt in spring that needs corroboration.

**Taxonomy.** The Northern Wryneck forms a superspecies with the African Rufous-necked Wryneck (*J. ruficollis*), with which it barely overlaps in Cameroun during the winter. One reported hybrid of these wrynecks has proven to be an aberrant Rufous-necked Wryneck (Short and Bock, 1972). Within *J. torquilla* there is partly clinal and partly mosaic variation in what probably once were isolated northern populations and three disjunct, perhaps once-connected southern populations. The main Eurasian group of populations is best treated as one subspecies, *torquilla* (including *sarudnyi* Loudon, *chinensis* Hesse, and *japonica* Bonaparte; see Vaurie, 1959d). Populations of this group exhibit considerable variation, and minor races that have been recognized show great overlap. The extreme in rusty coloration is shown in Japanese birds ("*japonica*"), but even some European birds match some Japanese specimens. The pale extreme with few markings below is found in birds from the Ural Mountain region ("*sarudnyi*"), but some of these are moderately dark and well marked below, and other populations far removed from "*sarudnyi*" (i.e., in mountains of western China, see Vaurie, 1959d) approach it in paleness. Eastern Siberian and Chinese populations ("*chinensis*") and those of Japan are more barred than European birds, but the difference is not great and overlap is considerable. Central Siberian (Baikal area) birds resemble European wrynecks, though separated from them by paler populations. Eastern populations (especially in Japan) tend to be shorter winged, with a slightly (proportionately) longer tail than western birds, but the differences are only of the order of 5 to 8 percent on the average.

Two disjunct populations of the Mediterranean areas are recognized but barely are distinct from one another. These are nonmigratory *J. t. mauretanica* of northern Algeria and Tunisia, and *J. t. tschusii*, a partly migratory form from Italy, Sicily, Sardinia, and perhaps Corsica. The latter form is darker above, with darker buff on the throat, which is more barred and has more streaked or crosslike markings below than nominate *torquilla*. *Jynx t. mauretanica* is slightly smaller than *tschusii* and whiter (less buff and cinnamon-buff) below, but has similar markings and, like *tschusii*, has rounded, less pointed wings than *torquilla*. In the Kashmir region is found a migratory subspecies *J. t. himalayana*, that is characterized by strong, nearly complete ventral barring (rather than bar-spotting of *torquilla* and "cross" markings of *tschusii* and *mauretanica*). Both *tschusii* and *himalayana* would seem to contact *torquilla*, but their intergradation has not been studied.

**References**

RUFOUS-NECKED WRYNECK

*Jynx (torquilla) ruficollis*

Color Plate 1

Range Summary. Southern Africa.

Diagnostic Features. Small, 46 to 59 grams, wing length 82 to 101 millimeters. Peculiar, nightjarlike peppered and blotched pattern on a brown background; throat rufous to chestnut. Cheeks, malar area, sometimes anterior throat barred. Often feeds on ground.

Description. Bill pointed, narrow across nostrils, culmen curved. Above brown, tinged gray to rusty, with central, irregular bar-streaks extending up back to crown; fine black spots, often broader (crosslike) at shafts, and also very fine pepper spots or spot-bars; and white bordering large dark spots, and fine white peppering throughout. Rump as back, sometimes finely barred; uppertail coverts as rump. Wings generally colored as back; flight feathers brown with pale, often distinctly rufous-tinged bars; below barred pale cinnamon and brown; outermost primary rather long, unlike *J. torquilla*, and inner primaries show indentations on the outer vanes near the feather tips. Shafts dull whitish to dusky below and blackish above. Tail without modified, strong shafts of woodpeckers, soft, colored as back but darker in tone; black occurs in peppered, white-bordered bars numbering eight to 10; undertail coverts as uppertail coverts but paler. Tail/wing ratio 0.73 to 0.88. Black marks reaching crown from back break into bars on center and front of crown, which otherwise is colored like back. Lores, under eye, ear coverts, and malar area barred brown and buffy white, the bars becoming vague on sides of neck. Barring from malar area extends to edges of throat, the anterior and middle of which are barred in *pulchricollis*, but center is rufous to chestnut in others. Cinnamon-rufous to chestnut at rear of throat to breast, extending in *aequatorialis* to lower breast, sides, and flanks (in blotches even to abdomen); except as just noted the midbreast to abdomen is buffy to white with brown shaft streaks weak (or obsolescent in *aequatorialis*) to variably strong; sides and flanks streaked and barred, bars sometimes extending vaguely onto breast; undertail coverts rufous, as breast patch but paler, and reaching flanks of *aequatorialis*, with bars and streaks evident.

Sexual features: Sexes alike in plumage, males about 10 percent heavier, averaging longer wings, tarsus, bill, but shorter tail (Tarboton, 1976). Immatures generally as adults, but darker above, with more barring, especially on rump; broader outermost primary; tail often more barred; breast patch duller, more restricted, and intruded upon by bars and streaks; throat more barred race for race, entire throat of 10 showing bars; patch on throat smaller; underparts otherwise more barred, the shaft streaks and bars forming "crosses." Eyes brown to chestnut, legs and feet olive-green to brownish pink, and bill slate gray to brownish.

Distribution and Habitat. South-central and southern Africa from Cameroun, the Central African Republic, Sudan, and Ethiopia to the Cape of Good Hope, but with considerable disjunction. Woodland and forest edges and clearings, burned areas, scrublands, cultivated areas with trees, and savannas from near sea level in South Africa to highland savannas of East Africa and Cameroun, reaching 10,000 feet in elevation.

Foraging Habits. Feeds mainly to entirely on ants secured by gleaning, probing, digging out ant nests, and "tonguing" up of ants, pupae, and eggs. Most foraging is terrestrial, but sometimes they feed on the trunk or branches of a tree. On the ground they progress by hopping. Birds feed alone; or, if paired, they maintain vocal contact but feed apart (Tarboton, 1976). The sexes appear not to differ in their foods and foraging. Tarboton (1976) described the
food of South African wrynecks based upon observations and studies of fecal material. The bulk of the diet of the birds he studied consisted of brown house ants (*Pheidole megacephala*) and brown cocktail ants (*Crematogaster castanea*), each making up about 44 percent of the diet; summer feces showed more of the former, winter feces more of the latter species. Both are small ants. Lesser items of diet were the large ant *Anoplolepis custodiens*, the ants *Acantholepis capensis* and *Tetramorium setuliferum*, and winged termites of undetermined species. Wrynecks were seen by Tarboton to visit birdbaths for drinking and take in water without raising the head between sips. This species often perches crosswise in tree branches. It has an undulating, woodpeckerlike flight.

**Voice.** Although Drumming has not been reported as such, Tarboton’s observations (1976, p. 102) of what he considered displacement tapping, “a weak mechanical drumming noise by tapping rapidly on a branch,” should be considered in light of the occasional Drumming of related *J. torquilla* (see p. 60). The tapping occurred during interactions between Rufous-necked Wrynecks, with no apparent selection of a resonant sounding site. The chief call is a repetitive series of variable notes with a piercing, yelping, or screaming “yeek” quality. These variously are rendered “too,” “tew,” “tyew,” “kew,” and “kweeh,” from recordings by J.F.M. Horne near Nairobi, Kenya. For 90 such calls given during June, the average number of notes was 8.73, with calls having five to 12 notes. The longest calls were in response to playback; nine was the median number of notes in all calls. Tarboton (1976) termed this the Kweek Call; he found that males utter it at lower pitch than (smaller) females. Calls he heard (in South Africa) were of two to eight notes, varying from “quiet” calls to a “loud, strident call” audible for as far as a half kilometer. He noted that males during territorial encounters may call five to eight times per minute; the Kenya birds called six to seven times per minute. The call is used all year, but is presumably more frequent in the breeding season. It may serve as a location call between mated birds as well as for territorial proclamation. This call was described by Bates (1930), McLachlan and Liversidge (1957), and Mackworth-Praed and Grant (1962). A Peegh Call was described by Tarboton (1976, p. 102) as “a series of five to eight rasping, guttural notes sounding like ‘peegh-peegh-peegh . . . ’ or ‘krrr-krrr-krrr . . . ’.” This call accompanies displays (see later) at close distance during encounters. A call of more intensity is the Krok Call, also uttered during encounters, as well as in pairs, e.g., before copulation (Tarboton, 1976). Up to 15 “krok” notes occur in a call. The Click Call is a quiet note uttered singly either in alarm at the nest or at dusk as a contact call before roosting (Tarboton, 1976; this is the “zick” note of Mackworth-Praed and Grant, 1962, p. 588). A high-pitched shriek is given by birds trapped in a mistnet. Nestlings utter both a “wheezing squeak” in their first 6 days of age and a buzzing “tsch-tsch-tscht . . . ” thereafter (Tarboton, 1976). That author also reported (p. 107) a hissing call of nestlings accompanying a Snake-striking Display (see later).

**Displays.** These have been described by Tarboton (1976, pp. 103–104, 107), who provided almost the only available information based upon his South African studies. The Headswaying or Head Swinging Display is given with the tail cocked slightly, body forward, and head and bill slightly above horizontal, displaying the throat patch; the head is quickly moved from side-to-side. A Peegh or Krok Call accompanies the display, which is directed at another wryneck (mate or intruder). Supplanting or combat occurs following the display in male-male encounters. A Bobbing Display during encounters, in which the head is moved up-down rather than side-to-side was described by Pomeroy (1952). Bill Directing was discussed, although not named as such by Tarboton (1976, p. 104), as an aggressive display toward other species. The body is held horizontally with head and bill directed at the other bird.
Nestling birds give a Snake-striking Display, consisting of “stretching the head slowly toward the potential predator... with bill half opened, then rapidly recoiling it back and simultaneously opening the bill wide and uttering a loud hiss” (Tarboton, 1976, p. 107).

**Interspecific Interactions.** Nest-site competition apparently is severe. Tarboton (1976) introduced 10 artificial nests (boxes, hollow poles) into his South African study area, and all 10 were used in the same year for nesting by Crested Barbets (*Trachyphonus vaillantii*; seven nests) and by Rufous-necked Wrynecks (three nests). Four of the wryneck nest holes in Tarboton’s area later were used by this barbet, and two barbet holes later were occupied by the wryneck; however, the wrynecks used the barbet holes after they had been vacated, whereas in two or even three cases there is evidence that the barbet occupied the wryneck nest when it still held eggs or young (circumstantial evidence suggests that the barbets kill the young wrynecks and destroy their eggs). Tarboton also reported frequent encounters between the barbet and wryneck, usually involving the barbet supplanting a wryneck that was investigating prospective nesting sites.

**Breeding.** Nesting territories of eight to 24 hectares were used by six pairs studied by Tarboton (1976) in South Africa. Each territory had a supply of nesting and roosting holes in the form of old barbet holes and natural cavities. Territories are maintained to some extent throughout the year, but mainly in the July to October period in South Africa. Most territorial proclamation and defense is by males. The nesting season extends from February to July in Cameroun, April to May or later in Gabon, January to May in Kenya, probably April to June in Ethiopia, and late July to February in South Africa and Malawi. Most South African clutches are laid in October (range August to February). Nests are in old barbet and woodpecker holes, natural holes in trees and posts, and nest boxes. Betts (1966) reported finding naked young in an old woodpecker hole lined with grass that had been gathered while green (no such lining is used by woodpeckers). The nests were 0.5 to 9 meters above ground, mainly below 4 meters, with a mean height of 3.3 meters in 41 South African instances. Honeyguide eggs occasionally are placed in wryneck nests (Tarboton, 1976, p. 107). Copulation is not accompanied by vocalizations; the male approaches and mounts from one side (Tarboton, 1976). Clutch size ranges from one to five, with a mean of 3.12 eggs in South Africa. It is not known for certain which sex spends the night in the nest, but only one adult does so. The white eggs are incubated 12 to 15 days before hatching. Both sexes share diurnal incubation, which commences before the clutch is complete, according to Tarboton. The young are brooded constantly for 9 or 10 days, and then only at night thereafter. Both adults share brooding and feeding chores. The hatchlings are naked, pink and blind; feathers emerge after eight to 10 days, and the eyes open on about the eighth day (Tarboton, 1976). Fledging occurs at 25 or 26 days of age, possibly occasionally earlier. Food is brought to the young in the bill, and fecal sacs are removed from the nest by feeding adults. Well-developed nestlings are fed about six times per hour at midday (Tarboton, 1976). Fledglings rapidly become independent of their parents and are on their own in about 2 weeks after leaving the nest. Second nestings occur frequently, with egg laying in five cases at 8 or 9 to 24 days after fledging of the first brood. Success as measured by birds fledging was 40 percent at South African localities, and 57 percent of nests were successful. Molt follows the nesting season in August and September in Cameroun, July to December in Ethiopia, January and February in Kenya, and from January to April or even May in South Africa (there also are a molting specimen from South Africa on 23 June and one from Mt. Kenya on 14 May).
Roosting. Individuals roost alone in a hole or sheltered site (behind loose bark, in thick foliage). Roosting sites change frequently. A Click Call may be given as paired birds go to roost, often within hearing of one another. The cavity is entered shortly after sunset, and departure occurs about a half hour before sunrise in South Africa (Tarboton, 1976). Contact between mated birds is established by calling near the roosting site in the morning.

Migration. It is uncertain whether migration occurs in southern Africa. Tarboton’s (1976) data indicate permanence of territories, and hence migration is not likely to occur. That author noted that calling is much less frequent, and hence wrynecks are inconspicuous in the nonbreeding period, perhaps giving rise to speculation about migration.

Taxonomy. Jynx ruficollis forms a superspecies with J. torquilla, which in winter barely reaches the range of ruficollis. The two differ in several aspects of color pattern, in the size of the outer primary, and in size (ruficollis is larger, with a heavier bill and legs and feet), but their relationship is very close. Tarboton’s playback data (1976) suggest that they may indeed be specifically distinct. One putative hybrid has been shown to be an aberrant J. ruficollis (Short and Bock, 1972). There are three distinct and recognizable subspecies of J. ruficollis. The nominate race occurs disjunctly from Gabon and Kenya to South Africa and is variable, gray to brown in tone dorsally, with the upper breast cinnamon-rufous to chestnut (individual variation), usually connecting fully with the bill along the center of the throat (occasional Kenya specimens have some gular and anterior throat barring). There is a clinal increase in size northward (wing length difference between extreme samples is of the order of 5 percent), and the tail/wing ratio is less (0.73 to 0.78 in males, 0.75 to 0.83 in females) than in the two northern races. Synonyms include cosensi Grant, striaticula Clancey, rougeoti Berlitz, and diloloensis Pinto (see Rand, et al., 1959). Jynx r. aequatorialis of the western and central Ethiopian highlands is like ruficollis above, but has more extensive rufous coloring below (to the bill, rarely with gular bars, onto lower breast, along sides often to flanks, and with extensive cinnamon-rufous on the abdomen and sides). The streaking ventrally is less extensive and often vague. The tail/wing ratio is from 0.78 to 0.87 in males and from 0.82 to 0.88 in females. The third subspecies is pulchricollis of the southern Central African Republic, Sudan, and northeastern Uganda, with an isolate in the savannas of Cameroun. This form is rufous in tone dorsally rather than gray or brown; below the rufous is darker, more chestnut than in the others, the chestnut-rufous occurring on the breast and lower throat and on undertail coverts, with a rusty tinge on the sides and flanks, but less so than aequatorialis. Its throat to chin is barred white and black (intruded upon slightly from breast by chestnut in eastern populations). Ventral marks are strong as in ruficollis. The tail/wing ratio varies from 0.81 to 0.84 in males and 0.83 to 0.88 in females. The usually recognized J. r. thorbeckei (Cameroun) differs from eastern pulchricollis only in having the throat more completely barred and obviously is derived from pulchricollis (indeed there is some overlap in the single trait in which they differ slightly); hence I see no reason to separate it from pulchricollis.
SUBFAMILY PICUMNINAE

Tribe Picumnini

Genus *Picumnus* Temminck

These tiny birds are characterized by three white tail stripes, one down the center and one at each tip angling inward toward the tip. The plumage is soft and generally brown with markings. Males have red, orange, or yellow marks more or less forming a patch on the forehead, and females in most species bear white spotting on a black crown. The bill is short, pointed, and relatively straight or somewhat curved along the culmen. The tail is variable in length, but the shafts and barbs are soft, not hardened, and the tail is not appressed to the back in foraging. The feet are typically zygodactyl and four toed. These piculets drum (at least some species) in communicating with one another, and they tap and even excavate in foraging, woodpeckerlike. I recognize 23 species in this complex, taxonomically and behaviorally little known genus; their close resemblance, the very local ranges of some purported species, and very sparse sympatry within the genus suggest that there may prove to be fewer, perhaps only 15 or 16 species. All but one species are neotropical; that one, *P. innominatus*, occurs in southern Asia.

SPECKLED PICULET

*Picumnus innominatus*

Color Plate 2

Range Summary. Southern Asia.

Diagnostic Features. Tiny, weight 9.0 to 13.2 grams, wing length 52 to 62 millimeters. Only tiny woodpecker with speckled breast. Green above, crown darker, two white face stripes; below spotted, spots becoming bars on flanks. White patches in tail at outer corners and along center of central pair of feathers. Male with dull black and orange spots (sometimes few) in forecrown.

Description. Bill small, pointed, slightly curved along culmen. Above yellowish green, brightest in Himalayan *innominatus* (see crown); inner wing coverts as back, greater coverts browner or blackish, primaries and secondaries mainly brownish black, but narrow outer edges of primaries and broader area of outer vanes of secondaries edged in green; underwings gray, coverts yellow-white with black spots. Shafts brown, except white in white parts of tail, paler below. Tail black, white stripe formed on inner vane of central two rectrices; outer two feathers have white tip with narrow black edging; paler below; outer (sixth) rectrix half length of others. Tail/wing ratio 0.52 to 0.61. Crown gray-green (*innominatus*), greenish gray (*malayonun*), or cinnamon-brown (*chinensis*), the coloring extending onto upper back where grading into green of back. Lores whitish (*chinensis*) or yellowish white (others), grading into white line under eye and below ears; white line over eye. Blackish or (*chinensis*) brown patch behind eye on car coverts. Malar black, spotted with white anteriorly, becoming less spotted and browner or distinctly cinnamon-brown (*chinensis*) at rear; chin dull white with no or few vague dark spots; throat white or yellowish white with black spots. Underparts variably
almost white (especially worn birds) to pale yellow or yellowish white (in fresh plumaged birds especially); breast variably spotted, spots small to moderate in two races, larger and more dropletlike in *chinensis*, grading posteriorly into spot-bars then bars on rear of sides, flanks, and abdomen; abdomen usually rather clear (bars small, broken) in center; undertail coverts white with black spots or bars.

Sexual features: Females tend to be slightly larger (longer winged in all samples), but tail length almost the same, and bill length as in males; males have forehead and forecrown feathers with dull black bars or spots on a background of red-orange, orange, or yellowish — the red, orange, or yellow being very dull (in *chinensis* these markings are muted, the orange is barely visible, and the black spots are few); females lack these reddish and black markings. Immatures duller than females, colored similarly; “females” thus outnumber males in samples. Eyes brown, skin about eyes bluish gray. Legs and feet bluish gray. Bill black to blue-black, sometimes paling at tip or at base of lower bill.

**Distribution and Habitat.** Ranges from northern Pakistan across northern India, Nepal, and Sikkim to Assam, Szechwan, and southern Kiangsu (Yangtze River), China, southward in eastern India and Bangladesh to Andhra, Orissa, the hills of Assam, Burma, southeast Asia generally (in hill country, primarily), to Malaya, Sumatra, and Borneo. There is an isolate in western India’s Western Ghats from Goa to Kerala. It is generally found in foothills, ranging up to 3000 meters in the western Himalayas, but usually only to 2000 meters; usually over 500 or 1000 meters, reaching plains (to 200 meters) here and there, and the lowlands in China. Its habitat is dense undergrowth, bamboos, and wet second-growth oak and sub-tropical forests and woods.

**Foraging Habits.** Feeds in low trees and shrubs, bamboo, and stalks of herbaceous plants and vines. It taps sporadically, more so than species of *Sasia*. It flies rapidly, concentrating attention at rather few sites, moving some distance from site to site. In this way it can obtain larvae of beetles, ants and other insects, and spiders, yet still keep up with the mixed species flock of which it frequently is a part. Tapping is used to open a stem or branchlet; then food is picked out, probed out, or pecked to get at it. One male tapped on a small bamboo stalk in Malaya for 12 minutes, excavated four small holes, and fed from each hole for 2 minutes or more. When excavating, it did not touch its tail to the wood, but perched across the stem, tail curved in for balance, and pecked away. The blows were delivered two or three times from one side; the bird then swung to the other side and gave another small series of blows, repeating this until the hole was functional. I found small red ants (species unknown) within the stem after the bird left. It also forages under branches and creeps about, nuthatchlike (Ali and Ripley, 1970). It may hover to secure spiders, according to those authors, who considered the food to be mainly ants. Mixed species flocks with which it associates in the Himalayan slopes include babblers (of the genera *Garrulax*, *Heterophasia*, *Alcippe*, and *Stachyris*), drongos (*Dicrurus aeneus*), flycatchers (especially *Muscicapa solitaria* and *Rhipidura albifrons*), the barbet *Psilopogon pyrolophus*, the broadbill *Psarinsonus dalhousiae*, and the bulbul *Hypsipetes mcclellandii* (Short, 1973d). In Burma, species of *Mesia*, *Alcippe*, and *Rhipidura* are associates (Stanford and Ticehurst, 1939).

**Voice.** Little known. It drums loudly (Proud, 1958; Ali and Ripley, 1970) on a bamboo or other stem or on a stub. It is rendered regularly in the breeding period. The only vocalization known is a sharp “tsick” (Short, 1973d, p. 268) or “spit, spit frequently repeated” (Ali and Ripley, 1970, p. 173).

**Display.** Essentially unknown. Whistler and Kinnear (1934, p. 297) described “courtship”
as involving "the male pursuing the female round and round the branch of a tree in little jerky movements, always working downwards." Perhaps of the same circumstances Ali and Ripley (1970) stated, "In one phase of the courtship the male chases the female, scuttling forwards and 'in reverse' in little jerky spurts round and round a branch."

Breeding. Where known (India, Sikkim, Burma, probably Malaya), breeding seems to take place in March to May, or a bit earlier in southern India (Ali and Ripley, 1970). A tiny hole 2.5 centimeters in diameter is excavated, perhaps mainly by the male, in bamboo or in the stem of a tree 1 to 5 meters up. One male in Malaya excavated for 4 hours at a stretch in a hanging, dead frond of a broken-topped, small palm tree (the frond was 5 centimeters wide). The excavating bird appressed its tail to the surface about half the time, rectrices spread out on the stub (Short, 1973d), showing their white patches. The feet were held rigidly, locked in position with toes clenched (bowed out from frond surface). Blows were delivered from the sides and downward, with pauses in which chips were picked up and tossed out. The cavity later was deserted. A nest chamber 6 by 2 1/2 inches in depth and width, containing two white eggs, was described by Betts (1951). One nest mentioned by Betts was a foot below an occupied nest of the barbet Megalaima viridis. Ali and Ripley (1970) gave the clutch size as three or four and stated the incubation period at possibly 11 days, from Stuart Baker. Both sexes incubate and feed the young, but further details are unknown. Molt takes place following the breeding season, but its occurrence remains to be worked out (apparently the molt is rapid, as few specimens show signs of molt, regardless of season). Most populations seem to molt in late summer and fall.

Taxonomy. Related, albeit distantly, to neotropical Picumnus and sharing many features, including the unique tail pattern. Probably aurifrons, which shares such traits as spots to bars below, general dorsal coloration, bill shape, and muting of male markings, is nearest innominatus in relationship. I recognize three subspecies of innominatus, following Biswas (1961) and Ali and Ripley (1970). There are, however, two major groups, the Chinese chinensis (slightly larger with a brown crown, ear coverts, and rear of the malar; heavier ventral markings) and greener-headed innominatus-malayorum of the Himalayas, India, and Southeast Asia. Within this second group variation is slight, Himalayan innominatus being a trifle larger, paler crowned, and more yellow-greenish backed on the average than peninsular Indian and Southeast Asian malayorum. These latter two weakly characterized races make further racial subdivisions an exercise in futility. I grant that western Himalayan birds ("sinlaensis") average larger than those from farther east, but the difference is slight and clinal, not worthy of nomenclatural recognition. Peninsular Indian birds ("avunculorum") do not differ consistently from eastern malayorum.

Reference

BAR-BREASTED PICULET

Picumnus aurifrons

Color Plate 2

Range Summary. South America.

Diagnostic Features. Tiny, weight 10 grams (Ecuador), wing length 44.0 to 52.2 millimeters. Shows contrasting pattern of barring on breast and streaking or spot-streaking on
lower breast and abdomen, with yellow-tinged background color. Upperparts barred or unbarred brownish green or green; wings show yellowish edges of primaries. Never fully barred below, as in *lafresnayi*, and cap blacker than in *lafresnayi*. Males have red-spotted or yellow-spotted forehead, white spots on blackish crown and nape; females show white spots over entire black crown and nape, no red or yellow.

**Description.** Bill sharply pointed, slightly curved along culmen. Back olive, yellow-green, or brownish green; strongly barred in *transfasciatus*, weakly barred in *flavifrons*, and with faint bars in *wallacii* (other races mainly unbarred, but most birds show obsolescent bar traces); rump usually shows yellowish barring even in relatively unbarred-backed races; uppertail coverts short, white or dusky with white tips. Wing coverts as back, generally, but browner and virtually always with a hint of barring or edging; flight feathers brown to blackish, narrowly to broadly edged with greenish yellow; underwing paler with buffy white or yellowish white coverts and edges. Shafts brown to black above; below white in wings and white parts of tail, black in rest of tail. Tail black, central feathers with inner vanes (spaying onto outer vane slightly) white or yellowish white, rarely with a few black spots or bars; outer two feathers with white or yellowish white patch distally, and a black border at the tip; paler below. Tail/wing ratio 0.44 to 0.54. Crown black, occasionally brownish black, with round white or buffy white spots, these larger and more droplet like at rear; hindneck has fine buffy and black bars in one to three rows, usually obscured in skins; nasal tuft white, often discolored. Face dull whitish, sometimes brownish on ear coverts, the feathers finely edged in dull black, giving a vaguely scaled effect. Throat clear white or yellowish white, sometimes with fine dark edges or occasionally, fine bars. Below white to pale yellowish (yellow most pronounced in *aurifrons*, *transfasciatus*, *borbae*, and *juruanus*); breast barred strongly in black (*transfasciatus*, *purusianus*, *borbae*), less strongly in brown (*aurifrons*, *juruanus*, *flavifrons*), or bars weak and often broken (*wallacii*); lower breast to abdomen spotted in *flavifrons* and *wallacii*, and vaguely to strongly streaked or spot-streaked in others.

Sexual features: Sexes similar in size. Males have forehead finely to strongly tipped (giving streaky spotting effect) in red (*borbae*, *juruanus*), orange (some *borbae*, *juruanus*), gold (some of other races), or yellow (others); females have spotted forehead lacking red or yellow, spots finer than on crown and often discolored (buff). Immatures are duller and browner above than in adults; the crown is browner and is streaked, not spotted, with whitish; the underparts show less yellow, the bars are often broken, and vague, and the streaks are heavier and extend into the breast, giving less contrast between breast and abdomen. Sexes alike in immatures, but males molt forehead feathers early, so a few yellow- or red-colored feathers often show anteriorly. Eyes brown; legs and feet gray, bluish gray, or greenish gray; and bill bluish black, darker at tip and along culmen.

**Distribution and Habitat.** From eastern Peru east, south of the Amazon to western Para, and south to southeastern Peru, northern Bolivia (San Ernesto), and Mato Grosso. Inhabits low tropical forests up to 2000 or 3000 feet, rarely higher. It frequents the upper levels at edges, clearings, and in secondary forest (O’Neill and Pearson, 1974).

**Behavior.** Essentially unknown. Breeding, as indicated by specimens, occurs during June to November; most young birds are known from August to October. Molting birds are known from April on the Tapajoz River (birds completing molt) and in January and February in western Amazonian Brazil.

**Taxonomy.** Relationships unclear. I concur with Stager (in litt.; see also Hellmayr, 1910, p. 386) that the *borbae* group is conspecific with *aurifrons* and that the *lafresnayi* group is
specifically distinct from *aurifrons*. Stager (in litt.) feels that *P. olivaceus*, *P. granadensis*, *P. sclateri*, and *P. subtilis*, with bars on the breast or some suggestion of such and streaked-spotted abdomens, are its allies. I suggest that this group is not a natural group, although *sclateri* indeed may be close to *aurifrons*; it is possible that *exilis* and *lafresnayi* may prove closely related, and even the *cirratus* group may be involved. This discussion simply indicates what remains to be elucidated! The subspecies of *aurifrons* can be arranged as two groups, the red-crowned (males) *borbae* group and the yellow-crowned *aurifrons* group. Variation in the color of the forehead of males (many *borbae* are off-red) and similarities of *borbae* with *aurifrons* in other characters make a separation into barred- and unbanded-backed forms equally tenable (*transfasciatus* is as distinct from *aurifrons* as is *borbae*, or more so, and in fact *borbae* could represent a morph of *aurifrons* [also, *borbae* and *juruanus*, red-crowned, seem separated by yellow-crowned birds]). At any rate, there tentatively are recognized seven subspecies. Nominate *aurifrons*, with traces of barring on its back, occurs from Mato Grosso through the Madeira River region east of that river to the Tapajoz River. Adjacent to it across the Tapajoz and east to the Tocantins River is *transfasciatus*, very heavily barred above and with finer breast streaks below. From the lower Tapajoz west to the lower Madeira is found *borbae*, very like *aurifrons*, but with a red crown (forehead) in males and even less indication of dorsal barring. West of the lower Madeira, to the Purús, occurs *wallacii*, with very pale yellow below and broken, faint breast barring. In the upper Purús River area is little-known *purusianus*, with heavy breast barring and darker upperparts than *aurifrons*. From the Solimões River west into Peru occurs *flavifrons*, resembling *purusianus* but with stronger spotting on the abdomen and less strong barring on the breast. Finally, on the upper Jurua and into Peru occurs *juruanus*, resembling *borbae* in the red forehead of males and *aurifrons* generally in pattern; its breast barring is browner and weaker than in either *borbae* or *aurifrons*.

**LAFRESNAYE’S PICULET**

*Picumnus lafresnayi*

**Color Plate 2**

**Range Summary.** Northern South America.

**Diagnostic Features.** Tiny, weight 9 to 10 grams, wing length 47.2 to 54.9 millimeters. Fully barred below, dark bars narrower than pale bars. Greenish above with no bars or barring weak to moderate. Crown black to brownish with buffy or white spots; males have forehead very finely spotted red or yellow.

**Description.** Bill pointed, slightly curved along culmen. Above yellow-green with brown tinge, showing traces of dark bars (*pusillus, punctifrons*), very weak traces of such bars in some birds (*pusillus, taczanowskii*), or fully barred above (*lafresnayi*); rump shows bars in all but a few *taczanowskii* and *pusillus*; uppertail coverts yellowish white with bars. Wings brown, edges of flight feathers greenish yellow (barred so in *lafresnayi*); coverts as back except outer greater coverts brown with only edge yellow; underwings duller, coverts yellowish white with black bars. Shafts of wings dull brown, paling almost to white at tips; brown in tail except white in those areas that are white vaned; below, white with yellow cast in wings, brown or white in tail. Tail short, typically *Picumnus*-patterned with white stripe down inner vane of central two rectrices, and black-edged white tip of outer three feathers, paler below. Tail/wing ratio 0.42 to 0.53. Crown brown (most races) to brownish black
(taczanowskii) with white or buffy white spots, fine on crown but larger and longer on nape. Nape spot-streaks very brownish in pumilus and pusillus. Face spotted buffy white and brown or black with dark line through ear coverts behind eye. Throat buffy or white, scaly (fine black edges) or chin may be unmarked. Underparts yellowish or yellow-buffy white, or white (taczanowskii) with dark bars, the bars broadest on breast and narrowing anteriorly and posteriorly; in a few lafresnayi the abdominal bars almost break to become bar-spotted. Barring heaviest and blackest in taczanowskii and some punctifrons and lafresnayi, dark bars shallow and breaking abdominally in pumilus and pusillus. Undertail coverts barred.

Sexual features: No size difference between the sexes; males have fine red (lafresnayi) or yellow (other races) spots on forehead and forecrown, these colors lacking in females. Immatures resemble females but have the duller crown spot-streaked with buff; they are paler, greener, and less brown above, as well as being duller with less regular bars below. Eyes brownish gray, legs and feet gray, bill black except grayish slaty base of lower bill.

Distribution and Habitat. Southeastern Colombia, eastern Ecuador, and eastern Peru eastward through the Solimões River region and Brazil north of the Amazon to the Rio Negro and southern Venezuela (Cassiquiare River). Its habitat is tropical and subtropical forest to an altitude of 4000 feet (lafresnayi) or even 4600 feet (taczanowskii) in eastern Peru.

Behavior. Effectively unknown. Skutch (1948) felt that the species may be double brooded. He found one male and two females at a nest (and sleeping in it at night) in a Heliocarpus shrub, the nest containing two eggs under incubation. He considered this to represent a "helper" situation, one of the females presumably being a young bird of a previous brood. The nest entrance was $\frac{7}{8}$ inch in diameter. Skutch observed the piculets eating termites that moved about near the woodpecker’s nest. The nesting date, 17 August, in eastern Ecuador agrees with August to November dates of immatures from all areas except Colombia, whence came a January immature. Molting birds date from March to July in Peru, Ecuador, and western Brazil.

Taxonomy. Relationships unclear; possibly with aurifrons, although exilis is another possibility. Stager (personal comm.) considered lafresnayi to belong to the fully barred group, including cirratus, spilogaster, and exilis, but the shift from bars to spots on the abdomen is not a profound shift; hence its relations could be with aurifrons or some other species. Variation parallels that of aurifrons in that there are red-spotted (males, lafresnayi) and yellow-spotted (others) races, the spots referring to the forehead of males. The eastern Ecuadorean, Colombian, and north Peruvian lafresnayi is evenly barred below, although a few birds show spot-barring on the abdomen; males have red in the forehead, and the back is strongly barred in both sexes. Very slightly smaller punctifrons of eastern Peru has the upperparts with only very faint dark barring, or none; and males have yellow on the forehead. Known from the Huambo-Inayabamba-Huanuco area, taczanowskii of northeastern Peru is similar below to lafresnayi, but the barring is deeper and the background color whiter; there is almost no trace of dorsal barring, and males have yellow on the forehead. The remaining two races are more finely barred below and have browner hindneck spotting. Of these, pusillus occurs in the Rio Negro-Solimões region and is variably barred or unbarred above, with a rusty olive tone, and shows abdominal barring that breaks across the abdomen, such that the abdomen is little barred in its center. More widely distributed pumilus of the Uaupes River region of Brazil and adjacent Colombia and Venezuela resembles pusillus except for its stronger barring below, including the abdomen. Its crown and back are browner than in punctifrons.
**GOLDEN-SPANGLED PICULET**

*Picumnus exilis*

**Color Plate 2**

**Range Summary.** Northeastern South America.

**Diagnostic Features.** Tiny, 8.5 to 9.5 grams, wing length 46 to 54 millimeters. Usually barred below (spotted in one race, some abdominal spots in others); above yellowish green with black and paler arc-shaped marks; and, in one race, white spots. White mark behind eye. *Picumnus* tail pattern. Male with orange-red crown patch; crown spotted white in females.

**Description.** Bill pointed, curved along culmen. Above variable, olive-brown (*undulatus*) to pale yellowish brown (*clarus*) or yellow-green (*exilis*); markings also variable, from nearly barred with dull black (*savini*) to spot-barred with black and yellow-white (most races) and even sharply spotted with white (spots black bordered, *buffoni*). Rump barred; uppertail coverts white with black bars. Wings with coverts marked as back; greater coverts edged in white to yellow, almost forming a bar; flight feathers brown, the outer margins of inner feathers broadly edged in whitish but usually showing some yellow-green (strongly yellow in *exilis*). Underwings whitish in coverts; brown flight feathers with whitish inner margin. Shafts brown above except white in white areas of tail, whitish below except brown in brown areas of tail. Tail brown with typical *Picumnus* pattern. Tail/wing ratio 0.48 to 0.57. Whitish lores and nasal tufts, white line over and behind eye; ear coverts brownish with pale bar-markings. Crown and nape black with white spots, fine on crown, larger on nape. Sides of neck barred; under eyes, malar area, and throat squamate barred black on white. Underparts very variable individually and geographically. Fully barred black on whitish below in most *alegriae* and *undulatus*; dark bars narrower, sometimes breaking into spot-bars or even spots on abdomen; *buffoni* is yellower below, barred, but with narrower bars even more often breaking into spots; *clarus* is finely barred on whitish and *pernambucensis* is similarly barred on a more yellowish background; *exilis* shows barring and spotting about as *buffoni* but on a very yellowish background; and *savini* is pale yellowish white below with reduced markings, from spot-bars on the breast and spots on the abdomen to mainly clear with some spotting on the breast. Undertail coverts whitish, unbarred or barred.

Sexual features: Females average longer wings and tail than males, but size nearly or actually the same; males have black forecrown and forehead feathers tipped narrowly with orange-red to red, these areas and entire top of head being white spotted in females. Immatures have the crown streaked whitish on an olive or olive-gray background; markings above and below are less contrasting, duller, and less regular (more wavy); sexes alike. Eyes brown (but noted as "yellow" on a few labels of *buffoni*); legs and feet gray to slaty, often tinged blue or green; bill black to slaty above, pale blue-gray below with black distal half or only tip black.

**Distribution and Habitat.** Ranges from the Orinoco Valley and the delta region (Amacuro Delta) through the Guianas and adjacent (Rio Branco region) northeastern Brazil to the lower Amazon Valley, eastern Para, coastal Maranhão, and (probably disjunctly) to coastal Pernambuco, Bahia, and Espírito Santo. It generally inhabits lowland forests, savannas, and forest edges, but reaches 5000 feet in the tepui region of southeastern Venezuela.

**Behavior.** Little known. It eats ants and other insects and excavates nesting and roosting holes in soft stems of trees and saplings (Haverschmidt, 1968). Breeding takes place from December to March in Venezuelan *undulatus*, with juveniles molting into adult plumage in
April. Fledged *buffoni* date from October to December in Cayenne and along the Amazon. Slightly enlarged gonads have been noted during March in *salvini*. Molting birds represent March through September.

**Taxonomy.** Relationships unclear, possibly with *P. aurifrons* and *P. lafresnayi*. Subspecies include: *exilis* of Bahia to Espírito Santo; *pernambucensis* of coastal Pernambuco and Alagoas; *alegriae* of coastal Maranhão; *buffoni* of Para, the lower Amazon, and Brazil north of the Amazon to Cayenne, Surinam, and Guyana; *undulatus* of northeastern Brazil, western Guyana, and southeastern Venezuela; *clarus* of eastern Bolivar, Venezuela; and *salvini* of the Amacuro Delta of the Orinoco in Venezuela. Stager (in litt.) has noted that *Picumnus nigropunctatus* Zimmer and Phelps is a synonym of *P. exilis salvini*, of uncertain locality and noted in the literature as possibly a Bogota skin. I have examined the types of *nigropunctatus* and *salvini*, and I quite concur with Stager that they represent the same taxon. Thus, I designate Araguaímujo Mission, Amacuro Delta, Venezuela, as the type locality of *salvini*. Of the races, nominate *exilis* is very yellowish above and below, and its ventral barring tends to spotting on the abdomen. *Picumnus exilis buffoni* is colored like *exilis*, being a bit less yellowish, but is characterized by very distinct dorsal spotting, the white spots being accent by a black border. The race *pernambucensis* resembles *exilis* but is more olive above and more evenly barred below. Distinct *salvini* is ventrally weakly marked, the barring reduced to bar-spots or spot-bars or spots; it is very yellowish above. *Picumnus exilis alegriae* is dully colored, olive, less yellow than *buffoni*, whiter below, with the crown of males more orange (less red). The final two races are slightly larger than those just mentioned. Venezuelan *clarus* resembles *undulatus* but is pale brown above and has narrower, more broken ventral barring. Lastly, *undulatus* is the most strongly barred race ventrally, with a whitish background color; the upperparts are greenish brown with well-marked, blackish scaly bars.

**ECUADORIAN PICULET**

*Picumnus sclateri*

**Color Plate 5**

**Range Summary.** Northwestern South America.

**Diagnostic Features.** Tiny, 9 to 12 grams, wing length 49.1 to 53.8 millimeters. A grayish brown piculet with obscure barring dorsally, and barred throat and breast contrasting sharply with streaked lower breast and abdomen. Crown white spots large; males have yellow spots on forehead. Shows no greenish in plumage. Tail patterned as in other piculets.

**Description.** Bill pointed and curved along culmen. Above dull brown to grayish brown with barring usually evident (bars often obscure on back but well marked, brownish white and black on upper back and rump). Uppertail coverts white with brown bars. Wings brown, dully edged pale brown or brownish white on coverts and outer margins of secondaries and inner primaries; base of inner margin of flight feathers white; underwings much paler, coverts white with some brown bars. Shaft brown above, except white in white areas of tail; underside of shafts dull white, except brown in dark areas of tail. Tail brown, patterned with the usual three *Picumnus* stripes. Tail/wing ratio 0.50 to 0.58. White area on sides of neck, sometimes barred; nasal tufts white. Chin, throat, malar, and area under eyes are white with barring, the bars varying from fine and grayish (*parvistriatus*) to broad and black (*porcullae, sclateri*). Crown black, bearing fine white spots. Breast barred finely in grayish black (*parvistriatus*), broadly in black (*sclateri*), or very broadly black (*porcullae*); flanks and
abdomen streaked, mainly white with narrow grayish streaks in *parvistriatus*, more broadly streaked black in *sclateri*, or very broadly black streaked in *porcullae*, usually with some cross-barring evident (in all subspecies), especially on flanks. Undertail coverts white with black bars.

Sexual features: Sexes essentially the same size; males have yellow spotting narrowly restricted to tips of feathers of central forehead and center of forecrown, such yellow being absent in females. Immatures much as adults, but less regular and less contrasting markings dorsally and ventrally; sexes alike, both having sooty black crown with dull white spot-streaks. Eyes brown; legs and feet olive-gray; bill black, paling to leaden gray below.

**Distribution and Habitat.** Western Ecuador and northwestern Peru, including the western slopes of the Andes, from Guayas, Ecuador, south to northern Lambayeque, Peru. It frequents dry woodlands and thorn scrub (including scrub desert) from sea level to an elevation of 4500 feet or more in Ecuador and 6500 feet or so in Peru.

**Behavior.** Virtually unknown. Breeds in July through September in Ecuador and June through September in Peru. October birds show signs of molt.

**Taxonomy.** Relationships unclear, possibly with the *aurifrons* group, but another possibility is the *minutissimus-spilogaster-cirratus* complex. There are three subspecies, all similar in size. Well-marked *parvistriatus* of western Ecuador (Guayas to Manabi provinces) is very pale, the ventral markings being narrow and gray. The other two races are very much alike and are much darker, blacker below, with broader ventral markings than in *parvistriatus*. *Picumnus sclateri porcullae* of central Piura to northern Lambayeque, Peru, is even blacker below than *sclateri* by virtue of its broader breast bars and broader abdominal streaks; *sclateri*, with narrower and paler markings, thus is somewhat whiter below and tends slightly toward *parvistriatus* in coloration. *Picumnus s. sclateri* inhabits southwestern Ecuador and adjacent northwesternmost Peru.

**Scaled Piculet**

*Picumnus squamulatus*

**Color Plate 4**

**Range Summary.** Northern South America.

**Diagnostic Features.** Tiny, 7 to 12 grams (*squamulatus, rohli*), wing length 48.6 to 55.4 millimeters. Rather pale brown (paler than *minutissimus*) above and white below; dorsal feathers often have pale centers and are edged (squamate) in black but lack dark central streaks and strong pale spots; whitish feathers of underparts tipped black, so squamate below as well as above. Pale edges of wing flight feathers. Hindneck spotted white or buff on black; crown black with red spots in males, white spots in females (spots in both sexes smaller than in *minutissimus*). Typical *Picumnus* pattern of tail.

**Description.** Pointed bill slightly curved along culmen. Above variably brown; feathers paler in center, pale area tending to form vague, almost whitish subterminal spots; edges of feathers have fine black border, giving squamate appearance, occasionally (*obsoletus*) with central wedge-streaks. Uppertail coverts white with black border. Wings brown, coverts much as back; bend of wing with whitish feathers; flight feathers brown with narrow white inner margin and narrow brownish white outer margin, the latter sometimes showing a green cast (especially in *obsoletus*); underwings white in coverts, dull brown with white inner margins of flight feathers. Shafts brown above except white in center of tail, brown below in part of
tail, white in white areas of tail, and whitish in wings. Tail black or brownish black with white stripe on inner vanes of central feathers and broad, distally convergent white stripe on outer two rectrices. Tail/wing ratio 0.49 to 0.58. Hindcrown black with white spots, nape browner with buffy white spots; lores white, nasal tufts white or mixed white and black. Ear coverts brown with white spots or whitish streaks. Under eyes, malar area, and throat whitish with fine terminal bars of feathers giving squamate effect. Below dull white to yellowish white (obsoletus), the feathers bearing strong, black terminal bars (squamatus), somewhat finer, browner bars (variable in rohli), or very fine terminal bars and small wedges or wedge-streak markings in their centers (obsoletus). Abdominal and undertail markings are less dark and finer than breast markings. Fresh-plumaged birds are browner, darker, and show more yellowish, but there is great individual variation in color tone.

Sexual features: Males average slightly shorter wings and measure the same or slightly smaller than females in tail and bill length; males have crown to forehead black with fine orange-red terminal spots on feathers (squamatus, obsoletus, many rohli), but these spots sometimes orange or yellow (some rohli); females lack red or yellow, having black crown spotted finely in white. Immatures more marked dorsally than adults, often with black wedge-marks in feathers, hence are blacker backed; the crown is dullly spot-barred pale brown and blackish in both sexes (red or yellow new feathers soon mark males); ventrally less regularly and contrastingly marked. Eyes brown; legs and feet olive; bill gray or horn to blackish above and pale bluish gray to olive-gray below, either darkening to blackish at the tip or becoming horn colored at the tip.

Distribution and Habitat. Restricted to eastern Colombia and northern Venezuela from the area about Santa Marta, Norte de Santander, Boyacá and Meta, Colombia, east through northern Venezuela to Sucre. It occurs in the lowlands (from sea level upwards) and in lower montane situations, reaching 4500 feet or more in Colombia (Villavicencio) and 1900 meters (6230 feet) or more in coastal mountains of Venezuela. Little is known of its habitat preferences, but it frequents the undergrowth of forests and woodlands.

Behavior. Very poorly known. This piculet forages alone or in pairs, usually low in trees. It works over small branches and taps vigorously on vertical branches, holding the tail clear of the bark (Wetmore, 1939). Wetmore observed a bird “yawning” in an apparent attempt to eject digestible insect remains (exoskeleton) from its digestive system. D. Ewert (personal comm.) observed a pair displaying near Neiva, Colombia, on 16 March, with wings outspread and synchronized head and body movements as the birds perched on a twig — copulation followed. The breeding season occurs from January to at least April in Colombia (i.e., juveniles out of nest by late February and March, copulation in mid-March) and from April to at least June in Venezuela. Molting birds date from September in Colombia and in December to February in Venezuela.

Taxonomy. Relationships uncertain, appearing very like minutissimus and perhaps closely allied to it, but further study is needed. Stager (in litt.) considers it related to other piculets showing a squamulate pattern; i.e., minutissimus and albosquamatus (including “guttifer”). The species is weakly polytypic and polymorphic. There are three subspecies, obsoletus of extreme northeastern (Sucre) Venezuela, rohli of the remainder of its Venezuelan range and adjacent Boyacá and the Santa Marta area of Colombia, and squamulatus of the rest of its Colombian range. Of these, squamulatus is large, dark, and strongly marked. Picumnus s. rohli is slightly smaller and tends to be less heavily squamulate below, with paler, finer dorsal markings (there is much variation, and some birds are indistinguishable from squamulatus);
Picumnus spilogaster

this race is polymorphic, some males having yellow and others red crown spotting. The final race, *obsoletus*, resembles *rohli* in size; it appears not to be polymorphic in crown color; its squamulations are finer; there is a strong tinge of yellow pervading its plumage (especially on wings and underparts); and there are small, dark wedges in the centers of its dorsal feathers.

**WHITE-BELLIED PICULET**

*Picumnus spilogaster*

Color Plate 2

**Range Summary.** Northeastern South America.

**Diagnostic Features.** Tiny, wing length 51.2 to 58.4 millimeters. Variable above, brown without markings or with limited dull brownish white and blackish barring. White patch on side of neck. Underparts clear white or mainly white with black barring on the upper breast and scattered wedge-spots and vermiculations on lower breast, sides, and abdomen. Male has red forecrown patch. Tail pattern as in other *Picumnus*. Eyes brown.

**Description.** Bill pointed and curved along culmen. Above dull brown, unmarked, or (usually) with faint pale dusky white and dark (blackish) bars or occasionally with considerable, but not sharply contrasting, black, brown, and white bars. Uppertail coverts barred brown and white or white (*spilogaster*). Wings brown with buffy white edges of flight feathers and greater coverts; inner margins of flight feathers white; below, white in coverts, gray-brown with white inner margin of flight feathers. Shafts brown above, except in white areas of tail, and white below except in brown areas of tail. Tail brown with three white stripes (center stripe, lateral stripes), as typical in *Picumnus*. Tail/wing ratio 0.52 to 0.60. White nasal tufts, white patch (sometimes with fine bars) on sides of neck; ear coverts brown with black and white bars. Hindcrown and nape black with white spots, spots becoming bar-spots on rear of nape. Under eyes, malar area, and chin white or white with a trace of bars (*spilogaster*) or barred throughout (*orinocensis*, *pallidus*). Underparts of *orinocensis* entirely unmarked white or with a trace of vermiculations or barring on flanks. The other races usually have black barring on the upper breast, or they may show a few spot-bars; lower breast, sides, and flanks white, usually with scattered to moderately numerous black checks or wedges (flanks sometimes slightly barred), but occasionally the markings are very reduced (approaching *orinocensis*). Undertail coverts are white.

Sexual features: Sexes nearly or actually alike in size; males have broadly tipped red feathers of forecrown and forehead, forming patch; females have entire crown spotted white on black. Immatures lack spotting on the sooty crown, having spots on the nape, only; they are buffier white below and show more barring tendencies above and below than do adults; sexes alike. Eyes brown, legs and feet gray-green, bill slaty at base and black at tip.

**Distribution and Habitat.** Northeastern South America from eastern Venezuela (Orinoco region of Amacuro Delta and northern Bolivar) through Guyana to coastal Surinam and Cayenne; also in the Rio Branco-Rio Surumú region of northeastern Brazil and in eastern Para (Quati-purú, *pallidus*). Habitat apparently forest at low elevations.

**Behavior.** Virtually unknown. Breeding is indicated as September to November in northeastern Brazil and Guyana. A few September Brazilian birds show signs of molt.

**Taxonomy.** Relationships of this piculet are not clear. It seems related to sympatric, red or yellow-eyed, and squamate-breasted *P. minutissimus* and the *P. cirratus* complex. The
barred juveniles of *minutissimus* closely resemble *spilogaster*, and there is a possible hybrid of these from the Supernam River, Guyana, in the British Museum. *P. "leucogaster"* is a synonym of *spilogaster* (Zimmer and Phelps, 1950), actually representing *P. spilogaster orinocensis > spilogaster*. There are three subspecies: *spilogaster* of northeastern Brazil and the Guianas; *orinocensis* of easternmost Venezuela; and *pallidus*, known from a few specimens in eastern Para. *Picumnus spilogaster orinocensis* usually is unmarked below, but may have traces of spots or barring. Nominate *spilogaster* is larger than *orinocensis* but shorter billed and usually is barred on the lower throat and upper breast, with spotting along the sides, lower breast, and abdomen. Birds from the Río Surumú and Río Branco region of northeastern Brazil seem variably intermediate between *spilogaster* and *orinocensis*, although usually nearer the former. I have examined the cotypes of *Picumnus pallidus* in Berlin and find that they closely resemble *P. s. spilogaster* and assuredly represent but a weakly marked race of that species. *Picumnus s. pallidus* is smaller than *spilogaster*, about as *orinocensis* in size, but its tail is proportionately shorter.

**GUIANAN PICULET**

*Picumnus minutissimus*

**Color Plate 4**

**Range Summary.** Northeastern South America.

**Diagnostic Features.** Tiny, 11 to 16 grams, wing length 51.6 to 56.7 millimeters. Dark brown above with black checks and pale (whitish) bars; breast scaly-barred; with or without ventral wedge-streaks. Abdomen brownish. Male has red forecrown marks, large and confluent, forming red patch; female with white-spotted black crown. Typical *Picumnus* tail pattern. Eyes yellow or red.

**Description.** Bill pointed, strong, curved along culmen. Brown above, variably marked with a shallow blackish bar on the tip of the feathers; feather shafts have a black wedge or wedge-streak about in the center, with a broad, variably well-marked to obscure whitish spot distal to the black wedge; rump brown, few black bars; and uppertail coverts barred black and white. Wings brown; coverts blackish brown, feathers with paler edges; flight feathers brown, inner margins narrowly white, and buffy whitish outer margins of secondaries and inner primaries; underwing coverts mottled brown and white, flight feathers gray-brown with white inner margin of feathers. Shafts brown above except in white region of tail; below dull white in wings, white in white areas of tail, and black in rest of tail. Tail black or brownish black, *Picumnus*-marked (white central tail stripe, angled white lateral tail stripe on each side). Tail/wing ratio 0.51 to 0.59. Nasal tufts white or dusky white; white or black-barred or spotted white patch at rear of sides of neck. Ear coverts brown with black shaft streaks and whitish edges. Area below eyes through malar region and across throat white with narrow black squamulations. Hindcrown black with fine white spots. Underparts variably marked; background mainly white on breast; buffy white on lower breast, flanks, and front of abdomen; and brownish on lower abdomen (sometimes brown on sides of breast and flanks, also). Breast feathers white with V-shaped, fine black edges, the white brightest at the tip of the V; sides and flanks variably barred to almost clear: abdomen V-marked to squamulate anteriorly, usually unmarked posteriorly; there often are a few black wedge-streaks along the feather shafts on the lower breast or anterior abdomen, these wedges being well marked in about 20 percent of specimens. Undertail coverts dull white or brownish with
**Picumnus minutissimus**

dusky bar at tips of feathers.

Sexual features: Males appear to be slightly smaller (shorter wings, 5 percent shorter tail) than females, but have a longer bill; forecrown and forehead of males with broad red tips of feathers, forming red patch, whereas entire crown of females is finely white spotted on black. Immatures brown above, barred with black; crown unspotted brownish black; below less contrastingly marked, duller, paler. Eyes variously reported as yellow, carmine, and carmine brown. Legs and feet greenish gray, bill grayish.

**Distribution and Habitat.** The Guianas, from Guyana through Surinam to Cayenne, in lowland forest edges, savannas, coffee plantations, and coastal woodlands (*Avicennia nitida*).

**Foraging Habits.** Pairs forage together, usually on small branches and twigs of shrubs and low trees and also at such sites in the canopy. The food consists mainly of ants and beetles (Haverschmidt, 1968).

**Voice.** Reported as a frequent, shrill “kee, kee, kee” by Haverschmidt (1951, p. 196) and a “teee, teee” by the same author (1968, p. 211).

**Displays.** Unknown.

**Interspecific Interactions.** Haverschmidt (1951) noted that a female carrying food to the young attacked and drove away two copulating doves (*Columbina talpacoti*) near the piculets’ nest. *Dendroplex picus* and *Troglohytes aedon* also were attacked when near the nest. Haverschmidt also recorded an attack of the hummingbird *Amazilia finbricata* upon a flying piculet.

**Breeding.** Both sexes excavate a cavity in soft branches, stubs, or stumps. This may occur well before breeding, for the pair occupy the cavity together at night before the breeding period. Haverschmidt (1951) reported a nest excavated at 8 meters up an *Erythrina glauca* tree (soft wood) during October and roosting of the pair in the cavity at night. By 4 November a second adult male had joined the pair in the nest nightly. This extra male “helper” was forced out of the nest during incubation. Breeding occurs in Surinam between March and December, but most juval bird dates from September to November. The clutch is of two or three eggs (Haverschmidt, 1951, 1968). Incubation occurs for 12 (Haverschmidt, 1968) to 14 (Haverschmidt, 1951) days. The pair change places frequently to incubate, the bird inside leaving the nest before its mate enters. After the young hatch, both parents bring insect food, carried in the bill; but the female seems to feed more than the male. Fecal material is not carried from the nest (eaten by adults?) until the nestlings are 5 to 7 days old. The birds roost together in the nest past the time of fledging (at 28 or so days of age) and up to 62 or more days thereafter (Haverschmidt, 1951). Nothing is known of the breakup of family parties. Molt occurs from March to December.

**Roosting.** As noted earlier, the male and female of a pair roost together prior to egg laying, and the family may roost together in the nest “dormitory” for several months after the young fledge.

**Taxonomy.** Relationships of piculets remain to be elucidated. Meyer de Schauensee (1966) included *P. pallidus,* "guttifer," and *P. albosquamatus* in *P. minutissimus*. Of these, *pallidus* represents *P. spilogaster* (see in species accounts). Although *minutissimus* resembles *guttifer-albosquamatus* closely, the possible relationship of this latter complex with the *P. cirratus* complex, coupled with sympathy of *minutissimus* with *Picumnus cirratus macconnelli* in the Guianas, makes it advisable to separate *guttifer* and *albosquamatus* from *minutissimus* for now. *Picumnus minutissimus* differs from *guttifer* in its more squamulate ventral markings and in having few or no arrow-shaped ventral markings; *guttifer* also has discrete,
small, white dorsal spots with an accenting black border, whereas minutissimus has the white marks more barlike and obscure, with less sharp, black borders, the overall effect being quite different. Nonetheless, minutissimus probably is related closely to albosquamatus-guttifer and cirratus. The species is monotypic.

Reference

**SPOTTED PICULET**

*Picumnus pygmaeus*

**Color Plate 5**

**Range Summary.** Eastern South America.

**Diagnostic Features.** Tiny, wing length 49.3 to 54.4 millimeters. Brown with white spots above and below, whitish about the base of the bill, and the usual Picumnus crown pattern (black with white spots, the forecrown and forehead red in males) and tail stripes. No other piculet in its region shows the spotting dorsally and ventrally.

**Description.** Bill pointed, barely curved along the culmen, and narrow. Brown above and below, varying in tone (warm, almost rust-brown to dull brown and dark or light), but paling on the rump and abdomen; wings darker brown, with buffy or cinnamon edges of secondaries; marked above and below with fine to large spots that are clear white below, but may be brownish and less contrasting above, the spots bordered with black especially on the breast, with black concentrated along the shaft below each spot (occasionally these black marks are wedge-shaped and conspicuous), and at the distal border of the spot. Underwings paler below with whitish inner border of secondaries, and on coverts. Uppertail coverts white, with or without brown or black barring. Shaft brown above except white in white areas of tail; whitish below except brown in brown areas of tail. Tail brownish black with three white Picumnus stripes, paler below. Tail/wing ratio 0.54 to 0.64. Nasal tufts white; area under eyes and malar region white with fine blackish bars (squamulate); throat broadly white barred or squamulate or blackish with large white spot-bars. Ear coverts brown with fine white spots and blackish bars. Area of white usually occurs behind eye. Hindcrown and nape black with fine white spots; black over eyes and along front of forehead. Abdomen varies in color from near that of breast to buffy, or even buffy white; the abdominal markings may be nearly like those of the breast (they tend to be larger and toward black and white spot-bars), or decidedly barlike but with dull, not strongly contrasting bars, or almost obsolete, vague brown angled marks. Undertail coverts brown with white and black bars or spot-bars.

Sexual features: Sexes nearly alike in size, females tending to be longer tailed; male forecrown and all of forehead except (black) anterior edge is composed of black-based, broadly red-tipped feathers, forming a red patch; entire top of head is black with white spots in female. Immatures are duller and less contrastingly marked, the spots being more barlike below, and have a sooty crown weakly streaked, or unstreaked with spot-streaks on the nape; sexes alike. Eyes brown, legs and feet dull gray, bill black with a bluish base of the lower bill.

**Distribution and Habitat.** The “caatinga” and dry forests of Bahia, Piauhy, Pernambuco, and Maranhão comprise its range. It occurs from near sea level to at least 2500 feet (Bahia).
Picumnus steindachneri

No specific habitat information is available.

Behavior. Another almost unknown piculet. Molting March and April specimens suggest that breeding occurs in the period from November to February, but one juvenile from Maranhão dates from 1 August. Other juvenile specimens examined bear no dates.

Taxonomy. Relationships are suggested with the P. cirratus-albosquamatus-varzeae assemblage, but much study is required of the systematics of piculets. In particular, its relationships with varzeae and with the guttifer group of albosquamatus need investigation. See P. albosquamatus for a discussion of P. asterias Sundevall, which has been suggested to be a form of P. pygmaeus (Meyer de Schauensee, 1966; Stager, personal comm.). Pinto and Comargo (1961) described a coastal Bahia dark race distinctus of P. pygmaeus from Ilha Madre de Deus, but specimens from throughout the range of pygmaeus, when viewed in series, show such great individual variation in tone (seasonality was taken into account) that I do not think there is justification for polytypic treatment of pygmaeus.

SPECKLE-CHESTED PICULET

Picumnus steindachneri

Color Plate 5

Range Summary. Western South America.

Diagnostic Features. Tiny, wing length 53.7 to 57.5 millimeters. Gray-backed with dull squamate black and whitish barring. Breast black with white spots, abdomen white with black bars. Throat white, with squamations. Crown and forehead spotted red in male, crown white-spotted in female; tail patterned as in other Picumnus.

Description. Bill rather straight, pointed. Above brownish gray, variably marked (from almost no markings to strong barring) with dull whitish, squamate bars, edged narrowly in black and with black central spot on each feather so marked. Upper back barred weakly with black. Rump also barred; uppertail coverts white with dark bars. Wings browner than back, coverts edged in grayish or dusky white; inner flight feathers edged in whitish; underwings white in coverts, brown in flight feathers. Shafts brown above except white in white areas of tail; below whitish except brown in brown areas of tail. Tail blackish with usual three Picumnus stripes. Tail/wing ratio 0.55 to 0.60. White mark behind eyes. Ear coverts sooty black with dull brown spots; nasal tufts white; sides of neck with white and black barring; under eyes, malar area, chin, and upper throat white with fine black edges of feathers (hence squamate). Hindcrown and nape black with fine white spots. Lower throat, sides, and breast black with droplet-shaped white spots; flanks and abdomen white with black barring. Undertail coverts barred black and white.

Sexual features: Sexes similar in size. Males have broad red tips of forecrown and forehead feathers; entire top of head of female black with fine white spots. No data available on immatures or on soft parts.

Distribution and Habitat. Uncommon or rare. Restricted to the lower mountain slopes of the Huallaga River and its tributaries in northeastern Peru. Occurs from 4000 to 6000 feet, but habitat not described.

Behavior. Totally unknown, including period of molt and breeding season (specimens from July to November include no juveniles, nor are any in obvious molt).

Taxonomy. Relationships unclear. The markings suggest P. pygmaeus and P. varzeae, but its
pattern suggests the *P. cirratus* group (including *guttifer*), which reaches lower montane areas in Bolivia, northwestern Argentina, and southeastern Peru (*jelskii*).

**VARZEA PICULET**

*Picumnus varzeae*

**Color Plate 5**

**Range Summary.** North-central South America.

**Diagnostic Features.** Tiny, wing length 50.9 to 55.5 millimeters. Dull, dark brown with a plain back, a white-spotted breast, and dull barring evident on the abdomen. Tail has white stripes narrowed and partly obscured by brownish. Red forecrown patch in male, white spotted black crown of female.

**Description.** Bill pointed, slightly curved along culmen. Upperparts dark brown, on close examination showing vague black bars at tips of some feathers; uppertail coverts barred brown and black and white. Wings as back, primary feathers darker brown and secondaries finely edged in whitish buff; below paler, coverts barred brown and white. Shafts brown above except central rectrices white at bases; below dull whitish in wings, brown in tail. Tail brown; the typical *Picumnus* pattern of stripes is evident but much reduced by encroachment of brown, moderate in center of tail (sometimes brown-barred and not reaching tip of feathers), very narrow, broken or absent in outer two feathers; paler below. Tail/wing ratio 0.52 to 0.61. Lores finely speckled white and blackish, sides of face brown with few fine white spots and suffused blackish bars; sides of neck brown, black and white barred, a few black and white bars often occurring also on hindneck-back border. Throat blackish brown with white spot-bars or thin white bars. Hindcrown and nape black with fine white spots. Underparts variable, but mainly brown, unmarked on the sides and typically with but few dark bars on the flanks; breast black and brown with white spots or spot-bars; abdomen barred buffy and black in center; undertail coverts dark with few bars. There are numerous specimens that are more barred below, tending toward *P. cirratus macconnelli*.

**Sexual features:** Sexes virtually the same size, males tending to be a trifle larger; male with broadly red-tipped black forecrown and forehead feathers, these forming a patch (the anterior forehead is black, ahead of the red); females lack red (top of head black with white spots). Immatures more vaguely spotted on breast and more barred generally than adults, crown streaked, sexes alike. Eyes brown, legs gray, bill black but bluish at its upper base and having a variably sized, pale yellowish gray area in the center or near the base of lower bill.

**Distribution and Habitat.** Restricted to seasonally flooded areas (the *varzea*) adjacent to the Amazon River, including its islands, from the lower Madeira River eastward to the lower Jamundi River, Óbidos, and westernmost Para. Habitat dense lowland forest understory near or in water.

**Behavior.** Unknown, except for specimen data, which indicate a December to July molt and breeding late in the year. Immatures coming into adult plumage are known from November.

**Taxonomy.** In need of study. I have seen from the Faro and Óbidos areas at least three hybrids of *P. varzeae* and *P. cirratus macconnelli*, plus an undetermined number of each form that tend toward the other in one or more characters (e.g., fine spots on concentrated black of the breast and brownish flanks of "maccennelli" and barring on the sides and a fully barred throat of "varzeae"). Indeed, it is possible to put together several series showing almost continuous variation from one into the other. However, field investigations and
detailed studies of the available specimens are needed to determine the extent of their hybridization. There may be a bill color difference between them (varzeae pale-spotted on the bill). Differences other than the pattern of the underparts are few: varzeae has barred underwing coverts and restricted white patterning of the tail, macconnelli is a bit larger than varzeae, and females of macconnelli tend to be larger than males, which is not the case in varzeae. In any event, relationships of varzeae with P. pygmaeus, suggested by Meyer de Schauensee (1966, p. 217), appear not to be direct, but through the P. cirratus complex.

WHITE-BARRED PICULET

*Picumnus [cirratus] cirratus*

Color Plate 5

Range Summary. South America.

Diagnostic Features. Tiny, 8.7 to 12.0 grams (temminckii, cirratus, pilcomayensis), wing length 45.7 to 58.9 millimeters. Extremely variable, above unmarked brown to gray with the barest trace of brown, variously edged buff, and barred at upper back juncture with neck. Below fully barred black and white, black with narrow white bars and some white spots, mainly white with a few bars, or with squamate bar-tips and black wedge-centers. White mark over eye, sides of neck barred (except temminckii). Males with red-tipped forehead feathers; females lack red, have white spots. *Picumnus* tail pattern.

Description. Bill pointed, slightly curved along culmen. Geographical variation very great (but disparate forms interbreed). Above dark brown with no bars or but traces (macconnelli), similarly brown with pale bars on upper back (confusus), rich brown with no or vague bars (temminckii), duller brown with faint dark bars (cirratus), gray-brown with blackish and white bars (tucumanus, jelskii, dorbygianus), and similar but grayer (pilcomayensis, thamnophilooides). Wing coverts brown to gray, as the back, nearly or completely unmarked in the brownest forms (macconnelli, confusus, temminckii) but edged in buff or with pale spotted tips in others; primaries brown in all, secondaries brown, barely edged buff in brown races, but buffy white edges in others. Underwings paler, coverts buffy white to white, rarely spotted, and whitish inner edges of flight feathers. Shafts as in *P. albosquamatus* and other *Picumnus*; tail likewise. Tail/wing ratio 0.52 to 0.70 (note, northern races, jelskii, confusus, and macconnelli, have the shortest tail). Nasal tufts white; white mark over eye (at rear) in all but macconnelli and confusus; malar area and undereye region nearly black with white spots in macconnelli, barred in confusus, mainly buffy white in temminckii, and white with fine squamulations in others. Throat white in pilcomayensis; white with few traces of dark edges in some thamnophilooides, dorbygianus, and jelskii; squamate in cirratus, temminckii, and tucumanus, as well as in some thamnophilooides, dorbygianus, and jelskii; barred in confusus; and black with white spot-bars in macconnelli. Ear coverts deep brown in confusus and macconnelli (few white spots), rich buff in temminckii, buff with faint bars in cirratus, vaguely black and white barred with some buff in tucumanus, pilcomayensis, and most birds of the other races (sometimes streaked). Sides of neck forming buffy cinnamon patch around hind-neck and onto ear coverts and rear of malar in temminckii, diagnostic for that form; otherwise finely barred black and white on sides of neck in confusus and macconnelli, varying barred black and white or spotted those colors in the others. Nape and edges of hindcrown black with white spots, spots broader at rear of nape and forming streaks and bars in most others (not temminckii). Breast is black with fine white bars or sometimes bar-spots in macconnelli,
grading into evenly barred flanks and abdomen, and barely with any buff on the abdomen; evenly barred black and white in \textit{confusus}, grading into whiter, finely black-barred and faintly buffy abdomen; barred black and white in \textit{temminckii} and \textit{cirratus}, the white bars broader and becoming even broader on abdomen and flanks, which are very buffy in \textit{temminckii}, less so in \textit{cirratus}; barred black on white but with a tendency toward white bar-spots and squamation in \textit{tucumanus}, buffy white with narrow black bars on abdomen; variably almost pure white to sparsely barred in \textit{pilcomayensis} (bars incomplete on each feather, when present), even whiter on abdomen where markings are both sparse and dull; white with wavy black bars, giving scalloped effect in \textit{thamnophiloides}, varyingly giving way to barred or wedge-spotted flanks and a sparsely spotted buffy white, sometimes clear buffy white abdomen; white with fine black edges and center wedge-streaks (sometimes squamulate) in \textit{dorbygnianus}, very like some \textit{P. albosquamatus guttifer}, giving rise to barring or bar-spots on the buffy flanks and usually few fine bars or vermiculations or none on buffy white abdomen; finally, white with black streak-wedges in center of feathers of \textit{jelskii}, becoming finely streaked on buffy white sides and sparsely spotted, if at all, on the whitish abdomen. Undertail covert is barred white (or buffy white) and black in all forms.

Sexual features: Females generally (except for \textit{temminckii} and \textit{thamnophiloides}, where equal) are 1 to 2 percent longer winged and longer tailed and about equal the males in bill length; males have forecrown and forehead tipped red, broadly so and forming a patch in \textit{macconnelli}, \textit{confusus}, \textit{cirratus}, \textit{temminckii}, and \textit{jelskii}, less broadly in \textit{dorbygnianus} and \textit{thamnophiloides}, and finely tipped, showing as spots or streak-spots in \textit{tucumanus} and \textit{pilcomayensis}; females lack red, being white spotted on top of the black head (\textit{temminckii} has finer, sparser white spotting on the head in both sexes than do other races). Immatures duller, less contrasting, but almost always darker than adults, race for race, tending to be more barred or more heavily barred below and with bars more frequent dorsally; crown sooty, rarely spotted in the center anterior to midcrown, few buffy streak spots on sides of hindercrown, and becoming streak spotted across the nape; sexes alike. Eyes brown to chestnut; legs gray to grayish black; and bill black, lower bill gray in center and white at base (\textit{pilcomayensis}, \textit{cirratus}).

Distribution and Habitat. Occurs disjunctly in northeastern South America from Guyana and Cayenne to Para and Marajó Island, extending up the Amazon to Óbidos, and along the lower Tocantins, Xingu, and Tapajós rivers; also, an isolate (\textit{jelskii}) in montane eastern Peru; also from Minas Gerais and Espírito Santo south through Brazil to Rio Grande do Sul and westward through Parana, the Paraguayan border of Mato Grosso, Paraguay, southern Santa Cruz and Chuquisaca, Bolivia; southward in the west to Tarija, Jujuy, Tucumán and La Rioja; and farther east, south to Santiago del Estero, northern Santa Fé (southern limit of the chaco), and Entre Ríos, Argentina. Within this range it frequents forests, gallery forests, woodland, scrub woodland, and montane dry and wet forest. It particularly frequents mixed bamboo and forests and woods with a dense understory. Altitudinally, mainly a lowland species, but reaching over 3000 feet in eastern Brazil, occurring only between 4000 and 6000 feet in Peru, and extending from the chaco up into Andean valleys of northwestern Argentina and central and southern Bolivia to elevations as high as 7000 feet in Tarija and Chuquisaca, and 5000 feet in Jujuy and Salta. Orog (1958) found an altitudinal zonation of three races in northwestern Argentina, \textit{pilcomayensis} in the chaco, \textit{thamnophiloides} above it in dry forests, and \textit{dorbygnianus} in wet forests of the Andean slopes.

Foraging Habits. Forages in a woodpeckerlike manner but does not regularly appress its tail to the bark (see Wetmore, 1926). Works over small branches, branchlets, saplings, and
vines, occasionally high in trees, but usually in the understory. Active, it moves rapidly, but works over branchlets diligently, probing, gleaning, and tapping (Short, 1970a). It pays little heed to a human observer: One can thus approach it closely; however, like all piculets it "takes off" rapidly when finished on a tree and is very difficult to follow for any length of time. Its tapping is loud, very loud for its size, and often betrays its presence. Its food is insects, including ants, but D. Ewert (personal comm.) observed a bird in Corrientes feeding apparently on sap at holes it had excavated in the tip of a twig; he found no evidence of insects present in the twig. It occasionally moves downward, nuthatchlike (Sitta), observed also by Mitchell (1957), but it does so infrequently.

**Voice.** Drums staccatolike, very loudly for its size, on low dead stubs of saplings. Its drumming posture is picidlike, but with little or no appressing of the tail to the bark. Its call is a short, buzzy note (Mitchell, 1957), not uttered often.

**Breeding.** In the southern areas (races *tucumanus, cirratus, temminckii*) and Andean slopes breeding is late in the year, commencing in October, with immatures dating from that month to February and March. Northern *cirratus* nest earlier, with September to December immatures from São Paulo, and *pilcomayensis* nests at the same time. One immature *jelskii* dates from January. Breeding of *macconnelli* and *confusus* is from July to December, with immatures mainly representing September and October. The nest is excavated in dead stubs, usually very thin dead saplings, or in bamboo stems, mainly low in the understory (4 to 18 feet). The entrance is tiny, round, and even. Many old holes, or roosting holes mark areas where the piculet is common; no other picid makes, and few or none could use, such holes (even if enlarged). Chips are tossed out as the excavation is made (Mitchell, 1957), both sexes participating in the effort. Nothing is known of nesting habits, development and feeding of the young, etc. Molt occurs following nesting, from January to May in most (all?) parts of the range (December molting *jelskii* were noted).

**Roosting.** Not observed, It would be of interest to know if this common species roosts communally.

**Taxonomy.** As with all piculets its relationships are in need of study. Limited (possibly more extensive than we realize) hybridization occurs between *P. cirratus macconnelli* and *P. varzeae* (see pp. 82-83) along the Amazon River. Interbreeding of *P. cirratus pilcomayensis* with *P. albosquamatus guttifer* occurs to an as yet undetermined extent, but frequently in southern most Mato Grosso; and suspected hybrids have been seen from São Paulo between sympatric (exact extent of sympatry and hybridization remains to be established) *P. e. cirratus* and *P. albosquamatus guttifer*. Also, *P. cirratus dorbygianus* interbreeds with *P. a. albosquamatus* in Cochabamba and western Santa Cruz. The close similarity of *P. albosquamatus* to *P. cirratus thamnophiloides*, *dorbygianus*, and *jelskii* and the hybridization between these species warrant treatment of the two as comprising a superspecies. The relations of *P. cirratus* with *P. pygmaeus* where their ranges approach (Bahia) are unclear, but *pygmaeus* seems closely related to *cirratus*, *albosquamatus*, and *varzeae*. *Picumnus steindachneri* and *P. fuscus* may be related directly to *Picumnus [cirratus]*, and the entire *cirratus* complex seems closely related to the *minutissimus* group (including *spilogaster* and *squamatus*) and possibly is related to *P. selateri* and the *exilis*, *lafresnayi*, and *aurifrons* complex. Field investigations evidently will be required to piece together properly these relationships, as the hybridizing species mentioned above, plus intergradation and hybridization among the diverse forms of *P. cirratus*, clearly indicate the plasticity of simple plumage patterns (barring versus spotting and streaking) in this very uniform piculet genus. Within *P. cirratus* I recog-
nize as subspecies the following: *macconnelli, confusus, cirratus, temminckii, pilcomayensis, tucumanus, thamnophiloides, dorbygnianus, and jelskii*. Characteristics of these races have been given earlier under Description and will not be repeated here. Their summarized ranges are: *macconnelli*, eastern Amazon valley region to northeastern Brazil; *confusus*, Guyana and Cayenne; *jelskii*, Andean slopes of eastern Peru; *cirratus*, Minas Gerais and Espírito Santo to Parana, eastern Paraguay, and São Paulo; *temminckii*, from eastern Paraguay to São Paulo, to Misiones and Rio Grande do Sul; *pilcomayensis*, from southern Santa Cruz, eastern Tarija, and eastern Salta to Santiago del Estero, northern Santa Fé, Entre Ríos, Corrientes, and eastern and western Paraguay; *tucumanus*, from western Salta to La Rioja; *thamnophiloides*, from Chuquisaca and Tarija, Chaco, and northern Salta; and *dorbygnianus*, from Cochabamba south along the Andes to Jujuy and northern Salta; and *dorbygnianus*, from Cochabamba south along the Andes of Bolivia west of, and interdigitated with *thamnophiloides* (of drier woods) to Jujuy, Argentina. Interrelations and field studies of all these taxa are required before we can fully understand their taxonomy. Stager (in litt.) pointed out that numerous hybrids exist of *temminckii* and *cirratus* from Parana and São Paulo, and these do indeed seem to intergrade. A problem is that, although *pilcomayensis* and *cirratus* intergrade in eastern Paraguay, and *cirratus* interbreeds with *temminckii*, interbreeding of *pilcomayensis* with *temminckii* in easternmost Argentina (where they must meet) has not been established. Specimens I have seen demonstrate intergradation of *tucumanus, thamnophiloides*, and *pilcomayensis* where their ranges meet in Salta and Jujuy (unfortunately, most samples are not from single localities, nor from the breeding season—pieced-together samples from an area showing divergent vegetation and topography, although suggestive, cannot give a fully clear picture). The problem of *dorbygnianus* is complicated by interbreeding of this form with *P. albosquamatus*, but *thamnophiloides* and *dorbygnianus* do interbreed in Chuquisaca and Tarija. Peruvian *jelskii* is difficult, and may be allied to *P. albosquamatus* (*P. albosquamatus* may prove conspecific with *P. cirratus*, anyway), but more likely is a northern disjunct of a montane population ancestral to both *jelskii* and *dorbygnianus* (Meyer de Schauensee, 1966, merged *jelskii* with *dorbygnianus* in *P. ‘dorbygnianus’*). I think it is best viewed as such, a disjunct, and consider that *P. albosquamatus* is a recent invader of montane Bolivia from the east (towards guttifer’s range), hence complicating the picture with interbreeding where it contacts *dorbygnianus*. The northern two races, *macconnelli* and *confusus*, are distinctive inter se and are distinct (not inconceivably specifically distinct) from the southern populations. It is possible that the array of *macconnelli, confusus, cirratus, and temminckii* is separable at or near the species level (*P. cirratus, sensu stricto*) from western *pilcomayensis–tucumanus–dorbygnianus–thamnophiloides–jelskii* (the specific name of which would be *P. dorbygnianus*); that is, the superspecies could consist of *P. albosquamatus, P. dorbygnianus* as just defined, *P. cirratus* as just restricted, and possibly even *P. varzeae* and *P. pygmaeus*! Or, *all* of these could prove conspecific! The taxonomic course chosen here seems the best compromise in view of the data available and analyzed at present.

Reference

WHITE-WEDGED PICULET

Picumnus [cirratus] albosquamatus

Color Plate 5

Range Summary. Central South America.

Diagnostic Features. Tiny, 9 to 11 grams, wing length 48.6 to 60.1 millimeters. A brown piculet with white or whitish dorsal spotting (back, wing coverts) and ventral white wedges with or without black "arrow" marks in their center. Male forehead strongly red; female with white-spotted black crown. Abdomen buffy or whitish with weak markings. Tail pattern as in other Picumnus.

Description. Bill nearly straight, pointed. Dorsally grayish brown (albosquamatus) to warm brown (guttifer), marked with finely black-bordered white spots having a black basal spot within them (most guttifer), or these spots variably expanded into white and black spot-bars (some guttifer, albosquamatus). Uppertail coverts black and white. Wing coverts as back, flight feathers darker brown, inner secondaries with buffy white outer edges; underwings paler, whitish coverts and inner edges of flight feathers, few white spots on brown bend of wing. Shafts brown above, but white in white areas of tail and white below except brown in brown areas of tail. Tail brown with broad, white, three-striped Picumnus pattern. Tail/wing ratio 0.54 to 0.65, averaging lower in albosquamatus. Throat and malar area black with white spot-bars (some guttifer), barred, or white with black squamate markings (albosquamatus); sides of head brownish with vague black and white spot bars, becoming black and white barred (guttifer) or squamate-barred (albosquamatus) on the sides of the neck. Nasal tufts white. Fine line over eye and at front of forehead; and hindcrown and nape black with fine white spots (larger on nape). Breast variable, typically white with black borders, hence "scalloped" in albosquamatus, and white with narrow black edge and central black wedge-streak in guttifer; but some of former show black wedge-streaks, and some of the latter are blacker, nearly barred, or giving a white-spotted effect. Abdomen and flanks usually much less marked or even almost unmarked, and buffy in albosquamatus, but less buffy with more markings in guttifer; abdominal markings vary from vague squamate bars or fine vermiculations at tips to finely barred or streak-barred. Undertail coverts unmarked white to barred black and white.

Sexual features: Sexes similar in size, females tending to be longer tailed. Males with broad red tips of black anterior crown and forehead feathers; females have entire top of head black with white spots. Immatures less contrastingely marked, and markings above and below more barlike, browner on back (albosquamatus); crown brownish black, unmarked except for buffy spots or spot-streaks on nape. Eyes brown, legs and feet greenish gray, bill black paling to gray in center of lower bill.

Distribution and Habitat. Ranges from the Yungas of northern Bolivia eastward through lowland Beni, Cochabamba, and northern Santa Cruz, through Mato Grosso, and to southeasternmost Para, Maranhão, Goias, Minas Gerais, and São Paulo. Inhabits dense woods and gallery forests, mainly in lowlands, but sporadically reaching 2100 meters in La Paz, Bolivia (Yungas).

Behavior. Essentially unknown. Immature birds date from 30 May through December in Bolivia, and from June to December in Mato Grosso. Molting specimens from January to March in Bolivia, Goias, São Paulo, and central Mato Grosso, but from September in southern Mato Grosso.
Taxonomy. Merged with *P. minutissimus* by Meyer de Schauensee (1966), following Gyldenstolpe (1945), but the relations of *albosquamatus* with *P. cirratus* and sympatry of *P. minutissimus* with *P. cirratus confusus* make this merger unlikely. Interbreeding of *albosquamatus* with *cirratus* in Bolivia and southern Mato Grosso is under study and I am not now prepared to state its extent. Hybridization of these two taxa also may occur in São Paulo. *Picumnus albosquamatus* of course separates the southern *cirratus* and northern *macconnelli* groups of *P. cirratus* (the latter group interbreeds with *P. varzeae*). Further, possible relations of *P. albosquamatus* with *P. pygmaeus* are unclear. Pending further study, I prefer to treat *albosquamatus*, including *guttifer*, as a species forming a superspecies with *P. cirratus* (see p. 85). The merging of *albosquamatus* and *guttifer* in one species was suggested by Bond and Meyer de Schauensee (1943, p. 221: “We see no reason to retain *P. guttifer* Sundevall as a species distinct from *albosquamatus*”). There are signs of intergradation in western Mato Grosso, and individual variation in each encompasses part of the ventral patterning of the other (see Description). This merger permits no further subspecific breakdown of the species, although there is minor geographical variation within Bolivian *albosquamatus* and possibly some masked by great individual variation of *guttifer*. Thus, *albosquamatus* occupies the Bolivian range of the species, into western Mato Grosso, and *guttifer* occurs east from central Mato Grosso. I have seen the cytotypes of *P. “asterias”* in Leiden and find them to represent *Picumnus albosquamatus guttifer*. They show few back spots, but the ventral pattern matches that of southern Mato Grosso *guttifer* (possibly introgressant towards *P. cirratus*!) and measurements agree well with birds from that area. Finally, the examination of the Berlin type of *Picumnus “sagittatus,”* generally accepted as representing *guttifer*, indeed easily falls within the range of variation of that form. Thus, *asterias* and *sagittatus* are synonyms of *P. albosquamatus guttifer*.

**RUSTY-NECKED PICULET**

*Picumnus fuscus*

**Color Plate 3**

**Range Summary.** Central South America.

**Diagnostic Features.** Tiny, wing length 49 to 52 millimeters. Brown with buff or cinnamon-buff band about hindneck, and same color on face. Forehead of male and entire crown of female black without markings. Buffy underparts with vague or no traces of barring. Upperparts unmarked brown. Male has orange-red tips of hindcrown feathers.

**Description.** Bill slightly curved along culmen, almost pointed at tip. Above brown, including wings; rusty tinge on some wing coverts, edges paler, giving hint of bars; flight feathers dark brown with yellow-buff edging; wings paler below with buffy-cinnamon linings and edges. Shafts brown dorsally except white in white areas of tail; whitish below in wings, base of tail and white areas of tail, being brown distally in nonwhite parts of tail. Tail dark brown and white in typical *Picumnus* pattern except that the dark borders of outer tail are not fully pigmented, being dusky, not dark brown. Tail/wing ratio 0.52 to 0.54. Forehead and very rear of hindcrown black, sharply set off from rusty or buffy brownish band around hindneck; ear coverts, lores, malar region, and sides of neck also rusty or buffy brown. Throat buff with traces of barring or very fine, dull blackish or brown bars. Underparts buffy cinnamon at sides; paler, whitish buff in center; appearing variegated in background color below; markings are faint, evident especially on flanks, but often traces of bars are present at
tips of breast and abdominal feathers as well as on flanks. Undertail coverts buff-brown.

Sexual features: Sexes seem similar in size. Males have orange-red tips of central to hind-crown feathers, tips large enough to form patch; females lack red, having unmarked black cap. Immatures not known. Soft part colors unknown, but eyes assumed to be brown, legs and feet appear brownish in skins, and bill is black with gray extending from base outward to middle of lower bill in specimens.

Distribution and Habitat. Known only from Beni, Bolivia, and westernmost Mato Grosso, apparently in riverine or other forest at low elevations. Rare.

Behavior. Unknown.

Taxonomy. Status uncertain; could prove to be related to *cirratus* and its allies (neck color and faint barring below suggest *temminckii* of *P. cirratus*, which is similar in size). It shows resemblance to *P. rufiventris* in its neck band and color of upperparts and underparts and is sympatric with *rufiventris* in Beni.

**Rufous-breasted Piculet**

*Picumnus rufiventris*

Color Plate 3

Range Summary. Western South America.

Diagnostic Features. Tiny, but large for a piculet, 12 to 16 grams (*rufiventris; grandis* is considerably larger), wing length 54 to 67 millimeters. Back greenish, underparts unmarked rufous to rusty chestnut; usually a rusty bar across hindneck. Nasal tufts grade into forehead, not forming a patch. Typical *Picumnus* tail pattern, but white suffused with cinnamon. Cap black with white spots (female) or with feathers tipped red (males).

Description. Bill long, slightly chisel-tipped and curved along culmen. Toes proportionately longer in *grandis*. Strong racial size variation. Hindneck band (narrow or obscured in *rufiventris*), sides of neck, malar area, and entire underparts rufous-chestnut (*brunneifrons, grandis*) to cinnamon-rufous (*rufiventris*). Back green (*rufiventris*), yellow-green (*grandis*), or green tinged with rusty (*brunneifrons*), the rump usually with rusty traces. Wing coverts as back, but often edged rusty; flight feathers brown, edged green with rusty traces on outer side, and margined buffy cinnamon on inner side; there usually is a small buffy cinnamon patch on bend of wing; rusty underwing coverts and brown flight feathers with cinnamon patch. Shafts brown above, except whitish or tan in pale areas of tail, and whitish below except brown in dark areas of tail. Tail brown with three *Picumnus* stripes, these whitish suffused weakly to strongly with cinnamon. Tail/wing ratio 0.45 to 0.54. Forehead feathers mainly dull rusty in *brunneifrons*, blackish in other races. Ear coverts rusty, sometimes with dark barring or streaks evident; nasal tufts with black-tipped white feathers, thus not forming a patch. Black cap extends onto forenape in *rufiventris* but is restricted to crown in other races.

Sexual features: Sexes alike in size except males have 5 percent longer bill. Black crown patch is spotted white in females; males have red-tipped feathers of black forehead and fore- and midcrown (*rufiventris*) or midcrown to hindcrown (other races), there being white spots on the nape (*brunneifrons, grandis*), on the nape and hindcrown (*rufiventris*), in a line over the eyes (all races, but weakly developed in *rufiventris*), and on the forehead and forecrown (*grandis, brunneifrons*). Immatures bear striking resemblance to Afro-Asian *Sasia*, being
cinnamon-brown on the abdomen and throat but with gray across the breast and sides and sometimes in obscure bars on flanks and abdomen; upperparts gray-green, hindneck patch obscure; crown olive to gray, often with buffy cinnamon bar-marked tips of feathers, but not spotted; sexes alike. Eyes brown, legs and feet gray, bill black.

**Distribution and Habitat.** Lowland, forest edges, and secondary forest undergrowth along the east slope of the Andes from Meta, Colombia, through eastern Ecuador, and eastern Peru to northwestern Bolivia (Benti and Cochabamba). Occurs below 3300 feet in elevation.

**Behavior.** Essentially unknown. Breeds during January to March in Peru (*grandis*) and Bolivia (*brunneifrons*); Ecuadorean *rufiventris* juveniles are known from June and November. Molting birds date from June and July (*grandis*).

**Taxonomy.** Relationships unclear, not certainly related directly to *cinnamomeus*, despite superficially similar coloration, for their patterns differ. Eastern Peruvian *grandis* is 14 to 16 percent larger than Ecuadorean and Colombian *rufiventris* in measurements; it is paler below and more yellowish above, its hindneck band is better developed, the cap is more restricted at its rear edge, the red markings of males extend farther posteriorly, white spotting is evident on the forecrown of males, and its toes are proportionately very long. Bolivian *brunneifrons* is intermediate in size between the two races just mentioned; its crown and male markings are like those of *grandis*, but it is darker than *grandis*, with suffusion of chestnut into the green of the back and on the forehead, and its rusty nape patch is broader.

**TAWNY PICULET**

*Picumnus fulvescens*

**Color Plate 3**

**Range Summary.** Eastern South America.

**Diagnostic Features.** Tiny, wing length 51 to 53 millimeters. Rich brown above; rusty to tawny below with faint white shaft streaks. White nasal tufts, squamulated malar area. Typical *Picumnus* tail pattern. Male unknown, probably with red forecrown; female with white-spotted black crown.

**Description.** Bill lightly curved along culmen, pointed at tip. Back tawny or rusty brown, uppertail coverts tawny white. Wings brown, darker on flight feathers, with pale whitish or buffy edges of covert feathers and buff outer edges of secondaries; paler below, coverts tawny; buffy patch formed by pale inner edges of flight feathers. Shafts brown except white in white areas of tail, and ventrally white except brown in brown parts of tail. Tail brownish black, paler below, with usual *Picumnus* pattern of three white stripes. Tail/wing ratio 0.55 to 0.56. Throat whitish or buffy or tawny white; anterior malar and area under eyes white with fine traces of squamations. Ear coverts brown with few black and white marked feathers; sides of neck tan; nasal tufts white or buffy white. Nape and crown (of females) black with white spots that are bigger on nape. Underparts tawny or russet and with vague shaft streaks that are narrow and whitish on breast and broader, more cinnamon tawny (and hence more obscure) on abdomen; undertail coverts tawny.

Sexual features: Male unknown. Probably differs from female in having red on forecrown and forehead versus white-spotted black cap of female. Immatures unknown. No data on soft parts.

**Distribution and Habitat.** Known so far from five female specimens obtained in Pernambuco and adjacent Alagoas, northeastern Brazil (see Stager, 1961b). Habitat woodland or
**Picumnus limae**

forest of unspecified type from 500 to 3000 feet above sea level.

**Behavior.** Unknown.

**Taxonomy.** Thought by Stager (in litt.) to be related subspecifically to *Picumnus limae*. It is possible that *P. limae saturatus* of Pinto and Comargo (1961) is related to or identical with *P. fulvescens* and that *saturatus* and *fulvescens* have little or nothing to do with *P. limae limae* as represented by the Berlin cotypes of the last (see *P. limae*). Further studies are necessary. Possibly *P. nebulosus* of southeastern Brazil, which shows some similarity in pattern to *fulvescens*, is related to it. In view of this uncertainty, *fulvescens* must be treated as a species at least for the time being.

**OCHRACEOUS PICULET**

*Picumnus limae*

**Color Plate 4**

**Range Summary.** Eastern South America.

**Diagnostic Features.** Tiny, wing length 50 to 53 millimeters. Pale brown above, with darker wings; below creamy white, unmarked except for faint abdominal bars. Tail typical of *Picumnus*. Male with red-spotted forecrown; female has white spots on black crown.

**Description.** Bill pointed, slightly curved along culmen. Above gray-brown with a tan tone. Wings darker brown with pale edges of secondaries and some pale edging of coverts; paler below, coverts whitish. Shafts brown above (white in tail white areas) and whitish below (brown in brown areas of tail). Tail brown with three white stripes, in typical pattern of genus. Tail/wing ratio 0.55 to 0.61. Nasal tufts creamy white, white behind eye in mark; throat white; chin, area under eyes, and malar region white with fine blackish squamations anteriorly. Ear coverts pale brown, with rusty tinge. Nape, side of crown, and hindcrown black with white spots; front edge of forehead black. Underparts dull white with slight buffy tinge; abdomen buffier; flanks and abdomen, but not rest of underparts, faintly barred (variable, may be obsolescent) blackish.

Sexual features: Too few specimens examined to indicate size relations. Female has entire top of head black with white spots, whereas male forecrown and all but front edge of forehead black with broad, red tip-spots, almost forming red patch. Immatures not seen. Eyes brown, legs bluish gray, bill black with pale horn gray center and base of lower bill.

**Distribution and Habitat.** Known from interior Ceará and western Paraíba, eastern Brazil, probably in dry woodlands. Probably fewer than 20 specimens exist from a half dozen localities.

**Behavior.** Unknown.

**Taxonomy.** So little known that its relationships within the genus are unclear. I do not think Stager (in litt.) is correct in suggesting that *limae* bears relationships with *P. varzeae* and *P. nebulosus*. *Picumnus fulvescens* presents a problem, as it is very rusty brown below with streaks; and *Picumnus limae saturatus*, described in 1961 by Pinto and Comargo, differs from *P. l. limae* in being rufous ochraceous tending toward ferruginous below with whitish lines tending to form along the shafts, and somewhat ochraceous above, i.e., tending much toward *P. fulvescens*. Unfortunately, I have not had access to specimens of *P. l. saturatus* or to reasonably fresh specimens of *P. l. limae*. Until comparisons are made to establish relations among these taxa, I leave *P. fulvescens* as a full species and only tentatively accept *P. limae saturatus* of Paraíba. It is possible that *saturatus* represents the same taxon as *fulvescens*, and
even that the _P. l. limae_ specimens of Pinto and Comargo (1961) do not represent the same taxon as the Berlin cotypes of _Picumnus limae_.

**MOTTLED PICULET**

*Picumnus nebulosus*

**Color Plate 3**

**Range Summary.** Southeastern South America.

**Diagnostic Features.** Tiny, 11 to 12 grams, wing length 54 to 60 millimeters. Brown above and on breast; no marks above, but lower breast with black streaks. Chin, lores, and malar area white with fine black bars. Brown ear coverts with white stripe across them. Tail as in other piculets, but rather long. Males have red in forecrown and forehead; females have white-spotted, black crown.

**Description.** Bill barely curved along culmen, very slightly chisel-tipped. Above warm brown (rusty tinged to buffy brown); uppertail coverts black or black and white, latter in a broad streak. Wing coverts as back; flight feathers blackish brown, edged on both sides with buff or buffy cinnamon; pale below with buffy cinnamon coverts. Shafts deep brown except partly white in white areas of tail; below, brown in dark parts of tail, dull white elsewhere. Tail long, pattern nearly that of other piculets, black with white streak along inner vanes of central feathers, and black-bordered white streak in outer three rectrices; however, black border of outer tail white area is broad, so that the white, instead of tipping the outer tail, forms a distinct, narrow streak (the spread tail thus shows three white streaks); paler below. Tail/wing ratio 0.62 to 0.68. Hinderrown to nape black with white spots; sides of neck buff-brown; lores white with some black edging; malar area and chin to upper throat white with black bars; and, white stripe through ear coverts, bordered below by buff-brown area. Below varying from buff on lower throat, buff-brown with a rusty tinge on the breast, and pale buff on the abdomen to somewhat darker; central breast has vague brown streaks, lower breast to flanks marked with blackish brown, broad streaks. Undertail coverts tan-brown with vague brown blotches.

Sexual features: Females perhaps a trifle larger than males; latter have broad, deep-red spotting on tips of forehead and forecrown feathers, these areas lacking red in (fully white-spot crowned) females. Immatures as adults, but duller, with crown streaked. Eyes brown; legs and feet gray; bill black, paling to gray on base of lower bill.

**Distribution and Habitat.** Southeastern Brazil and adjacent Uruguay and northeastern Argentina (Misiones, Corrientes) and probably easternmost Paraguay; in Brazil from Parana south to Rio Grande do Sul. Apparently uncommon or locally distributed. This piculet occurs in forests and forest edges from sea level to an elevation of at least 3000 feet.

**Behavior.** Virtually unknown. Breeds in October to December and molts thereafter (January to April).

**Taxonomy.** Its relationships are obscure. Resemblance in markings of the underparts and in overall color suggest relationship with _P. olivaceus_, as a southeastern subtropical forest derivative. Its size, but not much else, suggests _P. "guttifer."_ Further studies are necessary. Monotypic.
**PLAIN-BREASTED PICULET**

*Picumnus castelnau*

**Color Plate 4**

**Range Summary.** Western South America.

**Diagnostic Features.** Tiny, 11.4 grams (Colombia); wing length 48.5 to 53.7 millimeters. Females with all-black cap; males have red-spotted crown but nape is black, lacking spots, though grading into finely barred hindneck and sides of neck. Underparts white tinged with grayish or yellowish, unmarked or with a few very fine vermiculate bars. Back grayish olive, unbarred or with faint indications of grayish and yellow-olive bars. Wings edged yellowish green on secondaries. Tail pattern typical of *Picumnus.*

**Description.** Bill slightly curved along culmen, pointed at tip. Above grayish olive, often with faint indications of dull yellow-olive bars. Uppertail coverts brown with white streaks. Wing coverts as back, edged greenish; greater coverts and flight feathers brown, edged dull white on inner margin of flight feathers; secondaries edged yellow-green on outer margin. Underwings grayer brown, coverts and inner flight feathers white. Shafts brown above and whitish below, except white above in white areas of tail and brown below in brown areas of tail. Tail brown with three white stripes typical of *Picumnus.* Tail/wing ratio 0.45 to 0.53 (average 0.489 to 0.495). Hindneck barred blackish and white, extending onto sides of neck and upper ear coverts; white mark over eye; ear coverts brownish, barred and streaked buffy and gray. Nasal tufts buffy white below, black above. Forehead and nape black. Throat dull yellowish white, extending over malar area (upper malar area sometimes finely barred extending from ear coverts). Below dull yellowish white, mainly or entirely unmarked; sides with faint olive-gray edges; occasionally there are a few faint bars or vermiculations on breast or abdomen; undertail coverts unmarked yellowish white.

Sexual features: Males average slightly greater wing and tail measurements than females, and the bill is 6.6 percent longer in males; black crown of male is broadly spotted red (the border of the red area is black entirely around the crown); females lack red, having an unmarked black crown patch. Immatures are more barred above and have faint bars prevalent below; as do adults, they lack spotting on the crown. Soft part colors are unknown.

**Distribution and Habitat.** Andean slopes and adjacent lowlands of extreme southeastern Colombia (Remsen, 1977), south through eastern Ecuador and eastern Peru as far as the Ucayali, the Urubamba Valley, and Pucallpa. Occurs up to 2500 or 3000 feet, in forest edges, edges of cultivation, and the upper part of secondary forests (O'Neill and Pearson, 1974). Remsen (1977) found it in seasonally flooded, swampy woods on an island in the Amazon River near Leticia, Colombia. Apparently rare.

**Behavior.** Virtually unknown. Its breeding season is indicated as May by an immature specimen from eastern Ecuador. A Pucallpa, Peru, adult had slightly enlarged testes in August. A female taken 21 June was feeding a fledgling in southeastern Colombia (Remsen, 1977). No molting specimens were seen.

**Taxonomy.** Closely related to *P. subtilis;* see *subtilis* for characters distinguishing the two species. In the collection of the American Museum of Natural History are a female of *subtilis* and a male (AMNH 240125) identified by K. Stager as *subtilis,* but which appears to represent a hybrid of *subtilis × castelnau,* if not an aberrant *castelnau.* Both were collected 14 November 1927 at Santa Rosa on the upper Ucayali River. The male is intermediate in having tiny white spots, but very few of them, on its nape, and very fine, almost obsolescent
breast vermiculations. Its red crown spotting also seems intermediate between the orange-red of *subtilis* and the red of *castelnau*. Otherwise, in color, measurements, and proportions, it resembles *castelnau*. Obviously further study of the contact area between these forms is needed to establish the sympathy and frequency of hybridization between them.

**FINE-BARRED PICULET**

*Picumnus subtilis*

**Color Plate 4**

**Range Summary.** Western South America.

**Diagnostic Features.** Tiny, wing length 48.9 to 51.2 millimeters. Faintly barred yellowish and olive on back, barred hindneck. Crown black with white spots in female, spotted orange-red in male, but male’s nape is spotted white (see *P. castelnau*). Broad yellowish edges of secondaries. Underparts dull yellowish white, breast finely and faintly barred yellowish and olive; sides grayish; abdomen often with faint bars, and undertail coverts often barred. Bill shorter and less heavy than in *P. castelnau*. Tail pattern typical of *Picumnus*.

**Description.** Bill curved along culmen, pointed at tip. Above yellow-green, barred with olive, but bars not contrasting greatly. Uppertail coverts barred black and white. Wing coverts olive-brown, edged (thus barred) with yellow-green; secondaries broadly yellowish along outer edge, rest of flight feathers brown, with whitish inner edge; paler below, coverts white marked with brown. Shafts brown above, whitish below, except white above in white areas of tail and brown below in brown areas of tail. Tail as in other *Picumnus*. Tail/wing ratio 0.50 to 0.55 (average 0.520 to 0.533, 7 percent greater than in *P. castelnau*). Hindneck barred gray-olive and white, extending onto sides of neck and ear coverts; ear coverts brownish in center. White mark over eye. Buffy white nasal tufts, black at dorsal edge. Nape black with white spots (in both sexes). Throat yellowish white, with or without fine olive bars. Underparts whitish gray or grayish white with strong yellow cast, finely barred gray-olive on breast, with sides of breast olive-gray; abdomen usually faintly barred and streaked grayish or olive; undertail coverts yellowish white with dark barring.

Sexual features: Sexes about same in measurements, including bill. Males have orange-red spots on crown; females have white-spotted black crown. Immatures barred more strongly, but barring is less contrasting below, hence birds are grayer; crown streak-spotted on sooty black background. Eyes brown, legs and feet greenish olive, bill black above and light bluish gray below.

**Distribution and Habitat.** Endemic in southeastern Peru along base of Andes from the Ucayali River to the Cuzco and Marcapata regions, at elevations up to 3500 feet. Apparently rare and little known.

**Behavior.** Virtually unknown. Immature specimens (three) are known from December in Candamo and in the Ucayali Valley, and there are June and July immatures from the Cuzco area. Molting adults from about Cuzco and Marcapata represent June through August.

**Taxonomy.** Only recently described (Stager, 1968), this piculet appears to me much more similar to *P. castelnau*, with which it long was confused, than the superficial similarity noted by Stager. In fact, one specimen of *subtilis* so identified by Stager (see *P. castelnau*) either represents *castelnau* or a hybrid of these two species, which are known to occur together in the upper Ucayali Valley. Features distinguishing *subtilis* from *castelnau* are its spotted crown of females, the white-spotted black nape of both sexes, the greater ventral and dorsal
barring of *subtilis*, its yellower coloration, and the more orange tone of the red crown spots of males. The species differ somewhat mensurally, *castelhau* being longer winged and longer billed, but shorter tailed, and hence with an actually and a proportionately short tail compared with *subtilis*.

**OLIVACEOUS PICULET**

*Picumnus* [olivaceus] *olivaceus*

**Color Plate 3**

**Range Summary.** Middle and South America.

**Diagnostic Features.** Tiny, 11 to 15 grams, wing length 49.5 to 58.3 millimeters. Olive above; breast washed with olive or brownish, abdomen streaked, and sides of face usually with squamate bars. White crown spots very fine, inconspicuous. Male has red, orange, or yellow spotting on crown. Tail with typical *Picumnus* three-striped pattern. The only piculet in Middle America.

**Description.** Bill slightly curved along culmen, pointed at tip. Above olive, sometimes with brownish cast, to yellowish olive-gray (*eisenmanni*). Uppertail coverts whitish on shafts with obscure bars. Wings brown in flight feathers, coverts as back but tips paler, often yellower or buffy; edges of secondaries greenish or yellow-green; underwings paler, coverts whitish, flight feathers brownish gray with white inner margin. Shafts brown above and whitish below, except that tail shafts are white above where feathers are white and brown below where feather vanes are brown. Tail brown with typical *Picumnus* pattern of three buffy white stripes in center and diagonally at sides. Tail/wing ratio 0.45 to 0.57. Hindcrown and nape black with very fine white spots; ear coverts brown, streaked white; white line behind and over eyes; yellowish white area on rear of sides of neck. Nasal tufts black anteriorly and centrally, whitish at rear and below. Throat buffy or yellowish white, showing squamate fine black bars on the chin, this squamate barring extending to malar area and under eyes. Below variable both within and between races; breast usually olive to brownish (clear yellowish white in a few *harterti*), from yellowish olive in *eisenmanni*, to olive-gray in *tachirensis*, to dull brownish olive or olive in other races. Abdomen and flanks dull yellowish white to whitish with fine to (usually) broad olive-brown streaks. Undertail coverts yellowish white.

Sexual features: Sexes similar in size, females tending to have a longer tail and a greater tail/wing ratio and appearing larger than males in *tachirensis*; males have rear of forehead and crown (except for hindmost crown) black, bearing spots that vary from orange to red in *olivaceus*, from yellowish to orange-red in *flavotinctus*, and generally orange to yellow in other races; females have the entire crown black with very fine white spots. Immatures grayer, less green than adults, often with a paler breast and with variable (usually streaked but sometimes showing bars or spots) abdominal markings; crown sooty black or olive-black with streaklike dull white or buffy white spots that are much larger than in adults. Eyes dark brown, brownish ring of skin around eye; legs and feet bluish to greenish gray with pale brown claws; bill black above and light brown below with a grayish base.

**Distribution and Habitat.** Ranges from eastern Guatemala and Honduras south through Middle America to Colombia, western Ecuador, and east to Tachira and Zulia, Venezuela. It occurs in the lowlands in Middle America and parts of Colombia, but generally occurs between 2000 and 7000 feet in Colombia, Venezuela, and Ecuador; it ranges up to 5500 feet in Middle America. Diverse habitats occupied include mangroves, humid forest under-
OLIVACEOUS PICULET

growth, and secondgrowth and overgrown clearings on lower mountain slopes. It appears to be absent in mature forest (Slud, 1964).

**Foraging Habits.** Usually forages low in thickets and vines to about 8 meters above ground (Land, 1970). It seems to avoid trunks and large limbs of forest trees (Slud, 1964; Otvos, 1967). It clings without support of the tail and pecks twigs and vines sharply. Usually found in pairs, it perches frequently like a songbird. A. H. Miller (1947) observed it progressing head downward on a tree trunk. Wetmore (1968, p. 531) noted that “they search rapidly through creepers or other cover, or at need settle down to hammer rapidly and persistently in true woodpecker style to dig out some larval morsal,” and “the birds creep like nuthatches supported by strong feet.” Miller (1947) pointed out that the piculet does not press its tail to the bark and is quite nuthatchlike, but has much larger feet than nuthatches (*Sitta*).

Skutch (1969) found this species less nuthatchlike than did Miller and more like a small woodpecker. Olivaceous Piculets peck constantly and seem to feed largely on ants, especially when feeding young (Skutch, 1969). The ants are obtained frequently from the pith of slender dead branches, but the piculets also peck into debris at the bases of large leaves and in other such sites. Wetmore (1968) reported that the species has large salivary glands extending onto the back of the crown, as in many ant-foraging picids. Otvos (1967, p. 523) listed stomach contents of three Costa Rican specimens as follows: both female piculets had exclusively ants in the stomach, one mainly of *Camponotus* with some *Pseudomyrmex* species, the other of *Camponotus* and *Ceramotogaster* ants; the male had 65 percent of its contents as a species of *Camponotus* that lives in hollow twigs of *Olividia* (the same species of ant was found in both females as well), and the remainder was composed of cockroach egg cases and eggs (15 percent) and various beetles (20 percent, half of them nitidulid beetles).

**Voice.** Drums loudly for so small a woodpecker, but rapidly. Of its drumming Wetmore noted (1968, p. 531) that “the steady percussion of such efforts earns them the common name of *telegraphista* as the sound simulates the measured rattling of the old-style telegraph instrument.” Vocalizations include “a laughing rattle,” “a very weak *Tiaris*-like trill,” and a “sharp little ‘pss pss’” (Slud, 1964, p. 187), as well as a buzzy sound by the young in the nest (Skutch, 1969). According to Skutch (1969, p. 534), adults outside the nest occupied by fledged young that have returned to it give a trill answered by a monosyllabic call of the young. A. H. Miller (1947, p. 363) noted a “peep” call of a juvenile and said of the adults’ trill, “yet fundamentally it is nothing but a rapid, high-pitched Downy Woodpecker trill.”

**Displays.** Displays have not been described.

**Interspecific Interactions.** None reported as such, but Skutch (1969) found that *Xenops minutus* feeds in a similar manner, has similar vocalizations to those of *olivaceus*, and nests occasionally in holes left by *olivaceus* — it is possible that interactions may occur at piculet nesting or roosting cavities.

**Breeding.** The nest is excavated in stubs or soft wood, especially of *Heliocarpus* (Middle America; Skutch, 1969) in abandoned clearings and in decayed fence posts from 3 to 30 feet above ground, but usually below 15 feet. Both sexes excavate the cavity, and indeed the female may do more of the excavating than does the male, 4 to 5 days being required for the excavation (Skutch, 1969). Nesting occurs in the dry season in Costa Rica and Panama, namely between December and May, but the species may raise two broods; hence the season can be long. May juveniles are known from Nicaragua, juveniles of *harterti* (western Ecuador, southwestern Colombia) date from August to October, and Colombian juveniles date mainly in January and February, but also from October to May and even 10 August. The nest
measures $3\frac{1}{2}$ to 4 inches deep, $2\frac{1}{4}$ to $2\frac{3}{8}$ inches wide, and the entrance is $\frac{7}{8}$ to 1 $\frac{5}{16}$ inch in diameter. Three eggs are laid usually, but two- or even one-egg clutches were noted by Skutch (1969). The eggs are laid on consecutive days. Only one or two young usually survive to fledging. Both adults sleep in the nesting cavity together at night before the eggs are laid, and they alternate incubating by day. At nest relief, the incoming bird gives a trill call and often enters while the other bird is still inside, but sometimes the incubating bird exits first. The male on the average incubates more than the female. Incubation occurs 100 percent of the time; i.e., one or both birds are constantly at the nest, and it apparently commences with the laying of the first egg. The eggs hatch in about 14 days and young are pink and naked at hatching. Their eyes open in 8 days, and feathers appear at 16 to 17 days. Both sexes feed the young at a rate totalling three to five times an hour, but the female tends to feed more than the male. There may be a shift toward greater participation by the male late in the nestling period, perhaps associated with the female preparing to lay again. The male is more timid about the nest than is the female. Food fed to the young mainly consists of ant larvae and ant pupae, with more adult ants and other insects being added later. Both adults remove fecal material from the nest and frequently brood the young. After the nestlings appear at the entrance, they vigorously take food from the adults and seem to peck them (even driving them off) in quest of more food. Two nests were destroyed by ants that killed the young (Skutch, 1969). Fledging occurs at 24 to 26 days. The fledglings begin pecking at slender branches within a day out of the nest. They return to the nesting cavity to roost nightly with their parents, for up to 3 or 4 months, at least, although not until the following breeding season. When at the cavity they are not fed by the parents. Skutch (1969) noted cases of second broods. In one instance one of the (surviving?) young of the first brood roosted in the nest as the pair raised the second brood, but this immature disappeared each morning and did not help to raise the second brood. Molting follows nesting, in April to July in Middle America and in October and November in Colombia.

**Roosting.** As just mentioned, members of a pair roost together just prior to nesting in the newly excavated nesting cavity, they sleep there together at night during incubation and the nestling period, and the fledglings roost with their parents for at least 3 or 4 months after fledging. One young bird of a first brood roosted in the nest with the parents and nestlings of the second brood. Roosting holes are excavated at any season, presumably as needed. Birds may roost singly or in pairs, or families may roost together as noted earlier. Roosting holes often have to be changed because of damage or destruction of the cavity, its being usurped by some other animal, or because of disturbance (by a predator, human intruder, etc.).

**Taxonomy.** Forms a superspecies with *P. granadensis*, with which it may be conspecific. Relations of these two piculets remain to be investigated in Antioquia and elsewhere in Colombia. Both seem related closely to *P. sibtilis* and *P. castelnau*. There are several subspecies of *P. olivaceus*, all showing relatively minor variation, and hence I prefer to merge less well-marked forms. *Picumnus granadensis* barely is distinguishable from *P. olivaceus*, and it seems futile to recognize nomenclatorially very minor variation of the latter. The nominate race occupies much of the range of the species in Colombia. I consider "*malleolus*" of Bolivar and the lower Magdalena River area of Colombia a synonym of *olivaceus*, finding no constant differences from that form ("*malleolus*" averages slightly smaller). *Picumnus olivaceus harterti* of southwestern Colombia and western Ecuador differs from *olivaceus* in smaller size, its darker olive (less yellow) coloration overall, and the more yellow (orange-gold to
golden yellow and less red) spotting on the crown of males. The race *tachirensis* of the Andes of Tachira, Venezuela, and adjacent (Norte de Santander) Colombia resembles *harterti* in crown color; it is grayer below than *harterti*, is large like *olivaceus*, and is even greener and less yellow above. The Zulia, Venezuela (possibly entering adjacent Colombia on the western slope of the Perija Mountains), race *eisenmanni* (described as “*perijanus*,” preoccupied by *P. cinnamomeus perijanus*) is much more yellowish dorsally and shows more yellow on the wings than do other races; its breast is paler, a yellowish olive with no trace of brown, and its abdomen is distinctively yellowish. Southern Middle American *flavotinctus* (including “*panamensis*,” which does not differ appreciably) ranges from Costa Rica to the Colombian border of Panama and is of rather small size; it closely resembles *harterti*, but males tend to have redder crown spots, and both sexes show finer spotting at the rear of the crown and on the nape. Eastern Guatemala to Nicaragua forms the range of *dimotus*, resembling *flavotinctus* but greener and less brown above and below and paler on its underparts.

References

GRAYISH PICULET

*Picumnus* [*olivaceus*] *granadensis*

**Color Plate 4**

**Range Summary.** Northern South America.

**Diagnostic Features.** Tiny, 12 grams, wing length 52.1 to 57.7 millimeters. Gray-brown above and rather unmarked below in one race that shows faint dusky streaks, but grayer with pale, definite streaks in the other race. Pale buffy or greenish buff edges of wing flight feathers. Males have finely yellow-spotted forecrown. Told from *P. olivaceus* by the yellow in the crown of the male and the paler, less-marked underparts.

**Description.** Bill pointed, slightly curved along culmen. Above grayish brown, unmarked, with white uppertail coverts. Wings brown on flight feathers and outer greater coverts, gray-brown on rest of coverts, sometimes tipped buffy; secondaries edged white with a hint of yellow-green; underwings paler, flight feathers with buffy white inner margin, coverts gray and white. Shafts brown above, except white in white areas of tail, and white below except brown in brown areas of tail. Tail patterned as in other *Picumnus*, with three white stripes. Tail/wing ratio 0.50 to 0.56. Nasal tufts white but tipped black; ear coverts brown with white streaks; area under eyes, malar region, and throat dull white (*granadensis*) or grayish white (*antioquensis*), with squamate black tips most pronounced in malar region and on chin, and often obsolete elsewhere. Hindcrown and nape black with fine white spots. Whitish patch on sides of neck. Lower throat and breast dull white grading to grayish on the sides in *granadensis*, but very pale gray throughout in *antioquensis*. Abdomen white with fine gray streaks confined to sides and flanks, sometimes almost obsolete in *granadensis*, but dull white with very pale gray streaks throughout in *antioquensis*. Undertail coverts white.

Sexual features: Sexes about equal in size: Males tend to be slightly larger (by 2 to 3 percent in wing length, 1 to 2 percent in tail length, 4 percent in bill length) in *granadensis*, but females are larger (4 to 5 percent in wing length, 6 to 7 percent in tail length and bill length) in *antioquensis*; the male’s tail is proportionately slightly shorter in both races; males
have crown and forehead black with fine yellow to golden spots at the feather tips, whereas females lack the yellow, having a white-spotted black crown. Immatures show a sooty crown with dull whitish streak-spots; race for race, young birds are darker, grayer below with stronger abdominal streaking than in adults. Eyes brown, legs and feet greenish or bluish gray, bill black.

**Distribution and Habitat.** Found in scrub, openings and edges of moist but not wet subtropical forest on the Andean slopes of Colombia, in Antioquia, and the Cauca, Dagua, and Patía valleys and adjacent slopes. It ranges from about 2500 to over 7000 feet in elevation.

**Behavior.** Essentially unknown. Apparently it breeds at diverse times of the year. A. H. Miller (1963) noted enlarged testes in a January male and reported a juvenile taken in June; other juveniles date to 27 September. Molting birds are known from January to March.

**Taxonomy.** Closely related to, and possibly conspecific with, *P. olivaceus*, with which it forms a superspecies. These may meet in the middle Cauca Valley, about Caldas, where their interactions should be studied (A. H. Miller, 1963). Two races are known: *antioquensis* from the slopes of the northern Andes of Antioquia and *granadensis* from the middle Cauca Valley south to the Patía Valley. The former is much grayer and more heavily streaked ventrally; it could be considered intermediate toward *P. olivaceus*, but males have the yellow-spotted crown of *granadensis*. Females appear to be larger than males in *antioquensis*, but sample sizes were small (five males, five females).

### CHESTNUT PICELET

**Picumnus cinnamomeus**

**Color Plate 3**

**Range Summary.** Northern South America.

**Diagnostic Features.** Tiny, wing length 50.3 to 56.5 millimeters. Rusty chestnut above as well as below with brown wings and a typical *Picumnus* three-striped tail pattern. Nape chestnut, black cap restricted to crown; white spots on crown of female, yellow spots on crown of male. White to cinnamon nasal tufts and forehead.

**Description.** Bill pointed and curved along culmen. Above deep rusty brown (*cinnamomeus*), chestnut (*perijanus*), or dark chestnut (*persatutatus, venezuelensis*), paling on rump; entire underparts as upperparts, only a trifle darker in tone and paling slightly on abdomen and undertail coverts. Wings brown, coverts edged rufous; inner primaries and secondaries bordered by buffy white, cinnamon (some *cinnamomeus*), or rufous (*persatutatus*); below rusty in coverts, gray-brown flight feathers with cinnamon inner margins. Shafts brown above except white in white areas of tail, dull white below except brown in brown areas of tail. Tail blackish, bearing *Picumnus* pattern of three stripes; these are whitish, buffy (some *cinnamomeus*), or pattern masked in brown (*persatutatus*). Tail/wing ratio 0.46 to 0.55. Ear coverts, area under eyes, malar region, entire throat, sides of neck, and nape colored as underparts. Nasal tufts, lores, and forehead form patch of creamy white (most races) to cinnamon (*venezuelensis*).

**Sexual features:** Sexes alike in size or females slightly larger; male has black crown spotted with fine orange-yellow spots anteriorly and broader yellow spots posteriorly; female has black crown with white spots throughout and grading anteriorly into the forehead patch (*perijanus, persatutatus*) or white spots on anterior crown only (*venezuelensis*, grading into forehead) or white spots restricted to a band about the hindcrown (*cinnamomeus*). Immatures not seen. Eyes red-brown, legs and feet gray, bill dull black.
**Distribution and Habitat.** Coastal lowlands and adjacent slopes from Serranía de San Jerónimo, Bolívar, Colombia, and the Cartagena region eastward about the lower Magdalena Valley, the Guajira Peninsula, and the Santa Marta Mountains, and around Lake Maracaibo to its eastern side (western Venezuela). Coastal forests seem to be its haunts, and it probably ranges no higher than 1500 feet in elevation.

**Behavior.** Virtually unknown. Apparently is a rare denizen of thickets and undergrowth of forests. Its nesting has not been described.

**Taxonomy.** Relationships unclear. Possibly related to (perhaps only superficially) similar *P. rufiventris*, but its head pattern is not very much like that of any congener. Four subspecies have been described and are characterized as follows (see Haffer, 1961, p. 399): (1) *cinnamomeus* of the Magdalena River area and coastal Colombia is paler rufous above and below than other races, and the crown of females has white spots posteriorly restricted; (2) *perijanus* of the northern portions of the Lake Maracaibo area is darker than *cinnamomeus*, and its females have a fully spotted crown; (3) *venezuelensis* of the southern and eastern areas of Lake Maracaibo is deeper chestnut than *perijanus* or *cinnamomeus*, with a tawny forehead patch, and its crown in females has the white spots restricted anteriorly; finally, (4) *persaturatus* of the Serranía Jerónimo of Colombia is dark like *venezuelensis*, the females have the entire crown spotted white, its tail pattern is obscured, its wing edges are more rufous, and its forehead is creamy white.

**Genus Sasia Hodgson**

The three species of *Sasia* are tiny, resembling rufous- or chestnut-colored species of *Picumnus* (e.g., *rufiventris*), from which they are distinguished by a bare area of skin around the eyes, the lack of white tail stripes and white crown spots, and reduction or loss of the hallux. The bill is short, deep, and pointed or slightly chisel-tipped, slightly curved along the culmen, and very rounded over the culmen. The relatively short tail is soft, not stiffened, and is not used for support in movement. The feet are zygodactyl and lacking the hallux in *ochracea* and *abnormis*, whereas the hallux is present but very thin in *africana*. The two Asian species, *ochracea* and *abnormis*, are closely related and form a superspecies; African *africana* is more distantly related, but shares most structural and some color features of its three-toed Asian relatives, which it closely resembles in juvenal plumage.

**AFRICAN PICULET**

*Sasia africana*

**Color Plate 6**

**Range Summary.** Forested central Africa.

**Diagnostic Features.** Tiny, weight 7.5 to 10.5 grams, wing length 46 to 53 millimeters. A short-tailed woodpecker of the undergrowth, green above, olive-gray below, with white lines above, behind, and below the eye and a bare patch of reddish skin about the red eye. Four toes.

**Description.** Bill curved along culmen, pointed at tip, rounded across base of culmen. Above yellowish green, brightest on the back and wing coverts and edges, duller on uppertail coverts and neck region. Wing coverts and edges as just noted, remainder brownish black, the
flight feathers bearing a whitish inner margin that, with underwing coverts, form a white patch under the wings. shafts brown above, dull whitish below, especially at bases. Tail very short, feathers numbering eight, feather shafts not rigid; brownish black sometimes with olive tinge at margins of feathers. Tail/wing ratio 0.33 to 0.40, averaging greater in females. Crown to nape grayish olive, darker than back; white line from above eye rearward along nape and another, duller white, from under eye posteriorly along lower ear coverts, which are gray otherwise; throat and chin as underparts. Entire underparts olive-gray, palest on abdomen, varying in strength of olive tinge.

Sexual features: Males tend to be smaller (shorter wings), have rusty or chestnut-rufous forehead patch; females larger, forehead grayish olive, concolored with crown. Immatures very like adults but mixed grayish in green of back, also with buffy tinge there; underparts mixed cinnamon-rufous and gray, the gray especially prevalent on breast and rusty dominating elsewhere (abdomen, flanks, throat); also rusty on ear coverts, sides of neck, and in whitish facial marks. Sexes as in adults. Eyes red, brown in immatures; large area of bare skin around eye is red to purplish red. Legs and feet purplish red to brownish purple, claws grayish pink. Bill black, paler below (slaty or gray) and darker above.

Distribution and Habitat. Central Africa, in wet forests from Cameroun south through Zaire and the Congo Republic to northern Angola, and eastward to eastern Zaire and western Uganda. It frequents the forest understory, where it is well developed, and dense second growth, as for example about clearings in the forest. It ranges from sea level to about 3000 feet in elevation. (Recent sight records from Ghana need corroboration.)

Behavior. Rather little known, this piculet forages alone, in pairs, or in association with other birds in flocks, working the small branches of trees and shrubs, as well as vines in the understory, often near the ground. It often clings to small grasses and other stems, perching crosswise to them, assisted by transverse ridges on the underside of its toes. This piculet taps with its bill, at times loudly, as it feeds (Bannerman, 1933; Serle, 1965), boring into plant stems and working in bark crevices. Various “grubs,” mainly beetle larvae, are pulled from the holes it drills. Bates (1930) recorded it splitting the pencil-thin stems of the creeper Trachyphrynium to obtain grubs. Drumming as a signal has not been described, but is likely to occur. Serle (1965, p. 78) described the “song” of this piculet as a “rather weak high-pitched trill in a monotone.” Nesting takes place in the dry season in some areas (Bannerman, 1933), but in the wet season in eastern Zaire and Uganda (see Friedmann, 1966), namely from June to October. July and August females from Cameroun had eggs forming in the cavity. Immature birds from Ituri in eastern Zaire date from September to January. The nest is constructed in a small (narrow) stub, usually from 3 to 15 feet from the ground. Bates (1909) described a nesting cavity 40 millimeters in diameter and 50 millimeters deep, with a 20 millimeter-wide entrance hole. Apparently two eggs is the usual clutch size. Both adults incubate the eggs and assist in raising the young. Molting occurs from October to January in eastern Zaire, up to April in Uganda, and from March to June in Cameroun.

Taxonomy. Monotypic. Bears four toes (outer rear toe long, but very thin compared with others), but otherwise very similar to Asian species of Sasia, having similar proportions, bare orbital skin, and markings about the eye (resembling S. ochracea). Juveniles of S. africana are gray and rufous below, closely resembling young of S. abnormis. The Asian species of Sasia form a superspecies (hence the restricted genus Sasia is monotypic), and the African Piculet clearly is closely related to them. I see no reason to maintain monotypic genera (Sasia, Verreauxia), obscuring the relationships of these piculets, merely on the basis of the lack of a fourth toe in Asian Sasia (such toe loss is disregarded in Picoides and Dinopium).
Rather, allowing some variation among congeneric species, the African Piculet readily is accommodated in Sasia with its Asian near-relatives.

RUFOUS PICULET

*Sasia [ochracea] abnormis*

**Color Plate 6**

**Range Summary.** Southeastern Asia.

**Diagnostic Features.** Tiny, weight 7.2 to 12.0 grams, wing length 48.3 to 54.0 millimeters. Mainly green and rufous, fast-flying piculet of undergrowth. Bare purplish area about eye; yellowish green above; cinnamon-rufous rump, face, and underparts, tinged yellow below. Yellow forehead patch in male. Tail short. No white face, no wing patch (see *S. ochracea*).

**Description.** Bill moderately long, somewhat curved along culmen, rounded over base of culmen, pointed at tip. Above yellow-green from crown to rump, becoming cinnamon-rufous or mixed rufous and green on rump. Uppertail coverts black. Wings mainly yellow-green, even flight feathers edged in that color; flight feathers otherwise brown with narrow cinnamon inner margin, forming cinnamon underwing patch; alular (bend of wing) area greenish brown; outer primary short. Wing shafts brown above, buffy white below; tail shafts blackish. Tail short, with 10 feathers, shafts not rigid; color black with olive-tinged margins of feathers. Tail/wing ratio 0.39 to 0.47. Except for yellow-green crown and forehead of male, head cinnamon-rufous, darkest on ear coverts and over eyes, palest on throat. Underparts entirely rufous or cinnamon-rufous with a distinct yellow or golden wash at the breast-abdomen border.

Sexual features: Male very slightly smaller (shorter wings, tail, bill) than female, bearing a yellow forehead patch (yellow often mixed with rufous); larger female lacks forehead yellow (forehead entirely rufous). Immatures variable, but darker than adults, showing gray on the crown and forehead, back grayish green, and underparts variably mixed greenish gray and rufous (darker birds closely resemble young *Sasia africana*). Eyes orange-chestnut to red (brown in juveniles), bare skin area around eye purple or red-violet. Legs and feet yellow to orange; upper bill brown to black, lower bill entirely yellow.

**Distribution and Habitat.** Occurs from Tenasserim (?) , Burma, peninsular Thailand south through Malaya, and in Sumatra, Borneo, central and western Java, and smaller islands such as Billiton and Nias. It is parapatric, or overlaps slightly, with its allospecies *S. ochracea* in the vicinity of southernmost Tenasserim, Burma, and Ranang, Chumphon, and Prachuap, Thailand. The records of *abnormis* from Tenasserim and Prachuap should be checked. In Chumphon, *ochracea* occurs along the hills south to Tasan, west of Chumphon, and *abnormis* follows the coastal lowlands north at least as far as Maprit, west of Patiyu (or Pathriu), about 20 miles north of Chumphon. Present-day contact in that region between the two piculets may be restricted or nonexistent because of clearing of forests between the coast and mountains. The Rufous Piculet occurs in lowland forests and dense secondgrowth, especially about bamboo clumps and riverine undergrowth. It ranges into the foothills as high as 3000 feet and occasionally to 3500 or rarely even 4000 feet (Glenister, 1951).

**Foraging Habits.** Frequent dense undergrowth of saplings, vines, shrubs, and bamboo, foraging in such places and flying some distance between suitable feeding areas. Often it is to be found near water, probably a reflection of its undergrowth preference. It taps and gleans in small saplings, vines, branchlets, and bamboo, almost always within 5 meters of the
ground and often only a meter or so above ground level. Movements are rapid, as is the bursting flight of this tiny bird. The piculets are seen usually in pairs or family groups. In progress up a stem they flit, perching crosswise, facing first to the left, then right as they zig-zag upwards. The ridges of their three toes are well developed and probably aid in clasping to smooth, wet stems of grasses and vines. When one flies, the other bird or birds join immediately, zooming out of sight. Because of the dense undergrowth, their fast flight, and distances between feeding sites, it is extremely difficult to follow a piculet or a group of piculets for more than a few minutes. The diet includes ants, ant eggs, and larvae ("grubs," some large, Harrison, in litt.) of various insects.

Voice. Poorly known. A repetitive "tik" note is given when it is disturbed, and H. C. Robinson (1928, p. 115) has reported "a creaking note of many syllables."

Displays. None described.

Breeding. Almost unknown. Young birds from all areas (including Nias Island) represent May to August, suggesting April to July as the nesting period. Enlarged testes of Nias Island males were noted in June (Ripley, 1944). Family parties remain intact through the post-breeding period, at least until the following February.

Taxonomy. Forms a superspecies with Sasia ochracea (see below). Sasia abnormis differs from parapatric ochracea in its fully pale lower bill; lack of white face markings; a generally darker (purple versus red or slaty in ochracea) orbital skin area; a more curved culmen of the bill; a smaller outer primary; and unicolored, dark feathers on the bend of the wing (alular area). Nias Island birds have a distinctly longer, deeper bill than Rufous Piculets from other areas; and, although they do not differ in other ways, I recognize magnirostris for the Nias population because of its geographic isolation. Ripley (1944) did not note greater bill depth of magnirostris, but this is evident in my measurements and in viewing the bill from the side.

Reference

WHITE-BROWED PICULET

_Sasia [ochracea] ochracea_

**Color Plate 6**

**Range Summary.** Southern Asia.

**Diagnostic Features.** Tiny, weight 8.3 to 11.8 grams (ochracea), wing length 48.0 to 54.2 millimeters. A fast-flying, short-tailed woodpecker, mainly rufous and green in color, found in undergrowth. Dark greenish crown and wings; rufous rump, face, and underparts. White line above and behind eye and cinnamon stripe along edge of wing. Yellow forehead in male. Three toes.

**Description.** Bill pointed, slightly curved along culmen, rounded across base of culmen. Above variably mixed greenish and rufous – more green in ochracea and "hasbroucki"; more or entirely cinnamon-rufous in "quercivox." Upper back tends to be more rufous; rump rufous with little or no greenish; uppertail coverts black. Wings yellow-green except flight feathers brown (edged green), with buffy white inner margin that forms patch under wing; underwing coverts buffy white; bend of wing (alular area) edged in cinnamon to buffy white, outer primary feather large, bicolored brown and cinnamon to white. Shafts brown, becoming pale horn under wings. Tail short, feathers number 10, shafts soft, deep
brownish black in color, paler below. Tail/wing ratio 0.37 to 0.48. Ear coverts, malar area, and throat generally cinnamon-rufous, darkest on ear coverts, paler on throat; lores, and often border of feathers around orbital skin, a grayish or even black color (regularly blackish in “hasbroucki”); chin may show gray, or blackish, especially in “hasbroucki”; rather narrow white or dusky white line beginning over eye and extending backward to end of crown. Crown olive-green, gray-green, or in “hasbroucki” blackish, forming a cap, with rufous on forehead-crown border and grading into rufous on nape. Underparts variable, deep rufous in ochracea and “hasbroucki,” cinnamon in “querulivox,” and showing a slight yellowish tone on center of breast (not so distinct as in S. abnormis).

Sexual features: Males have golden yellow forehead patch, lacking in rufous forehead of females. Immatures are as adults but show slight greenish or grayish in the underparts and more green dorsally. Eyes red; bare skin around eye red to pink (may be paler generally in females), except for “hasbroucki,” in which it is blackish or deep gray. Legs and feet orange to yellowish, pads of toes yellow, toes three in number. Bill black above; below gray at the base, gradually pale to horn color at the tip and along the lower edge (gonys); overall distinctly darker than in S. abnormis.

Distribution and Habitat. Foothills of the Himalaya Mountains from northwestern India and Nepal eastward through Sikkim and Assam, south to Bangladesh, and through Burma, Thailand, Laos, North Vietnam, South Vietnam, and probably Cambodia. Its southward limit in Thailand (Ranang, Chumphon) has been discussed under S. abnormis. Inhabits dense undergrowth, especially bamboo groves, of forests and second growth, in hills and mountain slopes, reaching lowlands only immediately adjacent to hills. Occurs up to 6500 feet in Sikkim and 6000 feet in Burma.

Behavior. Presumably very similar to that of its allospecies, S. abnormis, but little known. It forages alone or in pairs low in dense growth such as bamboo, clambering about the stems and occasionally hopping about on debris on the ground (Stanford and Mayr, 1941; Ali, 1962). Frequently this piculet taps loudly as it pecks into stems seeking beetle and other larvae and ants. The bird flies rapidly and moves quickly, almost agitatedly, as it feeds. It often perches crosswise on stems and branches. Apparent signal drumming in Burma was described by Stanford and Ticehurst (1939, p. 9, “drumming performance”; see also Lister, 1954). The call note is a sharp “isik” note (Ali and Ripley, 1970, p. 176). Courting birds utter a squeaking, repetitive call, according to Ali and Ripley. Those authors described courtship in a pair of White-browed Piculets, involving the male hopping and bounding about a crouched female, with twisting head movements (possible Swinging Display), accompanied by squeaking notes. Breeding occurs generally between March and July, the nest being drilled in the stem of a bamboo or in a thin tree branch. In bamboo, the opening is made below the node and the nest excavated within the internode below it. The hole is 1.3 to 2.5 centimeters in diameter. Two to four eggs are laid, but information about incubation and raising of the young is lacking. Molting occurs following the breeding season, until at least October.

Taxonomy. Forms a superspecies with parapatric allospecies S. abnormis, from which it differs in having a white line over the eye, large outer primary, alular feather bicolored, bill straighter, generally a paler orbital skin area, and a darker bill. These species may make contact, but no intermediates are known. The southern subspecies S. ochracea “hasbroucki” of Tenasserim and adjacent provinces of Thailand (the area of possible contact with S. abnormis) has a white eye stripe that is smaller than that of other races of S. ochracea, hence tending toward S. abnormis. In other traits, however, “hasbroucki” clearly resembles S. ochracea; that is, it has the stighter culmen, longer outer primary, and bicolored alular
feathering marking *S. ochracea*. It differs from other races of *ochracea* in having blackish orbital skin instead of red orbital skin (this area is purplish in *S. abnormis*, darker than in *S. ochracea*, but not blackish as in "hasbroucki"). Examination of the type of *S. o. reichenowi* in the Berlin Museum showed that specimen to represent a form having dark (grayish black) orbital skin, so *hasbroucki* must be regarded as a synonym of *reichenowi*, and the latter name must now be applied to birds with dark orbital skin in Tenasserim and southwestern Thailand. I prefer to treat only two other races of *S. ochracea*, the variable *S. o. ochracea* (including *querulivox* and *ferruginea*) as well as all the populations formerly assigned to "reichenowi," but having pale orbital skin, namely Burmese, central and northern Thai, Lao-tian, southern North Vietnamese, and South Vietnamese birds) and dark *kinneari* of northern North Vietnam (Tonkin) and adjacent China (Yunnan, Kwangsi). Those who would separate *querulivox* of Bangladesh, southern Assam, and southwestern Burma from *S. o. ochracea* on the basis of its paler coloration should be aware that Vietnamese birds and scattered individuals from northern Burma, Thailand, and Laos also are pale, matching "*querulivox*.”

Reference


**Tribe Nesoctitini**

**Genus Nesoctites Hargitt**

This is the largest of the piculets and forms a monotypic genus, greenish without barring above, and lacking crown spotting. Females are larger than males. The bill is long, pointed at the tip, curved along, rounded across the culmen, and feathered over the nostrils (as in all piculets). The tail is rather long and soft, without white striping. The feet are zygodactyl, about as in *Picumnus*. The single West Indian species forages in a less woodpeckerlike manner than do other piculets, and it otherwise differs behaviorally (e.g., antiphonal calling). Its actions are reminiscent of those of small barbets.

**ANTILLEAN PICULET**

*Nesoctites micromegas*

**Color Plate 7**

**Range Plate 7**

**Hispaniola, West Indies.**

**Diagnostic Summary.** Small, weight 26 to 28 grams, wing length 66 to 77 millimeters. A heavy-bodied, unwoodpeckerlike bird that taps occasionally and criss-crosses its way along branches and vines. Olive above, pale below with spot-streaks on breast; yellow on crown (red-centered in male). Only “woodpecker” other than larger and very differently colored Hispaniolan Woodpecker (*Melanerpes striatus*) on Hispaniola.

**Description.** Bill very curved on the culmen, but flattened in the area between the nostrils and narrow between the nostrils. Above yellow-green or dull yellow-green throughout, tinged grayish in *abbotti*; bronze traces on back, often with yellow concentrated at feather tips; upper back and nape frequently show white spots. Wings unbarred; yellow-green coverts becoming bronzv at tips; flight feathers brown with bronze edges and cinnamon-buff edges of inside margins of secondaries. Shafts brown above, and pale dusky white to dull yellow-white below. Tail brownish olive with a bronyz cast; feathers broad, soft. Tail/wing ratio
0.53 to 0.64. Forehead, sides of crown, nape usually yellow-green, with a lemon-yellow patch of variable size in the center of the crown, sometimes reaching edge of nape and forehead. A color phase occurs (20 percent of specimens) in which the yellow-green of the forehead to the eye, and over it to the upper edge of the ear coverts, is replaced by dull black. Lore white; ear coverts olive or grayish olive above, becoming white with olive edges and bars below. White under eyes and in malar area, with vague dark bars or spots. Chin to throat white with small blackish spots, tinged yellow, but less so than breast. Underparts white to whitish yellow, or even pale gold (breast), variably marked with broad to fine, even spotlike streaks.

Sexual features: Males with dull rusty or orange-red center of yellow crown; females lack the red in the yellow crown patch, and they are larger (wings, tail, bill, tarsus longer) than males. Immatures are duller green above and have a duller yellow crown than adults; abdomen more barred than in adults. Sexes appear alike (as adult females) in juvenile plumage, but crown feathers frequently are lost, and immatures often are bare on the crown until adult crown feathers grow in. Eyes various shades of brown, red-brown, or red; legs and feet greenish gray; bill blackish, paling on lower bill.

Distribution and Habitat. Hispaniola and Gonave Island (off Haiti). Occurs from sea level to at least 5800 feet (Baoruco Mountains, fide D. Dod) in various types of forest, including pines mixed with some broad-leaved trees, thorn forest, and dense secondgrowth. Most numerous in hill forests, especially in tangled streamside vegetation, and on Gonave Island.

Foraging Habits. A gleaner of the bark of branches, saplings, and vines, often shifting from side to side with each hop, perching at an angle to the branch each time. Occasionally taps, without using the tail as a brace, and often while perched crosswise on the branch. Persistent tapping is uncommon, and blows are delivered weakly and from a lateral position. Its appearance while foraging is unlike that of woodpeckers or of other piculets, the bird superficially resembling a gleaning tanager or warbler. Forages from near the ground to the treetops and in all types of trees, including pines. More foraging occurs at lower levels in small saplings and vines than high in the trees. Probing is used commonly, especially about fruits and flowers and the bases of pine needles and leaves of other trees. The piculets maintain vocal contact, calling two to five or so times an hour, the call immediately bringing a response from the mate, which usually is feeding some distance away. The sexes seem to feed identically, moving rapidly along a branchlet, dropping to another branch, moving to the crown of the tree, then flying several or more trees away, perhaps to feed briefly, then flying off. They have the habit of pausing for an extended period of time, up to one or two minutes. This trait, the denseness of the vegetation, and the tendency to move considerable distances make it difficult to follow an individual for more than a few minutes. Many times I followed a flying bird, failed to find it, and then had it call from a point far to the rear.

The diet consists mainly of insects, although fruit is utilized seasonally to some extent. Wetmore and Swales (1931, p. 298) list "a centipede, many ants, three earwigs and many small beetles" in the stomach of one bird from Hispaniola, but (p. 299) only "seeds and pulp of some fruit" in the stomach of a piculet from Gonave Island.

Voice. I have heard five apparently distinct vocalizations of the Antillean Piculet. Two calls uttered as single notes are the sharp Prit Call, a rapid mechanical note with diffuse sound at frequencies between 2 and 8 kilohertz, and the longer Prew Call, a rising, then falling note with several distinct overtones and at a frequency of between 2 and 5 kilohertz. The Prit Call often introduces the Piping Call but is employed on other occasions, expressing mild alarm. The Prew Call is uttered, apparently in alarm, but in the presence of another piculet (mate?).
Of the three calls given in series, the Wiii Call is a soft utterance, composed of three to five pritlike notes, but weaker and delivered in one-third to one-half second. The piculets use this call when two of them are close together, as in the same tree. The Yeh Call is a series of long (one-quarter second), wavering notes with many overtones at a frequency of between 1 and more than 8 kilohertz. Each note contains several connected, peaked elements, and the composite call is very like begging calls of various woodpeckers. Apparently this call functions in aggressive encounters, as the only such call recorded was uttered by one of two males clutching one another and displaying on the ground, where they had fallen in conflict. The Piping Call is the loudest, most frequently heard vocalization of this piculet, and the call responsible for the bird’s Spanish name (flautero, the piper). The call is a series of two to eight notes lasting up to three quarters of a second. The notes are sharply peaked, with a frequency mainly between 2 and 3 kilohertz. Typically there is a longer terminal note, at a lower pitch, delayed beyond the main group of notes and imparting a distinctive quality to the call. Often the initial note of a call is abbreviated, weak, and preceding the main group of notes — this initial note is very like the Prit Call note. The Piping Calls frequently are uttered antiphonally, presumably by members of a pair. Sometimes there is a delay between initial call and response, but one usually hears two calls more or less closely approximating each other. Occasionally there will occur a round of calls by two or rarely three adjacent pairs. The call and its response usually take place within three quarters of a second to 2 seconds. This distinctive call clearly serves as a location call and apparently also as a territorial proclamation (“song”).

Display. The only display I have observed, and to my knowledge the only one known, occurred when I chanced upon a violent encounter between two males, about 15 feet up in a sapling. They moved at each other, giving a Yeh Call; then they hit and fell to the ground, clasping each other by the legs. Then one bird held the other against the ground, half on its side (this about 3 meters in front of me), raised its head high, bill pointing somewhat above the horizontal, and, calling “yeh-yeh-yeh,” swung its head far to one side, paused momentarily, swung to the other side, paused, and repeated these jerky swings five or six times. Both birds then sped away in opposite directions. This aggressive display bears a resemblance to the swinging displays of other woodpeckers.

Breeding. Nesting occurs from March to July. Pairs are territorial, and no colonial nesting is evident. Prior to breeding, interactions occur between adjacent pairs and, rarely, three pairs may come near one another and engage in calling bouts, the calls seeming to serve as aggressive displays in establishing or enforcing territorial boundaries. Courtship and nesting behavior largely are unknown. Nests are excavated at rather low heights (below 5 meters) in dead stubs and fence posts. Eggs number two to four. Nothing is known of the feeding habits, care of the young, or occurrence of family parties following nesting season. These piculets molt between July and September.

Taxonomy. Very distinct, no close relatives. A pale race, abbotti, occupies Gonave Island off western Haiti. It is distinguished chiefly by its grayer, less green upperparts, and a smaller, more central yellow crown patch (both sexes); other features cited by Wetmore (1928) vary greatly, and there consequently is much overlap with mainland Hispaniolan birds of the nominate form.

References
SUBFAMILY PICINAE

Tribe Melanerpini

Genus Melanerpes Swainson

The 21 species of this genus, widespread in the Americas, are characterized by a white stripe or white and black barred area in the central tail feathers of most species, usually a bright crown or nape patch, no malar markings, often a forehead-forecrown patch, rarely green in the plumage, and a red or yellow abdomen. The head is frequently marked with large areas of color in a broad pattern; it is mainly unicolored in a few species. Several species show little or no sexual color dimorphism, but most do, and the pattern usually involves a crown patch in males that is lacking in females. The bill is rather long, almost circular in section, curved slightly to strongly along the culmen, with a pointed tip or a small chisel-tip, and somewhat broad across the nostrils. The tail is specialized, with a strong rachis as in all true woodpeckers. The foot is zygodactyl and four toed. The genus includes the most social of woodpeckers (M. striatus, M. formicivorus). Included in Melanerpes are the monotypic "Asyndesmus," "Leuconerpes," "Trichopis," as well as "Chryserpes," "Tripsurus," and "Centurus." The last two genera were merged in Melanerpes by Peters (1948). "Tripsurus" actually represents a superspecies interconnecting the formicivorus group (Melanerpes, sensu stricto) and "Centurus." None of the supposed genera just mentioned approaches the level of distinctness represented by the melanerpine Xiphidiopicus or Sphyrapicus, and their treatment as genera masks their close relationship with species of Melanerpes and falsely equates them with the distinctive genera of the tribe, Xiphidiopicus and Sphyrapicus.

WHITE WOODPECKER

Melanerpes (Leuconerpes) candidus

Color Plate 8

Range Summary. North-central South America.

Diagnostic Features. Medium, weight 116 to 136 grams, wing length 154 to 167 millimeters. Mainly white (head, rump, underparts) with black back, wings, and tail; bright yellow bare patch of skin about white eyes. Often flies long distance cross country in small groups; flight rather straight, not typically undulating as most woodpeckers.

Description. Bill moderately long, slightly curved along culmen, with a slight chisel tip and rather wide across nostrils. Above mainly black on back and wings, showing slight bluish gloss, becoming brown on wing primaries; rump and uppertail coverts white, forming patch with white tail base. Wings show white at bend ("wrist"); below black on coverts, grayish brown on flight feathers. Shafts dark brown above, horn white below in wings; tail shafts creamy white at basal two thirds, brown at tip. Tail white for basal half or more, extending farther toward tip on outer feathers, meeting brownish black tip area in a variably barred pattern; central feathers with narrowed tips. Tail/wing ratio 0.55 to 0.64. Head creamy white, sometimes tinted buff; large bare area around eye (see Sexual features) a narrow black line extends rearward from below eye along neck, connecting to black back; some black or brown usually is evident about nostrils and lower loral area before eyes. Rarely, birds may show dull black on throat or even crown (where usually creamy white). Below creamy white,
often tinted buffy, sometimes strongly discolored brown or buffy; center of abdomen yellow in patch, variable in extent and brightness; birds having much yellow on abdomen show some yellow at tips of breast feathers as well. Undertail coverts creamy white.

Sexual features: Males with narrow lemon-yellow nape patch, lacking in females (nape creamy white). Immatures very like adults; both sexes have yellow in nape but more extensively yellow in males (onto crown). Females have broken yellow nape band; above browner, less glossy black. More buffy in white color throughout; duller ventral yellow. Eyes white to pale bluish (grayish in immatures) with bare golden yellow area around them (this area was bluish in one captive-bred immature bird). Legs and feet greenish gray to olive-green, bill black with greenish to whitish base.

Distribution and Habitat. Ranging from southern Surinam and scattered Amazon River localities southward through open and lightly wooded country of interior central Brazil; also southern Brazil, eastern Bolivia, Paraguay, western Uruguay, and northern Argentina south to La Rioja and Entre Ríos. Favors semiopen country, edges, clearings, and cultivated parts of forested regions, savannas, campos, and chaco woodland, ranging from sea level rarely (Chilón, east-central Bolivia) to 7500 feet.

Behavior. Resembles Lewis' Woodpecker somewhat in its flight, often seen flying over open country and pausing intermittently to perch in dead trees before resuming its flight. Forages by tapping and gleaning for some insects but mainly plant materials, also honey, grain, and fruits. Feeds on orchard fruits such as oranges, causing havoc because of visitations on a regular basis in small groups. They are quite social, but it is not known whether these are family groups or assemblages of birds representing several pairs. Vocalizations include a typically melanerpine “churring” note, a loud “kreeer” or “kwee” call, and a long “cree-cree-cree-cree-creek.” In captivity they bathe frequently and eat mealworms, bananas, apples, and grapes (Macklin, 1937). Group displays occur, including bobbing and bowing reminiscent of that of M. cruentatus. Breeding activities are not well known. Nests in September to November in Bolivia, Paraguay, southern Brazil, and Argentina, from which immature birds out of the nest are known from November to May. Piahuí birds may nest in August and September. Three or four eggs are laid and are incubated by both adults (captive birds; it is not known if the species breeds socially). Macklin (1937) reported that the female of a captive pair brooded the young at night, an unusual event that needs corroboration. He fed the adults ant eggs and mealworms, which, with soft food, they fed the young. After feeding, the adults removed excreta from the nest. One surviving young bird left the nest at 36 days of age. The annual molt follows the breeding season, generally occurring from January to April, but earlier in parts of Bolivia (October), and from September to April along the Amazon River.

Taxonomy. Monotypic with no close relatives, but probably related to the M. cruentatus group.

References
LEWIS' WOODPECKER

Melanerpes (Asyndesmus) lewis

Color Plate 8

Range Summary. Western North America.

Diagnostic Features. Small to Medium, weight 85 to 138 grams, wing length 155 to 178 millimeters. Unmistakable, glossy black above with a silvery white collar; head black with red about the face; below pinkish red and, on breast, silvery white. Flight not deeply undulating, more direct and slower than in other woodpeckers; often flies long distances.

Description. Bill moderate, slightly curved along culmen, nearly pointed at tip, and rather broad across nostrils. Entire upperparts from crown to tail, including wings, glossy black, except for a band of silvery white around hindneck; the gloss is greenish on head and back and greenish blue on flight feathers. Occasionally the tips of wing feathers, especially secondaries, have a narrow white area, and infrequently the outer tail feathers have a fine white margin. Underwings and undertail browner, less black. Shafts blackish brown above, horn colored below. Tail not highly specialized, tips somewhat narrowed on central feathers. Tail/wing ratio 0.55 to 0.60. Head glossy black above, brownish black on throat, with deep red variably extending over the forehead, lores, anterior ear coverts, malar area, chin, and anterior throat (red feathers with black bases that show through). Breast feathers black based with tips modified, splayed (presumably barbules reduced), and colored silvery white to olive-silver. Flanks and abdomen also with loose-tipped feathers, colored red with silvery tips, rendering overall color pinkish red (more silvery pink anteriorly, redder posteriorly). Thighs and undertail coverts glossy greenish black, sometimes connecting across lower abdomen.

Sexual features: Sexes alike; males have slightly longer bill on the average. Immatures are slightly less glossy green above and browner on the neck and crown; the face is mainly brown, with no or only slightly red; more often than adults they show fine white tips on wing flight feathers and on edges of outer tail; also, they lack the loose feather tips of adults on the underparts, and they show more white, less red (red mainly on center of underparts), and distinct barring and streaking (resembling Sphyrapicus, young M. erythrocephalus, and M. formicivorus) below. The silvery hindneck band of adults is lacking in young birds. Eyes reddish brown, brown in immatures. Legs and feet blue-black, bill slaty black.

Distribution and Habitat. Mainly migratory, breeding from southwestern Canada (southern British Columbia, southwestern Alberta), Montana, and the Black Hills of South Dakota southward, largely in mountains, to south-central California, central Arizona, and southern New Mexico, and eastward to east-central Colorado, western Nebraska, and southeastern Wyoming. Winters from Oregon, or even British Columbia, and Utah and Colorado, south occasionally to northwestern Mexico (Baja California, Sonora), and western Texas. There are accidental or casual records of the species eastwardly, diminishing to the east coast, where accidental. Habitat in breeding season consists of open woodland, especially pine woods (Pinus ponderosa), at edges and especially near recently burned areas of coniferous forest, in riverine timber situated in relatively open country, in various oak woods, and sometimes at edges of orchards. Sporadically it reaches the west coast where conditions are favorable, and it breeds as high as 9000 feet where recently burned forest provides suitable habitat. In winter the species frequents oak woodlands, other woodlands where oaks occur frequently,
and cultivated areas in which nuts (pecans, walnuts) or corn are available, usually at lower elevations and farther south than the breeding areas. Groups wander about in fall before settling into the winter habitat.

Foraging Habits. Very unlike most woodpeckers, the Lewis' Woodpecker (named for explorer Merriwether Lewis), subsists mainly on a combination of various insects seized in flight, as well as on nuts, fruits, and grain. Hawking for insects is the primary foraging mode in spring and summer, giving way to feeding upon nuts and other such foods, eaten directly or stored, in fall and winter. However, flycatching occurs on warm winter and fall days, when feasible. Hawking for insects takes various forms: slow, prolonged, circling flight relatively high in the air after emerging insects (often in the company of swallows); flycatching from perches situated in the open with direct, flapping flight; and dropping from low perches to seize insects on the ground. Some probing and gleaning is accomplished, but never any tapping or excavating (C. E. Bock, 1970). Various flies (Diptera), ants, beetles, caterpillars, grasshoppers, and crickets are consumed. Occasionally insects may be stored (Bent, 1939). Actions of Lewis' Woodpecker when gleaning or pursuing prey on a tree or bush are "acrobatic," often involving perching crosswise on a branch and even hanging upside down. Nuts, especially acorns and almonds, are harvested in fall and winter, but the woodpeckers eat green almonds if they are available in the nesting areas during the breeding season. Harvesting of nuts is important, even critical, for winter survival. First the woodpeckers pull the nut from the branch by reaching and twisting, or occasionally by hanging and pulling the nut loose. Then it is taken to a nearby perch with a horizontal surface having some sort of notch in it that serves as an "anvil," the shells accumulating below it with regular use. The bird delivers heavy blows, in short series, down upon the nut until the shell breaks. The nutmeat then is stored whole, or often it is broken into pieces that are stored separately (or part may be eaten). Natural cavities, sometimes enlarged by the birds, are used for storage (unlike \textit{M. formicivorus} that stores whole nuts or acorns into holes excavated to fit them). Cracks in telephone poles or in rough-barked trees serve as major storage sites. The nuts are pushed and tapped into place. Throughout the winter Lewis' Woodpeckers guard their stores territorially, and they often shift nuts about from site to site, possibly assisting in retarding their decay by exposing various surfaces to the air (C. E. Bock, 1970). When hawking for insects is not possible, winter feeding is largely confined to the nut stores. In late summer and fall, various fruits are eaten, and orchards may be devastated by numbers of these woodpeckers. Wild strawberries, serviceberries, huckleberries, raspberries, quinces, pomegranates, apples, and pears are among the foods eaten.

Voice. Drums sporadically in the breeding season, in "a weak, simple roll, occasionally followed by three or four individual taps resulting in a drum pattern similar to that of the Williamson Sapsucker (\textit{Sphyrapicus thyroideus})" (C. E. Bock, 1970, p. 65). Mutual tapping has not as yet been described. The alarm note is a "yik" (male) or "yik-ik" (female) according to Bock, and these are used when the birds are agitated, as when disturbed near the nest. An aggressive chattering call is given, often during displays. The Chur Call is a vocalization associated with breeding, given mainly by males and serving to proclaim a territory and to attract a mate (C. E. Bock, 1970; he does not ascribe the call to females, but I do not doubt that females employ it). According to Bock (1970, p. 64), the call is "a short, rather loud and harsh, churr-call, usually uttered three to eight times in quick succession," in the manner of other species of \textit{Melanerpes} (see, e.g., \textit{M. herminieri}). Use of this call may to some extent replace drumming.
Displays. These have been described by C. E. Bock (1970, pp. 65–66), but are not well known. A Wing Out or Wing Spreading Display involves a bird perched usually on a horizontal branch, with wings spread and head lowered; the silvery breast feathers are erected, giving a fluffed appearance. The aggressive bird in such a display approaches an intruder head on or sideways. Another spread wing display is the Circle Flight Display in which a male (always a male?) flies in a gliding, floating flight in a circle about its nest tree, ending in the bird's landing and giving a Chur Call at the nest. Both displays seem aggressive in function and are used as well in courtship. For example, a male may give a Wing Spreading Display and a chattering call before its mate, copulate with her, then drop off in a Circle Flight Display about the female and the nest tree.

Interspecific Interactions. Interacts strongly with other woodpeckers such as Colaptes auratus, Picoides nuttallii, and especially the acorn-storing Melanerpes formicivorus, as well as birds other than woodpeckers that may rob their nut stores. C. E. Bock (1970) has discussed the aggressive encounters, interspecific territoriality, and pirating of acorn or nut stores of lewis and formicivorus. Lewis' Woodpeckers arrange their activities about their winter storage areas, which they defend with vigor. Ever watchful, they fly to attack intruding woodpeckers, even from great distances and in atypically fast flight. After storage areas are established, there may be a reduction of interactions, and Bock mentioned a formicivorus storing in the top of a tree, the bottom of which was used by a lewis, with no interactions so long as neither wandered into the other's storage area. In most cases the owner of a storage site, be it formicivorus or lewis, was successful in defending that site against intruders. The social formicivorus has group storage areas, or caches, whereas lewis stores individually but often in close proximity to one another. Disappearance of a Lewis' Woodpecker may result in appropriation of its stores by Acorn Woodpeckers. Although robbery of acorns or nuts from stores is common, and there is strong aggression between Acorn and Lewis' woodpeckers in the nut- or acorn-gathering areas, actual takeover of a defended storage area is a rare event.

Breeding. The nesting period commences in late April or May, with eggs generally laid from mid-May to early June (varies from late April to September; C. E. Bock, 1970), the later dates being from more northern areas and higher altitudes. Pairs tend to be maintained year after year; unmated birds are much more vocal and drum more than mated birds. The nest is excavated in dead trees or stubs in a great majority (75 percent; C. E. Bock, 1970) of cases. Various coniferous trees, cottonwoods, sycamores, oaks, telegraph poles, and other tree sites are utilized. The nest is excavated at variable heights from 2 to 52 meters, the cavity is 23 to 76 centimeters deep, and the entrance is 5 to 7.5 centimeters in diameter (C. E. Bock, 1970). The hole is often used year after year, and natural cavities are used as well as holes excavated by the woodpeckers. Very frequently the nesting cavity is the winter roosting hole of the male, if the birds are resident in an area. Males seem to select the nest site. Only the nesting site is defended, there being no defense of a large (feeding) territory; the nest site defense is by the male. The clutch usually numbers six or seven eggs (four to nine), and the incubation period is 12 to 16 days (C. E. Bock, 1970). Males are most active in incubating, and they incubate at night. The young are in the nest 4 to 5 weeks before fledging. Feeding is at a rate of about 15 times per hour, but is very variable (two to 62 times per hour). When insects are swarming, there is some storage of insects by the adults, the stored food later being fed to the young. Feeding apparently is direct, adults carrying food in the bill. Males brood the young at night until the week before fledging, when the adults both sleep elsewhere. Both sexes care for the young about equally during the day.
Nest sanitation data are sparse. Fecal sacs uncommonly are removed, mainly by the male, but it is uncertain whether the nest becomes soiled or adults generally eat the fecal material (C. E. Bock, 1970). Young birds remain with the adults for some time after fledging and migrate either in mixed flocks with adults or in groups of young birds. The molt commences in midsummer, lasting from July to as late as 17 November. Young birds undergo a post-juvenal molt over an extended period, growing adult wing and tail feathers very early but not completing body molt and acquiring fully adult plumage until late fall or even early winter, when they must secure and defend stores of acorns or nuts.

Migration. Some details of migration are presented above. Most Lewis' Woodpeckers migrate, although often but a short distance downslope or to nearby orchard or oak areas that can supply nuts or acorns necessary for winter survival. There is some postbreeding wandering, sometimes to or through orchard areas where the birds may stop to feed for a time. This takes place in September and October, the birds reaching the wintering areas by late November. Migration is in very loose groups, not flocks, the birds generally passing a given point singly or in twos or threes at most. In March and April they return to the breeding grounds.

Taxonomy. Related rather closely to _M. erythrocephalus_ and _M. formicivorus_. C. E. Bock (1970) considered that _formicivorus_ is at least as distinct from _erythrocephalus_ as is _lewis_. This may be so, but I consider it likely that _erythrocephalus_ and _lewis_ evolved independently from some ancestor of _formicivorus-cruentatus_ before the last group had evolved its strong sociality and before ancestral _formicivorus_ evolved its acorn-storing abilities. Lewis' Woodpecker is monotypic.

References

**GUADELOUPE WOODPECKER**

*Melanerpes herminieri*

**Color Plate 9**

**Range Summary.** West Indies.

**Diagnostic Features.** Small, 87 to 93 grams, wing length 122 to 140 millimeters. The only woodpecker on Guadeloupe Island, it appears entirely black in the field and cannot be confused with other species.

**Description.** Bill narrow between nostrils, long, somewhat curved on the culmen. Entire plumage black, with glossy blue sheen on crown, face, neck, back, upper wing coverts, and edges of flight feathers. The chin and throat are sooty, overlain by dull red (tips of feathers); dull red continues over breast to belly, variable, but subdued and not visible at a distance. Bases of breast feathers gray-white or dull white. Tail strong, but not especially modified; tail/wing ratio 0.64 to 0.74. Nonglossy portion of flight feathers, tail, sides, and flanks is dull brownish black to blackish brown.

**Sexual features:** Sexes alike in color, but males are somewhat larger and distinctly longer billed (no overlap between sexes). Immatures browner and duller below than adults; red coloring of underparts more orange tinted (but dull); otherwise like adults. Eyes dark brown, legs and feet bluish gray, bill dull black.
GUADELOUPE WOODPECKER

Distribution and Habitat. Endemic to Guadeloupe, Lesser Antilles, and the only woodpecker found in that island chain. Rare on the low, flat eastern section of the island (Grande Terre), but seen by R. W. Guth (personal comm.) near Chateau and Lasserre. Common on the eastern mountain slopes (at 100 to 700 meters) of the western island (Basse Terre) in moist forest, less common in mixed cultivation with large trees, and uncommon to rare along the island’s dry western slopes.

Foraging Habits. An active and generally quiet forager, this woodpecker utilizes both forest trees and isolated planted or remnant forest trees in the open. Foraging sites are erratically visited, and usually are 8 to 20 meters up in trees. A bird probes and taps lightly along a portion of a branch, moves to another tree, feeds briefly, then flies once more to a site in another tree. One bird visited five trees in 7 minutes; it did not tap loudly during that time. During pauses it perches quietly, closely appressed to the bark. At one branch of a tree it paused to examine an unripe fruit, from which it hung momentarily upside down. Another bird tapped repetitively at one site, from which it removed a large larva; the woodpecker then flew to another tree, where it foraged, moving rapidly. Most feeding is accomplished on branches, less on trunks. Danforth (1939, p. 33) reported 93 percent insects (mainly cerambycid beetles and their larvae, and other Coleoptera) and 7 percent seed (one seed!) in stomachs of four Guadeloupe Woodpeckers. I have no evidence indicating a sexual difference in feeding habits, other than the 20 percent difference in bill length between the sexes (the longest-billed female I have measured has a bill 9 percent shorter than the shortest-billed male), a matter requiring field study at various seasons of the year.

Voice. Two forms of drumming occur: a faster, louder drumming and a slower, weaker demonstration drumming. Typical drumming bouts are 0.85 to 1.31 seconds in duration, contain 10 to 16 beats, and have a tempo of nine to 14 beats per second. This drumming seems equivalent to the territorial drumming of other picids, and it may also have a localization function. Demonstration drumming occurs when a pair is together at a nest, as for example when one bird is in the nest and the other flies to the entrance; thus it presumably functions in pair formation or maintenance of the pair bond, in synchronization of breeding activity, or some combination of these. Bursts of four to seven or so beats are given at a rate of four to six beats per second. Often the drumming is mutual, the bird in the nest responding to its mate’s drumming outside the cavity. Bursts last up to 1.75 seconds. Two vocalizations are known: a low, weak series call, the Wa Call, and a loud Chur Call, also given usually in series. The Wa Call contains variable notes uttered at six to eight notes per second. The notes are 0.03 to 0.075 second in duration, the longer ones showing vague peaks spectrographically, but the shorter ones having only diffuse sound at diverse frequencies. The function of the Wa Call is unclear, but it may be agonistic; the call is used by birds interacting at close quarters. The Chur Call, rendered “ch-arrgh,” is given in series of calls that vary from 0.18 to 0.55 second in duration; the series contain three to eight calls and last as long as 5 seconds. Each call is a cluster of up to 13 diffuse, vaguely peaked elements at frequencies between 0.8 and 3.5 kilohertz. In at least one pair the sexes differed in the pitch of the Chur Calls, one calling at a frequency 1 kilohertz more than the other. Chur Calls probably function in territorial proclamation and in indicating the location of a mate, with perhaps some pair maintenance function as well.

Displays. Displays include a Bill Raised Posture, Head Swinging, Bowing, and Courtship Feeding. In the first of these the bill is held above the horizontal, pointed in the direction of an antagonist. The Bill Raised Posture may be incorporated into a Head Swinging Display, in which the head is slowly moved from side to side with a brief pause at each end of the swing.
Both displays were directed at me and also at the mate of a displaying bird. Bowing is an up-down movement of the head, directed at a mate or other conspecific bird. There is a pause between bows in the usual series of three or four of them. A Wa Call frequently accompanies the Bowing, which I saw principally between mated birds at a nest. One instance of mutual Bowing by a woodpecker outside the nest and its mate within the cavity (its head protruded slightly from the entrance) terminated in Courtship Feeding, the outside bird leaning forward and passing food items into the bill of its mate.

Breeding. Virtually unknown. Birds seen in late March appeared to be commencing their breeding season. Juvenile birds are known from July to September. The annual molt occurs in September and October, indicating a nesting season of approximately May or June to August. An occupied cavity in late March was 10 meters up a dead stub within hill forest beside a newly cleared roadway. The cavity was the highest of seven holes in the stub, and at least one of these other holes appeared fresh (possibly female's roosting hole). The uppermost cavity was the scene of considerable activity, including demonstration drumming, Wa Calls, Bowing, and Courtship Feeding, all by both members of a pair, one of which was situated within the cavity during these activities. One or both woodpeckers made frequent visits to this cavity throughout each of two days in late March, which, with the activities just mentioned, suggests that this pair would have nested in April or May.

Taxonomy. No races have been described. The Guadeloupe Woodpecker is distinctive by virtue of its all-black plumage and rather long outer primary. Its morphology and behavior indicate its rather close relationship to such species of Melanerpes as the cruentatus-chrysauchen group and portoricensis. Its tinge of reddish ventrally suggests the coloration of portoricensis, but it differs from that species (see below) in its great bill dimorphism sexually, its non-social habits, its strong drumming, and its relatively unmodified Chur Call. Nevertheless, portoricensis may be the closest living relative of herminieri.

Reference

PUERTO RICAN WOODPECKER
Melanerpes portoricensis

Color Plate 9

Range Summary. Puerto Rico.

Diagnostic Features. Small, 51 to 72 grams, wing length 108 to 129 millimeters. Only Puerto Rican woodpecker other than wintering Yellow-bellied Sapsuckers (Sphyrapicus varius). Black above with a white rump and white forehead; brown below with bright red variably extending over breast, throat, and abdomen.

Description. Bill slightly curved along culmen, slightly chisel-tipped, and moderately broad across nostrils. Above glossy blue-black, including back, wings, and tail, except for white rump and uppertail coverts; flight feathers browner, less glossy black. Wings show white on the leading edge ("wrist") and the inner bases of inner secondaries; the white on the secondaries varies, and in birds in which it is more extensive there also is a narrow white tipping of secondaries (half the birds show some white tipping). Wings brown underneath, coverts
mixed black and white. Shafts brown above except white at base of tail; below horn-brown, becoming whitish in base of tail. Tail somewhat narrowed at tips of central feathers; outer feathers sometimes white tipped. Tail/wing ratio 0.57 to 0.67. Crown, nape, sides of neck glossy blue-black, as back; ear coverts brownish black, the black continuing as a fine line to the base of the bill below the eyes. Lores, forehead, nostril feathers, and fine line of feathers around eye white, usually showing a dull orangish or buffy tinge about the nostrils. Underparts mainly brown on sides, darker anteriorly and paling to grayish buff posteriorly on flanks of some birds, the body midline being overlain variably with red (see Sexual features); glossy blue-black from sides of neck encroaches on upper breast, restricting central red. Undertail coverts pale brown with whitish bases and dark shafts.

Sexual features: Males 4 to 5 percent longer-winged and longer-tailed than females, weight about 12 percent greater, and bill 16.4 percent longer (no overlap between sexes). Males are more extensively red below, red covering the throat, breast, and center of the abdomen; also, there is more restriction of black on the breast such that the center of the breast occasionally is admixed red and black. Females have a mainly or entirely brown throat and malar area (red traces often on chin and about malar), and the breast and abdominal red is more narrowly restricted to the midline. Ventral red areas sometimes show an orange or even yellowish tendency. Immatures resemble adults but have less red ventrally and the red is more orangish. Males have some red-tipped feathers in the crown. Eyes brown, legs and feet grayish black, bill black.

Distribution and Habitat. Range is Puerto Rico and nearby Vieques Island, West Indies. Occupies, or formerly occupied, lowlands and mountains, but absent about coast where extensively cleared. Inhabits forest, groves in pastures, and tree plantations, such as coffee plantations.

Foraging Habits. Males tend to feed lower on trees and to utilize tapping and probing more than do females, which feed higher and favor gleaning over the other two modes, especially in the winter dry season (Wallace, 1969). Its foods are obtained entirely from tree trunks and branches, and flycatching occurs rarely, if at all. Larvae of the wood-boring longicorn beetles and other beetles make up a large portion of the animal food of this woodpecker, and ants and earwigs also are important. Some grasshoppers, hemipterans, and a few frogs and lizards form the bulk of the other animal food, which totals about two thirds of the diet. About a quarter of its food is composed of seeds (palms, figs, berries, composites, euphorbias) and fruits, mainly of palms and rubiaceous shrubs. Wood fragments make up the remainder (up to 9 percent) of stomach contents, but whether purposely eaten remains to be determined. The dietary information is from Wetmore (1916) and is based upon analysis of 59 stomachs of birds taken from January to August. Foraging birds feed alone or in pairs early in the season, in family groups later in that season, and in loose groups of up to 10 birds in the nonbreeding (winter) period (Wallace, 1969).

Voice. Drums weakly and uncommonly in a "rapid tattoo on a dead limb" (Wetmore, 1916, p. 62); it is not loud, and even may be mistaken for the "groaning" caused by wind moving a banana tree (Wallace, 1969). Its function is not known. Wallace (1969) mentioned an alarm call employed at times, such as when disturbed by humans, but the call was not described. Knowledge of its calls comes mainly from recordings supplied to me by G. B. Reynard. Unfortunately I am not certain of the functions and circumstances surrounding the utterance of the calls. Single calls, sometimes given in very loose series, form the Pep Call (see sonagram in Short, 1974d, fig. 7G), a short, sharp note with dominant sound at 2 to 3 kilohertz and strong overtones. This probably is a low-intensity aggressive-alarm note, and it resembles
similar calls of *M. striatus* and *M. herminieri*. A Preep Call (Short, 1974d, fig. 7M) differs from the Pep Call in being longer (0.15 second) and in having less overtonal emphasis. Their functional differences are unknown. Simple Pep notes are combined into the Pep Series Call (Short, 1974d, fig. 13H), a rattlelike call uttered at about nine notes per second, the notes tending to cluster somewhat in pairs or triads. Individual notes resemble Pep Call notes but have weak overtones. Another related call is the Compound Pep Series Call, or Long Call (Short, 1974d, fig. 13H), a loose series of Pep-like notes strongly but irregularly clustered in singles, twos, or threes, and differing from the Pep Series Call in having strong overtones and the notes more diffuse, connecting, to form a churlike element. The Pep Series Call resembles the Rattle Calls of *M. carolinus* and *M. striatus*, and the Compound Pep Series Call resembles the Chur-Rattle Call of *M. erythrocephalus* and the Long Call of *M. striatus*. Finally, a Chur Call (Short, 1974d, fig. 11G) with weakly connected notes uttered at 20 notes per second (faster than those of other calls) seems the equivalent of Chur Calls of other melanerpine species and such other calls as the Bدددت Call of *M. striatus*. The function of these various calls remains a subject for study.

**Displays.** No displays have been described. Wallace (1969) mentioned an encounter between two males in the presence of a female, in which the males fought violently in mid-air, but their behavior was not described further.

**Breeding.** Although social for part of the year, pairs remain at least loosely associated throughout the year. During the breeding season the groups disassemble into pairs, and these maintain small territories usually widely spaced apart (Wallace, 1969, p. 27). Because of the spacing there is little territorial aggression. The spacing may result from social displays in groups, for Recher and Recher (1970, pp. E89-90) have this to say of their activities: “The ‘social’ gatherings of this woodpecker are very reminiscent of the social activities of the California Acorn Woodpecker (*M. formicivorus*). Tall, prominent snags (especially dead *Cecropia* trees) were utilized as group (and individual) calling and gathering perches….” Paired birds call often (Chur Calls, most likely) to one another, especially in the morning during the breeding season, but according to Wallace (1969) there is little interaction with other conspecifics (once the birds are on breeding territories). The nesting season primarily is in late winter and spring, birds excavating nests in February or so and laying eggs in April and May (Wetmore, 1916; on Vieques Island, in March and April [Wetmore, 1927]). The breeding period may be more extensive; and Wallace (1969), who saw excavating (roosting holes, possibly) in the dry season, reported that some nesting occurs throughout the year. The nesting cavity is excavated in a dead stub at various heights and in diverse species of trees. The clutch size is uncertain. Both parents feed the young, the feeding being direct (food carried in bill). After fledging, the young remain near the nest for a few days and are fed by attentive, vociferous adults for about 2 weeks thereafter (Wetmore, 1916). The family parties, usually of three or four birds (suggesting a clutch size of two to four eggs, or so), remain together for some time and form the bases for larger winter groups. The annual molt occurs from June onward, with birds completing the molt by the first of November.

**Taxonomy.** A monotypic species of uncertain relationships in *Melanerpes*, possibly related to *M. herminieri* and to the *M. chrysauchen* complex (Short, 1974d).

**References**

RED-HEADED WOODPECKER

*Mathelam erithrocephalus*

Color Plate 10

**Range Summary.** North America.

**Diagnostic Features.** Small, weight 61 to 97 grams, wing length 127 to 150 millimeters. Adults unmistakable, with all-red head and throat; white underparts and rump; large white wing patches; and blue-black back, wings, and tail. Immatures brown headed, mainly brown and white, but with much white in wings. Usually seen flying in open country or perched in dead trees.

**Description.** Bill curved somewhat along culmen, slightly chisel-tipped, moderately broad across culmen, and broad generally at base. Back glossy blue-black, rump and uppertail coverts white, often with faint, fine black shaft streaks. Wings show blue-black gloss, especially on coverts, but are browner than back; large white patch formed by white distal two thirds or three quarters of secondary feathers (there is sometimes an indication of barring); white area of wing usually has feather shafts partly or all black, forming fine streaks; underwing brown with white secondary patch and black and white coverts. Shafts brownish black, except white partly in wing secondaries, and whitish evident at sides of shafts of central tail feathers. Tail blackish brown with slight blue gloss, often tipped narrowly in white on outer feathers; also a very narrow white area at base of tail, broadest outwardly and shallowest in the center; tail tips narrowed, especially central pair. Tail/wing ratio 0.51 to 0.60. Entire head, neck, throat, and uppermost breast red, the feathers gray basally (showing in worn birds), except on rear of throat and uppermost breast where a black band occurs near the narrow red tips, thus forming an often distinct black band demarking red from white of underparts. Uncommonly, the red is partly replaced by orangish feathers, or even yellow (one specimen has a red head but yellow chin!). Below white, showing a variably intense dull yellowish, orange, or even reddish wash in center of abdomen, at times reaching from breast to vent; undertail coverts white, or creamy white, but often with fine black shaft streaks.

**Sexual features:** Sexes alike in color, males slightly larger (1 percent in wing length, 2 percent in bill length; males of mated pairs are 6 percent heavier, except when females have large ova). Immatures differ markedly from adults, rather resembling immature sapsuckers (*Sphyrapicus varius*), and they vary considerably. Dorsally, juveniles are barred blackish brown and grayish white, except for the white rump and uppertail coverts. The wing coverts are similarly barred; the wings are brown with much white in the secondaries, but that area has strong black barring toward the feather tips, restricting the patch. The tail is browner than in adults and is tipped with dull white and margined (outer tail feathers) with white. The head is streaked dark brown and grayish brown dorsally and on the sides and is streaked brown and grayish white on the lores, malar area, and throat. Most juvenile birds, even nestlings, show a trace of red, usually on the nape or about the eyes, but some (of both sexes) show no red. The throat-breast patch is barred, and streaks lead from it posteriorly, over at least the sides and flanks; there is variation in the amount of streaking in the center of the underparts, most birds being nearly immaculate white (hence throat-breast area contrasts sharply), others having streaks to some extent over the entire underparts (hence appearing mostly brown streaked throughout). This plumage is maintained to some degree for a long time, through the fall and even into winter. By November or December there usually is much red, but also some brown streaking on the head; the back is mainly blue-black, and the underparts have lost most of their streaking. January and February immatures
still may show some facial or crown streaks, perhaps even some back bars, and they usually have slight streaking on the flanks; they still can be distinguished as immatures by the bars on the white wing patch, and indeed the barring on the wings and some back barring may be evident as late as May (molting female from Roswell, Georgia, 10 May). Some birds, however, achieve the full adult plumage by late September of their hatching year; since two broods may be raised, the immatures attaining adult plumage that early probably represent early-hatched woodpeckers of the first brood. Eyes brown, legs and feet greenish gray, bill bluish white at base, blue-gray to slate toward tip.

Distribution and Habitat. Partly migratory, subject to wandering in fall and winter. Breeds sporadically in southeastern Alberta and from southern Saskatchewan, southern Manitoba, southern Ontario, central New York, Vermont (rarely), and (occasionally) New Hampshire south to eastern Wyoming, eastern Colorado, northeastern New Mexico, central Texas, the Gulf Coast, and Florida. Winters generally but irregularly north to eastern Kansas, Iowa, southern Michigan, Ohio, and New Jersey, but less far north in severe winters and farther north in mild winters. The northwestern populations (Colorado to Alberta, east to Minnesota and Nebraska) are highly migratory. Favors open woodlands, especially those bearing dead trees, riverine woods, forest edges and clearings, pinewoods, farmland, orchards, and savannas with scattered trees. Rarely extends far into mountains.

Foraging Habits. One of the most, or the most, omnivorous of woodpeckers, feeding on insects and other animals, fruits, nuts, and other plant materials. Much foraging for animal prey is accomplished by hawking from a perch, often to the ground; by hopping on the ground; and occasionally by swallowlike, circling flights. Animal foods make up most of the diet in spring and early summer, but are important in the winter as well, the birds flycatching in the warmth of the midday sun. Some more woodpeckerlike tree foraging is accomplished, mainly by gleaning on trunks and branches, but with some tapping, and by occasional hanging in twigs to secure insects. Insects taken include grasshoppers, crickets, ants, diverse beetles and their larvae (e.g., June “bugs,” carabid beetles, weevils, tiger beetles), moths and butterflies, caterpillars, and wasps. Spiders also are eaten, and earthworms are secured on the ground. The larger insects may be stored for future use, in pieces or whole, within crevices or cavities that may be sealed off with wood to prevent theft (Kilham, 1958a). At times Red-heads are severe predators on birds’ eggs of diverse species; Bent (1939) reported a colony of Cliff Swallows (Petrochelidon pyrrhonota) meeting disaster as these woodpeckers devastated their nests. They also enlarge openings of cavity-nesting birds such as nuthatches, chickadees, bluebirds, and even flickers (Colaptes auratus), eating the eggs or young birds. Young robins (Turdus migratorius) have been seized in their nests, and I saw a Red-head fly off with a newly hatched Mourning Dove (Zenaida macroura). Birds, and even mice (Bent, 1939), may be pounced upon from above by a hawking Red-headed Woodpecker that delivers one or several powerful blows with its bill to injure or kill its prey. Among the plant materials utilized, the most important are acorns and various other nuts such as beechnuts. These are harvested in fall and are stored, the storage areas forming the winter territory of a single bird. The nuts or acorns are forced into natural cavities of all kinds; unlike the Acorn Woodpecker (M. formicivorus) the Red-head does not prepare a site for each nut, but rather stuffs the nut into any crevice, hole (even in buildings), or crack it can find. When a suitably large cranny is unavailable, the bird breaks the nut into pieces (as the Lewis’ Woodpecker, M. lewis, does with all its nuts) and stores the pieces. Many types of fruits and berries, both wild and cultivated, also are taken in season. Cherries are a favorite food; and blackberries, chokecherries, grapes, apples, and dogwood berries are among the other fruits utilized.
Red-headed Woodpeckers eat corn as well, sometimes in large quantities. Where this bird is common, deprivations in orchards and cornfields may be locally severe. At times, the Red-head eats quantities of bark (Kilham, 1959c; trees used were birches and oaks), a habit that possibly is shared by the Puerto Rican Woodpecker (*M. portoricensis*), and one that has been reported (see Kilham, 1959c) in Yellow-bellied Sapsuckers (*Sphyrapicus varius*) and Great Spotted Woodpeckers (*Picoides major*). The bark may provide food in the form of sap, an item that they utilize otherwise by visits to sap holes of Yellow-bellied Sapsuckers (*Sphyrapicus varius*). At winter bird feeding stations, sunflower seeds, peanuts, peanut butter, and some suet are eaten.

**Voice.** Drums rather weakly, usually in short bursts of 0.35 to 0.75 second, at a rate of 19 to 25 beats per second. The drumming mainly occurs in the breeding season. Mutual tapping also occurs in the nesting area, most frequently with the pair distributed one inside and the other outside of the nesting cavity. Kilham (1959b) noted the taps as occurring at two to three per second and in bursts of five to 15 taps. Drum-tapping also is used in actual selection of a nesting hole site, the male choosing the site but the female exercising final determination of the site by tapping near it (encouraging the male’s response) when the female approves of it (Kilham, 1959b). Vocalizations are several in number; I designate four basic types: the begging call of young, the Chatter Call, the Chur-Rattle Call, and the Chur or Kweer Call. The begging call has been described by J. A. Jackson (1970a, p. 7) as a “chee-chee”; I have not studied this call audiospectrographically. The Chatter Call probably is an aggressive call with appeasement possibly a major function; it was rendered “er-er” by Jackson (1970a, p. 6). Basically akin to the Chur-Rattle and Chur calls, the Chatter Call varies from a low “er-er-er” or “er-re-re” to a longer, louder, but still subdued “chee-er-er.” The call, usually heard from mated birds in proximity to one another, consists of rapidly uttered, sharp notes that connect with one another, usually given in bursts. The elements are uttered at 41 to 46 per second in bursts of 0.15 to 0.4 second, the bursts occurring at two to three bursts per second — often the two birds Chatter together. The emphasized pitch of the notes varies greatly, but usually is at 3 to 5 kilohertz. A Chatter Call given during copulation consisted of very short (0.18 second) bursts given at three and a half bursts per second. Sometimes a single chatterlike note (“kip”) is uttered preceding or following a Chatter Call. The Churr-Rattle Call is an aggressive vocalization heard the year round. It has been rendered “quirr” by Kilham (1959a, p. 349). The call is a series of notes with overtones, varying in emphasis, but given at a slower rate (18 to 22 notes per second); it is similar to the Chur Call of *M. portoricensis*. Most examples I have available contain five to seven notes, given in 0.26 to 0.4 second, singly or in series of one and a half calls per second. Individual notes are not connected and usually show diffuse sound at a pitch of 1 to 5.5 kilohertz, but some calls show emphasis at 2 to 3.5 kilohertz. This call is used in encounters, as territorially in winter and early spring, and it is employed interspecifically as well. The Chur or Kweer Call has been rendered “quee-ark” by Kilham (1959a, p. 354) and is uttered in the breeding season (probably it serves as an advertising call and contact call between mated birds, but it also seems to have an aggressive connotation, being especially loud and strong when three birds are present). The calls usually are given in a series of several bursts at a rate of every 0.65 to 1.5 seconds, more rapidly when two birds are calling simultaneously. The Chur or Kweer consists of a connected series of notes uttered very rapidly (at 56 or 57 notes per second), with most sound at a pitch of 1.5 to 2.5 kilohertz (Short, 1974d, fig. 11E,F). Initial notes rise rapidly in pitch, then “plateau”— in some calls the initial notes rise to a pitch higher than the plateau, then drop down, giving a “kwi-urr” or “kwee-urr” rather than a “kweeer.” Each call is
Melanerpes erythrocephalus

0.2 to 0.3 second in duration. The Kweer Call is similar to Chur Calls of other melanerpine species (see Short, 1974d, fig. 11).

**Displays.** Despite the abundance, conspicuousness, and strongly aggressive nature of Red-headed Woodpeckers, their displays are known inadequately. Bobbing or Bowing Displays, common to many melanerpine species, are well known; but their association with calls and their occurrence in particular situations need clarification. The Bowing is much like that I have described for *M. herminieri* (1974d, p. 17; see also preceding text). Highly aggressive, the woodpecker uses Bowing Displays during encounters with other Red-heads and with other species. A Wing Spreading Display is commonly seen about the nesting area when birds other than a pair are present and often is continued in a Flight Display at the antagonist. Tail Spreading Displays at times accompany Wing Spreading (Kilham, 1959a) but are not conspicuous. I have not observed Swinging Displays, although these occur in related *M. herminieri* and *M. cruentatus* (Short, 1974d). Actual supplanting attacks are frequent, with or without a stilted wing spreading in flight—the attacking bird is highly conspicuous in color and pattern (white wings and rump), and such attacking Red-heads are successful even against large birds such as crows (*Corvus brachyrhynchos* and *C. ossifragus*) and Pileated Woodpeckers (*Dryocopus pileatus*), as well as smaller birds.

**Interspecific Interactions.** Because of their aggressiveness, Red-headed Woodpeckers frequently are involved in encounters with other species; in these encounters they are almost invariably dominant. Much of their aggressiveness is related to the defense of food storage sites, and they are quick to attack actual and potential competitors and even noncompetitors for their stores. Chief among their actual competitors are Red-bellied Woodpeckers (*M. carolinus*), and the ecology and competition between these related woodpeckers have been the subject of a detailed report by Reller (1972). Not all the aggression of Red-heads is related to food storage, however, for breeding adults are quick to attack a variety of visitors to the dead trees in which they nest, and even at other times and places Red-heads may go out of their way to drive a bird away from a perch in a tree. Among nonwoodpeckers, White-breasted Nuthatches (*Sitta carolinensis*), Tufted Titmice (*Parus bicolor*), and Blue Jays (*Cyanocitta cristata*), all species that might be expected to steal stored nuts or acorns (the last two species actually store acorns themselves; see Kilham, 1958a) are attacked most frequently, although Starlings (*Sturnus vulgaris*) come in for a great share of attacks in the breeding season. The Starlings usually are unsuccessful in displacing Red-headed Woodpeckers. Among woodpeckers, the Red-bellied and, to a lesser extent, the Downy (*Picoides pubescens*) receive the most attacks. The former, as mentioned earlier, is a serious competitor for acorns and nuts in fall and winter, and the latter woodpecker is common and seeks its food in branches and trunks where Red-heads store nuts; hence, it invites attack even though it does not utilize acorns and nuts (Kilham, 1959a). Although interacting aggressively at times with *Colaptes auratus*, Reller (1972) reported a nest of that species but 2 feet from a Red-head’s nest with some interactions when birds of both species arrived at the same time (the flicker being subordinate) but no harassment of the flicker by the Red-heads. Aggressiveness of Red-headed Woodpeckers establishing winter territories is strong toward conspecific birds and any other competitors for nuts or acorns. According to Reller (1972) much of this aggression is directed at the Red-bellied Woodpecker, and in fact the Red-heads are interspecifically territorial against Red-bellies in the winter; the Red-bellies “were frequently found around the fringes of Red-head territories and encroached upon them regularly when not actively excluded,” and “when red-bellies were attacked by red-heads,
the red-bellies offered little resistance and quickly left the red-head territory” (Reller, 1972, p. 278).

**Breeding.** Two broods regularly are raised: the first from eggs laid in late April to early June, the second from eggs laid in July and August (rarely even September). Red-headed Woodpeckers not resident leave their winter territories in April for the breeding areas and commence drumming and calling (Kweer Call). The nest site may be in a tree of diverse species but usually is in a barkless dead tree, or at least the dead stub of a live tree. The height of the nest varies greatly, from within a few feet of the ground to 65 feet or more. In resident birds the male’s winter roosting hole may become the nesting site, but apparently the female “decides” on the site; her tapping provokes the male to mutually tap, and repetitions of this signify that the site is suitable (the female’s failure to tap acts as a stimulus to the male to start excavating elsewhere). Occasionally, in largely treeless areas, this woodpecker selects unusual sites for nesting, as inside buildings, in wagon wheels, in pumps, and even in the exposed nest of a Blue Jay (Bent, 1939). Social nesting has not been reported in Red-headed Woodpeckers, but I noted several trios of birds associated with a single nest hole in the Great Plains in 1964 and 1965. Two of these groups proved to contain one male and two females; in each case the gonads of all three birds were large. In one case both females had just laid an egg. Since the birds involved seemed not to be in conflict, and were associated at the hole for 10 to 15 minutes, it is likely that two females occasionally may mate with a single male, perhaps laying in a single nest. Bent (1939, p. 196) gave these measurements for four Ohio nests of this species: entrance 2.06 by 1.66 inches, depth 10.75 inches, and diameter at bottom of nest 4.41 by 3.35 inches. Copulation has been described by Southern (1960), who found the male to copulate from one side, holding onto a limb with its claws (both birds parallel to the limb) and turning its cloaca to make contact with that of the female from below and one side. The female was motionless during copulation, and there were no displays or calls. Nest excavation is mainly or entirely by the male and can be accomplished in 12 or 14 days. From four to as many as 10 eggs form the clutch; the females are indeterminate layers. 28 eggs having been taken from one pair’s nest in one season (Bent, 1939; following removal of the last egg, the birds excavated another cavity and there laid four more eggs and raised four young). One egg is laid daily until the clutch is complete. Incubation takes 12 or 13 days, both sexes sharing the incubation and the male remaining on the eggs at night. The nest is rarely left alone during incubation, egg laying, and incubation. Incubation commences before the final egg is laid, and this results in the young hatching up to 24 or 30 hours apart, or more. The young are attended almost constantly by one of the parents. Chattering Calls and mutual tapping mark the exchange of adults at the nest. Hatchling birds have a well-developed egg tooth on both upper and lower bill, used to break open the egg shell in hatching. The egg teeth, white in color, also may serve as stimuli to direct the adults’ feeding efforts in the dark cavity. The egg teeth diminish in size gradually, disappearing about one month after hatching (Jackson, 1970a). The young are fed by both parents at a variable rate, but in at least the case studied by Jackson, the female undertook most of the feeding. Various insects and pieces of earthworms are fed to the young birds, and berries (mulberries) and other fruits (cherries) also serve as supplements. Large insects are broken or wings and legs removed before feeding them to the young; this is done on a nearby “anvil” (branch or top of stub). The young birds grow rapidly, doubling in weight their first 2 days, and again in 5, 8, and 14 days of age, reaching maximum weight before fledging at about 23 days of age. The late-hatching young are smaller than the others, and the smallest of these probably fails to survive in many nestings. Hatchling birds are
naked for their first week of life. Further, their eyes do not open until 12 or 13 days of age (Jackson, 1970a). Observations and simple experiments with artificial lighting suggested to Jackson that the nestlings, although blind, perceive light coming through the opening into the nest, and interruption of this light (by an adult appearing at the entrance) triggers begging responses. The young of other woodpeckers react to hearing the approach of adults, as well; the claws of a woodpecker rattle loudly against the surface of a dead tree. Fecal sacs of very young woodpeckers were eaten by the adults at first, then were carried from the nest after feeding the young. However, late in the nesting period less attention is devoted to sanitation and the nest becomes soiled (Jackson, 1970a). The nestling phase lasts about 31 days. Reller (1972) found that from none to three young fledged per nest. The adults renest shortly thereafter, sometimes in the same nest but usually in another, freshly excavated cavity. Since the female carries out a great deal of the feeding in the late nestling stage, the male may be elsewhere excavating for some of that time. Reller (1972, p. 276) noted that at least three of 15 pairs nested a second time, “two of them while still feeding their first fledglings.” At the time of second nesting, much aggression is directed at independent juvenile birds (that are very distinctly different from adults in plumage). Predation on nestlings by snakes may be severe in some areas; one of the brood studied by Jackson (1970a) at a nest 30 feet up a dead tree was eaten by a Pilot Black Snake (= Black Rat Snake, Elaphe o. obsoleta) that he had to forcibly remove from the nest. The molt occurs after nesting and is rather late in terminating. Molting adults are known from August to December, but young birds show signs of molt until the following May.

Migration. Northern Red-headed Woodpeckers often migrate, as discussed earlier. In particularly favorable sites having a plentiful supply of acorns or beechnuts, the Red-heads may winter over or may concentrate from nearby areas. Usually the birds migrate in small numbers and are not noticeable; but in certain areas, notably coastal Long Island, they formerly moved in numbers (Bull [1974, p. 355] quotes several hundred, mainly young birds, seen at one point in Suffolk County, Long Island, prior to 10:00 on the morning of 24 September 1881).

Taxonomy. Related rather closely to the *Melanerpes formicivorus* group and to *Melanerpes lewis*. The northwestern birds (western Great Plains south to central Colorado and western Nebraska) have been treated as a subspecies, *caurinus* Brodkorb. These birds are held to be larger, with more pronounced yellow ventral coloring than in more eastern and southeastern birds (Brodkorb, 1935). I find that the northwestern Red-headed Woodpeckers are not “larger” but are slightly (5 percent) longer winged, probably reflecting the fact that these birds migrate extensively. Their longer wings render the tail/wing ratio slightly less (by 4 percent) for these birds; but in tail length, bill size and proportions, and weights they seem not to differ from eastern birds. As for the yellow of the underparts, this represents only a slight tendency, for the species shows great variation in the intensity and extent of yellow ventrally and there is great overlap. I feel that the slightly greater wing length of northwestern birds and their weak tendency for deeper yellow underparts are insufficient bases for nomenclatural recognition of *caurinus*. I prefer to state the existence of these tendencies and to discourage fruitless attempts to “identify” woodpeckers, especially migrants as representing such a “subspecies,” undertakings the results of which would be meaningless or, worse, misleading.

References

<table>
<thead>
<tr>
<th>Color Plate 11</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACORN WOODPECKER</strong></td>
</tr>
<tr>
<td><em>Melanerpes formicivorus</em></td>
</tr>
</tbody>
</table>

Range Summary. Americas.

Diagnostic Features. Small, weight 62 to 90 grams, wing length 130 to 150 millimeters. Unmistakable glossy black woodpecker with white forehead connecting to yellowish throat, red on top of head (except females of one subspecies), white rump, and streaks below. Black band across breast (may be broken by streaks). Pale (white to yellowish) eyes.

Description. Bill rather broad at base, moderately broad across nostrils, curved along culmen, only slightly chisel-tipped, and moderately long. Above, glossy black back and wing coverts, the gloss varying from green to purplish blue; rump and uppertail coverts usually white, sometimes with narrow black shaft streaks, but edges and tips of feathers black (hence barlike) in *flavigula*. Rest of wings and tail above black or brownish black with less gloss than back; wings with white patch formed across base of primaries, becoming white and black barred on secondaries (patch reduced and barred to brown and black in *striatipictus*); underwings duller, except coverts, which are black with white streaks; tail with modified tips of central rectrices and uncommonly showing white tips of outer feathers and, occasionally, traces of white bars on outer feathers. Shafts black above except whitish at base of tail in some birds; below pale brown to blackish, but partly white or white in wing patch area. Tail/wing ratio 0.54 to 0.64. Nostrils and chin black (rarely brown), bordered by white forehead and white line through lores to throat, which is yellow to yellowish white. Forehead patch narrow in *angustifrons*; yellow of throat palest in *albeolus*, brightest in *striatipictus* and *flavigula* (rather weak in *formicivorus* and *lineatus*, moderate in *angustifrons* and *bairdi*). Black area entirely around eyes, and ear coverts and sides of neck glossy black as well. Below mixed white and black. Breast black, solidly so to form broad band in *bairdi*, narrow band in *angustifrons*; in others the upper breast is mainly black but is marked with white spot-streaks that often limit the all-black area (*formicivorus*) or usually break it up (most races). The center of the breast at the border of the yellowish throat is marked by a small red area (red-tipped feathers) that is inconspicuous or even absent (worn off in some cases) in some birds. The lower breast, sides, and flanks are variably streaked black on a white background, the streaks delimiting a white area on the abdomen and center of the lower breast, the clear white area being largest in *bairdi* and most restricted in heavily streaked *flavigula*. Undertail coverts white with black streaks or droplet-shaped marks.

Sexual features: Males about same size as females (females may be slightly longer winged and longer tailed), with bill about 10 percent longer in northern races (*bairdi, angustifrons, formicivorus*) but only slightly longer in more southern forms. Male has more extensive red on crown and nape, the red in females being restricted to the hindercrown, the forehead (extending farther forward in *angustifrons*, which has narrower white forehead patch) being glossy black. In *flavigula* males are patterned on the head like females of other races, whereas females lack red, having an entirely black crown and nape. Immatures very similar to adults but somewhat browner, less glossy black, especially on neck, breast, wings, and tail; forehead
**Melanerpes formicivorus**

buffy white; throat paler yellow race for race; abdomen with buffy tint in white; upper breast spot-streaks are larger, but duller, less contrasting; there is cross-barring evident in the streakings below; the undertail coverts are more heavily streaked; and the tail shows more white, more often (outer feathers often show white barring, and central feathers more often show a white streak). The sexes are alike, both having an orange-red crown patch that does not include the nape (females may have, on the average, less red than males). Eyes white, grayish white, yellowish white, or pinkish white. Juveniles have brown eyes; subadults, to about May, have grayish eyes. Skin around eyes gray, brown, or blackish. Legs and feet gray or greenish gray. Bill black.

**Distribution and Habitat.** Resident from western North America to northernmost South America, from southwestern Oregon through central and western California, including several offshore islands, into northern Baja California. There is an isolated population in the Laguna Mountain-Cape area of southern Baja California. Also, from north-central Arizona and New Mexico southward through Mexico, Belize, Guatemala, El Salvador, Honduras, Nicaragua, and Costa Rica to western Panama (isolates occur throughout this region, as in western Texas and in the Chisos Mountains of Texas); and an isolate occurs in the Andean slopes of northern and western Colombia. Throughout this region it is associated with oaks (*Quercus*) and with pine-oak woodlands. These occur in lowlands (to the coast) of California, where it reaches 6000 feet, in northern Baja California from sea level near Santo Tomas to 7200 feet in the Sierra San Pedro Martir, in the pinelands near sea level in Belize, adjacent Guatemala, and Nicaragua, and generally only in the mountains elsewhere. It occurs between 2500 and 6000 feet in Arizona, above 2000 or even 4000 feet in Mexico, to 9000 feet in Guatemala, from 3000 to 10,000 feet in Costa Rica, and from 4000 to 7000 feet in Panama. It varies greatly in numbers, being most common where there is a diversity of oak species (e.g., California). Open oak woodland or pine-oak woodland with grass below is optimum habitat, but also woodland or forest edges, parklands, and cultivated areas that have some oak trees (also oak savannas).

**Foraging Habits.** Quantities of nuts, especially acorns, some fruits and berries, sap, and insects compose the diet of this omnivorous woodpecker. Acorns are eaten as they mature and are stored thereafter until the end of the acorn crop; they are used as food throughout this period and thereafter, occasionally even in the breeding season. Acorn Woodpeckers twist the ripening acorns from the twigs, or occasionally pick them from the ground, and carry them individually to a convenient “anvil” if they are to be eaten directly. The anvil is a special site on a branch or top of a stub having a crevice or other irregularity that allows the acorn to be wedged for cracking by use of the bill. The nut is then split by a twist of the bird’s head and bill. The shells and debris accumulate below the anvil. Most acorns are stored rather than eaten immediately. The storage sites, and indeed the territories and breeding of Acorn Woodpeckers, are a function of group activity, for this species associates in groups of three to 12 or more birds that defend a common 10- to 15-acre (in California) territory including nesting sites, roosting sites, oak groves for foraging, and storage sites. The storage sites include natural cavities or crevices, such as the furrows in the bark of some rough-barked trees, desiccation cracks in utility poles (also old nesting holes and diverse cavities in trees or even buildings), and specially excavated pitlike holes made by the woodpeckers. The excavations are prepared in advance and are constructed to fit acorns of the average size of the commonest local oak. The acorns are wedged, usually whole, into the hole, narrow end first. In long, natural crevices they are fit lengthwise with the crack. The woodpecker taps the acorn securely into the opening, even counter-sinking it below the surface. Acorns
are communal property, the birds of a group sharing fully in the gathering and use of the stores, as well as in their defense and the defense of the territory. Acorns are stored in favored sites, usually part of a particular tree that may serve several generations of woodpeckers. Such a site may contain more than 41,000 holes (Stearns, 1882) or even 50,000 or more holes (Ritter, 1938, p. 22). Once the nut is stored, it is not left in place until used; but the woodpeckers of a group tend the site, transferring acorns (they dry, hence shrink and do not fit the hole snugly after a while) from loose-fitting to more tightly fitting holes. This activity takes place throughout the harvesting period and for a month or two thereafter. The care and protection of the acorns demand a great deal of the woodpeckers' time. Various acorns are used; in California, black oaks (Quercus kelloggii), valley oaks (Q. lobata), coast live oaks (Q. agrifolia), and blue oaks (Q. douglasii) are preferred in that order over other species that also serve to provide food (Ritter, 1938). The Acorn Woodpecker is dependent upon acorns throughout its range, even in northern Colombia (A. H. Miller, 1963); but as Bock and Bock (1974a) have shown, it reaches its most dense population where more than five species of oaks (the acorns of which are suitable for food) occur — this diversity of oak species precludes the catastrophe of acorn crop failure, since different species of oak do not all fail simultaneously. Not only acorns, but wild and cultivated nuts of other types such as almonds, walnuts, and pecans also are eaten and are stored. Where oak groves are near nut-bearing orchard trees, the woodpeckers may seriously damage the nut crop. In some areas of Middle America the bulk of the nuts are stored in pieces, rather than in preconstructed holes (Skutch, 1969), but in other parts of that region (Honduras [Skutch, 1969], Panama [Wetmore, 1968], and certainly Mexico [personal observ.]) whole nuts are stored in holes as they usually are in California. It is quite common to find pebbles and other objects, chiefly those bearing a resemblance to acorns, in some of the holes. Storage stratagems sometimes fail, as the woodpeckers may use overly deep cavities in trees, openings in buildings that are too great in size (acorns pour into unreachable areas, or out the other side!), and crevices in telegraph poles that expand, cracking and destroying the nuts, or dry and contract, causing them to fall out (Ritter, 1938). Acorns and other nuts make up 53 percent of the Acorn Woodpecker's annual diet (Bent, 1939) but are the major food for the critical winter period. Central American birds utilize pine cones, eating the seeds or insects therein, in addition to acorns (Skutch, 1969). Other plant foods include cherries, apples, figs, various berries, and green corn. Another important food is sap, taken largely in late winter, spring, and summer (at other times of the year, California and Arizona birds may utilize sap from holes made by one of the sapsuckers, Sphyrapicus). Small holes are excavated, scattered about (not in series as are those of sapsuckers) the bark of trees, usually oaks. Hundreds and even thousands of holes may be constructed for sapsucking in a single tree by the birds of a group. Different species of oaks are used at different times (MacRoberts and MacRoberts, 1972). Almost all of the woodworking activities of Acorn Woodpeckers are taken up by excavation of nests and roosting holes, of holes for acorn storage, and of holes for sapsucking, for there is no true woodpecking (for insects [MacRoberts and MacRoberts, 1972]). There is some gleaning of the bark and twigs for insects such as ants, but this is limited. On the other hand, hawking for insects is an important foraging activity, providing food in the form of beetles, moths, and flies. The woodpeckers hunt in groups, usually from the tops of trees, flying upward in sorties after passing insects or occasionally swinging widely, back and forth, taking several insects in a swallowlike manner. The insects often are stored in the manner of acorns, in pieces or whole, and these stores are used communally by all members of the group. During the nesting period the insects are broken up on anvils near the
nest, and the pieces are taken to very young nestlings. Acorn Woodpeckers prey at least occasionally on eggs of other birds; Bent (1939) mentions such an instance involving the Western Wood Pewee (Contopus sordidulus). Utilization of the acorn resources apparently has led to selection favoring the sociality evident in this woodpecker. The satisfactory territories exist about well-defined acorn supplies (oak groves) and trees suitable for excavating nesting and roosting holes. Many of these have been occupied constantly by Acorn Woodpecker groups that have long (ancestral) histories in those territories; and the old, often still-used cavities and old acorn-storing holes bear testimony to their continuous occupancy. The flight of the Acorn Woodpecker is somewhat less undulating and more direct than in most woodpeckers (Slud, 1964, p. 190), and its mastery of the air is evident in its hawking flights, some of which commence with a vertical swoop, and in its manner of dropping directly downward to the nest site from above.

Voice. I can find no documentation of drumming or of mutual tapping; the sociality of this species may be correlated with these lacks. The most common call is a “ya-kup, ya-kup” (“ja-cob” used by diverse authors, “rack-up” by Skutch [1969, p. 524]), given when two birds meet; I believe it is an aggressive note, perhaps with threat implied. The call is very similar to the Katsup Call of M. cruentatus (Short, 1970a, pp. 14–15) and is given under the same circumstances. Another common call is a Chatter Call, a low “aak-a-ak-a-ak” (rendered “châk-a, châk-a” in Bent [1939, p. 222] and “hîck a ick a ick” by Slud [1964, p. 190]). The Chattering Call is used at close range by members of a group, as for example by a bird initiating a changeover of adults at the nest during incubation. Probably strong appeasement is indicated by calling birds. A loud, rattling call also can be heard. This was rendered “r-r-rack-up, r-r-rack-up, with a long, deep roll” by Skutch (1969, p. 525). Its function is unclear, but its elements are similar to those of the Yacup Call. Another call is a churring “chaar chaar tchurrup” (Bent, 1939, p. 222), seemingly an aggressive-alarm note uttered, for example, when an intruder (such as I) appears near the nesting tree. Finally, Skutch (1969, pp. 529–530) reported large nestling Acorn Woodpeckers giving “a dry churr that resembled the call of certain species of Centurus and Tripsurus” (these two I regard as synonyms of Melanerpes).

Displays. Very little detailed information is available; known displays seem very similar to those I have described (Short, 1970a) for M. cruentatus. A Bowing Display, the up-down movement of the head, is usually accompanied by Yacup Calls, much as the same display of cruentatus is accompanied by Katsup Calls. I have not analyzed this display of formicivorus with motion pictures, but I have seen a Hunched Posture following a Bowing Display. The Hunched Posture involves the extreme lowering of the head and bill and hunching of the back (showing off the crown patch). This posture is associated with the Bowing Display and other elements (Head Turning, Bill Directing, Swinging Displays) in the complex display repertory of M. cruentatus, and it is likely that these other elements, or some of them, will prove to occur in formicivorus. Wing Spreading Displays are commonly seen in or near the nesting tree when several birds perch near one another (see Skutch, 1969, p. 528). There may be a dominance hierarchy involved in such displays, the dominant male or female asserting itself with other members of the group. Both wings are spread, often vertically, then horizontally. This display also is used aggressively toward intruding Acorn Woodpeckers. Similar Wing Spreading Displays occur in M. crythrocephalus (Kilham, 1959a) and in M. cruentatus (Short, 1970a). Flight displays (or a flight display) seem to occur, but I have not had the opportunity to study them.
Interspecific Interactions. Interactions occur with all woodpecker species that occur within its range, with various species (squirrels, woodpeckers, nuthatches, titmice, jays) that rob its nut stores, and with hole-nesting competitors (bluebirds and Common Starling, *Sturnus vulgaris*). The strongest interactions occur with Lewis' Woodpeckers (*Melanerpes lewis*), with jays, and with squirrels (all thieves of the nut stores and large enough to put up a defense), as well as with Starlings, persistent hole nesters of about the same size. The acorn-storing, related Lewis' Woodpecker is a threat wherever it winters in the Acorn Woodpecker's range. However, despite its larger size, it usually is no match for the group of Acorn Woodpeckers; usually several or even all birds of a group respond to defense of the stores by one of its members. The ferocity of these encounters is demonstrated by a wounded Lewis' Woodpecker set upon in flight by several Acorn Woodpeckers, one of which clashed in the air, the two birds then tumbling earthward (Bent, 1939, p. 222). When the birds were reached by the observer, the Lewis' Woodpecker was dead but clinging to the Acorn Woodpecker, with its claws penetrating the latter's eyes and skull — the Acorn Woodpecker soon succumbed. Other details of interactions of these two species are included in the account of Lewis' Woodpecker. The Nuttall's Woodpecker (*Picoides nuttallii*) does not use acorns but examines the acorn holes for insects, methodically works over the Acorn Woodpecker's storage trees, and utilizes sap at sap holes made by the latter. It retires rapidly at the approach of an Acorn Woodpecker. Acorn-stealing squirrels are mobbed en masse; so too are Scrub Jays (*Aphelocoma coerulescens*), an inveterate robber of acorns and possibly a predator on young Acorn Woodpeckers. Flickers (*Colaptes auratus*) also are attacked frequently, although not in any way harmful to the Acorn Woodpeckers. Any small- or medium-sized bird choosing to perch in the conspicuous perches of the Acorn Woodpecker, or perching in the nesting tree, is likely to come under attack. Other hole nesters are not tolerated, of course, and the concerted effort of the group is sufficient to drive away such species as Western Bluebirds (*Sialia mexicana*) and Masked Titryas (*Tityra semifasciata* [Skutch, 1969]). However, Starlings, though subordinate, are persistent in returning to potential nest holes, and in many areas the Starlings manage to take over the Acorn Woodpeckers' nesting cavity, forcing them to excavate another cavity and thus delaying their nesting (Troetschel, 1976).

Breeding. Acorn Woodpeckers often nest two or even three times in a single year (Bent, 1939); hence, the breeding season is a long one. Nesting, as mentioned earlier is social, the groups varying greatly in numbers and in sexual composition. Available evidence suggests that one pair usually is responsible for the eggs that are laid, but there is suggestive evidence (following) that at times two or more females may be responsible for the eggs in a clutch. The breeding season commences in June in southern Baja California (*angustifrons*), reaching a peak in late June and July, and juvenal birds are noted until at least September. California woodpeckers (*bairdii*) nest from March to September, with young in the nest into September (Ritter, 1938); immature specimens date from 4 July to 2 November. Arizona (*formicivorus*) Acorn Woodpeckers nest from April to August, immature birds being from the months of July to October. Farther south, in Mexico, the season is perhaps earlier, as fledged birds date from late May (Durango, Oaxaca) onward, and immatures are known through October. Guatemalan *lineatus* young have been noted in July and August. The nesting of *striatipectus* in Costa Rica takes place from March to August (Slud, 1964; Skutch, 1969), and immature birds are known from July to September; the same schedule holds for Panamanian birds. Colombian *flavigula* apparently varies in its season or has a long breeding season. Miller (1963) reported breeding from September (by extrapolation, from August) to at least December; I have seen an aberrantly plumaged (brown) immature bird taken in January but
also three undoubted fledgling birds taken from 30 April to 9 May. Possibly the season lasts from March to December, or breeding occurs throughout the year. The nest may be a roosting hole, in which case the communal roosting in the hole ceases with egg laying, one bird, apparently the male, then remaining in the nest at night (Skutch, 1969). Selection of the nest has not been described. Many cavities are lost to Starlings, necessitating excavation of a new hole where that species is common. At times a new cavity is excavated, as sometimes occurs for second or third broods, although they too may be reared in the same nest. The nest site varies greatly in height and in choice of trees but is virtually always in a dead stub or dead tree. The birds will nest close to the ground if need be, but usually the nest is more than 4 meters above ground. For nesting purposes the birds prefer the soft wood of trees such as pines, if they are available. Excavation, if required, is by all birds of a group (MacRoberts and MacRoberts, 1972) and may require as long as three months to complete (Leach, 1925). Nothing is known of courtship, and it is uncertain if more than one pair, or more than one female or one male, ever are involved in the mating effort at a given nest. Ritter (1938, p. 55) produced evidence that a single female mated in quick succession with two males, suggesting that more than one pair may breed at a site. The clutch size usually is three to seven white eggs, but as many as 10, 12, or even 17 have been reported (Ritter, 1938), suggesting that more than a single female may lay in a given nest. However, in groups studied by MacRoberts and MacRoberts (1972), a single male and female initially devoted a great deal of time and attention to the completed clutch for the first few days after egg laying (but within a week all birds were taking turns equally at incubating); this suggested that only a single pair usually is involved in producing the clutch. Incubation lasts about 14 days; and, except perhaps for the first few days after the clutch is completed, all adult members of a group participate in incubation (young of the first brood apparently are not actively engaged in later nestings that year). Skutch (1969) reported removal of one egg from a nest by an adult; the egg was carried away, but the circumstances and fate of the egg were not discussed. Remarkable is the very rapid changeover rate, the adults replacing each other every 2 to 5 minutes on the average, sometimes as frequently as three times in one minute, and with no bird attending for more than 17 minutes (Leach, 1925; Ritter, 1938; Skutch, 1969). Thus, up to 10 birds or more may share in incubation and feeding the young. Incoming birds give Chatter Calls upon landing at the nest, and almost always the bird inside the nest exits immediately. Ritter (1938) reported that males generally are more active than females in incubating the eggs and feeding the young, but this requires verification. Nestling woodpeckers are fed mainly on insects secured by hawking, which are broken into pieces on a nearby “anvil.” Late in the nestling period acorns from old acorn stores also are fed to the young (Bent, 1939), and berries and fruit also may be used to supplement the insect diet. Feeding of the young is at a rate of up to 24 or even 28 times an hour (Bent, 1939). After fledging, the young are fed for a while, but less frequently as time passes, although they may beg food until August. About 2 months are sufficient to raise a brood to be independent; and when more than one brood is raised, the second and third broods are at about 2-month intervals. The annual molt occurs from late in the breeding season onward (molting adults are known as early as 21 June in western Texas [formicivorus]) and until November or even December in the northern part of its range. In northern Mexico the molt is somewhat earlier; and farther south, in Jalisco, it may be completed as early as late July (birds raising but one brood may molt much earlier than those raising two broods). Molting lineatus specimens date from July to November, and striatipsectus molts from June to September (Costa Rica; molting Panamanian birds are known from March and September). Colombian
flavigula molts from late October to February. Juvenal flight feathers are not molted for a full year, allowing age determination of birds with white-barred tails.

**Roosting.** Members of at least some social groups roost together in one hole. As many as six birds roosted in one hole in New Mexico (Bent, 1939), and five birds did so in Costa Rica (Skutch, 1969). As noted earlier, in the nesting period one adult (probably male) roosts in the nest, incubating the eggs or brooding the young; the others roost together elsewhere. The birds return to the roost very late, as it becomes dark, deterring observation of their sexual markings; they also vacate the roost very early in the morning.

**Taxonomy.** Related most closely to the *M. chrys thenen-M. cruentatus* group (especially to *M. cruentatus*) and also to *M. erythrocephalus* and *M. lewis*. Various subspecies have been described, but variation is not very great; size, proportions and pattern, and habits generally are similar throughout the range of the species. Thus, it seems especially unwise and unwarranted to recognize subspecies based on trivial differences. Most distinct among the populations is *flavigula*, the isolated form of Colombia. Even this subspecies does not differ notably in size and proportions from related forms to the north. It is distinctive in its modified pattern of sexual dimorphism, males having reduced red on the crown (resembling females of other forms) and females lacking all red on the crown, thus differing from all other subspecies. Also, the white rump and uppertail coverts bear black markings, a distinctive trait; otherwise, the throat is very yellow, as in *striatipectus*, and the underparts are the most heavily streaked of all the races. Among the other subspecies, all having the typical crown pattern of sexual dimorphism and (generally) immaculate white rump and uppertail coverts, the northern three races (*bairdi, angustifrons*, and *formicivorus*) differ from all others, including *flavigula*, in having a strong sexual difference (10 percent) in bill length, males having a longer bill. The race *striatipectus* of Nicaragua to western Panama is of average size, has a very yellow throat (as *flavigula*), and has a narrowed white patch in the primaries, often showing black bars there. Like *flavigula, lineatus*, and *albeolus, striatipectus* has streak spotting through the black breast patch, hence no distinct, entirely black breast band. *M. f. lineatus* of Chiapas and Guatemala to northern Nicaragua is of average size and resembles *striatipectus*, but it has a pale yellow throat and more (normal) white in the wings, without barring; this form is very like *formicivorus*, but shows little sexual difference in bill length, has a completely streaked breast patch, and is isolated from *formicivorus* by the Isthmus of Tehuantepec. The race *albeolus* of eastern Chiapas, probably Tabasco and Campeche, Mexico and northeastern Guatemala (see Land, 1970), and Belize, closely resembles *lineatus* and *formicivorus*, but has an even paler yellow throat (palest of all races) and more white below with reduced dark streaks. *M. f. formicivorus* of mainland Mexico north of Chiapas, Arizona, New Mexico, and south-central and western Texas is of average size, has a quite pale yellow throat, and has moderate ventral streaking; pale streaks variably pervade and restrict the narrow black breast band. As in *bairdi* and *angustifrons*, the sexual difference in bill length is great. This is the most variable subspecies, with incipient variation shown in long-billed Nuevo Leon and Tamaulipas birds and in thin-billed northern Mexican and United States populations; there is considerable overlap, the differences are small, and I see no sense in finely splitting the species, especially since other, recognized subspecies are not very well defined (e.g., *lineatus, albeolus*). The Baja California Cape area isolate *angustifrons* is slightly smaller than other races (it is the smallest form). It shows a relatively long bill and strong sexual difference in bill length, the throat is yellower than in all races except *flavigula* and *striatipectus*, the white forehead patch is very narrow, and the females show
more red anteriorly, hence a narrower black crown patch than in other races (except flavigula). Ventral streaks are stronger than in formicivorus, and the black of the breast is more fully pervaded by white streaks than in that race. Finally, bairdii of northern Baja California to Oregon is slightly larger than other subspecies, with an especially long and stout bill and a broad, little-streaked, glossy black breast band. This form has a moderately yellow throat, shows a strong sexual difference in bill length, and has weak ventral streaking such that there is a large white center of the abdomen and lower breast. Birds from northern Baja California have been separated from bairdii on the basis of their slightly smaller size, shorter bill, and a difference in head markings of females. Examination of 19 specimens from the area ascribed to this putative form ("martirensis") shows no substantial difference, only slight average differences (or none at all; e.g., in wing length), and complete overlap with California bairdii in all measurements. On the average, northern Baja Californian birds have a slightly shorter, weaker, and less stout bill; and by so stating, this variation is appropriately treated, without the undue emphasis accorded such trivial variation by formal nomenclatural treatment.

References

RED-FRONTED WOODPECKER
Melanerpes [cruentatus] cruentatus

Color Plate 12
Range Summary. South America.

Diagnostic Features. Small, 44 to 64 grams, wing length 106 to 123 millimeters. Mainly black woodpecker with red below centrally and some barring on flanks. Yellow eyes and skin around eyes. Male with red on crown. White rump and uppertail coverts, black and white barring on inner wings.

Description. Bill rather long, curved along culmen, moderately wide across nostrils, and barely chisel-tipped. Upper back, most of head, wing coverts, and upper breast black, glossed with blue sheen. Lower back, rump, and uppertail coverts white, frequently showing a few bars (occasionally moderate barring) or black shaft streaks (on uppertail coverts). Rest of wings brownish black, less glossy, with white bars on inner vanes of feathers, basally on primaries, but reaching tips of secondaries; below, brown at tip, becoming black and white barred at base, on coverts, and on inner wing surface. Shafts black above, except white at base of tail, especially central pair of feathers; below, black to brown, often (wings) with white central line, and white at base of tail. The tail is black with some blue sheen, and frequently it shows a white margin or streak on the inner vane of the central feathers; occasionally, outer feathers are tipped white; below, duller with brown tinge. Tail/wing ratio 0.47 to 0.56. Other than sexual markings, head lacks markings (all black) in rubrifrons morph or, in cruentatus morph, has broad white stripes, often bearing some yellow, over eyes and rearward, connecting with broad golden (sometimes shows red or orange) or yellow and white nape patch (in the range of rubrifrons morph, intermediates occur with partial nape patch and partial stripes over eye). Below, glossy black on throat and upper breast,
contrasting with bipartite pattern on lower breast and abdomen, namely a variably extensive red or orange-red patch along the center of the lower breast and abdomen, bordered at each side by black V-bars on a whitish or yellowish white background (yellow-orange tint strong around red center area); also some black shaft streaks; undertail white with black bars.

Sexual features: Male with variably sized, round (rubrifrons morph, also some of other cruentatus) to rectangular red crown patch, longer bill; female lacks red on crown and has somewhat shorter bill. Immatures resemble adults, but both sexes bear a red cap, the black of the plumage is browner (especially on the wings, breast, and throat), the ventral red is more orange, the flank barring is less clear (bars less regular, background grayer), and the white and gold band about the crown (cruentatus morph) is less extensive. Eyes lemon-yellow to gold, bare skin about eye pale yellow. Legs and feet gray. Bill black.

**Distribution and Habitat.** South American lowlands east of the Andes Mountains from eastern Colombia and Venezuela through the Guianas, northern Brazil, eastern Ecuador, and eastern Peru to northeastern Bolivia, Mato Grosso, and Para. Most of this range is occupied by the partly white- and gold-headed cruentatus morph. The black-headed rubrifrons morph is found with cruentatus, though outnumbering it, in eastern Venezuela, the Guianas, easternmost Brazil south to Para (Tocantins River), west on the north side of the Amazon as far as Faro, and probably Manaus (the Manaus bird is intermediate between rubrifrons and cruentatus [specimens American Museum of Natural History]). Frequents forest edges, swamps, clearings, and the canopy of forests from sea level to 3000 feet (Ecuador, Peru) or more.

**Foraging Habits.** Feeds on berries and other fruits and on arthropods, the arthropods including ants, spiders, and chilopods. These are obtained chiefly by gleaning in the foliage and along the trunks of forest trees.

**Voice.** Drumming is not known in this species. Vocalizations are variable, resembling those of *M. fomicivorus*, and are summarized by Short (1970a, p. 14). Calls given by individuals with no other birds about are a Chowp Call ("chowp") and a "churr-dowp." These are uttered from the tops of trees, including the nest tree when no other conspecific birds are about. No functional difference is known. A rapid Kwi Call ("kwi-wi-wi-wi—") also was described by Snyder (1966, p. 159) as a "nine-syllable 'ih-ih-ih-ih...,' rapid at first, slow at end." This is uttered when groups, such as a female and two males, give Wing Spreading Displays at one another. Other interactions involved a similar sounding, raspy "kwi-kwi-kwi—," but given more slowly, and a "'chew-chew-chew—chew-up,' resembling food begging calls of baby birds." At times of replacement of adults at the nest, the incoming bird called "kew-kew-kew—" (Kew Call). Variable notes, including "kwi-dip—," "chow-chow-chup," "churr-churr," and "kwi-dip, che-che-che, churr-churr," were given in a complex interaction among an incoming male and four birds of both sexes in a nesting tree, with Wing Spreading Displays. Finally, a Katsup Call ("kat-sup, kat-sup...") is the prevalent call given when two birds meet, often with Bowing Displays.

** Displays.** Several displays have been described by Short (1970a). The most conspicuous is the Wing Spreading Display, rendered by an incoming bird after it lands beside another bird or in any approach to another woodpecker, by the perched woodpecker when approached by another, and at times by a bird landing at the nesting cavity when another adult is inside. The display involves an extending of the wings upward over the back or outward; sometimes they are held in position for a period of time. Rarely given is a Swinging Display, an agonistic display sometimes incorporated into a Bowing Display, the head, body, and tail being swung from side to side. A complex of displays and postures is incorporated into a Bowing Display,
Melanerpes [cruentatus] cruentatus

the elements being the Bill Directing Display, the Head Turning Display, and the Hunched Posture (Short, 1970a, fig. 3). The pointing of the bill toward an opponent is termed a Bill Directing Display. A Head Turning Display turns the bill away from an antagonist and shows off the yellow eye and eye skin and, if present, the eye stripe and nape patch. The Hunched Posture involves the lowered head (bill down, full sexual markings of crown and other crown colors shown) and bowing upward of the back. Bowing Displays contain aspects of Bill Directing and the Hunched Posture and sometimes the Head Turning Display. The head is raised and lowered, varying in the upward and downward extent of the bow. This display may be directed toward an antagonist or to one side. It is frequently given in close interactions between two birds in an encounter and seems very like the Bowing Display of such related species as *M. erythrocephalus* and *M. herminieri*.

**Breeding.** Nesting occurs in July and August in eastern Peru; in December and January in southeastern Peru; in March to June in Bolivia; in January and February in Mato Grosso; in April and May along the Amazon River and west to Ecuador; in September along the Rio Negro; and in June and July in Colombia, Venezuela, and the Guianas. In Peru I found at least 11 adults associated at three occupied nests, two in one stub 15 meters tall and one in a palm stub 75 meters away (Short, 1970a). All three nests contained young, as I saw fecal material tossed out the entrance of all three of them (three times in succession from one nest). One female entered all three cavities, bearing food in her bill, in quick succession, going from one to another within a period of 3 minutes. Three other adults were seen to enter at least two of the three cavities in succession. There seemed to be a dominance hierarchy within the nesting trees, the topmost perch being occupied usually by a male. But a single male flew from one nesting tree to the other, successively occupying the dominant perch in each tree. The birds flew individually or in groups of up to four birds from nesting tree to nesting tree, and occasionally back again. The adults carried food (of indeterminate nature) in the bill directly. The time each spent within the nests was brief, never more than 2 minutes and usually much less. When another bird flew to a nest, the adult inside usually exited immediately. Details of the association at these nests were not studied, but communal nesting definitely can be ascribed to this species on these bases. Skutch (1969, p. 520) reported communal roosting of as many as five birds in one cavity in Ecuador and Peru. Nothing is known of incubation, clutch size (two or three most likely), or raising of the young. The annual molt occurs at the following seasons: August and September in Surinam, August to October in Guyana, May to October in Venezuela, June to October in Colombia, May to October in Ecuador, May to August in northeastern Peru, July to October in western Amazonian Brazil, January in southeastern Peru, October in Bolivia, January and February in Mato Grosso, May to July south of the Amazon (Tapajoz to Madeira rivers), and September along the lower Amazon.

**Taxonomy.** Forms a superspecies with more southern and eastern *flavifrons* of South America; with *chrysauchen* from western Costa Rica, western Panama, and northern Colombia; and with *pucherani* from Mexico to Colombia and western Ecuador (east of *chrysauchen* in Middle America and west of it in Colombia). These resemble one another generally in pattern and bill structure (*flavifrons* differs most from the others in bill structure). They form a “cline” in pattern from the solid patterning of *cruentatus* (and *formicivorus*) through *flavifrons* and *chrysauchen* to the quite barred patterning of *pucherani*. All are allopatric (they do not meet as far as I can determine). Relationships of the superspecies are with *formicivorus* (through *cruentatus*), possibly with *herminieri* and *portoricensis* (through *cruentatus*), with *cactorum* (through *flavifrons*), possibly with *candidus* (see p. 108), and...
with *chrysogenys* and *hypopolius* (through *pucherani*). The two morphs of *cruentatus* previously were treated as separate species (*M. cruentatus*, *M. rubrifrons*), but it has been suspected for a long time (Griscom and Greenway, 1941), that *rubrifrons* actually represents a color phase that segregates incompletely; i.e., usually birds either have or lack the eye stripes and nape patch within the area (eastern Venezuela, Guianas, eastern Brazil) in which *rubrifrons* occurs. There are, however, numerous intermediates showing variation in the amount of nape patch present (trace to nearly complete) and, somewhat independently variable, in the extent of eye stripes (trace to nearly complete stripes). There are no other differences between the two forms, and they are known to associate with one another and intermediates, even within a single social group (Haverschmidt, 1968). The range of *rubrifrons* exactly coincides with the eastern portion of that of *M. cruentatus*, and in most of that region it outnumbers the *cruentatus* morph. I have tried to determine racial separation within *M. cruentatus*, particularly contemplating the possibility that the polymorphic situation may be confined to one, discrete, subspecific taxon. My efforts were in vain; a supposedly western race, "*extensus*" has been described (Todd, 1937) on the basis of a single variable character, the extent and tone of ventral red color. Todd (1937, p. 251) himself was aware that "this form is not strongly marked," and I fail to find more than the slightest tendency with regard to the color of underparts. There is great variation in the extent and color of the red ventral patch; but birds from the Guianas, including or excluding the *rubrifrons* morphs, match Colombian and Peruvian birds with great frequency, and Venezuelan birds are so variable as to include extremes in this pattern. Thus, I see no possibility of satisfactorily characterizing subspecies within *M. cruentatus*, which becomes monotypic, with *rubrifrons* a synonym of *cruentatus*.

Reference

**YELLOW-FRONTED WOODPECKER**

*Melanerpes (cruentatus) flavifrons*

**Color Plate 13**

**Range Summary.** Eastern South America.

**Diagnostic Features.** Small, 53 to 64 grams, wing length 110 to 127 millimeters. Glossy black with a white rump, yellow throat, yellow forehead, barred wings and flanks, grayish breast, and bright red patch in the middle of the lower breast and abdomen. Males have red crown. Eyes dark with bare, orange skin about them.

**Description.** Bill long, only slightly curved along culmen (straighter than in its relatives), rather broad across the nostrils, and with a small chisel-tip (but larger than in its near relatives). Glossy blue-black from nostrils and lores rearward around eyes, ear coverts, and sides of neck to the wing coverts and primaries. Upper back glossy blue-black with white streaks (feathers white on one side, black on other side of shaft). Lower back, rump, uppertail coverts white, often with fine black shaft streaks (uppertail coverts) or black spots, less commonly some black bars. Rest of wings (secondaries and underwings) black or brownish black with white bars, the white bars merging to form white patch on inner vane of innermost (tertial) secondaries. Shafts black above except white at base of tail; brownish below in tail, with white shaft streaks, and pale whitish (grayish) brown under wings. Tail black
above, brownish black below, often with olive cast (outer feathers) below; central feathers frequently show one or several white bars on inner vanes; outer several feathers usually with tip white in fresh plumage. Tail/wing ratio 0.50 to 0.62. Forehead and forecrown with deep yellow to gold (sometimes orangish) tips, white base; sometimes white bases of black hindcrown feathers give spotting effect on rear of forecrown patch. Throat and malar area pale yellow or whitish yellow to gold and varying in extent, sometimes pervading the upper breast. Orange-red to crimson from center of midbreast to rear of abdomen; the red varies in extent and intensity. Upper breast pale gray to olive-gray washed with yellow, showing some white in paler (grayer) birds; variation geographical, but also individual variation is great. Sides colored as upper breast; flanks barred black and white, basically, but white often overlain with yellowish or olive. Undertail coverts mainly black with white bars.

Sexual features: Male has midcrown to nape red or orange-red; female lacks red, being glossy blue-black from midcrown to nape; males about 5 percent longer winged, 8 percent longer billed. Immatures closely resemble adults, but ventral red is more orange and is more restricted to the center; glossy black above is muted, browner; both sexes have red in the crown, more generally over the midcrown and hindcrown in males and more restricted to midcrown or sprinkled weakly over top of head in females. Eyes black or deep blue, brown in immatures; bare skin area about eyes is orange. Legs and feet olive-green, bill black.

Distribution and Habitat. Occurs from Bahia and Goias south through Minas Gerais, Espirito Santo, Rio de Janeiro, Sao Paulo, and Parana to eastern Paraguay; Misiones, Argentina; and Rio Grande do Sul, Brazil, in forests and woodlands, including cleared areas with some standing woods, from sea level to an altitude of 5900 feet (Sao Paulo).

Behavior. Very little known. Fruits seem to comprise much of the diet of this woodpecker. Mitchell (1957) commented on its fondness for the purple fruit of a pokeweed (Phytolacca). Carpentier (1954) successfully maintained the species in captivity, mainly on a liquid diet (honey-sugar water) used for sunbirds (Nectarinidae), supplemented with mealworms. Presumably it combines insects and fruits in its natural diet. The breeding season occurs during January to April in Minas Gerais and Goias, in November in Espirito Santo, in February to June in Parana and Sao Paulo, in January to May in southern Brazil, and in January to April in Argentina. Nothing is known of breeding, but some degree of sociality is indicated by a displaying group of three birds seen in Misiones (Short, 1970a). Molting follows breeding, from February onward in Parana and Sao Paulo, in January to May in Argentina, and in February to May in southern Brazil.

Taxonomy. Forms a superspecies with M. cruentatus (see p. 131), M. chrysauchen, and M. pucherani. To somewhat yellow-throated, white-fronted M. cactorum is allopatric, occurring west of flavifrons; it has other similarities of pattern, and its bill is straight and similar in structure to that of flavifrons - cactorum possibly is related to the cruentatus group through the ancestor of flavifrons. There is strong individual variation in M. flavifrons, involving size and color, especially of the breast and ventral midline (red area). Generally, northern birds are slightly longer winged and longer tailed than are southern birds. Observed variation that seems geographical is not in accord with the usually accepted subspecies, northern M. f. flavifrons, and southern M. f. rubriventris. Birds from Goias, western Minas Gerais, and northern Sao Paulo contrast strongly with coastal Bahia, eastern Minas Gerais, and Espirito Santo specimens, being paler (pearly gray) on the upper breast, having a somewhat paler yellow throat, and having more orangish, less extensive red on the underparts. However, there is strong variation elsewhere, especially in southern Brazil. Argentine, Paraguayan, and Parana specimens generally are intermediate between the two extremes, but extreme variant
birds match both Goias and Espírito Santo specimens. Birds from Rio Grande do Sul and Santa Catarina are nearer Espírito Santo birds, but show great variation. In view of the individual variation encountered, the fact that none of the traits involved are especially diagnostic or distinctive, and the irregular pattern of the geographical variation prompt me to follow Stager (1961a) in treating *M. flavifrons* as monotypic.

**GOLD-NAPED WOODPECKER**

*Melanerpes [cruentatus] chrysauchen*

**Color Plate 14**

**Range Summary.** Costa Rica to Colombia.

**Diagnostic Features.** Small, weight 45 to 68 grams (*chrysauchen*), wing length 103 to 118 millimeters. Black above with white down back and on rump; black around eye and rearward to wings; forehead and anterior crown gold to white, also broad golden to buffy gold nape patch. Olive-gray breast and throat, red center of abdomen bordered by barring.

**Description.** Bill rather long, curved along culmen, somewhat broad across nostrils, and almost pointed (slight "chisel" effect) at tip. Upper back glossy blue-black on sides, white in center, forming streaky white patch due to white inner vanes of feathers, or (*pulcher*, some specimens) barred across the white. Lower back to uppertail coverts creamy white, at times buff tinted, sometimes with fine black shaft streaks on uppertail coverts and (*pulcher*) often with black bars on uppertail coverts and lower back. Wings mainly glossy blue-black above, Browning toward tips of flight feathers; inner vane of flight feathers barred white and black; tips of flight feathers often narrowly white in fresh plumage. Underwings mainly brown with white bars, but coverts black and white (spotted and barred; edge of wings white). Shafts black above, except white at tail base; below, brown in tail with bases whitish and dull white or dusky white in wings. Tail black, with brownish cast below; outer feathers tipped white in fresh plumage and often showing white bar or streaks; central tail feathers all black or barred weakly with white. Tail/wing ratio 0.44 to 0.55 (0.48 to 0.55 in *chrysauchen*, 0.44 to 0.52 in *pulcher*). Head with glossy black ear coverts, extending narrowly around eye and marked with a small, white spot-streak over and to rear of eye (thus giving a trace of a line-over-eye effect); nasal tufts, forehead, and forecrown gold or golden yellow, sometimes with orange traces (*chrysauchen*), or only nasal tufts and forehead creamy white with a hint of yellow (*pulcher*); lores white, sometimes with fine black line at rear. Nape dull yellow, buffy yellow, gold, or orange-gold. Throat and malar areas as breast, but paler, often showing some white. Anterior underparts gray with a yellow to olive cast, more extensive posteriorly in *chrysauchen*; flanks barred black on a buffy or yellowish white background, extending forward to rear of breast and not cutting across breast (or very narrowly doing so) in *chrysauchen*, but fully extending across lower breast and sides in *pulcher*. Center of abdomen with crimson to orange-red patch, bordered at sides by flank barring and, in *pulcher*, bordered anteriorly as well by barring. Undertail coverts whitish with black bars.

**Sexual features.** Male longer billed (by 12 percent), slightly larger (longer wings), and with red patch on midcrown to hindcrown (*chrysauchen*) or entire crown (*pulcher*); females of *chrysauchen* either lack red or have traces of red in the crown, but mainly show a black band across the central crown, connecting with black over the eyes and separating the yellow or gold of the large frontal patch and nape patch; females of *pulcher* have a red hindcrown and anterior nape patch, the forecrown and midcrown being glossy black (thus, females of
Melanerpes [cruentatus] chrysauchen

Chrysauchen have gold, black, and gold on top of head from front to rear, whereas females of pulcher show white, black, red, and gold in that order. Immatures are as adults, but ventral red is more orange, the red is reduced, the yellow or white forehead patch is less extreme, and the ventral dark bars are duller (grayer; hence the barring is less contrasting than in adults). The upperparts are less glossy black, and browner, and both sexes have red on the crown, mixed with black (more red in male). Eyes brown, legs and feet gray to greenish gray, bill black with pale base.

Distribution and Habitat. Occurs in two isolated populations: in southwestern Costa Rica and adjacent western Panama and in the central Magdalena Valley of northern Colombia. Habitat principally forests, clearings, and wooded cultivated areas (coffee plantations). Occurs up to 5000 feet in Costa Rica (Skutch, 1969).

Foraging Habits. Feeds in trees, usually high up, partly by gleaning and tapping, by eating fruits, and by flycatching. Various larvae and beetles are eaten, and winged termites and other insects are taken in flights from treetops in the forest, in the manner of M. cruentatus. Various fruits make up an important part of the diet, including berries, bananas, oranges, tangerines, fruits of Cecropia trees, fruits of the palm Guilielma utilis, and seeds of Clusia plants (Skutch, 1969). Feeding often is in groups of up to five or seven birds.

Voice. Drums occasionally, both males and females (Skutch, 1969). The main call is a Chur Call, "a resonant churr of a peculiar, pleasant quality" (Skutch, 1969, p. 482), often given with a Bowing Display. Wetmore (1968) stated that its call is like that of M. rubricapillus, but louder and very like the call of M. carolinus. Slud (1964) mentioned a Rattle Call in addition to the Chur Call. Young birds give a squeaky, buzzing call in the nest.

Displays. Bowing Displays are common, the bows being deep, probably similar to those of M. cruentatus; a Chur Call often accompanies the bow (Skutch, 1969). That author reported Wing Spreading Displays of an immature female to an adult male from which she tried to solicit food that he was carrying to nestling birds of another brood. No other displays are known.

Interspecific Interactions. Interactions occur most commonly with M. rubricapillus, which is smaller and is driven away by the more aggressive chrysauchen, which does not tolerate the other species about its nesting tree, roosting tree, or where it is feeding. Masked Tityras (Tityra semifasciata) and Black-crowned Tityras (T. inquisitor) frequently take over nesting and roosting holes of M. chrysauchen, not aggressively, but simply by filling the hole with leaves whenever it is unoccupied. The woodpecker soon tires of removing the debris and moves to another unused hole or excavates a new one. However, the tityras are unsuccessful in taking over nests with eggs or young woodpeckers, probably because the woodpeckers do not leave the nest for lengthy periods at the time when they are incubating or feeding nestlings. Lineated Woodpeckers (Dryocopus lineatus) are aggressive toward Gold-naped Woodpeckers, which show anxiety and call excitedly whenever there are Lineated Woodpeckers about (Skutch, 1969). Finally, aracari toucans (Pteroglossus frantzii) prey on the eggs of Gold-napes if they can reach them within the nest; despite this, the toucan may nest in proximity to the woodpecker and avoid disturbing the woodpecker.

Breeding. The breeding of this species has been discussed extensively by Skutch (1969). The nesting season occurs from February to July in Costa Rica and adjacent Panama, with eggs laid from late March to June. Most nests are situated at the edge of forests, in trees killed by fires, or in trees or branches killed by lightning. The cavity is usually at a considerable height, over 40 feet and rarely below 20 feet. Usually the nesting cavity is a newly
excavated hole. Excavation may take a long time, with the male working on it a little at a time; then the female and male excavate to complete the final stages. However, both sexes may rapidly excavate a hole within 2 weeks, if necessary. More new holes are started than are completed, and they may be started at any season, then finished later as a nesting or roosting cavity. The hole is $1\frac{3}{4}$ inches in diameter at the entrance, about a foot deep, and $4\frac{3}{4}$ inches in diameter inside. Eggs are laid daily until the clutch of three or four white eggs is completed; only two or three, never four, young are raised, the average being 2.4 birds per brood (Skutch, 1969). Second broods occur following some successful broods and often occur when the first nesting fails. Incubation begins before the last egg is laid, for the eggs hatch over a 2-day period. Both sexes incubate, and both adults usually occupy the nest at night. The adults change over frequently during incubation; Skutch (1969) found that the birds incubate between 76 and 100 percent of the time, with an average of 18 minutes and never more than 51 minutes per setting. Incubation lasts 12 days, and the nestlings hatch blind, naked, and with a strong egg tooth. Feathers appear in 6 days, and the eyes of the young open before the age of 12 days. The young are brooded in a schedule about like that of incubation. Adults carry food in the bill directly, passing it to the nestlings. Various insects may be broken into pieces before they are fed to the young; a special site near the nest often is used for the preparation of the insects. Fruits such as bananas, berries, pieces of fruit, seeds of *Clusia*, and other items are also fed to the young and become the major food late in nestling development. Feeding is frequent, occurring up to a rate of 56 times per hour in a half-hour period; the overall rate is five to 17 feedings per young bird, per hour, with the slowest rate seven per hour for a nest with two young. The male feeds more, even twice as much as the female, but females seem more excited and aggressive in disturbances at the nest. The nestling period lasts 34 to 37 days. After leaving the nest, the young birds follow the adults back to the nest each night and spend the night with them. In the morning the adults feed the young a few times; then they follow the adults out of the nest. Fledgling young are fed for a long time, usually pieces of fruit; a female was fed up to an age of 81 days, and a young male to the age of 92 days (Skutch, 1969). The family roosts together generally for nearly a year, although disruption frequently occurs because the cavity (dormitory) often is taken over by tityras, and a new chamber must be excavated. Young fledged in May or June thus may remain with adults until the following March or April, at which time the adults move to a new nesting site, and the previous year’s young are driven away by the adult male. Skutch (1969) had two instances of a second brood attempted out of eight pairs studied. In one instance a single female was raised from the first brood; then a second brood of two was hatched in the same nest. The female of the first brood shared the nest with the adults and took part in incubating and brooding, but the young of the second brood died. In the other case, three females were raised in the first brood. A new hole was excavated, eggs laid, and two young were raised from this second brood. The young of the first brood moved into the nesting hole, which then served as a dormitory for seven birds. The earlier young sometimes helped to feed the later brood, though but 4 months old themselves. The young helpers seemed afraid of the bills of the nestlings they attempted to feed, and they fed and behaved in a stilted manner appropriate for feeding hatchling young rather than the well-developed young birds they were trying to feed (Skutch, 1969). One of the young birds was noted excavating a cavity when but 57 days old; this was the male that was fed to the age of 92 days, mentioned earlier. Molting commences in June in Costa Rica and lasts until September.

**Taxonomy.** Forms a superspecies with allopatric *cruentatus*, *flavifrons*, and *pucherani* (see
Melanerpes [cruentatus] pucherani

discussion under cruentatus, p. 133). The back pattern seems intermediate between that of flavifrons and of pucherani; the head pattern resembles that of both those species (M. c. pulcher tends more toward pucherani). The bill of chrysauchen resembles that of cruentatus and pucherani more than it resembles that of flavifrons. The two isolates, chrysauchen and pulcher, are distinctive, and some authors (Wetmore, 1968) treat them as separate species. They differ in the whiter forehead patch of pulcher, the more extensive black crown and the red crown of pulcher, the reduced nape patch of pulcher, more frequent barring in the back of pulcher, the more extensive ventral barring that crosses the lower breast in pulcher, the slightly smaller size of that form, and its somewhat shorter (on the average) tail than in chrysauchen. These differences, although strong, are not at all comparable to the differences existing between, say, chrysauchen and pucherani or chrysauchen and flavifrons. The pattern of the side of the head, the back streaking (with some barring in pulcher), the tail, the wing, the underpart patterns, and the forehead and nape color all point to the close relationship of pulcher and chrysauchen. Since cruentatus, flavifrons, chrysauchen, and pucherani have not proved that their strong differences actually would preclude their interbreeding, I see no reason to stress the lesser differences of pulcher and chrysauchen at the level of species (such recognition also would distort the close relationships among cruentatus, flavifrons, chrysauchen, and pucherani).

Reference

BLACK-CHEEKED WOODPECKER

Melanerpes [cruentatus] pucherani

Color Plate 14

Range Summary. Middle and South America.

Diagnostic Features. Small, weight 42 to 68 grams, wing length 100 to 122 millimeters. Resembles M. chrysauchen. Mainly black above and grayish below anteriorly, with red-centered, barred abdomen; but, upper back strongly black and white barred, golden yellow on head restricted to nasal tufts and forehead (white area on forecrown of females), and only occasionally showing in nape, which is red. White or buffy line over eye rearward, much stronger than in chrysauchen. From barred backed M. chrysauchen pulcher, distinguished by white over eye, white barring evident on closed wings, and lack of conspicuous golden yellow nape patch (females of pulcher show less white in crown and are black crowned).

Description. Bill moderately long, curved along culmen, barely chisel-tipped and broad across nostrils. Upper and middle back barred black and white, the white bars variably shallower to same depth as black bars. Rump and uppertail coverts white, but tinged buffy or yellowish and often barred slightly or streaked with black. Wings black with slight gloss, usually unbarred on coverts and outer vanes of outer primaries, but otherwise with white bars (strongest on inner vanes of secondaries); flight feathers narrowly tipped white (fresh plumage); underwings barred brown or black and white, wing edge ("wrist") white. Shafts black above except white at base of tail, dusky below, showing white in wings and yellowish white in outer tail feathers. Tail black above, central feathers broadly to narrowly barred white; outer feathers often show partial white barring and are tipped white in fresh plumage; below, brown with dusky yellowish sheen. Tail/wing ratio 0.47 to 0.58. Forehead and nasal
tufts golden yellow, sometimes with orange traces and showing white about nostrils. Lores, malar area, lower ear coverts, and throat buffy white, sometimes with yellow tinge. Black around eye and rearward through ear coverts; conspicuous buffy white line over eye (at rear of eye). Upper breast olive buffy gray, tipped with yellowish or gold. Lower breast, sides, flanks, and undertail coverts narrowly barred black on buffy yellowish white background, black bars often chevron shaped at shafts. Center of abdomen red; surrounding barred feathers show gold tips.

Sexual features: Males somewhat larger (4 percent heavier), longer winged, bill 9 percent longer on average, and with entire crown and nape red (some white spotting often shows on forecrown, and occasionally nape is tipped dull buffy gold); females with red restricted to nape (sometimes with narrow, dull golden or buffy edge anteriorly and posteriorly) and with extensive white or yellow-white extending from forehead onto the center of crown; rest of female crown black or black with white tipped feathers, the black narrow at center of crown, extending anteriorly over eyes and connecting with black around eyes. Immatures as adults, but nasal area paler yellow, less gold; nape patch less extensive and more orange; back is brown, white bars broader; ventral bars more even but duller, hence less contrasting, and barring occurs weakly on breast. Both sexes show red on the crown, the females much less so (females often show barring on gray of crown). Eyes and surrounding ring of bare skin are brown. Legs and feet olive, greenish gray, or grayish green, with orangish "soles" of toes. Bill black with grayish or whitish base of lower bill.

Distribution and Habitat. From southeastern Mexico (southern Veracruz, Oaxaca) southward through Guatemala and Belize, and through Middle America (except western Costa Rica, northwestern Panama) to northwestern and western Colombia and western Ecuador. Frequents moist lowland forests and forest edges and clearings, ranging less commonly into cacao plantations, banana plantations, coffee plantations, and pastures. Usually occurs below 1500 feet, but reaches 2500 feet in Honduras and, occasionally, 4000 feet (Skutch, 1969) in Costa Rica.

Foraging Habits. Omnivorous, eating diverse insects (especially caterpillars, also ants and spiders), various seeds, and fruits. Land (1970, p. 184) noted them about fruiting trees, "sometimes in flocks of a dozen or more birds." Otvos (1967) reported it feeding on seeds of the bromeliad *Aechmea mariae*, even taking seeds to feed to the young. Skutch (1969) noted that this woodpecker drills open cacao pods, feeding upon their pulp. Bromeliads are visited frequently, the birds probing into them for insects and seeds. Of the Black-cheek's feeding, Slud (1964, p. 192) said, "It is an active bird that climbs, pecks, probes, and sometimes engages in flycatching. It investigates the under sides of mossy branches, peers at scaling rotten bark as do many tanagers, and inserts its tongue under loose bark . . . . It clings head downward to pliant leafy twigs and vines, works away at nodes, and drinks from reservoirs in epiphytes and crotches." Usually, birds occur alone, or in pairs, but sometimes in family parties or larger groups, as noted earlier.

Voice. It drums infrequently (Wetmore, 1968). The calls that have been described are a Rattle Call (Slud, 1964) and a Chur Call. The latter call resembles Chur Calls of other melanerpine species, such as *M. rubricapillus*, Skutch (1969, p. 518) said of it: "Its call is a loud, full-voiced *krrrr*, not quite so mellow as that of the Golden-naped Woodpecker" (*M. chrysauchen*).

Displays. Virtually unknown. Eisenmann (in litt.) reported to me an instance of reverse mounting in Panama during March 1974. He saw a male Black-cheek mount a female,
presumably copulating; and a few seconds later the female mounted the male. Slud (1964) described a possible courtship flight.

**Breeding.** The breeding season occurs in March and later in Mexico; in July in Belize (Russell, 1964), in Costa Rica (Skutch, 1969), and in Nicaragua (specimens); and in February and March in Panama (Wetmore, 1968). Five Belize nests mentioned by Russell were 12 to 55 feet up in trees. Nests are excavated in dead trees or in dead stubs of living trees. Once the cavity is completed, both adults sleep inside (Skutch, 1969). One pair reported by Skutch lost their first cavity to a pair of Masked Tityras (*Tityra semifasciata*), moved 20 feet to a second, unused cavity, then excavated (both sexes) a third cavity, and finally a fourth. The last hole was completed in about one week; and the first egg laid in it, a runt, was tossed out by the male. By late May incubation was under way, and young were being fed by June 13. The female did not sleep in this nest with the male, probably because it had been completed hurriedly and was insufficiently large for the two adults. Nothing is known of helpers at the nest or of the feeding of fledged young. The annual molt occurs in October to February in Middle America (Guatemala, Nicaragua, Costa Rica) and in May to October in Ecuador and Colombia.

**Taxonomy.** Forms a superspecies with *M. cruentatus*, *M. chrysauchen*, and *M. flavifrons*. Very closely resembles partly barred backed and barred breast red *M. chrysauchen pulcher*. *Melanerpes chrysogenys* is another species that seems related closely to the *cruentatus* complex and to *M. pucherani* in particular. There is a tendency toward more white (broader bars, larger wing markings) in northern birds, but variation is so great that extremes of northern birds are matched southward to Ecuador and vice versa. Coupled with this problem is the great effect of wear on the white edgings of certain of the feathers. Wetmore (1968) considered that birds from Costa Rica northward tend toward *perileucus*, the northern (Belize, Guatemala, Mexico) supposed race. Frankly, the variation involved seems trivial and representative of only a general tendency that does not permit clear-cut characterization of subspecies; hence I regard the species as monotypic. Wetmore (1968) found slight color differences between Panamanian and Colombian birds. I could not detect these differences. However, there is geographic variation in size, to a slight degree — central birds (western Panama, Costa Rica, Nicaragua, Honduras) averaging about 4 percent longer winged than shorter winged birds to the north (Mexico to Guatemala) and to the south (eastern Panama to Ecuador). However, my samples suggest too that higher altitude birds, e.g., in Colombia, are longer winged than are nearby lowland birds, so the size variation is not likely to prove taxonomically useful.

**Reference**


---

**WHITE-FRONTED WOODPECKER**

*Melanerpes cactorum*

**Color Plate 13**

**Range Summary.** Central South America.

**Diagnostic Features.** Little to Small, 33 to 53 grams, wing length 99 to 115 millimeters. A black and gray woodpecker with a white forehead, and throat either white or yellow. Wings, tail, and rump barred black and white. Back streaked buffy white and black. Black
around eyes and over back of head. Buffy gray below, with inconspicuous black bars on abdomen. Buffy white nape.

**Description.** Bill rather short, almost straight along culmen, broad across nostrils, and with a small chisel-tip. Back streaked black and white or dull buffy white (very much as in *chrysasauchen* and *flavifrons*); lower back and rump white with black bars, chevrons, or spots; uppertail coverts from white with black bars to (rarely) black with white spot-bars. Wing scapulars and lesser coverts glossy blue-black; rest of wings (except tips of primaries) black with strong white bars or spot-bars, these being largest on greater coverts where forming a wing patch that is broken, and black and white in worn birds, but is large and strongly tinted buffy grayish in fresh plumage. Underwings brown with white barring; coverts white with little or no barring. Wing flight feathers tipped with white and even (primaries) narrowly white margined in fresh plumage. Shafts black above, paling at base of tail; below black (tail) to pale dusky (wings) with fine white shaft streak. Tail black, tipped narrowly with buffy white (fresh plumage), and barred white throughout, although bars usually do not reach shafts; below, brownish black with white bars. Tail/wing ratio 0.57 to 0.66. Forehead, forecrown, malar area, nasal tufts, front of lores, lower ear coverts, and throat white; throat tinged grayish buff at rear or throat partly to entirely yellow or gold (polymorphism occurs). Rear of head glossy blue-black to midcrown, extending around sides of white forecrown-forehead patch to encircle eyes, and including ear coverts; nape forming a buffy white patch, whiter to rear, the anterior buff sometimes vaguely yellow tinted. Underparts grayish buff, the buff strongest on sides; markings absent except on rear of flanks, rear of abdomen, and undertail coverts, areas which are white or buffy white with dull black bars or chevron-bars.

Sexual features: Males average 18 percent heavier, with bill averaging 8 to 11 percent longer than that of female; males have small red patch of feathers nearly hidden in the black of the midcrown, just behind the farthest rearward extension of forecrown white. Females lack red on crown. Immatures much like adults, browner and less glossy black, with more extensive abdominal barring; both sexes show orange-red patch on center crown. Eyes brown to reddish brown, legs and feet gray to slate colored, bill black.

**Distribution and Habitat.** West-central South America from southeastern Peru, Bolivia, and southwestern Mato Grosso southward through western Paraguay and northwestern Argentina south to La Rioja, San Luis, Cordoba, and Santa Fe, and extending eastward across the Parana River into the chaco of western Corrientes and Entre Ríos. Frequents scrub woodland such as chaco; palms in partly wooded areas; and arid scrub in mountain valleys of Bolivia, western Argentina, and southeastern Peru, ranging from an elevation of near sea level (Entre Ríos) up to 5600 and even 8100 feet in Bolivia (Lajma).

**Behavior.** Not well known. It has a rather darting, unwoodpeckerlike flight (Short, 1970a). It seems somewhat social, like members of the *M. cruentatus* group, for I usually saw the species in groups of three to five birds early in the breeding season in Argentina. White-fronts largely fed by gleaning and probing, picking insects such as ants from branches and trunks of trees, and also eating fruits. One stomach contained pits resembling those of a cherry, some red fruit material, and beetle remains. Another stomach contained chiefly ants. This woodpecker drums rather softly, and frequently early in the breeding season; the bursts are short, and the drumming often occurs beside the nesting hole. Vocalizations I have heard are a Weep Call ("weep," "weep-weep"), similar to calls of *Sphyrapicus varius*, and a faster Wee-beep Call uttered by displaying birds. The latter call, a "wee-beep," was uttered by three displaying individuals, but I could not make out the nature of the displays. On another
Melanerpes striatus

occasion two males and two females perched together gave Weep Calls, and one male showed slight Head Bowing (up-down head movement). In Formosa, Argentina, the birds were nesting in holes in palm tree stubs, but no details were observed. Breeding occurs in September and October in Argentina, in October and November in highland Bolivia, and in October to December in Paraguay. The annual molt occurs from February to May.

Taxonomy. As Wetmore (1926) long ago noted, there seems little basis for separating this species from Melanerpes. Indeed, its throat and forecrown patterns, its back streaking, and its glossy black color suggest relationship with the cruentatus group, especially M. flavifrons; its bill is straight and shaped almost identically with that of flavifrons, with which it is allopatric and almost parapatric (western versus eastern Paraguay, western Corrientes versus eastern Corrientes and Misiones) in a manner suggesting replacement. Its streaking and barring represent extensions of tendencies already found in that group, and its pallid patterning may reflect some effects of its xeric habitat. The species is polymorphic, some birds having a yellow throat, others a whitish throat, and some a partial yellow throat. There is a geographic pattern involved, as Bolivian and western Argentine birds invariably are yellow throated, Entre Rios specimens virtually all have whitish throats (or show yellow traces only), and chaco Paraguayan and Argentine birds are mixed. A putative race ("parvus") was described from the Paraguayan chaco on the basis of several size, bill shape, and pattern differences from Bolivian birds, with no geographic range ascribed and no comparison with specimens from other areas. I do find that the shortest winged specimens tend to come from Paraguay, but size variation in this species is so little that the tendency is inconsequential and is masked by individual variation. Furthermore, color pattern features supposedly typifying this form were not found to hold, and indeed seem especially prone to effects of feather wear. Birds from Argentina match both Bolivian and Paraguayan specimens, and I see no reasonable way in which the species can be divided into meaningful subspecies.

Reference

HISPANIOLAN WOODPECKER

Melanerpes striatus

Color Plate 15

Range Summary. Hispaniola, West Indies.

Diagnostic Features. Small, weight 56 to 99 grams, wing length 104 to 133 millimeters. Only woodpecker on Hispaniola other than much smaller Antillean Piculet (Nesoctites micromegas) and occasional wintering Yellow-bellied Sapsucker (Sphyrapicus varius). Unmarked dark buffy olive below, barred black and greenish yellow above. Eyes whitish to yellow. White patch on sides of neck, bordered black. Conspicuous and common, often seen in groups.

Description. Bill long, straight, rather broad. Above barred black and greenish yellow to greenish gold (faded, worn birds are whiter, less yellow or gold); rump yellow to greenish yellow, tipped red at rear and with or without vague bars; uppertail coverts short, black at bases, tipped broadly with red. Wings barred brown and yellowish white to gold or greenish yellow; below brown and white barred, except coverts olive. Shafts brown to red-brown on upper wings and tail, buffy white to dusky below. Tail brownish black above, outer
feathers tipped and margined buffy white; below brownish, becoming suffused with dull yellow to greenish yellow in outer feathers. Tail/wing ratio 0.66 to 0.80. Nape broadly red, short feathers with gray or blackish bases. Three neck patches, dorsally black bordered by buffy yellowish white, and laterally, white margined above in black. Head mainly gray, paler to whitish on forehead and over eyes and becoming buffy olive on throat and lower neck. Underparts essentially unmarked grayish, varying from buffy olive on the throat and vinaceous gray on the breast to yellow-olive on the abdomen; central abdomen occasionally shows slight to moderate red or orange feather tips; posterior flank and abdominal feathers occasionally with black shaft streaks or, rarely, light black bars. Worn specimens become discolored with rusty or cinnamon, pervading the underpart and head coloration; this probably is due to certain feeding habits; extremely discolored birds are rusty, without detectable yellow, green, or gray.

Sexual features: Males distinctly larger (27 percent heavier) and longer billed (no overlap with females); central crown feathers red tipped over black bases, forming continuous red patch with nape. Females smaller, with a proportionately longer tail; crown dull black, often with tiny white spots around the border of the black patch. Immatures colored as adults, red of tail coverts and nape more orange and more restricted; both sexes have black crown patch, showing white spots, and with some red. Eyes white or cream to yellow. Legs and feet grayish green to greenish gray. Bill dark gray, becoming black at tip and edges.

Distribution and Habitat. Endemic to Hispaniola; not found on its offshore islands. Common and widespread, sea level to high mountains, even in deserts, towns, and pinewoods. Absent only where trees are lacking, as in cities (but found in their parks) and sugarcane fields. Most numerous in hilly, partly cultivated and partly wooded areas and in palms about cultivated fields.

Foraging Habits. Obtains insects and plant foods, mainly by gleaning and probing. This woodpecker hangs upside down to peck out pieces of large fruits, or it may pull off small fruits. It is widely regarded as a pest and is unprotected because it eats various fruits (e.g., it gouges holes in oranges and removes seeds from cocoa pods). Sporadically it taps loudly enough to be heard. Occasionally it flycatches from treetops. In pines it pries loose pieces of bark from the trees, gleaning the insects thus exposed, and it hangs from and probes into pine cones. Small insects are fed to their young by regurgitation; and larger insects, berries, and other fruits individually are passed to the young by adults. Foraging sites include all arboreal situations (trees, bushes, vines, cacti, fence posts, telegraph poles) at all heights, but not the ground. Females tend to glean more and probe and tap less than do males, especially in the dry season (Wallace, 1969). Foraging is often social, pairs feeding together; at fruiting trees up to 15 or even 20 birds may be seen at once. Some birds feed upon corn (Wetmore and Swales, 1931, p. 292). Irregular pits or holes in palms and other trees suggest that Cherrie's (1896) report of sapsucking by the Hispaniolan Woodpecker is likely to be valid.

Voice. Demonstration drumming signals were noted several times in the vicinity of nests. This vocally variable picid has as call notes the Wup and Ta calls. The former call is louder, often shorter, and with stronger overtones than the similar Ta Call. The Wup Call is an alarm-aggressive note, and the Ta Call perhaps is a more submissive call used in encounters. The Ta-a Call is a Wickalike call resembling Wicka Calls of some other melanerpine species. A Bdddt Call is a short call with three to five distinct notes. In contrast, the more common Waa Call has up to 13 connected notes and strong overtones (this call closely resembles the Waa Call of M. superciliaris and is equivalent to Churlike calls of other melanerpine species). Both Waa and Bdddt calls are employed in encounters and presumably are aggressive vocal
Melanerpes striatus

defended; the Waa Call may be more submissive or have reproductive functions lacking in the Bdddt Call. Aggressive encounters are initiated from afar, and the mate and other pairs at a nest site are apprised of the arrival of an adult by use of the Rattle Call—Long Call complex. These calls are series of up to 23 notes, lasting as long as 2 seconds. Rattle Calls have simple, inverted U-shaped notes spectrographically, whereas Long Call notes usually are broken at their peaks, and they often have extra elements. About five categories of Rattle Calls, at least 10 types of Long Calls, various intermediate calls, and different combinations of these calls suggest individual variation, and hence the possibility of individual recognition through use of these calls.

Displays. Bowing and Swinging are the displays seen most frequently. Bowing involves an up-down movement of the head and bill, often with the bill held open. It is repeated up to three or four times. Accompanying the display are Bdddt, Ta-a, Waa, or Rattle calls. Swinging is a simple side-to-side motion of the head and bill, with the bill held at diverse heights. Rarely are the Swings repeated. Bowing occurs mainly between mated birds, and Swinging is an agonistic display; they never are combined into a compound display as in Colaptes. Bill-positioning postures include the aggressive Bill Directing Posture (bill held low, pointing at an antagonist) and an apparently submissive Bill Raised Posture (bill held high, usually facing an antagonist). A Dihedral Flight Display, given within 10 meters before a bird lands, essentially is a gliding display, the wings held outstretched upwardly. It usually is rendered by an incoming bird when its mate is in sight beside or within the nest, and it was most frequent during excavation, the incoming bird displaying to its excavating mate. Courtship feeding takes place between mated birds at the nest site and often is associated with Bowing Displays. The food is passed by regurgitation, or berries or large insects are passed individually, usually to the adult within the nest. Occasionally, the bird in the nest would then leave the nest and, in displaying to its mate, pass back some of the food it had received. Once I saw a bird leave the nest and, following a mutual Bowing Display, pass food to the other individual, even though the latter had not fed the former bird. There is no Tail Spreading Display in these woodpeckers. A rapid Wing Flicking frequently seen in striatus may be a display, but it appears unritualized and may be a simple flight intention movement.

Breeding. According to several authors, nesting occurs to some extent throughout the year, but it principally takes place from February to July. Nesting is often colonial, but in many areas (e.g., well-forested regions, deserts) some or even all nests are of single pairs. Most colonies are small, containing several pairs nesting in one tree or, more usually, in two or three trees situated rather closely together; but I have seen one tree containing 19 active nests, and Dr. Robert Wallace (1969) found 26 nests in “one colony.” Such large groups are unusual. Nests are placed in live or dead palms, in live cacti, in dead stubs (all types of trees), and in telegraph poles. Large colonies (over five nests) in a single tree were in dead trees in each case. Both sexes excavate the nesting cavity, but males probably accomplish most of this task. While engaged in excavating, the excavater sometimes is fed by its presumed mate, which often perches close to the working bird. A third bird (helper?) was seen at several nests; these assist at more than one nest, as I saw such a bird enter two nests consecutively in a colony. Generally the nest site is defended against other woodpeckers that encroach upon it. A convenient perching place, such as a stub, situated near a nest also is defended: A bird in the nest may dart out to drive away an intruder using the perch. In colonial situations the highest stub, or several of the higher stubs of the nesting tree, appears to be defended by dominant birds, often but not always associated with the nearest nests. Non-nesting woodpeckers attempting to enter the colony are prevented from assuming the
conspicuous perches and are driven away from all areas of the nesting tree except its base. Submissive or lower-ranking nesting birds appear to have nests situated at lower levels in the nesting tree, and those birds also are prevented from using perches high in the tree. Solitary nesting birds excavate at all levels in a tree, from about 1 meter upward. Colonies in which the nests are scattered in different trees show defense of the nesting trees by individual pairs. Little is known of the number of eggs laid (four to six, usually; see Wetmore and Swales, 1931) or of the young raised, and the incubation period is unknown. There is great variation in the size of eggs measured by Wetmore and Swales (1931, p. 294), the variation in width being as great as 11 percent and in length as much as 33 percent. Males incubate at night and spend the night in the nest after the young hatch. An incubating bird may be replaced when its mate flies to the nest, following a Bowing Display ceremony (bird in the nest bobs its head out the opening, usually with bill spread apart), or it may be fed either regurgitated food or a fruit or insect directly from the mate’s bill. Occasionally the food is passed back and forth from one to another before it is swallowed. An adult seems to remain for a time at the nest after feeding the young, often until its mate arrives. Molt occurs in late summer and fall.

Taxonomy. The species is monotypic, although individual variation is great, and highland and Haitian birds tend to be rather larger than those from Dominican Republic lowlands. Olson (1972) and others dating back to W. Miller (1915) have questioned the relationship of _M. striatus_. Miller placed it in the monotypic genus _Chryserpes_ but thought it close to the _Centurus_ group of _Melanerpes_. Olson, using several minor anatomical features he admitted were of unknown significance functionally, argued for a campetherine-colaptine relationship of _Chryserpes_ and of _Xiphidiopicus_, which he believes (perhaps correctly) related to _Chryserpes_. I find (Short, 1974d) the behavioral, ecological, zoogeographical, and external morphological evidence entirely indicative of a melanerpine relationship and that no trenchant characters appear to separate _striatus_ from _Melanerpes_. The behavior, ecology, zoogeography, and external morphology of this bird provide no indication of its campetherine or colaptine relationship, and I am therefore compelled to leave the Hispaniolan Woodpecker in _Melanerpes_, where Peters (1948) and others have placed it. It may have evolved from an ancestor of the _Centurus_ group of _Melanerpes_, an earlier ancestor of which would have given rise to _Xiphidiopicus_.

References

**JAMAICAN WOODPECKER**

*Melanerpes radiolatus*

**Color Plate 15**

**Range Summary.** Jamaica, West Indies.

**Diagnostic Features.** Medium, 92 to 131 grams, wing length 122 to 141 millimeters. The only woodpecker on Jamaica, except for wintering Yellow-bellied Sapsuckers (*Sphyrapicus varius*). Black above with very fine white bars, olive-gray below with yellow to red patch on barred abdomen. Face whitish, nape red; crown red in males, gray in females.
Description. Bill long, curved along culmen, somewhat broad across nostrils, and barely any chisel-like tip. Back, rump, and uppertail coverts black with narrow white bars; white barring broadest on uppertail coverts and rump; the white of the back often is tinged olive or greenish, sometimes strongly. Wings black, bearing fine white bars on outer vanes of secondaries and inner primaries and on coverts (bars spaced farther apart than on back); inner vanes of flight feathers more broadly barred white; underwings brownish black with white bars, coverts barred white on black. Shafts black above, although paler (even whitish) at base of tail; brownish black to dusky below. Tail black with fine white bars on inner vanes of middle pair of feathers and on outer pair (outer vane; sometimes inner vane also), the barring occasionally pervading all of these two pairs of feathers. Undertail brownish black with olive cast on outer feathers and showing barring as on upper tail. Tail/wing ratio 0.63 to 0.71. Nape broadly red; nasal tufts dull yellowish or golden white. Forehead, lores, short and narrow line over eye, ear coverts, malar, and throat white, entirely so anteriorly (sometimes stained), but tinged olive or gray toward rear of ear coverts and throat. Underparts mainly olive-gray to grayish olive, the feathers more greenish yellow at tips, but grayer at front of breast; center of lower breast and of abdomen with ill-defined yellow, orange, or red patch. Rear of flanks and of abdomen (sometimes vaguely across abdomen, feather tips of which are red to yellow), as well as undertail coverts, black with narrow white or olive-white bars, the pale bars broadest on undertail coverts.

Sexual features: Males 12 percent heavier than females (fide A. Cruz), but latter measure only slightly less; also, males have entire crown, as well as nape, red, whereas females lack red on crown, their crown being gray, buffy gray, or gray with blotches of black (sexes nearly alike in size, including bill, males averaging only 2 percent larger). Females also may be less red, more yellow ventrally. Immatures resemble adults but are duller, grayer below; the ventral patch is less often red (more yellow); and ventral bars are less contrasting. Both sexes have red in the crown, but the female’s crown has less red or quickly develops some gray or black and gray feathering. Eyes red (brown in immatures), legs and feet slaty to black, bill black.

Distribution and Habitat. Found “from the shores to the summits of the mountains” (Gosse, 1847, p. 271) on Jamaica, where it is a very common bird and in fact outnumbers in its biomass that of several common Florida woodpeckers combined (Cruz, in litt.). Habitats vary from forests to edges, clearings, and cultivated tree plantations.

Foraging Habits. Fruit eating, gleaning, probing, and tapping are the principal foraging modes, but authorities differ in their results as to the importance of gleaning. Wallace (1969) found that much feeding is by gleaning, males doing even more gleaning than females. He found that the sexes largely overlap in foraging modes, but that females tend to feed lower in trees than do males. Cruz (1977) found no difference in foraging between the sexes, and foraging modes employed were fruit eating, probing, tapping, and to a lesser extent gleaning, flycatching, and feeding in bromeliads. Foods are varied, and Cruz noted about 58 percent animal and 43 percent vegetable food in the diet of this woodpecker. Gosse (1847, p. 272) reported large red ants; “hard, strong seeds enclosed in a scarlet pulpy skin”; “white pulp and oval seeds of the sour sap”; grapelike fiddleweed (Cytharaxylon) berries; cherries; and mangos as important in the diet. He also noted that this woodpecker pecks holes in oranges, taking out juice and pulp, and that it sucks juice from sugar cane (for which it is persecuted). Wallace (1969) reported much flycatching for winged termites when those swarm.

Voice. Both males and females drum loudly in the breeding season. The drum bursts are about 1 to 1.75 seconds in duration, and they usually are preceded by one to three taps
spaced 0.1 to 0.15 second apart. Also, they may show one or more breaks in the course of a burst. The rate of beats within a drumming burst is 16 to 19 per second, excluding initial, spaced beats and ignoring gaps during a burst. The function of the drumming presumably is advertisement, as well as territorial establishment and defense. Two calls represented, with drumming, on a tape made available through the courtesy of G. B. Reynard are the Chut Call and the Chur Call. The Chut Call is a sharp, loud, single note, sometimes given in loose series (Short, 1974d, fig. 7H, compared with Pep Call of M. portoricensis and Chup Call of M. carolinus). Emphasized primarily at about 2.5 kilohertz, the call has strong overtones. It varies in duration from 0.05 to 0.1 second and in the intensity of overtones. The significance of this variation is not known (see similar Chup Call of M. carolinus, however). The Chur Call is a variable, single call or is given in series of up to three or more notes (see Short, 1974d, fig. 11E,F, compared with similar calls of M. striatus, herminieri, portoricensis, carolinus, superciliaris, and erythrocephalus). Basically similar to the Chut Call, it contains a fast series of connected elements given at 31 to 41 per second, the notes varying from 0.2 to 0.33 second in duration. In series, the last call often is shorter and is given at a greater interval from the preceding call than between the first two calls. Emphasis mainly is on tones at 2.3 and 3.4 kilohertz. The call resembles both the slower Chur Calls of M. carolinus and its relatives and the fast Chur-Kweer Call of M. erythrocephalus. Functionally, the Chur Call presumably is similar to those of M. superciliaris, M. erythrocephalus, and other species of Melanerpes, namely that of territorial proclamation and location notes among paired birds.

Display. Displays are unknown.

Breeding. The nesting season apparently is from February to August or longer (Cruz, 1977), with immature birds out of the nest in September and October, and the annual molt occurs from August to January. The nesting is not well known. Apparently pairs nest in tall dead stubs and defend only the area around the nesting site, having overlapping home ranges (Cruz, 1977). The extended breeding season may reflect renestings and second or third broods, as Wallace (1969) reported as many as three nestings by one pair in one year. The variation in clutch size is not known, but as many as three young are hatched. The young are fed directly (food carried in bill [Wallace, 1969]). It is uncertain how social this woodpecker is in the nonbreeding season.

Taxonomy. Relationships uncertain, but probably derived from ancestor in Middle America perhaps related to M. chrysogenys and M. pucherani or the ancestor of the aurifrons complex. Possibly related also to other West Indian species such as herminieri. No apparent geographic variation has been noted; I have been unable to compare adequate series of montane and lowland birds to determine the extent, if any, of size differences between populations in the two areas.

Reference
and white barred woodpecker with gray-brown underparts, a golden suffusion on the face, a large black mark behind the eye, and a yellow to orange nape patch. White wing patch visible in flight. Male with red crown; female gray crowned with some black at sides and rear.

Description. Bill moderately long, curved along culmen, somewhat broad across nostrils, and with a tiny chisel-tip. Above, barred black and white, the white sometimes tinged brownish anteriorly; black bars deeper than white ones anteriorly, but whiter posteriorly with narrow black bars on rump, and uppertail coverts mainly white with well-spaced black bars. Wing coverts and secondaries barred as back, but greater coverts mainly black with white spots; primaries black with white tips (fresh plumage) and fine outer margin, and bearing white bars toward the inner bases that terminate outwardly halfway up the feathers in a white patch visible in flight. Underwings brown with white bars and patch just described; coverts brown and white barred. Shafts blackish brown above except white at base of tail shafts; below, brown but fine white stripe on sides and paling to dusky white on outer primaries. Tail black with white bars, the white deepest on central pair; next outer pair all black, third pair mainly or entirely black (few bars in some); fourth pair black with white bars discontinuous at shaft, and outer large tail feathers fully barred; paler below. Tail/wing ratio 0.55 to 0.65. Malar area, area below eyes, chin, lores, nasal tufts, and forehead golden yellow or mixed brownish and golden yellow (more brown, yellow reduced in Morelos, Michoacán birds), this color extending around ear coverts often to meet brighter yellow to orange-gold nape patch. Nape more orange or reddish in northwestern populations, yellower to southeast. Upper ear coverts and area behind and over eye, as well as entirely around the bare skin surrounding the eye, black. Rear of forehead and anterior crown grayish or brownish white. Throat gray-brown, sometimes with some yellow suffusion. Below buffy grayish brown to buffy gray, often with an olive or yellow cast because tips of feathers may be slightly yellow; variably sized yellow to golden orange patch in center of abdomen; rear of abdomen and undertail coverts dull grayish white to white with chordate black bars.

Sexual features: Males slightly longer winged (4 percent) than females, with bill averaging 10 percent longer; crown of males is red or orangish red, whereas females lack red on crown, which is buffy gray with black along the sides and often across the rear of crown in front of nape patch; also, males tend to have more golden orange or deeper yellow on malar and nasal tuft regions, these areas being less brightly colored (on the average) in females. Immatures as adults but pale dorsal color more gray-brown; hence barring shows less contrast. Below, paler, grayer, less brown, with yellowish suffusion often strong; ventral barring less contrasting; sexes both have red in crown, but male much more so, and female quickly loses red feathering; females often with more black on crown than in adult females. Eyes orangish brown, with blackish bare skin around them, legs and feet greenish gray, bill black.

Distribution and Habitat. Mexico, from Sinaloa south through Nayarit, Guerrero, and Jalisco to Oaxaca. Habitat lowlands and foothills, reaching 3000 feet in Guerrero and Jalisco, occupying dry forest (e.g., short tree forest) and riparian woodlands, including tree cultivated areas.

Behavior. Very little known. Feeds in trees and cacti, pecking at bark, gleaning, and probing. Food is insects, including beetle adults and larvae and ants, various fruits (including a cherrylike fruit), and fruit seeds. Selander and Giller (1963, p. 253) indicated that its calls are rather harsher than other Mexican species, with a distinctive "location call" composed "invariably of three or four notes (two or three short ones followed by a long one)." There is no information about drumming by this species. Nesting occurs during May to July
throughout its range, the nest being excavated in a tree or cactus. There are no data on nesting behavior. The annual molt follows breeding, in August and September.

**Taxonomy.** Related probably to the *M. cruentatus* group, especially *M. pucherani*, and also possibly to *M. hypopolius*. Three races have been described and are essentially clinally variable; I recognize but two of these. *Melanerpes c. chrysogenys* is the Sinaloa-Nayarit population, mainly in the coastal lowlands. This form is strongly yellow about the face, with a bright yellow abdomen, tan underparts, and an orange-gold nape. From Jalisco south through most of Michoacán, Guerrero, and Colima to Oaxaca occurs slightly larger and less colorful *flavinuchus*, with less yellow about the face, a less yellow abdomen, grayer underparts, and an orangish yellow nape. In the interior (Morelos, adjacent Michoacán) is found a somewhat paler population (grayer below with less orange and less yellow on abdomen, slightly less facial yellow) that, however, overlaps with *flavinuchus* to such a great extent and differs so trivially that I treat *morelensis* (Moore, 1950) as a synonym of *flavinuchus*.

**GRAY-BREASTED WOODPECKER**

*Melanerpes hypopolius*

**Color Plate 16**

**Range Summary.** Mexico.

**Diagnostic Features.** Small, 46 to 54 grams, wing length 118 to 126 millimeters. Plain grayish brown below (except barred abdomen), brownish head with white forehead, back and most of upperparts barred black and whitish. No yellow or red on abdomen. Occurs in dry, cactus-studded areas. Male with small red crown patch.

**Description.** Bill nearly pointed, curved along culmen, broad across nostrils. Above, barred black and buffy to whitish, whiter on rump, which is streaked or chordate spotted; uppertail coverts white with chordate bars. Wings black with buffy gray to whitish bars on inner coverts and secondaries; flight feathers tipped white, primaries barred white, the white forming a patch at midwing; underwing brown, barred white, with white patch in midwing. Shafts blackish above, pale at base of tail; blackish to dusky below with white streak on shaft. Tail mainly black, but tips white (discolored or worn off readily); white area with black bars forming a patch from central tail feathers across outer base of those feathers to bases of adjacent feathers; barred outer vane of outer tail feathers. Tail/wing ratio 0.61 to 0.71. Head and neck pale brown to buffy grayish brown, except for sprinkling of red feathers in malar area and under eyes in most birds; black mark over eye (sometimes with white line of feathers in it), continuing narrowly around eye; and buffy white to white forehead and nasal tufts. Rear of abdomen and flanks grayish white with black bars or chordate bars, becoming chordate black barred on undertail coverts. Rest of underparts dull grayish brown (or grayish tan, palest on throat.

Sexual features: Sexes virtually alike in size; males have red patch on forecrown and mid-crown, restricted laterally so as to appear somewhat rounded (as *unopygialis*), red lacking on crown in female (crown brown). Immatures as adults, but duller (grayer, browner on barred areas); ventral barring duller, less contrasting; sexes alike or nearly so, both with red crown patch. Eyes reddish brown; legs and feet gray; bill gray-black, paling to dusky gray below.

**Distribution and Habitat.** Interior Mexico, from Morelos and Guerrero to Puebla and Oaxaca, mainly in cactus deserts but also in riverside timber on the highland plateau at 4500 to 7000 feet.
**Melanerpes rubricapillus**

**Behavior.** Almost unknown. Nesting occurs from late April or May through July in Puebla, the nests being excavated frequently in cacti. Molting follows the breeding period. Of the vocalizations, Selander and Giller (1963, p. 251) reported a disruptive, repetitive series of “'chi' notes delivered with rising inflection,” “quite unlike any given by other species” of *Melanerpes*. They noted that the harshness of the call of *hyopolius* suggests the calls of *M. chrysogenys*, but is softer.

**Taxonomy.** Seems to connect the *M. cruentatus* group and *M. chrysogenys* with the *M. carolinus* group (see Selander and Giller, 1963). Seems to avoid competition with partly sympatric *chrysogenys* by avoiding riparian groves where latter is found: favors desert vegetation. I detect no appreciable geographic variation.

**RED-CROWNED WOODPECKER**

*Melanerpes rubricapillus*

**Color Plate 17**

**Range Summary.** Middle and South America.

**Diagnostic Features.** Little to Small, weight 35 to 52 grams, wing length 94 to 114 millimeters. Barred black and whitish above, bars narrow or broad. Underparts and head buffy gray to grayish brown, often with olive or yellow cast; whitish forecrown and chin, sometimes with yellow; dull yellow, yellow, or orange nasal tufts and forehead; orange-yellow to red abdominal patch; barred lower abdomen. Rump white, may be barred. Yellow to red, shallow to deep nape patch; male with red from crown to nape (or only on central crown).

**Description.** Bill short to moderately long, curved along culmen, small chisel-tip, rather broad across nostrils. Above, barred black and whitish, the pale area often tinged buffy (especially *pygmaeus* group); rump and uppertail coverts vary from immaculate white to mainly white with black bars and shaft streaks. Wings mainly barred white and black (or brownish black), the black usually more extensive; primaries and greater coverts predominantly blackish, but primaries tipped white (in fresh plumage) and barred with white at bases, the white bars confluent, forming a patch at center of wing. Underwings brown at tip; white and brown barred on coverts, secondaries, bases of primaries, with white forming patch in center of flight feathers. Shafts brownish black except white at base of tail; below, paler, dusky, showing whitish shaft streak and, in primaries, white lateral shaft streaks as well. Tail black or brownish black with white bars on outer feathers (outer vane mainly), sometimes near tip of penultimate pair, and mainly white at base of central feathers, expanding on the inner vanes toward the tip (forming a central tail patch), the central feather white bearing black bars or spots. Undertail brown and with brownish or yellowish brown cast on outer feathers. Tail tips white in fresh plumage, at least on outer several feathers. Tail/wing ratio 0.45 to 0.56 in *rubricapillus* group, 0.52 to 0.64 in *pygmaeus* group. Nape bears patch varying from shallow and dull yellow (*paraguianae*) to deep and orange-red or red (usually showing more orange than does crown area of males). Throat, malar area, ear coverts, and broad line over eye (except anteriorly) variably whitish buffy gray to deep brownish gray or grayish brown, paler anteriorly and on throat. Forecrown, rear of forehead, lores, and anterior part of line over eye white or whitish, paler than rest of head (malar area, lores, and chin suffused with yellow to gold in many birds of *pygmaeus* group). Nasal tufts and usually anterior forehead are variably pale yellow (*paraguianae*), yellow, gold, or orange-gold. Underparts very variable individually and geographically: breast, sides, and anterior flanks varybly
pale gray, buffy gray, pale grayish brown, or deep gray-brown (*subfuscatus*), the tips with weak to moderate yellow, giving olive or yellowish cast (especially near abdominal patch). Center of lower breast to abdomen red, orange-red, golden orange, or orangish or golden yellow (*paraguanae*), suffusing into adjacent breast and flank areas. Sides of lower abdomen and undertail coverts white with black bars that are strongly chordeate at shafts.

Sexual features: Males average 2 percent longer winged, with bill averaging 10 to 11 percent longer than that of female; males with red patch that may extend from the forecrown continuously into the nape patch, may break partially at rear of crown, or may be well separated from the nape, rectangular to round (a tendency toward this condition is seen in some individuals of most races; but *tysoni*, and especially *paraguanae*, are characterized by a distinct crown patch). Females lack the crown patch and usually have a less bright nape patch (nape varies in extent, to some degree geographically; e.g., *seductus* females have broad patch). Immatures resemble adults, but the upperparts are browner on the pale areas; hence the barring is less contrasting. Duller below, usually with faint streaks, abdominal bars less contrasting; abdomen with paler (pinkier, more orange) red; forehead brown, forming less distinct patch; nape and nasal tufts duller, even yellowish; and females have black crown, often barred. Sexes differ as adults, except that some immature females have red traces on crown. Eyes red to brown or yellowish brown, reported "cream" on one bird. Legs and feet pale gray or greenish gray. Bill blackish horn color to black.

**Distribution and Habitat.** Middle America and northern South America, disjunct in Yucatan Peninsula of Mexico, adjacent Belize, Cozumel Island, Guanaja Island (or Bonacca) off Honduras, and from southwestern Costa Rica through Panama and adjacent islands to northern Colombia, northern Venezuela, Guyana, and Surinam, and on Tobago Island. Found in wet forest edges and cleared country bearing some trees, coffee plantations, gardens, suburbs, parks, and mangroves, but not in deep forest. In Surinam and parts of Colombia it occupies arid scrub areas. Ranges from sea level to 4500 feet in Costa Rica, to 4900 or even 5900 feet (Wetmore, 1968) in Panama, over 3000 feet in Colombia and Venezuela, and only to 1000 feet in Tobago.

**Foraging Habits.** Feeds mainly by gleaning and tapping for insects, especially ants, on the surface of trees, and by plucking fruits, including berries. Of its fruit-eating habits, Eisenmann (in litt.) wrote, "It is a persistent fruit-eater, and is regarded as a nuisance in orchards," and "I saw it eating a variety of wild fruits, including *Miconia argentea*, *Cecropia* sp., some species of orange-fruiting mistletoe, and the following cultivated fruits: papaya *Carica papaya*, cashew *Anacardium occidentale*. In the case of these last two fruits the bird pierces the skin and either sucks the juice or takes a small amount of pulp." He found that the Red-crown moves from fruit to fruit, not eating much of any one item. He also suspects that it may take nectar from certain flowers, as of the guayacan tree (*Tabebuia guayacan*). Orthopterans, coleopterans, and spiders are other arthropods eaten in addition to ants (Haverschmidt, 1968). On Tobago it comes to bird feeders, eating sugar-soaked bread and citrus fruits (ffrench, 1973).

**Voice.** Drums rapidly, but not so fast as *M. carolinus*, according to Wetmore (1968). It may engage in mutual tapping at the nesting chamber (Skutch, 1969, p. 468). Slud (1964, p. 191) listed its calls as: (1) a "drawn-out churr"; (2) a "long rattle"; (3) "several short rattles, often in sets of three"; and (4) "*Meganryynchus* (tyrant flycatcher)-like chatter similar to that of *M. hoffmannii*." Skutch (1969, p. 462) stated that its call is "a droned rattle or churr, krr-r-r-r, which is uttered with a number of variations." Wetmore (1968, p. 559) found displaying birds calling "rapidly and repeatedly a high pitched note, *whick whick which.*"
Displays. Poorly known, but certainly include a Bowing Display, often at the nest entrance, and very likely a Swinging Display mentioned by various authors, e.g., ffrench (1973, p. 273; "When nervous, this species 'feints' from side to side"). Wetmore (1968, p. 559) described a Wing Spreading Display during courtship; males "follow the females in flight, and then when they alight raise the stiffly spread wings to hold them at a 45° angle while they call," the call having been quoted above. Various interactions between mated birds were noted by Skutch (1969), but it is difficult to determine the displays occurring (e.g., p. 473, "vigorous movements" of the head), if any.

Interspecific Interactions. Dominated by Gold-naped Woodpeckers (*M. chrysauchen*) at various roosting and nesting areas, and at feeding trays (Skutch, 1969), although the two may nest close to each other, even in the same stub. Skutch (1969, p. 476) reported an instance in which a calling Red-crown was attacked by first one, then three Gold-napes that emerged from a "dormitory" roost at the sound of the Red-crown calling. Red-crowned Woodpeckers often lose their roosting and nesting chambers to tityras (*Tityra semifasciata*; Skutch, 1969).

Breeding. Breeding takes place in April and May on the Yucatan Peninsula (deduced from gonad condition; see Paynter, 1955), from February to June or July in Costa Rica and Panama (Panamanian juveniles from 9 February to 30 June), May and June in parts of Colombia (Santa Marta), May to November in Venezuela, and from March to July on Tobago (ffrench, 1973). Most of the following data are from Skutch (1969). A cavity is excavated in a dead stub or dead tree at a height of 11, or more usually 25, to 75 feet above ground. Often the nest is the male's former dormitory; but if no cavity is readily available, both sexes may excavate a new one. The cavity is irregular in shape, one measuring 9 inches deep by $3\frac{3}{4}$ inches wide, with an entrance $1\frac{3}{4}$ inches in diameter. Pairs are territorial, and the sexes roost apart, as in most woodpeckers. Courtship chases have been mentioned earlier. The birds establish contact by calling (Churr Call) in the morning, the female often visiting the male's roosting chamber as he calls. Probably three or four eggs are laid, but two young are the usual number fledged. The incubation period is 10 days. The changeover rate at the nest varies greatly. In one pair studied by Skutch, the adults were restless, frequently moving to the entrance, or outside the nest, then in again. Incubating sessions lasted less than half an hour, and the attendance at the nest was 71 percent over a 5-hour period; another pair averaged an hour on the eggs at a session, covering the eggs 96 percent of a day. Nestlings are fed frequently, the food being carried in the adult's bill. Insects and fruits are brought, sometimes every few minutes and other times at greater intervals. One female brought a large orthopteran, but placed it in a crevice near the nest and pecked at it, then left; the male later found it and took it to the young. Fecal material is carried from the nest until late in the nestling period when the adults no longer enter the cavity to feed. The male adult roosts in the nest at night until the last few days of the nestling period, then roosts elsewhere. The young leave the nest at 31 to 33 days of age. The fledglings are attended by the adults for some time, mainly by the male (up to 36 days after fledging). By the twelfth day, some fledglings are able to feed on fruit by themselves. Their first few nights away from the nest are spent in the open, but they seek unused cavities or try to use the cavities of their parents. Usually they are repulsed by the adults, but the latter shift roosting holes frequently, so at times a fledgling may occupy a cavity that was the previous night's roost of one of its parents. Skutch (1969) found but one case of two birds roosting together, apparently due to weather conditions. A second brood sometimes is attempted, and Skutch mentioned one such successful attempt. Molt follows breeding in March to June on Cozumel Island and
Yucatan, from July to December in Costa Rica, from August to November in Panama (as late as January on Sevilla Island and February on Medidor Island), from August to November or rarely February in Colombia, but in October and November in Colombian paraguanae; and in June to November in Venezuela (August cited for Tobago by ffrench, 1973).

**Roosting.** Various roosting habits have already been noted. An unusual habit is the tendency to back into roosting holes, but not nesting holes, tail first (Skutch, 1969; Kilham, 1972b). The habit is not invariable and seems related to the often thin (perhaps chosen to afford protection) and horizontal stub in which the roosting cavity is excavated. Skutch noted the frequency with which these cavities suffered breakage due to wind and rain.

**Taxonomy.** Very closely related to the *M. carolinus* complex, but not with *M. hoffmannii* as has been suggested by Monroe (1968, p. 216). Smaller in size than are birds of the *carolinus* complex, variation in *rubricapillus* parallels that of the *carolinus* group, e.g., in the restricted crown patch of *paraguanae*; and color patterns are very like those of *M. aurifrons*. I suspect that *rubricapillus* is a declining Middle American species related to an ancestral, northern Middle American species, itself ancestral to the *carolinus* complex. Thus, partial replacement of *rubricapillus* by *M. aurifrons* and *M. hoffmannii* would explain the split in the range of *rubricapillus*, which, however, probably recently expanded into South America. As to the status of the *pygmaeus* and *rubricapillus* groups, these most closely resemble each other in so many details of pattern, and in size and proportions, that they surely are closely related. Certainly, considering variation in, say *M. aurifrons*, there seems little or no reason to doubt that *pygmaeus* and *rubricapillus* are conspecific. Only in face pattern (yellow on chin, malar), which is highly variable (yellow lacking in some birds of *pygmaeus* group and present to slight degree in scattered Panamanian, Colombian, Venezuelan *rubricapillus*), and in its longer tail (but overlaps *rubricapillus* group, with *paraguanae* intermediate) is the *pygmaeus* group moderately distinctive; it is noteworthy that *tsonyi* of Guanaja Island, Honduras, suggests in its intermediate location and reduced yellow on the face that a former intermediate population may have connected the *rubricapillus* and *pygmaeus* groups. Similarities between the *pygmaeus* and *rubricapillus* groups not noted above are: both have a red nape; the bill is similar, finer and shallower, less curved along the culmen than in *hoffmannii*; there is a parallel variation in reduction of the male's red cap in *tsonyi* (even some *rubricomus*) and in *paraguanae* and some *rubricapillus*; and there is an identical tail pattern differing somewhat from that of *hoffmannii* and barred-tailed forms of *aurifrons*, though resembling that of *carolinus*. In the *pygmaeus* group are *rubricomus* of the Yucatan Peninsula, and adjacent Belize and northeastern Guatemala, slightly smaller and darker *pygmaeus* of Cozumel Island, and *tsonyi* of Guanaja Island; the latter resembles *pygmaeus* but is the size of *rubricomus*. It has a distinctly larger bill than either *rubricomus* or *pygmaeus*, more white in the rectrices, a tendency for separation of the male's crown patch from the nape, less yellow on the face, and a more yellow (less orange) nasal tuft-forehead area. The *rubricapillus* group includes *rubricapillus* as the most widespread form. This subspecies is variable, and slight tendencies responsible for oversplitting ("costaricensis," "neglectus," "wagleri," "sanctaemartae," "terricolor") are best described, not treated nomenclatorially; characters of these supposed subspecies are trivial when compared with those of the subspecies that are recognized. There is a slight size cline from larger Costa Rican birds (but these overlap Panamanian birds completely; see also Blake, 1958, p. 526), through Panama, to smaller Colombia birds. The characters noted by Wetmore (1968) for Panamanian *wagleri* do not permit separation of most birds, and racial separation of *wagleri* masks both the very close resemblance of Panamanian and Colombian birds and the color
variation of Costa Rican birds tending toward features of the Colombian populations. Two weakly differentiated insular Panamanian subspecies may be recognized, although very like rubricapillus: The Coiba Island form, subfusculus, is very slightly smaller than adjacent Panamanian birds and is distinctly browner, less gray below than rubricapillus. The San Miguel Island race, sedectus, is barely recognizable (comparably plumaged birds are separable) on the basis of 8 percent shorter wings, its slightly darker brown breast, and the more extensively red nape of females. Eastward from Colombia, there is a trend toward greater wing length; Venezuelan birds thus resemble Panamanian birds in wing length (the wing length differences among populations assigned to rubricapillus vary between 1 and 8 percent). Treated by most authors as a separate subspecies, “terricolor,” the Venezuelan-Tobago-Guyana birds are highly variable, tending to be slightly grayer and darker than Colombian rubricapillus. Many northern Venezuelan specimens, even those from far to the east of the range of paraguanae, tend toward that form in the reduction of the red cap in males. Finally, this separation of the cap is stable and characterizes the Paraguana Peninsula, Venezuelan paraguanae, which also is longer tailed, whiter above (white bars deeper), less orange-red (yellower) on the abdomen, and more yellowish naped (female's nape very pale orangish brown) than is rubricapillus.

References

Hoffmann's Woodpecker
_Melanerpes carolinus_ hoffmannii

Color Plate 18

Range Summary. Middle America.

Diagnostic Features. Small, 62 to 84 grams, wing length 109 to 128 millimeters, tail rather short. Golden yellow nape patch; black and white barred above, white rump. Face and underparts largely brownish gray, paler (whiter) about eyes and bill, darker to rear; orange-gold or golden yellow abdominal patch, with barring laterally about it.

Description. Bill rather broad across nostrils, curved along culmen, very slightly chisel-tipped. Back barred black and white, the white sometimes tinged grayish, black bars deeper than white ones; rump and uppertail coverts usually immaculate white, sometimes with few black bars or spots. Wing coverts and secondaries barred as back, but black bars much deeper, hence blacker; primaries blackish with tips white (fresh plumage), and basal portion barred on inner vanes (white bars broad here, several meeting to form small white patch in some birds). Underwings brownish black with white bars, coverts white with brown bars. Shafts black above, except white at base of tail; below brown with pale, whitish shaft streaks in wings. Tail mainly black except for: white tips in fresh plumage; narrow white bars on outer feathers (outer vane and tip area of inner vane); and, mainly white along base of outer vane and most of inner vane of central pair of feathers, the white usually black barred on the inner vane and black barred or forming a white streak on outer vane. Tail paler below with brownish gray cast on outer feathers. Tail/wing ratio 0.45 to 0.53. Nape with broad band of golden yellow, orange-yellow, or gold with red flecks; nasal tufts very pale golden yellow,
often barely a tinge. Hindcrown, line over eye, ear coverts, lores, malar area, and throat pale grayish brown to brownish gray, paling to whitish anteriorly (in front of eyes, front of line over eye, chin, lores) and to white on forehead (often discolored); occasional birds show a black spot above the eye, and many birds show faint yellow (rarely moderate yellow) tips of the malar, loral, and chin feathers. Below, gray or tan-gray, frequently discolored (browner), with a slight olive cast, paling onto throat; flanks grayish white or yellowish white with black chordate bars; center of abdomen from orange-gold to golden yellow, suffusing into surrounding regions. Undertail coverts grayish white with chordate black bars.

Sexual features: Males 15 percent heavier, slightly longer winged, and averaging 10 percent longer billed than females; males with red cap partly separated from nape patch, but usually with orange or red sporadically connecting the areas; females lack crown patch, having crown gray or brownish gray (as ear coverts). Immatures resemble adults, but streaks usually vaguely evident on abdomen (sometimes on breast and sides); also, abdominal patch paler (more yellow) gold; I have not seen sufficiently young juvenile birds to determine the difference in crown color, if any, between the sexes, but they presumably differ at least somewhat (do females show any red?). Eyes reddish brown (brown or hazel in young birds), legs and feet gray, bill black.

Distribution and Habitat. Restricted to western lowland Honduras, Nicaragua, and Costa Rica (northwestern lowlands, eastern highlands; Skutch, 1969), where it is found in dry forests and xeric scrublands, as well as in various open and cultivated areas (e.g., parks, pastures, coffee plantations; Slud, 1964), reaching elevations as high as 7000 feet (Skutch, 1969). It is most common in Costa Rica between elevations of 2000 and 6500 feet, but it sporadically occurs in the lowlands as well in northwestern Costa Rica (Slud, 1964; Skutch, 1969).

Behavior. Little known. Slud (1964, p. 191) noted that it is "a typical wood-chiseling woodpecker, it also exhibits great interest in the ends of broken limbs," but Wetmore (1944, p. 53) observed them "feeding on the juice of ripe oranges and sometimes [he] noted that one bird claimed as feeding territory one or two orange trees, attempting to keep others away." It often frequents the lower portions of trees, as well as fence posts, according to Slud. Otvos (1967, p. 523) found it in open and semiopen areas associated with trees of these species: Caesalpinia eriostachys, Cordia mexicana, Cordia alliodora (?), Enterolobium cyclocarpum, Gliricidia sepium, Guazama ulmifolia, and Tabebuia chrysotricha. Usually the birds seen by Otvos were paired and foraged together. He ascertained that 32.5 percent of the diet of four birds were insects, with Lepidoptera most common, but he failed to mention the remainder of the diet (probably fruits).

Slud (1964, p. 191) listed its vocalizations as (1) a "long chattering rattle that may be accompanied by a violent nodding" (Head Swinging or Bowing, possibly) and (2) a "metallic zick-azick-azick" (Wicka Call). He also reported it drumming in "a machine-gun like tattoo." Skutch (1969, p. 458) stated that its voice resembled that of M. aurifrons "and consists largely of 'churrs' which are sometimes loud and sometimes soft."

Skutch found that the species roosts individually in separate holes, but a (family?) group may occupy cavities clustered in a small area. He noted (1969, p. 459) an instance in which a pair slept in the same cavity, but it was a peculiar chamber with two separate openings. Breeding occurs during May to July in Costa Rica (specimens; Skutch, 1969). Two nests were found by Skutch in trees of Persea caenilea, one 16 feet above ground in a dead-topped live tree and the other similarly situated at 12 feet. The former nest contained three white
eggs on 22 June, the other held two young birds on 29 June. As usual, the male remains in the nest at night, and both sexes incubate (Skutch, 1969). Further details about breeding are not known. Molting occurs from mid-June (Nicaragua) through September (Nicaragua, Costa Rica).

**Taxonomy.** Forms a superspecies with *M. carolinus*, *M. supercillaris*, *M. aurifrons*, and *M. uropygialis*. It is parapatric with *M. aurifrons*, and hybridization occurs in a narrow zone along the Pespire River between Pespire and Nacaome, Honduras (Selander, cited in Monroe, 1968, p. 215; no details of the extent of hybridization were reported).* The distinctive features of *hoffmannii* are few, as it resembles one or another form of *M. aurifrons*, *M. uropygialis*, or (tail pattern) *M. carolinus* in its various traits. Its very short tail, considerably white tail, and partly separated crown patch-nape patch (males) are its most distinct characteristics (Selander and Giller, 1963). Although its tail is short, resembling that of *M. rubricapillus*, the variation in tail length in the latter species lessens its taxonomic significance in *hoffmannii*. There also is a cline of diminishing tail length (wing length rather constant), hence of tail/wing ratio, southwardly in *M. aurifrons*, such that *M. a. santacruzi* (tail/wing ratio 0.51 to 0.62) and *M. a. pauper* (ratio 0.54 to 0.61), geographically nearest *M. hoffmannii*, also approach that species in tail/wing ratio, which in *hoffmannii* is 0.45 to 0.53. The extent of hybridization with *aurifrons* remains to be established before it can be determined whether or not *hoffmannii* is conspecific with *aurifrons*.

**Reference**


---

**GILA WOODPECKER**

*Melanerpes [carolinus] uropygialis*

**Color Plate 18**

**Range Summary.** Southwestern North America.

**Diagnostic Features.** Small, 51 to 79 grams, wing length 117 to 139 millimeters. Pale grayish to tan head and underparts, with black and white barred upperparts, as well as central and outer tail. Golden yellow abdominal patch with barring at sides. Forehead whitish. Male with small round or rectangular red cap.

**Description.** Bill long, curved along culmen, very slightly chisel-tipped, and moderately broad across nostrils. Back barred black and white, black bars heavier in darker forms (*fuscescens*, *cardonensis*); white often tinged strongly with grayish buff, especially toward nape; rump noticeably whiter than back as black bars narrower. Uppertail coverts white with narrow black bars (chordate at shafts), the distal bars sometimes shaped like a horseshoe or chevron. Wings black with white bars, except that outer half of primaries is brownish black with tips white (fresh plumage); inner secondaries and covert feathers nearly as back, but black bars broader; and most distal white bars in center of primaries are contiguous, forming white patch. Underwings paler, coverts mainly white with black bars. Shafts black above, brown below, but showing fine white lateral streaks near their bases and very white sides in

*They probably meet in Nicaragua as well, but I have seen no sympatric specimens from there.*
center of tail. Tail with second and third feathers black (tipped white in fresh plumage); fourth pair mainly black but barred white toward tip of inner vane and along most of edge of outer vane; outer large feathers barred black and white; central feathers black with extensive black-barred white area diagonally running from near base of outer vane (less barred, often forming streak on outer vane along shaft) to near tip of inner vane, forming large patch. Undertail paler, blackish brown with white bars. Tail/wing ratio 0.55 to 0.67. Head varies from entirely brown, barely paling at nasal tufts and chin (most _fuscescens, cardonensis_), to pale whitish tan, paling to near white on nasal tufts, forehead, lores, above eyes in front, and chin (some _uropygialis_ and _brewsteri_). Nape occasionally tinged dull yellow; brown of nape feathers suffusing onto upper back in many birds. Nasal tufts rarely pale yellow, more often buffy. Breast, sides, upper abdomen tan, grayish tan, or (_fuscescens, cardonensis_) pale brown, confluent with head, and palest on sides. Center of abdomen with pale yellow to bright golden yellow; the surrounding (flank) feathers are buffy white with chorde black bars, and the undertail coverts are similarly barred on a whiter background.

Sexual features: Male bears irregularly shaped but small red patch on center of crown, which female lacks; males also average 20 percent heavier (Mexican _uropygialis_), with a bill on the average 13 to 18 percent longer (wings only 3 to 4 percent longer) than that of females. Immatures resemble adults but are duller, with more buff on the pale back bars, black barring usually evident (but variable in extent) on the crown and nape, paler yellow on the abdomen, less contrasting abdominal bars, and, in half the birds, streaks or faint bars on the throat and malar areas (occasionally on breast as well). Sexes as adults. Eyes dark red to reddish hazel, legs and feet brownish green or bluish, bill dull black.

**Distribution and Habitat.** Arid regions of southwestern United States from southern California, southern Nevada, Arizona, and southwestern New Mexico southward throughout Baja California, and northwestern Mexico (Sonora, Sinaloa, Nayarit) to Aguascalientes, Zacatecas, and Jalisco. Frequent deserts bearing sufficiently large cacti or trees to permit excavation of nesting and roosting holes, dry subtropical forest, and riparian woodlands. Selander and Giller (1963, p. 241) cited various habitats used in different parts of its range; they give an elevational range of sea level to 3000 feet, usually, and less often to 5000 feet or even more (Aguascalientes). In the few areas where it meets _M. aurifrons_, it seems to frequent more arid habitats (deserts), whereas _aurifrons_ favors riparian woods (Selander and Giller, 1963).

**Foraging Habits.** Omnivorous, feeding in trees and cacti, in bushes, and going to the ground for visible food items. Insects such as ants, beetles, grasshoppers, and larval gall insects are taken by gleaning, probing, and tapping in trees, cacti, and bushes. Mistletoe berries are plucked from mistletoes, saguaro (cactus) and other cactus fruits are eaten in season, corn is taken from growing stalks or storage areas, and other fruits are obtained in cultivated areas (watermelons, peaches, grapes, oranges, dates, pomegranates). At feeding stations this woodpecker eats suet, meat, and scraps tossed out on the ground. Earthworms and small lizards are taken at times (Phillips et al., 1964). Even chicken eggs are eaten; and, in the breeding season, the eggs (and young birds; Phillips et al., 1964) of warblers, vireos, tanagers, and finches provide food (Bent, 1939). Food storage apparently does not occur, but study is needed to verify this. An intriguing episode dramatically indicates the capabilities of this woodpecker: Antevs (1948) put a saucer of thick honey on a sycamore stump to feed Gila Woodpeckers in the nesting season. Faced with the woodpeckers' gorging themselves, carrying off the honey to feed to their young, she was forced to thin the honey to a syrupy consistency to make it go further. I quote the rest of the incident (Antevs, 1948, p. 91):
“Not so easily scooped, the liquid was fed by the male parent in a clever manner. He gouged pea-sized lumps of bark from the stump, dipped them in the syrup, and gave the honey-coated pellets to his fledglings. He repeated this trick for many days, sometimes varying it by using grains or sunflower seeds which were in a hollow of the same stump.” This seems to be an instance of “tool-using.”

**Voice.** Drums in a steady, loud beat, but infrequently; it is probably not highly important. Of the various calls, Bent (1939, p. 255) cited a “dchůrr, dchůrr” and a “sharp, shrill ‘huit.’” I have also heard a rattleslike “kek-kek-kek” from nesting birds. Brenowitz (in prep.) reported a Chur Call (his Call 1), used as a location note and for territorial proclamation, a series call (Long Call, presumably) given in alarm and during displays and disturbances, and a rasping call given infrequently during conflicts. Its calls have not been compared with those of its congeners.

**Displays.** Brenowitz (in prep.) described three displays. A Bill Pointing Display, given uncommonly, features a forward extension of the bill and head toward an antagonist. He reported instances of this display given toward a flicker (Colaptes auratus) and toward a human observer. A Bowing (or Head Bobbing) Display, commonly seen, emphasizes the downward thrust of head and bill and is directed at intruders both intra- and interspecifically. A lateral Head Swinging Display also is reported, less common than the Bowing, but often combined with more frequent Bowing in a compound display. A series call often accompanies Bowing (on the down movement) or Bowing-Swinging.

**Breeding.** The breeding season begins in April in northern Baja California and Arizona and lasts through August in the latter area. Young out of the nest are known from June to early September in Arizona, where eggs are laid from late April to June for the first clutch (a second or even third clutch sometimes is laid, according to Bent, 1939, and Phillips et al., 1964). In southern Baja California, June to August marks the period when fledglings are seen. In southern Sonora small young were noted in a nest in early August, but most of the nesting takes place earlier (Short, 1974e). Farther south, fledgling young dating from June through July were examined from Zacatecas and Aguascalientes. The clutch size usually is 3 or 4, rarely up to 6 (Short, 1974e), and apparently fewer eggs are laid in second clutches (Bent, 1939). The nest is excavated in a large cactus (saguaro, cardón, “hecho” cacti), in a tree stub (cottonwoods, willows, mesquites), or in a live or dead palm tree (Short and Banks, 1965). The nest is at various heights up to 30 feet, with an entrance 1.95 to 2.25 inches in diameter (Bent, 1939). According to that author, the cavity for next year’s nest is excavated after the breeding period, but he also noted that the same hole is used yearly. A cactus hole requires time for drying out of the oozing cactus flesh, and holes cannot be utilized immediately. One function of the family group remaining together on a territory after nesting is that each bird must have, or prepare, its own roosting cavity. Since the young birds eventually are driven away, and disperse prior to the next breeding season, there usually are some holes available for emergency use despite the demand for these cavities by other avian and some mammalian species. Adults, especially males, are highly aggressive during the nesting period, driving other birds, especially hole-nesting species, from prospective nesting sites. Details of nesting and care of the young are poorly known; food is carried in the bill directly to the young and includes insects, fruits, and honey or other foods secured about human habitation. The annual molt takes place following the nesting period, mainly in September and October in the United States and adjacent northern Mexico, from July through September in Baja California, and from late June to August farther south in Mexico.
Taxonomy. Forms a superspecies with *M. carolinus*, *M. superciliaris*, *M. aurifrons*, and *M. hoffmannii*. Barely meets *M. aurifrons* in southern Zacatecas, Aguascalientes, and eastern Jalisco and hybridizes to an extent of about 5 percent (Selander and Giller, 1963). As those authors noted, *uropygialis* is slightly smaller than *aurifrons*, its tail is proportionately longer, the male’s red crown patch is reduced, the nasal tuft color is less yellow, the nape is unmarked or but slightly yellow, and the tail is more barred with white. The subspecies of *M. uropygialis* are very weakly characterized, as Selander and Giller (1963, p. 241) pointed out. The main variation is in darkness and lightness of the back barring and color of underparts and head. Pale birds nevertheless can be matched from areas as disparate as Nayarit, the Cape Region of Baja California, and the Colorado River Valley. The dark populations also vary, and there is overlap of paler birds with darker birds of generally paler populations, but at least all birds of these “dark” forms are indeed dark. I recognize the following: (1) *uropygialis*, including “albescens,” “sulfuriventer,” and “tiburonensis,” a somewhat pale race of Arizona, New Mexico, southeastern California, northern Sonora, and, disjunctly, Sinaloa, Nayarit, Jalisco, Aguascalientes, and Zacatecas; (2) very similar *brevleri* of southern Baja California, which is the only form showing significant size variation (smaller than *uropygialis*) and which is isolated geographically from *uropygialis* by *cardonensis*; (3) *cardonensis*, a dark form of northern Baja California; and (4) a very similar dark race, *fuscescens*, of southern Sonora. The last two races have not been compared using adequate series: They may be identical, and there is zoogeographical precedent for the view that they once formed a single population (Short, 1965a). I find no separation possible between northern and southern *uropygialis*; there is a slight, perhaps climatic diminishing of size southwardly, but northernmost Sonoran and Sinaloan birds bridge the small (7 percent) average difference that obtains in wing length between Arizona and Jalisco-Nayarit birds. In the absence of features other than this trivial size shift, “sulfuriventer” is not recognizable. The Tiburon Island birds (“tiburonensis”) differ from dark Sonoran mainland specimens (*fuscescens*), but resemble “albescens” and northern Sonoran *uropygialis*. Finally, “albescens” is too variable and too greatly overlaps Arizona *uropygialis* to merit separate treatment, as van Rossem (1934) and Phillips et al. (1964) have noted. The Colorado Valley birds are slightly paler on the average, and they average a trifle shorter winged than other Arizona birds, but this variation is nomenclatural insignificance.

Reference

GOLD-FRONTED WOODPECKER

*Melanerpes (carolinus) aurifrons*

Color Plates 18 and 19

Range Summary. North and Middle America.

Diagnostic Features. Small, 67 to 100 grams, wing length 117 to 149 millimeters. Very variable in color; pale and black barred back, pale bars very narrow to equally as broad as black bars. Most of head and underparts grayish or buffy gray to brownish; abdomen yellow to red in center; nasal tufts yellow to red; nape patch varies from gold to red, but mainly reddish with yellower area at rear. Whitish rump and uppertail coverts, often black barred or streaked. Male with variable crown, small red patch to fully red area from nape over crown and rarely to nasal tufts.
Description. Bill long, curved along culmen, small chisel-tip, rather broad across nostrils. Geographically and individually variable in color, less so in size. Back barred black and (usually) white, the white tinged brown in *leei*, some *insulanus*, some *santacruzi*; white bars equal or nearly equal black bars in depth in *aurifrons*, narrower in *polygrammus*, and very narrow in *santacruzi* (variable), *pauper* (variable), *leei*, *dubius*, *grateloupensis* (variable), *tumeffensis*, *insulanus*, and *canescens*. Rump white, variably clear or with white bars or streaks. Uppertail coverts all white or with shaft streak or (especially *leei*) barred. Wings follow same pattern as back on coverts and secondaries, but black bars broader than on back, white bars more separated; outer half to two thirds of primaries black (tips white in fresh plumage), with white bars basally and tending to form a white patch in the middle of the wing (but may be absent). Wings paler below, barred toward base and on coverts. Shafts black above, brownish black below with white shaft streak in center and on sides. Tail mainly, but rarely entirely (some *leei* and *dubius*), black, the tips often with white in fresh plumage; usually outer feathers are white barred to some extent, but only near tip on their inner vane; central feathers vary from all black to black with white on inner vane in center and basally and often white streak on outer vane, the white on inner vane being barred weakly to strongly (*polygrammus* especially shows this white area, but it is also found as a patch in other races occasionally, and in some form occurs in scattered individuals of all races except *leei* and *dubius*). Undertail paler, often with suffused buffy white cast on outer feathers. Tail/wing ratio 0.51 to 0.69 (0.51 to 0.62 in *pauper* and *santacruzi*; 0.59 to 0.69 in *canescens* and *leei*; 0.56 to 0.66 in others). Head mainly gray to brown, darkest in *leei*, but paling anteriorly on forehead, anterior part of pale area over eye, lores, and chin; rarely suffused with yellow on ear coverts, malar, lores, and chin. Nasal tufts red (dubius, leei, canescens, some *grateloupensis*), orange or orange-gold (most races, although variable), or yellow (most *aurifrons* and *polygrammus*). Nape varies from almost pure yellow in some *polygrammus* and *aurifrons* through gold and orange-red (most races; the rear of the nape always is yellower than anteriorly) to entirely red or red with a narrow orange or gold band at rear (dubius, leei, insulanus, canescens, grateloupensis, santacruzi, and pauper). Below, as throat and head or paling onto throat and along flanks, darkest in *leei*, palest (gray) in canescens and some aurifrons. Rear of flanks and abdomen barred black and whitish, tinged buffy, gray, or red to yellow (because of fine tips of this color). Center of abdomen varies from yellow or golden yellow (aurifrons and polygrammus) to orange-gold or orange with red tinge in center (most birds of variable grateloupensis, insulanus, santacruzi, and pauper) and even red or red with gold tinge about the edges (dubius, leei, and canescens). Undertail coverts pale, usually whitish, with black bars.

Sexual features: Males larger than females, averaging as much as 14 percent heavier (Texas *aurifrons*), and with bill 9 to 15 percent longer on the average; males with red cap varying from a small patch (many aurifrons and polygrammus, occasional tendency in grateloupensis and santacruzi) to a larger patch continuous with nape (few aurifrons; most birds of other races, except polygrammus; some grateloupensis and santacruzi tend toward separation of nape and crown patches) or even continuous from nape to nasal tufts (some dubius and leei). Females usually lack red in the crown, but a few birds of most races have several red feathers or rarely a small patch on the crown; crown darker (rarely with some black) posteriorly, paling anteriorly onto forehead. Immatures resemble adults, but usually (less often in more finely streaked forms) show vague to moderate ventral streaking, less contrasting abdominal barring, paler yellow or red on the abdomen, broader black dorsal barring, and weak to extensive black, usually in form of bars, on crown. Males have red to
orange-red crown patch much smaller than that of adult male; females vary, a few having no red, most with slight red in the crown, and a few approaching the male crown condition. Eyes reddish brown to deep red, brownish in immatures; slight area of skin about eye is brownish. Legs and feet grayish green or greenish gray. Bill black.

Distribution and Habitat. Ranges from central Texas (where parapatric and barely sympatric with related *M. carolinus*) and southwestern Oklahoma southward through eastern and central Mexico (west to Chihuahua, Durango, Zacatecas, and Jalisco, where approaching or contacting related *M. uropygialis*) to Veracruz, Oaxaca, the Yucatan Peninsula, and south through Middle America to the southern border of Honduras, where meeting *M. hoffmannii*. Habitats occupied are varied, but tend to be arid or semiarid, including xeric scrub, riparian woods in dry country, cultivated regions, and edges and openings in moist (not wet) tropical forest, e.g., in eastern Honduras. Ranges from sea level in places (e.g., Texas, Tamaulipas, Yucatan Peninsula, various islands, western Honduras) to xeric highland valleys at altitudes approaching or exceeding 6500 feet (central Mexico, Guatemala, Honduras; see, e.g., Land, 1970, and Monroe, 1968). In sympathy with *M. rubricapillus* on Yucatan Peninsula, it frequents open tall forest and edges, not the scrub and low, cutover forest used by *rubricapillus*.

Foraging Habits. Gleans, probes, and taps for insects; eats various fruits, berries, and nuts. Various insect larvae, including some boring insects (beetle larvae); grasshoppers; and ants are taken (Bent, 1939). In addition to fruits and berries, acorns are eaten where oaks occur; corn is picked from stalks, storage bins, or the ground; and mesquite pods are opened for seeds therein. Bananas provide food in Middle America. Pecans also are eaten, and extensive cultivated areas of pecans form habitat for *aurifrons*. Occasionally this species flycatches (Skutch, 1969) during insect swarming periods. I have no records of nest robbing as ascribed by various authors to related *M. carolinus* and *M. uropygialis*, but probably eggs and perhaps young of small birds are eaten on some occasions.

Voice. Although Bent (1939, p. 248) stated from another source that this species is not known to drum, Skutch (1969, p. 452) reported that it “sometimes beats a rolling tattoo on a dry, resonant trunk or branch.” Its vocalizations were summarized by Bent (1939) as follows: (1) “a harsh, rapid, scolding chuh-chuh-chuh-chuh-chuh-chuh”; (2) “a metallic whah-whah”; (3) “a loud, long-drawn sk-k-k-k-ah-r-r-r or tscher-r-r-r, tscher-r-r-r-r”; (4) “a short check, check-check”; and (5) the “same chow, chow, chow call” as *M. carolinus*, but differing in tone, more a “chooogh-chooogh.” Call (1), the Chur Call, and call (5), the Cha Call, were discussed and sonagrams figured in comparison with *M. carolinus* by Selander and Giller (1959, pp. 110-111). These authors noted that the Chur Call is a location call, used in territorial proclamation; whereas the Cha Call is the common warning call. Further, they stated (p. 110) that *carolinus* and *aurifrons* “have the same repertoire of calls, but those of *aurifrons* are louder and harsher.” Since only one call of each type was illustrated for each species, no comparisons can be made from their sonagrams, except that their vocalizations obviously are extremely similar structurally, indeed are almost identical. Skutch (1969, p. 452) noted three calls, a “loud, rolling krr-r-r-r” like that of *M. carolinus*, a “tsuka tsuka,” sometimes given in flight, and a “low, rather harsh krrrr.”


Interspecific Interactions. Relations with allopecies *M. carolinus* in the very limited area of overlap between *aurifrons* and *carolinus* were discussed by Selander and Giller (1959).
They found that these species maintained interspecific territories in a manner entirely like intraspecific territorial maintenance within each species. That is, the two species interacted sex for sex, at territorial incursions by individuals of the other species. Firm boundaries were established and the number of transgressions were few. In one case a pair of each nested 75 yards apart, with a definite territorial boundary between them. The following year, after a vigorous encounter between males of the two pairs, the carolinus pair left the area and the aurifrons pair proceeded to nest in the tree cavity used successfully the year before by the carolinus pair. No evidence of interbreeding was found.

**Breeding.** The nesting season commences in late March to mid-April in Texas, with eggs laid from the end of March to the end of June, mainly in late April and early May; but in central Texas the peak period may be in late May or June. Egg laying occurs in May and June on the Mexican Plateau, at the end of March and in April in Oaxaca, in late January in Chiapas (santacruzi), July on the Yucatan Peninsula, May and June on Chetumal Island, and in February to August in Guatemala. The nest site is in a tree, stub, or fence post, usually between 6 and 25 feet high in the north, but opportunistically at almost any height in Middle America (Skutch, 1969). Both sexes may excavate a cavity in as little as 6 to 12 days (Bent, 1939; Skutch, 1969), or a cavity used previously may serve once again. Two broods, or rarely three (Skutch, 1969), may be raised in one season, sometimes in the same cavity. The eggs number four to seven, four being the usual number; it is rare that four or more young are raised (the eggs hatch over as great a period as 2 days; and the small, later-hatched birds or bird often, even usually, fail to survive). Incubation is by both parents, the male incubating at night. The incubation period is 12 to 14 days (Bent, 1939; Skutch, 1969). Both adults feed the nestlings, carrying food in the bill (insects, fruits). Hatching birds are blind and naked, with a projecting lower bill and a prominent egg tooth at the tip of the upper bill. Fecal material of the young is removed from the nest until the time when the young are fed at the entrance, after which the nest is fouled. The adult male remains with the young at night until the last week before fledging, which occurs at about 30 days of age. After leaving the nest, the young birds do not return to the site. In the case of second broods, about 3 weeks passed between departure of one brood and initial egg laying of the next clutch. Molting commences during the breeding period, presumably in adults not engaged in raising multiple broods. Young birds retain some juvenile feathers until late in the year, even to January (Bent, 1939), and red feathers may persist in the crown of females until the following May. September to November marks the main molting period in Texas (one bird in wing and tail molt in February!); in Yucatan and Cozumel Island, the period of November to February includes molting birds; Veracruz birds molt in October; Guatemalan birds molt from June to September; and Honduras specimens taken in September and October are in molt.

**Taxonomy.** Forms a superspecies with *Melanerpes carolinus*, *uropygialis*, *superciliaris*, and *hoffmannii*. Meets *carolinus* in Texas with barely any overlap and no hybridization; overlaps slightly with *uropygialis* in parts of Aguascalientes and Jalisco, with hybridization affecting about 5 percent of the populations; and narrowly overlaps with, or contacts, *hoffmannii* in southern Honduras, with few hybrids reported (for these situations, respectively, see Selander and Giller, 1959; Selander and Giller, 1963; and Monroe, 1968). *Melanerpes aurifrons* is highly variable and is difficult to characterize, but it has less white in the tail than have the other four allospecies. Variation in *aurifrons* has been discussed and summarized by Selander and Giller (1963). This discussion summarizes their findings and presents my modifications of them. They treat populations from Texas (and Oklahoma) southward to Jalisco, Michoacán,
Hidalgo, northwestern San Luis Potosi, and southern Tamaulipas as a single race, *aurifrons*, marked by relatively broad white bars dorsally, pale ventral color, yellow to orange on the frontal area, nape, and abdomen, and little or no white in the tail. A supposedly paler race, *incanescens*, of central and western Texas was synonymized in *aurifrons*, and justifiably so. Such pale birds occur throughout the western plateau of Mexico, as well as in western Texas, and the form part of the same size cline (smaller to south) as eastern birds. Overlap is great; and, lacking trenchant characters for these populations, it seems absurd to do more than call attention to the tendency for western birds to be paler than those farther east. An intergradient subspecies, *grateloupensis*, including “*veraecrusis*,” occurs from southernmost Tamaulipas and central San Luis Potosi southward to southern Veracruz. This population clinally varies from *aurifrons* like in the north to *dubius* like in the south, and it also intergrades with *polygrammhus* in the Isthmus of Tehuantepec. Its traits are intermediate between those of *aurifrons* and *dubius*. The Yucatan Peninsula race *dubius* occurs from Tabasco and northeastern Chiapas through the Peninsula to Belize and northeastern Guatemala. It is characterized by narrow dorsal bars; dark underparts; a red nape, abdomen, and nasal-frontal area; dark underparts; and little or no white in the tail. The Cozumel Island form, *leei*, was not recognized by Selander and Giller, and it is not highly distinctive; nevertheless, it is darker than *dubius* (distinctly darker below and with brown tinge dorsally), the bill is 12 percent longer, the tail is proportionately longer (0.61 to 0.69 versus 0.58 to 0.63 for *dubius*), the uppertail coverts are more barred, and the red of the nasal tufts more often connects with the red crown of males (resembling *M. carolinus*). These traits, and its geographic isolation, seem to warrant its recognition taxonomically. Another insular form, *tumefvensis*, occurs on the Turneffe Islands off Belize. This form has broader white back bars than *leei* or *dubius* (resembling *pauper*), its abdomen is red-orange rather than red, its nasal tufts are pale red, and it has orange-red in the crown. Farther south, *insulanus* of Utila Island, off Honduras, resembles nearly mainland Honduran *pauper*, but is distinctly larger and longer tailed than *pauper* (barely any overlap in wing length). Still another Honduran island race, *canescens*, occupies Roatan Island and the Barbareta Islands. This form resembles *dubius* and *leei* in its red frontal area, but its white back bars are deeper. It also has a proportionately very long bill, like *leei*; is larger than nearby mainland races; and is pale gray below and on the face. Arid southwestern Oaxaca and western Chiapas form the range of pale *polygrammhus* (includes *frontalis*), which has a yellow nape (yellow on abdomen and frontal-nasal area, too) and shows the greatest sexual difference in bill length (male bill 15 percent longer, overlap minimal). Intergrades with *grateloupensis* are known from south of Matias Romero and near Tequisitan, Oaxaca. From southern Chiapas south through Guatemala and El Salvador and to southwestern Honduras (Nicaraguan border area), occurs *santacruzi*, a variable form with yellow to orange on the frontal area, an orange-yellow abdomen and nape, the shortest tail of the species, and white patterning of the tail. I agree that “*fumosus*” is a synonym of *santacruzi*; but, contrary to Selander and Giller’s findings, I agree with Monroe (1968) that Caribbean coastal Honduran *pauper* is separable. This form is 14 percent shorter winged, and it is more narrowly barred with white, hence blacker. In other respects, *pauper* indeed resembles *santacruzi* closely.

References
RED-BELLIED WOODPECKER
Melanerpes [carolinus] carolinus

Color Plate 18


Diagnostic Features. Small, 67 to 91 grams, wing length 118 to 136 millimeters. Grayish below, barred black and white above with whitish rump, white in central and outer tail feathers, a red nape, red to pink nasal tuft, and orange to red abdominal patch. Male with red top of head (usually connecting nasal tufts with nape). White wing patch, chordate-barred sides of abdomen and undertail area.

Description. Bill long, curved along culmen, rather broad across nostrils, and with small chisel-tip. Back barred black and white, black bars usually deeper, the white sometimes with slightly brownish cast. Rump white with few to many black streaks, chordate spot-bars, and bars; uppertail coverts more white than is rump, with black streaks or horseshoe-shaped bars. Wings above barred more coarsely than back, becoming fully black on primaries (outer portion, except tips, which are white in fresh plumage) and greater coverts; white bars at base of primaries form white mark in center of wing; underwings paler, with white mark and white bars, underwing coverts fully barred. Shafts black above, paler below with white along sides of shafts, especially at bases. Tail black with white patch on central pair of feathers, often partly barred, and white barring on outer pair (outer vane and tip of inner vane); tips of feathers white in fresh plumage; paler below, with grayish cast on outer feathers. Tail/wing ratio 0.58 to 0.67. Area over eyes, ear coverts, lores, sides of neck, malar area, anterior nasal tufts, and throat whitish gray to gray, whiter on chin and throat, lores, and over and around eyes; but malar area, and sometimes lores, sides of head, and throat suffused pinkish, varying from weak to strong. Rear of nasal tufts and forehead pinkish to red; nape red, rarely orange or even yellowish. Underparts mainly gray, varying in intensity, but always paler toward throat, sides, and abdomen; a tint of buff, olive, or a wash of pink variably present, sometimes strong; center of abdomen pale pink, orange, or pale red, with pink to yellow suffusion around it. Rear of abdomen and posterior flanks white or grayish white with black chordate bars, or bar-spots, continuing onto uppertail coverts, which are whiter.

Sexual features: Male larger, averaging 8 to 9 percent heavier, bill 8 to 10 percent longer (but wings and tail only 2 to 3 percent longer), and with red crown usually connecting nape and nasal tufts (sometimes partly or occasionally fully broken by gray at rear of forehead); also, males with more reddish cast on underparts and sides of head and throat. Females usually lack red on the crown, but occasionally have a small patch of red in the center; the crown is gray, rarely with black traces at rear, paler to pearly gray or whitish at front of crown and forehead; females also show less reddish suffusion on face and underparts. Immatures blacker, black bars deeper above with gray to brown cast on pale interspaces giving less contrast; nape patch smaller, paler, nearly lacking in some (females); crown with black bars, sometimes almost entirely black; below, darker with paler (sometimes vague) abdominal patch, indistinct to strong black streaks on breast or breast and sides (occasionally vague streaks throughout), and with often more extensive barring on abdomen and flanks (extending sometimes to sides), the barring, however, being less contrasting than in adults. Some birds resemble young Sphyrapicus varius or females of S. thyroideus rather strikingly. Immature males show less red on the crown than adults, but females show some red as well (less than males); females have less red or orange on the abdomen and nape than do males.
(both sexes show less than adults). Eyes dark red to reddish brown, brown in immatures. Legs and feet gray or greenish gray. Bill black.

**Distribution and Habitat.** Ranges from southern Canada (Ontario), southeastern Minnesota, Wisconsin, Michigan, western New York, and southern New Jersey southward to the Gulf Coast and southern Florida and west to central Texas, Nebraska, and South Dakota. Quite frequently, but irregularly, occurs and breeds well north of this range (into North Dakota, Canada, and northeastern states as far as Massachusetts); there are indications that the Red-belly has contracted its range southwardly in its northern range (Stickel, 1963). Only slightly migratory, but subject also to movements, especially concentrations in winter in favorable areas. Habitat deciduous forests and bottomland (wet) forests with oaks, gums, and other hardwoods; also found less commonly in cypress and other swamps and in pinewoods. Parks, cultivated areas near woods, and riverine woodlands in the eastern Great Plains also are favored habitats. Usually found below 2000 feet, but ranges up to 3000 feet along the Appalachian Mountains.

**Foraging Habits.** Omnivorous, and seasonally very variable. Feeds by gleaning, picking fruit, probing, tapping, excavating, and flycatching. Plant materials make up over 80 percent of its fall and winter diet, declining to 44 percent in spring and rising to 60 percent during summer (Stickel, 1963). Burt (1930, cited by Stickel, 1963) noted that only about 7 percent of its food included wood-boring insects. Various insects, including ants, flies, grasshoppers, lepidopterous larvae, and spiders, are eaten (Bent, 1939). Small amphibians and reptiles also are consumed, as are the eggs of small birds (Brackbill, 1969); Nero (1959) reported a wayward (Saskatchewan) Red-belly that had taken only fishes for several days. Suet, nuts, and crumbs, as well as fruits, are obtained at feeding stations. Swarming insects are caught in the air, and sometimes a woodpecker flies out to seize a single insect. At times insects may be stored in crannies or holes (Bent, 1939), and even fruit (tangerine pulp) is occasionally stored. Oranges are a favorite fruit, as are wild grapes; also taken when available are juniper berries, blackberries, strawberries, mulberries, blueberries, palmetto berries, cherries, apples, peaches, and Virginia creeper fruits and seeds. Nuts are stored during the fall and early winter, the birds utilizing acorns, beechnuts, hickory nuts, pecans, hazelnuts, and pine seeds; ragweed seeds also are taken. These are stored individually, usually in bark crevices, but sometimes in larger cavities. Standing, drying, or stored corn is a major dietary item in many areas. Sap is sought in tree wounds, and Bent (1939, p. 241) reported Red-bellies feeding at sapsucker (Sphyrapicus varius) sap holes, after driving off the sapsucker. Reller (1972) found that the sexes differ in foraging sites during winter insect foraging, the males utilizing tree trunks more than females; at other seasons the sexes showed no appreciable difference in site.

**Voice.** Drumming occurs in several forms. Drumming itself is rather weak and steady at 18.3 to 19.4 beats per second, lasting 0.75 second to over 1 second and usually containing 15 to 20 beats. Often the initial beat is weak and irregularly is set off from the others by a greater interval than that found within the main portion of the burst. Often alternated with Chur Calls, the drumming is accomplished on a dead stub or tree or telephone pole. It serves as a territorial proclamation, and perhaps in advertising to a prospective mate. Mutual tapping occurs in that form, i.e., two birds being involved, or in the form of drum tapping, by a single bird (see Stickel, 1963). These are slow bursts of four to 20 taps at two or three taps per second (Kilham, 1958b, 1961b). The drum tapping usually is associated with the actual or potential nesting site. According to Stickel (1963), it functions in pair formation, selecting a nesting site, and facilitating accord between the members of a pair regarding the
nesting site. Thus, it is a communication between actual or potential mates. It continues beyond the egg-laying period, occurring, for example, by an incubating bird hearing the approach of its mate to relieve it on the eggs, and thus it also serves in pair maintenance. There is not full agreement upon the varied vocal repertory of this woodpecker, and the following summary is based upon analysis of sonagrams from my own recordings and from the reports of Kilham (1961b) and Stickel (1963). There is a basic Chip-Chup Call, with variations including single chip or chup notes, series of either, and a more intense, high-pitched chew or kew (Kilham, 1961b; Stickel, 1963) version used as an alarm note or in “anxious” situations, such as a disturbance about the nest. Chip (or “yuk” or “cha”) notes are sharp, fast, peaked notes of about 0.02 second duration, emphasized at 1.9 and 3.8 kilohertz. The Chup notes are more diffuse, with varying points of emphasis between 1.0 and 5.5 kilohertz (usually a strong point occurs at 3.8 to 4.0 kilohertz) and lasting 0.03 to 0.05 second. I have not obtained recordings of the Chew version. These calls express low intensity aggression and “agitation” and also may serve as contact notes (see Stickel, 1963). The Chip and Chup notes vary and grade into each other; an intermediate form of the call was shown (called Chup Call) by Short (1974d, fig. 71). Series calls of both the Chip and Chup type apparently are more intense versions of these aggressive notes; their notes are longer than in single notes. The Chip and Chup series calls differ much as do Chip and Chup single calls; i.e., Chup Series Calls have notes that are more diffuse, with less definite peaking and more variable emphasis in pitch. In short series of two to four notes these calls may be given at the same tempo, about two to four notes per second; in longer series, however, Chip Series Calls are uttered at three to four notes per second, whereas Chup Series Calls are given at seven to eight notes per second. Such series may extend for as long as 6 or 8 seconds, or longer, although broken by pauses in most cases. A Chip Series Call was shown by Short (1974d, fig. 13F). I am unable to explain differences between the two versions. One circumstance under which a Chup Series Call was given is as follows: a male carolinus had been calling intermittently (Chur Call) from a tree for about 10 minutes. I approached slowly and stood about 20 feet from the tree. The male ceased the Chur calling upon my approach and began to give the Chup Series Call, broken frequently by pauses. A Wicka Call (chee-wuk call of Kilham, 1961b, and wuck-aa call of Stickel, 1963) is uttered during conflicts between members of the same or opposite sex. One Wicka Call was given after a Chur Call and Long Call exchange between two males in an encounter. This call consists of alternating short, peaked ta or ka notes and longer, rising peaked wick notes. Ta notes are 0.02 to 0.03 second in duration with a fundamental tone peaking at 0.7 or 0.8 kilohertz (usually weak or lacking), main emphasis at 2.4 kilohertz, and minor emphasis at 1.6, 3.2, and 4.0 kilohertz. The wick notes are variable in duration, usually 0.07 to 0.1 second in duration, with a rising initial portion and one or two peaks, the emphasis being on either or both of the fundamental tone (at 1.0 to 1.2 kilohertz) and the first harmonic tone (2.0 to 2.4 kilohertz). Two ta-wick couplets were figured by Short (1974d, fig. 7L). Wicka Calls may last up to 10 seconds; two completely recorded calls were 4.17 and 5.83 seconds in duration. These contained seven and 12 pairs, (ta, wick) of notes, the pairs given at 1.67 and 2.07 pairs per second, respectively. The Chur Call is a single, complex note or a series of up to four Chur notes. Each note contains six to eight connected, peaked elements, with a duration of 0.27 to 0.33 second. The first few elements usually rise in pitch. Emphasis is on the peaks of one tone and the trenches of the next higher tone, at 1 to 2 kilohertz, and often at 6 to 8 kilohertz, with less emphasis at intermediate frequencies (Short, 1974d, fig. 11F; Selander and Giller, 1959, fig. 1—the latter authors contrast the call with the Chur Call of M. aurifrons,
which is slightly shorter and is emphasized at consecutive tones between 1.5 and 4.0 kilohertz). This call, termed a location call by Selander and Giller and a breeding call by Kilham (1961b, p. 237), undoubtedly serves as a location call, particularly for paired or pairing birds. It also is uttered territorially, perhaps indicating a mated bird on territory; it also may synchronize the mated birds for reproduction. Kilham (1961b, p. 252) reported a male Red-belly that uttered the Kweer Call of M. erythrocephalus instead of its own Chur Call. Another territorial call is the Long Call (Short, 1974d, fig. 13F,G; "cha-aa-ah" call of Kilham, 1961b, p. 237, and of Stickel, 1963), a 1 to 3 second series of up to 40 or more peaked notes emphasized at about 2.4 kilohertz. The notes sometimes are nearly vertical with vague peaking. Notes are uttered at 14.4 to 17.0 notes per call (faster in shorter calls), with a slower start and a rapid ending (in longer calls the difference in rate may be considerable, e.g., from 12 up to 17 notes per second). Usually, calls are strongest in the middle and weaker at the ends. This call, often with interspersed Chur Calls, accompanies encounters between males or females, usually territorial conflicts. The only other call of adults not mentioned so far and cited by Kilham (1961b, p. 237) is the "grr, grr," or "intimate note," a vocalization given by individuals in proximity, usually mated birds. This sounds like a low form of Wicka Call, but I have not been able to analyze it, or the various calls of young birds. Stickel (1963) heard grr calls from mated birds approaching a site at which the mate (or potential mate) might be expected to occur, sometimes when no other bird actually was present.

Displays. Many of the displays were described by Kilham (1961b, pp. 238–239) and include the following (the names are mine, as applied to related woodpeckers): Crest Raising, Wing Spreading, Tail Spreading, Dihedral Flight Display, Bowing Display, and various bill positioning postures. Reverse Mounting (Kilham, 1961b, p. 248) also is a "display" complex, serving as a precopulatory display. Males, especially, employ Crest Raising against antagonists, at times in the presence of the mate, and also toward the young after they have left the nest. Females also use Crest Raising, but less frequently (or it is less conspicuous). Wing Spreading is used aggressively as in other melanerpine woodpeckers. Tail Spreading also is employed, often with Wing Spreading during conflicts (a useful comparison might be made with M. aurifrons, with its generally less patterned tail). The Dihedral Flight Display closely resembles that of Melanerpes striatus and others of this group; it is a floating, gliding flight, usually given within a few meters of the landing site beside (or atop) an antagonist. The Bowing Display functions in lowering the bill and in exhibiting the sexual markings of the crown; it seems to be a submissive display. I have observed slow Swinging Displays (head and foreparts slowly swing back and forth) during male–male encounters. It is usual for the female to mount the male, as if to copulate, as a prelude to his mounting her (Kilham, 1958b, 1961b; Stickel, 1963), although this occurs at times without copulation ensuing. There are no obvious precopulatory displays by the male.

Interspecific Interactions. Mutually exclusive territories are held with M. aurifrons where the two overlap slightly in Texas (Selander and Giller, 1959). Calls and displays of the two species are very similar. Red-bellies also are interspecifically territorial with Red-headed Woodpeckers (M. erythrocephalus) in the fall and winter (Reller, 1972). At this time, both Red-heads and Red-bellies are acquiring and defending stores of acorns and nuts in areas where these are available. Aggressive interactions between carolinus and erythrocephalus are marked by the dominance of the latter woodpecker. Many nesting cavities are lost to Starlings (Sturnus vulgaris; Stickel, 1963).
Breeding. The breeding period commences in January and February, with nesting in late March through August (Stickel, 1963); two or even three broods may be raised in the South (Bent, 1939). The nest usually is excavated in the dead stub of a live tree, at any height (up to 120 feet), but fence posts occasionally are used. Sometimes the roosting hole of the male becomes the nest, but the male may commence excavating several holes, the female "choosing" that which finally is used. The male does all of the early excavating, but its mate increasingly takes part toward the end of the activity. Chur Calls and territorial encounters mark the early breeding period. Females are attracted to the calling, drumming males; and by tapping and engaging in mutual tapping at the site, the female effectively chooses the site and the mate. Females may engage in conflicts for the attention of a male and its site of excavation (Kilham, 1961b). Copulation is preceded usually by reverse mounting, the female mounting the male before actual copulation. The male mounts the female from above and to the rear, but gradually slips to the left and downward, ending on its back with cloacal contact maintained (Kilham, 1961b, pp. 248-249, fig. 2). Copulations occur through the egg-laying period, and reverse mounting takes place for somewhat longer. The nesting cavity is 9 to 12 inches deep and 3 to 5 inches wide (Stickel, 1963); in it three to eight (usually four or five) eggs are laid (Bent, 1939), at a rate of one a day. The nesting cavity is considerably larger than is a roosting hole (Stickel, 1963). The incubation period is about 12 days and begins at about the time the third egg is laid. Both sexes incubate, the male doing so at night. The bird inside usually taps when its mate is heard approaching to relieve it. Periods of incubation during the day average 12 to 40 minutes, with periods lasting up to 95 minutes; females average longer periods than males, although the latter incubate more because of night incubation. The eggs usually hatch over a two-day period. Adults carry food in the bill, insects at first, then mixed fruits and insects. Feeding is most frequent in morning and evening, dropping at midday and averaging from three times an hour at midday to a high of 15, or exceptionally 19 to 21, times per hour in mornings and afternoons. Egg teeth are present on upper and lower bill and disappear gradually. The eyes of the young open in 6 to 10 days. The sexes feed about equally. Females brood and guard the young more than males, although the male is in the nest at night until the last day before the young leave. Ceremonies sometimes occur, including low Wicka Calls, when both adults are at the nest at once. Only males remove fecal material from the nest (Stickel, 1963), although the nest becomes unsanitary late in the nesting period. The young birds leave the nest at 22 to 27 days of age (Stickel, 1963) and at first remain close to the nest. A juvenal form of the Long Call seems to be that used to attract attention of the adults for feeding. They are dependent upon their parents for 6 to 10 weeks after fledging (Stickel, 1963). By early fall the young birds are gone from the home range, dispersing usually a short distance, but occasionally they move farther afield. The molt occurs from July through October or November, being completed as early as September (presumably in single-brooded birds). Some local movement and concentrations occur in fall (Mengel, 1965), and there is northward dispersal and sometimes dispersal southwest in Texas (to the Rio Grande Valley). In late summer or fall the pairs break up, each bird forming its own territory, although some males tolerate a female's presence at times within their feeding area (Stickel, 1963).

Taxonomy. Forms a superspecies with allopatriic M. uropygialis, M. hoffmannii, and M. supercilialis and with parapatric M. aurifrons. Differs from Texas aurifrons in the full red crown of males and the white tail pattern. Nearby supercilialis (West Indies) is very similar, but usually has a black facial mark. No hybridization is known between aurifrons and
carolinus (Selander and Giller, 1959, 1963). I regard *M. carolinus* as monotypic. Four subspecies have been recognized, but these are trivial and it does not serve any purpose in treating them formally. There is a tendency toward a longer bill in the Northeast. Florida birds are a trifle smaller (shorter wings, but only by 5 percent), and there is a cline toward broader white barring westwardly. All of these are effectively masked by individual variation. In fact, *carolinus* is remarkably stable in mensural and color features, and no trenchant characters or combination of characters serve to separate significantly any populations. Mengel (1965) could not distinguish western "zebra" from *carolinus*; Texan "harpaeus" is inseparable from "zebra" and *carolinus*; and South Floridan "perplexus," although slightly smaller and exhibiting tendencies toward whiter upperparts, paler red nasal tufts, and less white in the tail than *carolinus*, seems insufficiently differentiated to merit recognition (it comes closest of these putative "races" to being recognizable nomenclatorially).

References


GREAT RED-BELLIED WOODPECKER

*Melanerpes [carolinus] superciliaris*

Color Plates 18 and 19

Range Summary. Northern West Indies.

Diagnostic Features. Small to Medium, weight 70 to 126 grams, wing length 115 to 156 millimeters. Red cap (males) to nape, and red nasal area. Usually a black patch over eyes and, in female, on rear of crown. Barred black and whitish above and on tail; white patch in wings; underparts grayish tan with barring at rear and red patch on abdomen.

Description. Bill long, curved along culmen, slightly chisel-tipped, and moderately broad across nostrils. Very variable in size and pattern. Above, barred black and buffy white, whiter in worn birds; the whitish areas often tinged yellowish, green, or even red, and are generally buffy with less white in *caymanensis*; rump less black barred, whiter, but more barred than in *M. carolinus*. Uppertail coverts white or whitish with narrow black bars, chordate bars, or "horseshoes." Wings black with lesser coverts and secondaries colored as back (but whiter, with broader pale bars); primaries tipped white when fresh plumaged, and with white bases extending into outer vanes, forming patch; underwings paler, with black and white barred coverts. Shafts brown to black, paler below with white shaft streak. Tail long, black, with strong white barring on inner vane of central feathers and outer feathers; less barring on outer vane of central feathers and, often, near tip of next to outer pair;
usually no barring on the other feathers; paler below, suffused with grayish white outwardly. Tail/wing ratio 0.61 to 0.77. Nasal tufts red, very pale in *caymanensis*; broad red nape patch often with red suffusion onto back. Buffy white to white forehead (more buffy in *caymanensis*); broad black area over eyes in most races, reduced in *nyeanus* and usually absent in *caymanensis*. Ear coverts, lores, malar area, and throat grayish white, whiter anteriorly, often tinged tan or buff, grading into darker breast. Underparts basically grayish, but tinged yellow-buff in many *superciliaris* and *murceus*, less so in others, becoming more yellowish olive on rear of breast. Center of abdomen red or orange red, suffusing as pale orange onto breast and surrounding black-barred, whitish flanks and lower abdomen. Undertail coverts white with chordeate black bars.

Sexual features: Males 20 percent heavier, with a proportionately slightly shorter tail, 3 to 5 percent longer wings, and a 10 to 13 percent longer bill than females; males with red crown, extending from nape to frontal patch, but restricted laterally at rear of eyes; females with anterior crown concordored with forehead, not red, and with rear of crown variously black and buffy gray, all black (forming patch with black above eyes), or dark grayish tan with no black (*caymanensis*). Immatures very like adults, pattern less contrasting, often showing more red tinge on back and underparts, and females with red on crown (as males, but with black mixed with red). Eyes red to reddish brown, legs and feet olive-gray, bill black.

**Distribution and Habitat.** Cuba and adjacent small islands (keys), Isle of Pines, Grand Cayman, and several islands in the Bahamas (Grand Bahama, Abaco, Watling’s islands). Found in forest edges and clearings, woods, cultivated areas, and mangroves, in both lowland and mountain areas.

**Behavior.** Not well known, presumably very like that of *M. carolinus*. Omnivorous, they feed on insects and various cultivated and wild fruits, occasionally coming to the ground for insects (Felix, 1965). That author kept captive birds on insects, a soft mix diet containing ant eggs, pears, apples, oranges, and bananas. I have some vocal data from Grand Cayman birds supplied by G. B. Reynard. Vocalizations presumably are very like those of *M. carolinus*. There is a low call, the Waa Call, uttered by two birds when near each other (Short, 1974d, fig. 11B). This call consists of repetitive clusters of three to six or more vertical, connected notes (“waa-aaaaa-aaa,” etc.), resembling the Waa Call of *M. striatus*. The Chur Call of *superciliaris* (Short, 1974d, fig. 11F) closely resembles that of *M. carolinus* and of *M. aurifrons*. It contains five to eight connected notes, with a pitch of the fundamental tone equivalent to that of the *carolinus* Chur Call, but the emphasis regularly is on the peak of the initial harmonic tone such that overall the call is higher pitched than that of *carolinus*. Presumably it functions similarly (see *M. carolinus*). Almost nothing is known of breeding (no displays have been described). Nesting commences in March or April, and young are out of the nest in May and June in Cuba and the Isle of Pines. The annual molt commences in June and terminates in October and November on those islands; Watling’s Island birds in molt represent February.

**Taxonomy.** Forms a superspecies with *M. carolinus*, *M. aurifrons*, *M. uropygialis*, and *M. hoffmannii*. Seems closest to *carolinus* in pattern, but resemblance of these two species to *M. rubicapillus* suggests that their pattern may be primitive within the *carolinus* superspecies. At any rate, the usually well developed black eye mark of *superciliaris* is distinctive. Also, Cuban *superciliaris* is of very large size (it and *M. lewis* probably are the largest melanerpine woodpeckers). There is strong racial variation, making it unwise to name minor variants of
the Cuban and Isle of Pines’ races. The nominate race occupies Cuba and the Cantiles Keys and probably other islands. The Isle of Pines and Cayo Largo and Cayo Real support populations assigned to *M. s. murceus*, a form about 8 or 10 percent shorter winged and shorter billed than *superciliaris*, but with tail even shorter (14 percent), hence the tail/wing ratio is less. I see no justification for recognition of other supposed races (“florentinoi,” “sanfelipensis”; see Garrido, 1973) on the basis of size differences, since *superciliaris* and *murceus* barely differ enough in that respect (also, *sanfelipensis* seems based on molting birds; and *florentinoi*, based on few specimens, is within the range of variation of both *superciliaris* and *murceus*). As for color differences, these seem too slight to consider, especially in light of the variation in the other distinctive subspecies. Three races are known from the Bahamas, of which I recognize two. Grand Bahama and Watling’s Island form the range of *nyeanus*, a variable race in which some males show black at the sides of the crown and others do not; it shows less black than *superciliaris* and is considerably smaller (8 percent shorter winged than *murceus*). From *blakei* it differs in its whiter back (broader white bars), yellow tinge (hence “green” appearance) in the gray underparts, and brighter red nasal tufts. I also include Watling’s Island birds with *nyeanus*; these are a trifle longer billed and a bit paler below, averaging less black on the head of males, but otherwise seem identical with Grand Bahama specimens, and the latter do not merit separate status nomenclaturally (as “bahamensis”). Abaco Island is occupied by slightly larger *blakei*, blacker above with more black around the eye (hence more like Cuban and Isle of Pines’ races), and with paler nasal tufts than *nyeanus*. Most distinct among the races is *caymanensis* of Grand Cayman, marked by its tannish buff (less yellowish) tinge on the back; the absence of black about the eyes, and on the crown of females; less white about the face; and paler nasal tufts (compared with *superciliaris*; it is slightly smaller than *murceus* with a disproportionately shorter bill).

Reference

**Genus Sphyrapicus Baird**

The four species of sapsuckers are derivatives of *Melanerpes* as shown by their skeletal structure (e.g., of the sternum), behavior (e.g., vocalizations, fly-catching habits), patterns of coloration of adults (e.g., of *S. thyroideus*, *S. ruber* with *Melanerpes formicivorus* and *erythrocephalus*), and juvenile plumages. Their adult plumage is partly black and white (except females of *S. thyroideus*), with white in a patch in the wings and on the rump and with red on the crown or nape. Melanerinelike white or white and black markings are present on the central rectrices. The sexes are alike to very different. The bill is medium in length, broad at the base and flattened in cross section; the nostrils are beneath lateral ridges and are covered by feathers. The tail is strongly hardened in the shafts and bars, and the feather vanes are concave from below. The four-toed foot has a long hallux and long fourth toe. Three of the four species are highly migratory; all are North American in distribution.
YELLOW-BELLIED SAPSUCKER
*Sphyrapicus varius*

Color Plate 20

Range Summary. North and Middle America.

Diagnostic Features. Little to Small, weight 43 to 55 grams, wing length 115 to 131 millimeters. Black "shield" on breast; white wing patch; black stripe bordered by two white stripes on sides of head. Below yellowish white streaks and bars on sides. Crown red with black band at rear, or entirely black. Lacks red nape patch. Throat red or white; if red, the red not usually crossing black malar stripe.

Description. Bill rather straight with chisel-tip, broad between nostrils. Above, mixed black and yellowish buffy white (white in worn birds), black tending to be concentrated in center of upper back with two broad, pale and black stripes alongside and converging on lower back, the stripes being in a "chain" pattern of irregular bars; worn birds appear blacker. Rump white in center, black sides; uppertail coverts with white inner and black outer vanes. Black wings with white patch on outer sides of covert feathers; broad white tips on secondaries, narrower tips on primaries; flight feathers barred white; below barred black and white. Shafts dusky below, black above. Black tail with narrow white border at outer edge and at tip; central feathers have broad white and narrow black bars on inner vane; sometimes irregular white marks on outer vanes of central feathers, and on other feathers; duller below, but similar. Tail/wing ratio 0.55 to 0.64. Rear of crown black, nape buffy white. Nasal tufts, lores, and area under eye form a white line; ear coverts form a black stripe (through eye anteriorly), and there is a white line over the eye; malar black. Below, broad black breast patch, feathers tipped yellow-buff in fresh plumage, appearing black with narrow bars (see immatures); breast patch at rear bordered by yellow-white, which continues down breast and abdomen. Sides with asymmetrical black V's, forming streaklike tips, on buffy white to whitish buff background; flanks more regularly barred. Undertail coverts whitish with black wedge-streaks.

Sexual features: Male red from forehead to rear of crown, red bordered all around by black (rarely red is replaced by yellow); rarely with red traces on white nape; throat red to breast patch, extending to edge of black malar areas, but not usually to white above malars. Female has white throat, and crown is variably like that of male, or mixed red and black or black with red spots on forehead or all black or black with buffy white spots or streaks (about 10 percent of females lack red in crown).

Juvenal birds differ greatly from adults. Except for the longer, broader outer primary, the wings are like those of adults, and the tail is similar but is more barred. The back is blacker, often appearing black with white spots; rump more barred on the white areas. Head brown with buffy white streak-spots on crown, ear coverts, and throat; buffy white lines over and under eye usually present, but narrow; throat paler or white, at least anteriorly. Breast brown with scallop-bars; abdomen clear, yellowish white in center, barred dully on sides and flanks. Sexes similar, though some red throat feathers of male appear early. The molt (postjuvenal molt) into adult plumage is prolonged, and immature birds can be distinguished until the following March or April. At that time the crown yet may be incompletely red or black, and the black breast patch yet may be partly mixed with brown bars. Red comes into the throat (males) early in the molt, but it does not progress rapidly, and red in the crown also lags in development. The black breast patch is late in appearing, and birds with only a few fully black feathers may be found as late as February.
Eyes brown, legs and feet bluish gray, and bill dull black to slaty black.

**Distribution and Habitat.** North America, breeding from Mackenzie and the Peace River area of northeastern British Columbia across Canada to southern Labrador and Newfoundland, and south to southern Alberta, North Dakota, Missouri, Indiana, New York, and Connecticut, and along the Appalachian Mountains to eastern Tennessee and northwestern Georgia. Migrates southward for the winter, occurring from the southern limit of its breeding range south through the southern United States, Central America to Panama, and all of the West Indies. In migration, rarely west to Arizona. Breeds in mixed coniferous and deciduous forest, especially where there are aspens (*Populus*), at elevations up to 6000 feet. In migration and on the wintering grounds it is found in diverse woodlands, orchards, and even scrublands.

**Foraging Habits.** This sapsucker eats diverse insects, particularly ants that it glean from the tree surface. Very little or no extensive tapping or excavating is accomplished while foraging for insects. Seasonally, the birds flycatch, circling about from an exposed perch to secure flying insects. Fruits and berries are taken whenever they are available. Responsible for the name of sapsucker is its habit of feeding on sap and tree tissues (as well as on insects attracted to the sap). A regular series of pitlike holes, usually in lines, is excavated on various trees, especially those with smooth bark. These are made at all seasons (I have seen them in Hispaniola, where sapsuckers winter), but especially in late winter and spring. Trees regularly used by sapsuckers show myriads of healed-over pit marks often criss-crossing the tree. Probably about one fifth of the diet is obtained directly by sapsucking.

**Voice.** Drumming is complex, and there are several distinct forms. Characteristic is their slowness and irregularity. Generally there are four to six beats per second in the various forms of drumming. The first two or more usually three beats are rapid, given within 0.10 to 0.15 second. In some bouts there follow single beats in irregular two- and three-beat groups. These last up to 4 seconds, but usually 2 or 3 seconds, and contain 10 to 20 beats. The last several beats often are distinctly slower. More complex and often longer (up to 8 seconds), drumming bouts usually have double beats, although the first three or so beats are single and rapidly delivered. The double beats then are given, sometimes regularly at 0.10 to 0.15 second intervals; at other times they are at alternating intervals of two or three double beats given 0.10 to 0.15 second apart, followed by a double beat or series of them at an interval of 0.22 to 0.38 second. Kilham (1962a) found that long series of single beats delivered at four to five per second were used in attracting a mate to a potential nest site. Lawrence (1967) noted ritual tapping by one or the other but not both birds of a pair at the nest hole. Kilham (1962a) heard ruffling sounds of agitation and winnowing sounds during courtship flights, both indicated by him to be wing noises. The call note is a “Chee-aa” or “ce-vaan” call, a dropping call 0.4 to 0.6 second in duration with emphasis on the first and second harmonic tones (fundamental tone, initial peak at 1.3 kilohertz). The call is variable and some notes approach a Chur Call. The latter (“chur” or “quarr”) is a 0.2 to 0.3 second dropping call with five or six separate peaks and is a typical call of species of *Melanerpes*. Related to the Chee-aa Call, the fundamental tone is similar (1.3 kilohertz), and the same harmonic tones are strong, but other overtones also receive emphasis (as many as six tones, to 7.8 kilohertz); and in this and the somewhat separate elements, the Chur Call differs from the Chee-aa Call. The Chur Call is given during interactions between sapsuckers or in strong alarm. The Chee-aa Call expresses mild alarm and may be a location call as well. The Wicka Call equivalent is a low “week-week” or “quirk-quirk” (Kilham, 1962a) given in close interactions. The squalling Weep Call is a series of six to 10 “weep,” “wee-urp” or “kwee-urk” notes, delivered at
one and a half to two notes per second. Spectrographically these notes are flat topped, with the flat peak at 2.3 kilohertz and no overtones. This is the territorial call, used also in attracting a mate to possible nesting sites (Kilham, 1962a).

Displays. This sapsucker has several displays used in aggressive and aggressive-sexual encounters. The Bill Raised Posture has the head held high or even backward beyond the vertical. This places the bill away from the opponent and also clearly shows off the red throat patch of males or white patch of females; thus, it is apt to be a submissive and perhaps sexual display, although studies are needed to document this for the Bill Raised Posture and the Bowing Display (see following). Crest Raising is another display used in aggressive encounters. The Bill Directing Posture described for other species evidently occurs as well (see Lawrence, 1967). Bowing Displays involve the raising of the head and lowering it, thus invoking both Bill Directing and Bill Raised postures. The emphasis is on the latter, and Bowing appears associated more often with bisexual than with unisexual encounters (Lawrence, 1967, p. 53) — perhaps they are partly or mainly sexual in function. Head Swinging is a side-to-side motion that is common during aggressive unisexual encounters. It too invokes Bill Directing and Bill Raised postures. Throat Fluffing (Lawrence, 1967, p. 53) may be a display incorporated in the Bill Raised Posture, the red (male) or white (female) feathers being spread to an antagonist or prospective mate. Wing Flicking occurs in agonistic encounters, and a modification, the Wing Drooped Posture (Lawrence, 1967, p. 53) is used between the sexes.

Breeding. Courtship seems to occur in the form of lessened aggression and ultimate pair formation between initially hostile birds of the opposite sex (Lawrence, 1967). Nest excavation takes place in late April and May, eggs are laid in May and June, and the young fledge by late June to July. Live birch and poplar trees commonly are selected for the excavation of the nest, which is 2 to 20 meters above ground. Rarely the same hole is used in two consecutive years. Both sexes take turns excavating the cavity. Courtship Flights with flapping wing beats are made by one or the other bird of a pair from or to the site of the excavation; a “winnowing” sound made by the wings accompanies the flight (Kilham, 1962a, p. 32). Ritual tapping at the nest apparently is part of courtship, and similar tapping occurs at changeover during incubation. Copulation occurs mainly late in the excavation period and is described by Lawrence (1967, p. 81). Four to seven eggs are laid, and the incubation period is 12 to 13 days. Both adults incubate, the male more so and at night. Both sexes feed the young for the 25 to 29 or so days they are in the nest. Food is carried in the bill and fed directly to the nestlings. The average feeding rate is about nine times per hour (both sexes). Droppings are carried from the nest mixed with sawdust, and they are not in a firm sac; adults excavate within the nest at times during the nestling period, apparently producing sawdust to facilitate nest sanitation. After fledging, the young are fed for 10 days or so before achieving independence.

Migration. One of the most migratory of woodpeckers, this sapsucker begins migrating southward in late August. Some birds remain at the fringes of the zone in which there is more or less constant snow cover through the winter, but the bulk of the species winters in the southern United States, Central America, and the West Indies. Thus, migrants cross considerable water gaps. They are well spaced apart in their winter quarters and are rather quiet in contrast to their conspicuousness early in the breeding season. Migrants head northward in March and reach the breeding grounds by late April to late May. Males usually appear in the breeding area before the females.
Taxonomy. Very closely related to, and forming a superspecies with, the Rocky Mountain *S. nuchalis* and *S. ruber* of the far west and northwestern North America. A few hybrids are known with *nuchalis*, which *variuss* presumably meets in southwestern Alberta. *S. variuss* is whiter backed and shows more white in the wings than does *nuchalis*, its sexual dimorphism is more strongly developed (see *nuchalis*), it generally lacks the red nape patch of *nuchalis*, and the postjuvenal molt is much more prolonged. A few hybrids likewise are known between *variuss* and *ruber* from British Columbia, but the two overlap and interbreeding is limited. *S. ruber* is not sexually dimorphic, has a red head and breast, is much less white above, and has a very rapid postjuvenal molt; it also is somewhat larger than *variuss*. Despite the contacts among these three forms, their hybridization is very limited and no true hybrid zones are formed. Their differences in sexual dimorphism pose problems for their interbreeding. I prefer to treat them as species on these bases. I consider *S. variuss* monotypic, the supposedly darker Appalachian population being based on worn summer specimens (these tend to be blacker). The southern Appalachian birds may be a trifle darker and smaller than northern birds, but overlap is great. Also, considering the close relationship and similarity of *S. nuchalis* to *S. variuss*, it seems inappropriate to recognize weakly defined races within either species.

References

RED-NAPE SAPSUCKER
*Sphyrapicus [variuss] nuchalis*

Color Plate 21

Range Summary. Western North America.

Diagnostic Features. Little to Small, weight 37 to 61 grams, wing length 118 to 133 millimeters. Differs from *S. variuss* in red patch on nape; females as well as males have red on the throat. Blacker above, less “marbled” appearance. Otherwise, as *S. variuss* in adult plumage.

Description. Bill chisel-tipped, straight, broad between nostrils. Closely resembles *S. variuss*, except as follows: Back less marked with white and buff, blacker. Tail/wing ratio as in *variuss*, 0.55 to 0.64. Red patch on nape behind black area of hindcrown; crown mainly red in both sexes, bordered all around by black. Throat red or partly red (see discussion following), the red in males crossing the rear of the otherwise black malar stripes to reach the white region below the eyes; black ear covert area often with red-tipped feathers.

Sexual features: Some females identical with males, but 90 percent show reduction of red anteriorly on throat (all but one of 50 males have no such reduction), the remainder being white, and also reduced red laterally such that malar region may be all black; throat of
females less than half white usually, rarely to two-thirds white. In juvental plumage it resembles _S. varius_, but it is blacker above, being black with white in spots, not bars; it has a blacker crown with few or no spots; the red feathering of crown and of throat appears much earlier than in _varius_, hence most juveniles of _nuchalis_ have red in these areas; the underparts are darker, with more barring on the flanks and with the abdominal clear area more restricted. The sexes are virtually alike in this plumage although older females show white on the forethroat. The immature plumage resembles that of _S. varius_, differing as adults of _nuchalis_ differ from those of _varius_, but molt into adult plumage is faster than in _varius_, all September birds having adult throat and crown color; adult breast patch begins coming in early, but does so slowly; nevertheless, most birds show signs of it (by January, almost all young birds are completing the molt and essentially are in adult plumage). Eyes brown, legs and feet grayish, bill black.

**Distribution and Habitat.** Mainly the Rocky Mountain region of western North America from southeastern British Columbia and southwestern Alberta southward along the eastern slope of the Cascade Mountains and some sites along the eastern Sierra Nevada Mountains, the Rocky Mountains, and various isolated mountains of the Great Basin and elsewhere (e.g., Black Hills of western South Dakota), to central Arizona, southern New Mexico, and the Guadalupe Mountains of western Texas. In winter it occurs from the southern part of its breeding range south to Baja California, Jalisco, and Coahuila, Mexico. It frequents montane coniferous forest at elevations to 9400 feet, especially but not exclusively in areas where aspens are common. During migration and in winter it is found in diverse habitats, including orchards and pine-oak woodland.

**Behavior.** Treatment of this species as a subspecies of _S. varius_ probably has discouraged studies of _nuchalis_. Details concerning its behavior seem very similar to or identical with those reported for _S. varius_. Displays include at least Head Swinging and Bowing, and probably other displays like those of _S. varius_. Vocalizations and drumming are not mentioned as differing from those of _varius_. Territories are up to 150 or more yards in radius about the nest site. Most nests are in aspens, but dead coniferous trees also are used. Copulation occurs after nest construction is under way. The male approaches the female with vibrating, lowered wings, calling and raising his crown feathers. The female perches crosswise on a branch; and, if receptive, she raises her head far back, even to the back, and the male mounts. Nests are excavated at heights up to 70 feet or more and sometimes are in trees in which nesting occurred the year before. Both sexes incubate the three to seven eggs at intervals of 5 to 90 minutes (except at night, when the male presumably incubates), with vocalizations marking the changeover. The young develop for about 25 days in the nest prior to fledging. The young are fed every 7 minutes at first, and up to 30 times an hour later on. Foods of this sapsucker are like those of _S. varius_; sap-sucking activities probably include more coniferous trees than in _varius_. Migration occurs in September and October and in the spring from March to May.

**Taxonomy.** Forms a superspecies with _S. varius_ and _S. ruber_. For features separating _nuchalis_ from _varius_ and comments on their hybridization, see _S. varius_ (p. 176) and Short (1969a). See _S. ruber_ (p. 179) for differences from that species and for details of hybridization between _ruber_ and _nuchalis_. More distantly related to _S. thyroideus_, two hybrids of _thyroideus_ and _nuchalis_ have been described, both from nonbreeding areas (southern Arizona and Mexico [Short and Morony, 1970]). _Sphyrapicus nuchalis_ is monotypic.
References

RED-BREASTED SAPSUCKER
*Sphyrapicus* [varius] *ruber*

**Color Plate 21**

**Range Summary.** Northwestern North America.

**Diagnostic Features.** Little to Small, weight 39 to 60 grams (*daggetti*), wing length 118 to 129 millimeters (*daggetti*) and 124 to 133 millimeters (*ruber*). Entire head red except black spot in front of eyes and white line from lores to nostrils, the red extending to nape and over the breast, generally obscuring black bases of feathers; no black crown patch; sexes alike.

**Description.** Bill as in relatives *S. nuchalis* and *S. varius*. Sexes alike, above black with restricted white spotting (*ruber*) or buff-white barlike marks in narrow lines converging down back (*daggetti*, less white than *S. nuchalis*). Rump and tail coverts as in *S. varius*. Wings black with white covert patch; white bars and tips narrower than in *S. varius* and *S. nuchalis*. Shafts as in *S. varius*. Black tail with narrower white bars on central feathers than in *S. nuchalis* and *S. varius*, and white border narrow or lacking. Tail/wing ratio 0.58 to 0.66. Entire head to nape, sides of neck, sides, and midbreast red, the red varying from purplish to crimson; only other colors in this area are white from nostrils to lores or occasionally rearward in *daggetti*, black spot in front of eye, and black around edge of lower bill (worn birds show some black on crown and hindcrown, and on breast where black bases show through). Red on upper breast to midbreast and sides, from head; clear area of pale yellow to yellowish white from midbreast to center of abdomen. Lower sides and flanks barred with irregular asymmetrical bars, forming streaks, but less barred than in *S. nuchalis*. Undertail coverts white with narrow black wedges or streaks.

Sexual features: No differences. Juvenile birds very like *nuchalis* but darker, without white in throat, with red tint over brown breast and throat feathers, and with black crown feathers (*ruber* is blacker above and below than *daggetti*). The sexes do not differ. The postjuvenal molt into adult plumages is rapid, and by late summer immatures are indistinguishable from adults, in contrast to *S. nuchalis* and *S. varius*. Eyes dark brown, legs and feet greenish gray, bill black.

**Distribution and Habitat.** Northwestern North America. Breeds from coastal southern Alaska southward through inland and coastal British Columbia and its islands; south along the coast generally west of the summit of the Cascade Mountains to northern California; in the Sierra Nevada Mountains and the various high mountain areas of southern California (San Bernardino, San Jacinto mountains). Winters within its breeding range (except parts of inland British Columbia) and southward to northern Baja California, coastal southern California, and occasionally Arizona. Frequents northwestern wet coastal evergreen forest and some drier inland habitats, especially aspen parklands and even yellow pine woods. Occurs up to 9500 feet or higher in the Sierra Nevada and Cascade mountains.

**Behavior.** Little known, but very like that of the Yellow-bellied and Red-naped sapsuckers
Sphyrapicus thyroideus

(see pp. 174 and 177). Displays are likely to prove somewhat different, for the sexes are alike in this species, but differ in S. varius — sexual discrimination therefore must be behavioral in S. ruber. Four to seven eggs are laid and the incubation period is 14 or 15 days. Bent (1939) quoted others who found that the young were fed by regurgitation, which, if true, contrasts with data from the other species. Vocalizations described by Bent seem very like those of S. varius (“jay,” “peurr,” “kee-a, kee-a,”) and a Red-headed Woodpeckerlike “high. strong, qué-oó,—qué-oó” (Bent, 1939, p. 154). Sapsucking and other foraging habits, including flycatching, are similar to those of S. varius. Bent (1939, p. 153) cites a paper listing 67 species of trees used by S. ruber for sapsucking. Ants make up a large part of the diet during summer.

Taxonomy. This species forms a superspecies with S. varius and S. nuchalis (see pp. 176, 177). Hybridization between S. ruber and S. varius is extremely limited, despite extensive contact in northeastern and east-central British Columbia and sympathy in places along the area of contact (Howell, 1952; Short, 1969a). There also are opportunities for hybridization of S. ruber with S. nuchalis in south-central British Columbia, in places along the Cascade Mountains, and along the Sierra Nevada Mountains. Although these species hybridize frequently in local areas of contact (see Howell, 1952), they behave as sympatric species hybridizing in a zone of overlap — no entirely hybrid populations are formed, apparently. Further studies are needed, but the indications are that we are dealing with species (it is likely that the strong differences of S. ruber, and particularly its lack of sexual dimorphism, act as a deterrent to hybridization with S. nuchalis and S. varius). S. ruber is the most distinctive of the three species, with its red head, lack of sexual dimorphism, restricted migratory habits, and much more rapid postjuvenal molt. It also (especially S. r. ruber) is somewhat larger than S. nuchalis and S. varius. Two subspecies occur: S. r. ruber of the northern and generally coastal areas and S. r. daggetti of northern coastal California and the mountains of central and southern California. S. r. ruber is larger than daggetti, and its back is blacker with pale markings restricted to spots rather than bars; S. r. daggetti also shows stronger black and white markings on the face, and juvenile birds are much paler.

References

WILLIAMSON’S SAPSUCKER

Sphyrapicus thyroideus

Color Plate 22

Range Summary. Western North America.

Diagnostic Features. Small, weight 44 to 64 grams, wing length 128 to 141 millimeters. Sexes differ greatly: Male black with yellow abdomen, white wing patch, and red throat; female brown and buff barred with a brown head, a pale yellow abdomen, and sometimes a black breast patch.

Description. Bill straight, broad across nostrils, chisel-tipped. Above, black glossed with blue (male) or buffy with broad blackish brown bars (female); rump white, uppertail coverts mainly white with black outer vanes. Wings black with large white patch on coverts and narrow white bars on outer flight feathers (male) or brown with buff bars on coverts and buffy
white bars on outer flight feathers (females). Both sexes barred on inner vanes of flight feathers and barred under wings. Shafts as in _S. varius_. Tail unbarred black, or black with white bars or streaks on inner pair of feathers in males; brown-black with more barring (on central and outer feathers, with traces sometimes on others) in females. Tail/wing ratio 0.57 to 0.64. Male with black head, narrow white line over ear coverts behind eye, and narrow white line from nostrils and lores to under ear coverts; small red patch on chin and upper throat. Female has variably colored head — crown tan with bars (sometimes streaks) or buff, often with black line over the eye sometimes connected, especially in worn plumage, around the hindneck as a black band; ear coverts buffy tan, also lores and feathers of nostrils; malar area tan with few to many black streaks, or fully black; throat usually streaked black on buff at sides and tan in center (where male is red), but may be black with a buff patch anteriorly (females rarely show red in throat). Male below is black on breast and sides, flanks irregularly black bar-streaked on white; bright yellow from center of lower breast to abdomen. Some females resemble males rather closely below, but most show paler yellow on breast to abdomen with buff and black barred sides and flanks (bars sometimes streaked and irregular as in males); breast variable, feathers black barred narrowly at tips and broadly at bases, so worn birds tend to show a black breast patch; fresh-plumaged birds more barred on breast, but sometimes showing a concentration of black in the center. Immatures rapidly undergo the postjuvenal molt, attaining adult plumage by late August or early September (as in _S. ruber_). In juvenile plumage the sexes differ markedly. Males are as adult males but are duller black without a gloss; the throat patch is white, not red; there is more white, especially around the nape, connecting with white over the eye and sometimes forming a patch around the nape; bases of black back feathers have white wedge-marks, sometimes showing as spots; wings more barred; tail more barred, never fully black; underparts as in adult, but black duller and yellow paler. Females are like adult females, but are browner and duller; crown less cinnamon, buff with more barring; ear coverts streaked; throat with little or no clear area (barred or spotted); more barring in wings and tail; darker cinnamon background below with heavier barring, a narrower clear area, no evidence of a black breast patch, and yellow of abdomen to breast much paler, even whitish. Eyes chestnut-brown, legs and feet dark gray, bill black.

**Distribution and Habitat.** Mountains of western North America from southern British Columbia south in the Cascade-Sierra Nevada mountain chain and beyond to the San Jacinto Mountains of California, various Nevada ranges, and south in the Rocky Mountains to northern New Mexico and central Arizona. Winters at lower elevations adjacent to breeding range, and southward to Texas and north-central Mexico (Durango, Sinaloa, Jalisco). Apparently females winter farther south than males, on the average. In the breeding season it is found in montane fir and spruce forests up to about 9500 feet in elevation. This sapsucker also frequents pine forests and frequently nests in pines, although in some areas it prefers aspens. In winter it moves into pines and pine-oak woodlands of mountain areas.

**Foraging Habits.** Its food is similar to that of other sapsuckers, including sap and phloem materials obtained by sapsucking, as well as insects, primarily ants (86 percent of diet when breeding in Colorado [Crockett, 1975]) gleaned from the tree surface during the breeding season. Modes of foraging include sapsucking, gleaning, some flycatching, and a little scaling of bark, probing, and pecking (other than to form sap wells). Occasionally the birds forage for ants on the ground at the bases of trees on which they have fed, probably following the ants out from the tree. Crockett (1975) found that Colorado males tend to glean more on the limbs and ground (latter difficult to conceive if females are on trunks more frequently
than males), and females more often on trunks. Smaller, thinner barked trees of diverse species are used in sapsucking, although birds in Colorado prefer Douglas firs and unhealthy or broken Ponderosa pines. Sap wells are drilled in the manner of Sphyrapicus varius, especially in the spring when sap is running. The shift to ants occurs when ants become available late in spring, but there appears to be a correlation (Crockett, 1975) with feeding of ants to the young birds, as bachelor males unsuccessful at securing a mate continue to utilize sap through the summer and do not switch to ants as do breeding adults. Carpenter ants (Crematogaster sp.) and wood ants (Formica sp.) are the usual fare among ants in the diet. Crockett (1975) reported both sunning behavior and “anting” behavior by this sapsucker.

Voice. Drumming is of the usual sapsucker type, rendered as “Bddddr-rdddr-rddr-rd-ta-ta-ta” in my notes from Montana. Variable, it consists of a roll followed by three to five short rolls or single taps. Often Drums are interspersed with Churr Calls; playback of Drumming evokes a response of either, or both, of Churr Calls and Drumming (Crockett, 1975). Its function has to do with aggressive assertiveness of a territorial bird, presumably both attracting a potential mate and warning other conspecifics of the calling bird’s “assertiveness.” Females drum in shorter bursts, generally more weakly than males. Drumming of Sphyrapicus thyroideus seems slower and more regular with longer beats than in sympatric S. nuchalis (Crockett, 1975). Specific signal posts (dead stubs or limbs) are employed for Drumming, about two to four marking each territory, and seem chosen for their resonating qualities. This species appears not to use mutual tapping (Crockett, 1975). There are at least six, and perhaps more, vocalizations. The common Churr Call varies and is given singly or, more usually, in series of up to six notes, rendered in my field notes from Montana as: “cheer-cheeur-cheeur,” “cheeur-cheeur-cheeur-cheeur,” “churr,” and “purr-purr-rurr.” Aggressive notes, they are employed toward conspecific and other birds at a distance, and even toward humans walking near a nest. According to Hadow (unpublished report, 1974), the call is slower than that of S. nuchalis. Crockett (1975) also considered this call as a location note of mated birds. The ca-haw note reported by Crockett may be a form of Churr Call, perhaps with a slightly different aggressive-alarm function than long Churr Calls. It is uttered in an approach flight and sometimes with the Bouncing Flight Display (Crockett, 1975; see discussion following). A variable set of notes given in series, designated by Crockett as Chatter Calls, “Rattle Calls,” and Intimate Notes, seems to represent a form of Wickalike call, an aggressive call conveying both threat and appeasement and varying accordingly. I choose to treat these as the Chatter Call (“Rattle” is inappropriate, as the calls do not resemble closely the Rattle Calls of Picoides and other species). Renderings from my notebook include: (1) a “ch-ch-ch-ch-ch,” variably slower (“ch-a-ch-a”) and more rapid in longer bursts, with some segments more emphasized and others less so (37 notes in one call); (2) a “pa-chik-chik-wik-wik-a-wik-a-wik” as from a male and female close together (also given by a male approaching and chasing a female); and (3) a “t-ch, t-ch, t-ch” series, a “wik-wik” series, and a “ch-ch-ch” series, all softly given in a precopulatory setting just before the male mounted the female. Crockett (1975) reported low Chatter Calls in nest-relief situations and in territorial establishment, with Bouncing Flight Displays and especially with Bobbing and “Wagging” Displays between interacting birds at close range. His “Rattle” Call was not described fully, and I consider this a rapid form of Chatter Call. Crockett also reported a guttural alarm Scold given at disturbances, a Scream Call delivered by birds caught and held by humans, and a Twittering Call of nestlings that rises in intensity when the birds are fed, as in the Chirp and Loud Chirp group calls of Picoides (Winkler and Short, 1978). Bent (1939, p.
160) described three of these calls: the Churr, the Scream, and the Chatter.

Displays. Crockett (1975) discussed six displays, some associated with particular vocalizations. The Crest Raised Display is similar to that of many woodpeckers (*thyroideus* lacks a distinct crown patch, usually found in birds that erect the “crest,” but related sapsuckers of the *varius* group have a crown patch), used as an indicator of assertiveness in mild threat. The Wings Up Display is given after a sapsucker has landed near another; it seems to be a threat display. The wings are raised high over the back, and the throat and breast are puffed out. A Bobbing-“Wagging” Display probably represents the combined Head Bobbing and Swinging displays of other woodpeckers (e.g., flickers, and other melanerpines). The head is both raised and lowered, and swung from side to side simultaneously; usually the high bill position is emphasized; the breast is puffed out; the body plumage is sleeked; and the crest is raised. A Chatter Call usually accompanies this aggressive display (which of course has both submissive and threat aspects, hence is used both in territorial encounters and intersexually). The Swinging aspect may be minimal or left out, as in a series of precopulatory displays seen in Montana. Crockett (1975) denoted two flight displays, the Exaggerated Bouncing Flight (a cumbersome term, with inference that there are less exaggerated similar flights) and the Moth Flight, but I find their distinction difficult to establish from his description. The former is ascribed to a territorial or courtship function, used in approach to another bird, in conjunction with a Churr or Chatter Call; upon landing, a Wings Up Display results toward an intruder, or a Bobbing-Swinging Display to a mate. The Moth Flight was observed at the end of courtship or territorial encounters, as a bird flew away at close range (5 to 25 meters); a “Rattle” Chatter Call accompanies it. I found that the Fluttering Flight Display of an incoming bird, with accented undulations and high and stilted wing beats differed little from the initial display of a bird flying off, although one can appreciate that the emphasis will vary depending on whether the side or front or back of a bird is presented to its “antagonist.” I saw members of a pair depart in Fluttering Flight Display, approach each other in such display, and circle in this display up and down about the nesting tree. It is clear that a departing bird drops the display quickly, evening out into normal flight, whereas in approach the bird begins the display at a considerable distance. Both fast Chatter and slower, Wickalike Chatters were used by displaying birds in Montana. Prior to copulation, described later, a male flew in Fluttering Flight Display to his mate and perched less than a meter above her calling (Chatter Call); both then Chattered as the male softly dropped down, still in Fluttering Flight, to perch beside her, then go through a series of Bobbing Displays (no side-to-side Swinging was evident) before copulating. Four forms of Chatter Call (“t-ch” series, “wik” series, “ch-a-ch” series, “ch-ch-ch” series) were used during these displays, at times two simultaneously. There is a precopulatory crouch also described by Crockett (1975).

Interspecific Interactions. Interactions occur with some frequency with other woodpeckers, e.g., *Picoides villosus* (personal observation; see also Crockett, 1975). Interactions with closely related, sympatric *S. nuchalis* are under study by Hadow, and some data are available. Both Crockett and Hadow (unpublished report, 1974) indicated that some interspecific territoriality occurs between *nuchalis* and *thyroideus*. It is uncertain to what extent territories of these species overlap, but they do meet frequently (despite statements of habitat separation in the literature), and both select aspens as the predominant nesting tree in Colorado (pines may be preferred elsewhere). Their interactions are less frequent than are encounters intraspecifically, e.g., in response to playback. Species of the nest tree and specific requirements seem identical in the two species in Colorado. If they maintain inter-
specific territoriality and do not overlap to a great degree, this would imply considerable mutual recognition of signals such as Drumming and Churr Calls, used in territorial proclamation and defense, casting doubt upon their function in reproductive isolation suggested by Hadow (unpublished report, 1974).

**Breeding.** Males return to the breeding grounds prior to females by about a week. Although defense centers on the nesting tree, territories of about 6 to 7 hectares are established and maintained, with both sexes participating in these activities. The nest is located in a suitable tree, usually the same tree in which the previous year's nest was situated. Most nests in Colorado are in live aspens, at 1 to 9 meters up, with a preference for trees bearing bracket fungi (Crockett, 1975). Several nests in Montana were 9 to 12 meters up Douglas firs. The male excavates alone, working several hours a day over 3 to 4 weeks, often with the female nearby. Nesting is in May and June, the young leaving the nest from late June onward. Copulation is preceded by various displays (see preceding discussion). The male mounts from the left side, curves its tail under and around that of the female, and slowly slips off to the left as he copulates; copulation lasts about 15 seconds (three cases in Montana). Three to seven eggs are laid; in Colorado there usually are four or five eggs (average 4.5) and three young fledge from most nests (Crockett, 1975). The male attends the young at night, and he performs most of the nest sanitation, carrying fecal sacs to a nearby tree, then tossing them away, or doing so as he leaves the nest. Both sexes share about equally in diurnal incubating and brooding, in feeding the young, and in defense of the nest. The young hatch in 12 to 14 days and are brooded constantly for their first 2 weeks. Feeding rates vary, being low at first, but increasing, then diminishing just prior to fledging (probably the adults then carry more food). Regurgitation has not been reported, although most ant foragers do regurgitate. Crockett reported insects held in the throat and mouth of *thyroideus* carrying food to the young; lack of regurgitation suggests that ant foraging is a derived feeding habit in *thyroideus*. Ants make up most of the food fed to the young at five to 20 feedings per hour. In the third week after hatching, food is brought every 3 to 4 minutes (this feeding rate clearly precludes regurgitation). At this time many of the insects are obtained in trees adjacent to the nest site. Hawks such as the Goshawk (*Accipiter gentilis*) preying on adults and fledged young, as well as weasels (*Mustela* sp.) climbing to the nest holes, especially if they are low, are the chief predators of the breeding period in Colorado (Crockett, 1975). Fledging occurs at 3 to 4 weeks of age. Although fledged birds sometimes more or less remain together, they usually disperse rapidly, even the day of fledging; hence, independence is achieved as rapidly or more so than in any woodpecker. Bachelor males, apparently unable to obtain mates, occur with some frequency in Colorado. They maintain usually small territories, feed on sap rather than ants, and attempt to attract and court paired females that pass near or through their territories (Crockett, 1975). The young birds acquire the adult plumage rapidly, during July and August; adults molt into the early fall.

**Roosting.** Fledged birds do not return to the nest to roost. Winter roosting sites apparently are not excavated, and winter distribution may be affected by availability of holes suitable for roosting.

**Migration.** Migration occurs in September and October, with Rocky Mountain birds making extended migrations to the Mexican border area and southward. Females appear to migrate farther south than males (Crockett, 1975). Little is known of winter foraging, which apparently is diverse (Crockett, 1975), or of winter territoriality, if any. Northward migration takes place from March to early May.
Taxonomy. Rather closely related to the *Sphyrapicus varius* complex, it has hybridized twice with *S. nuchalis*, which is almost completely sympatric with *thyroideus*. Although often found at lower elevations and more often in deciduous trees (Short and Morony, 1970). There are two weakly defined subspecies, characterized entirely by the size of the bill. *Sphyrapicus t. thyroideus* occupies the range of the species in California and northward through the Cascade Mountains to British Columbia; its bill is longer, broader, and deeper than that of *S. t. nataliae*, which occurs from British Columbia southward in the Rocky Mountains and Great Basin ranges to Arizona and New Mexico.

References

Genus *Xiphidiopicus* Bonaparte

Very distinctive by virtue of its green dorsal plumage and the white-spotted crown of the female, this monotypic Cuban genus nonetheless resembles melanerpine species in its throat pattern, forehead patch, small bare orbital area, ventral streaking and red breast patch, yellow abdominal patch, and behavior (vocalizations, sociality). The bill is deep as well as broad, and somewhat chisel-tipped. The tail is of the general picine pattern (central rectrices concave on lower surface, shafts hard, bars partly modified near tip), and the foot is typical of arboreal picids, with a long fourth toe.

CUBAN GREEN WOODPECKER

*Xiphidiopicus percussus*

Color Plate 23

Range Summary. Cuba and nearby islands.

Diagnostic Features. Small, weight 48 to 97 grams, wing length 102 to 117 millimeters in *insulaepinorum* and “gloriae,” 108 to 139 millimeters in *percussus*. Unmistakable long-tailed green woodpeckers with streaked underparts, a yellow belly, a black and red patch along the center of the throat, a black and white face pattern, and a crown all red or black with white streaks.

Description. Bill long, rather broad across nostrils, straight, and with a slight chisel-tip. Very variable in size — island forms tending to be smaller; montane populations larger. Above, green, varying from yellow-green to gray-green in tone, brighter (more yellow) on rump and showing vague or no dark bars on the back; rump with dark shaft streaks and pale and blackish barring usually, sometimes strongly, evident; uppertail coverts duller than rump feathers and more strongly streaked or barred. Wing coverts as back; flight feathers mainly brown, with broad white bars on inner vane and narrow white (primaries) or greenish (secondaries) bars on outer margins; underwing brown and white barred; coverts with stronger pale, even greenish, bars. Shafts brown above; horn brown below, becoming whitish at tips. Tail long, brown above with a peculiar pearly gray cast and showing pale bars, especially on outer feathers; below, barred brown and gray on outer two or three feathers, unbarred brown central feathers (barring evident on all feathers of *insulaepinorum*).
Xiphiopicos percussus

Tail/wing ratio 0.68 to 0.80. Hindcrown and nape red, forming small red crest. Forehead, lores, broad line over eye, lower cheek, sides of throat, and malar region white (lores show some buffy or rarely reddish); dull blackish, narrow line behind eye. Throat with central area forming a patch, enlarging from the bill posteriorly; black in front but becoming red (feather tips red, bases black) rearward, forming a large red (or red and black) patch on the uppermost breast. Unmarked yellow (occasionally showing orange) patch on lower breast and center of abdomen, pale in insulaepritorum; rest of breast greenish yellow with narrow black streaks. Sides and flanks yellow-white, tinged greenish, with black streaks anteriorly, posteriorly becoming streaks and bars and then heavily barred on rear of flanks, rear of abdomen, and undertail coverts.

Sexual features: Males heavier than females and longer billed (bill averages 20 percent longer in percussus; my samples show no overlap in bill length, race for race, using 120 specimens). Crown of male red (forming red crown-nape area), usually with black bases evident; female has anterior two thirds of crown black with very narrow white streaks. Also, female more barred below, with ventral yellow patch more restricted than in male. Immatures more barred below and on rump than adults; abdominal patch more restrictive, but more frequently orange or even reddish; back with more fine bars; tail more barred; throat-breast patch much more brownish black and less red; and red sometimes extending onto upper back. Immatures of both sexes have red mixed with black on the forecrown, the females less so; white-streaked black crown feathers soon replace these in females. Eyes brown, legs and feet grayish olive or green, bill blue-black.

Distribution and Habitat. All of Cuba, the Isle of Pines, and certain offshore islands (e.g., Cantiles Key), accidentally reaching Hispaniola at times after storms (fide Mrs. D. Dod, one record). Occurs in open woods, especially of palms, and in dense woods and forests at all elevations. Common, but less so than Melanerpes superciliaris, which is abundant in more open situations.

Behavior. Poorly known. Its call is a “sharp ta-ha, not unlike the cry of a Yellow-bellied Sapsucker” (Sphyrapicus varius [Bond, 1947, p. 138]). Usually found low in dense vegetation, it clammers up vines and trees, gleaning and tapping for insects. Somewhat social, several birds may be seen together. Foraging involves considerable gleaning, and insects of fairly large size are taken from the bark and foliage. The birds are aggressive toward Melanerpes superciliaris, at least when nesting, as Walkinshaw (1953, p. 265) mentioned both birds of a pair chasing these woodpeckers “with extreme vigor.” Nesting commences in February and March and lasts until about August. Immatures out of the nest are known from 19 March (Isle of Pines) to 7 October (also Isle of Pines), although the large majority of specimens representing fledged birds date from June to September. Walkinshaw (1953) described nests in “bottle palms,” including two nests within nests of the termite Termes ripperti located on this species of palm tree, all at 4 to 5 meters above the ground. Territory size; degree of sociality, if any, in nesting; and clutch size are not known. Hatchlings are fed by both adults, which carry (large) insects directly in the bill (do they also regurgitate food?). Both parents feed regularly at 2- to 9-minute intervals (Walkinshaw, 1953; total 76 feedings, 38 by each sex), also indicating direct rather than indirect feeding. Adults foraged from the vicinity of the nest to as far as 400 meters away. Other nesting data are unknown. The molt occurs after the long breeding season, from September to December.

Taxonomy. No close relatives. Its intricate color patterns resemble to some extent those of species of Melanerpes (formicivorus, cactorum) and Sphyrapicus. Melanerpes striatus may be
related ancestrally to the ancestor of *X. percussus* (see Olson, 1972). The species is very variable, including size parameters. There is ample evidence that eastern highland Cuban birds average larger and perhaps brighter, e.g., specimens from Sierra Maestra. Noting this variation, I see no need to treat formally any local highland population (e.g., "monticola" of the Cuchillas de Toa, Oriente Province; Garrido, 1971) or to recognize a generally distributed highland race (the isolated highland populations may have parallel adaptation but not represent a single population), preferring simply to describe the tendency of highland birds to reach larger size. Two small subspecies have been treated, *insulaepinorum* of the Isle of Pines and *gloriae* of the Cantiles Island (Garrido, 1971). The former is smaller than nominate *percussus*, although there is considerable (50 percent) overlap, and it is paler, especially on the underparts, and has less extensive red on the throat. It is recognizable taxonomically, especially since it represents an insular isolate. The Cantiles Island population, from the Canarreos Archipelago just east of the Isle of Pines, resembles *insulaepinorum* in size and some aspects of color (less yellow below than *X. p. percussus*); its slightly smaller bill and other minor tendencies cited by Garrido (1971, p. 6) do not seem sufficient to merit separate nomenclatural recognition for this population, which may have been derived from the Isle of Pines. Thus I treat *gloriae* as a synonym of *insulaepinorum*.

**Tribe Campetherini**

**Genus Campethera G. R. Gray**

This wholly African genus comprised of 10 species is green backed and shows yellow in the shafts of the flight feathers. Sexual recognition features include a malar stripe, a nape patch, and red versus white-spotted crown. The juvenile head pattern of some is very colapentine. The bill is curved along the culmen, not very broad across the feathered nostrils, and pointed or with a small chisel-tip. The tail has stiffened shafts, but the vanes are only slightly concave on the lower surface. The feet show a rather short hallux, and the fourth toe is not longer than the front toes.

**FINE-SPOTTED WOODPECKER**

*Campethera [nubica] punctuligera*

**Color Plate 24**

**Range Summary.** Central Africa.

**Diagnostic Features.** Small, weight 56 to 74 grams, wing length 102 to 125 millimeters. A green-backed woodpecker bearing tiny spots on yellow-white underparts, spots mainly on breast. Barely, if at all, meets its close relatives: the darker backed, ventrally large-spotted *C. nubica*; and *C. bennettii*, which is much more heavily spotted below and has white or dark brown ear coverts in the region where contact is remotely possible (eastern Zaire).

**Description.** Bill moderately long, broad at base, narrow across nostrils (see *C. nubica*), and with culmen curved moderately. Above, green to yellow-green with yellow-white shaft streaks broadening to form on each feather one to three spots or bars; feather tips yellowish, giving three-tone effect; rump finely barred. Wing coverts as back but more spotted, less barred; brown flight feathers barred white or yellow-white; underwings yellow-white with dark bars, sometimes breaking to form large yellow-white patch. Shafts yellow below, extending over lighter colored parts of vanes; above, yellow in tail, dusky yellow in primaries, dusky in
Campethera [nubica] punctuligera

secondary. Tail barred brown and yellow to dusky yellow-white with conspicuous yellow shafts. Tail/wing ratio 0.51 to 0.59. Nape and hindcrown red. Chin unmarked dull white or peppered with tiny spots; throat yellower, spotted. Narrow white line over eye, broader white line below eyes to lores and nasal tufts. Ear coverts white below, streaked black above, forming a variable black eye stripe continued at front of eye, where separating white over eye from that of lores; fine black spots at rear. Below, yellow-white to pale lemon-yellow, bright on chest and whiter to front and rear; very fine black spots, at least on breast to sides of neck, less so or lacking on throat, flanks, and sides (more spotted birds are barred variably on flanks).

Sexual features: Male with red and black malar stripes and with crown feathers broadly red tipped over a gray base; female with variably streaked or spotted black and white malar stripes, forehead to central crown black, spotted (balia) or streaked (punctuligera) with white. Immatures darker olive-green than adults, often with blacker bars and white bars more spotlike and obscured by yellow; paler yellow shafts; blacker malar stripes and larger black eye stripe; below, less yellow, more buff; sexes alike, crown black from center to forehead, lacking white spots. Eyes with varying shades of red, from pink to violet; brownish gray in juveniles. Legs and feet greenish gray; less green, more brownish or bluish gray in immatures. Bill gray to black, paler gray below with black tip; white egg tooth and gape swellings in nestlings.

Distribution and Habitat. From Senegal and Gambia, east to the Nile River in southern Sudan, and south to central Ivory Coast, Nigeria, northern Cameroun, and the upper Uele Valley region of Zaire. Habitat is savannas of western Africa west of the range of its allo-species C. nubica and C. bennettii.

Foraging Habits. This woodpecker forages on trees and on the ground at the bases of trees, consuming ants and termites. Chapin (1939) considered this the most likely Congolese woodpecker to forage on the ground, but never saw it so feeding. However, Bannerman (1933; p. 438) reported finding it often on the ground probing at the bases of trees, knocking away termite-nest soil, and feeding on termites. It also gleans ants from trees and taps at least occasionally (Bannerman, 1933), although Bates (1930, p. 287) said of it in West Africa, “It is silent, not even tapping as it pecks ants.” All authors but Serle (1957; Nigeria) list only ants and termites as its food; Serle listed ants and undetermined other insects. Stomach contents indicated on labels of 22 specimens list ants (usually “small” ants, “black” ants, or “ants and their pupae” or their larvae) or, in five cases, ants and termites. Termites are listed for two other specimens; all three juvenile birds for which data are available list termites or termites and ants. Birds forage generally in pairs or in family parties of up to four individuals. Several authors found them occasionally feeding with mixed species foraging flocks.

Vocalizations. Bannerman (1933) reported a four-syllable call heard in West Africa during May and June (breeding season). Bates (1930) mentioned loud cries heard when two birds were together. Chapin (1939, p. 565) heard a repeated, kestrel-like, “shriel metallic ‘kweeyer’” from a male. I have heard nubicalike, loud calls recorded by C. Chappuis.

Breeding. In West Africa C. punctuligera nests during the rainy season in May and June (Bannerman, 1933; Serle, 1957, mentioned a female taken in eastern Nigeria during February and having three ruptured follicles in its ovary, thus having just laid eggs). Bannerman noted a pair excavating a cavity in a tree during May, but the cavity was abandoned. Farther east in Zaire there is much more diversity, although Chapin (1939) gave the main breeding season
for the region as early November to late April, noting young (two or three birds per nest) from January to April. Females with partly enlarged to enlarged ovaries are known from the upper Uele River area in November (specimens in Amer. Mus. Nat. Hist.). Juvenal birds in collections from the Uele River region bear dates between 1 January and 3 June. The annual molt follows the breeding period; molting birds represent the months of June to October.

**Taxonomy.** Forms a superspecies with *C. nubica* and *C. bennettii*. Southern Sudan is an area where *C. punctuligera* may contact *C. nubica*: their interactions merit study. Various authors, including Chapin (1939) and Goodwin (1968), have suggested that the three forms may comprise a single species. Goodwin (1968, p. 20) thought *C. p. balia* "largely intermediate" between *C. punctuligera punctuligera* and *C. nubica*, but *balia* largely extends clinal variation found in *C. p. punctuligera*; its slightly smaller size compared with the latter suggests no trend toward *nubica*. I know of no evidence for interbreeding between *C. punctuligera* and these other species. There are two races of *C. punctuligera*, the clinally variable western African *punctuligera* and an eastern (Sudan to eastern Zaire) subspecies, *balia*. The latter is smaller, greener above (less yellow), generally whiter and less yellow, with larger spotting below than *punctuligera* ("batesi"); females have distinctly round crown spots, contrasted with the streaked crown of females of *punctuligera*. Eastern *C. p. punctuligera* tend toward *balia* in color, but Nigerian specimens are the longest winged birds within the species.

**References**

**BENNETT’S WOODPECKER**
*Campethera [nubica] bennettii*

**Color Plate 24**

**Range Summary.** Southern Africa.

**Diagnostic Features.** Small, weight 61 to 86 grams (Rhodesia and Zaire; Verheyen, 1953), wing length 103 to 129 millimeters. It is like its close relatives, *C. nubica* and *C. punctuligera*, which it does not meet. Differs from *C. punctuligera* by less green color above, larger spots below, unspotted hindneck, males (except *scriptoricauda*) with white cheek patch and no eye stripe, and females (except *scriptoricauda*) with brown chin, part of throat, and ear coverts. Differs from *C. nubica* by yellower color above, yellower and less clearly barred tail, more curved culmen of bill, and (except *scriptoricauda*) white cheeks of male and brown cheeks and throat-chin patch of females.

**Description.** Bill moderately long, narrow between nostrils (see *C. nubica*, p. 192), culmen curved moderately. Above, barred brown and white, overlain by yellow, giving three tones; only very worn birds as brown-green as *C. nubica*; occasionally more spotted than barred. Wings brown edged greenish or yellow, barred yellow-white on inner vanes; coverts like back but more spotted. Shafts very yellow above and below, extending into vanes of tail feathers and underwings. Tail brown and yellow, usually vaguely barred, but bars lacking in some; strong yellow suffusion above and below (underside nearly like yellow-shafted forms of *Colaptes auratus*); tips often black. Tail/wing ratio 0.51 to 0.61. Nape and hindcrown red.
Campethera [nubica] bennettii 189

Very narrow white line over eye; lores white, separated by black before eye from white line over eye. Below, yellow-white or greenish white, tinged gold, especially on breast; moderate-sized round to fine streaklike spots, occasionally (capricorni) unmarked; flanks usually barred; undertail coverts white, spotted or not.

Sexual features: Male has red over brown- to black-based malar stripes; forehead and crown red over gray basal color, usually with unmarked white to gold throat and chin and with white ear coverts connecting with white under and over eye. Some males have brown traces or moderately brown throat and ear coverts, approaching female; in scriptoricauda throat and chin spotted with black and ear coverts white, streaked black, dorsally forming black eye stripe (all males and females of scriptoricauda at my disposal have distinct brown feathering just behind and above the eyes, color as in females of other races of bennettii). Females with mainly or entirely white malars, crown to forehead black with moderate to large white spots; anterior throat and chin variously cinnamon brown, red-brown, chestnut, or black; ear coverts like chin, except tipped white dorsally and at rear, continuous with brown line under eye to nasal tufts (in scriptoricauda, throat, chin, and ear coverts as in males of this race, see above). Immatures as adults, but spots larger below; back darker with less white barring and more spotting; shafts paler yellow. Sexes differ in male having blacker malar stripes and fewer or no white spots in crown; crown white spots finer than in adult females; molting females have brown chin color coming in before adult, large-spotted crown (three of nine juvenile males have some brown on chin and ear coverts). Eyes various shades of red in adults, dark brown in immatures. Legs and feet between blue-green and gray-green. Bill dark (slate) with a paler base in at least some individuals other than in scriptoricauda (see Mackworth-Praed and Grant, 1962, p. 574), which has a more extensive pale yellow base of the (lower) bill (specimen labels; J. Vincent, 1935; Mackworth-Praed and Grant, 1962).

Distribution and Habitat. From southeastern Zaire, Angola, and Tanzania to Southwest Africa, northern South Africa and Mozambique. Habitat is savannas, preferring open woods with grassy and bare places between trees (e.g., Brachystegia woodland) and areas of thorn scrub, up to an elevation of 4100 feet (Katanga and Zaire; Chapin, 1939) and even 5000 feet (Malawi; Benson, 1940).

Foraging Habits. Forages on the ground to some extent (Priest, 1934; Mackworth-Praed and Grant, 1962) and extensively so in some seasons and at some places (Satara in Kruger Park; Short, 1971d). During two days in September at Satara five Bennett’s Woodpeckers foraged on the ground for 85 percent of their foraging time. When on the ground, they hop about, sometimes stepping in pivoting (Short, 1971g, fig. 9) as they scan, pick, and probe for ants in the earth. Arboreal foraging is by scanning, picking, probing, and occasional tapping, especially at crevices or broken places frequented by ants. At suitable sites ants are “tongued” into the mouth with little or no tapping action of the bill or movement of the body for minutes at a time. Various authors report this species feeding upon insects and larvae, obtained by tapping, but I can find no mention of insects other than ants or of specimens with indications of food other than ants and termites (one case for latter), except for Priest’s mention (1934, p. 520) of beetles and “grubs,” in addition to ants and termites. This woodpecker must be considered to consume primarily ants and termites. J. Vincent (1935, p. 17) mentions scriptoricauda as foraging arboreally using backward movement, tail first, for “prolonged periods.”

Vocalizations. Not well known. I heard a Long Call, noted as “wi-wi-wi-wi,” from an adult
male at Kruger Park in September. Priest (1934, p. 520) reported a “keek-keek-keek-keek,” probably equivalent to the Long Call just mentioned. A “loud squeaking chatter very like that made in display by Bennett’s Woodpecker” was mentioned by Mackworth-Praed and Grant (1962, p. 576) for C. b. scriptoricauda, which, according to Benson (1942, p. 300), “calls like C. bennettii.” A commonly heard call is a “chaur” note, uttered by single birds or individuals in groups of two or three (Short, 1971d). A “coo - r - a-a-a-a,” with a soft a, was noted for C. B. bennettii in Malawi by Benson (1940, p. 431). Other vocalizations reported are a “deep bell-like note” (Mackworth-Praed and Grant, 1962, p. 574; see also McLachlan and Liversidge, 1957), a “persistent tittering chatter” during display (see discussion below; J. Vincent, 1935, p. 17), and a loud, fast Wickalike call, “two-puddley, two-puddley,” of birds engaged in an aggressive interaction in Rhodesia (Harwin, 1972, p. 184). This species is not known to drum.

Displays. J. Vincent (1935), p. 17) described the following episode involving Bennett’s Woodpeckers in Mozambique: “When the male was first seen it was uttering a persistent tittering chatter, which reminded me of a Phoeniculus purpureus, the while running up and down a low sloping branch towards the hen and back again; now and again it also flipped its wings and nodded its head.” The female remained motionless during the male’s activities. Harwin (1972, p. 183) illustrated a Wing Waving Display and a Tail Spreading Display of two birds. The Wing Waving was by an intruding male, which was attacked by a pair of birds (the pair were engaged in excavating a nesting cavity). I observed Bill Directing displays by dominant birds in instances when they advanced toward and supplanted another individual. Males seem completely dominant to females. Priest (1934) found that paired birds maintained contact by tapping on trees or by calling.

Interactions With Other Species. I noted a curious association of Bennett’s Woodpeckers feeding on the ground with glossy starlings of two species (Lamprotornis australis, Lamprocolius nitens) in Kruger Park. This seems to be an association of a less terrestrial species (woodpecker) with terrestrial species (starlings), apparently benefiting the former through its utilization of the surveillance modes of the highly social, terrestrially adapted starlings (Short, 1971d).

Breeding. Nesting occurs from November to February in Angola (immature specimens), in December and January in Tanzania (specimens), in October and November in Malawi (both bennettii and scriptoricaud), from August (specimen) to November (with a peak in October) in Zambia and Rhodesia (Benson and Pitman, 1963), in November and December in Transvaal (Clancey, 1970b), and from September to November in Katanga, Zaire (immature-plumaged specimens with brown eyes noted until March). Chapin (1939) reported a late October nest in a tree 5 feet above ground, containing two young birds. Three eggs is the clutch size of scriptoricauda, which nests in a hole in a dead tree, especially dead palm stubs (Mackworth-Praed and Grant, 1962). In Rhodesia, A. W. Vincent (1946) recorded a nest on 11 November in a perpendicular bough of a Berlínia globiflora tree, 11 feet up, with an opening 2 inches in diameter and an inside depth of 8 inches for the cavity; the nest contained three eggs. The same author reported a nest on 9 October with four fresh eggs and another on 22 November in Katanga with eggs about to hatch. The eggs were a foot down from the entrance of the cavities, one of which was at 18 feet in a bare, dead tree; the other was at 25 feet in a tree at a point where a bough had broken, leaving exposed a large bare area of wood. Priest (1934) described nests in Rhodesia from 6 to 25 feet above ground, with oval openings measuring 45 by 40 millimeters or less, with eggs (usually three, once four) situated at the bottom of a 6- to 9-inch deep cavity. Harwin (1972, p. 184) mentioned
Campethera [nubica] bennettii

a pair in Rhodesia during November excavating a nest in a dead limb of a Baikiea plurijuga about 4 meters above the ground. Both sexes took part in the excavating. Both sexes incubate, according to Priest, and the same nest may be used for as long as 3 years. Also, a new nest hole may be excavated below the cavity used in previous years. Priest reported the case of an excavating bird working at a tree scheduled to be removed; he placed a stone tightly in the freshly excavated entrance to discourage the birds, so that they would choose a new site in safer surroundings. However, the woodpecker (or two woodpeckers) persistently worked around the edge of the stone for most of 2 days and had nearly succeeded in dislodging it before the tree was cut down. A group of five birds at Satara, Kruger Park, in September appeared to be composed of a pair and three subadults (two males, one female). Assuming that the breeding season commences after the rains begin (October, November), the family party I saw must have been together for nearly a full year. The adult male uttered the only Long Call, and it tolerated only the presumed adult female close to it. The subadult males associated closely, without aggression. However all five birds frequently foraged loosely together on the ground and in scattered trees about the center of the Satara camp. It is likely that the subadult males and female were driven off by the adult male shortly thereafter, as the breeding season commenced (if indeed they had not bred in July and August, producing the three birds seen accompanying them in September). Molt occurs following the breeding season, for example in February to July in Angola, in May in Mozambique (scribericauda), and in April and May in Zaire.

Migration. Clancey (1964a), following several earlier authors, noted that populations of C. b. bennettii may be to some extent migratory in very arid regions and (p. 165) that C. b. capricorni “is almost certainly also subject to such movements,” that is, from drier areas to more mesic nearby regions prior to the winter dry season. It is likely that such movements, along water courses out of drier areas and back into them prior to the breeding season, occur; but I doubt that these migrations cover more than 100 miles.

Taxonomy. Forms a superspecies with C. punctuligera and C. nubica; possibly all are conspecific. C. bennettii is polytypic. I recognize three races, the southwestern capricorni, bennettii to the north and east, and scriptiona in the northeast (northern Mozambique, southern Malawi, southern Tanzania). Except for the last-mentioned races, the variation is too extensive and traits too unstable to permit recognition of subspecies. If Clancey and others are correct that some migration occurs in this species, gene flow, and hence variation, are apt to be enhanced. C. b. capricorni is yellower below, with generally fewer markings on the underparts and with a whiter rump and uppertail coverts. This race too has the blackest throat and ear coverts (females), although browner throated birds match bennettii. Eastward there is a paling of the throat and ear coverts, culminating in C. b. “vincenti,” which is pale brown throated (note that this pertains to females, although scattered males of both capricorni and bennettii show brown in the throat and ear coverts). C. b. scriptiona variably has been considered as a race of C. nubica (Peters, 1948), of C. bennettii (Benson, 1952; White, 1965), and as a separate species (van Someren, 1922; Mackworth-Praed and Grant, 1962). I consider it a race of C. bennettii (Short, 1973b) because on the whole it resembles that species more closely than it resembles C. nubica, including its morphological features and aspects of behavior.* It is very doubtful that scriptiona could represent a species distinct from the closely related C. nubica and C. bennettii.

*There also is evidence of sympatry with C. nubica (see p. 193). I now have examined 51 adult scriptiona, and data from them fully substantiate details in Short (1973b).
Reference

NUBIAN WOODPECKER

Campethera [nubica] nubica

Color Plate 24

Range Summary. Central Africa.

Diagnostic Features. Small, weight 47 to 70 grams, wing length 95 to 118 millimeters. A green-backed, spot-breasted woodpecker resembling its close relatives C. punctuligera and C. bennettii, but contacts them barely if at all. Ventral spots larger than in C. punctuligera; back browner, much less green, more barred or spotted white; and tail clearly barred, barring not obscure. Differs from C. bennettii by being greener, more white-spotted, and with less-barred upperparts, black and white streaked ear coverts, more distinctly barred tail, and straighter, less curved upper bill.

Description. Bill moderately long, rather straight along culmen, and broader between nostrils (3.2 to 4.2 millimeters) than C. punctuligera (2.5 to 3.5 millimeters) or C. bennettii (2.7 to 3.2 millimeters). Above, olive-brown with white spots and spot-bars, or bars, feathers bearing yellowish tips; rump barred. Wing coverts as back; flight feathers brown barred on inner vanes with white or yellowish white, bars occasionally breaking to form yellowish undertail patch. Shafts strongly yellow above and below (more yellow than C. punctigula), dusky only at tips of upper surface. Tail clearly barred brown and dull yellow, shafts and entire ventral surface yellow. Tail/wing ratio 0.53 to 0.64. Nape and hindcrown red. Chin buffy white, usually unspotted (spotted in some Ethiopian birds); throat spotted. Broad white line over eye and under eye connecting to nasal tufts and lores. Ear coverts white below, gradually becoming heavily streaked with black above, forming a black eye stripe which continues in front of eye (separating white of lores and over eye); sides of neck white spotted with black, connecting behind nape patch. Below white or buffy white to yellowish white with large black spots on breast and sides, forming bars on flanks, spotted undertail coverts, belly usually unmarked, but sometimes heavily spotted or barred; spots streaklike in some cases (subadults?).

Sexual features: Male has gray-based, broadly red-tipped crown and forehead and mainly red (partly black) malar stripes; female with black crown bearing large white spots, and malar stripes black spotted with white. Immatures browner and less yellow and green above with paler yellow shafts; underparts more heavily spotted and barred, including belly; breast marks more wedge-like or forming streaks (like C. abingoni), and throat and chin often spotted or streaked. Juveniles of both sexes have a black crown, variously unspotted or finely white spotted; males lack the red malar stripes of adults, and hence are like juvenile females. Eye color variably pink, red or purplish in adults, gray or gray-brown in young birds; skin around eyes gray. Legs and feet grayish olive to olive-gray. Bill dark horn color, dull gray, gray or blackish, paler below, becoming buffy whitish on the underside.

Distribution and Habitat. Occurs from northern Sudan and Red Sea through Somalia and Ethiopia, south to northern Tanzania, and west to eastern Zaire. It favors savannas throughout its range and does not enter (wet) forests. In Kenya and Ethiopia it reaches elevations of 6000 feet, and it extends upward to 5000 feet in the Ruwenzori region.
Foraging Habits. Diverse foods have been cited, including spiders, tree-ants, and boring beetles and their larvae (F. J. Jackson, 1938). No one has reported ground foraging in this woodpecker, so it is assumed that these foods are gleaned from the bark or from under the bark by tapping. Jackson (1938, p. 745) reported that Nubian Woodpeckers in Kenya are partial to baobab fruits, which they tap “to drive out ants and other insects.” It seems likely that *C. nubica* will prove to feed at least occasionally on the ground in the vast savanna area it occupies.

Voice. Its main call is a long, resounding series of screaming “wee” notes, increasing in tempo, a “wee-wee-wee-wee-week-kweek,” often repeated and answered by the mate or by other birds nearby. This was the “loud, sharp, and shrill” metallic call ending in a “squeaky trill” reported by F. J. Jackson (1938, p. 744). Chapin (1939, p. 564) also mentioned its “sharp metallic note,” like “kring-kring-kring,” increasing in tempo, then dying out. Its voice, according to Chapin, is “closely similar to *C. punctuligera balia*,” as is its behavior generally. Simultaneous, duetlike calling of pairs has been noted in Kenya.

Breeding. Nesting varies greatly in time throughout the Nubian Woodpecker’s range. Chapin found a nest 7 feet above the ground in an old, rotten tree (*Erythrina*) stump, with a male incubating, on 5 February at Semlik in the Congo. He also mentioned (1939, p. 564) a female incubating eggs in a natural cavity of an acacia tree (only the entrance had been worked by the birds) on 6 June at Kidong (= Kedong) Valley in Kenya. June and July seem to be the main nesting period in Uganda and Kenya, with young reported until November (F. J. Jackson, 1938). I had evidence of nesting north of Mt. Kenya during October, at an elevation of 6000 feet. In southern Ethiopia birds with enlarged gonads have been taken in March, June, and July (elsewhere in Ethiopia nesting occurs in November to February [Friedmann, 1930]); and in the Sudan, eggs and young occur in May (Lynes, 1925). All of these times pertain to *C. n. nubica*. Somali dates for nesting of *C. n. pallida* are in January and February (Friedmann, 1930). The annual molt follows the nesting period. Several authors have noted the rapidity with which juvenile birds assume the adult plumage.

Taxonomy. Forms a superspecies with *C. bennettii* and *C. punctuligera*. Relationship very close; conceivably these are conspecific. A comparative study of these three putative species, and especially of their interactions where they are in contact in the breeding season, would be enlightening. Supposed sympathy between *C. nubica pallida* and *C. bennettii scriptoricauda* has not been demonstrated fully on the basis of breeding birds in eastern Tanzania, but there are two adult males of *pallida* and an adult male of *scriptoricauda*, all typical, in the Copenhagen Museum collected on 15 August 1967 on Mt. Kilimanjaro, hence sympathy is likely. Weakly polytypic. It seems that birds of xeric habitats throughout the range of *C. nubica* match the eastern *C. n. pallida* in color. Friedmann (1930) mentioned that montane birds throughout the range of *C. nubica* tend to be darker, and lowland birds lighter. Sudanese and some western Tanzanian birds fully match Somaliland birds ascribed to *pallida*; and southeastern Ethiopian birds, supposedly *pallida* (White, 1965), are as dark as *nubica*. The likelihood of mosaic evolution of paler and darker populations makes it difficult to define races in this woodpecker; supposed size differences (White, 1965) between *nubica* and *pallida* do not seem to hold, as *C. n. nubica* varies greatly (see also Friedmann, 1930, for measurements). I hesitate to recognize *pallida*, except as limited to Somalia. Up to one quarter or even one third of Ethiopian birds show spotting or streaking on the chin. Of 16 specimens from four southern Ethiopian localities (Boule Boulo, Dire Daoua, Maraco, Lake Zuai), 10 show some markings on the chin, and three are fully as spotted as *C. bennettii scriptoricauda*. 

*Campethera* (*nubica*) *nubica*
References

GOLDEN-TAILED WOODPECKER
Campethera [notata] abingoni

Color Plate 25

Range Summary. Africa.

Diagnostic Features. Small, weight 50 to 76 grams (abingoni, anderssoni, mombassica), wing length 100 to 128 millimeters. Variable, breast from black with white spots to white with broad black streaks, but always showing black streaking. Black spots absent or restricted to abdomen. Back yellow-green barred to spot-barred with white. Ear coverts white or streaked black and white.

Description. Bill moderately long and broad across nostrils, slightly curved culmen. Variable above, usually three tones: olive-brown to gray-brown, pale yellow-white, and greenish yellow (tips), barred but spot-barred in some (two tones above, yellow-green with fine yellow spots in mombassica); rump barred, dark bars narrower than on back, becoming white with narrow bars or almost no bars in some anderssoni. Wing flight feathers brown, barred white narrowly on outer edge, heavily on inner vanes; coverts like back, but more spotted. Shafts yellow below and in tail yellow above; wing shafts yellow-dusky above. Tail brown with yellow-white bars, suffused yellow, sometimes obscuring pattern above and often so below. Tail/wing ratio 0.52 to 0.67. Lores white, narrow white line over eye broken by black mark over eye; white line under eye spotted or streaked black. Red nape patch. Ear coverts vary from white in abingoni and anderssoni, often with small brown-black spot behind eye, to white streaked (more heavily dorsally) with black or brown in other races. Black and white checks or streaks on sides of neck, becoming olive with white spots behind nape. Chin and throat very black with white spots (abingoni, anderssoni) to white with black streaks in others. Below, from yellow-white with brown streaks, heavier on breast, to distinctly bi-patterned, black on breast and throat with white spots and white on abdomen with narrow black spots and streaks; flanks spotted or barred.

Sexual features: Males with forehead and crown gray-black or olive (mombassica) with narrow red tips of feathers and malar patches red tipped over black and white streaking; in females crown and forehead black with fine white spots or (mombassica) olive with fine yellow-buff spots, and malar variably brown or black and white streaked to black with white spots (chrysura, anderssoni). Immatures more heavily marked below in black, race for race, than adults, often with fine bars on abdomen; greener and grayer above, less yellow, more spotted or streaked rather than barred; shafts paler yellow. Sexes alike in juvenile plumage; crown black to olive, very finely spotted white; malar black with white spots, becoming adult plumaged in 3 to 4 months after hatching. Eyes various shades of red, brown in a few apparent adults (subadult?), and brown to gray in juveniles. Legs and feet greenish, olive-green, or grayish olive. Bill slate colored, usually paler below with a greenish tinge; corners of mouth of nestlings yellow-gray.

Distribution and Habitat. From Senegal and Guinea probably across West Africa to Cameroon, Central African Republic, and northeastern and eastern Zaire; southeast to Tanzania,
thence south to Natal, Transvaal, Botswana, and Southwest Africa. Habitat is diverse forests and woodlands (e.g., *Brachystegia*) to at least 4500 feet elevation, in drier areas favoring dense riverine trees and denser center portions of trees standing in the open.

**Foraging Habits.** Forages on large and small branches of trees, especially dense trees, often flying long distances to favored foraging sites. Modes of feeding include tapping, gleaning, and probing, sometimes while hanging upside down exploring the underside of branches. Taps into dead branches where ant corridors are found. Chapin (1939) noted that its habits are like *C. nabica*. *C. abingoni* has been observed on the ground, according to Priest (1934), but his observations could refer to *C. bennettii*. Ants are the most frequently cited food; I found only ants in the stomach of a bird from Transvaal, and some 15 labels indicate only ants (and ant eggs, pupae, etc.). Some authors indicate that the Golden-tail eats other insects, but the only nonant food mentioned specifically is a single millipede in a stomach containing ants (Priest, 1934, p. 524). Some association in foraging with *Dendropicos fuscescens* was noted in South Africa (Short, 1971e).

**Vocalizations.** Several calls have been mentioned, including a “kweek” call directed at *Dendropicos fuscescens* (Short, 1971e), “a loud laughing note” (Priest, 1934) that is monosyllabic (“a sharp, derisive laughing cry ‘waa,’” [Mackworth-Praed and Grant, 1962, p. 577 and also Benson, 1942]), an accented “hey” (J. Vincent, 1935), and a screech of alarm.

**Breeding.** Nests are excavated in trees, usually not at great heights. Benson (1942, p. 301) described a Malawi nest in a stump of a tree cut off at 4 feet, the opening 2 inches in diameter, 3 inches from the top of the stump, and reaching a depth of 6 inches. This nest contained three eggs on 6 October. Chapin (1939) reported a nest with two eggs plus a honey-guide’s egg in Tanzania. Breeding occurs generally earlier in the north (July to October in Zaire, September to December in Zambia and Rhodesia, August to December in Angola) and somewhat later southward (September to December in Natal; after September in Transvaal; September to February, with immatures in January and February, in Southwest Africa). However, *C. a. mombassica* nests rather late in coastal Kenya (large ovary of female on 15 January, eggs in oviduct of female on 6 December; specimens in U. S. National Museum). Molting occurs after the breeding season.

**Taxonomy.** Forms a superspecies with South African *C. notata*, and both species are closely related to the superspecies *C. nabica*. The Golden-tailed Woodpecker is polytypic. I fully subscribe to remarks of White (1965, pp. 282–283) about the clinal and transitional variation in this woodpecker. Various races have been designated that are intergradient, and upon very variable characters. I recognize these subspecies: *anderssoni*, a white-cheeked, grayish green-backed, very black-throated form with much white on the rump, from Southwest Africa and southern Angola; *abingoni* (formerly *smithii* [see Clancey, 1967]), a white-cheeked, yellowish-green subspecies, more streaked and less extensively black on the throat and breast, from Transvaal and Botswana to Angola, Zaire, and western Tanzania; *chrysura*, a small, greenish-backed, streak-cheeked form rather heavily black on the breast and throat, scattered from Senegal and Gambia to northeastern Zaire; *constricta* (formerly *abingoni*), a streak-cheeked, green-backed subspecies with narrow streaks (whiter) below, from Natal and Zululand; *suahelica*, a streak-cheeked, golden green-backed form with larger dorsal white markings and narrow ventral streaks, from Zambia, Rhodesia, Moçambique, Malawi, and southern Tanzania; *kavirondensis*, a streak-cheeked subspecies with more broadly pale-marked upperparts and fine-streaked underparts from Kenya and Tanzania; and the very distinct *mombassica*, which is smaller in size and has a golden-green back bearing fine yellow-white spots, an olive-green crown (except where red in male), and, in the female, fine yellow-buff
spots, from southern Somalia, coastal Kenya, and Tanzania. In the Copenhagen Museum are
four birds collected 22 June 1967 at “Mt. Kilimanjaro”; three of these represent suahelica,
and one clearly is mombassica. There is, however, no indication of breeding; and the mom-
bassica may represent a wanderer. From Moshi and the Dar es Salaam area of Tanzania I
have seen four specimens intermediate in color between mombassica and suahelica. More
field data are needed to permit evaluation of the status of mombassica.

Reference

**KNYSNA WOODPECKER**

*Campethera [notata] notata*

**Color Plate 25**

**Range Summary.** Southernmost Africa.

**Diagnostic Features.** Small in size, wing length 102 to 114 millimeters. Resembles *C. abin-
goni*, its close relative, but does not meet it geographically and is heavily spotted below,
including the throat and ear coverts, and with a finely pale-spotted, green back. Bill narrower
than in *C. abingoni* (except *C. a. mombassica*), and tail proportionately longer.

**Description.** Bill moderately long, narrow, with culmen slightly curved. Above, green to
yellow-green with fine pale yellow spots (resembling *C. abingoni mombassica*), occasionally
bar spotted; traces of red in edges of upper back feathers of a few birds; rump green, finely
barred white. Wing coverts as back but spots more streaklike; flight feathers brown, edged
green, barred white narrowly on outer margins, broadly on the inner vanes. Tail yellow-olive
with narrow yellowish bars above and suffused yellow (obscuring the bars) below. Tail/wing
ratio 0.66 to 0.73. Shafts yellow below, dusky at tips, and brown above except in outer tail
feathers. Nape and hindcrown red, narrow white line over eye obscured by black spots,
white under eye, spotted black. Sides of neck spotted black, becoming olive with white
spots on hindneck. Ear coverts white with black streaks below, becoming blacker above with
heavy spots. Lorea buffy white. Chin white, streaked and spotted with brown-black. Below
white, faintly suffused with yellowish and with large brown spots tending to become nar-
rower and streaked on abdomen.

**Sexual features:** Males have red malar patches, the bases spotted black and white and the
crown and forehead deep olive-brown with feathers narrowly tipped red; females have black
and white spotted malar patches and olive-brown crown bearing small white or yellow-white
spots. Immatures are more streaked throughout, with larger spots and bars below, and above
greener, less yellow, even grayish green with less spotting; paler yellow shafts. Sexes as in
*C. abingoni*. Eyes reddish, bill slate-gray with blackish tip, legs and feet greenish gray (Clancey,
1964b).

**Distribution and Habitat.** South Africa from eastern Cape Province to west-central Natal.
Habitat is various types of forest and woodland.

**Behavior.** Very little known, and should be compared with *C. abingoni*. It feeds upon
wood-boring beetles and their larvae and ants, sometimes participating in mixed species
foraging flocks. Nesting reportedly occurs in September in Natal (Clancey, 1964b) and
October in Cape Province (Mackworth-Praed and Grant, 1962), with two eggs being laid in a
cavity excavated in a tree. Vocally it is presumably like *C. abingoni*. 
Campethera [maculosa] cailliauti

**Taxonomy.** Forms a superspecies with *C. abingoni*, which it appears not to meet in Natal and inland in Cape Province. Clancey (1958, p. 34) feels “almost certain” that the two species will prove conspecific. Goodwin (1968) has noted the similarity of *C. notata* to *C. nubica*. I have noted earlier that the superspecies *C. notata* and *C. nubica* are closely related. *C. notata* particularly resembles *C. abingoni mombassica* in color and pattern of the upperparts, and its narrow bill is nearest that of *mombassica* among races of *C. abingoni*. The color pattern, especially of spotting versus barring, is rather plastic genetically, however; and one could conceive of parallel reversions to possibly ancestral aspects of color pattern in closely related species. That is, *C. notata* and *C. abingoni mombassica* could represent such reversions, or they simply could have retained patterns ancestral in this superspecies. *C. bennettii scriptoricauda* also resembles *C. notata* (in its ventral spotting). Clancey (1958) described *C. notata relicta* as a smaller, darker, heavily spotted subspecies. I find its size differences from *C. n. notata* too small, and some of the color differences may be a matter of wear. In a species so restricted in distribution, and representing one of a group of species exhibiting great individual variation, I see no need to burden the nomenclature by the formal recognition of such differences.

**GREEN-BACKED WOODPECKER**

*Campethera [maculosa] cailliauti*

Color Plate 26

**Range Summary.** Central and southern Africa.

**Diagnostic Features.** Little to Small, weight 38 to 55 grams (40 to 49 in *cailliauti*; 38 to 51 in *nyansae*; 44 to 55 in *permista*), wing length 88 to 108 millimeters. Very variable, but unmarked to white-spotted, green upperparts; spotted to barred below; entire face barred, checked, or spotted; red nape patch in both sexes. Tail mainly yellow below. Spotted or barred underwing coverts.

**Description.** Bill short, wide based, but rather wide across nostrils. Above, yellow-green to green or gray-green, variously unmarked or with faint, small, white streak-spots (*permista*; when spots occur, especially found on upper back) or with larger white spots (*nyansae*) or very large whitish spots or bar-spots (*cailliauti*, *loveridgei*); rump unmarked in less spotted forms to barred in spotted races. Wings with coverts as back; flight feathers brown broadly edged on outside with green, yellow-green, or bronze-green and variously white barred on outer margins but heavily barred on inner vanes; underwing coverts spotted or barred. Shafts yellow on underside; above, variously brown (*permista*), dusky-brown to dusky yellow (tail; *cailliauti*), or dusky yellow (wings) to yellow (tail; *loveridgei*, *nyansae*). Tail variable; above, black with green edges (*permista*) to yellow-green (*loveridgei*); below, mainly yellow, especially near shafts, often tipped blackish and obscurely brown barred near base in some birds. Tail/wing ratio 0.55 to 0.70. Entire face, over eye to chin, including ear coverts and malar region, buffy white to white; barred, checked, or spotted black; in more spotted forms (*cailliauti* group) face whiter and white line over eye more distinct. Lores buffy, nasal tufts darker buff or cinnamon (*permista*). Nape and hindcrown red. Sides of neck barred or more commonly spotted or checked, continuing to hindneck, behind nape patch. Below, greenish white, paler and yellower on belly and often tinged buffy on breast; flanks and sides barred; breast heavily barred black or deep brown (*permista*), spot barred (*nyansae*), or spotted (*loveridgei*, *cailliauti*); belly in center with finer spots or bars, occasionally unmarked.
Sexual features: Males with forehead and crown feathers black, moderately tipped red, usually edged at sides with black (above, pale stripe over eye) bearing small white spots; females with forehead and most of crown black spotted finely or broadly with white to buffy. Immatures greener, less yellow above than adults; barring below is less regular, often more spotted; malar sometimes blacker, more patchlike; shafts paler yellow; sexes alike in juvenal plumage, crown brown-black to black, with at least a few whitish spots on forehead and edges or fully spotted or streaked, though marks finer than in adult female. Eyes apparently variable, from brown to red, in some cases purple, and even yellow (Sclater and Moreau, 1932); generally gray-brown or brown in immature birds. Legs and feet from gray or pale olive-gray to (usually) greenish gray or even dull green. Bill gray to black, paler below, often with green evident, and sometimes yellow-gray along the base of the lower bill.

**Distribution and Habitat.** From Ghana east to southern Sudan and southwestern Ethiopia; southward to Angola, Rhodesia, and Mozambique; and in the east to coastal Kenya and Tanzania. The habitat of the Green-backed Woodpecker varies greatly, but it seems to prefer edges, clearings, and secondgrowth, even in forested western Africa (Bannerman, 1933; Chapin, 1939); its occurrence in savannas is in accord with its being an "edge" bird. Its habitats in eastern Africa include riverine woods, *Brachystegia* woods, palm groves ("it is not improbable that it confines itself entirely to the palm areas" of Kenya and Uganda [F. J. Jackson, 1938, p. 746]), baobab and thorn scrub, large trees in cultivated areas, and clearings in forests. Found at altitudes up to 5500 feet (Malawi [Benson, 1942]).

**Foraging Habits.** Apparently shy, it sometimes goes to the other side of a tree when disturbed, as do many woodpeckers. Several authors mention its tapping in trees (not drumming?). Birds forage constantly in pairs, working often at dead tree trunks, usually quietly, but apparently tapping occasionally and gleaning ants (see van Someren and van Someren, 1949). In Cameroun they frequently forage together at tree ant or termite nests. At one such ant nest in the crotch of a tree, I watched a female perch quietly beside a male that quickly excavated a large cavity in the soft ant nest. The male lunged, hung sideways, and appeared to jump about, perhaps being attacked by ants. Occasionally the female picked up an ant or two, but generally she remained hunched beside the male. The birds fly from tree to tree with a deep undulating flight. Bannerman (1933) noted their fondness for the umbrella tree (*Musanga*), where they silently work up the trunk and along the branches gleaning ants. F. J. Jackson (1938) mentioned this species as being very like *C. nubica* in habits. Various authors cite the food as being mainly ants, but only termites have been mentioned as a food item other than ants. Stomach contents of specimens representing all races mention ants, and several authors note "only" ants in all stomachs examined. Chapin (1939) gave only small, dark ants as the contents of 14 stomachs of *C. c. permista*, some crammed full, and even the crop (presumably esophageal pouch) filled with these insects. The last observation indicates that the species feeds young by regurgitation of partly digested ants.

**Voice.** This species may drum, or reports of its tapping may refer entirely to foraging sounds. A whining note has been mentioned by various authors, who consider it a silent bird generally (e.g., Mackworth-Praed and Grant, 1962). A "small chattering cry" was mentioned by J. Vincent (1935, p. 18). Sclater and Moreau (1932, p. 667) gave the call as a "harsh 'keree.'" Benson (1942, p. 301) states that the call is a plaintive high-pitched 'hee,'" followed by up to four "hee" notes spaced at intervals equal in duration to each note. I tape-recorded two types of vocalization of *C. caillaultii permista* in Cameroun. Most commonly heard is a "weet" or, more usually, "p-weet" note, the Pweet Call. The weet version is shorter, clearer toned, and simpler. Sonagrams show it to be 0.25 to 0.3 seconds in dura-
tion, consisting of a rapid rise to a peak at 2 kilohertz, followed by a long horizontal or slightly rising "plateau" of sound, then a drop. The initial harmonic tone, peaking at 4 kilohertz, is equally loud as the fundamental tone. The pweet or p-weet version, 0.25 to 0.45 second in duration, has the (weet) plateau of sound of the simpler version, but is preceded by an irregular, long rise, often marked by much diffuse sound. The plateau is at the same pitch as in the weet version. This call seems to be that generally uttered by a disturbed bird. The other call, a "dat-dat-dat-da," was given following a Pweet Call as a male flew away from me. Sonagrams show the call to consist of vertical, diffuse notes, 0.1 second in duration, given at intervals of 0.25 second (about four per second).

**Interspecific Behavior.** J. Vincent (1935, p. 18) reported a female *C. cailliautii nyansae* "in close consort with a male *Dendropicos fuscescens*" while foraging in Moçambique.

**Breeding.** Nesting occurs mainly during the rainy season in the Congo region and eastern Africa. Chapin (1939) reported most birds breeding March to May in Zaire, with populations near the Equator nesting in September. Verheyen (1953) mentioned June and July as the nesting season at Upemba, in Zaire, where he also found adults of both sexes with brood patches. In eastern Zaire, as at Baraka, nesting seems to occur in September and October, although a Bukovu juvenile was taken in June. Eastern and southern African breeding occurs from September to November. Molting commences late in the breeding season and lasts for 3 to 5 months thereafter. Two to three eggs are laid in a tree cavity, which may be used as a roosting hole (e.g., a single bird roosting at a hole 12 feet up an old rotten coconut palm in Kenya [F. J. Jackson, 1938]).

**Taxonomy.** Forms a superspecies with *C. maculosa* of West Africa (one hybrid from Ghana; see *maculosa*). The western forest form *permista* often is treated as a separate species, but various authors have followed Chapin (1952) in merging *permista* with *cailliautii*. Van Someren and van Someren (1949) suggested that *C. cailliautii nyansae* tends strongly toward *permista*. Traylor (1963) noted intergradation of *permista* and *fulleborni (=nyansae)* in Angola. White (1965) reported intergradation between *permista* and "fulleborni" in Zaire and Angola. There are three specimens intermediate between *nyansae* and *permista* from Kasai, Zaire, in the American Museum of Natural History. I tentatively accept the merger of these forms, although further study is required. Southern African races have been reviewed by Clancey (1970a), and I concur with his findings. Briefly, *C. c. cailliautii* is a small form resembling *C. c. loveridgei*, but with tail shafts dusky above; breast spots smaller and browner, with less concentration on the breast; and with larger black spots. *C. c. cailliautii* is found in eastern Kenya and northeastern Tanzania, whereas *loveridgei* occurs southward from east-central Tanzania to southeastern Malawi, eastern Rhodesia, and Moçambique. West of these two forms *C. c. nyansae* ranges to Angola, eastern Zaire, and Uganda, intergrading westward with *C. c. permista*. *C. c. nyansae* differs from *cailliautii* and *loveridgei* (and tends toward *permista*) in its broader bill between the nostrils; its greener and less yellow back; the smaller, more streaklike back spotting; and its more heavily spotted underparts with convergence of spotting on the breast. Also, *nyansae* is larger than the two races already described. *C. c. permista* is green backed without spots, and with ventral bars rather than spots. Among other described races that I do not recognize, *togoensis* is a synonym of *permista*; and *C. c. kaffensis* Neumann, based upon an immature female, is a synonym of *permista*. The race *quadrosi* (Pinto, 1960) has as its chief feature the orange instead of red coloring of the nape. Known only from the Moçambique holotype, and the orange nape color very likely being an aberrancy, I see no reason to recognize this form, the other features of which (Pinto, 1960) seem to agree with *loveridgei*. 
LITTLE GREEN WOODPECKER

*Campethera [maculosa] maculosa*

**Color Plate 26**

**Range Summary.** Central (West) Africa.

**Diagnostic Features.** Small, wing length 97 to 107 millimeters. Green above and barred below like closely related, partly sympatric *C. cailliautii* (*permista*), but females of *C. maculosa* lack a red nape-crown patch, and both sexes have a blacker tail and unmarked (or few spot-bars) yellowish underwing coverts.

**Description.** Bill short, relatively broad at base, and moderately broad (broader than in *C. cailliautii*) across nostrils. Above, yellow-green to bronze-green, sometimes with red traces, and lacking marks except for traces of pale spots on upper back (especially females) and vaguely barred rump. Wing flight feathers brown, narrowly pale barred at outer edges with a green margin, and broadly barred buffy white on inner vanes; wing coverts as back, underwing coverts unmarked yellow-white or with few spot-bars. Tail above, black, overlain with yellow on vanes beside shafts; outer feathers green; below, blackish with some yellow suffusion. Shafts brownish above, except for pale yellow tail bases, and pale yellow below. Tail/wing ratio 0.54 to 0.62. Lores cinnamon; rest of face, including buffy area over eye, ear coverts, malar region, chin and anterior throat, sides of neck, and hindneck, buff bearing brown spots. Below, barred olive and greenish white strongly overlain with buff or cinnamon on breast and throat, becoming spotted on throat.

Sexual features: Male with olive-black crown, narrowly tipped red, tips broadest on nape, but forming very diffuse nape patch; female has olive-black crown bearing fine buff spots, becoming olive with spots on nape. Immatures are greener above, showing some whitish streaking on upper back; below, whiter, less buff, with irregular barring. Eye color of apparent adults reported brown to pink, but dark brown in immatures. Legs and feet greenish or olive-gray. Bill dark olive-green to black above, and pale olive or bluish below.

**Distribution and Habitat.** West Africa from Portuguese Guinea to Ghana. Habitat primarily lowland forest, clearings, edges, secondgrowth, and isolated trees near forest.

**Behavior.** Very little known. Bannerman (1933) noted its unsuspicious manner and slow movements. This woodpecker feeds at Crematogaster (ant) nests, and stomachs are reported crammed with these ants. No other food has been reported. Immature specimens date from 27 May in Portuguese Guinea to 7 July in Sierra Leone. Molting adults are known from Sierra Leone in June and from Liberia in May and June.

**Taxonomy.** I follow White (1965) in treating *C. maculosa* and *C. cailliautii* as allospecies of a superspecies. The two species meet in Ghana, from whence (Aburi) I have seen one hybrid, an immature female with finely barred underparts (as *cailliautii*) and with the intermediate breast color, markings under the wings, crown color, buff-toned throat, bronzy tint in the back, broad pale spot-bars on the wings, and large bill of *maculosa*. The extent of hybridization is unknown, but probably very limited, as White (1965) reported that these woodpeckers overlap in Ghana. These species are related rather closely to the superspecies *C. nubica*. *C. maculosa* is monotypic.
**TULLBERG’S WOODPECKER**

*Campethera tullbergi*

**Color Plate 27**

**Range Summary.** Central Africa.

**Diagnostic Features.** Small, weight 54 to 66 grams (*tullbergi*), wing length 103 to 116 millimeters. Green above; narrowly barred to spotted below (spotted race has red on bend of wing), with yellow-green cast and no buff. Bill longer than in other ventrally barred species.

**Description.** Bill moderately long, culmen slightly curved, rather narrow across nostrils. Above, green with yellow cast, unmarked except for few pale shaft streaks or few bars on rump in occasional birds. Wing coverts like back, also edges of flight feathers (in *tullbergi* bend of wing broadly tipped crimson); rest of flight feather surfaces brown, barred with yellow-white on inner margins at bases of outer feathers and throughout inner feathers. Shafts pale yellow below, somewhat brighter under tail where suffusing into vanes; above, brown, occasionally yellow in tail. Tail brownish or blackish broadly margined by green, greener on central feathers; tips often yellow; below, suffused yellow with yellower shafts; obsolete early bars, occasionally barely visible. Tail/wing ratio 0.57 to 0.70. Entire face from line over eye and lores to chin finely vermiculated with black and white, becoming spotted behind eye in some, and in *tullbergi* entire face peppered with fine black spots instead of bars (ear coverts barred at tips in *tullbergi*). Sides of neck and hindneck barred yellow-green and gray-black. Nape red. Below, greenish yellow, barred finely (*taeniolaema*) or very finely (*hausburgi*), or with bars largely reduced to spots, except for fine barring on sides of breast and broad barring on flanks (*tullbergi*). Undertail coverts barred or spotted.

Sexual features: Forehead to crown black, feathers broadly tipped red in males; females have forehead and crown black with white spots, but all females show red at sides of forehead (over lores), extending to nasal tufts. Immatures more gray-green above with more pale spotting on upper back and more heavily barred below with blacker or grayer bars; sexes alike as juveniles, with black or olive-black crown and forehead, spotted (more finely than in adult female) white. Crown feathers of adult plumage come in early, so white-spotted feathers are replaced rapidly in young males, but all six immature males seen show some finely white-spotted feathers. Eyes red in adults, brown in immatures. Legs and feet dull olive-green. Bill slate to black above, becoming blue-gray below.

**Distribution and Habitat.** Mountain forests above 3000 feet from Fernando Po and southeast Nigeria to Uganda, western Kenya and western Tanzania. Habitat is forest ravines and edges, including isolated dead trees near forests.

**Behavior.** Very little known. Forages mainly high in trees, with ants the only food noted on labels. Accompanies mixed flocks of bulbuls and other birds on occasions. F. J. Jackson (1938) reported that it is attracted to fire-killed trees and that its habits resemble those of *C. nubica*. Nothing is known of its breeding habits. One male on Mount Cameroun in 1969 called "week-week-week-week-week-week," apparently at another conspecific bird, before disappearing into the fog. Molting birds are known during April in Cameroun, during May to November in Kenya, and during January in Tanzania.

**Taxonomy.** This species has no very close relatives, although probably related to the superspecies *C. maculosa*. Three subspecies merit recognition: *C. tullbergi taeniolaema*, green above and evenly barred below, occurs west of the Rift Valley in Kenya and Uganda, in western Tanzania, and in eastern Zaire. *C. t. hausburgi* is yellower above and barred more
finely below, with a yellow instead of a green cast; it is found east of the Rift Valley in Kenya. *C. t. tullbergi* of the mountains of Fernando Po, southeastern Nigeria, and Cameroun is slightly larger and longer billed, is green above, and has the barring reduced on the breast and throat to fine spots; it also has large red spots on the wing coverts at the bend of the wing. The last-mentioned race is variable and is approached by some *hausburgi* in a tendency toward very fine barring and bar spotting. There is no basic difference in structure among these montane, allopatric populations; and I fully concur with White (1965) in merging *taentia* into *C. tullbergi*. The close relationship of these forms was suggested first by Chapin (1939, p. 569; also unpublished notes dated April 1936). In view of the variation existing within the three subspecies just mentioned, I see no need or merit in more finely splitting *C. tullbergi*.

**BUFF-SPOTTED WOODPECKER**

*Campethera nivosa*

**Color Plate 28**

**Range Plate.** Central Africa.

**Diagnostic Features.** Little, weight 30 to 49 grams, wing length 79 to 95 millimeters. Back green, breast basically dark with pale spots (like *C. caroli*, unlike *C. cailliautii*); chin and throat streaked, not spotted, and contrasting with breast. Ear coverts streaked, lacking brown patch of *C. caroli*. Male with discrete red nape patch.

**Description.** Bill rather short, culmen curved, narrow between nostrils. Above, green to bronze-green, rarely with traces of pale spots; rump unbarred. Wing coverts as back; flight feathers brown, edged green and spot barred on outer edges, with large pale bars on inner vanes. Shafts pale yellow below and brown above on wings; tail shafts brown except extreme base and, in some, a narrow pale shaft streak near base below in *nivosa*, but yellow below and bases dorsally in *herberti*. Tail mainly black in *nivosa* to mainly green in *herberti*; below, black with yellow suffused on outer one or two feathers of former, but entire underside yellowish in *herberti*. Tail/wing ratio 0.47 to 0.58. Green-olive to blackish or brownish olive crown; only checkered trace of line over eye at posterior end, merging into olive- and white-streaked ear coverts, lores, malar region, anterior throat, and chin. Below, brown-olive to green, with buffy white to yellow-white spots (breast) or bars (abdomen); eastern populations with larger spots, hence whiter below.

Sexual features: Broad red nape patch in male, lacking in female. Immatures greener above with no bronze tone; below, grayer (east) or brown, breast more barred, hence more evenly barred below; sexes alike, without red on head, resembling adult female, but crown grayer. Eyes red-brown to mahogany red, brown in immatures, and dull olive-green skin around eyes. Legs and feet olive to green ("as back" on one label). Bill slate to black, paler gray below with bluish or greenish tinge.

**Distribution and Habitat.** Portuguese Guinea east to Uganda, including Fernando Po, and south to northwestern Angola, Zaire, and western Kenya. Found in forests, especially dense secondgrowth, and "jungle" adjoining banana and coffee plantations, up to 3000 feet.

**Foraging Habits.** Feeds mainly or exclusively on ants and termites, especially *Crematogaster* ants, gleaned from saplings and vines and sometimes from tree trunks and branches, usually very near the ground, but up to 60 feet. It very frequently forages with mixed species flocks. Lone birds or pairs visit arboreal ant nests of the carton type, as well as termite nests,
Campothera nivosa

opening them and feeding for long periods on the ants or termites. It regularly perches crosswise on branches. Various authors call it slow or lethargic in regard to its movements, probably because it feeds quietly for long periods without movement and is less easily disturbed than most other woodpeckers. I found that it moved rather rapidly when foraging along sapling trunks and branches. One male tapped briefly on an 8-inch thick limb of a quite dead tree, breaking the surface.

**Voice.** Variously reported as a “squeaky trill rather like a rusty hinge” (Mackworth-Praed and Grant, 1962, p. 573), a “loud rattle” (Traylor and Parelilus, 1967, p. 103), and a call “so like *C. n. nubica* that I believed it to be that bird” (F. J. Jackson, 1938, p. 742). Chasing males give a low “te-te-te-te-te” call as they display to one another (see discussion following).

**Display.** I saw two males chasing each other on 31 October near Kumba, Cameroun. When close together they swing their heads from side to side and spread one or both wings, accompanied by the call just described.

**Breeding.** Breeding activity commences in November in Cameroun, where a male with an incipient brood patch had the usual asymmetrical testes (left, 6 by 2 millimeters with a 3 millimeter curved tip in the form of a J; right, 3 by 2 millimeters) found in this and other species of *Campothera* (Chapin, 1939). The male had been chasing another male. Chapin reported breeding from December to June in Cameroun. Bannerman (1933) mentioned nests in the dry season and in the less rainy of two rainy seasons, i.e., in April, June, December, and January for the Cameroun population. I have seen March immatures from Cameroun. Other immatures (of *C. n. herberti*) were taken in January to March (Kenya, Uganda) and in January to May (Zaire). Molting Sierra Leone birds during June suggest breeding early in the year. Molting Buff-spotted Woodpeckers from Fernando Po are known from April, August, and September. The nest is excavated in carton-type tree ant or termite nest, or occasionally in a cavity excavated in a tree (Bannerman, 1933). All references to eggs mention clutches of two eggs. According to Bannerman, the ants in the ant nest are eaten as the woodpeckers excavate their nest cavity. Nests probably are parasitized by the Spotted Honeyguide (*Indicator maculatus*), which strikingly resembles a female Buff-spotted Woodpecker in coloration and the range of which is almost identical with that of this woodpecker (see Bates, 1930; p. 270).

**Taxonomy.** Related to *C. caroli*, but distantly; the two species overlap broadly. I recognize three subspecies: western *nivosa*, eastern *herberti*, and *poensis* of Fernando Po Island. *C. n. nivosa* has a rather dark olive breast with spotlike pale markings; birds stained with green from algae resemble *herberti* ventrally except for the smaller, more spotlike markings. The tail is blackish; only the outer feathers are margined in yellow-green and bear a suffusion of yellow below. The wing and tail shafts are distinctly blacker. Eastern *herberti* is yellower in tone below, with more barlike pale spots on the breast and narrower bars on the abdomen; hence it is paler below than *nivosa*. The background color ventrally is less olive and more green, and it is greener and less bronze above generally. The tail is greener above and entirely yellowish below. Wing and tail shafts are yellow below, and the tail bases are yellow above. These two races intergrade broadly between eastern Nigeria and Zaire (weakly differentiated “*efulensis*” or “*congica*”; see Chapin, 1939). *C. n. poensis* is not very distinct but is recognized chiefly because of its insular (isolated) range. It resembles *nivosa* generally but has distinctly more barlike breast spots and narrower bars (hence whiter) on the abdomen. Its tail is only a trifle more yellow than that of *nivosa*, but a few birds approach *herberti* in this feature. *C. n. maxima*, a recently described race (Traylor, 1970), is based upon two
specimens from isolated gallery forest in northern Ivory Coast, well beyond the northern range of that species as previously known. The female topotype of maxima is identical with C. n. nivos in all features except its longer wings (95 millimeters, chord) and tail (52.5 millimeters). I call attention to these specimens, preferring not to recognize this race until more specimens have been studied—its measurements are about 10 percent greater than those of nivos, perhaps warranting recognition of this taxon.

Reference

BROWN-EARED WOODPECKER

Campethera caroli

Color Plate 28

Range Summary. Central Africa.

Diagnostic Features. Small, weight 49 to 66 grams, wing length 94 to 115 millimeters. Unmarked green back combined with spotted underparts; brown ear coverts and conspicuous pale line over eye. Larger than sympatric, somewhat similar C. nivos.

Description. Bill rather long, moderately narrow between nostrils. Above, green to bronze-green, usually unmarked, but occasionally with a few yellow spots on upper back; rump frequently white spotted. Wing flight feathers brown, edged green, and with buffy white narrow bars on outer edges and broader bars on inner vanes merging to form a large pale patch; wing coverts as back. Shafts pale yellow below wing and at base of tail; otherwise brown. Tail black with slight green edges; outer feathers bear fine, pale spot-bars at margins and have suffused yellow below. Tail/wing ratio 0.53 to 0.62. Ear coverts rufous to chestnut, variably extending to sides of neck. Sides of neck olive-green with pale spots, extending to hindneck. Throat, chin, lores olive with medium to large buffy white spots (stained green frequently). Distinct, broad, buffy white line over eye, frequently stained green, with olive streaks, extending to the sides of the neck. Crown darker than back, olive to blackish. Below greenish to olive with buffy white spots, three (arizelus) to five (caroli) per feather, becoming larger spot-bars posteriorly.

Sexual features: Male with red-tipped hindcrown feathers, giving spotted appearance, broadening rearward to form diffuse red nape patch; female lacks red on crown and nape. Immatures greener above (less gold-bronze); ear coverts paler, more cinnamon; pale areas below are clearer white, spots larger on breast, becoming very barred on abdomen; chin streaked rather than spotted; shafts whiter. Eyes of undoubted adults variously are red to dark brown; eyes of immatures are brown. Bare skin around eyes is dull gray to olive. Legs and feet olive-yellow, greenish, or gray. Bill gray-black, with olive- or green-tinged base and lower edge.

Distribution and Habitat. Sierra Leone east to southwestern Sudan, and southward through the Congolese forest and western Kenya to northwestern Angola. Habitat is forested low-lands, secondgrowth, and coffee plantations, ranging into gallery forests along rivers outside forested regions, but less common there. Ranges up to 5500 feet in western Kenya.

Foraging Habits. Forages in trees by picking, probing, tapping, and excavating. In Cameroun a male excavated a small cavity in a vine, foraging apparently for insects, and then foraged in a sapling 2 inches thick. Another foraged near the ground on a 3-inch thick tree.
Most authors who have noted the foraging habits indicate feeding low in the trees, sometimes pecking, at other times quietly feeding by gleaning. Stomach contents include mainly ants, but also “other insects”; Chapin (1939) found ants in all five stomachs examined, plus four caterpillars and one undetermined insect. Many specimens of *C. caroli*, as well as *C. nivosa*, are green stained, apparently from contact with algae on trees (Chapin, 1939).

**Voice.** Calls infrequently, its note “a unique, three-noted slurred call” (Zimmerman, 1972, p. 296).

**Breeding.** Eggs are laid in holes excavated in trees and number two or occasionally three. According to Chapin (1939), breeding occurs in Zaire during the dry season, e.g., from November to February in the Uele and Ituri regions. Near the Equator breeding is earlier, from August to October at Lukolela and along the Congo River. In Cameroun breeding occurs in January and February (specimens; Bannerman, 1933). Like many species of *Campethera*, the testes of *C. caroli* become asymmetrical in the breeding season, the left tapering and curving and the right remaining rounded and smaller in volume. Molt occurs following breeding, commencing late in the breeding season.

**Taxonomy.** Related to sympatric *C. nivosa*. I find that *C. caroli arizelus* of Sierra Leone and Liberia is recognizably distinct from more eastern *caroli*. It differs from *caroli* in its greener, less spotted underparts (due to there being three rather than five pale spots per feather) and its deeper olive-green, less golden upperparts. These are the only constant differences that I have found.

**Reference**

**Genus Geocolaptes Swainson**

This monotypic South African genus is marked by its brown and red coloration, the yellow shafts of the flight feathers, and its terrestriality and sociality. Its bill is long, somewhat curved along the culmen and pointed at the tip. The nostrils are only partly covered by feathers. The tail shafts are stiffened but the vanes do not curve, and the tail generally is less “stiff” than that of most picids. The hallux is short, as is the fourth toe, which is shorter than the two anterior toes. It is related to *Campethera*, one group of which (*bennettii* group) feed to some extent terrestrially.

**AFRICAN GROUND WOODPECKER**

*Geocolaptes olivaceus*

**Color Plate 29**

**Range Summary.** Southern Africa.

**Diagnostic Features.** Small, wing length 122 to 140 millimeters. Its unpatterned face, red rump, pinkish red underparts, and ground-dwelling (open-country) habits distinguish it from other woodpeckers.

**Description.** Bill long, very narrow between nostrils, curved culmen, and without a “chisel” tip. Above, dull grayish brown to green-brown with pale spots and bars on back (these wear during the year, worn birds being almost unmarked); rump red. Wings brown on flight
feathers, barred dull white; coverts and edges gray-brown with fine spc:s and bars. Shafts yellow in flight feathers and tail, spreading onto vanes of feathers on their undersides. Tail brown and white barred, as are tail coverts, the undersurface tinged yellowish. Tail/wing ratio 0.65 to 0.75. Crown brown or gray-brown. Nape brownish, occasionally with red traces. Face unpatterned gray with whitish; throat dull white. Below, feathers white tipped with pinkish red (crimson on belly) from breast to belly, faint traces of light streaks and spots on breast, and vague to strong brown and white bars on flanks and belly.

Sexual features: Malar region dull gray-black with fine red tipping (not visible at any distance) in male; dull blackish gray in female. Immatures duller in color, with paler yellow shafts and pale pink underparts; traces of red nape patch usually are present. Eyes grading from white about pupil to pink on outside, paler in immatures; legs and feet gray; bill black.

**Distribution and Habitat.** Restricted to South Africa where it occurs in unforested country from Cape Province to the Transvaal and Natal. Usually found in upland grassland, particularly in rocky or otherwise irregular country, and along streambeds (dongas). Its terrestrial habits and need for earthen banks in which to nest probably restrict its distribution.

**Foraging Habits.** Completely terrestrial (Short, 1971c.e.g), pecking and probing the ground and flicking the bill, using the tongue to extract ants of several kinds (one of which has a yellow-barred abdomen) from the soil. The birds forage in pairs or loosely in family groups about rock piles or outcrops. Movement on the ground is largely by hopping, although walking steps occasionally are seen.

**Voice.** Three calls are known. An alarm call, the Peer Call varies from a “peer, peer, peer” (as given by a female flushed from a nest) or a “pee-o” or “peeah” to the harsh “pee-aaargh” uttered by a startled bird. A Long Call, serving an aggressive, territorial function and also as a location call for mated birds, is a burst of “ree-chick, ree-chick” notes (up to five), carrying far in open country. A Wicka Call, rendered in my notes as “tchew-kee, tchew-kee, tchew-kee,” was uttered by one or both of a pair of displaying birds which had met at the entrance to a nest.

**Displays.** These include the following: Wing Flicking when disturbed, or by a submissive bird in the presence of a dominant bird, showing intention to flee; Head Swinging, a side-to-side movement of the head (and body) accompanying a Wicka Call between members of a pair meeting at a nest; and Bill Directing of an aggressive, dominant bird, used in supplanting of the submissive bird at a favored perch. Wing Flicking may serve as a submissive display (see discussion following).

**Breeding.** Nesting occurs in August and September about Cape Town, in October to January in Natal, and during September in Transvaal. Nests consist of a chamber 15 centimeters in diameter at the end of a tunnel 50 to 120 centimeters long excavated in the bank of a stream or road-cut, about 1.2 meters above ground. The tunnel and nest are excavated mainly or entirely by the male. Copulation occurs during the period of nest excavation. One copulation involved a male moving toward a female perched on a rock; the male's head was held low and its wings were spread, quivering. The female turned away and crouched; and the male mounted, wings fluttering, for 6 seconds. Both birds flicked their wings vigorously after copulation. Both sexes incubate the eggs at intervals of $\frac{1}{2}$ to $2\frac{1}{2}$ hours. From three to five eggs have been reported, but three seems to be the usual clutch. The young remain with the adults after they leave the nest, and loose family parties may remain together for most of a year. Occasionally one of the young birds may remain with the adults into the next breeding season, perhaps helping to feed their young of that season. Molt occurs following the
breeding season, in February and March, but sporadic molting may occur even during the nesting endeavors.

**Taxonomy.** Forms a genus of its own, well separated from its relatives in the genus *Campethera*. Similarities in plumage pattern, including the yellow-shaft condition and pattern of sexual dimorphism, the ant-feeding habit, and terrestrial feeding (several species of *Campethera*, especially *C. bennetti*) indicate that *Geocolaptes olivaceus* evolved from some ancestral species of *Campethera*. Polytypic, with weakly defined western (*G. o. olivaceus*) and eastern (*prometheus*) races distinguished by color tones, the ventral red and dorsal coloration being paler in the eastern population. As many as five subspecies have been recognized, based on fine variations in color.

**References**

**Genus Dendropicos Malherbe**

An African genus of 12 species, *Dendropicos* usually shows some green in its plumage; the shafts of flight feathers are yellow in most species; and there often is a red, yellow, or gold area on the rump or abdomen. It differs from *Campethera* in lacking crown spotting and malar markings (as a sexually dimorphic feature). The bill is short to medium, broad across the nostrils; the culmen is slightly curved to moderately curved, and it has a chisel-tip. The nostrils are partly to fully feathered. The tail is variable in length, stiffened, but not much concave below the vanes. The fourth toe is long, as long as or longer than anterior toes; the hallux is short, and the claws are strong. "*Thripias,*" "*Mesopicos,*" and "*Polipicus*" are included in *Dendropicos*, as they are rather closely related to the tightly interrelated group of *Dendropicos*, sensu stricto.

**LITTLE GRAY WOODPECKER**

*Dendropicos elachus*

**Color Plate 30**

**Range Summary.** North-central Africa.

**Diagnostic Features.** Little, weight 17 to 19 grams, wing length 70 to 80 millimeters. The smallest woodpecker in its range, appearing barred gray-brown and white throughout, with a red rump and pale brown crown.

**Description.** Bill moderately long, proportionately very wide. Above, barred gray-brown and white from upper back to rump, latter and uppertail coverts fully red. Wings brown, barred white on inner and outer edges of flight feathers and on coverts; underwing coverts spotted. Shafts pale yellow above and below. Tail brown, barred dusky white, the pale bars sometimes not reaching shafts. Tail/wing ratio 0.44 to 0.50. Forecrown, forehead, and ear coverts pale brown. White stripe over and under eye; malar stripe very dull brown. Chin white with fine streaks and spots. Head markings indistinct because of fading even in slightly worn birds. Below, white with brown spots or bars on breast, these markings becoming narrower, paler, and less distinct on belly and flanks.
SPECKLE-BREASTED WOODPECKER

Sexual features: Male red on hindcrown and nape. Female lacks red on head; crown and nape pale brown. Immatures not seen. Eyes brown, not red. Legs and feet greenish gray overlain by whitish cast. Bill blackish gray to dull gray, paling below toward base, to almost white at base of lower bill.

Distribution and Habitat. Occurs across Africa from Senegal to western Sudan in the narrow belt of lightly wooded savannas bordering the Sahara Desert on the south, at elevations up to 5200 feet (Niger).

Behavior. Very little known. Feeds on insect larvae, probably mainly beetles, secured by tapping and excavating in scattered, small trees in the dry areas it inhabits. Breeding occurs from March to May in Niger (Niethammer, 1955; see also Bates, 1934) and probably elsewhere, but nothing is known of its nesting habits.

Taxonomy. Its relationships are not clear, but it has no very close relative. Probably related to the fuscescens group. Monotypic.

SPECKLE-BREASTED WOODPECKER

Dendropicos poecilolaemus

Color Plate 30

Range Summary. Central Africa.

Diagnostic Features. Little, 25 to 29 grams, wing length 79 to 89 millimeters. Above, yellow-green; below, pale yellowish with fine spots or bars mainly confined to the breast. Facial markings very weak. Tail mainly unbarred. Little or no red on rump.

Description. Bill moderately long, broad across nostrils. Above, yellow-green with traces (males) or definite (females) blackish and pale barring on upper back, and often on rump; feathers of rump narrowly, if at all, tipped red. Wings brown on flight feathers, edged yellow-green, and barred with yellowish white on inner and outer vanes. Coverts above, yellow and brown with pale spot-bars; below, barred. Shafts dusky yellow on upper wing, pale yellow on underwing, and bright yellow above and below tail. Tail brown with bars lacking or weak and dull greenish; below, mainly suffused yellow with obscure bars in some specimens. Tail/wing ratio 0.52 to 0.57. Ear coverts brown and white streaked; white line over eye to front of eye, and vague line under eye. Lores brown and white. Dull brown and white, inconspicuous malar patch. Chin white, usually unmarked or with a few spots. Below, pale greenish yellow, sometimes with a gray cast, whitening on throat; markings vary from usual scattered spots on upper breast and a few traces of bars on flanks to finely barred breast with indistinct broad bars on the flanks and vague abdominal streaks.

Sexual features: The hindcrown and nape are red; the forecrown and forehead are brown in males. Females lack red on the crown and nape, which are black, especially on the nape, becoming browner on the forehead. Immatures are gray-green, lacking yellow above, with indistinct black bars on the upper back; red is lacking on the rump, there occasionally being traces on the tail coverts. Below, immatures are grayish white, with little or no yellow or green tone and less distinct markings. There is a close resemblance of immatures to D. fuscescens lepidus. Both sexes have red on the crown, more extensive in males, and a distinct black nape, the black extending around the crown to the eyes. Eyes red in adults, brown in juveniles, and perhaps a few adults. Legs and feet various shades of green or olive. Bill dark gray or blue-gray to dull gray, paler on the culmen and base of the lower bill.
**Distribution and Habitat.** Ranges from Cameroun east to southern Sudan, Uganda, western Kenya, and northeastern Zaire. Occurs up to 5000 feet in elevation in savannas and the edges of cultivated areas, shunning forests (Chapin, 1939).

**Behavior.** Poorly known. This woodpecker secures insects from trees by tapping and excavating, especially at dead trees in clearings and also in elephant grass. Foods include various beetle larvae, caterpillars, and ants (van Someren and van Someren, 1949). A call given by both immatures and adults is a “dry ‘ché-ché-ché-ché-ché’” (Chapin, 1939, p. 585). Nesting occurs from May to August in the Uele River and Ituri regions of Zaire and in Uganda, with immature birds taken as late as 29 September in the Uele area (one 14 March in Ruwenzori region). Molting follows nesting, lasting until February (Entebbe, Uganda).

**Taxonomy.** Rather closely related to *D. abyssinicus* and sympatric *D. fuscescens*, this species is monotypic. It tends to be slightly larger than sympatric races of *D. fuscescens*, with a longer and broader bill.

---

**GOLD-MANTLED WOODPECKER**

*Dendropicos abyssinicus abyssinicus*

**Color Plate 31**

**Range Summary.** Eastern Africa.

**Diagnostic Features.** Small, weight 23 to 26 grams, wing length 87 to 96 millimeters. Unbarred yellow-gold above with fully red rump and uppertail coverts. Below, evenly streaked with black from chin to abdomen; dull brown ear patch and malar stripe.

**Description.** Bill rather long, moderately wide. Above, yellow to gold, sometimes edged with reddish, and feathers with brown bases showing mottled effect in worn birds; upper back tends to be brown behind nape; rump and uppertail coverts red. Wings brown with yellow-gold coverts and edges of flight feathers, barred white on inner and outer vanes. Coverts above, spotted white; below, streaked or barred brown. Shafts pale yellow below; brown above with yellow showing in bases of tail feathers and sometimes in wings. Tail brown with narrow white bars not reaching the shafts; below, barred but obscured by yellow suffusion on middle feathers. Crown pale brown, darkest at rear. Ear coverts and malar stripes as crown. White stripe over eye separated by brown mark from white of lores and under eyes. Chin white, streaked brown. Below white to pale yellow-white with broad blackish brown streaks, narrower on throat and belly.

**Sexual features:** Male with red hindcrown and nape; female lacks red on head, has pale brown hindcrown, becoming darker, even blackish on nape. Immatures greener above with more suffused olive and less yellow than adults; rump paler red; below, whiter and less yellow, with some barring amid streaks on belly. Sexes both have red on crown, perhaps more extensive in males, but red not reaching nape, which is blacker than in adult females. Data on soft part colors are minimal — eye color is recorded as brown on two adult specimens.

**Distribution and Habitat.** Forested highlands of Eritrea and Ethiopia. Occurs in juniper and other mountain woodlands, but noted in other habitats, including savannas, even below 1500 meters in elevation (Urban and Brown, 1971). Benson (1946) mentioned an ecological separation of *D. abyssinicus* and *D. fuscescens hemprichii*. The only instance of sympatry between *abyssinicus* and *fuscescens* (*D. f. lepidus*) was reported to me by Stuart Keith at 30 kilometers south of Gondar, 24 June 1974 – both were seen in the same spot 15 minutes apart, but this may reflect postbreeding upward movement of *lepidus*. 
Behavior. Essentially unknown. Stuart Keith (in litt.) informed me that individuals of this species forage quietly on trunks and branches, often probing and prying into mosses and other plants growing on the trees, but not tapping. The nesting season is reported as February to May by Urban and Brown (1971), and immature specimens I have seen date from February to June or even September (Maji, two young). Molting birds have been noted in April and June.

Taxonomy. Related rather closely to its allospecies, *D. fuscescens*, which it meets, and to allopatric *D. poecilolaemus*. No subspecies have been described.

**CARDINAL WOODPECKER**

*Dendropicos [abyssinic] fuscescens*

Color Plate 32

Range Summary. Africa.

Diagnostic Features. Little, weight 19 to 36 grams (five races); wing length 74 to 99 millimeters. White to yellowish underparts with black or olive streaks; sides of head to throat mainly white, broken by brown to black stripe extending along malar region to sides of neck. Variably unbarred green to barred brown or black and white above; wings and tail show conspicuous barring.

Description. Bill rather long, broad. Size variable individually and geographically. Above, unbarred green, green with brown and white bars on upper back only, green with vague to strong brown bars, various shades of yellow-green to greenish yellow barred brown and whitish, to brown and white barred with little or no greenish or yellow; rump and upper tail coverts often show barring and are distinctly yellower than back; tips of uppertail coverts usually red, never so much as to form a distinct patch and sometimes lacking, especially in green-backed races. Wings as back on upper coverts and flight feather edges; latter feathers brown, variably barred whitish or yellow-white. Shafts of wing and tail feathers yellow, brighter below, becoming dusky yellow above in the tail. Tail brown, variably barred strongly to weakly with greenish white or yellowish white, suffused yellow on vanes below. Tail/wing ratio 0.44 to 0.58. Ear coverts dusky white (dull, obscure streaking on white background); broad white line over eye broken by dark mark in front of eye. Lores white, connecting with obscurely streaked, whitish line under eye and in upper malar region. Brown to black streak along lower malar from bill to neck. Chin and throat unmarked white or bearing brown streaks or spots. Below variable, partly due to wear; background white to yellowish (especially fresh-plumaged birds, which may have conspicuous yellowish belly) or even light yellow-green (some *lepidus*); markings from narrow streaks on throat to abdomen, to broad streaks anteriorly and strong barring on flanks and abdomen (most birds show at least traces of barring on flanks).

Sexual features: Males with dull brown forehead and forecrown and with red hindcrown and nape. Females lack red on crown, have black nape and crown paling gradually to brownish (occasionally olive) on forehead, but always darker anteriorly than are males. Immatures are duller in color generally and tend to be less clearly marked and more barred below; both sexes have red feathering on the central crown, more extensive in males than in females. Eyes red to dark brown, more often red than not in adults, and varying in all races; brown in immatures. Legs and feet greenish, varying from grayish green to olive-green. Bill gray-black to black with a paler, even whitish tip, and paler below generally.
**Distribution and Habitat.** Widespread from Senegal and Sierra Leone across Africa to Ethiopia and Somalia, and southward (except in denser Congolese forests) to the Cape of Good Hope. Frequents diverse types of woodland, savanna, and bushland; generally avoids dense forests, being restricted to forest edges and clearings in heavily forested regions. In Ethiopia apparently replaced in dense highland forests by *D. abyssinicus*; in the Kivu region of Zaire, Chapin (1939, p. 584) noted that the Cardinal Woodpecker occurs below the mountain forests up to 6000 feet, is absent within the forest itself, and reappears at 11,000 feet in *Hagenia* woodlands.

**Foraging Habits.** Foraging is chiefly by probing and tapping, occasionally by gleaning and excavating, in the branches and twigs of large trees or throughout small trees and bushes. Cardinal Woodpeckers are very active foragers, moving constantly and rarely working long at a feeding site. They are acrobatic, often hanging upside down, wings beating to keep them in place as they probe into the bases of tiny twigs. Pairs and family parties forage together, frequently in the same tree, as they rapidly move through an area. Their food consists largely of moths and the larvae of beetles, obtained at or near the surface of the bark. Occasionally, birds foraging in low bushes will pursue a dropped morsel to the ground to retrieve it. An unusual habit is the breaking off of dried twigs to get at beetle larvae therein (van Someren and van Someren, 1949). In Kenya both plains (*hemprichii*) and upland (*lepidus*) birds feed on apparently the same beetle larvae during October (personal observation). Foraging habits of Kenyan, Cameroun, and southern African birds, representing the *hemprichii*, *lepidus*, and *fusescens* groups, appeared to be identical. This species frequently forages in company with mixed species foraging flocks, for which its rapid feeding movements seem to adapt it well. In Moçambique the woodland species comprising these flocks include “*Sylvietta*, *Eremiornis*, *Hyliota*, *Batis*, and often *Ploceus bicolor* and *Erythrocephalus*, to say nothing of the inevitable *Dicrurus adsimilis*” (J. Vincent, 1935, p. 21).

**Voice.** Several different vocalizations have been described. A Rattle Call may be heard throughout the year as an aggressive-territorial call. In my field notes from Cameroun and Kenya, this is rendered “pit, pit-pit-pit-dit-dit,” “pit-pit-pit-pit-pititi,” and “dit dit dit dit dit dit-dit-dit” (the last in an aggressive encounter). The same call is mentioned by Chapin (1939, p. 582) as a “trrrrrrriiiii” for Zaire birds, a “small chittering” for Moçambique birds (J. Vincent, 1935, p. 21), and “a chittering trilling cry often repeated ‘kri-kri-kri-kri’” for southern African individuals (Mackworth-Praed and Grant, 1962, p. 581). The call may be a contact call as well, for Kenyan adults after foraging for awhile flew to treetops and called repeatedly until a bird of the opposite sex, presumably the mate, flew in to join the mate. Another aggressive note is a “creek-creek-creek” or intense “tweek-week-week-week-week,” uttered by birds engaged in encounters (Short, 1971e, p. 90). When adults are feeding young birds, a soft “ssssss” or louder “wees-wees-wees” note, probably uttered by both young and adult, can be heard (Short, 1971e, p. 90). This may be the same call referred to by Attwell (1952, p. 89) as a “shrrrr chrrr-chrrr” uttered by nest-relieving adults or as “a throaty chrrr-chrrr” by young birds. Among other reported calls are a “penetrating call of ‘quakh-quakh-quakh-quakh’” (Priest, 1934, p. 526); a “shrrill double cry of ‘bwé-bwé’ (resembling the note of *D. elliotii*)... and also a single prolonged piercing cry” (Bates, 1930, p. 289); and a whistled “tu-tu-tu-tu” (Bannerman, 1933, p. 443). These calls generally resemble the Rattle, Kweek, and Wicklike calls of *Picoides* species (Short, 1971f). A few authors have reported drumming by *D. fusescens*; but it may drum mainly at one season of the year, for reports are scattered; I heard it in Kenya, but not Cameroun or southern Africa. Chapin (1939) noted it in Zaire birds, and Mackworth-Praed and Grant (1962, p. 582) stated
the following regarding southern African birds: "It also drums and is said frequently to do so while clingng to the fruits of the Baobob tree. The drumming is by both sexes and often ends with a sharp call."

Displays. Aggressive encounters and chases punctuated by "week-week" calls, were observed in Transvaal during September. Two adult males chased each other; and, when close together, "they called almost continuously, flicking the wings rapidly in and out, with tail spread, crown feathers erect almost effecting a crest, and with bowing and slight side-to-side swinging of the head" (Short, 1971e, p. 90). Very similar displays (Wing Spreading, Tail Spreading, Crest Raising, Bowing, Swinging) are known in colapte woodpeckers and in Picoïdes. Also noted were Rattle Calls given by pursuing birds after conflicts seen in Kenya. Wing Spreading by a female toward another female and a male was described by J. Vincent (1935, p. 21). The fluttering bird, calling constantly, was "wing-flapping," "precisely like that of a Sitagra Weaver (= Ploceus velatus) when, as is so often seen among individuals in a nest colony, it is hanging upside down at the entrance to its nest." In Cameroun I watched two females in an aggressive encounter, one swinging upside down with wings waving, calling "dit dit dit"; the other bird then flew at the displaying female and supplanted it. Tail Spreading and Bobbing displays also occurred in the same encounter. A female Cardinal Woodpecker in Cameroun was attacked by a sparrow (Passer diffusus), and it responded by attacking the latter, with Tail Spread, head held low and Bill Directing at its antagonist, and with a Swinging of the head, but no vocalization. The sparrow fled. Other chases and encounters were marked by periodic single taps, especially by the dominant bird. Head Swinging and Bobbing seen in Kenya and Cameroun were not of the continuous, back-and-forth type (see Colaptes), but rather abrupt, with a swing or two, punctuated occasionally by a tap with the bill on the substrate. The barred tail is conspicuous in Tail Spreading displays. Pair formation activities have not been described.

Breeding. Courtship has not been described. The nesting period varies geographically. Records from western Africa are sparse; I have seen an immature bird from Sierra Leone taken 9 June, and Nigerian specimens representing February and March. From Somalia young birds collected September to November have been seen, and Ethiopian (hemprichi) immature specimens occur from 23 February to July. A February immature from Cameroun, and lack of breeding activity in October, suggest breeding commencing at the year's end. Young birds have been taken between July and February in eastern Zaire, between September and April in Uganda, between October and March in Kenya, and from October to April in Tanzania. Benson and Pitman (1963, p. 34) recorded 32 nesting dates (eggs) from Zambia and Malawi between May and December, over two thirds being in September and October. The breeding seasons are very diffuse in Kenya. Irregularity of the rains may be a factor. During March of 1976 I consistently found pairs feeding fledglings about Laikipia; but within 40 miles to the south, and elsewhere in central and southeastern Kenya, there was no breeding. In October of 1976 I observed association of recently fledged young near Barsaloi, Central Kenya, but nowhere else nearby, nor in western Kenya or about Nairobi were they breeding. In Moçambique and Transvaal young birds are known from June to November, and Angola dates (July to December) are similar. In southern Africa nesting usually occurs in September and October, but young birds are known as early as August (Cape Province, Natal). Molting takes place from the latter part of the breeding season onward, lasting up to 5 months.

Detailed nesting information was presented by Attwell (1952). Both sexes excavate the nest, usually in a dead stub or fully dead tree. From two to four eggs are laid. The incubation
period is from 10 to 12 days, and the young remain in the nest for about 27 days. Incubation is by both adults. Insects are carried to the young in the adult’s bill; and, after hatching, the adults feed the young at about half-hour intervals. For the initial week after hatching, each adult remains with the young after feeding, until relieved by its mate; thereafter both foraged for food at the same time, bringing insects more or less alternately. Relieving adults gave the “chirr-chirr” call referred to earlier; and after the young were about a week old, they also called (“chrr-chrr”; Attwell, 1952, p. 89) frequently, even between visits by the adults. The male occupied the nest nightly with the young.

The nesting just described was interrupted by a near tragedy when the tree was broken diagonally through the nest by a gust of wind, throwing the young birds out of the nest and onto the ground. Attwell repaired the stump by wiring the parts back together, and she replaced the young in the repaired nest. The watching female woodpecker, and subsequently the male, resumed feeding the young.

Immature birds accompany the adults for a long period after fledging. In Kenya there seems to be some separation of duties, the female consistently feeding one or two fledglings while the male feeds the others. In several cases I saw a single young bird follow one adult for an hour or more. Whether the adults meet late in the day and their young regroup is uncertain, but it may be that the family breaks up, one (or more) fledglings accompanying one adult only, until independence. Attwell (1952, p. 90) described the following of foraging adults by young fledglings, which effectively were shown where to forage by the adults, very much as in *Picoides canicapillus*. The foraging family parties are very vocal, drawing attention from some distance.

Breeding males show testicular asymmetry just as do various species of *Campethera* (Short, 1971e).

**Taxonomy.** Closely related to *D. abyssinicus*, *D. poecilolaemus*, and *D. gabonensis*, but closest to *abyssinicus*, with which it forms a superspecies. Several dozen subspecies have been described, many of them weakly based and representing intergradient populations not worthy of nomenclatural recognition. There are three racial groups: the green-backed *lepidus* (or *lafresnayi*) group of western and central Africa; the larger, paler, barred-backed *fuscescens* group of southern Africa; and the small, very pale, barred-backed *hemprichii* group of Ethiopia, Somalia, and eastern and northern Kenya. The barred-backed groups are separated by green-backed populations. A tendency for greenish dorsal coloring extends through highland eastern Africa to Tanzania, Mozambique, and Natal (races *hartlaubii* and *intermedius*). In the western part of South-central Africa, green-backed and black-and-white-backed forms intergrade completely through Angola to Zaire. In the east the situation is complicated, probably because the green-backed form (*lepidus*) of moist forests has suffered range restriction to the highlands because of human activity and xeric climatic changes, whereas the more arid-adapted black and white forms (*hemprichii* group in northeast, *fuscescens* group to southeast) have spread and infiltrated the range of *lepidus*. The southern African *fuscescens* group intergrades with the *lepidus* group over a broad area from Mozambique and Zambia to Tanzania. In contrast, the *hemprichii* group of the acacia plains and the *lepidus* group which is restricted to highlands in central Kenya and southwestern Ethiopia largely are isolated by unfavorable habitat, chiefly due to man’s activities (clearing of woodland, livestock foraging, cultivation). In a few places they make contact and interbreed, as along the upper Ewaso Ngiro River northeast of the Aberdare Mountains and about the Maralal hills. Apparently as a result of introgression, the highland central Kenyan *lepidus* population is more barred than Ugandan and Zaire *lepidus*. There was formerly a highland connection to the coast, and that
and wetter conditions there seem to be responsible for the strong green-backed influence seen in coastal Tanzanian birds (*hartlaubi*) which may have contacted *lepidus* formerly through the Usambara and Ulu Guru mountains. Because of the limited interbreeding of the *hemprichii* group with *lepidus* and because of its small size and pale coloration, this group must be accorded status equal to that of the *fuscescens* and *lepidus* groups. Indeed, further study in Kenya and Ethiopia is needed to furnish details of the interbreeding reactions of the *lepidus* and *hemprichii* groups. There are no vocal or other behavioral differences evident among the three groups, although more data are needed from most populations.

I tentatively recognize nine subspecies, the ranges of which essentially can be found in White (1965). These subspecies include: (1) three green-backed forms of the *lepidus* group (*lafresnayi*, the fine-streaked, small West African race; *sharpii*, also small but more heavily streaked, of eastern Nigeria and Sudan to northern and western Zaire and northernmost Angola; and larger *lepidus*, more barred dorsally, of eastern Zaire to Ethiopia, Uganda, Kenya, and Tanzania); (2) three yellowish green-backed but dorsally barred subspecies of the *fuscescens* group (large *centralis* of Angola to western Tanzania, Zambia, and northern Namibia; somewhat smaller and dorsally olive rather than black-barred *hartlaubi* of southeastern Kenya through Tanzania to Mozambique; and large *intermedius* of Natal and adjacent Transvaal and Mozambique); (3) a large blackish and white-barred race (*fuscescens* of Cape Province to Namibia, Botswana, and Rhodesia); and (4) the smaller, browner, and less heavily marked *hemprichii* group (larger, darker *massicus* of inland Kenya, southern Ethiopia, and Tanzania and the still smaller, pallid *hemprichii* of most of Ethiopia, Somalia, and northeastern Kenya).

References

**GABOON WOODPECKER**

*Dendropicos gabonensis*

**Color Plate 33**

**Range Summary.** Central Africa.

**Diagnostic Features.** Little, weight 24 to 28 grams, wing length 72 to 87 millimeters. Unbarred green above, streaked below. Tail not barred. White background of throat and sides of head contrasts with yellow breast and abdomen.

**Description.** Bill rather short, moderately broad between nostrils. Above, green to greenish bronze (*lugubris*), rarely with traces of barring on rump or upper back. Wings as back on coverts and edges of flight feathers, which otherwise are brown, barred broadly with white on inner vanes; spotted underwing coverts. Shafts pale yellow below; above, brown except yellowish tail bases. Tail above, deep olive; blackish at tips and greenner at edges, sometimes with obscure green bars contrasting with deeper olive; or entirely black (*lugubris*); below, suffused yellow, sometimes with hint of barring. Tail/wing ratio 0.43 to 0.54. Ear coverts streaked with white along shafts and brown on vanes or (*lugubris*) brown stripe in center bordered with white. Vague white line over and under eye, streaked or spotted; lores buffy. Throat and chin white with checklike brown streaks. Malar area as throat (*gabonensis*) or with narrow (*reichenowi*) to broad (*lugubris*) brown stripe. Below, streaked brown from
throat to breast, broadly in *lugubris*, more narrowly in *reichenowi* and tapering and spotlike in *gabonensis*; streaks narrower on abdomen, sometimes spotted instead (*gabonensis*); flanks barred; background color light greenish yellow.

Sexual features: Male with a broad red cap from above eyes to nape, edges showing brown (blotched appearance) on crown or red restricted to nape (*lugubris*); forecrown light olive-brown, sometimes with pale streaks. Female lacks red and has blacker crown and nape. Immatures greener (less bronzy in *lugubris*) above; sexes alike with red on crown to hind-crown; nape blackish. Eyes red or red-brown in all races, perhaps occasionally brown in adults, brown in immatures. Legs and feet various shades of green, from brownish green and olive-green to yellow-green. Bill deep gray to black, becoming paler below and at base.

**Distribution and Habitat.** From Sierra Leone east across forested Africa to eastern Zaire and western Uganda, and south to Kasai in Zaire. Apparently shuns primary forests, except about clearings, preferring forest edges and secondgrowth, at elevations up to 4000 feet. It is more of a forest bird than sympatric *D. fuscescens* (Bannerman, 1933), as it does not occur in open savannas or even gallery forests (Chapin, 1939).

**Foraging Habits.** This woodpecker feeds probably in diverse ways, and doubtless this is responsible for contrasting statements about its habits, such as, "They do not tap loudly, apparently feeding chiefly on ants" (*lugubris*, Sierra Leone; Walker, 1939, p. 420); "They were never found to have eaten ants" (*gabonensis*, Cameroun; Bates, 1909, p. 21); Bannerman's report (1933, p. 446) that it (*lugubris*) taps loudly and can be heard 150 yards away; and Chapin's statement (1939, p. 586) that *gabonensis* feeds on wood-boring insect larvae. The few individuals I was able to observe in Cameroun (*reichenowi*) foraged in cultivated areas utilizing scattered trees left standing, at forest edges, and in secondgrowth. The birds moved rather rapidly. One female foraged for 12 minutes at several sites in three trees, all less than 6 inches in diameter and below 50 feet in height. This bird did not tap or excavate, but probed, picked, and pried at leaf bases, especially working about the bases of leaves of a *Cecropia* tree. Other birds were seen tapping, but sporadically, as they foraged mainly by gleaning. Stomach contents reported variously cite "insects," but J. Chapin's files contain a reference to carabid beetle larvae and ants in the stomach of a female taken by P. Hostie at Epombo, Zaire; and Friedmann and Williams (1968, p. 20) reported "small insect fragments, including beetle larvae" in gizzards of two Uganda birds. "Ants" are listed as stomach contents of a *lugubris* specimen.

**Voice.** A "shriiII piercing cry," probably of this species, was reported by Bates (1909, p. 21); and a "shriii 'wickering' cry similar to that of *Mesopicos (Dendropicos) pyrrhogaster*, but not so loud" was noted by Walker (1939, p. 420). In Cameroun a female uttered a very fast Rattle Call, "bdddddddlddddddtt," not particularly loud or emphatic. This call seemed directed at me.

**Breeding.** There is little information about the breeding activity of this woodpecker. Birds with enlarged gonads were reported from western Uganda in June, and breeding occurs in Cameroun and Zaire in September and October (*gabonensis*). Young of *lugubris* were noted on 14 April by Bannerman (1933), and I have seen February and March immatures from Ghana and Sierra Leone.

**Taxonomy.** Rand, et al. (1959) merged *D. lugubris* into *D. gabonensis*, and this merger was followed by White (1965). I fully concur with this treatment. Three races are recognized: West African *D. g. lugubris* is distinctive by virtue of its brown-striped ear coverts and malar stripe, very broad ventral streaks, blackish tail, bronzy back, and restricted nape patch in males. It is also a trifle larger than the eastern forms. *D. g. reichenowi* of southeastern
Nigeria and western Cameroun was long treated as a race of *D. lugubris*, but Serle (1950) showed that on the whole it was more nearly like *D. g. gabonensis*. The features of *reichenowi* are those of a population intermediate between *lugubris* and *gabonensis*, to wit: (1) back color is green, like *gabonensis*; (2) ear coverts are streaked, like *gabonensis*; (3) malar stripe is partial, intermediate between *lugubris* and *gabonensis*; (4) ventral markings are nearer *lugubris*, but less broad, hence intermediate; (5) crown-nape patch is like that of *gabonensis*, but a trifle more restricted, tending toward *lugubris*; (6) tail is greener than that of *lugubris*, nearest *gabonensis* but somewhat intermediate; and (7) size is small, like *gabonensis*. Differences between the geographically representative *lugubris* and *gabonensis* are not great; the somewhat restricted nape patch of *lugubris* would not in my estimation restrict interbreeding if *lugubris* and *gabonensis* were to meet. At any rate, the partial bridging of the morphological gap between them by *reichenowi* is argument for the merger of these forms into one species.

**STIERLING’S WOODPECKER**

*Dendropicos stierlingi*

**Color Plate 31**

**Range Summary.** Southeastern Africa.

**Diagnostic Features.** Small, weight 25 to 31 grams, wing length 95 to 106 millimeters. Unbarred brown back with black band on upper back; broad brown eye stripe and malar stripe, latter broader to rear (like larger *D. namaquus*, see p. 217). Below appears “scaly” because of broad white spot-bars.

**Description.** Bill long and moderately broad. Above, dull brown, tinged olive, the only marks being faint white bars and streaks on uppertail coverts; upper back broadly black to hindneck. Some birds show red traces in uppertail coverts. Wings brown above, edged faintly olive; white bars on inner vanes of flight feathers; underwing coverts spotted. Shafts pale yellow below, dusky above on wings, yellow above on tail. Tail brown with conspicuous yellow shafts and feather tips above, suffused yellow below, unbarred. Tail/wing ratio 0.46 to 0.51. Brown eye stripe through central ear coverts, bordered by white stripes above (to eye, where interrupted by black mark) and below, latter connecting with lores. Sides of neck white, connecting to line over eye behind ear coverts. Malar area brown, broadening into a Y or yoke at rear, leading down toward breast and up to hindneck. Chin clear white, becoming brown checked on throat. Forecrown brown, paler at edges of feathers, giving scaly appearance. Below, appearing scaly or scalloped from rear of throat to belly, due to broad white spot-bars not reaching feather shafts, outlined in brown narrowly on shafts and between the spot-bars.

**Sexual features:** Male with red hindcrown and nape patch (bordered by black of upper back). Female lacks red; crown brown with vague streaks, becoming blacker on nape to upper back. Mackworth-Praed and Grant (1962) report immatures to be duller and darker than adults, and that both sexes bear red on the crown. I have seen two immature females, both showing less regular markings below and mixed brown upperparts. One has red scattered over the crown; in the other it is restricted to the hindcrown. Eyes red, occasionally red-brown in adults, probably brown in immatures. Legs and feet olive-green to greenish slate, “soles” of toes pale gray. Bill slate colored, paling to gray toward the base of the lower bill.

**Distribution and Habitat.** Restricted to southern Tanzania, northern Moçambique, and
adjacent southern Malawi, apparently only in *Brachystegia* woodland, up to an elevation of 5000 feet.

**Behavior.** Virtually unknown. J. Vincent (1935, p. 23) noted their “loud quick tapping” and the foraging of a male “hammering away at a dead twig of a low bush” in Moçambique. In March, Vincent saw a pair moving through open woodland in close company with a mixed species flock (including these species: *Sylvietta ruficapilla, Eremomila scotops, Parus afer,* and *Salpornis splinota*). On specimen labels their food has been noted as “insects.” Mackworth-Praed and Grant (1962) give the breeding season as probably from July to October, but nothing is known of their nesting habits. Juvenile birds date from November in Tanzania and March in northwestern Moçambique. The only vocalization reported is the “shrill laughing chatter” of members of a pair, uttered at intervals (J. Vincent, 1935, p. 23). With J. Horne I recently found that Malawi birds drum vigorously and have a loud, quavering Rattle Call.

**Taxonomy.** Not related very closely to any other species, but morphologically, behaviorally, and vocally intermediate between the *D. namaquus* and *D. fuscescens* groups, though nearer *D. namaquus* than to sympatric *D. fuscescens* (Short and Horne, studies in Malawi, 1980). Apparently uncommon within its range, and perhaps a relict species suffering from competition with the slightly smaller *D. fuscescens* and larger *D. namaquus,* “hanging on” in *Brachystegia* woodland, to which it may be particularly adapted. No subspecies have been described.

**Reference**


**BEARDED WOODPECKER**

*Dendropicos namaquus*

**Color Plate 29**

**Range Summary.** Central and southern Africa.

**Diagnostic Features.** Small, weight 67 to 98 grams, wing length 122 to 140 millimeters. Largest of arboreal African woodpeckers. Grayish tone above and below; barred above and below; white-bordered black eye stripe and malar patch, latter patch enlarging posteriorly. Yellow evident in wings and especially in tail.

**Description.** Bill very long and broad. Slight geographic size variation. Above, brown to olive-brown with narrow white bars (reduced to chevronlike marks occasionally), tinged yellowish in fresh plumage; rump paler with yellow tinge; uppertail coverts with strong yellow to red edges and tips, red variable and sometimes nearly absent. Wings brown; coverts barred or spotted white or with white shaft streaks; barring on both vanes of flight feathers, narrower on outer vanes and obscured by yellow-green edging in some birds; coverts barred below. Shafts dusky yellow to bright yellow above and fully yellow below, extending onto vanes. Tail variably barred, sometimes fully, with narrow whitish bars, but mainly yellow, especially entire feather tips; below, rather bright yellow with or without barring, which yellow obscures. Tail/wing ratio 0.45 to 0.53. Head boldly patterned with narrow black or brown-black eye stripe in center of ear coverts (*coalescens, namaquus*) or broader stripe extending to sides of neck (*schoensis*); white below eye stripe to upper malar region (sometimes finely barred), lower part of which forms black stripe expanding to rear and connecting
with sides. Rear of nape to upper back black. Lores white with black mark to rear. Chin white, sometimes with obscure bars or streaks. Below, variable; barred gray and white, the white tinged yellowish and gray tinged olive (namaquus); or breast blackish brown to gray with scattered white spots or bar-spots (occasionally lacking), and abdomen barred brown and white without much olive or yellow tone (schoensis, coalescens).

Sexual features: Males with red forenape and hindcrown, occasionally showing yellowish traces at front of patch, with forecrown to forehead brownish or olive-black, bearing many white spots; bill moderately longer. Females have a black forehead, crown, and nape, spotted white weakly to strongly on the forehead and forecrown and with bill generally shorter. Immatures show more green above, race for race; pattern of barring less distinct; bill shorter; crown spotted further to rear. Sexes both with red on crown in juvenal plumage, the red less extensive than in adult males and mixed with black and especially white-spotted feathers; females have less red, mainly on hindcrown, and it is more mixed with black. Eyes red-brown to red in adults, gray-brown to red-brown in immatures. Legs and feet olive-gray or greenish gray to gray. Bill gray-black, paling to gray on lower bill.

**Distribution and Habitat.** From Central African Republic, Sudan, Ethiopia, and Somalia southward in eastern Africa to the Cape Region of South Africa and west to eastern Zaire (including Katanga), Angola, and Namibia. Habitat is diverse woodlands and savannas, but not dense forest; secondgrowth and cultivated areas are utilized if sufficient numbers of dead trees and tall trees are present. Occurs up to 6000 feet elevation (Ethiopia).

**Foraging Habits.** Bearded Woodpeckers tap and excavate and, to a lesser extent, probe and pick at the bark of tree trunks and larger branches of trees. Small trees are used frequently, in addition to larger trees. There may be a sexual difference in site of foraging, especially when members of a pair feed near one another. In such cases males seem to utilize larger trees and trunks of smaller trees, and females are found more often in smaller trees and on smaller branches. Dead trees of all sizes are used by both sexes in foraging. Often the birds fly long distances between favored feeding sites. Larvae, chiefly of beetles, make up most of the food of Bearded Woodpeckers, but caterpillars and other insects also are taken. Most of the insects apparently are obtained from within the bark. Spiders, and also small lizards, have been reported.

**Voice.** A characteristic screaming alarm call, rendered “hare” (e.g., in Mackworth-Praed and Grant, 1962, p. 583) is heard throughout the year. Prior to the breeding season, and during, both sexes utter a Long Call, “kwik-wik-wik-wik-wik...,” sufficiently similar to the call of a Gray-hooded Kingfisher (*Halcyon leucocephala*) that a male Bearded Woodpecker, having lost its mate, repeatedly responded to the kingfisher's call by answering it and by flying toward it (Short, 1971e). When two Bearded Woodpeckers come into close contact, a Wickalike call, “ke-yuh, ke-yuh, ke-yuh,” or “chew-a, chew-a, chew-a,” may be heard as the birds display. This appears to be an aggressive vocalization. Short bursts of drumming also are rendered by Bearded Woodpeckers (Chapin, 1939), perhaps as a territorial pronouncement and as a contact note between members of a pair.

**Displays.** Various Swinging and Bill Directing posturings are considered displays, although they require study. Two males, apparently representing an adult and a subadult bird, swung from side to side, emphasizing the bill and its high position during an encounter. Also, the bill was pointed at the antagonist, and the head lowered by the other male in this encounter. These displays are considered to be aggressive in context.

**Breeding.** Nesting occurs in June to November at the southern extreme of the range (South
Africa, Angola); from June to December in Malawi, Zambia, and Rhodesia; from April to October in Kenya; during April in Ethiopia; and as early as January in Somalia (specimens). Specimens in molt date from months following the breeding season in all cases (June and July in Ethiopia, February in Angola, March in Kenya, etc.). Nesting generally occurs in the dry season, with two to four eggs being laid in a hole excavated in a live or dead tree (Mackworth-Praed and Grant, 1962). A cavity may be used in subsequent years, even after other animals have made use of it. The entrance to the cavity typically is oval. Both adults attend the young and carry food items in the bill. Tarboton (1970) found that feeding is at a rate of 5.2 times per hour during the first week after hatching; he estimated that fledging takes place at about 27 days of age.

Taxonomy. A distinct species related indirectly to *D. stierlingi* and *D. fusescens*, which it resembles in proportions and in the extent of yellow shaftedness. *D. xantholophus* and *D. pyrrhogaster* seem to be related distantly to this species. Various intergradient races have been recognized among the three major subspecies. The slightly larger but shorter billed *D. n. namaquus* is almost or fully barred on the breast, the background color of which is gray, as in the rest of the underparts. Above, this race is more yellow-olive-brown than dark brown, and the eye stripe is shorter, the white over the eye connecting behind the eye stripe to the line under the eye. This race inhabits (with intergradient populations) the range of the species except the area from northernmost Kenya north (schoensis) and southeastern South Africa (coalescens, eastern Cape Province to southern Mozambique). The southern *coalescens* is small, with a short bill, but very olive-brown above, and with bars tending to break into spot-bars (as schoensis); below, the breast is darker than the belly, and the breast bars are reduced to spot-bars. Northern *schoensis* is slightly smaller than *namaquus* with a proportionately larger bill. Above, *schoensis* is dark brown with narrow white bars and little yellow; the eye stripe is longer, connecting with the dark malar stripe posteriorly. Below, *schoensis* has a gray to black breast, darker than the belly, with few to many spots or chevron bars, but no barring.

References

YELLOW-CRESTED WOODPECKER
*Dendropicos [pyrrhogaster] xantholophus*

Color Plate 34

Range Summary. Central Africa.

Diagnostic Features. Small, weight 50 to 68 grams, wing length 104 to 118 millimeters. Dull green above and below with bold head pattern of blackish eye stripes and malar stripes bordered by white line over the eye and under the eye, and by white chin and throat. Yellow on crown of male; only African woodpecker without red in plumage.

Description. Bill long and broad. No appreciable size variation geographically. Above, olive to brownish olive, becoming black on upper back; no markings or faint to moderate white bars on upper back; rump feathers edged yellow narrowly, not forming distinct patch. Wings blackish edged green; coverts olive above, sometimes with arrowlike white marks; whitish bars on inner and outer vanes of flight feathers. Shaft black above; dusky with white centers below. Tail unmarked black, duller below; tail/wing ratio 0.58 to 0.71. Crown
black, paling to brown on forehead, often spotted white on forehead and occasionally with some spots on crown. Lores white, separated by black spot from white line over eye; broad white stripe below eye includes upper malar region. Black stripe from lower bill along lower malar region, broadening to rear. Black stripe through ear coverts, edged white above and below. Chin white, with spots of white posteriorly ("necklace") on throat. Below, greenish olive, sometimes brown or even black on breast; central abdominal feathers edged yellow, not concentrated in distinct patch. Ventral markings are black streaks on white lower throat, broadening on the breast to restrict white to lateral bar-spots (underparts thus mainly dark with white markings), and becoming olive and white bars on the flanks and sides of abdomen.

Sexual features: Males with longer bill and narrowly yellow-tipped feathers from center to rear of crown. Females with shorter bill, no yellow on black crown. Immatures duller in tone, greener above, with grayer, more barlike white breast spots; shafts paler; both sexes have yellow-tipped feathers on hindcrown, apparently more extensive in males. Eyes various shades of brown to red in adults and brown to reddish brown in immatures. Legs and feet various shades of green to olive, greenish gray, "horn" colored, or brownish. Bill dark gray to black above, edged lighter, and paler gray below, often with a tinge of green.

**Distribution and Habitat.** From Cameroun east to western Uganda and western Kenya, and south through Zaire to northwestern Angola. The Yellow-crested Woodpecker frequents lowland forests, including edges and secondgrowth, clearings, and cocoa plantations bearing tall trees. Usually found below 3000 feet in elevation, but recorded at 5500 feet in Kakamega Forest, Kenya (specimen, U. S. Nat. Mus.).

**Foraging Habits.** This woodpecker taps and excavates for insects within the bark of larger trees, dead stubs, and occasionally small trees. Usually the birds forage in the middle and upper levels of larger trees. Their tapping makes considerable noise, attracting attention to them. "In many respects this species... resembles Thripias (Dendropicos) namaquus... in habit" (van Someren and van Someren, 1949, p. 44). Some scaling of bark occurs at recently dead trees, the birds dropping small pieces of bark as they tap. A male at a tree 15 centimeters in diameter foraged in an unusual manner in Cameroun, by gleaning insects from the bark. The bird originally was seen near the top of the tree; it fluttered downward about 1 meter, grasped several insects, then tumbled backwards and laterally another meter or so, to repeat its gleaning there. In less than 2 minutes it worked its way by fluttering backward down the tree some 8 meters or so in this manner, before flying off. Stomach contents revealed that various wood-boring beetle larvae (up to 30 millimeters in length) and adults compose most of the diet of Yellow-crested Woodpeckers, but ants and spiders also have been noted.

**Voice.** The main call heard in Cameroun was a rapid Rattle Call "pddddd-dtt" or "pdeet-pddd-eeet" or, in flight, a "bdiddeeff" repeated two or three times. I also heard from a pair displaying (see discussion following) on a branch a repeated "week-a, week-a." This species drums during at least the prenesting period. Recorded drums in Cameroun lasted 1.27 (21 beats) and 1.12 (18 beats) seconds. The bursts vary from slow and loud to rapid and soft. The tempo varies from 7 beats per second at the start of the burst to 25 or even 30 beats per second at the end of a burst. The early and middle beats are loudest, and there often is a break in the beats near the end of a burst.

**Display.** I have noted a male and female Bowing to one another and calling "week-a, week-a" when perched close together on a branch, but no other displays have been reported.
Breeding. A brood patch was forming in a bird taken in October (female) in Cameroun. Another bird taken there at the same time had enlarged testes and a brood patch. The latter male, taken 21 October, was with a female at a possible nest in a large, partly dead tree standing in a cacao plantation near Kumba, Cameroun. On 1 November a female taken near Kumba was with a male in a large dead tree in a cacao plantation; a cavity which the bird entered was 50 feet above ground in a 70-foot dead stub 10 inches thick. This female, which was with a male, had an enlarged ovary (ova to 4 millimeters) and a well-developed brood patch. Immature Cameroun birds are known from January to March. In Zaire, breeding takes place during the dry season from January to April (Chapin, 1939) and also in September (immature from Congo River). An immature bird was taken in October in Gabon. A subadult changing to adult plumage dates from November in Angola. Female birds in the Kakamega Forest of Kenya commence laying by December, with immature birds representing the months of February and March, and Uganda immatures date from September through March. The molt follows the breeding season.

Taxonomy. Forms a superspecies with western *D. pyrrhogaster* which it replaces in Cameroun, and eastward and southward from there. I do not find consistent differences allowing recognition of races within *D. xantholophus* (see also Rand, et al., 1959, pp. 302-303).

FIRE-BELLIED WOODPECKER

*Dendropicos [pyrrhogaster] pyrrhogaster*

Color Plate 34

Range Summary. West Africa.

Diagnostic Features. Small, 65 to 70 grams, wing length 106 to 121 millimeters. Strongly patterned face with black eye stripes and malar stripes, white line over eye and under eye stripe; green above with red rump; dark below with bright red patch from breast to belly. Throat white.

Description. Bill long and broad. No geographical size variation. Above, bronzny green, often edged with red; few pale bars often evident on upper back; rump and uppertail coverts red, feathers with black bases. Wings bronzny green, flight feathers brown; coverts with white angled spots; broad white bars on inner vane, yellow-white narrow bars on outer vane of flight feathers. Shafts brown except whitish at base of tail below and dusky white under wings. Tail black tinged olive above and yellow-green below. Tail/wing ratio 0.60 to 0.67. White throat bordered on lower malar region by black stripes, narrow to front, broadening posteriorly where joining breast. Black eye stripe on central ear coverts, above bordered by white eye stripe separated by dark mark from white lores and below bordered by broad white stripe to malar region. Below, black from where malar streaks join at rear of throat to breast, becoming deep olive posteriorly, and with broad white bar-spots; entire center of breast to vent red, obscuring barred pattern.

Sexual features: Male has longer bill and crown feathers broadly tipped red from eyes to front of nape, with blackish bases showing in front, and forehead browner (a few males have central crown feathers tipped buffy yellow, becoming red to sides and rear). Female has shorter bill and lacks red on the crown, which is black, paling slightly on the forehead. Immatures duller green above, browner on facial markings and breast; less red on underparts, and red of rump paler; shafts whiter below with yellow tinge. Immature males have red on the crown, but less than adult males, whereas immature females have scattered
red-tipped feathers restricted to the hindcrown. Eyes brown to red in adults, brown in immatures. Legs and feet green to gray-green. Bill gray, darker slaty above and paler below.

Distribution and Habitat. West Africa from Sierra Leone and Liberia to eastern Nigeria. Restricted to forested lowlands where they frequent large trees, both within the forest and in adjacent partial clearings.

Behavior. Forages usually high up in trees, but Walker (1939, p. 420) found one “climbing about a fallen tree-trunk in a clearing.” It taps and excavates in live and dead trees, often in pairs which “keep in touch by making loud drilling taps which were answered immediately by the partner” (Bannerman, 1933, p. 455). Beetle larvae and “white grubs” are the only foods noted on specimen labels. Its shrill cries are mentioned but not described further by several authors. Drumming is frequent and loud, “castanet-like” (Bannerman, 1933), although of short duration. Nesting reportedly occurs during March in Liberia (Rand, 1951); and specimens of immature Nigerian birds date from 10 November to 16 May. Bannerman (1933) noted an adult female with an enlarged ovary as early as November. Molt follows the nesting period, with dates from 18 April to 31 May for Sierra Leone, January and February in Ghana, during May for Liberia, and 3 July to 2 January for Nigeria. Nesting habits and displays have not been discussed in the literature treating this woodpecker.

Taxonomy. Closely related to D. xantholophus, with which it forms a superspecies. The two species are virtually identical in size and proportions, although differing strikingly in coloration. They are not known to meet, although approaching one another closely in south-eastern Nigeria and western Cameroun. Monotypic.

**ELLIOIT'S WOODPECKER**

*Dendropicos elliotii*

**Color Plate 35**

Range Summary. Central Africa.

Diagnostic Features. Little, 32 to 40 grams, wing length 83 to 97 millimeters. Unmarked, green above with black (female) or black and red (male) cap. Buff or greenish sides of head without markings; throat white with fine dark streaks. Pale to moderately bright greenish yellow below, with variable streaking (nearly obsolete to strong, broad). Tail longer proportionately to wings than any other African woodpecker.

Description. Bill rather long and broad. Green above, sometimes tinged gold or bronze, without markings. Wing coverts green or bronze-green, flight feathers brown edged broadly with green to bronze; white bars on inner vanes. Shafts pale yellow below except tail feathers dusky toward tips; above, brown except pale yellow at base of tail. Brown tail, edged green above and suffused yellow below with dusker tips; some specimens weakly to strongly barred buffy on inner vanes of outer feathers near their bases. Tail/wing ratio from 0.64 to 0.81. Forecrown and forehead black; chin and throat white, finely streaked brown or black. Buffly lores and nasal tufts (latter black tipped); lines over eye and under eye, and ear coverts buffy, becoming green tinged at rear or fully pale green. Below, pale greenish yellow, yellower in less marked birds; markings vary from obsolete or faint fine streaks (*johnstoni*) to fine streaks (*kupeensis*, *gabela*) to broad or very broad olive to brown streaks (*elliotii*);
heavily marked *elliotii* tends to have barred and spotted abdomen and flanks (bars and shafts olive, spot-bars laterally), and very heavily streaked birds even show barring on the breast.

Sexual features: Hindcrown and nape red in male; red lacking in female, which has a black “cap” from forecrown to nape. Young birds are more streaked below than adults; males have red over the crown, and the red is restricted to the hindcrown of females. Eye color varies from red to reddish brown in adults, Legs and feet greenish gray to brownish green or olive. Bill variable, from black to gray, pale gray, even yellowish at tip, and paler on lower bill as well.

**Distribution and Habitat.** Fernando Po and eastern Nigeria eastward to eastern Uganda, and south to southern Zaire and northwestern Angola. Habitats vary from misty montane forests (*johnstoni, kupeensis*, from 3000 to 7500 feet elevation) to lowland primary forests and tall trees amid secondgrowth woods.

**Foraging Habits.** Elliot’s Woodpeckers forage alone or in pairs, usually well up in trees, but also descending into the understory. The woodpeckers move rapidly over the branches and vines, tapping frequently and audibly, but not in my experience (Cameroun Mountain) excavating very often. Where the forest trees bear dense moss and other plants, these birds favor the more open or bare branches and branchlets. Foods include various insects and larvae, especially beetle larvae, but not ants. Various authors have observed them participating in mixed species foraging flocks, including one flock in which individuals of *Campethera caroli* and *C. nivosa* also occurred (Chapin, 1939).

**Voice.** “An excited, reiterated vocal note, resembling slightly that of Mesopicos (*Dendropicos*) goertae” was mentioned by Chapin (1939, p. 588). Another note is a “rather shrill ‘bwe-bwe’” (Mackworth-Praed and Grant, 1962, p. 586). This woodpecker is known to drum, “but not very loudly” (Chapin, 1939).

**Breeding.** Only a few details are known concerning the breeding seasons of *D. elliotii*, and nothing is known of its nesting activities. In lowland forests of Zaire nesting occurs in November to February, and perhaps later. According to Serle (1950), *D. e. johnstoni* breeds early in the dry season in Cameroun, and he mentions an adult female taken on 19 October with ovary and oviduct enlarged. Molting birds I have seen bear dates during July and January from the Ituri region, December from Cameroun (all *elliotii*); a 14 June specimen of *kupeensis* is in molting condition. Three molting *D. e. johnstoni* date from late June and July.

**Taxonomy.** I view *D. elliotii* as a well-marked species not particularly closely related to any other species of its genus but probably evolved from an ancestor in common with the superspecies *D. goertae*. Its proportions are similar to those of *D. griseocephalus*, and the restriction of its crown patch, reduced head patterning, and tendency toward reduced markings ventrally (*johnstoni*) parallel specializations found in *D. goertae* and *D. griseocephalus*. Races of *D. elliotii* include highland *johnstoni* of Cameroun, eastern Nigeria, and Fernando Po; *kupeensis* of Kupe Mountain, Cameroun; *gabella* of Angola; and *elliotii* of the remainder of the species’ range. These races are not highly distinctive, varying mainly in the extent of ventral markings (color of upperparts of *elliotii* fully overlaps that of other races). *D. e. gabella* and *kupeensis* are intermediate between *elliotii* and *johnstoni* in the prominence of ventral streaking. When the variability of *D. e. elliotii* is allowed for each of the other subspecies just named, it seems inadvisable further to subdivide this species.
GRAY WOODPECKER

Dendropicos [goertae] goertae

Color Plate 36

Range Summary. Central Africa.

Diagnostic Features. Small, 40 to 65 grams (goertae, rhodeogaster), wing length 102 to 118 millimeters. Light gray head continuous with pale gray underparts, broken by red cap (males) and variably sized yellow to red patch on abdomen of most birds. Green back, red rump. Lacks yellow-olive, or only traces, on breast. Tail proportionately shorter compared to wings than in related D. griseocephalus.

Description. Bill rather long, broad. Very little variation in size geographically. Above, greenish gold or olive-yellow with bronze tones, and unmarked, to greenish yellow with narrow white bars on middle to lower back; rump and uppertail coverts red. Flight feathers brown with yellow-green edges, barred white on inner margins only (spodocephalus group) or reaching outer margin also (goertae group); coverts above as back, bearing pale bars in goertae group; and barred white and black below. Shafts brown above, varying below from yellow-white or dusky white in the goertae group to dusky in the spodocephalus group. Tail above, brown, barred white on outer feathers (spodocephalus group), or barring reaching central feathers (not completely; goertae group); brown below but suffused yellow on pale barring and most of outer feathers. Tail/wing ratio 0.50 to 0.63 (average 0.544 in spodocephalus group, 0.578 in goertae group). Head pale gray, reaching upper back and continuing onto breast; some birds of all races except rhodeogaster faintly but distinctly show a pattern marked by white lores, a white line under the eyes connecting with the lores, and a faint whitish line over the eye, combined with rather deep gray ear coverts (i.e., typical Dendropicos pattern). Below, whitish gray to pale gray, slightly edged with pale olive or yellowish in some birds; unbarred or weak to moderate white or yellow-white bars on flanks, sides, and even across abdomen. Center of abdomen with red patch of large size (spodocephalus, rhodeogaster), moderate size (abessinicus), or small size (occasional goertae, koenigi); or patch small and yellow or yellow-orange (goertae, koenigi; red occasionally evident in the yellow); or patch lacking (many koenigi).

Sexual features: Male with longer bill than female, red patch on hindcrown to nape, red usually lacking fine black bars evident in D. griseocephalus, but these faintly seen in some specimens of spodocephalus group. Female with shorter bill, lacks red on head. Immatures generally greener above, with less red or yellow on the abdomen and a paler red rump; both sexes have red on the center crown, but not the nape, males having more extensive red. Abdominal barring and face patterning are more frequent in immatures than in adults. Eyes variable in color from brown to red or pink (even white in two Nubian koenigi), gray-brown in immatures. Legs and feet greenish gray; white at joints and chalky over basic green-gray elsewhere. Bill slate to black above, paler gray or blue-gray below with dusky tip; corners of mouth yellow in immatures.

Distribution and Habitat. Ranges eastward across Africa south of the Sahara from Senegal to Niger, northern Sudan, and northern Ethiopia, and southward except in dense forests to Sierra Leone, Volta, southern Nigeria, Cameroun, northern Angola, less forested parts of Zaire, and northwestern and north-central Tanzania. Habitat woodlands, savannas, and edges of gallery forests in lowlands and especially in highlands up to 11,000 feet.

Foraging Habits. Gray Woodpeckers forage in live trees and to some extent in dead trees,
where they tap and excavate for insects. Mackworth-Praed and Grant (1962) mentioned their being seen on the ground at ants' nests occasionally, but no one else has reported this activity. Bannerman (1933) stated that they move rapidly during their foraging. Members of a pair usually forage together, but groups (family parties?) of up to six birds have been observed. Foods include ants, termites, and insect larvae, including various beetles (longicorns, buprestids; van Someren and van Someren, 1949). Chapin (1939, p. 591) mentioned seeing a Gray Woodpecker “catching winged termites in midair.” I have watched a pair forage amid fallen maize stalks on the ground in Kenya.

**Voice.** Little known. A loud “‘birri-birri-birri,” rather shrill and excitable with a repeated metallic ‘clink’ in it” (Mackworth-Praed and Grant, 1962, p. 583). Chapin (1939, p. 591) mentioned *D. goertae* attracting attention by “its protracted chattering note.” Alarm calls were rendered by Bannerman (1933, p. 452) as a “peet-peet-peet-peet” and “peeuh” or “peeeh” given three to six or eight times. The latter author also heard a “tiny squeaking noise” made by newly hatched young in a nest (1933, p. 453). The main territorial call in Kenya is a long “week” series somewhat resembling that of *D. namaquus.*

**Display.** No data. Van Someren and van Someren (1949) mentioned a resident male of a pair exhibiting territoriality, driving away occasional birds wandering into its home area.

**Breeding.** Little known, except for timing. Nesting of *D. g. goertae* occurs from January to March in southern Sudan, in February to May in Nigeria, in April to June in Senegal, from February to April in northern Zaire, September in eastern Zaire and adjacent Uganda (also 20 July, Uganda), and from April to July in western Kenya (data mainly from specimens and to some extent diverse literature). Molting birds in late July (Nigeria), May (Cameroon), November (Kasai, Zaire), and July and August (Sudan) also indicate that breeding occurs prior to these months. One can extrapolate from May and June molting in Niger and November molting in Timbuktu that breeding occurred several months prior to these times in *D. g. koenigi.* Urban and Brown (1971) gave December as the nesting period for *abessinicus* in northern Ethiopia and March to April plus August to September as the nesting period for *D. g. spodocephalus* in central and southern Ethiopia. Six immature *spodocephalus* from Ethiopia bear dates in the months of November, January, February, and March; and Friedmann (1930) reported a nest with one young found on 9 April. Together with molting specimens from the months of April to October (six birds — 22 April, May, 2 June, 29 June, 13 August, and October), these data indicate breeding from November to April, probably varying with elevation, for *spodocephalus.* Immatures of *rhodeogaster* were taken in September and October, and fully molting birds represent February. Dead or live trees are used for nesting purposes, and two to three or occasionally four eggs are laid (Mackworth-Praed and Grant, 1962). Bannerman (1933, p. 453) described a nest in northern Nigeria containing two naked young in a cavity excavated a foot above ground in a white ants' nest on 9 March and another in a cavity 12 feet up a large tree containing four eggs on 25 February. The latter nesting cavity was 1 1/2 inches in diameter at the entrance and 10 to 12 inches deep.

**Taxonomy.** Closely related to *D. griseocephalus,* forming a superspecies; possibly they are conspecific, as their differences are neither great nor profound and they are parapatric, approaching closely, but seeming to show altitudinal separation near Mt. Kilimanjaro. They meet and hybridize in Ruanda (see *griseocephalus*). The facial markings and their vocalizations clearly are those of *Dendropicos,* and generic separation of *D. goertae* and *D. griseocephalus* from *Dendropicos* is unwarranted. Races of *goertae* are grouped into a distinctive eastern (*spodocephalus*) and a western (*goertae*) group. The former group is distinguished by
its extensive bright red patch on the center of the breast and abdomen, its less barred wings, and its slightly shorter tail proportionate to the wings. I emphasize that there is very little size variation among all subspecies. The *goertae* group is composed of two rather weakly defined races, *koenigi* of arid savanna bordering the Sahara Desert on the south and *goertae* extending across Africa from Senegal to Sudan and south to Angola. *D. g. koenigi* is paler than *goertae* and shows more barring on the abdomen and on the back (lower back mostly); it is less orange and yellow on the belly. Nubian desert birds tend toward *abessinicus* of the *spodocephalus* group in having a small red abdominal patch. *D. g. goertae* is variable, but further racial subdivision (e.g., "centralis") is fruitless biologically. The *spodocephalus* group includes three subspecies. *D. g. abessinicus* of northern Ethiopia is paler below and yellower on the back than more southern *spodocephalus*. *D. g. rhodeogaster* is very similar to *spodocephalus*, which replaces it in southern Ethiopia (*rhodeogaster* occurs in Kenya, south to the Tanzanian border region); unlike *spodocephalus* and like paler *abessinicus*, it is yellow rather than bronzy olive above. The *goertae* and *spodocephalus* groups are reported to "occur side by side" (van Someren, 1932, p. 283) in western Kenya, but I have not seen specimens taken together; and Friedmann and Loveridge (1937, p. 195) reported an intermediate (between *goertae* and *rhodeogaster*) from Kabare, Tanzania.

**OLIVE WOODPECKER**

*Dendropicos [goertae] griseocephalus*

**Color Plate 36**

**Range Summary.** Southern Africa.

**Diagnostic Features.** Little to Small, 33 to 51 grams (*nwenzori, kilimensis*), wing length 97 to 118 millimeters. Its gray head, capped red in males, contrasts with the olive-yellow breast and green-yellow upperparts; rump red. Tail proportionately longer than in *D. goertae*, its close relative.

**Description.** Bill rather long, broad. There is little geographic variation in size. Above, green-yellow, sometimes golden or bronze in tone; rump red, uppertail coverts olive based, broadly tipped red. Wing coverts and edges of flight feathers greenish yellow, rarely with faint red tinge; flight feathers otherwise brown, bearing white bars or spots on inner margin and rarely narrow bars on outer margin. Shafts below, dusky with pale bases; above, brown. Tail black to blackish brown, edged deep olive above; outer feathers below suffused dull yellow. Tail/wing ratio 0.58 to 0.66. Head medium gray, including crown, forecrown, nape (female), over eyes, hindneck, lores, ear coverts, malars, upper throat, and chin. Below, diversely colored: gray on upper throat; lower throat and breast olive with gold or yellow tips of feathers, occasionally showing orange or red; and lower breast to abdomen gray with suffused yellow-olive (nearly all gray in *kilimensis*), with variable central red patch (lacking or reduced in a few *nwenzori, most griseocephalus, all kilimensis*). About 10 percent of all birds have vague to distinct white bars on gray flanks.

Sexual features: Males with distinctly longer bill (almost no overlap with females on sample-to-sample basis), hindcrown to nape feathers with gray bases variably showing or lacking fine black barrings, and tipped narrowly (partly due to wear) to broadly with red. Female lacks red, has entire head gray, and has shorter bill. Immatures distinctly grayer

*I have been able to find no intermediates of *abessinicus* and *spodocephalus*. 
Dendropicos [goertae] griseocephalus

below, breast green with little yellow, abdominal red paler and patch smaller; white bars on flanks of most birds, extending onto abdomen and sides in some individuals; shafts paler, white below; above, greener, less yellow, and rump paler red. Immatures of both sexes have red in the crown, more extensive in males and less so in females; feathers of the red area on the head bear black bars just below the tips, as in adult males. Eyes brown (brown, gray-brown, dark brown) generally; Mackworth-Praed and Grant (1962) reported dark crimson as the eye color for this species, but I noted red (“ruby red” on labels) only in the two females of kilimensis that I examined (a single male had brown eyes). Eyelids dull gray, tinged olive. Legs and feet olive or grayish olive. Bill black or gray-black above; below, black at tip, becoming greener or bluer gray toward base.

Distribution and Habitat. Occurs from central Angola, eastern Zaire, Ruanda, Malawi, and northeastern Tanzania south to southern South Africa. In the northern part of its range this woodpecker is strictly a montane forest bird, occasionally extending into riverine evergreen forest (Zambesi River). Extends upward to 11,000 feet in Hagenia forests of eastern Zaire (Chapin, 1939). Sometimes forages in scattered trees outside the forest.

Foraging Habits. Birds forage in large and small trees, especially favoring smaller trees and the smaller branches of large trees. Olive Woodpeckers probe and tap amid mosses on branches, often backing up or moving laterally. Tapping frequently is accomplished with angling of the head and delivery from the side. There seems to be a tendency for a sexual difference in foraging, males moving more rapidly than females. Stomach contents include ants, chafers, and beetles. Family groups and parties of three or four birds frequently are noted, as well as pairs. This woodpecker often forages with mixed species flocks (see Short, 1971e).

Voice. There are few data concerning vocalizations of the Olive Woodpecker. Chapin (1939, p. 593) reported hearing one drumming. A “cheerful clear but not very loud call, ‘chirr-re-re’” was mentioned by Mackworth-Praed and Grant (1962, p. 585). I heard repeated calls of “pep-pep-pep—” from a group of two males and a female in Transvaal, but no calls from a pair foraging together. A bird flushed from a tree called “wat-chew, wat-chew,” and another that I disturbed uttered a “queek,” probably an alarm note (Short, 1971e).

Breeding. Nesting occurs in September to November in southern Africa (McLachlan and Liversidge, 1957), and in June (Chapin, 1939) or February to April and July to September (Verheyen, 1953) in eastern Zaire. Molting kilimensis in June and August suggest breeding in Tanzania prior to that time. Molting birds also are known during August in Angola, and a juvenal bird was taken 3 August in the Ruzizi River region of Zaire. Three eggs are laid in a cavity excavated in a dead tree or stub; both sexes incubate the eggs (McLachlan and Liversidge, 1957). This woodpecker is somewhat social in that family parties may persist for long periods, such that groups of up to six birds have been noted together. A male specimen taken with a second male at a nest containing three eggs (Zululand; see Short, 1971e) suggests that one or more birds of a previous year’s brood may remain with a pair as helpers-at-the-nest during the subsequent year. I saw two males and a female traveling about together in Transvaal prior to the breeding season; these birds were very vocal compared with another pair (no “helper”) nearby. Thus, raising of three young, plus a helper, could explain the occurrence of groups of up to six birds. F. Dowsett-Lemaire (pers. comm.) studying this species in Malawi has reported that both adults of one pair spent the night in the nest with the young, even for a few days after fledging. Only one or two young were raised by 11 pairs that she studied. I note that Verheyen (1953) reported two distinct breeding seasons in
Upemba Park, Zaire. Raising of double broods and the occurrence of occasional "helper" situations could also account for the frequent sighting of groups of several individuals.

**Taxonomy.** Forms a superspecies with parapatric *D. goertae*. These allospecies probably meet in the Kilimanjaro region of Tanzania and in northern Ituri, Zaire. M. Louette (pers. comm.) recently has found that these two allospecies hybridize in Ruanda; the extent of their interbreeding is being analyzed. The races of this species are rather weakly defined, except for the moderately distinct *kilimensis*. *D. griseocephalus griseocephalus* of Zululand to Cape Province is darker generally, with less red on the abdomen, a more bronzy gold breast, and greener, less yellow back than *ruwenzori*. The latter race occupies most of the rest of the species’ range and shows a slight tendency toward smaller size (shorter wings) in Angola (but Zululand *griseocephalus* match these in wing length, and the variation is likewise nomenclaturally inconsequential). *D. g. kilimensis* of the mountains of northeastern Tanzania is small (but overlaps others completely) and pale below, with much reduced yellow below and no red on the abdomen; it is grayer in appearance than the other two forms and intergrades with *ruwenzori* in southern Tanzania (Dabaga region).

**Reference**

**Genus Picoides** Lacépède

The largest genus in the family, containing 33 species, the so-called pied woodpeckers are distinguished by their patterned black (or brown) and white plumage and the red or yellow on the nape, sides of the nape, or crown of the male. None are very large. It differs from *Dendropicos* in lacking red on the rump and, except for two species, in lacking yellow shaft color. The bill is short to medium and is straight, with a chisel-tip, with a strong culmen ridge, wide at the base, and with the nostrils under a lateral ridge. The tail is stiff, the barbs modified, and the vanes of the central feathers are concave ventrally. There are three or four toes, the hallux being lost in two species and varying in length in the others; the fourth toe is longer than the anterior toes. Included in *Picoides* is *Dendrocopos*, species of which have four toes; this feature is not a valid generic character, and the two species formerly in *Picoides* are more closely related to American "*Dendrocopos*" species than are the latter to Eurasian species placed in "*Dendrocopos.*" The genus is widespread in Eurasia and North America and reaches the Celebes and Philippines in Asia, central Africa, and South America.

**TEMMINCK’S PYGMY WOODPECKER**

*Picoides* [maculatus] *temminckii*

**Color Plate 37**

**Range Summary.** Southeastern Asia.

**Diagnostic Features.** Little, wing length 71 to 86 millimeters. The only small woodpecker in Sulawesi, mainly olive-brown with streaking below and barring on the back. Barred wings; brown face mark surrounded by white bars above and below. Some white on back of neck; nape red in males.

**Description.** Bill rather long, almost pointed at tip, slightly curved along culmen, broad across nostrils. Above, olive-brown to greenish olive with narrow whitish bars, the white
tinged brownish, thus partly obscuring the barring; rump pale, sometimes unmarked yellowish white, but usually whitish with dark barring. Uppertail coverts barred white and brown. Wings mainly brown, darker than back, with only tinge of olive; white spot-bars on coverts and white bars on inner and outer vanes of flight feathers; barred brown and white below. Shafts brown above in wings, dull yellow or yellowish horn color in tail except for brown tips; below, pale horn in wings, whitish in tail except for dark tips. Tail short, barred, varying from brown with buffy bars to buff or buffy white with brown bars, paler below with vague yellow or buffy yellow cast. Tail/wing ratio 0.40 to 0.52. Crown, ear coverts, and sides of neck are brown, the feathers gray-based, hence showing gray streaking in worn plumage; white lores, short line over eye posteriorly (separated by brown area from lores), and line under eye from bill to sides of neck. Malar area dorsally white as part of line under eye, ventrally brown with white checks or bars. Throat barred dull white and brown. Underparts streaked, the background color being buffy olive, or yellowish tinged white, with buffy brown or brown broad streaks along feather shafts; breast has broadest streaking and strongest buffy or yellow-buff tint, abdomen paler with narrow streaks. Undertail coverts buffy white and brown barred.

Sexual features: Females slightly longer winged and longerailed and proportionately longer tailed than males, but with same bill length. Males with narrow red nuchal band, narrowest and often broken in center, broadest laterally where sometimes extending slightly forward toward white over eye. Immatures much as adults, pattern less contrasting, stronger tinges of brown obscuring patterning of back and underparts. Eyes brownish red or red, legs and feet dull olive-green with brownish gray claws, and bill black with gray basally on the lower bill.

Distribution and Habitat. Ranges from sea level to 2300 meters in forests and woodlands of Celebes (Sulawesi). I have seen two specimens in the American Museum of Natural History ostensibly from Lirung in the Talaut Islands (between Philippines and Celebes). These were taken by Bornean collectors of J. Waterstradt in 1897, but Hartert (1890, p. 91) expressed grave doubt that all birds purported to come from those islands actually did so — the hunters may have stopped in Celebes en route to or from Borneo. Apparently occurs in coffee and fruit plantations (Meyer and Wigglesworth, 1898).

Behavior. Virtually unknown, unfortunately, as studies of this species would shed light on the evolution of Picoides and Dendropicos. Immature birds are known from March to August, and adults in molt represent the months from August to February.

Taxonomy. Related, probably quite closely, to its allospecies P. maculatus of the Philippines. No geographical variation has been ascribed to this monotypic species, but I find a tendency for birds of mountains, and those of southern Celebes, to be larger than lowland and northern birds.

PHILIPPINE PYGMY WOODPECKER

Picoides [maculatus] maculatus

Color Plate 38

Range Summary. Philippine Islands.

Diagnostic Features. Little, weight 22 to 30 grams (maculatus, "leytensis," fulvifasciatus), wing length 76 to 89 millimeters. The only small woodpecker in its range. Streaked vaguely
to boldly below, breast with spots, spot-streaks, or yellow patch. White line over eye, under eye; more or less well-defined dark malar line and “ear” patch. Above, brown to black with white bars; rump white, with or without bars. Males with red nape or sides of nape, in some forms not evident. Differs from Indonesian moluccensis by whiter rump (usually), more red in nape (male), and distinct pattern difference between breast and abdomen; from Sulawesi temminckii by stronger malar mark, absence of olive or yellow on back, and difference between pattern of breast and abdomen.

**Description.** Bill moderately long, very slightly curved along culmen, slightly chisel-tipped, broad across nostrils. Above, brown to black (validirostris, “leytensis”) with white bars or irregular streak-bars (ramsayi), whiter posteriorly; rump fully barred (some validirostris), partly barred (some validirostris), white to buffy white with a few dark spots or bars, or (ramsayi) streaks. Uppertail coverts barred or with chordate streaks or spots. Wings slightly to considerably darker (blacker) than back, bearing white spot-bars throughout (most races), these being sparse in maculatus and restricted to the inner vanes of flight feathers in ramsayi (which has white tips on secondaries); underwings brown with white bars. Shaft brown in wings, very pale yellowish white in tail with fine brown shaft streaks and brown tips; below, pale, whitish, with tinge of yellow, and some dusky. Tail short, usually brown to blackish and white (or dusky white) barred, but barring vague or absent (except white tips) in brown-tailed ramsayi; undertail paler, often with buffy yellow cast. Tail/wing ratio 0.40 to 0.55 (greater in ramsayi and maculatus; below 0.50 generally in others). White line starting over eye, leading posteriorly, and usually broad white line under eye and above malar to lower lores, border a dark (brown to black) patch on ear coverts, extending to sides of neck. Crown brown to (blacker races) black, often paler in center and blacker along lateral margins. Malar area brown with fine to strong white spotting, the malars enclosing a white throat usually sparsely marked anteriorly (rarely entirely spotted), but with brown or black spots at rear. Below mainly streaked brown to blackish brown on buffy white to yellowish white background, the streaks shifting to spots on breast; breast often shows concentration of buffy or orangish; but ramsayi differs in having streaking less pronounced and breast with distinct orange-yellow patch bearing no, or vague, spots. Undertail coverts streak barred on pale background.

Sexual features: Females slightly (5 percent) larger (longer winged, longer tailed, slightly longer bill) than males. Males with red on nape, lacking in females; amount of red varies, being extensive across the hindcrown and nape (and forward somewhat at sides of crown) in ramsayi, slightly narrower (sometimes broken in center) in fulvifasciatus, “leytensis,” and maculatus, still smaller and broken in “menagei,” and reduced to moderately small patches at the sides of the nape in validirostris. Immatures as adults, but browner (less black), more white barred above, less contrasting streaks below. Eyes brown to brownish red, legs and feet dull olive or dusky brown, bill deep gray to blackish, paling to bluish slate or gray basally.

**Distribution and Habitat.** This little woodpecker ranges throughout the Philippine Islands and extends to the Sulu Islands, but not reaching Palawan. Occurs from near sea level up to 5500 feet in dipterocarp forest, forest clearings, partly lumbered forests, and secondgrowth woods. It is most common in hills and mountains and is especially prevalent where there are many dead trees.

**Behavior.** Very little known. Presumably forages on trunks and on large and small branches of diverse trees. Its call is mentioned by various authors as a “very characteristic” note, but
this has not been recorded on tape. Gilliard (1950, p. 489) observed one moving in a foraging flock of creepers (Rhabdomis), orioles (Oriolus), graybirds (Edolisoma), and warblers (Phylloscopus). Breeding occurs between April and August in diverse subspecies. Nothing is known of its nesting. The annual molt takes place between August and December.

**Taxonomy.** Most closely related to its allospecies *P. temminckii*, which it resembles in various ways, including yellowish shaft color, and also to the *moluccensis–canicapillus* complex. Of the several races treated by various authors, I recognize four. The Panay, Sibuyan, Cebu, Guimaros, and Negros island *maculatus* (including "menagei") is rather brownish with red across the nape of males. Closely similar is *validirostris* of Luzon, Mindoro, Lubang, Marinduque, and Catanduanes islands; this form is shorter tailed and blacker than *maculatus*, the rump is more fully barred rather than unmarked white, and the red of the male's nape is restricted to small lateral patches. Both these subspecies show little or no buff color on the nasal tufts. On Bohol, Leyte, Samar, Basilan, and Mindanao occurs *fulvifasciatus* (including "leytensis"), which is blacker than *validirostris* and *maculatus*, with a pure white rump, more buffy underparts, and buffy nasal tufts; the male's red barely is connected across the nape. Most distinct is *P. m. ramsayi* of Siassi and the Sulu Islands. This subspecies is brownish in color with much less well marked streaks below, reduced spotting, a bright golden or yellow tinge on the breast (I find *siasiensis* not separable from *ramsayi*), and a broadly red nape in males.

**BROWN-CAPPED WOODPECKER**

*Picoides moluccensis*

**Color Plate 39**

**Range Summary.** Southern Asia.

**Diagnostic Features.** Tiny to Little, 14.5 to 18 grams (*nanus, moluccensis*), wing length 69 to 88 millimeters. A barred brown or black and white woodpecker with a fully barred tail, brown or black cap, black patch on the ear coverts, and underparts rather finely streaked throughout (except southern India and Ceylon, where nearly immaculate). Male with red patches on sides of nape, usually inconspicuous. Differs from *canicapillus*, where sympatric, by fully barred tail and solidly colored crown.

**Description.** Bill almost straight, moderately long, with a slight chisel-tip, and broad across nostrils. Back blackish brown to black with white bars (*moluccensis* group) or white bar-spots (*nanus* group), becoming whiter posteriorly; rump white with black spots or bars; uppertail coverts white with black bars or chordate marks. Wings blackish with lines of bar-spots on coverts and on most of flight feathers, but reduced on outer vanes of outer primaries; underwings brown and white barred. Shafts blackish above, paling to yellowish white or white at tail base; below, dusky tipped, paling to white toward bases. Tail black to brown with white marks usually barlike on outer feathers, spotlike on central feathers; brown with white spot-bars below. Tail/wing ratio 0.39 to 0.60. Crown to nape black (*grandis*), blackish brown (*moluccensis, gymnophthalmus*), or brown (*nanus, cinereigula*), often paling toward forehead. White line over eye from rear of eye posteriorly; below it, a broad black to brown ear covert stripe; and below that, a white to buffy white line under eye. The *nanus* group lacks a malar mark, having buffy white to white over throat, on malars, under eyes, and on
lores; the moluccensis group shows a strong brown (moluccensis) or white-flecked brown (grandis) malar mark that continues to sides of breast, enclosing whitish throat. Underparts buffy white to white (bright yellow buff cast evident on breast of some grandis) with fine streaks from breast to abdomen, becoming obscure on abdomen; streakings finer in nanus group, reduced in cinereigula, and obsolete or almost so in gymnophalmus.

Sexual features: Females slightly larger than males (longer wings in six of six samples), with bill proportionately longer, 5 to 10 percent greater than that of male. Males with tiny red patch on each side of nape, usually hidden by overlying black or brown feathering, but evident in some displays; females lack red. Immatures closely resemble adults, but plumage browner, less contrasting, males with more red (red is more orange in tone) on nape than in adults. Eyes brown to brownish red in moluccensis group, brown to whitish in nanus group (gymnophalmus of this group has eye color given on labels as “white,” “pale buff,” and “blue”); nanus group has bare ring of reddish skin around eye, this area being feathered in the moluccensis group. Legs and feet various shades of green to greenish gray or greenish slate; nails gray to brown. Bill dull gray to grayish slate or black above, paling below, dark at the tip; mouth lining grayish pink.

Distribution and Habitat. Northern Pakistan across northern India and lower parts of Nepal to Bangladesh, south through the Indian Peninsula, and also Sri Lanka (nanus group); also Malaya, Sumatra, Borneo, North Natuna Islands, Java, and the Lesser Sunda Islands. Restricted to lowlands in some areas, e.g., Malaya, where occurring only in coastal areas, but reaches 4500 feet in southern India (Betts, 1934), at least 5000 feet in northern India and Sri Lanka and up to 5000 feet on Lombok and Sumbawa in the Lesser Sundas. Frequent forest edges and clearings, secondgrowth woodlands, mangroves, tree plantations (such as mangoes and tea), parks, and golf courses.

Foraging Habits. Favors twigs and smaller branches at the tops of trees, and trunks and branches of saplings and smaller trees (e.g., mangroves) at lower heights. It forages quietly and rapidly by tapping, gleaning, prying, and probing. Most food seems to come from the surface or from superficial layers of bark. One bird was seen to pry unidentified insects from beneath bark. It flits and twists, and it flies frequently from site to site in the foliage, its movements often seeming nuthatchlike (Sitta), although not facing vertically downward in moving about. Participates in mixed species foraging flocks of flycatchers, warblers, and other birds. When moving about, the woodpecker often perches crosswise momentarily on a branch. Birds forage alone or in pairs. Its foods include ants of the genera Camponotus, Oecophylla, and Crematogaster; bees; weevils and other beetles; and caterpillars. Fruits also are important, including figs, as are insects and nectar obtained at various flowers. Some of these flowers were cited by Ali and Ripley (1970, p. 232), who noted that this woodpecker often has pollen on its chin and forehead and thus may cross-pollinate certain plants.

Voice. Drums weakly at six to eight bursts per minute over intervals of up to 5 minutes during the breeding period. Four bursts that were analyzed show a rapid 28 to 30 beats per second as the tempo; bursts contained 17 to 20 beats, given in 0.58 to 0.68 second. The drumming is likely to be territorial in function; it often is performed at a tall, conspicuous (small) dead stub overlooking surrounding woods. Two calls are known, a short “feeble, mousy click-r-r” (Ali and Ripley, 1970, p. 232) and a Rattle Call, “ti-ti-ti-ti-ti-ti-ti,” also rendered as a “prolonged ki-ki-ki-ki” resembling that of Dinopium benghalense “but uttered more softly and quickly” (Dharmakumarsinhji, 1956, p. 278). This call, which I have not analyzed, resembles that of the sympatric Gray-capped Woodpecker (P. canicapillus), but is softer. The functions of the two calls are as yet unstudied.
**Breeding.** The nesting season occurs from February to June in northern India, between December (Betts, 1951) and early July in central and southern India, from February to June (possibly also in October and December, but records may be erroneous [W.W.A. Phillips, 1953]) in Sri Lanka, and from March to July in Malaya and Sumatra. Both sexes excavate the nest, which is situated up to 70 feet or more above ground, usually above 10 feet, in a small, dead stub of a living tree. The nest entrance is about 3 centimeters in diameter, leading 5 to 10 centimeters down to the egg chamber. Sometimes the nest is excavated on the underside of a horizontal branch. The eggs number two or three or, in northern India, up to four. Both adults incubate the eggs and brood and feed the nestlings. The incubation period probably is 12 or 13 days (W. W. A. Phillips, 1953). Little is known of the feeding of the young, but the adults carry insects in the bill (Betts, 1934). The postnesting family association has not been described. The annual molt occurs between October and March on Java, from April to May on Sumbawa, and in June to August in India.

**Roosting.** Ali (1954) reported a bird roosting in a crotch of upright branches in a leafless tree, at a 45-degree angle, in Gujarat, India. The bird did not return the next night.

**Taxonomy.** Related closely to the pygmy woodpeckers *P. temminckii* and *P. maculatus*, as well as to *P. canicapillus*, which, although largely allopatric, overlaps with *moluccensis* in Malaya and perhaps Borneo. The two racial groups of *P. moluccensis*, the eastern *moluccensis* and western *nanus* groups, often are treated as separate species, but seem very closely related, more so to each other than is either to any other species; I judge them to be conspecific. Their differences chiefly are in the lack of a malar mark in the *nanus* group, the presence in that group of a bare (reddish) skin area around the eyes (the *moluccensis* group has this area feathered), and the tendency of the *nanus* group to have pale eye color. There is also some difference in general coloration, the *nanus* group being whiter (wings, back, tail) above and less strongly streaked below. However, the groups are very similar in size, in proportions, and in other color characters. Races of the *nanus* group include northern and central Indian peninsular *nanus*, *cinereigula* of southern India (Madras, Kerala), and *gymnophthalmus* of Sri Lanka. Northern *nanus* is broadly brown streaked below and shows a cline of increasing darkness southerly (however, racial separation of southern “hardwickii” apart from *nanus* is unjustified, as there is great overlap and the differences are trivial). Northern birds also are very slightly longer winged than more southern *nanus*. Southern Indian *cinereigula* has distinct but fine ventral streaks and is darker above than *nanus*, especially on the crown; thus it tends toward *gymnophthalmus*. Insular *gymnophthalmus* is distinct in having a blackish crown and blackish brown upperparts and in lacking or virtually lacking ventral streaking (streaks obsolete or traces only). Juveniles of both *cinereigula* and *gymnophthalmus* (as well as *nanus*) are streaked below. The *moluccensis* group includes two races, the widespread *moluccensis* of Malaya to Borneo, Sumatra and Java (including “tantalus” and “sondaiscus”), and *grandis* (including “excelsior”) of the Lesser Sunda Islands (Flores, Lombok, Lomblen, Sumbawa, and Alor islands). The latter subspecies, *grandis*, differs from *moluccensis* in its larger size (wings 10 percent longer), proportionately longer tail (tail/wing ratio 0.50 to 0.60 versus 0.39 to 0.51 for *moluccensis*; all forms of the *nanus* group fall within 0.42 to 0.52, thus agreeing with *moluccensis*), more streaked and less solidly colored malar stripe, more finely streaked underparts, presence of a faint yellowish buff cast on the breast, and a streak-spotted rather than barred white rump. The Alor Island population has been separated from *grandis* nomenclaturally as *P. m. excelsior* on the basis of its (slightly) larger size and more finely and paler streaked underparts. These differences indeed hold, but they are simply a slight extension of tendencies present in *grandis* as opposed to *moluccensis*, and I find evi-
dence of clinal variation in the Lesser Sunda Island populations — Sumbawa and Lombok birds are most heavily streaked and smallest, Flores birds vary from extremes represented by Lombok and by Alor ("excelsior") birds, Lomblen specimens rather closely approach those of Alor, and Alor specimens are identical with "excelsior"-like extremes of Lomblen and Flores. Given this variation and the fact that the differences are not great, I merge excelsior into grandis.

References

BROWN-BACKED WOODPECKER

*Picoides obsoletus*

**Color Plate 37**

**Range Plate.** Africa.

**Diagnostic Features.** Little, 18 to 25 grams, wing length 75 to 96 millimeters. Brown to blackish above and on crown. Wings spotted white on brown, tail barred. Brown malar mark, ear patch, with white stripe above and below the ear patch. Streaked below, streaks faint to strong. No obvious yellow in plumage. Male has red nape patch.

**Description.** Bill rather long, straight along culmen, slightly chisel-tipped, broad across nostrils. Brown above, varying in tone with wear and fading, as well as geographically; approaching blackish in *crateri*, deep brown in *ingens* and *nigricans*. Rump white with brown bars, uppertail coverts similar. Wings dark brown with white spots or spot-bars throughout, except some covert feathers, or, in *heuglini* and *nigricans*, coverts mostly unmarked brown; below barred brown and white. Shafts brown above in wings, pale yellowish in tail with brown streak along sides; below dull white to yellowish white (especially tail). Tail brown with white spot-bars above, paler below with yellow cast. Tail/wing ratio 0.37 to 0.50. Crown brown, palest in *obsoletus*, darker in others, fading more rapidly anteriorly (forehead), reaching eyes at lores. White stripe from behind eye posteriorly around sides of neck, reduced in *crateri*. Brown patch from eye across ear coverts to neck; white line under eye to breast; malar area brown, extending posteriorly onto sides of breast. Throat white, unmarked or with fine spots or streaks posteriorly. Below dull white with streaks varying greatly in size and darkness; obsolete or fine and faint in *obsoletus*, moderate in *ingens* and *heuglini*, broad and dark in *crateri*. Undertail coverts streaked finely on dull white.

Sexual features: Males a trifle larger than females, with bill 8 percent longer, but females have proportionately slightly longer tail; males with broad red nape patch, lacking in females. Immatures as adults but with markings less contrasting with grayer background; abdomen more strongly barred; and darker above, especially on crown. Both sexes have red on the crown, the red area being smaller and often only on the hindcrown of females and usually more extensive on the midcrown and hindcrown of males (but some birds of both sexes probably overlap). Eyes generally dark red or reddish brown (gray in one adult), brown
in immatures. Legs and feet vary from grayish green to slate or blackish. Bill slate or blackish above, paler (often gray) below with darker tip and even paler base.

**Distribution and Habitat.** Found in sub-Saharan savanna belt across Africa from Senegal and Gambia through western Africa to northern Nigeria, northern Cameroun, northern Zaire, Sudan, Ethiopia, and Somalia, thence southward to Kenya, northern Tanzania, and Uganda. Occurs inland on plains and in mountains generally, but reaches sea level at the Red Sea; ranges up to 3000 feet in Cameroun, to 4000 feet in Sudan, to 6000 or 6500 feet in Ethiopia, and up to 7000 feet or more in Kenya and northern Tanzania. Its habitat is open acacia or other savanna, even dry savanna with sparse small trees, and also in thornbush and other scrub woodlands.

**Behavior.** Forages on the trunk and branches of trees and saplings, these mainly being small dry-savanna trees, its foraging reminding Chapin (1939, p. 587) "of a tiny Dryobates (= Picoides)." Apparently tapping and gleaning are important foraging modes. Larvae of beetles and other insects, butterflies, moths, and other adult insects constitute its food. Several authors have noted that it occasionally joins mixed species foraging flocks moving about the savannas; otherwise it forages alone or in pairs. It is not known if this species drums, and its vocalizations are mainly unknown. Serle (1957, p. 418) referred to its "feeble, high pitched trill" that others consider infrequent, and Bannerman (1933, p. 449) noted a "little click," apparently a call note. These suggest a "Pik Call" and a "Rattle Call" akin to those of other related species. The nesting season occurs in February and March in Sierra Leone, during May and June in Portuguese Guinea, in the dry season from February to April in Nigeria and Zaire, during February and March in Uganda, in January to April in Kenya, and in February to June in Ethiopia. The nest is excavated in a dead stub or living tree at 5 to 15 or 20 feet. The tree may be at the edge of woods or isolated far out in a field (one in a maize field in Kenya). The clutch appears to be only two eggs. Adults back downward from above in going to the nest. Both adults incubate (Bannerman, 1933) and feed the young, carrying insects in the bill. Nothing is known of postnesting family affairs. The annual molt follows the breeding season, mainly in June to August in western Africa, from February to June in Kenya and Uganda, and during January in Tanzania.

**Taxonomy.** Represents the fully barred-tailed, small, pied woodpeckers lacking red on the underparts; probably related to *Picoides moluccensis* and its relatives. I recognize four subspecies: widespread *obsoletus* of western and central Africa; *ingens* of Kenya, Uganda, and most of Ethiopia; *heuglini* of northern Ethiopia and adjacent Sudan; and *crateri* of the Ngorongoro region of northern Tanzania. Of these, *obsoletus* and *heuglini* are rather pale, the others darker. The form *heuglini* is larger than *obsoletus* (indeed *ingens* and *crateri*, too, are 7 to 9 percent larger than *obsoletus* in regard to wing and tail measurements), it is more heavily streaked below, and the wing coverts are paler and lack spotting (or spots vaguely enlarged to form whitish edging of feathers). The race *ingens* resembles *heuglini* in size but is darker brown, especially on the crown, and the wing coverts are spotted. I cannot distinguish Ethiopian "*nigricans*" from Kenyan *ingens* and therefore treat *nigricans* as a synonym of *ingens* (White, 1965, synonymized *nigricans* with *obsoletus*—it clearly is larger and darker, thus resembling *ingens*, not *obsoletus*; the type of *nigricans*, incidentally, is an immature bird). Finally, *crateri* is even darker, approaching black in dorsal color, and it is very broadly streaked below, the streaks merging on the breast to form a patch. The brown to black variation in this species is found frequently in *Picoides*, but not in African *Dendropicos*. 
JAPANESE SPOTTED WOODPECKER

Picoides [kizuki] kizuki

Color Plates 40 and 41

Range Summary: Eastern Asia.

Diagnostic Features. Little, 16 to 23 grams, wing length 76 to 93 millimeters. Mainly brown and white, wings darker than upper back, crown paler. Differs from blacker canicapillus by ear patch connecting with crown, restricting white over eye, and brown ventral streaks tending to enlarge and coalesce on sides of breast, setting off white throat patch. Barred lower back and wings. Tail with central pair and most of adjacent two pairs unmarked brown, only outer feathers barred. White patch on side of neck. Male with often hidden red mark on each side of nape.

Description. Bill rather short, straight along culmen, moderately broad across nostrils, and very small chisel-tip. Upper back solid brown to blackish (amamii) (connecting up center of neck to crown and, at sides of neck, to ear covert patch), becoming barred heavily (amamii, kizuki) to moderately (ijimae, sebohmi) brown and white on middle back to rump; upper-tail coverts brown to black. Wings brown to brownish black, darker (race for race) than upper back, and marked with white spot-bars throughout, except on coverts at bend of wing; underwing barred white and brown, coverts white with brown bars. Shafts brown above, showing some white in outer tail feathers; below, horn-brown in wings, becoming whiter at tips; horn-brown in central tail feathers, becoming brown at tips; and white with dusky streaks in outer tail feathers. Tail not highly modified, central pair blackish or deep brown, next pair with some white at outer tip, third pair with bars at tip and, usually, long white streaks on outer vane, others white with brown bars in middle and toward tip; paler below. Tail/wing ratio 0.52 to 0.66. Crown, hindneck, ear coverts, and line from ear coverts along sides of neck to sides of breast brown to blackish (amamii), darker to rear and sides, paling to grayer brown on anterior crown, forehead, and anterior ear coverts: white line over eye enclosed at rear by brown connection of ear coverts and crown; lores brownish and white, as are nasal tufts. White line under eye, bordered by brown ear coverts and by brown malar, these connecting at rear to isolate subocular stripes. Malar continues as brown mark to sides of neck and onto sides of breast. Throat white to upper breast. Breast white at anterior margin, then mainly white or with pale brown cast posteriorly onto abdomen; markings include brown streaks from breast to abdomen, concentrating at sides of breast to form brown mark, tinged buff or rusty, forming “necklace” setting off white throat; markings paler brown in ijimae and sebohmi, deep brown tending to bars as well as streaks and with buff edging around brown marks in kizuki, and blackish with rusty or buff edging in amamii. Undertail coverts white with brown streaks (northern races) or bars (kizuki, amamii).

Sexual features: Females 3 to 4 percent longer winged, 6 to 7 percent longer tailed, with proportionately slightly longer tail and slightly longer bill than males. Males have red mark at each side of nape, the red usually obscured by overlying brown feathers. Immatures grayer and less buff below than adults, with less contrast, and throat streaked or spotted. Females as adults, males with red center crown mark. Eyes brown to reddish brown, legs and feet gray; bill dull black, paler at base.

Distribution and Habitat. Resident from northeastern China, Korea, and adjacent southeastern Siberia (Ussuri and Amur regions) through small and large islands of the Japanese chain to Amami, Okinawa, and Iriomote in the Ryukyu Islands. Ranges from sea level to
mountains at 4000 feet (Korea) and 7000 feet and more (Japan) in woodlands, gardens, and forests (especially edges). It seems to be most common in foothills and lower mountains.

**Behavior.** Not well known, but I may have missed information in the Japanese language. It forages often in pairs, the birds working especially on smaller branches and in the foliage. Frequently the pairs join mixed species foraging flocks, particularly of tits (*Parus*), during the fall and winter. Insects of various kinds make up most of the diet. Drumming apparently has not been reported. The vocalizations include a “sharp 'khit’ or 'khit-khit-khit'” (Austin and Kuroda, 1953, p. 493), in other words, a Pit Call and a Rattle Call. Nesting occurs in March to May throughout the woodpecker’s range, although northern birds commence later in this period. The nest is 5 to 30 feet above ground in a tree trunk and measures 3 to 4 centimeters in diameter of the entrance and 15 to 30 centimeters deep (Austin and Kuroda, 1953). The eggs number five to seven. The postnesting activities of families have not been described. Molting occurs during August and September in the Ryukyu Islands and from late August through October or early November elsewhere.

**Taxonomy.** Forms a superspecies with parapatric *P. canicapillus*; these two species are sympatric with each other and related *P. minor* at Suifin and Sidimi in the Ussuri-Amur area. The brown coloration and small size of *kizuki* distinguish it from *canicapillus*. Many races of *kizuki* have been described; most of these have little or no basis, especially given the considerable variation that occurs in this “very plastic” species (Austin and Kuroda, 1953, p. 492). Much of the variation is clinal, with an increase in size and diminished intensity of dark color from south to north. Some smaller islands have populations that show tendencies away from populations on nearby larger islands; but, as Vaurie (1965, p. 727) noted, their “differences are relatively slight.” Thus, I treat four subspecies. Large, pale, northern *ijimae* ranges from the southern Ussuri region and probably northeastern Korea and adjacent eastern Manchuria through Sakhalin and the southern Kurile Islands to Hokkaido. Synonymized in *ijimae* are “kurilensis,” “permutatus,” and “nagamichi”; Hokkaido birds have been called *seebohmi*, but I follow Vaurie (1965) in considering them to represent *ijimae*. Most of Korea, the Quel Part Islands, and Honshu form the range of *seebohmi* (includes “nippon,” “acutirostris”), which is weakly differentiated from *ijimae*; it is darker with broader dorsal dark bars, the crown is browner with less gray tone, the sides of the breast are browner, the streaks below are heavier, its tail is proportionately shorter, and its size is smaller (by about 5 to 7 percent in wing and tail measurements). The remaining populations all are very dark plumaged; from them I can separate satisfactorily only *amamii*, of Amami and Tokunoshima, northern Ryukyu Islands; this form is distinctly blacker above, especially on the upper back, with a darker brown crown, and its sides have a characteristically rich brown tone not found in the other, southern, dark-plumaged populations. The remaining dark populations constitute *P. k. kizuki*, a generally small, dark brown form with heavy ventral streaking, occurring in northern China (“wilderi,” indistinguishable from *kizuki*), Shikoku (“shikokuensis”), Kyushu, Yakushima (“petersi”), the Seven Islands of Izu (“matsudairai”), Tsushima (“kottaki”), Okinawa (“nigrescens”), and Irionote (“orti” — I have not seen this form, known from two specimens destroyed in World War II, but apparently resembling “nigrescens” closely). All of these are darker than *seebohmi*. Most of the populations on smaller islands show greater measurements (matching or approaching *seebohmi*) than *kizuki* of the main islands, but they match *kizuki* in coloration and the size difference is trivial. The main island *kizuki* populations are smaller by about 3 or 4 percent than *seebohmi*, such that females of the smaller form resemble in size males of *seebohmi*. 
I find such a close approach between darker seebohmi and kizuki that it seems inadvisable to treat nomenclaturally a number of island populations that are at best weakly differentiated.

GRAY-CAPPED WOODPECKER

*Picoides [kizuki] canicapillus*

Color Plates 40 and 42

Range Summary. Asia.

**Diagnostic Features.** Little, 17 to 36 grams (seven races), wing length 76 to 109 millimeters. Mainly black and white, back and tail barred, wings spotted. White patch behind eye to side of neck; brown ear coverts. Crown gray in center and front, black at edges and rear. Dusky to orangish below with brown streaks. Indistinct brown malar patch. Males with partly or entirely hidden red patch at sides of nape.

**Description.** Bill moderately long, slightly curved along culmen, barely chisel-tipped and broad across culmen. Very variable in size geographically, from *aurantiiventris*, the smallest race, to *doerriesi*, the largest. Upper back black, connecting at hindneck with crown; middle to lower back and rump white (*doerriesi*), white with black bars, or black with white bars. Uppertail coverts black (*doerriesi, scintilliceps, kaleensis, swinhoei, many semicoronatus, mitchelli*) mixed, or barred white and black (most races). Wings mainly black, especially on coverts, with white tips of flight feathers and white spots on most of wings, becoming barred on inner primaries; white pronounced, forming patch in *doerriesi*. Underwings brown with white marks. Shafts blackish brown above, often paling to horn color on base of tail. Tail variable, black with buffy white restricted to outer two or three pairs (*scintilliceps* group, *semicoronatus, mitchelli, some auritus, and aurantiiventris*), or with white spot-bars on all feathers; undertail brown with white spots or bars, but often suffused white or buffy cream below at outer rectrices. Tail/wing ratio varies racially, from 0.37 to 0.71, least in southeast Asia, greatest in northeast. Forehead and nasal tufts dusky, mixed brown and white; forehead to midcrown gray, bordered with black or brown laterally and on hindcrown and nape; black on sides of forehead connects with eyes, separating a small white area anteriorly from a large buffy white patch behind eyes and onto sides of neck. Ear coverts brown; below them is a white streak above a partial, obscure malar streak. Patch behind eye connects with white siedeckneck to form creamy patch. Throat whitish, mottled black. Below, buffy or dusky with streaks, except yellow-orange on lower breast and abdomen of *aurantiiventris* and *volzi* (a trace of such color affects some *semicoronatus* and *mitchelli*); paler, less buff, whiter in *doerriesi*. Streaks brown, moderately broad, finer in *doerriesi*; always broadest on breast. Undertail coverts brown in center, dull white laterally.

Sexual features: Females larger than males, but approached in size by males in some southern and western races (e.g., *canicapillus, semicoronatus*); wings of females 1 to 3 percent longer, tail 2 to 6 percent longer, bill variable from near that of males to 8 percent longer (in *nagamichii*), tail/wing ratio 1 to 5 percent greater in females; male has red patch on either side of nape, usually hidden by black feathers but visible at times, as during displays (red expanded nearly or fully across nape in narrow band in *semicoronatus*); the red is lacking in females. Immatures are darker below, more heavily streaked (often with barlike projections), and darker above (crown black or brownish without gray, back and tail usually darker); and, races with yellow or gold on breast of adults have this largely or entirely lack-
ing in juveniles. The sexes differ as do the adults, although the red tends to be more orange and slightly more extensive in young males than in adults. Eyes various shades of dark gray or brown to reddish brown or brownish red (Ripley, 1952, p. 485, reported eyes “white” and “gray” in specimens from northeastern India); slaty orbital skin. Legs and feet dull green, grayish green, greenish gray, or greenish yellow, with dark gray or brown claws. Bill blackish (slaty black) or gray, darker above and grayer below, especially at the base.

**Distribution and Habitat.** Ranges from southeastern Siberia (Amur River area) and Korea through China to Taiwan, Hainan, the Indochinese region, Thailand, Malaya, Sumatra, Borneo and Burma, thence west along the lower slopes of the Himalayas to Bangladesh, northern India, Nepal, and northeastern Pakistan. Occurs at various elevations, in some areas from sea level to 4000 feet (Borneo, Thailand); in others restricted to the coastal areas (Malaya); and in others ranging from the lowlands to 7200 feet (Burma, occasionally in India) and even 10,000 feet (Yunnan; Sumatran birds are from hilly areas or mountains up to 9200 feet). Frequents very diverse habitats from coastal mangroves (Malaya), scrub woodlands such as oak (India), secondary lowland forest that has some openings, the terai and sal forests of the Himalayas, cultivated areas with trees, and mixed evergreen and deciduous forest in Siberia.

**Foraging.** Gray-capped Woodpeckers move rapidly over the trunks, various branches, twigs and leaf clusters of trees, saplings, and bushes. They work over dead stubs, especially small dead stubs of living trees. Most feeding is by gleaning, probing, and tapping at the surface of bark or in leaf clusters. Occasionally, the birds pry at pieces of bark or excavate in one place, but long bursts of noise from excavating rarely are heard, and excavating thus seems uncommon. Frequently this woodpecker perches crosswise on branches. Also, it hangs from leaf clusters, sometimes upside down, to feed therein, and it utilizes otherwise inaccessi-
ble leaf clusters by hovering briefly in front of them and glean- ing insects from within the cluster. Most foraging birds move from tree to tree, systematically foraging over the smaller branches and branchlets in the foliage, but sometimes movement from tree to tree is rapid, with few sites used in each tree; occasionally foraging occurs on the trunk, even so far as the base of the tree. Birds forage in pairs, each member of a pair in the same or adjacent trees, or singly, or in family groups; paired birds sometimes forage within a meter of one another (Short, 1973d).

**Voice.** Drumming has been reported in diverse forms of this woodpecker (Caldwell and Caldwell, 1931; Smythies, 1953; and Ali, 1962), but I have neither heard drumming nor do I know of any recordings; drumming is therefore infrequent, strictly seasonal, or both. Vocalizations include a Pit Call, a variable Rattle Call, a Kweek Call, and possibly another call (a “curious squeaking noise” by a male chasing a female [Stuart Baker, 1927, p. 52]) that I have not heard. The Pit Call is a short (0.025 to 0.035 second), sharp, but soft call spectro-graphically appearing as an inverted tight U or V emphasized on the peak of the fundamental tone at 2.4 to 2.7 kilohertz and on the legs and peak (at 4.8 to 5.3 kilohertz) of the initial harmonic tone. Double Pit notes have a longer, more U-shaped note followed by a shorter, lower pitched, more V-shaped note. These calls serve as agonistic notes, and perhaps as a location call. Often they are interspersed among Rattle Calls. Compared with the comparable call of *P. macei*, the Pit Call of *canicapillus* is less intense, with a lower pitched fundamental tone that is usually weaker than the first harmonic tone, and it is given as a double noted call, unlike that of *macei*. In sympathy in northern India, *canicapillus* used the Rattle Call much more and the Pit Call much less than did *macei*. The Rattle Call is a series of six to 17 Pit Call notes uttered in 0.45 to 1.06 seconds (tempo 16 to 19.4 notes per second).
Some calls are irregular in having one or more double notes or in having a gap between the last two notes of a call. The first note of a call usually is longest, but thereafter the notes vary considerably in duration. Peaks are at 2.2 to 2.7 and 4.3 to 5.4 kilohertz in the emphasized fundamental and initial harmonic tones. Rattle Calls were associated with both Pit and Kweek calls and are aggressive vocalizations uttered during chases and aggressive encounters and with displays (Tail Spreading, Bill Directing, Swinging). The Kweek Call contains one or to four or more notes, rendered "kweek-kweek-kweek," similar in pitch to Pit and Rattle call notes, but longer (0.055 to 0.12 second). Notes are asymmetrical, with a step breaking the inverted U-shape; there is a strong emphasis on the fundamental tone (peak 2.2 to 2.8 kilohertz). One call contained two nearly symmetrical, very rattelike notes. The tempo of these notes is at 4 to 6 per second. The Kweek Call seems to be an aggressive call more intense than the Rattle Call, or it is used in more intense conflicts than is that call. Some mixed Rattle-Kweek calls were heard. The Kweek Call of canicapillus is very like that call of North American P. nuttallii, P. villosus, and P. pubescens, especially the last-named species (see Short, 1971f).

Displays. Bill Directing, Crest Raising, Tail Spreading, and Swinging displays are known. Bill Directing in an encounter between two birds of unknown sex was figured by Lister (1954, p. 59). The bill may be held high in the air (more submissive, probably, showing tendency to flee) or more horizontal and directed at an antagonist (more aggressive, probably). One case of Bill Directing (Short, 1973d, p. 272) preceded and continued through a Swinging Display accompanied by a Rattle Call, then a chase as the antagonist fled. Crest Raising is difficult to detect because there is no crest as such, and the red marks on the nape of males are not easily discernible. I saw the red areas partly or fully erected in adult males approaching, and while feeding, juvenal males (the young birds clearly showed red on the nape, the red being more extensive than in adult males). Such Crest Raising is aggressive and obviously identifies the sex of the displaying bird. A Swinging Display, just noted, was rather slow and wide, with two to three swings in each direction. Clearly this was an aggressive display. Tail Spreading, in flight and upon landing, also seemed to be an aggressive display; the tail was partly spread, but not to the extent observed in P. macei or in New World Picoides (Short, 1971f). I saw no definite flight display, but this species is likely to have such a display; certainly, some inflying birds have their tail spread at times during encounters, and fluttering of the wings probably accompanies the Tail Spreading.

Interspecific Interactions. See P. macei, p. 249.

Breeding. Nesting occurs from March to May in India, from February to April in Burma, in March and April on Taiwan, in April and May in China, and in September in Borneo. The nest is excavated in dead stubs of living or dead trees, at 5 to 15 meters above ground. The entrance is a small opening, 3 to 4 centimeters across, and the nest cavity is 10 to 20 centimeters deep. Often the cavity is excavated on the underside of a slanting or horizontal limb. Both adults excavate the cavity, incubate the eggs, and care for the young (Ali and Ripley, 1970). The usual clutch is four or five in India, according to those authors; five family groups observed in East Bengal each contained only two or three fledglings. Caldwell and Caldwell (1931, p. 209) gave six to eight eggs as the clutch in southern China. Incubation lasts about 12 to 13 days (Stuart Baker, as cited in Ali and Ripley, 1970, p. 230). Both sexes feed the young in the nest, conveying large numbers of insects in the bill (the insects protrude from the bill) and feeding at about 15-minute intervals (4 to 32 minutes between feedings, 10 observations at each of two nests). The fledged young accompany the adults actively, moving directly toward one of them when it obtains food, or they perch quietly,
awaiting arrival of an adult foraging at some distance from them. Older fledglings usually followed an adult, leisurely tagging along behind, sporadically pecking at the bark as the adult accumulated food in the bill; the adult turning toward the young bird stimulated the latter to approach the adult rapidly, and it was fed, the adult inserting its bill laterally into the bill of the juvenile. Apparently the young birds gradually are able to obtain even more food on their own, following adults at presumably optimal feeding sites. Nothing is known of the breakup of family parties. The molt follows breeding, from July to October in northeastern India, Burma, Yunnan, Shantung, Taiwan, and Korea; molting birds date from December in Fukien, July in South Vietnam, September and October in Malaya, and November in Borneo.

**Taxonomy.** Related rather closely to *P. kizuki* and forming a superspecies with it; *kizuki* can be viewed as a brown, small (for its latitude) derivative of ancestral *canicapillus*, with which it shares the pattern of sexual markings (reduced red on crown of male), black central rectrices, and grayish crown. These two species rarely meet in eastern Siberia, where both sporadically are sympatric with related *P. minor*. This superspecies connects the pygmy woodpeckers (*moluccensis, temminckii, maculatus*) with *P. minor*. Many subspecies have been described, some of them for minor variants that are not worthy of nomenclatural recognition (see Greenway, 1943; Biswas, 1950; and Vaurie, 1959c). Eastern Siberia, Korea, and eastern Manchuria form the range of the largest subspecies, *doerriesi*, characterized in addition to its size by its great extent of white that contrasts with its black markings. South of *doerriesi*, and very much like it, is the slightly smaller (by 5 to 6 percent in wing length), darker, more ventrally streaked, and buffer, less white *scintilliceps* (including *elementii*), occupying northern and east-central China from Szechwan to Hopeh and south to Szechwan, Hupeh, and Chekiang. I separate *scintilliceps* and *doerriesi* only because specimens are unavailable showing intergradation between them in northeastern China. When the nature of this intergradation is known, it may be possible to reassign southern *scintilliceps* and to merge *doerriesi* into (northern) *scintilliceps*. Still darker, more streaked birds occur south of the range of *scintilliceps* in western and southern Szechwan, Yunnan, northern Burma, Fukien, southern China generally, Taiwan, and northern North Vietnam. I treat these populations under one name, *kaleensis*, recognizing that Taiwan and Vietnamese ("tonkinesis") birds tend to be slightly smaller than the others; that mainland southeastern Chinese ("nagamichii"), southwestern Chinese ("omissus"), and northern Burmese ("obscurus") birds tend to be larger; and that southern and southwestern birds tend to have shorter tails. The variation tends to be clinal, and slight, and I prefer not to subdivide these essentially similar, dark subpopulations. Vaurie (1959c, p. 14) was quite correct in noting that the type of *Dryobates obscurior* Rothschild represents an immature bird ("obscurior" is thus a synonym of *kaleensis* or "omissus" if that be recognized). Hainan birds are only slightly smaller than Taiwan *kaleensis*, but they are whiter below with finer dark streaks and show more white in the wings, making this form, *swinhoei*, more distinct than other related populations of *kaleensis*. Eastern Nepal, northern India from Nepal to western Assam, and Sikkim and Bhutan form the range of distinctive *semicoronatus*, which alone among races of *P. canicapillus* has males with a full, if narrow, nape patch. Adjacent to *semicoronatus* from western Nepal through northwestern India to northern Pakistan is *mitchelli*, resembling *semicoronatus* in its black coloration and barred upper back, but having restricted lateral nape patches in males. Between the *scintilliceps* group and the *semicoronatus* groups just discussed, and south of them in southeastern Asia, is the short-tailed, brownish *canicapillus* group that has spotted or barred central rectrices. There are two races in this group, *canicapillus* of eastern
Assam, central and southern Burma, Thailand, and Laos, and the somewhat larger, distinctly more broadly brown-streaked *delacouri* of South Vietnam and Cambodia. South of *canicapillus* in Malaya and southern Thailand is *auritus*, somewhat blacker, less brown in tone, with generally black central tail feathers, broader ventral streaks, a somewhat shorter tail (8 percent shorter), and a longer (by 10 percent) bill. There are two other subspecies, quite similar to each other, namely *volzi* of Sumatran mountains and *aurantiiventris* of Borneo. These are black on the central rectrices and have orange-gold coloration on the breast and sides. Sumatran *volzi* differs from *aurantiiventris* in proportions, being shorter billed (by 10 percent) but slightly larger in size with a distinctly longer tail (tail 11 percent longer, tail/ wing ratio 14 percent greater).

**Reference**


**LESSER SPOTTED WOODPECKER**

*Picoides minor*

**Color Plates 40 and 41**

**Range Summary.** Northern Eurasia.

**Diagnostic Features.** Little, 17 to 26 grams, wing length 82 to 98 millimeters. Black and white, often with gray or buff cast ventrally; streaked to immaculate below. White patch on side of neck; dusky ear patch. Back black, usually barred with white on lower back and rump. Wings barred white on black. Black or blackish malar streak, enlarging on lower neck. Forehead and forecrown with dusky white patch in female, red patch in male.

**Description.** Bill slightly curved along culmen, small chisel-tip, broad across nostrils. Black patch above, across upper back, connecting with black nape and wing coverts; middle to lower back white with variably deep black bars, which tend to be reduced in northern birds and are lacking in "immaculatus." Wings black, relatively unmarked on smaller coverts but barred on flight feathers and large coverts; grayer below with white bars. Shafts horny brown or blackish above, paling to dusky white at tail base; brown or gray below, but whitening toward tips of wings and white on outer rectrices. Tail mainly black, bearing variably deep black bars that are reduced, even lacking (few "immaculatus") in some forms. Tail/wing ratio 0.54 to 0.76. White patch on side of head from behind ear coverts to rear of neck, bordered black above (neck, sides of crown) and below (by "yoke" from malar to sides of neck); in some forms (*morgani, danfordi, some colchicus*) there is a black line separating the ear coverts from the neck patch. Ear coverts white with gray-brown to brown patch in center. Nasal tufts dusky. Sides of crown, hindcrown, nape are black. Malar mainly white, as is throat (tinged grayish or buff in some birds), but upper malar has black or black and white line that gets blacker and deeper posteriorly, then sends branches toward bend of wing and toward sides of breast. Ventrally varying from immaculate white ("immaculatus") or white with a few black flecks and black spots on undertail coverts (*kantschakensis*) to whitish buff or buffy (most races) or grayish buffy white (*amurenensis*). Ventral streaks evident, but variable, in most races; sometimes they are confined to the sides, or they may occur all over (e.g., in *buturlini*), with flank streaks becoming barlike (markings lacking in most "immaculatus"). Undertail background color as breast, usually barred or with spots, unmarked in "immaculatus."
Sexual features: Females heavier and larger than males (very slightly longer winged, tail 2 to 3 percent longer, greater tail/wing ratio), but bill of male is 2 to 3 percent longer than that of female; males have red patch on rear of forehead and anterior crown, often with white of feather bases visible, giving white-spotted appearance and, especially in worn birds, forming white forehead patch; females lack red or rarely show red tips of a few crown feathers, forehead and crown being “dirty” white or buffy white. Immatures have the white patch on the forehead and forecrown obscured by brown to black tips, sometimes with buff streak-spots; they are more streaked below and browner (less black) above than are adults. Juvenile males have red on the center of the crown; females show a few red-tipped feathers on the crown. Eyes red-brown to brownish red. Legs and feet gray-green to greenish gray. Bill slaty or deep gray, paler at base of lower bill.

Distribution and Habitat. Ranges from Europe (England and all of wooded mainland Europe) eastward across Russia to Kamchatka and the Anadyr region of eastern Siberia, south to northwestern Africa, the Mediterranean Sea, Turkey, the Caucasus, northern and southwestern Iran, Mongolia, Manchuria, northern Korea, and Hokkaido, Japan. Frequent diverse forests (coniferous forests in Scandinavia and Siberia, deciduous forests in central Europe), parks, orchards, gardens, and trees in villages and towns. It occurs from sea level to at least 4000 feet in the various mountains encountered within its range, from the European Pyrenees to the eastern Siberian Stanovoi Mountains.

Foraging. Mainly gleanes for insects such as plant lice and ants in the small branches and foliage of trees, often fluttering from branch to branch, in the spring and summer, but tapping more frequently and excavating occasionally for wood-boring beetle and other larvae in trunks, branches, and stubs of dead trees during the fall and winter. Among its foods are coleopterous scolytid, buprestid, curcullionid, cerambycid, and lipid larvae, larval moths and butterflies, ants, fly adults and larvae, spiders, and fruits such as raspberries and currants (Witherby, et al., 1938). Its foraging includes little loud tapping, the bird being mainly unobtrusive. In winter it sometimes associates with foraging flocks of tits (Parus).

Voice. Drums principally before and during the breeding season, in Europe from February to June but occasionally also between September and November. Drumming is from a dead stub, usually high in a tree, occasionally from the branch of a live tree. Females drum less frequently and with fewer beats per burst than males (Blume, 1968, who mentions Pynnönen hearing a male drum 79 times over 14 minutes, whereas a female drummed but 14 times during that period). Males produce up to 12 or 14 bursts per minute. The bursts are usually 1 to 2 seconds in duration, with beats given at a rate of 17 to 25 per second. Various calls have been reported (Winkler and Short, 1978) or remain to be described (e.g., probably a Kweek Call). The call note is a Pik Call, infrequently heard and probably used as an aggressive note less often than the Rattle Call. The Pik Call is a short (0.03 second in duration), clicking note, not very loud or shrill, with a fundamental tone peaking at 2.1 kilohertz and emphasis on the initial harmonic tone at 4.2 kilohertz. A Scolding Call is a fast series of short, high-pitched call notes, uttered at 8 to 10 notes per second. This call is associated with call notes and is uttered by adults disturbed about the nest (Winkler and Short, 1978). The Rattle Call is unusual among species of Picoides, being not simply an elaboration of call notes; rather it is a series of very long, inverted U-shaped notes uttered slowly (at 5 or 6 notes per second) and resembling in their duration and structure the Kweek Call notes of other species (possibly the Rattle Call of minor is a compound Rattle-Kweek call, for no Kweek Call as such is known as yet in this species). The call sounds like “pee-pee-pee —”
or "kee-kee-kee—" and has been likened to the call of a Kestrel (*Falco tinnunculus*). Notes are about 0.07 second in duration, with a fundamental tone peaking at 2.7 kilohertz and an equally strong harmonic tone peaking at 5.5 kilohertz. Calls last 1 to 4 seconds, containing five to 20 or more notes. Because of the duration of the notes and their interval, there is greater resemblance of the Rattle Call to Kweek Calls of such a species as *canicapus-lus* (Short, 1973d) than to Rattle Calls of other species of *Picoides* (although the Rattle Call notes are simple, peaked notes not very different from those in Rattles of other species). Rattle Calls, however, commonly are uttered in aggressive situations. They are strongly associated with drumming and are uttered by fledgling as well as adult birds; hence, they functionally are akin to Rattle Calls. They also occur during chases and displays in some contexts in which Kweek Calls might be expected. A Wicka Call ("sh-wicka, sh-wicka") has been noted in this species, occurring during encounters between adults (Winkler and Short, 1978). Another call is the Wad Call, a soft note uttered by adults as they replace each other at the nest during incubation and brooding and at other times when paired birds are in proximity. It is a low-pitched, smacking sound (Winkler and Short, 1978). Four distinct calls are known from immature birds. Soft Notes have been heard from nestlings when handled and placed in an artificial nest; they also have been heard sporadically at nests in the wild and are soft musical notes (Winkler and Short, 1978). The Chirp Call is the common begging call of nestlings, a Rattle Call-like series of noisy, vertical elements given at about 25 per second when adults are nearby but not yet presenting food. The Loud Chirp is a slower (15 notes per second), more distinctly formed, louder call with a fundamental tone peaking at about 4 kilohertz and a strong initial harmonic tone at 8 kilohertz. This call is uttered when a bird is being fed. Fledged birds utter a Squeaking Call when hungry; this call is similar to the call note, but longer, and is much like Rattle Call notes of adults. It is derived from the Loud Chirp nestling call, and older nestlings give notes intermediate between Loud Chirp and Squeak calls.

**Displays.** Displays are not well known in detail. Bill Directing is evident in aggressive encounters, the bill being pointed toward an opponent or held up from the horizontal. A Head Lowering Display seems likely as a submissive, sexual-agonistic display; it is shown in Schlegel and Schlegel (1971, fig. 4) in paired birds engaged in a Swinging Display just prior to copulation. Swinging Displays apparently are agonistic displays, given slowly, the body and head moving from side to side. Tail Spreading is another display, possibly indicating submission in interacting, aggressive birds. The tail is partly spread, exhibiting the outer white feathers. Wing Spreading Displays occur with Tail Spreading, much as in *P. scalaris* and *P. nuttallii* (Short, 1971f). The spread wings with their white spots are used in aggressive encounters. A conspicuous flight display from tree to tree, a floating flight with wings spread fully, is usually called a butterfly flight, mothlike flight, or bat flight and has been recorded many times. It is uncertain whether this is the Flutter Aerial Display of other *Picoides* or is a courtship flight; most authors suggest that it occurs between paired birds, and it may be a true courtship flight. It is clear that this flight does not precede copulation (Schlegel and Schlegel, 1971), which seems to occur with no display or following Swinging Display, Bill Directing, head bowing, drumming, and calling (Rattle Call), as the Schlegels have described.

**Interspecific Interactions.** Apparently loses some holes to Great Spotted Woodpeckers (*P. major*), and competition with other hole nesters, such as the flycatcher *Muscicapa hypoleuca*, has been noted (Blume, 1968).

**Breeding.** Courtship and territoriality commence as early as January in Europe, but March to June mark the main nesting period. Young leave the nest as early as early May in
middle Europe to northern Africa, but mainly in June and July in Lapland and northern Siberia. Both sexes excavate the nesting cavity, and a new nest is excavated yearly. It is situated at varying heights from near the ground to 80 feet or more above ground in a dead stub or trunk of such trees as alders, birches, poplars, beeches, elms, willows, chestnuts, maples, and old fruit trees. Copulation often occurs near the nest, after a visit to the nest by the female. The nest measures 10 to 18 centimeters deep by 10 to 12 centimeters wide, with a round nest entrance 30 to 34 millimeters in diameter. The clutch varies from three to seven eggs, usually four to six. The male incubates at night and both sexes share the diurnal chore. Incubation lasts 11 to 12 days (Blume, 1968). The young are fed by both parents on insects carried in the bill. Stahlbaum (1960) consistently recorded the female feeding more often than the male, although the male may, as in the case of *P. arcticus*, bring more food per feeding. Other authors mentioned by Blume (1968) noted greater feeding by the male, especially to fledglings, the female tending to cease feeding before the end of the fledging period. The feeding rate is about 15 times per hour, varying in one 4-hour period from 11 to 20 times per hour (Stahlbaum, 1960). The nest is maintained clean, adults removing fecal material as often as other visit to the nest. About 3 weeks (18 to 23 days) pass before the young birds leave the nest. Adults forage about 0.5 to 1 kilometer from the nesting site. Only one brood is raised yearly. Little is known of the breakup of the family, which probably occurs rather soon after fledging. The annual molt follows the breeding period, from July to November in all areas.

**Taxonomy.** Related rather closely to *P. canicapillus* and *P. kizuki*, but differing from them vocally as well as in some plumage features (e.g., full crown patch of male), hence not so close to *canicapillus* as Voous (1947) suggested. This species is found sympatrically with *kizuki* and *canicapillus* at a few localities in the Ussuri-lower Amur region and adjacent Manchuria, but sympathy has been documented only with winter birds (minor local movements following the breeding season could result in apparent sympathy, but the birds may be parapatric, or they may be allopatric in the breeding season). Many subspecies have been named, often on trivial grounds; this is not a highly variable woodpecker, despite its great geographical range. Large, long-tailed *minor* occupies Scandinavia, northern continental Europe east of the Baltic, Poland, and Russia to the Urals. I agree with Vaurie (1959c) and others that “transitivus” (“lomnbergi”) of northern Scandinavia is not separable from *minor*, representing only a tendency toward whiter, less streaked birds in interior Lapland. Almost identical with *minor*, but separated from it by another race over a vast area, is *amurensis* of the lower Amur River region, Ussuriland, northeastern Manchuria, northeastern Korea, Sakhalin, and Hokkaido. It is a trifle grayer, less white below, and the upperparts are more heavily barred, but measurements are virtually identical to those of *minor*. Between *minor* and *amurensis* in Siberia (Urals to Kamchatka and the Anadyr River) is *kamtschatkensis*, a whiter backed, paler, less streaked, slightly larger form with a proportionately longer bill. The three races discussed so far are so similar that further subdivision, including very white “immaculatus” of eastern Siberia, is unwarranted. Unlike Vaurie (1959c), I find no difference in wing, tail, or bill length between “immaculatus” (11 specimens examined) and *kamtschatkensis* (33 specimens studied). On the other hand, I concur with Vaurie in recognizing the admittedly very weak race *hortorum* for populations from France to Poland and south to Hungary and Switzerland; this form is intermediate between paler, less marked *minor* and darker, heavily streaked *buturlini*. Vaurie gave the characters for these races; *buturlini* also has a strongly barred, much shorter (by 15 percent) tail and is smaller generally than *minor*. The range of *buturlini* is from Spain, Algeria, and Tunisia to southern France, Italy, Greece,
and Romania. This form is variable, and I fail to find characters separating even a majority of North African birds ("ledouci"), or of any other area covered in the range of buturlini, from the latter subspecies. England and Wales form the range of comminutus, a ventrally very gray-brown, dark form resembling buturlini, but less streaked. It is slightly smaller than buturlini; hence, it is much smaller than minor and somewhat smaller than hortorum. Closely resembling buturlini and the size of comminutus is danfordi of Asia Minor. This is barely browner than buturlini, but it has a black band connecting the malar area and the crown, unlike buturlini and the other races so far mentioned. In the Caucasus is colchicus, which is variable in the presence, absence, or extent of the black mark from the malar to the crown; it is whiter backed and somewhat larger than danfordi. The Transcaucasus form "ernsti" ("harterti") differs not at all from colchicus. I have examined one specimen of quadrifasciatus, in the area southwest of the Caspian Sea, and six "hyrcanus" from the north Iranian Caspian coastal area; these seem alike, resembling buturlini but with the wing coverts being unspotted (black). The black face bar is lacking in these birds, which I treat as quadrifasciatus. Finally, morgani, isolated in southwestern Iran, is proportionately long billed with contrasting pale abdomen-breast and strongly buff throat, much ventral streaking, a black band on the very whitish sides of the head, and white-spotted wing coverts.

References

STREAK-BELLIED WOODPECKER

Picoides [macei] macei

Color Plate 43

Range Summary. Southern Asia.

Diagnostic Features. Little to Small, 38 to 52 grams (macei), wing length 87 to 117 millimeters. Barred black and white with spots or spot-streaks on breast, otherwise rather weakly streaked and barred below on buffy background. Undertail area red or pink. Black malar and crown (except males), white or buff face patch. Throat usually unmarked. No white patch in wings. Male has red crown, but black nape (in all but one form). Resembles closely related atratus, but weakly streaked below, back more barred with less black on upper back, and bill blacker (lower bill gray-black, not yellowish).

Description. Bill rather long, straight along culmen, chisel-tipped, broad across nostrils. Upper back black without bars except in analis and andamanensis and in some longipennis; rest of back barred; rump and uppertail coverts fully barred in andamanensis, longipennis, and analis, but bars cease at upper rump in macei and westernani. Wings black with white bars or spot-bars throughout: underwings paler, barred. Shafts black above, except paling to whitish horn color at base of tail; grayish horn below, with a white streak; and whitening at tip of wings but blackening at tip of tail. Tail fully barred black and white in most races, but central two pairs entirely black (sometimes only outer pair shows white in westernani) in macei group, although about one fifth of macei show traces of white spots in central rectrices. Tail/wing ratio 0.49 to 0.66. Nasal tufts and anterior forehead mixed buffy or brown, white and black, often stained; lores, line over eye, area under eye, ear coverts, and sides of neck white or buffy, but showing some black streaks on sides of neck in andamanensis and with
central buffy brown or blackish ear covert mark in \textit{analis}. Black line along lower malar area to sides of breast, broadening rearward. Throat clear buffy (\textit{westermani}), whitish buff (\textit{macei}), white (\textit{longipennis, analis}), or white with a few spots posteriorly (\textit{andamanensis}). Breast bears “necklace” of black spot-streaks in \textit{longipennis} and \textit{analis}, more angular streaks limited to sides of breast in \textit{macei} and \textit{westermani}, and large chordate spots over the entire breast and rear of throat in \textit{andamanensis}. Rarely there is a red tinge on the breast, reminiscent of that of \textit{P. cathpharits}. Lower breast vaguely streaked, usually buffy brown or fuscous (streaks strongest in \textit{longipennis}). Abdomen and sides largely brownish to whitish with barring that is weak to moderate (\textit{macei} group, \textit{andamanensis, longipennis}), or barring very reduced (\textit{analis}). Background color of breast buffy brown in \textit{macei} group, paler in others, rarely with reddish or yellowish tinge. Rear of abdomen and tips of barred undertail coverts red (most races) to pink (\textit{analis}).

Sexual features: Sexes about same size, but females have up to 5 percent longer tail; bill of male from slightly longer to 10 percent so. Males have crown feathers black with red tips, showing black “spots” on red; nape black in all races but \textit{andamanensis}, in which red extends onto nape. Females have black or brownish black (\textit{andamanensis}) crown and nape. Immatures duller, less contrasting in color ventrally, and with pink, not red, undertail coverts (also pink is less extensive than is red of adults). Both sexes seem to have red in the crown, but it is much more extensive in males. Eyes reddish brown with slaty orbital skin. Legs and feet grayish green to dark greenish slate with slaty claws. Bill blackish above, paler (gray or bluish) at base; lower bill slaty or blackish gray, darkening at tip.

\textbf{Distribution and Habitat.} From western Himalayan India east across lower parts of Nepal, Sikkim, Bangladesh, Orissa, West Bengal, and Assam, to Burma, Thailand, Laos, Cambodia, and South Vietnam; the Andaman Islands; also Sumatra, Java, and Bali. Occupies hills and adjacent plains in the northwestern part of its range, lowlands in most of southeastern Asia, and lowlands and mountains of Java and parts of Sumatra. It reaches elevations of about 1500 meters regularly in India and Nepal, exceptionally ranging up to 2745 meters (Biswas, 1961); farther east in India, 1500 to 3000 feet is the preferred elevational level. It does not enter highlands east of Burma, usually occurring below 1800 feet in Thailand to the Vietnams, but in Java occurs in mountains to 1800 meters. Usually not a bird of the interior forest, it prefers open woodlands, forest edges, cultivated areas with trees such as tea plantations, and secondgrowth woods and bamboo.

\textbf{Foraging Habits.} Forages on trunks, branches, and in the foliage of trees of all sizes and also in bamboos. Much feeding is by gleaning from the surface; and tapping, prying, probing, and excavating also are employed in that order of occurrence. Its tapping can be heard for some distance. One bird somersaulted from a nearby vertical branch, grabbing an insect from a branchlet below, then landing on a perch still lower down. The birds pause and back up frequently, and they also perch crosswise when moving through the foliage. In northern Thailand they are associated closely with mai Kwao (\textit{Butea frondosa}) trees growing about villages. Foraging is at all levels, from near the ground to high in the trees. Ants are eaten commonly (I doubt that it forages for them on the ground, as Inglis reported, 1964, p. 122), and larvae of beetles and other insects are taken, as well as some berries and seeds (Ali and Ripley, 1970). Forages singly, in pairs, or in family parties; also joins foraging flocks of other birds at times.

\textbf{Voice.} Drums weakly and apparently only in the prebreeding period (Proud, 1958). A Pit Call (call note), double call note, Rattle Call, and Kweek Call are known (Short, 1973d). The Pit Call is a sharp “pit” or “pik” note, sharper than the call note of sympatric \textit{P. cani-
**Streak-Bellied Woodpecker**

capillus but less sharp than that of such species as *P. scalaris, villosus, or major*. The note is about 0.03 second in duration, with emphasis both on the fundamental tone peaking at 2.2 to 2.5 kilohertz and on the initial harmonic tone at 4.4 to 4.9 kilohertz (Short, 1973d, fig. 15c). Occasionally double Pit Calls are given; these are less frequent in *macei* than in *canicapillus*. Pit Calls are more frequent and Rattle Calls less common than in *canicapillus*. Pit Calls are given singly or in loose, irregular series, and they seem to function as a low-intensity aggressive alarm note, possibly with a localization function as well. The Rattle Call (Short, 1973d, fig. 15f) is a series of pitlike notes having the same pitch, generally, but with somewhat more emphasis on the harmonic tone. The calls are 0.9 to 1.2 seconds in duration, uttered at 12 to 14 notes per second. Double notes, that is pairs of notes closely associated compared with other notes in the calls, occur somewhat frequently. Often the last note of the call is delayed, as it and the initial note are among the highest pitched if not the highest pitched of all notes in a call. Rattle Calls of *macei* are slower and less regular than those of *canicapillus*, but closely resemble them. However, *macei* utters Rattle Calls much less often than does *canicapillus*. Lister (1954, p. 59) well characterized the Rattle Call of *macei* as “a shrill, rapid pik-pip-pip-pip-pipi.” This call is an aggressive vocalization heard during agonistic encounters; very disturbed birds also give this call. A Kweek Call is not as yet recorded on tape, but it is a series of notes louder and perhaps longer than those of the Kweek Call of *P. canicapillus* (see Short, 1973d, fig. 15h). This call is less often associated with Rattle Calls than is true of *canicapillus*. Kweek Calls were uttered by birds during encounters, especially by one or the other male engaged in an encounter in the presence of a female. Also, I elicited such calls by repeatedly disturbing a foraging bird until it became highly agitated (after three or four flights away from me). Lister (1954, p. 59) described a “curious, soft, rasping “kuier-kuier” that could have been a Kweek Call.

Displays. Elsewhere (1973d, pp. 274–278), I described and discussed the displays of *macei*, which include Bill Directing, Head Turning, Swinging, Tail Spreading, Wing Flecking, Wing Spreading, Crest Raising, and Flutter Aerial displays, employed during encounters, some of them interspecifically with *P. canicapillus*. Pit, Rattle, and Kweek calls are associated to some degree with the visual displays. In one encounter two males chased each other, giving Rattle Calls over the trees. One Kweek Call was uttered by a male as it flew after the other male and passed over a female perched conspicuously nearby (at the top of a tree). During several flyovers, the female tapped her bill against the branch on which she perched, whether as a signal or in displacement I do not know. The aggressor male in one case had its crest erected (Crest Raising), its bill directed towards its antagonist (Short, 1973d, fig. 16) as it approached the latter. Both birds spread their tails (Tail Spreading) moderately, exposing the barred outer feathers. When the aggressor neared the other bird, the latter raised its head but did not flee; the aggressor, still Bill Directing, swung from side to side (Swinging Display) three times, at which the other bird lowered its crest and tapped several times with its bill. The aggressor flicked its wings (Wing Flecking), gave a Rattle Call, then supplanted the other male, which fled. Intense encounters included fewer vocalizations, less Crest Raising, more Tail Spreading, Swinging farther to each side, Bill Directing with head held high, ritualized turning of the head (Head Turning), and little Wing Flecking (Short, 1973d, fig. 17). Wing Spreading Displays (Short, 1973d, fig. 18) accompanied supplanting attacks and display bouts during intense encounters; these resemble that display of *P. scalaris, P. nuttallii*, and other *Picoides*. The Flutter Aerial Display is given by either sex; the best observed instances involved a female in Flutter Flight (wings flapped slowly, held outward as if gliding, exposing barred wings and back) between two males engaged in an encounter. The precise hierarchy and correlation of these and other displays remain to be worked out.
**Interspecific Interactions.** I have documented (1973d, p. 271; 1975b) interactions between *P. macei* and *P. canicapillus* near Sukna, West Bengal, India. These involved situations of foraging by individuals of both species in the same tree. The Streak-bellied Woodpeckers actively drove the Gray-capped Woodpeckers away from the trunk and major branches of trees, effectively limiting the foraging of the latter to the outer branches and foliage. Bill Directing and Wing Flicking displays were given as the *macei* ceased feeding and moved to supplant the smaller *canicapillus* that had ventured into the center of the tree. This seems to be a clear case of competitive exclusion.

**Breeding.** Nesting occurs from April to June in India and Nepal, immature-plumaged birds being noted as late as September and even 3 November (Cuchar, almost adult). Andaman Island birds nest from January to May, Burmese birds nest in March, Thai juveniles are known from February through June, and Javanese birds nest in May through July (specimens). Both sexes excavate the nesting cavity in various trees (in Andaman Islands, Pithecocolobium samar is used) between 1 and 5 meters up. Often the cavity is excavated on the underside of a branch; usually it is in the branches or a stub of a live tree. Rarely, fence posts may be used (Inglis, 1964). From three to five eggs are laid, except in the Andaman Islands where one, two, or at most three form the clutch (Ali and Ripley, 1970). Both adults incubate, the period being as yet undetermined. Almost nothing is known of feeding or care of the young. September to November covers the molting period of most populations, but molting Bali birds date from March.

**Taxonomy.** Forms a superspecies with parapatric, higher altitude *P. auriceps*, which it meets sporadically in Nepal and northwestern India, and *P. atratus*, parapatric or barely allopatric with *macei* in Burma and Laos. The eastern *atracus* is more fully and strongly streaked below, including the throat and breast; the bill is paler; and the back is more fully barred. It is larger and longer binned than the adjacent race of *P. macei*. Western *P. auriceps* likewise is more heavily streaked below than *macei*; it is whiter (less buff) below and has a yellow and red nape patch in males and a brown crown. As yet no one has demonstrated sympatry during the breeding season of *macei* and either *atracus* or *auriceps*. There are two racial groups of *P. macei*, often considered separate species: the *analis* group of the Andaman Islands, southern Burma, Thailand, Laos, the Vietnams, Sumatra, Java, and Bali; and the *macei* group of northern India and Pakistan to Bangladesh and northern Burma. These differ especially in the fully spot-barred tail and uppertail coverts of the *analis* group; the *macei* group generally has all-black uppertail coverts and central rectrices. However, about one fifth of *P. m. macei* specimens show one or more white spots in the central rectrices, thus tending toward the *analis* group, and Deignan (1945) has noted a tendency toward *macei* in specimens of *longipennis* (*analis* group) from northern Thailand. Also, there is a cline in tail/wing ratio from longer-tailed birds (*westermani*) to shorter-tailed birds (*macei*) in the proportionately long-tailed *macei* group, tending toward the *analis* group as it approaches that group graphically; furthermore, within the proportionately short-tailed *analis* group the race *andamanensis* has fully as long a tail proportionately as does *westermani*. Finally, as Deignan (1945) noted, *P. canicapillus* includes both fully and incompletely barred-tailed forms, so it is not unexpected that *macei* should do so. Within the *macei* group I recognize *westermani* of western Nepal, northwestern India and Pakistan, and *macei* of central Nepal east to northern Burma. Recognition of *westermani* is on the basis of slight color differences from *macei* (less distinct gorget), its greater size (wings 8 percent longer, tail 10 percent longer, bill of males 17 percent longer, bill of females 6 percent longer), and the suggestion that *westermani* is a discrete population interacting with *P. auriceps* to displace in bill length (longer bill, also greater sexual difference in bill length [14 percent in *westermani*, 2 percent
in *macei*). I find no constant differences between *macei* and "*humei*" of the Khasi Hills area, and the latter is a synonym of the former. Continental *P. m. longipennis* of the *analis* group is proportionately short tailed, being very like *analis* in all measurements, but less yellow tinged below, more strongly marked below (broader spot-streaks, definite flank barring), with a pinker undertail area and more barred upper back. West Javan and Sumatra birds ("*montis"*) tend to be slightly smaller but are in no way sufficiently distinct to merit recognition apart from east Javan and Bali *analis*. Voous (1947) found Bali birds tending away from Javan specimens and toward *longipennis*, but I find only weak tendencies in that direction. Andaman Island birds (*andamanensis*) are distinctly longer tailed (14 percent longer tailed than *analis* and *longipennis*), the bill is paler, the female's crown is brownish black, the male has a very strongly red crown and nape, and, mainly, the underparts are distinctly tri-patterned with chordate marks or spots anteriorly, obscure streaks on the lower breast, and a very barred upper abdomen.

References

**STRIPE-BREASTED WOODPECKER**

*Picoides [macei] atratus*

**Color Plate 43**

**Range Summary.** Southern Asia.

**Diagnostic Features.** Little to Small, 42 to 52 grams, wing length 110 to 120 millimeters. Closely resembles lowland *P. macei*, i.e., black and white with streaks below and a white face patch, but ventral streakings are much heavier and extensive and extend onto rear of throat. Also, whiter below and on face, upper back black area is larger, bill and legs are paler, and male has red of crown extending fully onto nape (no black nape patch).

**Description.** Bill long, chisel-tipped, broad across nostrils, almost straight along culmen. Upper back black, lower back and wings black with white bars; lower rump and uppertail coverts black. Wing bars minimal on leading edge, which is mainly or entirely black; flight feathers have bars on both vanes; wings paler, (gray-black) below with extensive white bars. Shafts as *macei*. Tail black, outer two or three pairs white toward tips, with black bars. Tail/wing ratio 0.57 to 0.63. Nasal tufts brownish white to mixed black and white, lores white, anterior forehead often whitish. White patch formed from lores, base of bill, upper malar area, under eye, over eye, ear coverts, and sides of neck, although some black is often evident in the form of a few streaks; lower malar black, enlarging to rear where merging with black streaks on sides of breast. Throat white with streaks at rear and sometimes streaking extending to chin. Below whitish on rear of throat and leading edge of breast, giving way to yellowish dusky or grayish yellow on the breast, with stronger yellowish (occasionally orange) on center of abdomen (anteriorly). Long, spearlike black streaks, broadest on breast, extend over rear of throat, breast, sides, flanks, and abdomen (sometimes reduced or obsolete on center of abdomen); some barring evident on flanks. Lower abdomen bright red, undertail coverts fuscous with red tips, forming red patch with abdominal feathers.

Sexual features: Females larger than males (wings 2 to 3 percent, tail 6 percent longer, tail proportionately longer), but with 6 percent shorter bill than males. Male with fully red
Picoides [macei] auriceps

crown and nape (rarely, partly yellow crown and nape), although a fine black border occurs laterally; females have black crown and nape. Immatures have broader but less contrasting, duller ventral streaks, the throat is mainly whitish (vague streaks), the underparts are less yellow tinged, the abdomen is grayish, and the rear of the abdomen is orange-red. Both sexes show red on the crown (not on nape), females having much less red, often a few red feathers in the center, compared with males. Eyes brown, chestnut-brown, or brownish red. Legs and feet dull gray, blue-gray, or greenish gray. Bill brownish horn to greenish gray or dark gray above, lower bill paler gray with horn-colored or yellow tinge to grayish yellow.

**Distribution and Habitat.** Hills and mountain slopes of Assam; possibly Bangladesh; central, northern, and eastern Burma; northern Thailand; and Laos. Occurs usually above 3000 or 3500 feet, but occasionally to 2000 feet in northern Thailand (Deignan, 1945; possibly only where macei is absent), most commonly between 3500 and 6800 feet (Assam, Thailand), but reaching elevations of 2800 meters in Burma (Mt. Victoria region, 1400 to 2800 meters, commoner above 2000 meters [Ali and Ripley, 1970]). Thus, generally occurs above *P. macei* where the ranges of the two approximate. It favors open pine and oak woods, often foraging on trees isolated in clearings, and also stunted trees on ridges (Thailand [Deignan, 1945]).

**Behavior.** Very little known. Forages for ants and beetle larvae in trees and branches, probably much as *macei*. It is not known to drum, but this probably is due to lack of observations in the pair-formation period. A Rattle Call, or “whinny,” has been described by Deignan (1945); and Ali and Ripley (1970, p. 223) described earlier observation of a grating, creaky sound “very like that produced by two rough pieces of wood — trunks or branches of trees — when pressed by wind and rubbing slowly against each other.” Stuart Baker (1927) mentioned that its squeaking vocalization was similar to that of *P. macei* and different from calls of other woodpeckers. Nesting occurs in March to May in India, during April and May in Burma, and in January to April in Thailand. Four or five eggs are laid in a cavity that often is excavated in a small, lone tree in a cultivated area. Ali and Ripley (1970, p. 223) reported earlier observations of a male and female incubating in a nest at the same time, unusual if true. Molt follows the breeding period, in July to October.

**Taxonomy.** Forms a superspecies with parapatric *P. macei* and allopatric *P. auriceps* (see *P. macei*, p. 249). Monotypic.

### BROWN-FRONTED WOODPECKER

*Picoides [macei] auriceps*

**Color Plate 43**

**Range Summary.** South-central Asia.

**Diagnostic Features.** Little to Small, 38 to 44 grams (Nepal) and 42 to 50 grams (Afghanistan, Kashmir, Pakistan); wing length 105 to 120 millimeters. Yellow or (males) yellow and red hindcrown-nape patch, brown forecrown, black streaks below, pink patch on abdomen and under tail, all-black upper back. Upperparts black with white bars and spots. Pale ear patch extending to sides of neck, bordered by black malar stripe. Adjacent longer-billed *P. macei* has all-black or all-red crown, is less heavily streaked below, and has a smaller red area under the tail.

**Description.** Bill somewhat curved (more so than *macei*, atratus) along culmen, long, slightly chisel-tipped, broad across nostrils. Black upper back, lower back black with white bars,
rump to uppertail coverts black. Wings black or brownish black with white spots on greater coverts and primaries, white bars on secondaries; gray below with white bars and bar-spots. Shafts black dorsally, horn colored to brown below with white streaks on sides. Tail black, white bars occurring on outer large rectrices and diminishing on next two pairs (inner two pairs entirely black); paler below. Tail/wing ratio 0.57 to 0.68. Dusky nasal tufts; forehead and anterior crown dull brown to buffy yellowish brown, paler eastwardly. White lores, under eyes, over eyes, ear coverts, and sides of neck, but pale brown patch occurs in center of ear coverts. Malar stripe brown anteriorly, becoming larger and black posteriorly, meeting streaking on sides of breast. Throat white, often tinged brownish, usually unmarked or with fine streaks at rear. Underparts white, assuming yellowish tinge on lower breast, becoming orange to pink on abdomen and undertail coverts; streaks broad and black on breast, becoming browner and narrower on flanks and abdomen (sometimes obsolescent).

Sexual features: Males longer winged but shorter tailed than females (hence proportionately 2 to 3 percent shorter tailed), bill 8 to 12 percent longer than that of female; male has orange-red nape patch at rear of yellow hindcrown patch. Females lack red on nape or show only traces of orange, also yellow of hindcrown and nape generally is duller (brighter on average in eastern birds). Immatures duller below, less contrasting, ear coverts browner, no yellow about abdomen, abdomen paler pink, and nape entirely black; also, crown may show streaks. Males nearly as adult females but with some reddish in the yellow of hindcrown; females with orange and yellow on hindcrown. Eyes reddish brown to red, possibly differing sexually. Legs and feet grayish green to slaty. Bill slaty, horn-blue, or blackish above, darkest on culmen, paler (gray) below with dark tip.

Distribution and Habitat. Range from Nuristan, Afghanistan, across northern Pakistan and northwestern India to east-central Nepal. Occurs in open pine-oak forests in hills and mountains between the elevations of 2000 and 9000 or more feet, above P. macei where their ranges show a close approach. Picoides auriceps tends to occur below P. himalayensis and in drier woods than that species where they overlap in Afghanistan and northwestern India.

Behavior. Little known. Forages for ants and larvae of Lepidoptera and Coleoptera, and also feeds on fruits (mulberry, pear, and apricot are cited by Ali and Ripley, 1970, p. 222) and pine seeds. The last mentioned authors also reported sapsucking by drilling of holes circling trees and taking the sap, as in P. hyperythrus. This woodpecker drums frequently during March and April in Nepal (Proud, 1958). The call note is a "sharp, metallic, high-pitched keep" (B. King, personal comm.), higher pitched and weaker than that of P. himalayensis and resembling that of P. hyperythrus (Magrath, quoted in Ali and Ripley, 1970, p. 222). In addition, those authors report that it also has a shrill, long Rattle Call resembling that of the kingfisher Halcyon smyrnensis. Breeding occurs from April to July in India and Nepal, and juvenal-plumaged birds occur until September. The nest is excavated in a tree up to 25 feet or so above ground, and four or rarely five eggs are laid in it. Details of care of the eggs and young are unknown. The annual molt occurs from early August to mid-November.

Taxonomy. Forms a superspecies with P. macei of lower altitudes and extending far to the east of it and with P. atratus of similar elevations from eastern India and Burma eastward. It differs from both in its brown cap, yellowish on the hindcrown, more extensive pink on the abdomen, and slightly more curved bill. Sympathy with macei in northwestern India and Nepal has not been established. There is a clinal increase in size from Nepal westward that is more pronounced in males than in females, but, like Vaurie (1959c), I find no constant shifts in color correlated with the size change. I prefer to treat the size cline (which is of the order of 5 percent in wing length and 7 percent in tail length, bill length showing no difference) verbally, and thus I do not recognize Nepalese "incognitus"; P. auriceps is monotypic.
YELLOW-CROWNED WOODPECKER

_Picoides mahrattensis_

**Color Plate 44**

**Range Summary.** South-central Asia.

**Diagnostic Features.** Little, 28 to 46 (average 34 to 36) grams, wing length 91 to 105 millimeters. Brownish yellow crown, males with red nape and hindcrown. Black or brownish black above, heavily streaked and spotted white. Tail and wings spotted white on black. White throat, brownish white face. Brown mark on sides of breast, streaked lower breast, red abdominal patch.

**Description.** Bill slightly curved along culmen, slight chisel-tip, broad across nostrils. Above, brownish black (pallescens) to black (many mahrattensis) with large, white spot-streaks, whiter on rump (which may be entirely white in some pallescens); uppertail coverts have black wedge in center, white edges, and spot-bars. Wings blackish or deep brown, heavily barred and spotted with white; underwings brown with white spot-bars. Shafts blackish brown above, horny white below on wings, and brown with whitish streaks in tail (under-side). Tail brownish black with white tips and bar-spots throughout. Tail/wing ratio 0.57 to 0.65. Throat, chin, under eye, and lores mainly white, tinged vaguely brownish; upper malar area and center of ear coverts with brown cast, but these areas mainly whitish. Brown to tan (mahrattensis) marks from rear of malar onto sides of breast, with “arm” upward on neck. Forecrown and forehead yellowish, with brown cast (darker brown in mahrattensis), yellower laterally. White patch on sides of neck nearly separated from pale ear coverts by brown “yoke” marks from breast. Streaked below, streaks fine or lacking on center of upper breast (pallescens especially); broad blackish, chocolate-brown, or tan-brown (pallescens) streaks on sides of breast, breaking up into moderate streaks posteriorly; sides of abdomen streaked brown on white; center of abdomen orange-red. Undertail coverts white with brown wedge-streaks.

Sexual features: Sexes nearly alike in size: Females with actually, proportionately (by 2 percent) longer tail; male has longer bill (by 17 percent). Males have red patch from nape to hindcrown; females lack red on head or show few red traces in yellow of crown, but have nape brown or blackish brown. Immatures as adult but paler red on abdomen, streaks less contrasting below, browner and less black above. Males have some orange-red on crown and nape; females show orange-red scattered on some central crown feathers. Eyes brown to red-brown, brown in juveniles. Legs and feet horn-gray, bluish gray, or slaty; claws similar in color. Bill gray to horn color, darker on culmen, paler in juveniles. Mouth lining pale pink in young birds, grayish pink in adults (Ali and Whistler, 1934).

**Distribution and Habitat.** Sporadic to common, with some disjunction from northwestern India (Sind, Punjab) to southern India and Sri Lanka, and east across Nepal and India and Bangladesh to Burma, northern Thailand, and southern Laos. Inhabits various dry woodlands, desert scrub, secondgrowth forest (prosopis, babool, euphorbia [Ali and Ripley, 1970]), gardens, bamboo, cultivated areas, roadside trees, and orchards (mangos, etc.) and other tree plantations (e.g., teak), mainly below 2000 feet, but reaching 5500 to 6000 feet or more in central and southern India (in the absence of similarly sized picid competitors?). Reaches 4000 feet in Sri Lanka, where it prefers tea plantations, parklands, and euphorbia woods.

**Foraging Habits.** Forages by gleaning, probing, and tapping in diverse trees; babool trees are preferred in Sind (Eates, 1937). Paired birds usually move together while foraging, but occupy
separate trees. Much foraging is accomplished in the branches and foliage. They apparently move upward in trees when foraging and are reported to make a strange creaking sound by action of the bill against wood in foraging (Ali and Ripley, 1970, p. 227). Those authors reported ants, termites, beetles, moths, lac insects (*Tachardia*), and dragonflies (carried in bill to feed young), as well as fruits of various kinds and some nectar in the diet. Has been noted in interspecies foraging flocks.

**Voice.** Drums in a 1- to 2-second burst, “a muffled *dr-rrr-rrr*—” (Ali and Ripley, 1970, p. 227), during the breeding season. Dharmakumarsinhji (1956, p. 276) reported the common call note as a “sharp and rather harsh *kirrick-kirrick,*” but most authors note it as a “peek,” “click,” or “chuck.” This is given when the birds are mildly alarmed and also as a contact note (Eates, 1937). A call note and a Rattle Call were indicated clearly by W. W. A. Phillips (1953, p. 122): “its presence being often disclosed by its shrill, trilling calls, interspersed with short, high-pitched single notes.” The Rattle was rendered “click*rrr*-” by Ali and Ripley (1970, p. 227), at times such as when the nest is approached by an intruder. Dharmakumarsinhji (1956) also noted a chatter call of young birds.

**Interspecific Interaction.** Eates (1937) reported replacement of *P. assimilis* by *P. mahartensis* in Sind, implying interaction of the two. He also noted attacks by a male *mahartensis* on a male Rose-ringed Parakeet (*Psittacula krameri*) of a pair nesting in the same tree as the woodpecker, after it had perched close to the woodpecker’s nest.

**Breeding.** The nesting season lasts from February to May, usually in March and April in most of the range, but in March to August in Sri Lanka. Both adults excavate the nest, the male more so (W. W. A. Phillips, 1953), in a dead branch of a live tree or in a dead tree, at 3 to 30 feet above ground. Occasionally, old nests are reused, but usually a new nest is excavated yearly (Eates, 1937). The nest is excavated in trees such as *Ficus* (fig), *Albizia moluccana* (in Sri Lanka), mango, babool, kandi (*Prosopis*), peelo (*Salvadora*), or ber (*Zizyphus*). Pairs were said by Eates (1937) to mate for life. The nest cavity is 15 to 40 centimeters deep, with an entry 4 centimeters across and 5 or 6 centimeters into the tree (Ali and Ripley, 1970). The clutch size is usually two and rarely three eggs in Sri Lanka and usually three or occasionally four eggs in India. Incubation lasts about 13 days, and both sexes incubate; Phillips (1953) reported that males incubate more than females during the day. In hot weather or when the eggs have warmed, the incubating bird perches at the nest entrance for long periods of time. Both adults feed the nestlings, carrying food in the bill (Ali and Whistler, 1934); insects are obtained from nearby, even on the nest tree, and feeding occurs at less than 15-minute intervals (Eates, 1937). The young birds remain with the parents for a long time after fledging; Eates reported that they apparently are driven away by the parents only at the advent of the next breeding season. Molt occurs following breeding, in August to October. The old nest hole may be used for roosting after the breeding season.

**Taxonomy.** Forms a species group with the *macei* superspecies, resembling *P. auriceps* in having yellow and brown on the crown. Other aspects of the plumage patterns, as well as size and proportions, are similar. The species is moderately variable in plumage and size, but there appear to be no well-marked patterns (long ago, at a time of great subspecific splitting, Whistler and Kinnear [1934, p. 289] concluded that “the recognition of two races is only just feasible”). Ali and Ripley (1970) treated all Indian and Ceylonese birds as *P. m. mahartensis*, with “aurocristatus,” “pallescens,” and “koezi” as synonyms, recognizing only *blanfordi* of Burma (to Laos) as racially distinct from *mahartensis*. I find size difference trivial among the various populations; further, weight data suggest that birds of higher elevations
throughout the range of the species are larger than lowland birds. Although I cannot follow Biswas (1951) and others who treat as many as five races, I am inclined to separate as *P. m. pallescens* the birds of Pakistan to the United Provinces, northern Bombay and northern Bihar. These are paler and very slightly larger; their ventral markings are tan, the crown is pale brownish yellow, and dorsal pale streaks and spots are larger than in the more southern and eastern nominate race. Within *P. m. mahrattensis*, there is a slight clinal variation in size, with northern and northeastern birds being larger; this tendency is slight, and variation in color is so great that I see no possibility of suitably distinguishing “*bifordi*” or any other subpopulation of *P. m. mahrattensis*.

References


**ARABIAN WOODPECKER**

*Picoides dorae*

**Color Plate 44**

**Range Summary.** Arabian Peninsula.

**Diagnostic Features.** Small, wing length 106 to 118 millimeters. Only woodpecker in its region. Brown with white bars in wings and outer tail, red crown in male, reddish on abdomen.

**Description.** Bill moderately long, slightly curved along culmen, small chisel-tip, broad across nostrils. Brown above, dark brown on rump and uppertail coverts, paler on back, palest on head, but subject to fading (dark in fall and winter, paler in spring and early summer). Wings darker than back, blackish brown, with white spot-bars on flight feathers and greater coverts; barred brown and white below, coverts mainly white. Shafts brown to black above, paling to horn color at base of tail, paler below with narrow white shaft streak. Tail brownish black, the outer pair with white bars, the next to outer pair bearing fewer (one or two) bars; paler below. Tail/wing ratio 0.57 to 0.62. Head mainly brown (see Sexual features), varying from dark brown to tan-brown, with dull whitish streaks vaguely evident in ear coverts, fine white streak sometimes found behind eye (in few birds), and mixed brown and white on malar region; throat dull white to pale tan, sometimes with vague streaking. Underparts gray-brown; with wear, fading and perhaps some staining, becoming more tan through the year. Vague pale streaks occasionally evident on lower breast; abdomen with orange-red or red patch in center, bordered by weakly barred and streaked (brown and white) flanks and feathers of lower abdomen. Undertail coverts brown with white spots or spot-bars.

**Sexual features:** Male slightly larger than female, with bill about 14 percent longer. Red patch on hindcrown and nape in males, lacking in females, which have brown crown blending into back color. Immatures similar to adults, females lacking red on crown, but males showing less red and more orange-red than adult males. Also, more streaking evident on lower breast and abdomen of immature birds, breast grayish, red of abdomen pinker, less red, and streaks more often present on throat. Eyes grayish brown (two labels report them as “biscuit yellow” and “dull white”); legs and feet gray; bill horn color, paling at base of lower bill (possibly yellowish).
Distribution and Habitat. Restricted to scattered remnant open acacia woods, particularly along ravines and stream beds (wadis) in the hills of western Saudi Arabia (from north of Mecca southward) south to western Aden and possibly Yemen. Apparently does not usually occur below an elevation of 2500 feet, and specimens represent only elevations between 4000 and 8000 feet (last at Wadi Hubait); but this may be due to habitat destruction, as B. King reports (personal comm.) finding them in acacias near sea level in 1976, although more usually between 4500 to 9200 feet in wadi acacias and in mixed broadleaf and juniper woods. This woodpecker may be locally common in well-wooded areas, but these are scarce and usually the birds are widely scattered.

Behavior. Very little known; for example, its eggs apparently never have been described. Forages in scattered acacia and caper (Capparis maerua) trees, in both of which it may nest, and in plants such as Asclepias (Meinertzhagen, 1954), by tapping and gleaning. It apparently obtains subsurface larvae of beetles and such surface insects as aphids. Drumming has been noted by Meinertzhagen and is relatively weak. The only vocalization reported in literature is a "not very strident 'ka-ka-ka'" (Bates, 1937, p. 52). B. King (personal comm.) noted a "high-pitched, somewhat metallic, piping series of 15 to 20 hack or wuck notes, uttered rapidly, speeding up, and becoming lower in pitch," apparently its Rattle Call, that he heard in 1975. When disturbed, it tends to move into upper branches of trees, as do many picids. Displays are unknown. Bates (1937) reported from Philby's notes the taking, on 14 January, of "another pair of males at Ukadh (alt. 5000 feet), a few miles north of Taif, shot when they had 'just separated from copulation, 7 A.M.'" As many as three cavities were found in a single acacia or caper tree, indicating use of the tree for several years. Nesting apparently occurs from February to April, as immature birds date from 24 April to 3 August. One female was obtained with a young bird, which it may have been feeding. The molt probably ensues in August, concluding by November.

Taxonomy. Relationships little known, but color pattern, structure and zoogeography suggest the macei-auriceps group and mahrattensis as relatives. The brown coloration and pattern of the abdomen in mahrattensis are very like those of dorae. It is noteworthy that P. obsoletus, the only species of Picoides to occupy Africa, lacks red on the abdomen, whereas dorae represents the derived, red-bellied group of this genus.

**RUFOUS-BELLIED WOODPECKER**

*Picoides hypertyrus*

Color Plate 45

Range Plate. South-central Asia.

Diagnostic Features. Little to Small, 37 to 53 grams (hypertyrus) and 55 to 74 grams (subrufinus), wing length 109 to 136 millimeters. Rusty chestnut below, usually unmarked, with pinkish red under tail. Black and white barred above, on wings, and outer tail. White lores, under eye, and over eye. Crown to nape red in males, black with white spots in females. Long bill.

Description. Bill long, broad across nostrils, almost straight along culmen, with chisel-tip. Above, black with white bars, whitest on center of back, blacker on upper back; black lower rump to uppertail coverts. Wings blacker than back with white bars on coverts and flight feathers (spot-bars on primaries); underwings gray-black and white barred. Shafts brownish black to black above, brown below but whitish at tips and bases of primaries. Tail black with
white bars on outermost large feathers, the white diminishing on penultimate pair and evident only near tips of third from outer pair; similar below. Tail/wing ratio 0.55 to 0.69. Nasal tufts and anterior malar area mixed dusky black and white; white area from lores below eye to its lower rear edge; small white mark over eye cut off from white of lores by blackish area just in front of and over eye. Ear coverts, sides of neck, rear of malar, throat, breast, and upper abdomen chestnut-rufous (*hpyerythrus*) to rusty buff (*subrufinus*), usually unmarked, but occasionally with few black spot-streaks or vague bars on sides of breast. Midabdomen to flanks with narrow area of white and black bars anteriorly bordering a pinkish red undertail and posterior abdominal patch.

Sexual features: Sexes the same size: Females with longer tail (up to 5 percent longer), male slightly longer billed. Males with red forehead, crown, and nape, the nape red sometimes orangish and red often extending (especially in birds from western Himalayas) downward on neck behind ear coverts (some basal black and a few whitish spots evident in crown of some males). Females usually lack red on head (may have one or two spots of red), instead showing black from forehead to nape, this area being spotted with white. Immature birds at an early stage are fully barred below, tricolored (white, black, tan), sometimes showing a chainlike pattern, with a streaked throat; bars on the face, often streaks on the ear coverts; a pinker, less red abdomen; and blacker, more white-spotted than barred upperparts. The postjuvenal molt seems protracted, and birds varying from the plumage just described to nearly fully adult plumage occur from September through November (even December and January birds may show a few bars on the sides, and some females still have a few red spots as late as January). Both sexes have a black crown bearing white spots with orange-red tips, but this red is much more extensive in males, although never reaching the nape or completely obscuring the white spotting on the crown. Eyes reddish brown to yellowish red, or deep brown in adults; dull brown to blackish brown in juveniles. Legs and feet olive, grayish green, greenish gray, or slaty, with dull yellow soles of the toes. Bill black above, yellow to greenish yellow below with more green, or greenish, at the base.

**Distribution and Habitat.** Ranges from Kashmir and adjacent northeastern Pakistan across northern Himalayan India and Nepal, Sikkim, Bhutan, hills of Bangladesh, Assam, and northeastern Burma to northern Thailand and northern North Vietnam, northward through western China; a migratory population may be isolated during the breeding season in Manchuria and Korea; an isolate also occurs inland in South Vietnam to southern Laos. It generally is a montane bird, but descends into the lowlands in the far northeastern part of its range and in South Vietnam, thus occurring from elevations of 500 feet or lower in the latter areas to 13,000 feet in the Himalayas and 14,000 feet in Szechwan. Northeastern birds (Manchuria, northern China, Korea) appear to migrate as far south as Szechwan (Traylor, 1967). Habitats include mainly open forests or parklands of pine or mixed deciduous and evergreen trees, such as oaks, alders, horse chestnuts, silver firs, rhododendrons, and others.

**Foraging Habits.** Primarily obtains insects and other invertebrates by prying, probing, and tapping at loose bark (Zusi and Marshall, 1970) and by gleaning; probably excavates occasionally. It feeds mainly in the middle stratum of trees, on the trunks and major branches, but descends to near the ground. Birds work alone or in pairs, often joining mixed foraging flocks of other avian species. Ants, coleopterous larvae, orthopterans, and caterpillars form the bulk of the insect diet, but they have been noted "flycatching" for butterflies at blossoms (see Zusi and Marshall, 1970, p. 400). It also feeds by "sapsucking," being the most specialized of Old World woodpeckers for this habit (Abdulali, 1968; Zusi and Marshall, 1970). Its tongue is brush-tipped and cannot be extended to the degree of most woodpeck-
ers. Apparently it utilizes sap only in the spring, excavating two types of holes for its sap-sucking activities. Some trees are ringed by rows or rings of small holes at 6- to 12-inch intervals or more. Interestingly, the birds have never been observed excavating or feeding at these holes, but the circumstantial evidence from distribution, other observations, and anatomy (Zusi and Marshall, 1970) is overwhelmingly in favor of this species' being responsible for the holes. The second type of excavation is a solitary deep hole or "sap well," at which Marshall (in Zusi and Marshall, 1970, p. 395) observed a Rufous-bellied Woodpecker feeding on sap. Apparently the ringed holes and sap wells are renewed in part every year. According to Zusi and Marshall, a Myrtaceae, Tristania rufescens, had rings of holes; and an oak, Quercus kerri, had sap wells in Thailand. Abdulali (1968, p. 219) illustrated an apple tree (Pyrus malus) ringed with holes in a manner suggesting that of North American sap-suckers (Sphyrapicus sp.).

Voice. Drums in "an accelerated roll of five to 15 notes, fading toward the end" (Zusi and Marshall, 1970, p. 396). Both sexes drum frequently, apparently only in the pair-formation and nesting periods. A dead stub or dead tree is used for drumming. Like other large species of Picoides, call notes seem to be less common than Rattle Calls, for the former are not mentioned by various authors. The Rattle Call was described as "a characteristic rattling call, reminiscent of the genus (Picoides) as a whole" (Ripley, 1952) and as "a typically Dendrocopos (= Picoides) dry trill, usually given three in succession" (Zusi and Marshall, 1970, p. 396). The latter authors also referred to a Wicka Call given by members of a "pair" when they are close together, a "wicka-wicka."

Display. None reported.

Breeding. Nesting takes place in March to May throughout its range, with juveniles represented from early April (Burma) through September; September through January immatures show mostly adult plumage, progressively more so through those months. Little is known of nesting habits. The clutch seems to be three to five eggs, and the nest is placed in a tree trunk up to 6 meters above ground. Molt follows breeding, from July to November in adults.

Taxonomy. Related rather distantly to the P. macei complex and to P. darjellensis and P. cathpharius. Its plumage features and specializations for sap sucking are deemed of taxonomic value only at the specific, not the generic, level (see also Zusi and Marshall, 1970). I recognize four subspecies: contiguous marshalli of northwestern India and adjacent Pakistan; hyperythrus of Nepal, northeastern India, Burma, northern Thailand, western Yunnan, southeastern Tibet, and Sikang; isolated subrufinus of Manchuria, Korea, and perhaps northernmost China (winters to Szechwan, Yunnan, southern China, and the northern Indo-Chinese region); and annamensis of South Vietnam and adjacent southern Laos. The synonymy of these races was discussed by Vaurie (1959c), except for "sikkimensis" of Sikkim to Yunnan, a synonym of hyperythrus. Westernmost marshalli closely resembles hyperythrus, but males have distinctly expanded red on the nuchal area (it stands out more than red on the crown) that extends onto sides of the neck behind the ear coverts (a few hyperythrus show this tendency); marshalli also is large, as subrufinus, being 8 percent longer winged, 10 percent longer tailed, and 10 percent longer billed than western hyperythrus (northeastern hyperythrus clinally show a size increase, approaching marshalli somewhat, but marshalli proportionately has a 10 percent longer tail than all other populations of the species, including northeastern hyperythrus). The southeastern isolate, annamensis, is recognized partly on the basis of its geographic isolation; it resembles hyperythrus but is distinctly longer billed and paler below in comparable plumage. (There is great seasonal and considerable individual variation in color of the underparts in this species, and care must be taken to use
comparably plumaged birds; fresh-plumaged specimens are darker, more deeply colored than worn birds.) Finally, subrufinus of the northeast is larger than hyperythrus or annamensis, about like marshallii, but with a shorter bill and proportionately shorter wings than that form; subrufinus is distinctly buff toned below, duller, and not brightly colored as hyperythrus and marshallii (annamensis approximates subrufinus in color of underparts, but is somewhat smaller with a proportionately larger bill).

References

CRIMSON-BREASTED WOODPECKER

Picoides cathpharius

Color Plate 46

Range Summary. Southern Asia.

Diagnostic Features. Little, 25 to 35 grams (cathpharius, pyrrhothorax), wing length 94 to 110 millimeters. Black and white with all-black back, white patch in center of wings. Black malar area connecting with black markings on sides of breast and underparts. Throat buffy. Breast often with red patch, bordered by black mark or black streaks at sides and rear. Red patch under tail. Forehead buffy white, also sides of face. Red nape in male.

Description. Bill moderately long, slightly curved along culmen, broad across nostrils, with small chisel-tip. Black from hindneck to rump and uppertail area. Wings black with small white bars or spots on flight feathers and large white patch on secondary coverts; underwings paler black with white bars. Shafts black above except whitish at tail base; brown below with white lateral streaks, but whitish also in part of outer tail feathers and at base of central rectrices. Tail black, outer three pairs bearing broad cinnamon-white bars near the tip, most extensive on outer pair, may be nearly lacking on innermost of these pairs of feathers. Tail/wing ratio 0.59 to 0.70. Forehead and nasal tufts buffy white with (usually) fine black line in center leading to crown. Crown black, reaching eye at front; white line over rear of eye connecting with buffy white (some dull black evident, rarely extensive) ear coverts and sides of neck. Rear of sides of neck orange or red-orange in cathpharius group, but not in others (or traces only). Malar area black, joining black streaking on sides of breast in cathpharius group or connecting with large black mark on breast in pernyii group. Throat buffy to cinnamon-white. Underparts mainly buffy brown, tan-brown, or cinnamon-brown, often with yellowish suffusion on anterior abdomen and flanks; markings are black streaks, fine on lower breast but concentrating into large streaks on upper breast and sides of breast in cathpharius group, or forming large black mark on breast and sides of breast in pernyii group. An orange-red patch is faint or lacking on the center of the breast of cathpharius but is present in ludowi and pyrrhothorax; other races (pernyii group) have a deeper red breast patch surrounded by black. Lower abdomen and undertail coverts streaked blackish and broadly tipped orange-red (cathpharius group) or pinkish red (pernyii group).

Sexual features: Sexes virtually alike in size, slightly longer bill in male, female with tail proportionately slightly longer. Males with moderately broad red nape patch (tends to be more orange in cathpharius group, redder in pernyii group), the nape being black in females. Immatures much like adults but blacker below with no red on the breast; red of abdomen
pincher and much less extensive; tail with more white. Both sexes have red on crown, more
extensive in male (nape to midcrown) and more orange toned; red lacking on sides of neck.
Eyes brown to reddish brown; skin around eyes is slaty. Legs and feet dark greenish gray to
dull grayish green. Bill gray to slaty above, very pale gray to grayish white below, rarely
(abnormally) ivory colored (type of innixus).

**Distribution and Habitat.** Nepal, Bhutan, Sikkim, and adjacent northeastern India, northern
Burma, northern Thailand, Laos, and North Vietnam and extending northeastward into
mountains of southwestern and central China as far as Szechwan, Kansu, and Hupeh. Occurs
in various deciduous forests and evergreen forests of mountain slopes and hills between
2500 and 13,000 feet, mainly between 4000 and 7000 feet in the west and between 5500
and 9000 feet from Burma eastward. A bird of densely wooded slopes, it favors broad-leaved
evergreen forest, oak and chestnut woods, and rhododendron woods. Above 7000 feet it
overlaps with larger *P. darjellensis* in India and Sikkim.

**Foraging Habits.** Little known. Feeds on insects by tapping and gleaning, with occasional
excavating in small and medium branches of trees. Ali and Ripley (1970) reported that nectar
also is obtained by the bird’s boring a hole in the corolla of flowers such as rhododendrons.

**Voice.** Although not known to drum, it probably does so. Its call note is a rather weak
Pit Call, a “pit” or “pwik” (Lister, 1954) uttered when the woodpecker is disturbed. The
call is about 0.025 second long, pitched at 2.1 to 2.2 kilohertz, emphasizing the fundamental
tone. It is most similar to the call note of *P. macei* (Short, 1973d), but is lower pitched.
Short Rattle Calls heard in India were recorded on tape and proved to contain three or four
fast notes, the notes forming a tight, inverted V on a sonagram. One call of four notes was
0.115 second in length and each note was given in 0.015 second, at a rate of about 34 notes
per second. The pitch was from 2.1 dropping to 1.8 kilohertz during one call; one harmonic
tone is evident and codominant with the fundamental tone. The notes are much like Pit Call
notes but are shorter. The Short Rattle is an agonistic call given during encounters or when a
bird is very disturbed. I did not hear a Rattle Call, but I suggest that this species has such a
call that will prove to have a tempo of 20 to 25 notes per second.

**Breeding.** Little known. Nests during April to June in most of the range; birds in juvénal
plumage date from early June to September or (nearly adult) October. Two to four eggs are
laid in a tree cavity presumably excavated by the woodpeckers. Nothing is known of its
nesting habits. Molt occurs from July to November, following breeding.

**Taxonomy.** Related to the *P. macei* complex and to *P. darjellensis*, with both species of
which it is narrowly sympatric. Seven subspecies have been recognized; I find six barely to
moderately distinct enough to warrant racial recognition. There are two groups of popula-
tions: a generally smaller, paler, southwestern nominate group having no or slight black on
the breast and strong reddish on the rear of the ear coverts; and a darker, larger northeastern
(*pemyii*) group having much black around some red on the breast and little or no reddish in
the rear of the ear coverts. In the *cathpharius* group are the nominate race of the Himalayas
from Nepal to northern Assam, weakly characterized *ludlowi* of southwestern Sikang, China,
and *pyrrhothorax* of the hills south of the Brahmaputra River in Assam and closely adjacent
Burma. The nominate race lacks red or has but traces on the breast; it has little red under
the tail, as well as being buffy in tone on the cheeks and underparts, and has a short bill.
Longer-billed *pyrrhothorax* (including *cruenticeps* of the Lushai Hills) has a distinct
orange-red patch on the breast with little or no bordering black, more red under the tail,
whiter face and underparts, and a longer bill. Isolated *ludlowi*, known from few specimens
(I saw three), resembles *pyrrhothorax* closely (*cathpharius* geographically separates *ludlowi*
and *pyrrhothorax*) but is darker on the face and underparts; it seems to resemble *cathpharius* (e.g., in color, in bill size) more than *tenebrosus*, contra Vaurie (1959b) but is distinctly redder on the breast and under the tail. *Picoides cathpharius tenebrosus* of the *pernyii* group is very dark, with much black about the breast and very streaked underparts. It occupies northern Burma, northern Thailand, Laos, North Vietnam, and central and southern Yunnan. It is slightly larger than races of the *cathpharius* group. North of *tenebrosus* is *pernyii*, occurring from northwestern Yunnan, Szechwan, and Sikang north to Kansu. It is larger than *tenebrosus* (wings 8 percent longer), with a proportionately longer tail (tail 13 percent longer), a more massive bill, redder (less orangish) abdomen, and more extensive black on the breast, forming a black patch behind the red area as well as at its sides. Three specimens of *innixus* from central Hupeh are similar to *pernyii* in size and most markings, but this race must be recognized because of its fine or obsolescent streaks on the sides and flanks, its very white underparts and cheeks, and the moderate rather than heavy black on the breast (resembles *tenebrosus* in breast markings).

Reference

BROWN-THROATED (DARJEELING) WOODPECKER

*Picoides darjellensis*

Color Plate 46


Diagnostic Features. Small, 61 to 87 grams, wing length 119 to 128 millimeters. Black backed with black malar stripe, heavy ventral streaks on a yellowish brown background; red under tail. Buffy brown face patch that becomes golden or orange-buff at the rear, conspicuous in field. Small white wing bars, barred outer tail feathers. Larger than sympatric *P. cathpharius*, with gold neck patch and no red on breast.

Description. Bill long, broad across nostrils, almost straight along culmen, chisel-tipped. Black above from hindneck to tail. Wings largely black or brownish black, with fine white spot-bars on flight feathers; underwings brown with white bars. Shafts black above, paler to horn color at base of tail, brownish black below except whitish on white parts of outer tail. Tail black with white to buffy white barring on outer three pairs of rectrices. Tail/wing ratio 0.61 to 0.67. Black nasal tufts; white line across forehead connecting with lores, then under eyes (where becoming buff), also over eyes to ear coverts. Rear of ear coverts brown to buff, connecting with sides of neck which show yellow or even orange tinge. Crown black. Malar black, enlarging to rear to form patch at lower sides of neck (patch connects with ventral streaks). Chin whitish, throat buff to brown. Breast anteriorly brown, connecting with throat to form unmarked area of central breast and throat, bordered by black streaks on sides of breast; brown of underparts pales posteriorly, taking on a yellowish tone on abdomen, then giving way to pinkish red undertail coverts. Ventral markings include streaks, heaviest on sides of breast, then giving way to a combination of black bars and shaft streaks on flanks.

Sexual features: Male larger, about 12 percent heavier, the wings and tail are but a trifle longer, and the bill is about 10 percent longer than that of the female; male with narrow red nape patch, red lacking on head of female, which is black from rear of forehead to tail. Immatures resemble adults but have paler red on the abdomen and lack golden orange
on the sides of the neck; throat streaked, abdomen more heavily barred, ventrally less contrast than in adults. Males have a red crown, even in the nestling stage (contra Ali and Ripley, 1970), whereas females vary from having the crown entirely black to (usually) black with red spotting or a red patch in the center. Eyes reddish brown in adults, dark brown in juveniles; orbital skin slaty. Legs and feet grayish green to greenish gray, soles of toes dull yellow, claws horn colored. Bill blackish above, paler below, grayish with slaty edges and greenish or ivory base.

Distribution and Habitat. West-central Nepal eastward across Sikkim, Bhutan, Himalayan northeastern India, the hills of Assam, southeastern Tibet, northern Burma, Sikang, western Szechwan, Yunnan, and northern North Vietnam. It is strictly a bird of mountain slopes and hills, occurring mainly between 6000 and 10,000 feet, but occasionally as low as 4000 feet (in winter, possibly) and ranging to 13,000 feet in the summer (Sikkim [Ali, 1962]). It generally reaches elevations above its partly sympatric, small ally, *P. cathpharius*, but they overlap considerably. Usually, the Brown-throated Woodpecker is found in moist or wet forests, often draped with mosses. Oaks, rhododendrons, pines, firs, and evergreen subtropical forests form the bulk of its habitats.

Foraging Habits. Feeds at varying heights in dead and living trees, mainly on the trunk and branches but also working into the small branchlets and descending onto fallen logs as well. Foraging varies, the birds moving slowly and tapping, probing, and picking apart moss on moss-draped branches, but tapping and excavating at scattered sites with rapid movement between them on smooth bark surfaces. Most food items are secured from the surface or under moss, debris, and loose bark; excavating is not frequent. Birds forage alone or in pairs (in adjacent trees), and they occasionally join mixed species foraging flocks. Beetle and other larvae, pupae, and diverse insects are consumed.

Voice. Drums in loud, regular bursts, mainly or entirely during the breeding season. Bursts last about 1.0 second and are given at 21 to 23 beats per second, rather like some drumming of *P. major*. Drumming presumably attracts a potential mate, warns potential intruders on a territory, and expresses aggression in cases of disturbance of the birds. The call note is a Peek Call, a sharp note pitched at 1.4 to 2.2 kilohertz in the fundamental tone (peak) and with emphasis mainly on the initial harmonic tone (3.1 to 3.7 kilohertz). About 0.025 second in duration, it is sharper than the higher-pitched but similar call of *P. cathpharius*. It is uttered when birds are disturbed by an intruder and when members of a pair approach or are near each other. A Short Rattle Call was heard but not recorded on tape. The Rattle Call itself is about 1.0 second in duration, given at a tempo of 12 to 12.7 notes per second. Notes are pitched at 2.2 kilohertz but emphasized on the harmonic tone's peak at 4.4 or 4.5 kilohertz, thus differing from call notes. It is rendered "di-di-di-d-dddddt" in my field notes. The call is given during interactions between members of a pair or during encounters. Soft, ill-defined notes were heard from birds close together, but these were not heard well. A Wickalike call, rendered "tchew-tchew-tchew-tchew," followed by a lower "ch-wee, ch-wee, ch-wee" series, was uttered by one of a pair of birds when the male flew in to its mate.

Displays. Slight Crest Raising Displays were observed in males, once in a drumming male and twice in Peek-calling males perched near the female.

Breeding. Nesting occurs from March until June; juveniles represent April to September (extreme months from Yunnan; mainly June and July). Two to four eggs form the clutch (Ali, 1962), the nest being excavated low in a tree trunk (Ali and Ripley, 1970). Other details are little known, but the young seem rather quiet in the nest (Dieselhorst, 1968). Molt follows breeding, in July through September or early October.
Taxonomy. Related rather closely to partly sympatric *P. cathpharius*; generally replaces the *P. major* complex, being east of similarly sized *P. [major] himalayensis* but overlapping with smaller *P. major* in the eastern part of its range. Several subspecies have been described, and all are with little or no basis for formal recognition. Vaurie (1959b) discussed the various named taxa, recognizing only *desmursi* of Sikang and Szechwan apart from the nominate race, and that only on the basis of its smaller bill. I find that northeastern birds are shorter billed (by 9 to 10 percent) and barely average shorter winged and shorter tailed, but these differences appear trivial and may be clinal, Yunnan birds being near "*desmursi*" but longer billed than more northern birds. Vaurie also mentioned intermediates from southern Sikang. No other differences were found. I prefer to treat the species as monotypic, recognizing that there is a decrease in bill size in northeastern populations.

Reference

**MIDDLE SPOTTED WOODPECKER**

*Picoides medius*

**Color Plate 46**

**Range Summary.** Southwestern Eurasia.

**Diagnostic Features.** Small, 50 to 65 grams (exceptionally to 85 grams in laying or fat female), wing length 116 to 129 millimeters. Brownish forehead; sexes alike in having red crown. Black malar patch connects with streaks on sides. White throat and upper breast. White on ear coverts and sides of neck. Pink to red lower abdomen and undertail coverts. Large white patch in center of wing. Black back and rump. Ventral streaks heaviest on sides and on midbreast. Usually tinged yellow on lower breast. Barred wings.

**Description.** Bill moderately long, slightly curved along culmen, broad across nostrils, tip almost pointed. Black above from hindneck to uppertail coverts. Wings mainly black, barred white on flight feathers, and with large white patch formed on inner secondary feathers and adjacent coverts (tips of some white feathers of this patch often finely barred black); underwings barred brown and white. Shafts black above, paling at base of tail; below, brown with white shaft streaks, mainly white at base of primaries and on outer tail feathers. Tail black, with bars or streak-bars of white at tips of third from outer feathers, increasingly barred outwardly to fifth pair; paler below. Tail/wing ratio 0.56 to 0.70. Forehead white or brownish (discolored); nasal tufts white at base, black at tips. Crown to nape red (see Sexual features), but red feathers have white bar near base that sometimes shows as spotting. Lores, over eyes, under eyes, and ear coverts white with some gray streaking in ear coverts and under eye; white of ear coverts connects with white patch on side of neck. Malar area usually white, as throat and chin, but sometimes with few gray-black streaks; large black mark from rear of malar posteriorly onto sides of breast and tending upward, yokelike, toward nape, but not bisecting white patch on ear coverts to the sides of the neck. White area in center of breast to throat, bordered laterally by black mark from sides of breast to malar area and by black streaking at rear of breast; white grades into dull white, barely if at all tinged yellowish or gold (*medius*), or into bright whitish gold (*caucasicus*) on upper abdomen. Lower abdomen and undertail coverts pink or dull pinkish red in *medius*, much more red in *caucasicus*. Markings below are restricted to sides of breast and (streaks) abdomen, except that black streaking sometimes pervades the breast-abdomen juncture across the center of the body.
Sexual features: Sexes almost alike in color, usually indistinguishable in field, but male has bright red crown and nape, whereas the female shows less bright, pinker red overall on the crown and a fading of the red to orange or even yellowish (in extreme cases, under good observational conditions, such females may be sexually identifiable in the field) on the nape, almost forming a separate nape patch. Immatures have much reduced patch on abdomen, the red replaced by pale pink, or even mostly white in some birds; browner dorsally, especially back of head; ventrally grayer, less yellow toned with paler but more extensive streaks on sides and flanks and often with cross-barring on breast and sides; and, white patch on wings often spotted or barred brownish black. Males have a fully red central crown area; females show paler (pinker), less extensive red on center of crown. Eyes chestnut brown in adults, dull grayish brown in juveniles. Legs and feet grayish green to olive-green. Bill dark bluish gray throughout or paler at base.

Distribution and Habitat. Occurs from France and, uncommonly, northwestern Spain, Belgium, Netherlands, Denmark, and southern Sweden, through central and southeastern Europe, Asia Minor, the Caucasus of Russia, Transcaucasia, northern Iran, and, disjunctly, southwestern Iran. It is uncertain whether contact occurs between Turkey and northern Iran populations. Normally resident below 3000 feet but reaches higher elevations sporadically where the habitat is suitable; occurs up to 7500 feet in southwestern Iran. Frequents deciduous woodlands, especially forests with old trees (abundant in such places as Schoenbrun Palace grounds near Vienna), that is, old oak forests, oak-hornbeam woods, and mixed woods in lowlands. Its range coincides with the eastern limits of lime trees (Tilia), beeches (Fagus), and sessile-capped oaks (Quercus sessiliflora) and with the western and northern limits of hornbeam (Carpillus betulus) and ash (Fraxinus excelsior). It has moved into Denmark and southern Sweden recently. Most frequently the Middle Spotted Woodpecker is associated with rough-barked, dense-foliaged trees. Competition with P. major and P. minor probably occurs subtly; where absent, its place is taken by those species.

Foraging Habits. Taps occasionally and audibly as it progresses, but mainly gleans and probes for insects, often in rough-barked trees. Rarely does it perch in the open, rather seeking dense-foliaged trees where it is inconspicuous. It does not go after flying insects so much as P. major, but uses its rather weak, pointed bill and short tongue (Blume, 1968) in glean- ing. Its diet of ants and weevils, and other surface insects, gives no indication of subsurface excavating or deep tapping. It uses trunk and major branches, as well as branchlets and the foliage of trees, frequently hanging on outer twigs in the manner of a tit (Parus) and perching crosswise on branchlets between movements. In winter, pine seeds are taken in some areas (Switzerland [Blume, 1968]). In feeding young, it secures food items (ants, beetles) entirely by gleaning. It methodically covers trees from bottom to top, pausing frequently at rough or broken places in the bark.

Voice. Does not drum as such, but does tap loudly at its nest cavity, which seems to attract its mate to the site (Winkler, personal comm.). Sporadic references to drumming in this species probably refer to this tapping. Drumming seems to be replaced by Kweek Calls (see discussion following). The call note is a dry, not very loud nor frequent Peek Call, a short "peek," "pit," or "djüg" (Blume, 1968), which in high intensity resembles the Kix Call of P. major. The Peek is a single note but often is run together in series. It is somewhat like the call of P. darjellensis, peaking at 1.6 or 1.7 kilohertz, with a very strong, dominant first harmonic tone (3.4 kilohertz); but it is longer (0.039 second in duration) with a clear introductory element (Winkler and Short, 1978). It is employed all year as a contact note or low-intensity aggressive note, but it is not very frequently uttered. The Scolding Call is a
regular series of peaked notes with strong overtones, having a fundamental tone peak of 1.8 kilohertz, given as an alarm call. The notes are shorter than call notes and are more rapidly given than in series of call notes, but each has an introductory element as in call notes. Short Rattle Calls commonly are heard and begin with a high-pitched note followed by several others. These are heard throughout the year and are indistinguishable from Rattle Calls except by duration and number of notes, the variation being great. Rattle Calls are series of call-notelike notes pitched at 1.2 to 2.1 kilohertz, with a high-pitched introductory note (at 2.1 to 2.2 kilohertz). Its tempo and duration are very variable, but the call generally sounds like “kik kekekeke” or “kyek-yeke-kye” (Winkler and Short, personal observ.). This is a frequent, aggressive call, given throughout the year. A rare call sometimes uttered, and in need of study, is the Mistle Thrush Call, a sort of vocal, drumminglike rattle, mechanical-sounding (see Feindt, 1956; discussed by Winkler and Short, 1978). The most characteristic vocalization, largely restricted to the breeding period (March, or less commonly January, to May) is the Kweek Call or Quack Call (Blume, 1968; Winkler and Short, 1978), a series of up to 20 notes (usually four to six) sounding like “gāh–gāh” or “kwaa-kwaa,” with a screaming quality reminiscent of calls of melanerpine woodpeckers (personal observ.). Occasionally given as single notes, the call has notes 0.033 second in duration with about 0.075 second between them and a pitch of about 1.6 kilohertz (0.8 to 2.3 kilohertz in different calls, there being little variation within a given call). Often a Rattle Call follows the Kweek Call, which is the so-called pairing call uttered mainly by males. It is a major spring bird sound in areas occupied by _P. medius_. The notes basically are very long, inverted U-shaped notes that have assumed a horizontal form sonographically, and overtones are prominent. It is directed at another bird, usually the mate, near the nest or at the approach or withdrawal of a conspecific bird. Wad Calls are the common “intimate” calls, given at nest relief, during flights of the male over its mate, and during displays of individuals close together. There are variants, including a “tu-a, tewk, tewk, tewk” and a “ra-ra-ra-ra.” They include banded, tall notes that form the Wicka Calls of other picids. Young birds give long Chirp Calls, notes of which are three parted (noisy element, peaked element, short noisy element). In the late nesting stage these become Loud Chirp Calls, more intense and squeaklike. The Squeak Call is another call of juveniles, also a vertical, inverted note series, the notes being rather long and loud, at 1.6 kilohertz, lasting about 0.077 second, with 0.187 second between notes. These commonly are given when the advanced nestlings are being fed by adults. A shrieking Distress Call, as in a bird captured by a human, is about 0.4 second in duration, with a pitch of 1.7 kilohertz (Winkler and Short, 1978), noisy with many overtones.

Displays. Displays of the Middle Spotted Woodpecker have not been well documented. There is a Crest Raising Display, the birds raising the feathers on the head during an encounter, either agonistic or with the mate, as prior to copulation. Tail Spreading Displays are common, although the tail is not often fully spread, during aggressive encounters. Wing Flicking Displays are seen in aggressive encounters, especially in the dominant bird. The wings are rapidly raised, then lowered again. A trembling form of Wing Flicking by the male may precede copulation (Blume, 1968). Wing Spreading Displays are commonly seen during agonistic encounters, particularly in the bird being attacked. Wing Spreading exhibits the white wing patches in a showy display. Bill Directing Displays by aggressive birds involve leaning forward and thrusting the bill toward an opponent or, in a less aggressive, more submissive context, by the bill’s being raised toward the vertical (away from the antagonist). Head Swinging Displays are uncommon, active Bill Directing movements being used more
frequently; swinging is much less frequent than in sympatric *P. major*. Attacking individuals have the head lowered, near the horizontal, bill thrust forward, tail half spread, and wings flicking. There usually are no vocalizations during intense encounters, with frequent attacks. (See Breeding section for Open Bill Touching Display.)

**Interspecific Interactions.** *Picoides major* does not respond to calls of *P. medius* but does frequently react to its presence, and vice versa. The larger *major* was observed on several occasions chasing a *medius* from a tree in which both had foraged. On one occasion a *medius* feeding in a cluster of dead leaves slipped from its perch and flapped its wings as it sought to grasp the twigs. As it righted itself, a male *major*, attracted to it visually from two trees away, flew toward it. The *medius* responded by lowering its head and Bill Directing. The *major* landed nearby, *medius* moved to the same branch on which the *major* was perched, then a second male *major* flew in, calling. The *medius*, now perched between the two Great Spotted Woodpeckers, hastily moved off to one side as the original *major* moved by (supplanting the *medius*) and tapped several times as it advanced toward the other *major*. In contrast to the lack of response of *major* to calls of *medius*, I saw three instances of Green Woodpeckers (*Picus viridis*) responding mildly to Kweek-calling *Picoides medius*, by dropping from flight to perch nearby after hearing the call and by flying up from the ground to investigate the calling bird.

**Breeding.** Pair formation commences from January onward in Europe, with Kweek Calling pronounced, especially in March and April. This activity is not associated with nesting sites, or roosting trees, but most Kweek-calling birds have a cavity available or begun (Blume, 1968). The territory may be of 40 to 60 hectares but often is loosely defined; feeding areas of different pairs can overlap, for birds may nest in a garden or other site removed from the feeding area, to which they fly, often across open country. Chases mark the mating period. Copulation may occur without ceremony, often outside the territory, but it can involve some or all of these actions roughly in this sequence: (1) exaggerated rapid movements of male and female, followed by slow movements; (2) climbing about a tree in each other's presence, again in rapid then slow movements; (3) short to long quiescent periods near each other; (4) simultaneous new movement after a joint quiet period; (5) drooping of the female's wings; (6) trembling of the male's wings; (7) female flying to a horizontal branch; (8) male following her; (9) both moving together along the branch; (10) both ruffling the crown feathers, erecting them; (11) Open-Bill Touching Display, with bill held open – the two birds touch bills; (12) female crouches with tail spread; (13) male glides, circles, drags itself around female, then mounts her; and (14) male leaves (Blume, 1968). The nest is mainly excavated in oaks but also in beeches, birches, alders, willows, and rarely conifers or fruit trees. Occasionally a nesting box placed out by humans is used, and sometimes an old cavity is used again for nesting, although some effort usually is put into beginning a new cavity first. The nest is in the trunk or a branch at 12 to 30 meters up but sometimes is placed lower, to 1 meter. Up to 20 days may be spent in excavating. Usually the male performs most of the labor, with intermittent periods in which both sexes excavate alternately in short shifts. Up to 15 days may pass after completion of the nest until the first egg is laid. Usually five, sometimes six, rarely seven or eight eggs are laid, mainly in the morning. The male remains in the nest from about the time the fourth egg is laid (Ruge, 1971b). Incubation commences after the last egg is laid; the male incubates at night and the sexes alternate about equally (Ruge, 1971b) or the male does a majority of the incubating during the day (Blume, 1968). All eggs hatch almost simultaneously after 12 days of incubation. Brooding is in brief spurts, up to 14 minutes according to Blume (1968), but Ruge (1971b) gave 3 to
74 minutes as the range. Both sexes carry insects, usually crammed in and protruding from the bill, to feed the young. Feeding is at a maximum at 8 to 9 in the morning; there are long pauses around midday. Most food is obtained nearby from leaves and branches (ants, beetles). Fecal sacs are removed by both adults until at least 14 and up to 20 days (Ruge, 1971b). If both adults arrive at the nest simultaneously, the female waits while the male feeds the young. The male remains in the nest with the young at night until at least the fourteenth day, at which time the nestlings begin to take food at the nest entrance. Fledging occurs in 22 to 25 days. The young follow the parents about for 10 or 11 days, then shift for themselves. They may remain in the territory until the following March, or, more usually, they leave the area soon after becoming independent, or by fall. Juveniles date from May to late August, by which time they nearly have acquired their adult plumage. Molt takes place from July through late September or early October.

Taxonomy. Related to the P. macei complex and probably representing, with P. leucotos, an old northern Eurasian radiation of Picoides. There is rather weak racial variation in P. medius. I follow Vaurie (1959b) in recognizing three subspecies, the most one can possibly define formally. There is a rather duller European population that shows slightly increased color saturation in Spain ("illianae") and a similar increase southeastwardly in Europe ("splendidior") toward the race caucasicus (Caucasus, northern Iran, Transcaucasia, Turkey). The latter form is slightly (3 percent) shorter winged, shorter tailed, and shorter billed than nominate medius; it is more contrastingly colored below; the undertail red is brighter red (less pink); the ventral streaks are broader; the yellow ventral tinge is stronger; and the outer tail feathers are more barred. The southwestern Iranian population, sanctijohannis, shows a reversal of the eastward cline of increasing saturation, being somewhat paler than caucasicus; it is smaller than both of the other races (by 8 percent in wing length, 10 percent in tail length from medius, somewhat less from caucasicus) but has a bill averaging longer than either; and its tail is proportionately shorter (tail/wing ratio 6 percent less than either of the others).

Reference

WHITE-BACKED WOODPECKER

_Picoides leucotos_

Color Plate 47

Range Summary. Northern Eurasia.

Diagnostic Features. Small (insula)ri to Medium (other races), 85 to 158 grams (92 to 158 grams in one Chinese population of leucotos); wing length 126 to 160 millimeters. Streaked below with black mark on each side of breast connecting with malar stripe and back, but usually not with crown. Lower breast and abdomen reddish pink. Wings barred strongly to weakly with white. Upper back black; lower back and rump vary from unmarked white to barred, and even to almost entirely black. White to buffy patch on side of neck to ear coverts, lores, nasal tufts, and forehead. Crown red in male, black in female.

Description. Bill long, slightly curved along culmen, broad across nostrils, and chisel-tipped. Black back connects with black of nape and hindneck and with patch on sides of breast; lower back and upper rump white or mainly white with few narrow bars (leucotos, "uralensis," subcirris), barred (most races), or black with a few scattered, narrow white spot-bars (owstoni).
Lower rump and uppertail coverts black. Wings black with variable white markings; primaries and secondaries broadly barred, a bar on lesser coverts especially broad and patchlike in leucotos, “uralensis,” and subcirris; bars moderate with reduced patchlike mark in most races; and bars very narrow with no patchlike mark in “quelpartensis,” namiyei, owstoni, and insularis. Inner secondaries with confluent white bars enhancing white of back patch in “uralensis.” Underwings gray-black with white bars. Shafts black above, paling to white at bases (but mainly white in inner secondaries of “uralensis”), white in outer rectrices of most races (less so in dark fohkiensis, owstoni, insularis); below gray to black, shifting to white at tips of wing feathers, also white at base of tail feathers and in outer rectrices of most races (except the dark forms just mentioned). Tail black, entirely so on first and second pair, white bars at tip of third pair; fourth and fifth pair white with black bars in most races, evenly barred black and white or black with white bars in owstoni and insularis. Tail/wing ratio 0.57 to 0.69. Hindneck black; black above eye anteriorly, separating pale eye stripe to its rear from pale loral area. Nasal tufts buffy and black; lores and forehead dull white to buff. Line behind eye, area under eye, ear coverts, and sides of neck white to buff, often with darker (buff) mark in center of ear coverts. Black malar broadens posteriorly into large patch that extends onto sides of breast and sends a usually small projection partway upward between ear coverts and sides of neck; this black projection reaches the nape in some owstoni, separating sideneck and ear covert patches. Throat white or creamy white (leucotos, lilfordi, “uralensis,” subcirris, takahashii, “quelpartensis,”) or buffy white (namiyei, fohkiensis, stejnegeri, insularis) or buff (owstoni). Black mark on sides of breast, giving way posteriorly to streaks at sides of lower breast and flanks. The black breast marks are more extensive in lilfordi, subcirris, and stejnegeri; still more extensive in takahashii, “quelpartensis,” insularis, and namiyei; very extensive in fohkiensis; and the breast is almost entirely black in owstoni. A white to buff (see throat, just described) area extends from throat to center of breast, between breast marks, but this area is nearly obliterated on the breast of fohkiensis and owstoni by the enlarged black breast marks. Ventral streaks are correlated closely with the extent of the breast marks, being proportionately broader and extending over center of lower breast in the blacker forms, the breast and sides being mainly black in owstoni and fohkiensis. Undertail coverts, abdomen, and rear of breast reddish pink, most red posteriorly, paler anteriorly; streaks usually weak in center of abdomen and lacking on undertail coverts, but moderate to weak on flanks.

Sexual features: Males about 10 percent heavier than females, slightly (0 to 3 percent) longer winged, with a tail of about the same length but proportionately slightly greater in females, and male bill 5 to 9 percent longer. Male has red crown patch (anterior crown to front of nape), although feathers have black on shafts and across vanes in feather center below red tip, such that black “spotting” often is evident. Females lack red on black crown, although winter, presumably subadult females may retain a few red-tipped juvenile feathers at least until that time. Immatures show less contrasting ventral black markings and a pinker, less red abdominal patch; both sexes have red on the crown, males less so than in adult males, and females still less red than in juvenile males. Eyes brown; legs and feet dark gray; bill slaty, gray, or blue-gray.

Distribution and Habitat. Deciduous and mixed woods from Scandinavia, Germany, and Austria, east across Russia to the Sea of Okhotsk, and the Japanese Islands; south to south-central Europe, the Caucasus, and northern China; and, with isolated populations in the Pyrenees, in western Szechwan, in northern Fukien, on Taiwan, on several Ryukyu Islands, and in the Kamchatka Peninsula. It occurs from sea level in the north to 1100 meters in the
Pyrenees and elsewhere in Europe and to 1700 meters in the Caucasus. Mixed forests including silver fir, beech, birch, ash, oak, aspen, pine, or some mixture of these are favored so long as dead wood is abundant; typically the species is found where there are windfalls, topped trees, and many rotten trunks and branches. The species is partly migratory or nomadic in winter in the northernmost parts of its range.

**Foraging Habits.** Feeding often takes place in standing or fallen, rotten trees and stumps at low levels in the forest. The woodpeckers hack away at well-rotted wood, often opening gaping holes that may accommodate most or all of the bird’s body. This “soft excavating” enables them to secure many larvae of longicorn beetles (*Rhopium*), as well as ants and some other larvae (Blume, 1968). Some gleaning and tapping also is accomplished on the trunks and branches of live trees (but dependency is upon well-rotted wood for at least part of the year). Trees utilized in Hungary include beech (*Fagus sylvatica*), an elm (*Ulmus scabra*), ash (*Fraxinus excelsior*), tilden (*Tilia platyphyllos*), hornbeam (*Carpinus betulus*), and oaks (*Quercus*) (Bankovics, 1973). Some foraging is by stripping of bark from rotten trees to get at the insects beneath the bark. Rather few surface insects are taken, but craneflies have been noted in the diet. Tipulid flies and perhaps other insects occasionally are taken on the wing by flycatching White-backs (Ruge and Weber, 1974a). Hazelnuts, acorns, and various berries are eaten late in the summer and fall. This species forages singly or in pairs. Movements of the birds are slower than those of *P. major*, and “in the heavy northern forests (of Japan) it seems less shy” than *major* (Austin and Kuroda, 1953).

**Voice.** Drums loudly in long bursts of 1 to 2.2 seconds. The bursts generally longer than those of any sympatric congener. There is an increased tempo through the burst, from 15 to 19 beats per second in the initial part to 22 to 25 beats per second (about a 35 to 40 percent increase in tempo). Bursts usually contain 30 to 40 beats. Drumming is used in territorial proclamation and also when birds are disturbed at the nest. The call note is a low Peek Call (a “peek,” “keek,” “kiük,” or “kük” sound), remarkably soft for the size of the bird. Sometimes it is uttered as a double note (“kiükkiük”; Blume, 1968, p. 86). The basic note is symmetrical in form sonographically, with a main peak at 1.8 kilohertz (fundamental tone, several overtones receive moderate emphasis) and lasting 0.023 to 0.034 second. They are uncommon, being uttered mainly when adults are disturbed near or at the nest. At such times the call notes are given singly or more commonly in series, the Scolding Call. This contains a few to many call-note elements, irregular in pitch and form. The notes generally are pitched low, at 1.6 kilohertz. The Rattle Call also is uncommon, as it is rarely reported, perhaps as a “Kkkkkkk” noted by Blume (1968, p. 86), although that could refer to the Short Rattle (Winkler and Short, 1978) given by nesting *leucotos*. Both calls are in need of study. Chirp Calls and Loud Chirp Calls are given by young White-backed Woodpeckers; the Chirp is very much like the call note, given in series, serving as a begging call, whereas the Loud Chirp is louder, with longer, noisy elements. The Loud Chirp Call is uttered by nestlings when they are fed. The Squeak Call is a long-noted (0.084 second) series call given by birds that have fledged or are about to do so, when begging or being fed. Probably an advanced form of Chirp Call, its notes are like those of a Loud Chirp but are fully formed, long, and inverted U shaped (Winkler and Short, 1978). The Kweek Call has been noted by placing dummy birds near a nest (Blume, et al., 1975). The notes average 0.17 second in duration, with a vertical element, a low-pitched squeaking element, then an inverted U-shaped element peaking at 1.8 kilohertz. A series of such notes forms the call, which may lead to notes like Wad or Twitter calls. Presumably Kweek Calls function in aggressive interactions. A Distress Trill was noted in nestlings, probably when attacked by siblings in the...
nest. A Distress Call heard by Winkler (Winkler and Short, 1978) during handling of an adult female was like that call of *P. major*. Notes of such a call published on the record by Blume, et al. are 0.28 second long, with a pitch of 0.75 kilohertz. Finally, the record of Blume, et al. (1975) contains a Wickalike call ("krek-ta-wit, ta-wit, ta-wit") and a Tewk Call-like "tu-tu-tu-tu-tu-tu-tu-tu-tu—" that require study.

**Interspecific Interactions.** Virkkunen (1967) discussed interactions between wintering *P. leucotos* and *P. major* in Finland. That author found that at least some White-backed Woodpeckers fled in the direction opposite that of calling Great Spotted Woodpeckers, the latter being smaller than *leucotos*, and that encounters invariably led to driving away of *leucotos* by *major*. These casual observations suggest that *major* is strongly territorial in fall and winter, and *leucotos* so much less so as to cause it to flee from aggressive birds of the related species. A hybrid of *leucotos X major* in the Stockholm Museum, taken in December 1950 at Vastmanland, Kopingstrakten, Sweden (see discussion following), clearly attests to their interactions.

**Breeding.** Nesting takes place rather early, earlier than in sympatric *P. major*; that is, in March through May through most if not all of its range. Young out of the nest are known from April on Taiwan and May to July (juvenal plumage to September) elsewhere. The nest is excavated rather low, up to 10 meters, in a rotten tree or stub; usually the nesting tree is fungus ridden, and the stub sometimes is so rotten that it may be broken during storms, resulting in loss of the brood. Trees selected include beech, birch, ash, maples, and less commonly oaks, Scotch pine, and aspen. The nest is situated diversely within a territory of about 200 hectares. Almost nothing is known of pair formation and courtship. Copulation may follow drumming bouts by the male and female, with no other observable ceremony. About 15 days is the incubation period. Both adults incubate, the daily cycle being up to 4.5 hours per bird. There is not much brooding of the young after hatching. Adults move sometimes as far as 1500 meters from the nest for food, but more usually they find it within 200 to 300 meters of the nest (Blume, 1968; Bankovics, 1973). Feeding intervals are greater than in *P. major*, ranging from a maximum in the morning of 12, to a minimum of once an hour in the early afternoon (Blume, 1968). There appears to be variation in attentiveness, as Blume indicated about equal participation in feeding; and Bankovics reported the female feeding 23 times in just over 5 hours, whereas the male fed but nine times. Brooding occurs regularly, if sparsely, up to about 7 days of age. Fecal sacs are carried far from the nest before they are discarded. The nestlings fledge in 27 or 28 days, reaching a weight of 80 grams at 17 days after hatching, this weight being that at which they are fledged. After achieving independence from the adults, the young birds (and probably some adults) wander about until the next breeding season. Some adults retain the nesting cavity as a roosting hole after breeding ceases for the year. The annual molt occurs from July to September or early October in all parts of the range.

**Taxonomy.** Related distantly to the *P. major* complex, and perhaps more closely to *P. medius*. A hybrid of *leucotos X major*, mentioned earlier, is an adult male with rather short wings and tail (in range of those of *major*, extremely short for *leucotos*), but a bill and tarsi considerably longer than in Swedish *major*. The specimen is intermediate in crown color, bill shape, and color of the lower back; it resembles *major* in the red of its undertail area and the barring of the outer tail, and it approaches *major* in its wing patch condition and color and pattern of the underparts; the black on the back is not connected with the crown, as in *leucotos*. Nearly 20 subspecies have been described, of which I feel that 10 merit formal
Picoides leucotos

recognition. The nominate race occupies Europe (except for the southeast), northern and central Russia, Siberia east to Kamchatka, and the Sea of Okhotsk, Sakhalin, Korea, and northern China. Included as synonyms are ussuriensis of southeastern Siberia, voznesenskii of Kamchatka, sinicus of northern China, and saghalinensis of Sakhalin, all so synonymized by Vaurie (1959b), and uralensis of the Ural Mountain region. I cannot see the point of splitting leucotos into two widely separated subpopulations by recognizing “uralensis” interposed between them, as Vaurie and many authors do, preferring to state simply that birds of the southern Ural Mountains and western Siberia are more white and less streaked below than other populations, and they tend to be slightly larger and longer billed. Birds of the Amur River region too are longer billed than European birds, but the difference, as in the case of “uralensis,” is only of the order of 5 to 7 percent (as Vaurie noted, some “ussuriensis” match “uralensis” in color). There is thus a somewhat variable, but essentially similar series of northern Eurasian populations meriting recognition as a single race, leucotos. Yugoslavia, the Balkans generally, the Pyrenees, Corsica (extinct), Asia Minor, and Caucasian and Transcaucasian Russia form the range of barred-rumped uralensis, which also differs from white-rumped leucotos in its heavy black streaking ventrally, its paler, pinker undertail area, and its blacker-barred tail. It is but a trifle larger than European P. l. leucotos. Japanese populations show a cline of decreasing size (the cline is slight, 5 percent at extremes) and increasing saturation of color southwardly. Northern birds, on Hokkaido, resemble leucotos in paleness, in having a white rump, and in the amount of black on the tail, being slightly larger in size; but they are buffy toned and less white, the mark on the side of the neck is larger, and they are pinker, less red under the tail. This northern Japanese race, subcirris, is replaced on northern (to central) Honshu by stejnegeri, a very slightly smaller form that is darker (buffer, blacker), with some barring on the rump area, redder under the tail, with a stronger black mark on the side of the head joining the breast streakings, and showing reduction of the white wing patch (patch reduced to a wing bar). The southern Japanese namiyei of southern Honshu, Kyushu, and Shikoku, as well as the Quelpart Islands (birds from Quelpart Islands, usually treated racially as “quelpartensis,” are a trifle whiter than typical namiyei, but differ in no other way) is still redder under the tail, blacker on the breast and back, buffer (especially on the ear coverts), with heavier ventral streaking, a fully barred (broad bars) lower back, and narrower white wing bars. A population (takahasii) on Dagelet Island, off Japan, is near stejnegeri in its reduced wing patch and blackness dorsally, but it is 7 percent shorter winged and shorter billed, with whiter underparts and face. The largest and darkest of all races, owstoni, occupies Amami Island in the northern Ryukyu Island chain; this form has the rump all black (white spotted in some birds) and the breast almost all black in a patch with broad black streaks extending from it posteriorly; the white wing bars and tail bars are very narrow, and the throat and ear coverts are whitish buff. I have seen only one juvenile of tangi, a race isolated in Szechwan, nearest fohkiensis in color but supposedly larger and less black with an incomplete breast band. Southeastern Chinese (Fukien) fohkiensis shows a small area of white on the lower back and is less black than owstoni, but it approaches that form in darkness more than all other races (it is smaller, is whiter on the throat, and has less extensive black on the breast than owstoni); it is heavily streaked below and approaches insularis in general color, but is larger (10 percent longer wings) and blacker (about between insularis and owstoni). Finally, Taiwan is occupied by insularis, the smallest subspecies. This form has the wing barring reduced as in namiyei and fohkiensis; it resembles namiyei in its moderate black ventral streaking and the buff tone of its ventral white, but the lower back is whiter (it is much smaller than namiyei).
HIMALAYAN WOODPECKER

Picoides [major] himalayensis

Color Plate 48


Diagnostic Features. Small, 57 to 85 grams, wing length 125 to 135 millimeters. All black above, unmarked buffy brown to grayish white below with red lower abdomen and undertail coverts and large white wing patch. Males have entirely red crown. Pale anterior forehead, face patch, separated by black bar from pale side of neck. Black malar and lower side of neck. White bars in wings, outer tail feather white with black bars.

Description. Bill long, barely curved along culmen, broad across nostrils, chisel-tipped. Entirely black from hindneck down back to uppertail coverts. Wings black with white spots, bars in flight feathers and large white patch on inner coverts near base of wing; underwing gray-black with white bars. Shafts black above with white lateral streak at base of tail; below, gray-brown to black, paling almost to white at base of primaries and white at least in white parts of outer tail. Tail black throughout inner two pairs, all but tip of third pair, and at bases of outer two pairs; tip of third pair with white bars, fourth pair barred white toward tip, more so on outer vane, and fifth pair white and black on outer half of feather (amount of white and black varies, sometimes black bars very reduced and tips of fourth and fifth pairs mainly white); duller below. Tail/wing ratio 0.58 to 0.70. Black on lower hindneck, extending around edge of crown to upper forehead, which is black (occasionally spotted white), and connecting behind ear coverts with black mark formed from malar area and its continuation and enlargement onto side of breast. Nasal tufts black and white; anterior forehead white (albescens) or buff (himalayensis), connecting with buffy white to white lores, area under eye, and ear coverts; separate buffy or white patch on side of neck. Chin and throat grayish white (albescens) to buff (himalayensis). Underparts unmarked except for black patch on each side of breast (occasionally there are a few black streaks on sides); breast grayish white in albescens, buffy or grayish brown in himalayensis, posteriorly becoming yellowish buff on anterior abdomen (lower breast often stained yellow-brown), then giving way to red lower abdomen and undertail coverts.

Sexual features: Males about 16 percent heavier than females, with wings 3 percent longer, the tail a trifle longer (hence, proportionately, female has 2 percent longer tail), and a 19 percent longer bill. Males with red crown to anterior nape, the gray and black bases often showing through; females have crown black, lacking red. Immatures duller (browner) black than adults and show weak streaking on sides and moderate barring on flanks (breast shows weak barring in some, reminiscent of P. hypertythus). Undertail area is smaller and pink, not red. The black portion of forehead is spotted with white. Both sexes show red in the crown, more so in males, but the red is more orange in tone than is that of adult males. Eyes reddish brown; legs and feet gray, slaty, dull green, or greenish brown; bill blackish above and paler below (gray) with dark edges.

Distribution and Habitat. Ranges from northeastern Afghanistan eastward across Kashmir and northeastern Pakistan, along the Himalayas of northwestern India east to western Nepal. It occurs between 1000 and 3300 meters but moves downward to below 2000 meters in the

Reference
winter (Ali and Ripley, 1970). It frequents rather dense forests of oaks, rhododendrons, chestnuts, and firs, including deodar trees, as well as occupying some orchards (walnuts [Paludan, 1959]). The altitudinal range of this picid generally is above that of P. auriceps and P. macei.

Foraging Habits. Forages mainly on trunks and major branches of oaks and other trees, tapping, gleaning, probing, and excavating, as well as tossing aside moss and lichens along branches and picking insects from the debris thus uncovered. Beetle larvae make up much of its food. It also seasonally eats seeds of conifers, such as chir pines (*Pinus longifolia*), wedging the cones in crotches of trees and then hacking them open with the bill (Ali and Ripley, 1970), and walnuts, hazelnuts, acorns, fruits, and berries. Ali and Ripley also reported (1970, p. 216) that the Himalayan Woodpecker excavates rows of “neat small holes in parallel rings round the stems of medium-sized trees, a few centimeters apart,” presumably to obtain sap. This needs verification (especially the parallel rows of neat holes), as *P. hyperythrus* is known to be responsible for such sapsucking endeavors, although *P. major*, closely related to *P. himalayensis*, also excavates holes for sapsucking.

Voice. Both sexes drum during the pair-formation and nesting period. Vocalizations reported include a call note, “a loud *kip* or *keep*, like *P. auriceps* but lower, deeper and louder, resembling the call note of *P. villosus*” (B. King, in litt.) and “a persevering *tri-tri-tri-tri-tri*” (two birds calling each other, one with a powerful voice, the other a weaker voice [Paludan, 1959, p. 139]). The call note was recorded on tape at a nest by G. Thielcke and has been studied by Winkler (Winkler and Short, 1978); it is a peaked note with slight asymmetry, resembling that of *P. syriacus*, with the fundamental tone peak at 3.0 kilohertz and being 0.028 second in duration. The other call referred to may represent a Rattle Call or, less likely, a series of call notes.

Breeding. Nesting occurs in April and May, the nest being excavated in a trunk or branch (often on the underside), up to 15 meters above the ground. Pine, cherry, apricot, oak, willow, and chestnut, especially the last (Ali and Ripley, 1970), are the trees used for the nest. Both adults excavate the hole. The eggs number three to five, mainly four. Both adults incubate the eggs and feed and brood the young. The incubation period is unknown, as are other details of nesting. Young just out of the nest date from May to June, and juvénal-plumaged birds are found through August. The molt occurs from July through September.

Taxonomy. Forms a superspecies with *P. assimilis*, *P. leucopterus*, *P. syriacus*, and *P. major*. There are two subspecies, nominate *himalayensis* of western Nepal and adjacent northwestern India and *albescens* of Himachal Pradesh, India, west to northeastern Afghanistan. The nominate race is proportionately longer tailed and considerably darker, especially on the underparts, as well as having smaller white tail bars.

Reference

SIND WOODPECKER

*Picoides [major] assimilis*

Color Plate 48

Range Summary. Southwestern Asia.

Diagnostic Features. Little to Small, 42 to 64 grams, wing length 114 to 126 millimeters.
All black above; white below with white wing patch, white sides of head, black malar area. Male has entirely red crown; red of undertail area extends forward in pinkish wash onto anterior abdomen and lower breast. Wings barred, outer tail tips white with black bars.

**Description.** Bill moderately long, broad across nostrils, slightly chisel-tipped, almost straight along culmen. Black to brownish black above from hindneck to uppertail coverts. Wings mainly black (often faded to brown at tips) with white bars on flight feathers, white bend of wing, and large white patch across coverts; underwings gray-black and white barred, coverts pure white. Shafts black above, gray at base of tail; below, brown with white shaft streak, except white in white areas of outer tail. Tail black on inner three pairs; outer two pairs have distal half or less white with narrow black bars (rarely mainly black); undertail brownish black with white bars. Tail/wing ratio 0.59 to 0.66. Entire forehead, lores, line over eye, ear coverts, under eye, and posteriorly to sides of neck are white, usually stained or colored buffy on anterior forehead and lores; ear coverts sometimes with buffy gray center; black on sides of crown reaches eye above it anteriorly. Hindneck black, reaching onto back. Malar area black, broadening to form "yoke" rearward, incomplete branch dorsally in direction of crown, and posterior "bar" to wings. Throat and chin white, often stained or colored buffy. Underparts unmarked except for few black flank streaks and black on sides of breast, otherwise white or slightly grayish or buffy white, except red patch on undertail coverts and abdomen, paling to pink as it extends anteriorly onto front of abdomen and rear of breast.

**Sexual features:** Females a trifle larger (1 to 2.5 percent longer wing and tail), tail proportionately longer, but male has 12 percent longer bill. Males have entire crown and nape red (tips of feathers red, with black, then gray toward base, the black and gray often showing through the red in spotting effect). Females lack red on crown, the crown being black, blacker in fact than the rest of the upperparts. Immatures have white areas tinged buffy and dorsally are browner and duller in tone; the abdomen is paler, pink in color, not red. Both sexes show red on the crown, less so in females, and the red does not reach the nape as it does in adults. Eyes reddish brown or brown. Legs and feet grayish. Bill slaty or gray, paler on lower bill.

**Distribution and Habitat.** Occurs from southeastern Iran east through Pakistan to Sind. It favors woods in dry situations, such as tamarisks, ker trees, babool trees, and desert scrub, but also is found in gardens and in irrigated tree plantations such as mulberries. Generally this woodpecker exists at low elevations, but it occurs to 1600 meters in the Salt Range and at about 2200 meters in Baluchistan, Pakistan (Ali and Ripley, 1970). It is sympatric with its close relative *P. syriacus* in parts of Iran.

**Foraging Habits.** Little known. Feeds on ants, termites, and beetle larvae, taken by glean- ing and tapping at trunks and branches of (usually low) trees in dry areas. According to Ali and Ripley (1970, p. 215), it is "partial to seeking food near the ground on fallen trees and branches, euphorbia stems, wooden stakes, fenceposts and the like."

**Voice.** Ali and Ripley (1970, p. 215) cite vocalizations that appear to represent a Rattle Call ("tr-r-r-r"); and a Kweek or Wicka Call ("Toi-whit, toi-whit"). They also stated that "in the breeding season, especially, both sexes drum in intermittent bursts at frequent intervals on a selected rotten branch."

**Breeding.** Nests during March and April, with juvenile birds known from late April through August. The nest is excavated, presumably by both adults, at 1 to 4 meters up a tree such as babool, kandi (*Prosopis*), *Salvadora persica*, or tamarisk. The clutch is three or four eggs.
Nothing else is known of its nesting (Ali and Ripley, 1970). Molt occurs from July through September.

**Taxonomy.** Forms a superspecies with *P. himalayensis, P. syriacus, P. leucopterus,* and *P. major.* It ascends high enough to meet *himalayensis,* which shares with it a fully red crown (male), but nothing is known of their potential contact situation. However, *assimilis* meets *syriacus* in eastern Iran, where sporadic hybridization occurs (Vaurie, 1959b). Of 107 adult *assimilis,* only four had wings over 120 millimeters in length; *syriacus* ranges upward from 120 millimeters in wing length. A worn adult hybrid from Minab, Iran, had wings 120 millimeters in length; this bird measures nearer *assimilis* than *syriacus,* and its tail pattern is intermediate. No subspecies of *P. assimilis* are recognized.

**SYRIAN WOODPECKER**

*Picoides [major] syriacus*

**Color Plate 48**

**Range Summary.** Western Eurasia.

**Diagnostic Features.** Small, 70 to 82 grams, wing length 120 to 132 millimeters. Black above with large white wing patch, black stripe from malar to sides of breast, white patch on side of head. Wings barred, tail sparsely barred white on outer feathers. Pinkish red undertail area, unmarked white or buffy white underparts. Male has narrow red nape patch. Compared with closely related, sympatric *P. major,* lacks the upper rear part of black facial Y mark of *major,* is pinker, less red on the abdomen, and has less white in the tail. From slightly smaller *P. assimilis,* which it meets in Iran, it is distinguished by the male’s narrow red nape patch.

**Description.** Bill barely curved along culmen, chisel-tipped, broad across nostrils, moderately long. Black from rear of nape to uppertail coverts. Wings black with white bars in flight feathers, white at bend of wing, white patch in scapular region and inner covert feathers; paler underwings, barred, with white coverts. Shafts black or brownish black above, brown below, paling to dull white at base of wing flight feathers. Tail black, tips of outer two pairs (rarely, tip of third pair from outside) variably barred white (usually one to three or rarely four bars on outer feather and one or two or rarely three bars on penultimate feather, but occasionally all these feathers are black), paler below. Tail/wing ratio 0.59 to 0.65. Nasal tufts black and white, forehead buffy white or stained brown; crown black, reaching eye at anterior upper part of eye. Lores, under eye, ear coverts, and sides of neck form single patch, variably white to buffy white. Malar area black, forming stripe that broadens to rear (onto sides of breast). Throat white or buffy white. Except for black at sides of breast, usually unmarked below (few flank streaks on several specimens), the breast to abdomen being white to buffy or grayish white, often soiled, and more often pure white in Iranian birds; rear of abdomen and undertail coverts pinkish red.

Sexual features: Males with slightly longer wings, 10 percent longer bill, but proportionately shorter (by 4 percent) tail than females; males have narrow red nape patch, lacking in black-naped females. Immatures resemble adults but are characterized by showing some red or pink in the center of the breast, red on the crown (but not the nape) in both sexes, and sparse streaking on sides of breast and flanks; also, buffer below, pink of undertail is less bright (less reddish), and upperparts browner, less black. Females usually have somewhat less red on the crown than do males; the red is mixed with black, and the patch is generally on
the anterior crown only. Eyes reddish brown to red, legs and feet dark greenish, bill black (paler below).

**Distribution and Habitat.** From eastern Austria and Czechoslovakia southeast through the Balkans to Turkey, Palestine, Syria, Iraq, western Iran, southeastern Iran, the southern Ukraine, and Transcaucasian Russia. Has gradually expanded its range northwestward into central Europe during the past century or so, hybridizing with *P. major* occasionally along the expanding front (hybridization diminished rapidly as *syriacus* became established in the newly invaded areas). The range expansion now seems to have terminated. Frequent arboreal cultivated areas (almonds, apricots, peaches, other fruit trees), vineyards with scattered trees, gardens, parks, lines of trees along roads, dry woodlands, irrigated areas with scattered trees, and desert "oases." In the European area of range expansion, *syriacus* is restricted to cultivated areas and towns, meeting the woodland-dwelling *major* only sporadically in some park situations. Elsewhere, *syriacus* is in drier, lower areas, and *major* is in wetter, forested situations usually at higher elevations, but *syriacus* extends into the areas favored by *major* wherever the latter is absent. In southern and southeastern Iran, sporadically meets and on occasion interbreeds with *P. assimilis* in cultivated arid areas. The elevational range of *syriacus* is not great, from sea level to about 2000 feet generally, but it occurs up to 1200 meters in the Zagros Mountains of Iran. There is some postbreeding wandering, usually westwardly, and especially of young birds.

**Foraging Habits.** Feeds mainly on fruits and nuts when these are available, even feeding raspberries, cherries, currants, and other berries to nestling woodpeckers. Also gleans for surface insects, mainly ants, small spiders, and beetles, and probably takes some beetle larvae (Winkler, personal comm.) by tapping in trees in the winter. Visits corn stalks tied in fields during the fall, taking corn-borer larva (*Pyrausta nubilialis* [Szlivka, 1960]) from the stalks. Among the fruits, nuts, and seeds eaten are mulberries, strawberries, raspberries, currants, and grapes; hemp, apple, and sunflower seeds; stones of cherries, plums, apricots, and peaches; and walnuts, beechnuts, hazelnuts, and almonds. In Yugoslavia, Stefanović (1958–59) found that Syrian Woodpeckers visit walnut trees during the summer, selecting certain trees (those in quiet sites) and testing the nuts. Green walnuts are eaten after the early stages of development. The woodpecker pecks through the outer and inner shells of such green nuts, leaving the shells hanging to the tree. As walnuts ripen, the bird opens the outer shell, releasing the walnut to the ground. The bird follows it down and opens it by tapping along the suture, forming a hole through which it extricates the nutmeat. During August and September Stefanović (1958–59) found that walnuts comprised 65 to 75 percent of the Syrian Woodpecker's diet in Yugoslavia, the birds eating two or three walnuts daily, supplemented by plum and cherry seeds, sunflower seeds, mulberries, some other seeds, and a small number of insects and spiders. Even in the breeding season the amount of fruit and nuts taken, and fed to the young, is great; and in most of its European range the Syrian Woodpecker breeds only where nuts and fruits are readily available. The woodpeckers use "anvils," suitably sized and shaped crevices in rough bark, in which to open various nuts and stones of fruits. Unlike *P. major*, *syriacus* does not maintain and adapt these anvils, but uses natural ones, abandoning them when they fill with debris. Hence, many more such sites are required by Syrian Woodpeckers. Broken stones of apricots, plums, and peaches and shells of walnuts and almonds litter the ground beneath the anvils.

**Voice.** Drumming occurs by both sexes in the spring. Males drum in longer bursts than females, as in *P. major*. Bursts vary, containing 16 to 31 beats per burst, given in 0.8 to 1.2 seconds (bursts of *P. major* contain usually 10 to 15 beats and last half a second or less
Picoides [major] syriacus

[Winkler, 1971]). There is a speedup from a rate of about 17 to about 26 notes per second (45 percent) between the initial and terminal part of the bursts. At the peak of activity, five to six bursts are given per minute. Drumming is territorial, serving as a song to repel invaders; it also probably functions in contact between mated birds (during changeover in incubation the relieved bird frequently drums [Winkler and Short, 1978]). Wing rustling sounds may be functional and seem to occur when two conspecific birds are near each other, as well as when a bird leaves a drumming post or when flushed. The call note is a Peek Call or Pug Call (Winkler and Short, 1978), a common and loud asymmetrically shaped note about 0.037 second in duration. The fundamental tone is dominant, peaking at 3.1 kilohertz, but the initial harmonic tone may be moderately strong. Given during displays, the notes may be uttered in loose series at a great rate and are shriller. The Peek Call may occur with the Rattle and Short Rattle calls and may lead into Squeak Calls. The call note is given by nestlings 10 days old and later, as well as by fledged young (which give call note — Squeak Call transitional calls frequently). A location note, and agonistic note, it can be heard throughout the year. A Scolding Call is uttered by adults disturbed at the nest. Essentially these calls contain call notes uttered in rapid series (120 to 180 per minute); a model woodpecker presented at a nest evoked such Scolding Calls and attacks. The Rattle Call of syriacus usually commences with two call notes at an interval of 0.5 to 0.8 second (omitted when several rattles are given in sequence); the first note of a call also is call notelike. Uttered in flight, especially in pursuit over the territory, after landing, and during encounters, the Rattle is less frequent than the call note and is more or less restricted to the breeding period. It functions, like drumming, as a “song.” Most Rattle Calls last less than 1.0 second. The first few notes are rather slowly delivered; then there is a speedup to a rate of 22 or so notes per second. The notes are pitched at 1.5 kilohertz, but emphasis is on the first harmonic tone. The Short Rattle Call, or Kreck Call, of syriacus is a series of fast, noisy Rattlelike notes, resembling the last (fast) part of a Rattle Call. As in that latter call, a call note is the initial note; the other notes are less sharp and clear patterned sonographically than are Rattle Call notes. The Short Rattle is given mainly in pursuit or during encounters and is an agonistic call. The Mutter Call is a short series of fast, connected, short Rattlelike notes, softer than the Short Rattle and given during encounters at close range, as during Swinging Displays. Notes are uttered at 35 to 40 or so per second; the fundamental tone peak is at about 1.0 kilohertz and overtones are well developed. The Kweek Call occurs in two types: Type I calls have inverted U-shaped notes sonographically, resembling call notes, but they are longer and lower pitched (2.5 kilohertz) with strong harmonic tones. Type II calls have peaked notes generally at a lower pitch. Both are given in series of about five or six notes, at about that rate per second (Winkler and Short, 1978). Type I notes are used in reaction to drumming and to the presence of other Syrian Woodpeckers, chiefly by the female, and during pursuits and “following flights.” The other call, Type II, is used also in chases and during encounters and is often interspersed with drumming. The latter call may combine with or show transition to Wicka Calls. The Wicka Call (Kreck Call of Ruge, 1970) is a short series of fast-falling, clicking elements, each followed by a fast-rising, whiplike element, with about six notes per second as the usual tempo. The elements of a note usually are unconnected, but may be so. An agonistic call, this vocalization occurs during attacks and engagements between antagonists at close range. The Twitter Call is a Rattlelike call (see Short, 1973d, p. 280) with notes uttered at 8 to 10 per second, given by juveniles when fighting. The Wad Call is a single-noted call delivered during changeover at the nest and when paired birds are near each other. About 0.11 second in duration, it is low pitched (0.6 kilohertz), with strong overtones. The note consists of clicking preliminary and terminal elements connected by a lower-pitched
sound. A Distress Trill of very fast notes is given by disturbed nestling woodpeckers; given at 25 notes per second, it is weak, with many harmonic tones. The Chirp Call is another vocalization of nestlings, consisting of fast, peaked notes, barely audible at any distance from the nest. These shift to Loud Chirp Calls when the parent is nearby; this call can be elicited by putting the hand over the nest entrance. With a pitch of 3.8 to 5.0 kilohertz, these calls are given at about 6 notes per second. The notes are inverted, V-shaped notes emphasized in the fundamental tone. The Squeak Call is the common fledgling call, given from late in the nestling stage onward. It grades into the call note, some shorter ones being almost indistinguishable from the Peek Call. Similar in form to the Peek Call, the Squeak Call elements are less regular, pitched at 3.3 kilohertz, and the notes are longer (0.126 second). They often are given in loose series. It is used when approached by an intruder or when approached too rapidly by the parent bird. A Screech Call is a noisilike note 0.17 second in duration, with vaguely stressed frequencies at 1.2, 2.5, and 3.4 kilohertz, given during a fight between two juveniles (Winkler and Short, 1978). Lastly, a Distress Call occurs in situations such as capture of a woodpecker by a human, when pursued by an attacking bird of some other species, or in severe fights. The call is long, with strong harmonic tones and forming a "plateau" at 1.2 kilohertz in the fundamental tone.

Displays. Displays of *P. syriacus* have not been studied in detail, and only casually are reported in papers such as those of Ruge (1969b, 1970) and Winkler (1971). Crest Raising, Wing Spreading, Swinging, and Bill Directing Displays are known to occur. Crest Raising is seen mainly in males interacting with another male, or with a female. Wing Spreading Displays, akin to those of *P. scalaris*, *P. minor*, and other species, have been associated with supplanting attacks. Aggressive encounters involve Swinging of the head and body, with the bill directed forward. Bill Directing Displays, the bill being pointed at an antagonist, are commonly seen even in juvinal *P. syriacus*.

Interspecific Interactions. Hybridization with *P. assimilis* was discussed earlier (under *assimilis*). It interacts also with closely related *P. major*, replacing the latter in drier, more cultivated situations. According to Blume (1968), Munteanu (1968, p. 354), and others, *syriacus* is dominant over *major* and physically displaces it. As *syriacus* moved from southeastern into central Europe, it largely replaced *major*, which became restricted to forests and larger, wooded parks, and thus the two species now meet infrequently during the breeding season. The movement of *syriacus* northwestward was accompanied by sporadic hybridization with *major* (Bauer, 1957); the interbreeding, however, tended to decline rapidly once *syriacus* became established, and hence a moving front of interbreeding took place. The situation has stabilized, with rare or no hybridization, as *syriacus* apparently has extended its range as far as it can (relating probably to availability of nuts and seeds in winter). The maintenance of reproductive isolation between *major* and *syriacus* was discussed by Winkler (1971). Interactions of *syriacus* with other hole-nesting species are common, especially in view of the Syrian Woodpecker's predilection for cultivated areas near human habitation. Starlings (*Sturnus vulgaris*), wrens (*T. troglodytes* [see Szlivka, 1960]) and sparrows (*Passer montanus* and *P. domesticus*) all utilize old tree cavities of *syriacus* or compete for roosting holes. Starlings often drive Syrian Woodpeckers from newly constructed nests, a major factor in the latter so frequently moving into old, unused nest sites (Szlivka, 1957). Szlivka (1960) also reported a cavity excavated by *syriacus* and taken over by *Passer montanus*; the *syriacus* pair excavated another hole just below the first and still connected to it. The sparrows nested in the base of the upper hole just above the dropping point to the chamber in which *syriacus* nested. In another instance of competition, that author related that Tree
Sparrows were driven from a roosting hole in a building by a male Syrian Woodpecker that chose to roost there.

**Breeding.** Breeding commences in March, or possibly even February (in Asia Minor); juvenal-plumaged young date from 6 April to 5 September from throughout the species' range. Copulation occurs usually in the vicinity of the nest hole, and the female often drums prior to copulation (Szlivka, 1960; Ruge, 1969b). Szlivka noted that the male calls and then the female drums; the male goes to the female and may shoo her with his feet to force her to seek a more suitable (horizontal branch) site before mounting her. Either sex may select the actual site of the nest, and Ruge found that the birds used old nests or roosting holes in nine of 12 nestings. The nest usually is 2 to 3 meters above ground, with the opening often facing south, and fruit trees frequently are chosen for excavating (Szlivka, 1960; he reported nests in trees as follows: 24 in mulberry, five in walnut, three each in plum and willow, two in cherry, and five in other trees). Both sexes take part in excavating, but the male plays the major role. Holes are guarded before egg laying commences, and Ruge (1969b) noted that the adults change over at the nest prior to egg laying, perhaps reflecting intense nest-site competition from other species. The eggs are laid beginning 4 to 7 days after copulation and number three to five; Blume (1968) reported that younger birds lay fewer eggs than older adults. Only two or three young usually are raised successfully. According to Szlivka (1960), changeover during incubation is marked by the incoming bird tapping outside the hole; the observations of Winkler (Winkler and Short, 1978, p. 76) indicate drumming by the incoming individual; but Ruge (1969b) specifically noted that no drumming occurs in changeover. The male incubates at night and both sexes share the diurnal incubating about equally. The incubation period seems uncertain: Szlivka reported 14 to 15 days, but Ruge noted 9 days as the shortest period he observed (the young, he stated, are born "very immature" [Ruge, 1969b, p. 223]). Further variation or discrepancy exists in that Blume (1968) discounted carrying away or discarding of fecal material, but Ruge (1969b) and Szlivka (1960) both presented data showing that both sexes carry away pellets or toss them from the entrance of the nest. This probably reflects age differences of the young, as in later nestling stages the adults transport fewer or no feces (Winkler, personal comm.). The female broods the hatchling young more than does the male, and both adults carry food, either about equally or with the male doing a major share (Ruge, 1969b). Ruge found that the young were fed mainly or entirely on insects and spiders; but Blume (1968) listed various fruits and nuts as major food items, and Szlivka (1960) noted that half the food brought to a nest over 11 days (1 to 2 hours per day of observation) was of plant origin. Adults move up to 0.5 or even 1.0 kilometer from the nest to secure food for the young. At 14 or 15 days of age the nestlings appear at the nest entrance to receive food. They fledge at 17 to 21 (Blume, 1968) or up to 24 days (Ruge, 1969b). After fledging they roost in the area for awhile, generally on the underside of a sloping branch. Parasites of adults and young *P. syriacus* were listed by Szlivka (1960) and include Mallophaga, various ticks, and worms. The young wander after the breeding season. Molt occurs in late July to early October.

**Taxonomy.** Forms a superspecies with *P. himalayensis*, *P. assimilis*, *P. leucopterus*, and *P. major*, most closely resembling *assimilis* but having in males the restricted nape patch of *leucopterus* and *major*, rather than the red crown of *assimilis* and *himalayensis*. Hybridizes sporadically with both allospecies that it meets, *P. major* (as discussed earlier; see especially Bauer, 1957, and Winkler, 1971) and *P. assimilis* (discussed under that species; see also Vaurie, 1959b). In neither case does the extent of hybridization raise a question as to
conspecificity of the taxa involved. There are no trenchant or even constant weak differences among populations of this species, and I concur with Vaurie (1959b) that *syriacus* is monotypic.

References
Blume, D.: 1968: Die Buntspechte (Gattung *Dendrocopos*). Wittenberg, Lutherstadt, Germany, A. Ziemsens Verlag, Brehm Bücherai, pp. 79–84.

**WHITE-WINGED WOODPECKER**

*Picoides [major] leucopterus*

**Color Plate 48**

**Range Summary.** South-central Asia.

**Diagnostic Features.** Small, 67 grams, wing length 120 to 131 millimeters. A white and black woodpecker with very large white patch on inner wing area, broad white wing bars, and white underparts with reddish extending from under tail to the middle of the breast. Broad black and white face stripes. Outer tail barred black and white. Narrow red nape patch in male. Bill narrow, slender.

**Description.** Bill moderately long with small chisel-tip, relatively broad across nostrils, straight along culmen; narrower and less massive than in sympatric *P. major*. Black above from neck to uppertail coverts. Wings variably marked white on black (see Vaurie, 1959b), with large patch on scapular feathers and adjacent coverts; also white on bend of wing and large white bars on flight feathers, these sometimes confluent on margins of feathers to form white streak; underwings largely white, tipped and barred in gray-black. Shafts black above except white in white areas of outer tail and gray at base of tail; brown below, becoming black at tips of tail, white in white portions of outer tail, and white at bases of wing flight feathers. Tail black, the outer two or three pairs broadly barred white near the tips, duller below. Tail/wing ratio 0.66 to 0.74. Crown black, as is malar patch that broadens posteriorly to form an extension toward breast and to connect with black of back at wings. White on sides of neck continuous with white ear coverts, lores, and front of forehead; nasal tufts mixed white toward forehead, black distally over nostrils (white areas of head, wings, and underparts often showing buffy or yellow tinge, probably stained from foraging); throat white. White below, sometimes tinged or stained faintly with buff or gray, with black mark reaching sides of breast from malar area and reddish pink patch on undertail coverts, lower abdomen, center of upper abdomen, and center of lower breast; 5 to 10 percent of adult specimens show traces of pink on breast.

Sexual features: Sexes about same size, male with 11 percent longer bill. Male has narrow red nape patch lacking in black-naped female. Immatures are duller (browner) black with white tips on primaries, occasionally with fine black bars in white wing patch; a distinct buffy cast ventrally; pinker, less red in the patch on the abdomen; and sometimes a few black streaks on the sides of the breast. They frequently show more white in the tail and wings than do adults. Immature males have a red patch on the crown (mixed with some white and black) but not on the nape; females show less red on crown than do those of *P. major*, with traces of red to moderate red in the forecrown or with scattered red spots on a predominately black crown. Eyes brown, red-brown, or dark red; legs and feet dull black or deep gray; bill grayish black, except paler (grayer) along base of lower bill.
**Distribution and Habitat.** From the Aral Sea and the Iranian frontier of southwestern Transcaucasian Russia east through Transcaisia, to Lake Balkhash, northeastern Afghanistan, the Panir foothills, the Tarim Darya region of Sinkiang east to Lop Nor, and southern Dzungaria in northern Sinkiang (north of the Tian Shan Range). It frequents scrub woods of desert regions, riparian woods (poplar, willow groves), saxaul (*Haloxylon*) scrub, and cultivated trees (orchards: mulberries, peaches, apricots), and gardens. It generally occurs in broad-leaved trees in valleys at lower elevations than coniferous forest-dwelling *P. major*, but regularly reaches 3500 feet and attains 6000 feet or more in the north slopes of the Kunlun Mountains. Probably wanders somewhat following the breeding season (Dementiev and Gladkov, 1966).

**Behavior.** Essentially unknown. Studies of interactions with *P. major* are needed. Apparently it forages in cultivated trees to some extent, probably much as *P. syriacus*. Drumming and Rattle Calls were reported by Dementiev and Gladkov (1966). It often nests in very small, isolated patches of woods. Excavation takes place in March, the nest tree often being a poplar or fruit tree (Dementiev and Gladkov, 1966, p. 642, reported an instance of nesting in a sand mound). The four to seven eggs are laid in late March or early April, the young fledging in May (4 May) to June; juvenile-plumaged birds are known from May to August. The annual molt is undergone from mid-July to early October.

**Taxonomy.** Forms a superspecies with *P. major*, *P. syriacus*, *P. himalayensis*, and *P. assimilis* and is possibly conspecific with *P. major*, which it resembles except for its thinner bill, lack of ventral black markings in both adult and juvenal plumage, the large white areas in the wings, and more extensive red ventrally (Vaurie, 1959b, p. 13, and others have noted that *leucopterus* lacks red in the juvenile female crown, but juvenile females actually vary from being black crowned to having a crown with slight or even moderate red in its center). The race *Picoides major brevirostris* that meets *leucopterus* geographically is larger with a longer, much heavier bill. Vaurie (1959b, pp. 8-9, 12-13) discussed the hybridization of *P. leucopterus* and *P. major brevirostris* in the Tian Shan and Ala Tau ranges of northwestern China. Some authors consider *leucopterus* and *major* conspecific as a result of their interbreeding, but hybridization seems to occur only occasionally in slopes where the upland forest-inhabiting *major* meets the riparian, lowland-dwelling *leucopterus*. If indeed *P. major* "*tianshanicus*" is a hybrid form, as Vaurie (1959b) suggested, it would indicate conspecificity of *major* and *leucopterus*, but "*tianshanicus*" is known from relatively few, scattered specimens that are variously intermediate between the two species, and I prefer to consider these as hybrids until and unless existence of a hybrid population, as such, actually is documented. I concur fully with Vaurie (1959b), who examined 37 adults of *leucopterus* (I have seen 67 such birds), that this species is monotypic. The geographical variation that occurs is minor and shows no pattern permitting formal recognition of discrete population entities.

**GREAT SPOTTED WOODPECKER**

*Picoides [major] major*

**Color Plate 49**

**Range Summary.** Northern Eurasia.

**Diagnostic Features.** Small to Medium, 58 to 110 grams, wing length 117 to 150 millimeters. Black and white (or buff) with a white patch in the wings, and white or buff patches
on the face and on the neck, separated by a black bar (*P. syriacus* lacks this bar, hence has single large patch). Crown all black or (males) with narrow red nape patch. Unstreaked white to brown below with red or pink abdomen and black marks from sides of neck impinging on, sometimes crossing, breast.

**Description.** Bill varies, rather short to long, broad across nostrils, barely curved along culmen, and moderately chisel-tipped. Considerable geographic color and size variation. Black above; rump feathers frequently have narrow white edges, giving slightly barred appearance. Wings black or brownish black, flight feathers barred white or with white spots; innermost greater coverts and scapular feathers white, forming patch. Underwings white in coverts, grayish black with white bars elsewhere. Shafts brown to black above, except pale horn color at tail base and white in outer tail; below, black to brown, paling to white at tips of primaries and secondaries, also white on outer tail feathers. Tail black and white, mainly black, with white appearing usually at tip of second rectrices, then gradually increasing in extent from the tip outwardly; outermost large rectrices over half white (tip half). The white areas of the tail are barred with black (except most *kamtschaticus*, which lack markings there), the depth of the black bars varying individually and geographically. Tail/wing ratio 0.57 to 0.70. Nasal tufts black to black mixed with white; forehead (often discolored), lores, area under eye, and ear coverts, as well as sides of neck and throat, pure white (*major* group) or pale buff to brown (*cabanisi* group). Malar area black, broadening to rear, forming large black mark on sides of throat and upper breast; the black extends from this area forward (malar); backward to the back, upward in a narrow bar to the nape (thus bisecting the pale area on the side of the head), and rearward and downward onto the breast. Crown black, connecting (in females) with black of back and of malar area. Below white (many *major* and *brevirostris*, all *kamtschaticus*), buffy to or grayish white (*pinetorum*; some *major*; and some individuals of *mauritanus*, *hispanus*, *numidus*, *thanneri*, and *japonicus*), buffy brown (*cabanisi*, *hainanus*, *harterti*, and some individuals of *mauritanus*, *hispanus*, *numidus*, *thanneri*, and *japonicus*), or deeper brown to gray-brown (*canariensis*, *poelzami*, and *stresemanni*). Rarely are there any small markings (few streaks on sides) on the underparts; large black area on sides of breast, converging on center of breast, even meeting there in *numidus*; central breast occasionally with red traces in all races (rarely in white-breasted races), the red being more frequent in the *cabanisi* group and *mauritanus* and forming a patch overlying the black across the breast in *numidus*. Undertail coverts, rearmost flanks, and center of abdomen (rarely reaching hindmost breast) variably pink to red, the variation being largely individual, although some races (*numidus*, *stresemanni*) average deeper red color than others.

Sexual features: Sexes nearly same size in some races or males larger (3 to 5 percent in western *major*, 8 percent in *cabanisi*); wings about equal (females longer winged in half the samples). Females nearly equal to 8 percent longer tailed. Bill similar in size to 11 percent longer in males (*poelzami*). Males have a narrow red nape patch, whereas females lack red there (nape and crown entirely black). Immatures are browner, less black, and generally show streaks on sides (sometimes streaking is heavy, covering most of underparts). Sometimes there is barring on flanks; the abdomen is pinker, less red than in adults; the dorsal coloration is browner; and the white wing patch often is marked with black. Both sexes have red on the crown (the red is more orange, or even yellowish, than in adults) and no red on the nape. Females tend to show restriction of the red to the central crown, but vary, and sexes often cannot be determined. Eyes deep red in adults, brown in juveniles. Legs and feet greenish gray to brownish green. Bill blackish gray above; lower bill gray, paling toward base.
Distribution and Habitat. Occurs from England, Spain, the Canary Islands, and North Africa east across the mass of Eurasia to Kamchatka, and Japan; north to the limit of trees, sporadically, and south to Morocco and Tunisia, Asia Minor, the Caucasus, the Caspian Sea area, the Tian Shan Range, the main islands of Japan, most of central and eastern China, Hainan, southwestern China, northern Burma, and northeastern India. Its habitats vary greatly in this enormous area, from pine plantations, broad-leaved forests (such as beech, oak, alder, rhododendron forests), coniferous forests, and parks to cultivated areas and gardens. This common woodpecker occurs from sea level to 4000 feet or more in North Africa, Europe, and Asia Minor; mainly between 1500 and 7500 feet in Japan (Austin and Kuroda, 1953); and in hills and mountains above 4000 feet in Burma and northeastern India. Birds in some populations migrate downslope (Japan, Himalayas) or southward (northern Eurasia), their numbers probably being dependent upon availability of pine seeds and other winter foods on the breeding grounds. About half or more of young birds fail to survive the first winter; those that survive that year may live as long as 6 to 8 years (Blume, 1968).

Foraging Habits. One of the most omnivorous of woodpeckers, this species gleans, probes, taps, occasionally excavates in trees for insects, uses and maintains “ anvils ” for cracking open seeds and nuts, feeds on pine seeds, eats fruits, and sometimes preys on young birds that are seized from nests or taken from nest boxes or other cavities that the woodpecker has enlarged in order to extricate the birds. It occasionally feeds on the ground, mainly on fruits, nuts, and items thrown to it by humans. Spring birds forage in flowers, as of alder and rhododendron, presumably for insects; they may pollinate these plants, as the forehead becomes pollen covered (Stanford and Mayr, 1941). Much foraging is on open branches, where it pecks and probes for insects. It also moves through small bushes in the undergrowth and drops to the ground to seize insects. At times it flycatches, flying at or more often dropping down upon some insect. It does not cover a tree thoroughly, but moves from one to another site, utilizing few sites on any single tree (at suitable food sources it may spend a considerable time feeding, however). Insects taken include larvae and adult beetles, moths, flies, and Hymenoptera (larval gall wasps are taken from galls, mainly in the winter); spiders also are eaten. Hazel nuts, beechnuts, acorns, hips of crabapple, pine seeds, rowan berries, and cherries are among the foods cited by Witherby et al. (1938). Plant lice and other insects largely gleaned from trees (Blume, 1968) are fed to the young, as well as some fruits and nuts and rarely even nesting birds of other hole-nesting species (Hodgetts, 1943; Löhr, 1972). In winter in Scandinavia, where P. tridactylus is sympatric, major forages higher in dead or diseased spruce trees and taps for insect food or scales the bark, especially in poor conifer cone years; normally its winter food largely is seeds of conifers (Hogstad, 1971). Anvils are used for extricating seeds from pine or other conifer cones (Conrads and Mensendieck, 1973) and for opening nuts or stones of fruits, as well as in breaking up large insects. The anvils are crevices in bark or other natural wedging places. These are relatively few in number compared with P. syriacus, and they are “strategically” located about the territory. In contrast to syriacus, major maintains its anvils, keeping them clear of debris and shaping them somewhat; hence the anvils can be used for a longer period than the more numerous anvils of syriacus. Sapsucking, involving the systematic ringing of trees, is well documented; trees utilized by P. major were listed by Gatter (1972), and Löhr (1972) described the technique. The small, pocked holes are less regularly placed in rows than in the case of sapsuckers (Sphyrapicus).

Voice. Drumming occurs from winter through the breeding season. Young birds first drum in their first winter. The drumming bursts are in short, loud rolls, usually lasting 0.5 to 1.0 second and containing 10 to 20 beats. Up to six bursts are given per minute, usually, but
rates of up to 11 per minute are known. Unmated birds or birds having lost a mate drum more often, and females usually drum in shorter bursts than males. The bursts vary in intensity and tempo; usually they are 15 to 25 beats per second, with a speedup of as much as one third through the call (a rate of 30 beats per second may be attained at the end of a burst). These bursts serve to announce and locate an individual and are given in reaction to drumming of other conspecific birds, as well as to drums of other species of Picoides, Picus canus, and Dryocopus martius (Winkler and Short, 1978). Demonstration drumming occurs at the nest site. The call note is a short, loud Kix Call, a peaked note sonographically with strong overtones, varying somewhat geographically. The peak is at 1.5 kilohertz in Japanese birds, 2.0 in Swedish, and 2.6 in Austrian P. major; notes are 0.025 to 0.035 second in duration. The Kix Call is uttered as an aggressive note and as a location call. The Scolding Call contains about 4 notes per second and is given in short to long series; the notes are like call notes but are pitched higher. They are uttered during stress, such as attacks on Starlings (Sturnus vulgaris) at the nest cavity. The Rattle Call begins with a call note or two and is a series of short notes given at 7 to 8 notes per second for up to 3 seconds. The notes resemble call notes. Rattle Calls are delivered during aerial pursuits, in conflicts for roosting sites, at intruders, in reaction to drumming, and in other aggressive situations. The Short Rattle Call or Kreck Call, given as “krrek,” is an aggressive call containing four or five fast, vertical, noisy notes that are poorly defined. It is uttered during encounters. The Mutter Call is a softer single call or series call, given during encounters at close range. A threat, it is often uttered at an antagonist prior to the advance of the calling bird. Swinging Displays often accompany this call. The Mutter consists of three or four fast, connected notes delivered in 0.1 second, with a peak at 2.5 kilohertz. The Kweek Call is of two types and shows some geographic variation. Generally given in 0.04 to 0.07 second, one type, given at a rate of about 9 per second, contains a dropping element, a noisy segment, and then a call motelike element, sounding like “gigigi.” The other contains two peaking elements, the main peak being at 1.9 kilohertz. The former is very much like a Wicka Call and may be its equivalent in major. Both are used aggressively in unisexual conflicts and also in interactions between birds of the opposite sex. The Wad Call contains a clicking element, a variable central portion, and a final click, giving a “smacking” sound. The typical version is pitched at 1.75 kilohertz and is 0.03 to 0.05 second in duration. A version used prior to copulation is much longer (0.17 second) and lower pitched (1 kilohertz), sounding squeaky. These notes are “intimate” notes given by paired birds, as during nest relief or when the male approaches its mate. The Chirp Call of nestling birds is low and sharp, given at roughly 14 notes per second, the peak of the notes being at 1.6 kilohertz or more. It is the begging call and becomes louder as the birds grow. The Loud Chirp Call is uttered as adults come near, usually bearing food. The notes resemble call notes but are longer and higher pitched, and the overtones are strong. This call is uttered at about 8 notes per second. The Squeak Call of the late nestling and fledgling stage consists of long chirplike notes (they are shorter than Squeak Call notes of P. syriacus) and are uttered during feeding or when there is a disturbance. A Distress Call is given by woodpeckers caught in the hand or besieged by such birds as Starlings or Black Woodpeckers (Dryocopus martius). A long, loud series, frequency modulated, and with strong overtones, the call is given at 5.5 notes per second (or as a long single note, to 0.3 second, with or without modulation) with a pitch of 1.1 kilohertz. Wing sounds are made at times when the woodpeckers are flushed, the sound being a rustling of the wings.

Displays. The pair-formation period is marked by territorial disputes and chases. Encounters at close range involve slow, usually wide Swinging Displays, the head held at various heights
and the bill swinging strongly to the side, or (more aggressively) weakly so, or in more intense situations, Wing Spreading (one or both wings fully spread, usually by a supplanting bird). Bill Directing Displays, with the bill pointed at the antagonist, and Head Raised Displays, with the head lifted high (Blume, 1968, fig. 39), also mark conflicts. Other displays functioning in agonistic encounters are Crest Raising, which also signals the sex of the displaying bird, and Tail Spreading (Witherby, et al., 1938, p. 285). The latter I noted as occurring to a greater degree in attacked birds than in the attacker (e.g., in one female attacked 15 times by a male, male's tail always was more “closed”); hence some submissive elements seem to be included. There is at least one form of Flutter Aerial Display used in several different circumstances. Blume (1968) described “suspension” flights between paired or pairing birds, a male in one instance following a normally flying female with set wings in parts of his flight, and a female flying about a male in “suspension” flight with tail spread and parted. Tooby (1943) mentioned similar flights, with gliding and slow wing beats of one bird ahead of the second, presumably of the opposite sex. I observed a young male attempting to forage in the territory of an aggressive adult male in Austria. The adult repeatedly used Wing Spreading Displays and a floating, gliding, downsloping flight with very slowly beating wings, displaying the barred wings to the juvenile. In another case an adult female repeatedly drove away a juvenile, apparent male. The female showed more Tail Spreading than had the adult male in the previous situation. I noticed that her red undertail area seemed fluffed out; her bill was open when attacking. The female supplant the young bird, each time foraging briefly where she had supplanted it, then flew on after it in a floating, gliding flight.

Interspecific Interactions. See P. syriacus and P. leucopterus (pp. 278 and 281). The Great Spotted Woodpecker is common, ubiquitous, and forages more diversely than any other Palearctic woodpecker. It thus encounters and interacts with most other picids, especially syriacus, its close relative. Its territories overlap those of tridactylus, medius, minor, the two European Picus, Dryocopus martius, and probably the specialized foraging Picoides leucotos, but not those of P. syriacus. Drumming responses to various species were noted earlier. In years of poor conifer seed crops, P. major in sympathy with P. tridactylus feeds higher in trees, forages on branches as well as the trunks, and seeks food superficially by tapping or bark stripping (Hogstad, 1971). I have observed interactions, including chases of P. medius (see p. 266) by P. major. Virkunen (1967) discussed interactions of P. major with P. leucotos in Finland during the winter. That author found major dominant to leucotos, probably because major remains territorial in winter, whereas leucotos wanders somewhat and is in unfamiliar circumstances. Starlings take over many nesting cavities, forcing later nesting.

Breeding. Interactions between the sexes occur in late winter, especially involving chases about the roosting area. Blume (1968) described one series of interactions as follows: The male chases the female through the upper levels of trees. The female lands and perches motionless, often with open bill. The male perches near the female, often on the opposite side of the branch; he then sidles around to the female, which moves upward on the branch, giving Wad Calls and Wing Spreading. The female then flies in normal flight, the male flying nearby in display flight. At times the female flies with a similar flight, tail parted, spread out, and upturned. Copulation takes place in Europe from late April onward. The female elicits copulation by perching diagonally, crouching. As the male lands, he spreads his wings and tilts to the left as he copulates. Afterward he flies off. Or, the female may drum and the male come in flying in Flutter Aerial Display. There is sporadic work on cavities during
the year. In some years no new cavities are excavated for nesting in an entire area. Blume reported 33 instances of old nests being reused with no new work, 10 cases involving enlargement of old holes, and four new cavities of 47 broods in Germany. The nest is 5 (usually over 12) to 50 feet above ground in the trunk or a major branch of a tree, the branch or tree tending to be defective. If newly built, the nest requires 2 to 3 weeks for construction. Openings tend to be toward the direction of greatest light, depending upon the surroundings. Both sexes excavate, but the female spends less time at this task than does her mate. Ten to 15 strokes usually result in production of a 1- to 2-centimeter shaving (Blume, 1968). The nest is 23 to 45 centimeters deep with the nesting chamber 15 centimeters in diameter and the entrance to the cavity 4 to 5 centimeters across. The four to seven (rarely three or eight) eggs are laid in the morning. The male commences roosting in the nest when the first egg is laid, and he spends the night there until about 2 days before the young fledge. Copulation continues up to 6 days after incubation begins. The adults change over very frequently, every 1 to 28 minutes (average 11 minutes at the beginning of incubation) at first; the periods gradually lengthen to 40 or 50 minutes or up to 2 hours. There is not a rigid change-over ceremony, but usually the incoming bird calls (Wad Call) near the nest, and the exiting woodpecker may utter a Short Rattle Call as it flies off. There are instances in which a male parent successfully raised at least part of a brood after loss of its mate from the last few days of incubation onward. Incubation lasts 11 to 15 days, but may be as short as 8$\frac{1}{2}$ or 9 days in some cases (Ruge, 1964). The eggs hatch over a 24-hour period. Nestling birds are fed mainly surface-gleaned insects, carried in the bill of the parents. The young birds fledge in 20 to 23 days, developing rapidly from the 4- to 6-gram egg to 70 grams (nearly fledging weight) at 11 days. The wing and tail feathers appear at 5 days, the ears open at 8 days, and the eyes at 9 to 11 days (Blume, 1968). The young are quiet at first but soon give Chirp Calls regularly. About 23 to 29 grams of food are ingested daily by well-developed nestlings. The male feeds more than does the female, generally, although there is variation. Fecal material is removed about every fourth feeding. There is considerable aggression among the nesting woodpeckers. The young fledge over 2 or 3 days, between late May and July in all subspecies for which data are available. Fledged young are able to find some food within a day after leaving the nest, and they are forced into independence by their parents' aggressiveness at 8 to 10 or so days after fledging. The molt into adult plumage usually is complete by October or occasionally to mid-November. Adults molt after nesting, between August and October.

Roosting. After fledging, the young roost in the open against tree trunks, a factor perhaps partly responsible for high mortality at this time. The nesting male returns to his old roosting hole at the end of the nestling period. The nest later may be used as a roost by one of the adults. In sunny weather, adults perch in treetops near the roosting hole before backing down to the roosting hole. In contrast to territoriality from late winter through the breeding season, several birds may roost in close proximity during the fall. Nest boxes or old holes are used for roosting; rarely, if ever, is a cavity excavated for roosting. Evasion holes are required in case of accident, so each bird usually has at least two potential roosting holes available to it.

Taxonomy. Related closely to, and forming a superspecies with, allospecies leucopterus, syriacus, himalayensis and assimilis (see earlier discussions). Hybrids have occurred with syriacus (see p. 278), especially as the latter underwent recent expansion into central Europe, but hybridization diminishes when syriacus becomes common. This species also has hybridized with leucopterus (see p. 281), the hybrids being responsible for naming of a race ("tianshanicus") of major. A hybrid of major and leucotos is discussed under the latter.
Many subspecies have been described; some of the clinal extremes and others not clearly separable are synonymized herein. The nominate race occurs from the Arctic tree line south in Scandinavia to northern Denmark, northern Poland, the eastern Baltic region, and northwestern Russia, southward to the northern Ukraine, and east to the Ural Mountains (it is partly migratory, to England and central Europe). This form intergrades broadly with *pinetorum* (including "paphagoniae," "anglicus," "italiae," "candidus," and "kitsutsuki"; last was *Dendrocopos major tenuirostris*), which is 3 to 4 percent smaller (wings, tail) but has a decidedly longer, much thinner bill and has a gray or buff tone on the underparts. It occurs across Europe from the British Isles (British birds are smaller by 6 percent than adjacent French *pinetorum*, but have the same thin bill and match southern European *pinetorum* in size), France and the Netherlands, east across Germany, southern Denmark, southern Poland, Italy, Sicily, Yugoslavia, the Balkans, Romania, Turkey, and the southern and central Ukraine as far as the Don and Volga rivers. (I find Romanian "candidus" indistinguishable from German *pinetorum*, though a trifle whiter than most western European birds); Italian specimens are not separable, and those from Asia Minor resemble Italian birds. Specimens from the Crimea, Caucasus, and Transcaucasia so closely resemble *pinetorum* that they are inseparable; they may represent an intergradient (*pinetorum* ≡ *poelzami*) population—moderately worn and worn birds are indistinguishable from *pinetorum*, however. It seems futile to attempt further treatment of subspecies within *pinetorum*, itself only moderately separable from *P. m. major*.

Very like *major*, including the shape of the bill, is *brevirostris*, a very white form, slightly larger than *major* with a deeper red abdomen (most specimens are distinguishable on a combination of these features). This race occurs in western Siberia (intergrading there with *major*), south to the Ala Tau, central Tian Shan ("tianshanicus" that show less hybridity with *P. leucopterus* are included in *brevirostris*; if, as seems unlikely, it proves to represent a hybrid population, then *leucopterus* will have to be merged in *P. major*), and Mongolia, and east to the lower Amur, Manchuria, and the Sea of Okhotsk; it extends north to tree line.

Farther east, on Kamchatka Peninsula and the northern coast of the Sea of Okhotsk, is found *kamtschaticus*, a large-billed form resembling *major* and *brevirostris*, but even whiter, with a very large white wing patch, clear white underparts, and the outer tail white with no black markings or but a few black flecks. South of these are a host of named races, some poorly characterized, representing more or less isolated populations.

On the Iberian Peninsula is *hispanus*, a weak race, darker in color than *pinetorum* and closely resembling *harterti* of Sardinia and Corsica, recognizable because it may not be directly monophyletic with those insular populations, from which it differs in its creamier, tanner, less-gray underparts; paler ear coverts; proportionately shorter tail; and smaller size (4 to 8 percent shorter wings and tail).

The race *harterti* is characterized by dark, grayish brown ventral color and a very deep red abdomen; it is larger than adjacent southern European *pinetorum*, resembling German birds in size, but is clearly separable by color from *pinetorum*.

Corsican birds have been separated from *harterti* as "parroti"; more northern, Corsican birds are slightly longer winged (2 to 5 percent), slightly longer tailed (2 to 3 percent), with males having a bill 5 percent longer and females 11.6 percent longer than Sardinian *harterti* (essentially, Corsican birds are slightly larger, but the sexes differ less in bill length; hence females have a disproportionately longer bill). Since there is no difference in color between them, and there is great overlap (e.g., longest winged female is from Sardinia, not Corsica), I merge *parroti* in *harterti*. 
Two races are located in the Canary Islands: *canariensis* on Tenerife and *thanneri* on Grand Canary Island. Both resemble dark *harterti* but have the abdomen distinctly orange-red, not crimson; the tail is even more black (black bars equal or exceed white ones in width), but the ear coverts and wing patch are whiter and less buff; also, the flanks are whitish, contrasting with the dark underparts. Grand Canary *thanneri* resembles *canariensis* but is completely separable by virtue of its whiter tan, less grayish buff underparts, the white invading the breast and sides from the flanks.

There are two North African subspecies: *mauritanus* of Morocco (including “lynesi”) and *numidus* of northern Algeria and Tunisia. The western *mauritanus* resembles *hispanus* but is paler below, is slightly smaller in size, and shows more red on the breast; high Atlas Mountain birds (“lynesi”) tend to be larger (to 5 percent, much overlap) and generally a bit darker on the breast and flanks than northern Moroccan specimens, but variation is clinal and overlap too great to admit “lynesi.” Eastern *numidus* is large in size, like interior Moroccan birds (“lynesi”), but is distinct in having a full red band across the breast, partly obscuring the black band. Woodpeckers of this race vary in being whiter to strongly buff below, although most show considerable buff tone.

Another southern form, *poelzami* is smaller than adjacent *pinetorum*, *major*, and *brevirostris*; it is very brown below with a disproportionately long bill (bill actually longer on average than any of the other three races just mentioned). It occupies the Transcaspian and southern Caspian regions.

Central and eastern Manchuria, Ussuriland, Korea, Sakhalin, the Kurile Islands, Hokkaido, Honshu, and Tsushima form the range of *japonicus*, a variable race affected clinally by intergradation with *brevirostris* and *cabanisi*. It is generally blacker than *brevirostris*, with less white in the wing patch and in the tail, but more white in the wing flight feathers; the underparts are somewhat darker, and the bill is narrower. From *cabanisi* it differs in being much whiter throughout. Southern birds tend to be darker, northern ones paler, the variation being strictly clinal (Vaurie, 1959b).

Chinese birds have been split into several races; all are dark below and very black above, and western birds are darker than eastern Chinese birds. There is a cline of increasing darkness southward in both eastern and western groups. I treat two subspecies: western *stresemanni* (including “beicki”) of Sikang, Szechwan, Tsinghai, Kansu, and Shensi to Yunnan, northeastern Burma, and possibly northeasternmost India; and eastern *cabanisi* (including “mandarinus” and “hainanus”) of southern Manchuria south through eastern China to eastern Burma, northern Laos, North Vietnam, southeastern China, and Hainan. Western *stresemanni* is considerably darker than *cabanisi* but shows no other differences. I see no reason to separate clinally from *stresemanni* variable forms such as *beicki* (= northern *stresemanni*, paler than southern birds) or *mandarinus* (= southern *cabanisi*, darker than northern birds of that race). The Hainan population is indistinguishable from adjacent mainland *cabanisi* (“mandarinus”) and is but 5 to 7 percent smaller (shorter wings and tail) than northern *cabanisi*; and, this being stated, I do not see any function served in treating it formally as “hainanus.”*

---

*Cheng Tso-hsin and colleagues have recently (1975) described *P. m. wulashanicus* as a new race from the Wu-la Shan of eastern Mongolia. From their description these birds match northern *stresemanni* except for being very dark ventrally, tinged grayish brown. If these birds indeed reverse the cline of increasing darkness southwardly, and prove to be even darker than southern *stresemanni*, the newly named form will merit recognition.
References

CHECKED WOODPECKER

Picoides [mixtus] mixtus

Color Plate 50
Range Summary. South America.

Diagnostic Features. Little, 30 to 36 grams, wing length 78 to 91 millimeters. Brownish black and white, barred above and streaked below. Tail barred fully. Brownish “ear” patch with white line above and below it. Not distinguishable in field from larger, blacker allopecies, P. lignarius (in hand, smaller with shorter wings and tail and generally shorter bill).

Description. Bill long, rather straight with slight chisel-tip, broad across nostrils. Most races virtually identical to P. lignarius. Barred above, bars breaking into a spotting or motting on upper back; brownish black predominates, except in cancellatus, which has broad white bars. Wings brown with white bars and, on coverts, spots or spot-bars; paler below. Shafts brown above except whitish at base of tail; below, shafts white or whitish, becoming dusky at tips of flight feathers. Tail brownish black, fully barred with white, paler below. Tail/wing ratio 0.46 to 0.64. Blackish brown crown (see Sexual features), auricular patch varying from dark brown to buffy brown. Nasal tufts buffy white. Narrow white line over and under eye and ear covert patch. Malar area white with brown streaks and spots. Throat white with brown streak-spots. Below, white with a trace of yellow or even buff (sometimes giving yellowish cast to entire underparts) and marked with deep brown streaks on the breast, sides, and flanks. These streaks sometimes spotlike, especially in “chaco” birds. Abdomen and flanks with streak spots and, often, bars; barring sometimes heavy, especially in “chaco” birds, reaching sides of breast. Markings on underparts of cancellatus reduced to fine streak-spots with a few narrow bars on the flanks. Undertail coverts white with brown streak-spots.

Sexual features: Males have slightly longer wings, a bill 10 percent longer, and weigh 8 percent more than females, but latter have tail as long as or longer than that of males; males have red or orange-red band on nape, often incomplete in center of nape, and crown streaked buffy white (tips of crown feathers occasionally tipped red, giving effect of coloration of P. scalaris); females lack red in the plumage — they show much less (or no) streaking of the crown, the streaking being confined anteriorly when it occurs. Immatures darker above than adults, the white often appearing as spots; below, duller white with heavier streaking and more barring; both sexes have red on the crown, but not the nape, although the red is more scattered and occurs in a smaller area in females. Eyes brown, legs and feet pale gray, bill black with grayer lower bill and grayish white base.

Distribution and Habitat. From Goias and Minas Gerais, south through Mato Grosso and western São Paulo, Brazil, Paraguay, southeastern Bolivia, westernmost Uruguay, and northern Argentina east to Corrientes and Entre Rios, and south to Neuquén, Río Negro, and southern Buenos Aires provinces. Frequent dry woodland of the campos, chaco, riverine scrub in Patagonia and the pampas, scattered groves of trees in the pampas, and xeric scrub woodland in western Argentina and southeastern Bolivia. It ranges from sea level to 2000 feet (latter in southeastern Bolivia and western Argentina).
Foraging Habits. Feeds singly or in pairs by gleaning, probing, and simple pecking into crevices and on the surface of trees, usually small ones. The birds move over the trunk, branches, and branchlets, scanning for various insects; rarely do they undertake prolonged tapping for subsurface food.

Voice. Drums loudly through at least part of the year. The call note is a weak Peek Call, similar to that of *P. pubescens*, about 0.38 second in duration and with a peak at 3.5 kilohertz (Winkler and Short, 1978). It may be interspersed with drumming in territorial birds. A Rattle Call has been heard, a “ti-ti-ti-ti-ti-ti-ti-ti,” given by territorial males and females. No other calls have been noted.

Display. Wing Raising in agitation as a Rattle Call was delivered is the only reported display.

Breeding. Very little known. Breeding in the southern (south of Brazil) populations occurs in the southern hemisphere spring, from September through November. Molt occurs from February through April. Short (1970a) described nest construction in September in Formosa, Argentina. A male excavated with the female perched nearby; then she took a turn at excavating, until he replaced her. The excavation was 3 meters up a dead palm stub in chaco woods. Another apparent nest cavity was 6 meters up a palm stub situated in open pasture with woods nearby, but no other trees within 20 meters (various species of *Picoides*, as well as other woodpeckers, tend to seek isolated trees or stubs for nests, perhaps because they are relatively safe from arboreal mammal and snake predation at such sites).

Taxonomy. Very closely related to, perhaps conspecific with, the generally larger, darker *P. lignarius* (latter has more extensive red nuchal patch on the average; the red is darker, more melanic; the tail is blacker; the underparts more heavily streaked; and the back more broadly and regularly barred black and white). These allospecies approach each other closely and may meet or may have met in the recent past: (1) along the upper parts of rivers in Neuquén and Río Negro, where riparian scrub woods contacted outlying Fuegian forest; and (2) in the lower portions of arid Bolivian valleys. Unfortunately, the streamside vegetation along rivers such as the Río Limay of Neuquén has been much reduced and replaced by eucalypts and other plantings so that *mixtus* has been diminished in numbers or even eliminated in that area of potential contact, and I have seen no specimens of *lignarius* or *mixtus* from intermediate altitudinal levels (between chaco and high Bolivian valleys) to indicate existence of a contact in Bolivia. Further studies in these regions are required before the status of these taxa can be elucidated. Four subspecies of *P. mixtus* can be distinguished within two major groups. The Brazilian (intergrades in northeastern Paraguay with southern group) *cancellatus* is distinctive: it is browner, less black, with the crown especially brown; there is more white throughout (dorsal white bars broader than black ones); the ventral markings are reduced to fine streak-spots; and the tail is proportionately shorter (tail/wing ratio 0.46 to 0.54 versus 0.54 to 0.64 in others) than in the *mixtus* group. The latter group contains three slightly differentiated forms: nominate *mixtus* of the Parana River area and Buenos Aires Province; *berlepschi* of Córdoba, San Luis, La Pampa, southern Buenos Aires, Neuquén, and Río Negro (partly migratory); and *malleator* of the chaco region (northern Argentina, Paraguay, southeastern Bolivia). The southern *berlepschi* resembles *mixtus* but is longer billed, has fewer fine white streaks on the crown (confined to front), a larger brown mark on the ear coverts, and whiter, less yellow-tinged ventral plumage. The northwestern *malleator* even more closely resembles *mixtus* but is more heavily streaked on the underparts with more barring evident there; it averages slightly smaller than *berlepschi* and *mixtus*. 
Reference

STRIPED WOODPECKER

Picoides [mixtus] lignarius

Color Plate 50

Range Summary. Southern South America.

Diagnostic Features. Little, 35 to 38 grams, wing length 89 to 97 millimeters. Black and white, barred above and streaked below: tail fully barred. Dark stripe through eye, white lines over and under eye. Indistinguishable in the field from parapatric P. mixtus and likely conspecific with it. In hand, distinguished by larger size (longer wings, tail, bill) and darker coloration (black, generally; more broadly streaked below; and dorsal dark bars broader, pale ones narrower).

Description. Bill rather long, nearly straight, moderately chisel-tipped, broad across nostrils. Brownish black above with narrow white to grayish or brownish white bars, the barring becoming scalloped and wavy on the upper back. Wings brownish black, fully barred white, paler below. Shafts brown above, paler below, becoming whitish at tips of primaries and on outer tail feathers near tip. Tail barred brownish black and white or dull buffy; dark bars deeper than pale bars and connecting along shaft; below, paler. Tail/wing ratio 0.58 to 0.70. Crown black (see Sexual features); nasal tufts buffy white to buff; lores, line over eye broadening to rear, and line under eye, white. Ear coverts have deep brown stripe from eye rearward to wings, bordered by white line above and below; dark stripe sometimes weakly streaked white. Malar area mixed blackish and white, streaked anteriorly, more black posteriorly. Throat white with very fine black streaks or spot-streaks. Below, white, yellowish white, or buffy white, whitest on breast, marked with streaks of irregular width on breast and sides; streaks become finer, breaking into spot-streaks on abdomen; flanks and often part of abdomen barred black and whitish. Undertail coverts whitish with black bars.

Sexual features: Sexes similar in size (wing length, tail length) or males slightly larger, but males have bill 14 to 18 percent longer than that of females. Males have narrow red patch on nape, occasionally orangish, usually complete across nape and extending farther forward on sides than in center; also, male's crown variously streaked white (from few fine streak-spots to fully spot-streaked). Females lack red and show a few streaks anteriorly or none on crown. Immatures duller, brownier, more heavily streaked and barred below, and with less regular dorsal barring. Males have a fully red crown. Females show some red on the crown, but less than do males. Eyes brown, legs and feet gray, bill black dorsally, pale at its base, and lower bill whitish gray.

Distribution and Habitat. Disjunctly occurs in high arid valleys of Bolivia (along Andes in east from Cochabamba to Tarija), and in southwestern Argentina and adjacent southern Chile (Neuquén, western Río Negro, western Chubut, and Santa Cruz, Argentina, and from Coquimbo south to Tierra del Fuego in Chile). It is somewhat migratory in Argentina, reaching Córdoba and La Rioja in the winter. This woodpecker frequents cactus- and acacia-dominated valleys in Bolivia; habitat very like that occupied elsewhere by P. mixtus and P. scalaris. In Chile and Argentina it frequents Fuegian forests where it prefers edges, partly cleared areas in the forest, and streamside vegetation. In central Chile it is found to
some extent in pasture trees, orchards, and plantations (Johnson and Goodall, 1967). It is uncommon to rare in continuous dense forest. Bolivian birds range from 5000 to 12,500 feet; it occurs from sea level to about 6000 feet in Argentina and Chile.

Foraging Habits. Feeds on trunks, branches, and twigs of large trees to small bushes by gleaning, probing, prying, and tapping and occasionally by excavating. It taps more often than does related P. mixtus, but nevertheless it mainly gleans and obtains food from on or near the bark surface. The food presumably is entirely or mainly insects. Vuilleumier (in litt.) found that they accompanied foraging flocks of the furnariid Aphrastura spinicaua through the forest; he also noted this woodpecker extracting white grubs from a fallen Nothofagus tree.

Voice. A Peek Call resembling that of P. mixtus, but a trifle lower and louder, and a Rattle Call similar to that of mixtus are the only described vocalizations (Short, 1970a). These were heard sporadically from territorial birds.

Display. Unknown.

Breeding. Nests in October through January in Argentina and Chile; the September to December molting of Bolivian highland birds suggests June to September breeding in that area. Southern birds molt from February through May. There is no description of actual nesting, but it excavates holes low in trees “or cacti” (Johnson and Goodall, 1967, p. 132; this seems questionable in Chile) and lays three to five eggs.

Taxonomy. Forms a superspecies with P. mixtus (see p. 290) and is possibly conspecific with it. The two appear not to meet, although closely approaching each other in Neuquén and Río Negro and in the valleys of eastern Bolivia. I concur with Hellmayr (1932, p. 152) that Bolivian birds are inseparable from Chilean-Argentine birds, especially since these all are barely distinguishable from P. mixtus.

Reference


LADDER-BACKED WOODPECKER

Picoides [scalaris] scalaris

Color Plate 51


Diagnostic Features. Little, weight 21 to 48 grams, from 28 to 48 grams in a single subspecies (eremicus), wing length 84 to 110 millimeters. Black and white (white replaced by brownish in many birds), barred above and on outer tail feathers. Underparts pale with spots and streaks along sides and flanks. Narrow black eye stripe, pale lines over and under eye, black or partly black malar stripe. Males have fully red-spotted crown (white spotting also).

Description. Bill long, almost straight along culmen, chisel-tipped, and broad across nostrils. Barred black and white above, barring often wavy on upper back, dark bars broader in some forms, narrower (whiter backed) in others, with great individual variation. Uppertail coverts and lower rump are black. Wings black, barred with white, coverts more bar spotted; barred below, dark areas paler than above wings. Shafts whitish at base of flight feathers and in white-barred areas of tail, otherwise dusky brown (wings) to black (tail tip); below, paler and whiter. Tail black, the outer three feathers on each side being usually barred white (rectrix three, only at tip), but unmarked white occasionally on outer feathers; paler below.
Tail/wing ratio 0.51 to 0.67. Nasal tufts dusky or mixed black and white; lores and line beneath eye white to buffy brownish white, as is line over eye connecting with sides of neck. Black line through eye across ear coverts, narrow to moderately broad; malar area black, reaching bill in most races (some white spotting often is evident at anterior end of malar), but narrower and breaking up well back of the bill in scalaris and some sinaloensis. Black of malar and ear coverts usually connected at rear of ear coverts, forming a sideways U on side of face. Throat white to gray-brown, paler on chin, rarely with few spots on chin. Underparts buff-tinged white to gray-brown or buffy brown, darker in fresh plumage, “whitening” through fading during the year and marked with lines of small spots, spot-streaks, or streaks on sides and onto sides of breast, these becoming mixed with weak to strong barring on flanks and undertail coverts (there is great individual variation in size and extent of streaking and barring, masking most geographical variation).

Sexual features: Males 10 to 16 percent heavier, with longer wings, a slightly longer tail (females have a proportionately longer tail), and bill 10 to 18 percent longer than in females. Males have white-based red tips on black crown feathers, the red being most extensive on the hindcrown and nape (fresh-plumaged birds thus are mainly red from midcrown to nape, spotted red and white on the midcrown, and black with white and red spots on the forehead; worn birds may have red tips and even white spots worn off, showing mainly black on the forecrown to midcrown, the red being restricted posteriorly). Females lack red, showing black crown and nape with paler (brownish) forehead and no, few, or rarely many white spots or streaks (spots most frequent on forecrown and forehead). Immatures more heavily streaked and, especially, barred on underparts; ventral markings duller, less black. Young birds all show black nape patch and red on center of crown, the red being less extensive there in females (but much overlap occurs between sexes), and some white spotting, especially on the forehead. Eyes brown, reddish brown, or dull red; legs and feet dull grayish olive-green; bill dull black to deep brownish gray, paler on lower bill.

Distribution and Habitat. Widespread resident in deserts, desert scrub, thorn forests, riparian trees, and (in Central America) pines or pine-oak woodland from southern California, Baja California, various islands in Gulf of California, southern Nevada, southwestern Utah, southeastern Colorado, western Oklahoma, and central Texas south through suitable parts of mainland Mexico to Cozumel Island, the Trés Marias Islands, Guatemala (?), Belize, the xeric scrub of western Honduras, some pine and even oak woodlands in Honduras, and into the pine savanna of northeastern Nicaragua. Although obviously xeric adapted, it occurs in diverse habitats, even into mangrove swamps in Honduras (Monroe, 1968). One wonders if the presence of narrowly overlapping or adjacent competitors such as P. pubescens, P. villosus, P. stricklandi, and P. muttalii is responsible in part for restriction of habitat in scalaris. It ranges from sea level to 7500 feet in the southwestern United States and, rarely, to 8500 feet in the highlands of Mexico.

Foraging Habits. Feeds primarily on insects, mainly beetle larvae and adults, hemipterans, caterpillars, and ants, the diet of Texas birds being 92 percent animal food (Beal, 1911). Paired birds often forage in proximity, sometimes within sight of each other, but at any rate calling sporadically in maintaining contact. In desert scrub the male and female of a pair forage in different sites. In one area (California) a male foraged entirely in large Joshua trees (Yucca brevifolia), utilizing mainly the trunk and branches and only 25 percent of the time amid seed clusters and blossoms. In contrast, the female foraged but 20 percent of the time in Joshua trees; when it did so, it mainly confined its activities to the clusters of blossoms. The bulk of the female’s feeding took place in small bushes and cacti. Occasionally the male
forcibly supplanted the female on a Joshua tree. Where large trees occur, males tend to forage more on trunks and branches; females on twigs, branchlets, and in smaller trees. Data are sparse, however, but in view of the female generally being much smaller than the male, a sexual foraging difference is likely. Ladder-backs move more rapidly and often fly farther from site to site than does its near relative, *P. nuttallii*. Techniques or modes include scanning, gleaning, probing, flicking of the bill in bark debris, prying, tapping, and, uncommonly, excavating. Males excavate more than females. The tail often is lifted clear of the bark as the birds forage. Pairs seem to circle their territory in a regular track. Birds drink water trapped in crevices in trees or other plants when they can do so.

**Voice.** Wing Rustling in the presence of another Ladder-back, or an intruder, may be a form of communication (threat, alarm). Drumming is uncommon; and in many (desert) areas, surfaces suitable for drumming are unavailable. Bouts of drumming are brief, usually 0.5 second or less, and the beats are delivered rapidly (rate about 30 per second). Drumming thus is less frequent, the bouts are shorter, and the tempo faster than in *P. nuttallii*. The call note is a variable Peek Call, 0.03 to 0.045 second in duration with the peak at 2.6 to 4.3 kilohertz. The call often is repeated, up to 32 times per minute, under situations of disturbance or alarm. Aggressiveness also is connoted by this call; drumming and Rattle Calls may be elicited by Peek Calls. Rattle Calls contain 12 to 25 or so call-notelike notes delivered at 9 or 10 notes per second; there is a drop in pitch and shortening of notes at the end of a call. The notes tend to be longer than call notes (0.03 to 0.068 second), with a peak at 2.9 to 3.9 kilohertz. Calls are slower and longer than those of *P. nuttallii*. Often associated with drumming and with Kweek Calls, the Rattle is aggressive in function. The Short Rattle Call is a distinct vocalization containing four or five notes resembling the short, terminal Rattle Call notes; it is given at a rate of 13 to 15 notes per second. The notes drop in pitch and may function differently from Rattle Calls (one given after copulation). The Kweek Call is a single note, double note, or series of up to five or six notes, long or short, involving a rise, a drop, a gradual rise, then a “plateauning” or final drop. Harmonic tones are strong, especially in long Kweeks. The form of the Kweek is of Type I (see *P. nuttallii*). Single notes peak at about 2.8 kilohertz and series notes at 3.5 kilohertz. In series the notes are uttered at 3 to 3.5 notes per second. Aggressive in context, Kweek Calls are heard during attacks, in Flutter Aerial Displays, during Bill Directing, and otherwise in encounters. The Wad Call (Winkler and Short, 1978) is a low, repetitive “tewk, tewk,” variably sharp and smacking as “tewk,” plaintive as in “kwah,” or sharp and clicking as in “wicka” (see Short, 1971f). The Wad Call is 0.098 to 0.135 second in duration with a pitch of 1.1 to 1.2 kilohertz (fundamental tone). It may occur with Kweek Calls and typifies confrontations between individuals at close quarters; the Kwah version is heard from mated birds, more or less as a contact note.

**Displays.** Displays have been described and figured by Short (1971f). Bill positioning postures include Bill Directing, the Bill Raised Posture, and the Head Turned posture. These are self-explanatory and involve more (Bill Directing) or less (the other two) threatening actions toward an antagonist. Crest Raising is not a striking display, since the nape patch is not restricted in the male but red occurs over the entire crown. The crown feathers are semi-erect in male–male encounters, the display serving as a threat, and in sexual advertising. Head Bobbing couples Bill Directing with Head Raised postures in an up-down movement. Even the Head Turned posture may be involved in Head Bobbing if the plane of the movement is directed laterally rather than toward an antagonist. The plane of movement, the speed, and the emphasis (whether high movement or slight movement with bill essentially directed forward) vary more or less independently. The display is rare and weakly developed in
scalaris. Head Turning is an active display leading to the Head Turned posture; it emphasizes a tendency to flee and often accompanies a stronger threat display; such as Wing Spreading, akin to an advance but with one's legs dragging. Head Swinging is a side-to-side movement, from Bill Directing to Head Turned postures, again varying in speed, plane of movement, and extent of the swing, all combining to indicate precisely the degree of threat posed by the bird. It may follow or precede Head Bobbing, Bill Directing, Head Turning, and Wing Spreading; and it often accompanies Wad (Wicka) Calls and Tail Spreading. As with all these displays, Head Swinging may be employed interspecifically (against P. muttallii). Wing Flicking is a partial lifting of the wings, a rapid movement seen in movies of attacking or advancing Ladder-backs. Wing Spreading is a conspicuous display, often related to the Flutter Aerial Display (see Short, 1971f, p. 73). Kweek Calls often accompany Wing Spreading, and an aspect of Head Swinging too is present. Often seen in an advancing bird during an encounter, Wing Spreading also has some aspect of “fear” or tendency to flee. The Flutter Aerial Display is a flight form of Wing Spreading employed in flying over or at an opponent. The wings are moved in a stilted, halting manner, well exhibiting the barred pattern of the wings and back. Kweek Calls usually accompany this display. It is a threat display seen in intense encounters, usually in the pair-formation period. Tail Spreading involves the spreading apart of the rectrices; sometimes the tail is tilted such that the lateral underside is faced toward an antagonist. A tendency to flee is evident in that this display usually is more fully developed in an attacked bird rather than in the attacker. A bird under attack that shifts to the attack closes its tail as it does so. Overt Attack is reflected by an advance toward an opponent, plumage sleeked, with Bill Directing and Wing Flicking. Supplanting Attacks often are repetitive and reversed, with a simple movement into the position occupied by an opponent; flight supplantings usually involve Wing Spreading Displays by the attacker.

**Interspecific Interactions.** These were the subject of a report (Short, 1971f), especially involving hybridization, interspecific territoriality, and encounters of scalaris and muttallii. Both sexes interacted sex for sex interspecifically, using virtually all of the displays and vocalizations just described. Except for differences in plumage associated with displays, differences in vocalizations, and some difference in Crest Raising, substantive differences between scalaris and muttallii in social behavior were not observed. The intensity and prolonged nature (for days) of their interactions suggest that one or both show some degree of inappropriateness of behavior, or that differences in plumage and vocalizations are somewhat effective isolating mechanisms. Where they are sympatric, both species feed similarly, at least during the breeding season, and their mutually exclusive territories are comparable in extent and details of vegetation (in the area of contact and sympathy they tend to favor different habitats: scalaris preferring smaller groves of trees with more xeric surroundings and muttallii favoring more extensive, lush settings with more mesic plants adjacent to the nesting area; but when they actually inhabit the same groves, their territories are essentially similar).

**Breeding.** Throughout most of its range, including such disparate areas as California, Guerrero, the Três Marias Islands, and probably Belize, scalaris nests in the spring, from March to July. Breeding seems to occur later in Oaxaca, recently fledged birds dating from August and September. Pairs may remain loosely attached throughout the year, especially in desert areas where there essentially are no competitors. The females are submissive but persistent in remaining near males early in the pair-formation period, and they are aggressive toward other females. The male's aggressiveness toward a prospective mate gradually wanes. Copulation occurs with the female crouching, uplifting her tail, and perching on a horizontal
branch. A Wad Call may or may not precede copulation. One male _scalaris_ engaged in a long series of encounters with a male of _P. nuttallii_ broke suddenly from the engagement at the appearance of its (conspecific) mate; the latter crouched, the male _scalaris_ mounted her briefly, then flew back to attack the male _nuttallii_.

The nest is excavated in various trees, including Joshua trees, as well as willows, cottonwoods, walnuts, oaks, hackberries, pines, mesquites, agaves, and diverse large columnar cacti (Bent, 1939). Probably both sexes excavate, but males seem to do most of the work. Usually three or four eggs are laid, but two to seven have been reported (Bent, 1939). Family parties rarely number more than four or five birds, however. The clutch size probably is only two or three in Central America south of Mexico. The incubation period is uncertain. Both sexes feed the young insects carried in the bill. There is no information concerning the care of the young and the relative amount of feeding by the adult male and female. Nor do we have details about the breakup of family parties. Molt follows breeding, generally in July to October, throughout the range of the species.

**Taxonomy.** Closely related to, and forming a superspecies with, _P. nuttallii_. It hybridizes sporadically with _nuttallii_ where the two barely meet in southern California, the race _P. s. cactophilus_ being involved, and it also hybridizes occasionally, with some introgression, in a 25- by 100-mile overlap zone in Baja California (race _P. s. eremicus_ involved). Within the latter area the habitats suitable for nesting are scattered, and either one or both species may occur (wetter, higher, denser vegetation preferred by _nuttallii_; more xeric, low, open vegetation attracting _scalaris_), with some hybrids at a given site.

Less than 10 percent of both species in California are affected by hybridization and gene flow, whereas 12 percent of _nuttallii_ and 30 percent of _scalaris_ in northern Baja California show signs of introgression. There is some character divergence (displacement) in northern Baja California _scalaris_, bill size being disproportionately greater in _P. s. eremicus_ compared with populations of _scalaris_ far from contact with _nuttallii_. _Picoides pubescens_ is another close relative of _scalaris_ (and _nuttallii_), able to overlap with _nuttallii_ in California, but not overlapping with _P. scalaris_, their ranges being complementary. Too many subspecies of _scalaris_ have been described, often based on trivial size or tone differences without adequate comparison. I would retain eight of the 14 races of Peters (1948). These are: (1) _lucasanus_ of southern Baja California (includes _soulei_); (2) _eremicus_ of northern Baja California; (3) _cactophilus_ (including _symplectus, centrophilus, giraudi, bairdi, mojavensis, and yumanensis_) of southeastern California, Utah, Colorado, and Oklahoma south to Guanajuato, Puebla, Mexico, Nayarit, and Michoacán; (4) _graysoni_ of the Trés Marias Islands; (5) _sinaloensis_ (including _azelis, lambi, and agnus_) of southern Sonora to west-central Michoacán, Guerrero, southwestern Puebla, and central Oaxaca; (6) _scalaris_ (including _ridgwayi_ and _percus_) of Veracruz and Chiapas; (7) _parvus_ of Cozumel Island and Yucatán; and (8) _leucopitirus_ of Belize and Guatemala south to northeastern Nicaragua. Northwestern _eremicus_ is large, dark, and long tailed. Southern Baja _lucasanus_ is long tailed, smaller, and whiter than _eremicus_ ("soulei" of Cerralvo Island tends toward _cactophilus_ but is based on a trivial, perhaps seasonal size difference and dark tail; _cactophilus_ and _lucasanus_ vary too greatly to admit such a subspecies). Variable _cactophilus_ is shorter tailed, shorter billed, and rather more broadly white barred dorsally. In some parts of its range (e.g., Lower Colorado Valley) tendencies toward even whiter color are evident, but neither these nor a clinal size decrease and other minor color shifts should be treated nomenclaturally, and I find "_centrophilus," "_symplectus," and "_giraudi," as well as "_mojavensis" and "_yumanensis_" (Short, 1968), indistinguishable from _cactophilus_. Insular _graysoni_ resembles _lucasanus_ but is shorter tailed,
slightly smaller sized, buffier, and less grayish brown below with finer streaks on the sides. Mainland sinaloensis is smaller than adjacent cactophilus, rather streaked below, with the malar mark broken. Southern Sonoran and Sinaloan birds are indistinguishable; southern birds ("azelus," based on a juvenile bird) are too slightly darker above and more bar spotted below to merit recognition; and "lambii" of Guerrero is not separable, though intergradient toward cactophilus. Eastern scalaris is smaller than adjacent cactophilus, the malar mark is whiter, and there are finer breast streaks. Southern Veracruz birds average very slightly smaller, but simply tend toward parvus and are not recognizable. Chiapas "percus" barely average darker above and paler below than Veracruz scalaris. Yucatán parvus is small, blacker on the malar area, more heavily barred on the abdomen, and less streaked (more spotted) on the breast and sides than scalaris; the back has broader black bars, and the forehead is black, not buffy as in scalaris. Finally, leucoptilurus is a weak race but may be distinguished from parvus by its slightly smaller size, darker (more buffy) underparts, paler (whiter) back, and weakly marked (weak abdominal bars, sparse breast spots) underparts.

Reference

NUTTALL'S WOODPECKER

Picoides [scalaris] nuttallii

Color Plates 51 and 52

Range Summary. Western North America.

Diagnostic Features. Little, 28 to 47 grams, wing length 96 to 107 millimeters. Pied black and white, very like P. scalaris but more contrastingly black and white; underparts whiter; markings below more barred or bar-spots; black patch on upper back; nasal tufts white, contrasting with black forehead; facial black markings larger, malar connecting with patch behind eye, both then connected with black of back region; white facial stripes narrower; and male has red in large nape-hindcrown patch sharply set off from white-spotted, black center crown to forehead.

Description. Bill moderately long, straight, tip chisel shaped, broad across nostrils. Upper back broadly black, giving way to barring on central back to upper rump; white bars narrower than black ones; lower rump and upper tail coverts black. Wings black with narrow white bars and, on coverts, spots; paler below. Shafts brown to black above, paling to whitish at bases; paler below, with white streak near bases of wing feathers and all white in white areas of outer tail. Tail black with white outer tips, white progressively increasing from third to fifth rectrix, and with one to three black bars near tips of white rectrices. Tail/wing ratio 0.60 to 0.68. Black malar stripe connects rearward with broad black patch on ear coverts and extends as large black mark in front of bend of wings; these black areas set off white throat, white line under eye, narrow white line over eye, and small white patch at rear of sides of neck (last connects with line over eye, but black area before it cuts it off from line under eye). White nasal tufts sharply set off from black forehead and forecrown; white spot-streaks frequently occur on forehead and forecrown (of males, see discussion to follow). White below, in fresh plumage tinged with buffy cream, especially on sides; marked with bar-spots, sometimes more streaklike, on sides of breast, these giving way to bars on flanks, rear of abdomen, and undertail coverts.
Sexual features: Males but slightly larger (2 to 3 percent heavier, trifle longer wings) than females, but with a shorter tail (1.5 percent shorter [Short, 1970b]) and a distinctly (10 percent) longer bill. Males have broad red patch on nape and hindcrown, usually showing some white spotting in red area, and white streaks or spots on black of forecrown, usually diminishing anteriorly on forehead. Females lack red, have black crown and nape, usually unmarked, but sometimes with few to many white spots (especially on forehead and on hindcrown), rarely fully streaked white on black. Immatures show less contrast ventrally because of duller markings and a less white, more buffy gray tinted background; their markings are more barlike below. Back whiter, and both sexes red on center of crown mixed with white spots or streaks, the red generally less extensive and more in scattered spots in females, more patchlike in males (but some birds with moderate red are impossible to sex). Eyes brown; legs and feet dark horn color to grayish olive; bill dark horn color to pale blackish gray, darkest on culmen.

Distribution and Habitat. Ranges from southern Oregon (Short, 1965c) through interior and coastal California to northern Baja California (Rancho Rosarito [Short and Banks, 1965]). From Oregon to central California it occurs mainly if not entirely in oak woodland of various types; where these become scarce in southern California and Baja California, this woodpecker largely becomes a bird of riparian cottonwood-willow-sycamore woods. Riparian situations tend to be favored for nesting sites if adjacent to oakwoods. Where oaks are common, some 70 to 90 percent of foraging is in such trees (especially Quercus douglasii and Q. agrifolia). Chaparral areas also are used for feeding if oakwoods are nearby. This is a lowland species, rarely ranging to 6000 feet (San Jacinto Mountains, perhaps Sierra Nevada Mountains).

Foraging Habits. Much foraging takes place in densely foliaged trees such as oaks and Ceanothus, in which the woodpeckers are little exposed to predation. Bare or isolated trees are infrequently utilized. At the edge of its range, this species may forage in such trees as Yucca brevifolia or mesquites (Short, 1971f). In spring the woodpeckers often are found on budding trees such as cottonwoods, seeking insects among the emergent leaves. At some seasons and places the sexes forage differently, males using trunks and major branches of riparian trees (61 percent of time) and females feeding in branchlets and twigs (87 percent of the time; Kern River area of California in March). This species mainly gleans for insects, probing, scanning, pecking, and fluttering from twig to twig. Only occasionally does it peck for any length of time or excavate (Short, 1971f; Miller and Bock, 1972). Movements often are lateral or tangential, without deliberate coverage of all surfaces. Miller and Bock (quoted in Short, 1971f, p. 65) noted that nuttallii less frequently pecks wood than does P. villosus or P. pubescens (they may not be correct about the latter, generally). Usually three or four blows, if any, suffice to enable it to extricate its prey. Sapsucking at sapsucker (Sphyrapicus) holes was noted by Miller and Bock (1972). Occasional flycatching, hovering to pick up insects, and gapine have been noted (Short, 1971f). The diet consists of 80 percent animal matter, beetles being most frequent (cerambycid, elaterid, chrysomelid beetles), with some Hemiptera, Lepidoptera, and ants. Some nuts (almonds, acorn mast), poison oak seeds, and elderberries are eaten; acorns play little role in its diet, despite the association of nuttallii with oaks.

Voice. Wing Rustling sounds have been noted and may accompany Flutter Aerial Displays (Short, 1971f).

Drumming is prevalent in winter and spring, as breeding activity commences; it often precedes or accompanies display interactions in encounters. Bouts last 0.7 to 1.5 seconds,
averaging 1 second, with an average of 19 beats per second. Both sexes drum, the male more frequently. Drumming can be elicited by Rattle Calls and drumming and is often alternated or interspersed with call notes and Kweek Calls.

The Pit Call is short and high pitched and is less frequent than the double call note, or Pitit Call. This call, which may evoke Rattle Calls and drumming, has the emphasis on the fundamental tone peaking at 3.4 kilohertz and is 0.023 second in duration; in double calls the pitch is slightly higher (3.5 to 3.6 kilohertz) and the separate notes are shorter (0.017 to 0.021 second). Longer versions grade into the Short Rattle and Rattle Calls. Moderate alarm or threat seems to be connotated by Pitit Calls.

Rattle Call notes are pitched higher (3.9 kilohertz) and are about 0.023 second in duration; the notes are very rapid, at 19.3 notes per second compared with about 10 per second for P. scalaris. The call is even and mechanical sounding. Short Rattle Calls are identical in form, but shorter. A call note or double call often commences the Rattle Call. Rattle Calls are agonistic vocalizations, often associated with call notes, Kweek Calls, and drumming during encounters; and they are used interspecifically as well.

The Kweek Call is variable, with two versions: The Type II Kweek Call resembles the Kweek Call of P. scalaris but is pitched higher (3.5 to 4.5 kilohertz), is clearer, and has weaker harmonics. The notes tend to be peaked sharply. This call lasts 1 to 3 seconds, with 5.16 notes uttered per second. The Type I Kweek Call has inverted U-shaped notes, variable in being pitched high (3.4 kilohertz) or low (2.4 kilohertz). Sometimes notes of the two calls are contained in one call, or intermediate notes may occur. More rapid than the Type II call, the Type I call has a faster tempo, at 6.14 notes per second. These calls function as threat displays and seem more aggressive in context than Rattle Calls. Functional analyses of the two types of calls are needed.

The Wad (Wicka) Call is variable, including a “smacking” type and a sharp form, both similar in pitch (1.07 to 1.31 kilohertz at peak) and duration (0.068 to 0.087 second). From three to 10 or more double notes (“ta-wik, ta-wik”) make up a series, delivered at 5.7 to 8.9 notes per second, faster than in P. scalaris. The Wad Call is employed during encounters, especially between equally aggressive birds.

A Twitter Call or Tewk Call (Short, 1971f), rendered “tew-tew-tew” or “tewk-tewk-tewk,” contains up to five or six notes with variable pitch and sharp inverted V-elements sonographically (see Winkler and Short, 1978). This vocalization typifies interactions at very close range, by members of either the same or opposite sex. It may have an appeasement function (Short, 1971f). This call was used by a male Nuttall’s Woodpecker against a male Ladder-backed Woodpecker during a long encounter between them.

Displays. Displays essentially are identical to those of P. scalaris (see p. 294), namely, Bill Directing, Bill Raised Posture, Head Turned Posture, Crest Raising, Head Bobbing, Head Turning, Head Swinging, Wing Flicking, Wing Spreading, Flutter Aerial Display, Tail Spreading, and overt and supplanting attacks. These were described earlier under scalaris, and many were figured by Short (1971f, pp. 73–75). Remarks here will indicate points of difference from scalaris. Crest Raising is more prevalent in nuttallii, in which the red patch of males is restricted, not diffuse as in scalaris. One sees males with the rape feathers raised during male-male and female-male encounters; females also show this display, but with less intensity and less often. Head Bobbing Displays were more common in nuttallii than in scalaris. The Wing Spreading Display of nuttallii was figured by Short (1971f, fig. 20G). Flutter Aerial Displays are frequent in the pair-formation period and seem primarily aggressive, associated with Kweek Calls. Other displays are structurally and functionally equivalent to those of scalaris.
Interspecific Interactions. The interactions between closely related, sporadically hybridizing nuttallii and scalaris have been mentioned under the latter (see also Short, 1971f, pp. 92-95). Nuttall’s Woodpeckers interact also with Downy Woodpeckers (Picoides pubescens [Short 1971f, pp. 95–96; Miller and Bock, 1972, p. 293]), Hairy Woodpeckers (P. villosus [Short, 1971f, pp. 96–99]), and sapsuckers (Sphyrapicus varius superspecies [Short, 1971f, p. 97; Miller and Bock, 1972, p. 293]); and Miller and Bock (1972, pp. 292–293) mentioned interactions of nuttallii with Ash-throated Flycatchers (Myiarchus cinerascens), Plain Titmice (Parus inornatus), House Wrens (Troglodytes aedon), and Acorn Woodpeckers (Melanerpes formicivorus). An instance of a Hairy Woodpecker pair attempting to occupy a territory within a dense Nuttall’s Woodpecker population was described by Short (1971f, pp. 96–97). In this case the birds were interspecifically territorial, probably as a result of the very simple and limited arboreal vegetation in the area of Baja California involved, an area normally outside the range of the Hairy Woodpecker. Interactions with the Downy Woodpecker include hybridization in southern California where this species is uncommon (Short, 1971f).

Breeding. Breeding activity commences in February and ends generally in June throughout the range of this woodpecker, but egg laying mainly occurs in April to early May. Members of a pair loosely maintain a bond through the winter, occasionally coming together with Wad Calls ensuing. Gradually they come to associate in foraging during midwinter, with considerable territorial and pair-forming activities occupying February and March. The female may give a Kweek Call prior to copulation, which is as in P. scalaris; low Wad Calls also may occur before copulation. There is no association of copulation with prospective nest sites. The pair often roost widely apart within a territory. Excavation of a nest takes place in February to April, a new nest being constructed yearly. Males do most of the labor (Miller and Bock, 1972), but in some cases females substantially assist them (Short, 1971f). The site is in a stub or a live tree, usually a willow, cottonwood, or sycamore, even where oaks are abundant; the former three types of trees are riparian, and territories usually are aligned along a quarter- to half-mile extent of streamside. Fence posts, oaks, and other trees sometimes are used for nesting (Miller and Bock, 1972). The nests vary in height from 4 to 35 feet or more. Three or four eggs normally comprise a full clutch, but up to six eggs have been noted by Miller and Bock (1972). Both sexes incubate, with incubation lasting 14 days. Young hatch from mid-April through May. Feeding is at a rate of 7 times per hour (up to 11 per hour in early morning), and both sexes feed about equally. The male incubates and broods at night until the nestlings are about 10 days old, after which he roosts elsewhere; half the diurnal brooding of young also is accomplished by the male. Fecal material is removed infrequently, more often by the male than the female. Young fledge about 15 days after hatching. Fledglings follow the adults, obtaining food for several weeks, but are driven away in late July and August. The annual molt follows the nesting period, from July to October.

Taxonomy. Closely related to P. scalaris and forming a superspecies with it. The two species interact behaviorally and hybridize sporadically in southern California and northern Baja California (see scalaris and Color Plate 51). Nuttall’s Woodpecker is blacker above than scalaris, with broader black bars, a strong black patch on the upper back, a fully black malar stripe, broad black ear coverts, a narrower white eye stripe, and a black mark on the sides of the neck from hindcrown to upper back. Males have a moderate-sized red nape patch; the nasal tufts are white; the white wing markings are smaller; the outer tail feathers are strongly white with little or no barring; the underparts are white, not buff; the ventral black markings are larger and tend to be more barlike; and its bill is shorter than that of scalaris. Moreover,
Picoides pubescens

the sexes of nuttallii are almost alike in size, whereas scalaris females are much smaller than males. The Nuttall’s Woodpecker also rarely hybridizes with the Downy Woodpecker (P. pubescens) in the southern extreme of the range of the latter in southern California. One male hybrid from an unknown locality and two female hybrids from near San Diego (Short, 1971f) indicate that, where uncommon or rare, Downy Woodpeckers may mate with Nuttall’s Woodpeckers to produce (F1) hybrids. The hybrids (Color Plate 52) tend to resemble pubescens in several traits, but show intermediacy in others and have the back barred, although not so broadly as in nuttallii. No subspecies have been described, and southern and northern birds are very similar, although the former show some introgressive effects of hybridization with P. scalaris that is immediately adjacent geographically to the southern populations of nuttallii (Short, 1971f).

References

DOWNY WOODPECKER

Picoides pubescens

Color Plate 52


Diagnostic Features. Little, 22 to 33 grams, wing length 83 to 105 millimeters. White to grayish or brownish below, generally without markings. Black above, except white down center of back. Black wings with white spots. Head with white stripe behind and above the eye, another below the eye, and a white band up the side of the neck; black crown, line enlarging from eye rearward, and mark posterior to malar streak. Male with narrow red nape patch. Differs from similar, sympatric P. villosus by small size, especially the small bill, and barring on white outer tail feathers (also softer, less sharp, call note; see discussion following).

Description. Bill rather short, slightly chisel-tipped, barely curved along culmen, broad across nostrils. Black across uppermost back, sides of back, rump, and uppertail coverts, with white down center of back. Black wings spotted with white on outer edges of primaries and on coverts in most races (gairdneri, some leucurus have no spots on most of coverts) and barred white on inner vanes of primaries and on secondaries. Shafts black or dull black above, except white in white parts of outer tail; below, gray to dull brown with white lateral streak, becoming entirely white on tips of primaries and in outer (white) tail feathers. Tail black at bases of feathers, central pair being all black; white distally on tips of second rectrices (most birds), as white partial bars, the white increasing toward the base outwardly in the third to fifth rectrices; outer white areas variably barred black, least so in glacialis, heavily in gairdneri and turati. Tail/wing ratio 0.58 to 0.71. Dull white to gray nasal tufts, white to grayish eye posteriorly to nape, where connecting across (in females), white to grayish line under eye, rising at rear of ear coverts up sides of neck; black crown (sometimes with few white spots), rear of nape to back, ear coverts and connection at their rear to posterior part of nape; and black from midmalar area, enlarging to rear and meeting black of upper back. Front of malar area mixed black and whitish. Throat and underparts generally a grayish white (pubescens and leucurus, latter usually whiter), pale buffy white (glacialis),
pale buff-gray (*turati*), or brownish gray (*gairdneri*), always paler on throat and more white on abdomen. Undertail coverts white, usually unmarked in *leucurus* and *glacialis*, and variably streaked or spot-streaked in others.

Sexual features: Sexes virtually alike in size, females being as heavy as, or heavier than, and as long-winged or longer winged than males, but with an actually and proportionately longer tail and a slightly shorter bill. Males have narrow, red band across nape, that area being white or white and black in females. Immatures browner, less black, more streaked on back; grayish or buffy below, usually with a few to many fine black streaks on the sides and flanks, or occasionally across breast (more streaked birds usually are barred on flanks). Males have red tips on black crown feathers from center of crown increasingly to rear of crown but not nape (the crown also shows a few to many white spots, especially on forehead). Females lack red on the brownish black crown, which variably is unsotted or bears few to many buff or white spots. Eyes brown to reddish brown in adults, pale gray or olive in juveniles (George, 1972). Legs and feet olive-gray, gray, or slaty. Bill dark gray to slate or blackish, paling to gray at the base of the upper bill and on the lower bill.

**Distribution and Habitat.** Widespread resident, partly and locally migratory in the northern part of its range, which extends across North America from southeastern Alaska, southern Mackenzie, Alberta, Saskatchewan, James Bay, and southern Quebec to Newfoundland; thence south in woodlands, cultivated areas, and forests to southern California, central Arizona, northern New Mexico, Oklahoma, south-central Texas, the Gulf Coast, and Florida.

It frequents diverse woodlands in the eastern part of North America, but distinctly prefers riparian (willow) woods in parts of the South and in the West generally; in the East, second-growth woods, oak-hickory woods, beech-maple-hemlock mixed forest, and other, chiefly deciduous forests are favored. It is very local in coniferous forest zones, being restricted to moist, deciduous (aspen and willow) growth in such areas. Altitudinal range, from sea level to 6100 feet in California and 9000 feet in the southern Rocky Mountains.

**Foraging Habits.** Feeds chiefly by scanning, gleaning, probing, and brief tapping, uncommonly excavating to obtain insects below the surface of the bark, but taps persistently to open galls on weeds and marsh plants in fall. Birds forage singly, generally, and move briskly; they are acrobatic, as they need to be in order to forage, as they do, on tips of leaf clusters and branchlets. Small trees of diverse kinds and the upper branches and twigs of large trees are favorite feeding sites, but there also is foraging on trunks and major branches of trees, in reeds, on poison sumac, and on milkweed and other weeds, especially in fall and winter. Like many related woodpeckers, much spring feeding is in clusters of incoming leaves and blossoms. There is sexual variation in foraging seasonally, but data are needed from many areas in order to corroborate preliminary findings. In Kansas and New York it has generally been found that females tend to forage low on trunks and major branches, whereas males utilize minor branches and the foliage. I have seen conflicting data. Also, males tend to be both more wary and more aggressive than females; hence females stay where they are or fly away directly as an intruder (human observer) approaches, whereas males tend to move upward into the foliage, even before the intruder is close, and to remain there when intruded upon. In the foliage both sexes are agile, hanging upside down, tapping and probing. Scaling of bark of dead elms was reported by Kilham (1961a) and was noted by J. A. Jackson (1970b). Flycatching is occasional during the spring and summer. Jackson found that there was seasonal variation of Kansas woodpeckers in utilization of trees and foraging modes and that there were sexual differences in foraging sites: Males fed on taller dead trees, but on lower live trees than did females; they used thinner branches and fed lower in the trees than
did females. Both sexes tap more, excavate more, and seek more subsurface insects in winter; they glean and probe more in spring and summer. Further investigation of foraging would be of interest, especially since females are as large as or larger than males and are longer tailed. About 75 to 85 percent of the diet is "animal," with beetles (larvae and adults) and ants being the favored items; but gall insects, caterpillars (cecropia, polyphemus, and other moth pupae are eaten [Waldbauer, et al., 1970]), ants, and plant lice also are taken. Some sap is eaten from holes of sapsuckers (Sphyrapicus), but insects also are taken there. Of the beetles eaten, only a small proportion are wood-boring forms (Beal, 1911). Various fruits and seeds are eaten when available, including poison ivy and poison sumac berries (thus spreading these noxious plants), cherries, blackberries, raspberries, and others. Downy Woodpeckers are the most common of the woodpeckers at suet feeders placed out in such great numbers.

**Voice.** Drumming is common in late winter and spring, bursts normally extending 0.8 to 1.5 seconds, at 13 beats per burst. Nine to 24 bursts per second have been reported. Drumming, Rattles, approaches, and various displays may be elicited by drumming. Slow drums may occur at 4 or 5 beats per second in relation to possible nest sites (Kilham, 1962b). Birds which lose a mate drum more frequently than do mated birds. Territoriality and attraction of a mate are two functions of regular drumming, which also may precede copulation (Kilham, 1974a). A wing rustling sound may be a display associated with alarm or interactions (Kilham, 1962b).

The call note is a Pik Call, peaking at 3.6 kilohertz at a duration of 0.033 second. It is associated with Rattle Calls, with rare double call notes, and with Scolding. It is the normal, low-intensity response to disturbance by an intruder, or alarm. Scolding Calls essentially are loose series of call notes, the note slightly lower in pitch than call notes at 3.3 kilohertz (0.032 second per note, about 5 notes per second). This call is heard from adults at a nest hole when they are disturbed. Playback (Winkler and Short, 1978) as far as 200 meters from the nest elicited Rattle Calls and call notes. Double call notes infrequently occur in place of call notes, being essentially similar to the more common double call of *P. nuttallii*.

The Rattle Call is a series of call-notelike notes, dropping in pitch and shortening through the call. Notes are slightly longer than call notes at 0.035 second, with a pitch of 3.4 kilohertz at the peak. Often it is introduced by a call note. Calls contain 11 to 25 notes uttered at 10 to 11 notes per second. Reactions to Rattles include approaches, Rattles, and drumming and may be given in response to other species such as Melanerpes erythrocephalus (Winkler and Short, 1978). Aggression and announcement are two functions of the Rattle Call. The Kweek Call is usually a series of long, inverted, U-shaped notes uttered at 3.5 to 4.0 notes per second, during agonistic encounters and especially accompanying Flutter Aerial Displays (see Kilham, 1962b). Wad Calls are short notes in series, called chirps by Kilham (1962b; see also tut-tit and khrae notes of Lawrence, 1967); soft in tone or harsher, these notes are used at encounters at close quarters. Young birds give Chirp Calls very like those of other *Picoides* species. Loud Chirp Calls are sharper notes characteristic of fledged young, peaked notes that become ever more like call notes as the young birds develop. Squeak Calls are long notes of young Downy Woodpeckers, the notes being variable (about 3.7 kilohertz at peak, 0.093 second in duration); in series they are about 0.23 second apart.

Various calls including noisy Screech Calls and Distress Calls are uttered as alarm notes. The Distress Call of *pubescens* is much like that of other pied woodpeckers, having strong harmonic tones and often being noisy. The fundamental tone peaks at 1.5 kilohertz; and the first, second (especially), and third harmonic tones are emphasized. Notes are 0.22 second in
duration. Some Distress Calls are Kweeklike; others are inverted, U-shaped notes often given in series. Sudden intrusion, alarm, and distress provoked by catching and holding a woodpecker evoke Distress Calls.

Displays. The displays of pubescens are closely similar to those described for scalaris and nuttallii. Important, as Lawrence (1967) has noted, is the position of the bill. In Bill Directing the bill is pointed at an antagonist and held momentarily; Head Turned Displays also occur, presumably somewhat submissive, in which the head and bill are turned to one side, away from an opponent, and held in place for a few seconds. From these low-intensity displays one can get Head Swinging Displays, the head and bill swinging from side to side (emphasizing shallow swings and head to front in aggressive birds, wide swings and head to side in intimidated birds); these are typical of encounters lasting more than a few seconds. Bill Directing obviously is one aspect of Head Swinging. Head Bobbing Displays, in which the head is nodded up and down, are less common and also involve Bill Directing at their most threatening aspect and a lowered or raised head in submissive aspect.

Aggressive birds have the plumage sleeked. Crest Raising occurs in both sexes and facilitates sexual recognition as well as reflecting aggression. Wing Flicking, mentioned by Lawrence (1967), is a mild threat display and is incorporated into an elaborate Wing Spreading Display (Kilham, 1962b; Lawrence, 1967), essentially identical to that of P. nuttallii and P. scalaris (Short, 1971f, p. 73). This waving and spreading over the back of the wings is incorporated with a weaving motion, more or less in the direction of an opponent, often accompanied by a Tail Spreading Display and a Head Turned Posture (the last two displays emphasize submissive aspects). A Flutter Aerial Display is derived from, and is a flight version of, the Wing Spreading Display. It involves a stilted, floating flight, either toward an opponent or over a perched opponent; or, at times when a conflict rages between birds of the same sex, an individual of the opposite sex may give this display over them. There is no question that this display is most prevalent in the breeding season and has reproductive components, but it clearly is not a "courtship" display (see Kilham, 1962b, 1974b). Not only is it utilized in unisexual encounters, but it frequently marks flying, supplanting attacks; I and one of my students (K. Fiala) observed an adult male using a Flutter Aerial Display against juvenile birds, and we saw the latter respond with incipient versions of the same display! A Tail Spreading Display, with the tail variably spread (showing the black-marked white tips) and sometimes swung from side to side as Head Swinging Displays occur, seems to be submissive to some degree, as it is muted in attacking birds and prevalent in submissive birds and in both birds in intense encounters, in which the antagonists are evenly matched and show much ambivalence. Attacks and withdrawals are similar to those of other species already discussed.

Interspecific Interactions. Interactions with many species of birds occur about feeding stations (see, e.g., J. A. Jackson, 1970b). Fortunately, its roosting and nesting holes are too small to permit the entrance of Starlings (Sturnus vulgaris). Encounters with Red-headed Woodpeckers (Melanerpes erythrocephalus) generally found these birds relatively undisturbed by threats and agitation of Downy Woodpeckers, although occasionally they supplant Downies (Fiala, personal comm., Long Island; Short, personal observ., Georgia). Hairy Woodpeckers (P. villosus) frequently encounter Downies and are almost always dominant over them. Occasionally, near a nest, or in other circumstances, the Downy may successfully attack a Hairy Woodpecker, compelling it to move off. Fiala (personal comm.) reported an encounter between an adult female villosus and a juvenile female pubescens, in which the former was the aggressor. The Downy responded with a Wing Spreading Display, evoking the
same display by the Hairy. The Downy approached the Hairy, then was forced to back away as the latter approached. The Hairy Woodpecker ceased its advance (backward, down the trunk) with the Downy in a Bill Directing Posture toward the Hairy, which then flew away. Head Swinging and Crest Raising Displays have been noted in *pubescens* reacting to human intruders and to Chipmunks (*Tamias striatus*). Hairy Woodpeckers may enlarge and take over roosting or nest cavities of Downies (Kilham, 1962b). Nuttall’s Woodpeckers (P. nuttallii) are generally dominant to *pubescens*, as mentioned earlier, and have hybridized with the Downy Woodpecker (see discussion following and under *P. nuttallii*).

**Breeding.** The breeding season commences in late winter in various parts of the range but is compressed into spring in montane and far northern, migratory birds that do not reach the breeding area until spring. Territories are loosely maintained and individual in fall and winter. Individuals, even of the same sex, may have roosting cavities within sight of one another and feed out from there in diverse directions with no aggression. Some indications of pair-formation activities occur in fall birds; Kilham (1962b) noted Flutter Aerial Displays, tapping near holes, and male supplantings of females in fall interactions between the sexes, as well as displays among two or even three (females) birds of the same sex that might relate to pairing activities or territoriality. Generally, drumming and increased use of call notes as location calls mark the onset of the breeding season in late winter. The sexes begin to duet by reciprocal drumming, the female drumming more often; at first there is no approach (Lawrence, 1967). Later, the male tends to approach, displaying and uttering Wad Calls, and the female begins to investigate holes and is submissive to the male. Triangles are common, but the bird on territory usually proves dominant in any such situation. As aggression diminishes between the prospective pair, the male may perform perfunctory copulatory movements against a twig before the female, perhaps flying away thereafter; the female may respond by vigorous drumming (Lawrence, 1967). The male’s crest is erect or semierect in all encounters. The male begins to follow the female about and to approach her closely, uttering low Wad Calls. He raises his crest, but spreads his tail widely. At this point both birds are effectively paired and attack intruders sex-for-sex; the mate may join in an attack with its mate, driving away the intruder, or may incite its mate and perhaps intimidate the intruder by drumming or by flying over in Flutter Aerial Display. Any loss of a mate from this point on results in resurgent drumming by the remaining bird. During the pair-formation period, both sexes drum near prospective nest sites, the female drumming more so.

Either sex may select the site of the nest (Lawrence, 1967). Both sexes excavate, the female more than in any of several woodpecker species studied by Lawrence (1967). Although 2 weeks or more may be used in excavating a nest, the bulk of the work can be accomplished in 2 days or so if the nest is lost near the critical egg-laying period (Kilham, 1974b). The nest site is in diverse trees (especially willows), fence posts, or telephone poles; rarely is it in a living limb of a tree, rather it is placed in a dead tree or in a dead branch of a live tree, between 5 and 60 feet, usually 12 to 30 feet, above ground. Often the entrance is amid fungus, lichen, or moss on the bark, these helping to camouflage the entrance. The nest is 12 to 16 inches deep and is dug 3 to 4 inches into the substrate, with an entrance diameter of $1\frac{1}{4}$ inches (Bent, 1939).

Copulation frequently occurs in proximity to the nest, usually on a particular branch, and commences before the completion of the nest. It is most frequent in the egg-laying period; as many as three instances have been reported within 17 minutes, and many copulations occur daily, presumably functioning in pair maintenance and nest site attachment, as well as for reproduction per se (Short, 1971f; Kilham, 1974a). There are few or no associated
vocalizations. The female invites copulation, choosing a horizontal branch and perch- ing crosswise on it, tail up, wings drooped, crouched with the head held back (Lawrence, 1967; Kilham, 1974a). In this species the male usually approaches for copulation in flight, hovering over the female before landing atop her. He holds her with his feet, mounting on, and gradually sliding away to the left side, his tail coming to lie forward along her right side, his head up and wings extended to maintain position. Cloacal contact lasts 4 to 10 seconds, and he may be atop her for up to 16 seconds (Lawrence, 1967; Kilham, 1974a). Abortive copulations are about one third as numerous as apparently successful copulations. Promiscuity occurs occasionally, with rapid and apparently successful copulation. Lawrence (1967) mentioned a strange female flying into a territory, following the territorial male about, soliciting, and copulating for a full 10 seconds before flying off. Kilham (1974a) discussed a situation in which he rescued an ill, egg-bound female that he nursed back to health in 2 days. On the afternoon of the day he picked her up, a new female appeared near the pair’s nest; prevented from approaching the nest cavity by the territorial male, she began a new excavation a short distance away. On that same day, she invited copulation; the territorial male copulated with her, but remained belligerent, attacking her frequently. Apparently the nest site was a crucial factor; but if his mate had not returned to him, the male presumably would have become less aggressive and eventually (rapidly) accepted the new female, with which he already had copulated. One wonders if some hybridization occasionally may occur through dalliances and infrequent copulations by a paired female that wandered to the territory of a male of a closely related species, for example, the hybridization of P. nuttallii and P. pubescens mentioned earlier.

Eggs number three to six, usually four or five, and are laid in May and June in such areas as New York, Kentucky, Colorado, Washington, and Alberta; during April to June in Illinois and California; and in April and May in the far south (Florida [Bent, 1939]). Incubation is by both adults and lasts 12 days. In relief at the nest, the incoming bird approaches quietly; there are low (Wad) notes; the crest often is erect; and the outgoing bird sometimes parts in Flutter Aerial Display flight (Lawrence, 1967). In the first week after hatching, as during incubation, the nest and eggs or young are attended constantly by one of the parents. The nestling period is 20 to 22 days (Lawrence, 1967). Fecal material is removed frequently by both adults; the fecal sacs are strong and clean (not mixed with sawdust), and the bird exits from the nest, flying well away from it before discarding the sac.

Food is carried in the bill to the young, first in small numbers, but later the bill is crammed with insects at each feeding. The adults share feeding about equally, with some variation from nest to nest. The average feeding rate is 15 times per hour, with intervals of 1 to 29 minutes; 80 percent of the intervals are under 5 minutes, and 2 to 3 minutes is the usual interval (Lawrence, 1967). There is the suggestion (Baier, personal comm.; Short, personal observ.) that the female slackens her feeding toward the end of the nestling period, and some females may not feed fledglings. The nestlings are louder and call more than do fledglings. As fledging nears, there is considerable postfeeding aggression by the young toward adults, with pecking of the bill at the face of the adult, which may be caused to fly; such aggressiveness may stimulate feeding, causing adults to feed more frequently (Baier, personal comm.). The male or female may fly across the area in front of the nest, apparently enticing nestlings to leave when ready to fledge. Fledged birds more or less follow the adults about; when actually with an adult they forage much less than they do when alone.

Rattle Calls are frequent as the fledglings develop and, although aggressive, seem to attract the parents, stimulating feeding (Fiala, personal comm.). The adults gradually become
intolerant of the fledglings through July, and drumming by the adults and Rattle Calls of young and adults become commonplace. Many aggressive encounters occur between juvénal birds and between juveniles and adults (Rattle Calls, call notes, Wing Flicking Displays, Crest Raising Displays, Wing Spreading Displays, Tail Spreading Displays, Head Turned Postures, and Head Swinging have been seen in juveniles interacting with adults). Regardless of the outcome of individual encounters, young birds end up outside the territory in which they hatched. Late in the fledgling period, feeding by adults is a delicate matter, the young and adults stretching the head and bill far out to pass food, as if holding their bodies as far apart as possible (Fiala, personal comm.). After becoming independent, the young may roost in the open or find an abandoned cavity in which to roost; in the fall they usually excavate a roosting cavity. The annual molt occurs from July to September or October, juvenal birds molting all but wing secondary feathers and some wing covert feathers (which are retained into adulthood) and adults undergoing a complete molt.

Migration. Regular migration occurs among most or even all birds in the northern edge of the species' range and in western mountains (the latter may migrate only downslope). Migration of Downy Woodpeckers along the Atlantic Coast is of regular occurrence. Individuals have been taken as far as 800 miles from where they were banded.

Taxonomy. Related closely to the larger Ladder-backed and Nuttall's woodpeckers (Picoides scalaris and P. nuttallii). Its range barely meets that of scalaris, the two being essentially allopatric; scalaris has a longer bill and is spotted below on a buffy background, pubescens being unmarked below (whatever the background color) and much blacker on the face than scalaris, with no barring above and a narrow red nuchal patch. The Downy overlaps with nuttallii in California. It has an unbarred back and no markings below; the malar does not connect directly with the patch behind the eye, and the nape patch of males is narrower in pubescens. In southern California, where nuttallii approaches the range of scalaris and becomes more predominately riparian, the riparian Downy is uncommon and has hybridized with nuttallii (Short, 1971f; see Color Plate 52). There is close resemblance of pubescens with the much larger villosus, with which it is broadly sympatric (pubescens shows black bars in its white outer tail, the outer tail of villosus being unmarked white). The fact of their sympatry, their many behavioral differences (foraging modes, territories, habitat preferences, display flights, pair relations, vocalizations), and the similarities between pubescens and scalaris—nuttallii suggest that pubescens is not related directly to villosus but is similar through parallel evolution or a combination of that with some character convergence.

Racial variation in pubescens is not great; and some putative, named subspecies are not worthy of recognition. Throughout most of its range, this species shows simple north-south variation (James, 1970). From Florida to western Alaska there is a 12 percent size increase, and I recognize only two races, the ends of the cline — namely, smaller (wing averaging less than 90 mm), browner (less grayish), and darker pubescens of eastern North and South Carolina, southern Georgia, Florida, southern Alabama, all of Mississippi except the northeast, Louisiana, and eastern Texas, intergrading with northern medianus (includes "nelsoni," northern birds being but 2 to 3 percent larger than north-central medianus) from Oklahoma and Kansas across to the southern Appalachians, southern Illinois, southern Virginia, and coastal Maryland. Larger medianus ranges from these areas to Newfoundland, northern Canada, and central Alaska. There are four additional, western races: (1) leucurus of the Rocky Mountains (mountains of southeastern Alaska to northeastern California, Arizona, and New Mexico; it is the largest, whitest subspecies, with black wing coverts and little black in the outer rectrices and under the tail, and includes "homorus" and "parvirostris"); (2)
glacialis of coastal southeastern Alaska (weakly separated from leucurus but more barred on the tail and abdomen and grayer below, tending toward the next form); (3) gairdneri of western British Columbia south coastally to northwestern California (darkest ventrally of all races); and (4) turati of inland Washington and Oregon and all but the northwest coast of California (5 to 8 percent smaller than gairdneri and less dark below, but nevertheless quite buffy gray). Picoides pubescens glacialis is smaller than medianus, with more barring, and it is grayer below.

References

RED-COCKADED WOODPECKER

Picoides borealis

Color Plate 53


Diagnostic Features. Little to Small, 40 to 55 grams, wing length 108 to 124 millimeters. Back and wings barred black and white (the only barred-backed species of its genus within its range), with a black cap and broad black malar stripe, and large white ear covert patch. White or grayish white below with black on sides of breast, spots from there posteriorly, and bars on flanks. Outer tail white with few bars. Males rarely show tiny red patch at sides of nape, otherwise sexes appear alike.

Description. Bill moderately long, slightly curved along culmen, small chisel-tip, and broad across nostrils. Black band across uppermost back, then black and white barred posteriorly to rump; lower rump and uppertail coverts black. Wings black with white spots or spot-bars on coverts, white bars elsewhere; paler below, gray with white bars. Shafts black or brown above except white on outer rectrices where they are white; below, deep brown (tail), hornbrown (wings), whitish (wing tips, bases), or white (outer white rectrices). Tail black, rather long, with grayish white appearing on outer vane toward tip of third pair of rectrices (white often in traces on second pair), and increasing in extent from tip toward base (-reaching it in outer rectrices), of fourth to fifth rectrices; weak to strong dark bars on inner vanes of outer two rectrices, one or no bar on outer vane of outer rectrices. Tail paler below, white areas often grayish. Tail/wing ratio 0.61 to 0.69. White nasal tufts, small line just over rear of eye, white in large patch from under eye through ear coverts, and white throat and chin; black from crown to upper back (this area blacker than rest of body), very small black line at rear of eye, and black over lores from forecrown to malar area, which is black (rarely with few white streaks) and enlarges posteriorly as it extends onto sides of breast. White below, often discolored (grayish to buff), with black mark from malar to sides of breast, this mark breaking into variably broad to narrow spots or spot-streaks (occasionally fine streaks) on sides, giving way to finer spots or to barring on flanks.

Sexual features: Females slightly larger than males (weights [see Ligon, 1968b]), wings slightly longer (0.5 to 1.5 percent), tail/wing ratio slightly greater, tail 3 percent longer, bill almost equal (male bill tends to be longer). Males with one small red spot at each side of the nape, the spot usually being hidden in crown feathers; females lack red in the plumage.
Immatures browner than adults, more dully marked below; males lack red on the sides of the nape, instead having a moderate dull red patch in the center of the crown; females closely resemble males, but have little or even no red in the center of the crown (very red-crowned females indistinguishable from less red-crowned males). Eyes dark brown, legs and feet dull grayish olive, bill dull black or blackish slate. Newly hatched birds have pink skin, white legs and feet, an egg tooth on the maxilla, and well-developed heel pads (Ligon, 1971).

**Distribution and Habitat.** Diminishing in numbers because of removal of old pine trees required for nesting, certainly threatened, but not truly endangered as yet. Resident from southern Maryland and southern Virginia south through the eastern Carolinas, plus most of Georgia to south-central Florida, and west across the Gulf Coastal Plain to eastern Texas; north to southeastern Oklahoma, Arkansas, and central Kentucky. This is a lowland and hill species, not ranging over 1500 feet in elevation. It frequents extensive pinewoods (of long-leaf pine, *Pinus palustris*; slash pine, *P. elliottii*; shortleaf pine, *P. echinata*; lobolly pine, *P. taeda*; pitch pine, *P. rigida*; and pond pine, *P. serotina*), requiring mature to old trees that are moderately well spaced. Frequent fires are important in maintaining open woods. The trees used for nesting purposes must be sufficiently old to have substantial strong heartwood (usually 70 years or older, but trees as young as 59 years have been used); a high proportion of such old trees are infected with red heart fungus (*Fomes pini*), sometimes considered a requisite for nesting of *borealis*, but possibly this “association” is coincidental.

**Foraging Habits.** Feeds singly or in pairs or loose groups, essentially family groups that tend to remain together the year round (see Breeding section following). In its uniform, simple habitat (pinewoods) that is not rich in insect foods, the pairs and groups are scattered, occupying large territories (see later discussion). Foraging sites include almost exclusively pines, and 90 to 95 percent of the feeding takes place on the trunks of pines (Morse, 1972). Ligon (1968b, 1970) found sexual differences in foraging in Florida secondgrowth pinewoods during the breeding season: males feeding on the upper trunk, above 15 feet, and in branches; females foraging on the lower trunk. In mature pinewoods of Louisiana during fall and winter, Morse (1972) found no sexual differences in foraging sites; this probably is the usual situation most of the year, in most places, but the larger size of females suggests that sexual differences in feeding are likely to occur. The woodpeckers rarely move into the understory and, in fact, prefer open pinewoods with no understory; they generally avoid deciduous trees and dead trees, except for those very recently dead. Beckett (1971) observed flycatching somewhat commonly in Red-cockaded. Bark scaling is important, the birds prying and probing, even scratching with both feet while backing down a trunk to scrape flakes of bark off the tree, exposing insects that are eaten. Some pecking occurs as well. The food is primarily insects; animal foods comprise 86 percent and plant materials 14 percent of its diet (Beal, 1911; Ligon, 1971). Beetle larvae and ants are the most important foods, but various orthopterans, hemipterans, hemopterans, moths, hymenopterans, damsel-flies, spiders, millipedes, and centipedes are also eaten. At the appropriate larval stage of the corn earworm’s (*Heliothis*) development, Red-cockaded Woodpeckers living in proximity to corn fields move into the fields, and for several weeks they may forage almost exclusively on these earworms (Baker, 1971), being more successful than any other predator of these pests. Conifer seeds are taken in fall and winter, but not to any major extent (Morse, 1972). Fruits and berries are used, in season, including wax myrtle, magnolia, poison ivy, wild grape, bayberry, pokeberry, wild and cultivated cherries, and black gum; blueberries also are eaten and even fed to the young. The woodpeckers take some pecans, as well.
Voice. Drumming is uncommon, perhaps partly due to the rarity of suitable dead trees and stubs in the pinelands occupied by borealis (Ligon, 1970). Both sexes do drum, on occasion, the bursts being rather soft. Drumming may be directed at an intruder on a territory; Ligon also noted that newly mated females tend to drum frequently about their territory in late winter and spring. That author listed no fewer than 12 vocalizations, although some of these appear to be but variations of one or another of the calls listed. The call note is a highly derived, distinctive vocalization, probably uttered more frequently than any other vocal signal of species of Picoides (Winkler and Short, 1978). Rendered “szreh” or “shrit” by Ligon (1970, p. 256), it is the longest call note known for any species of Picoides, being 0.072 to 0.128 seconds in duration. The peak of the note, with a fundamental tone of 2.6 to 3.0 kilohertz, is highly frequency modulated, the modulated frequency ranging from 0.064 to 0.088 kilohertz with a band width of about 1.2 kilohertz. The call rate is not great, but it is uttered incessantly, at least in territories occupied by a group (more than one pair)—lone birds call much less frequently. The call note is first heard from nestling birds and functions in maintaining contact as well as aggressively (at intruders or any sign of disturbance). The little-used Rattle Call of borealis contains a call notelike initial element, the regular notes being pitched at 1.8 to 2.8 kilohertz, and 0.034 to 0.06 second in duration. The notes of this call show some of the frequency modulation of the call note. The call may last 3 seconds or more, containing up to 30 notes, uttered at about 9 notes per second (Winkler and Short, 1978). Juvenal Rattle Calls are pitched higher and have more variable notes. Rattle Calls are aggressive in context. Short Rattle Calls contain few notes, and the notes have but two major peaks, compared with Rattle Call notes. This call is infrequent in adults, occasionally being uttered by an adult disturbed at the nest; nestling birds about to fledge, and fledglings, give this call more often when they are disturbed. The single or series Kweek Call notes are shrill, sonographically broad, inverted, U-shaped notes pitched at 2.1 to 4.1 kilohertz, with a duration of 0.045 to 0.072 second. In loose series one to two notes may be given per second. Heard year round, the call marks certain interactions, as after adults have fed and remain near a young bird (Winkler and Short, 1978). A Wicka Call, sounding like “tsi-vu,” repeated (Winkler and Short, 1978), or rendered “she-u” and “wic-a” by Ligon (1970, p. 256), is typical of interactions between adults and young after feeding bouts and especially in territorial defense or other encounters involving displays of two or more birds. The first element is loud and sharply peaked with distinct harmonic tones (“tsi-”) and a long dropping segment; the second element (“vu”) is long and low pitched, somewhat kweeklike. The “tsi” element peaks at 3.2 to 3.8 kilohertz; the “vu” element, at 1.8 kilohertz (fundamental tone). Each couplet is about 0.18 second in duration, and the notes are uttered in series up to 2 seconds or more at a rate of 3 or 3.5 couplets per second. Twitter Calls and transitions of Twitter-Wicka calls often are associated with Wicka Calls. The Twitter Call is frequently given by adults flying to the nest to feed the young. It was uttered by an adult frightened from the nest by Winkler (Winkler and Short, 1978) and was given by birds approaching one another. The bursts contain two to six notes, and several bursts may be uttered consecutively. Variants include a “tyet” version and a “peep” version. The former notes show strong harmonic tones, with a peak at 1.6 to 3.2 kilohertz and a duration of 0.011 to 0.03 second; there is an arrowlike appendage of this note and rarely a falling element that extends the note to as much as 0.038 second. Delivery is at about 6.5 notes per second. The “peep” version contains notes that are double peaked, the two inverted V- or U-shaped elements varying in pitch from 1.5 to 3.0 kilohertz and having a duration of 0.06 to 0.09 second. The rate of delivery is at 7.8 to 8.8 notes per second. The
"tyet" version is associated with Wicka Calls and situations in which they occur, whereas the "peep" version occurs with and may form transitions to Kweek Calls (Winkler and Short, 1978). Wad Calls are infrequent, resembling the "kwah" type of Wad Call of P. scalaris (peak at 1.4 kilohertz, duration 0.060 to 0.068 second in two calls studied by Winkler and Short, 1978). Chirp Calls of nestlings resemble those of other species and form transitions to the Loud Chirp Call and call note. Loud Chirp Calls of nestling and fledgling borealis have a broader introductory element and are louder than Chirp Calls, being also very like those of pubescens. Ligon's (1970, p. 256) "whew-whew" calls appear to represent Loud Chirp Calls. The Squeak Call may occur, but squeaklike calls heard from fledglings may represent an excited Loud Chirp Call (Winkler and Short, 1978). The distress call of a newly fledged young bird held in the hand by Winkler was characterized by a strong frequency modulation of 0.055 to 0.063 kilohertz, the pitch of the peak being at 2.0 kilohertz, with a duration of 0.37 second. Other calls mentioned by Ligon (1970, p. 256) ("shurz-u," a soft warning; "churt" of a bird as it flies to its roost; "chit" of a bird being chased; and "zrip" of a woodpecker preparing to roost) are in need of further study.

Displays. The displays of this uncommon woodpecker are in need of investigation, especially in view of its being somewhat more "social" than its congeners. There has been no mention of Bill Directing or Bill Raised postures; I am certain that these occur, and also a Head Turned posture (borealis alone of American Picoides has a full white cheek patch; that and the likelihood of male nape marks being visible laterally make it likely that this display occurs). Mengel (1965) mentioned bowing and fluttering, probably references to Head Bobbing (or Head Swinging) and Wing Spreading Displays. The former is not known otherwise, but Wing Spreading Displays are well documented (Ligon, 1970; Price, 1971). Ligon noted that the wings are spread at intruders into a territory, and also between mated birds. He ascribed a pair maintenance function to this display, but it is likely that he underestimated the aggression underlying even relationships of paired birds. Ligon (1970, p. 263) described Wing Flicking by attacking woodpeckers and wing fluttering in agitation as a bird flies to its mate—the latter probably reflects a Flutter Aerial Display. Crest Raising also occurs under conditions of disturbance (Ligon, 1970, p. 257); surprisingly, nothing is known of displays (perhaps Crest Raising, Head Bobbing, Head Swinging, Head Turned Posture?) and other circumstances in which the male Red-cockaded Woodpecker erects his tiny lateral nape patches.

Interspecific Interactions. Interactions have been documented with various birds, mammals, and reptiles; excluded from discussion are cases of use of abandoned, old nests of borealis by species of bees, squirrels, Wood Ducks, Starlings, Screech Owls, and others. Beckett (1971) suggested a form of symbiosis, in which foraging birds of several species (Bluebird, Sialia sialis; Carolina Chickadee, Parus carolinensis; Tufted Titmouse, P. bicolor; Pine Warbler, Dendroica pinus; Brown-headed Nuthatch, Sitta pusilla; and White-breasted Nuthatch, S. carolinensis) remain close to foraging Red-cockaded Woodpeckers, either catching insects that fly up ahead of the woodpeckers or feeding on insects exposed by their bark flaking. Flying Squirrels (Glaucomys volans) frequently use nests of the woodpecker but probably are unsuccessful in any attempts to take over an active nest. Other woodpeckers at times present problems at nests of Red-cockaded Woodpeckers. Dennis (1971) mentioned several cases of Pileated Woodpeckers (Dryocopus pileatus) enlarging and using cavities of borealis, but it is unclear whether these were used by the latter at the time of enlargement. The Red-headed Woodpecker (Melanerpes erythrocephalus) enlarges and uses borealis
roosting and nesting holes. Baker (1971) noted such use within a month after *borealis* had finished nesting in the hole. Ligon (1970, p. 262) mentioned a case of *erythrocephalus* taking over a *borealis* hole. Beckett (1971) reported that *borealis* usually can defend its nesting cavity successfully against both *M. erythrocephalus* and *M. carolinus*. The Red-bellied Woodpecker is the chief competitor of *borealis* for the latter’s holes (Ligon, 1971); and, if usually unsuccessful at usurping an active nest of *borealis*, it does manage to do so at times, even violently. Morse (1972) noted that *Picoides villosus*, though uncommon, broadly overlaps with *borealis* in Louisiana. Ligon (1970) cited three cases of aggressive encounters of *villosus* and *borealis* — in all three the Hairy Woodpecker was driven off. In Louisiana the Downy Woodpecker (*P. pubescens*) shares the pinewoods with *borealis*, and the two species segregate in foraging, *borealis* utilizing trunks of pines and *pubescens* feeding in the foliage and on limbs of pines and in deciduous trees. Ligon (1970, p. 275) reported three encounters of *pubescens* and larger *borealis*. In two cases *borealis* drove off the Downy, and in the other instance a Downy failed to drive away two Red-cockaded Woodpeckers feeding in a dead tree in which the Downy foraged.

**Breeding.** Territories are maintained year round, the birds remaining more or less permanently paired. Roosting holes especially are defended vigorously against conspecifics and other animals as well. Intrusions on the territory are met by both members of a pair, not sex-for-sex as in many woodpeckers (Ligon, 1970). A pair requires 35 to 50 acres of pine woods for a territory, individuals feeding out to 1500 feet from its center (Crosby, 1971; a minimum figure of 25 acres was given for a pair). Morse (1972) gave a density of 1.3 birds per 100 acres in extensive pinewoods of Louisiana. A clan comprised of three adult males, an adult female, an adult of unknown sex, two young females, and a young male held a territory of 162 acres, utilizing about one third of it each day and moving up to a half mile out from its center (Baker, 1971). Some territories about suitable roosting-nesting trees have been occupied for 50 years or more. A pair with no helpers or hangers-on successfully prevented intrusion by a group consisting of a pair, a one-year-old helper, and two juveniles in a series of encounters (Ligon, 1970). Most territories are occupied by pairs; Ligon (1970) studied eight groups — of which six were pairs; one, a group of three; the other, a group of five birds. The young birds rarely breed at one year of age (Ligon, 1971), and it is likely that most groups represent an adult pair and young of one or more previous years. Thus, the birds are not colonial in any sense, “clan” being the preferred term for such groups. Beckett (1971) found that there was never more than a single fully adult female per clan.

The occurrence of helper birds can be understood in terms of (1) the rarity of suitable nesting sites and strong dominance of the male with a nest-suitable roosting site; (2) the uniformity and simplicity of the habitat and related paucity of food requiring large territories; (3) very long dependence of the young on parents (Ligon [1970] reported a helper being fed by an adult male in the breeding season after the former was hatched); (4) greater fledging and survival rates at nests with helpers (Ligon [1970] noted 2.0 young fledged per nest with helpers, 1.4 young per nests of pairs without helpers); and (5) the greater experience gained by long-lived birds that act as helpers for several years. Helpers develop brood patches (Baker, 1971) and contribute greatly to the nesting effort (see discussion following).

Pair formation may commence in the late fall, when young of the previous year often are driven from the territory. Pairing birds fly about, calling (“szrek” [Ligon, 1970, p. 265]); the female may drum frequently, but not the male. Copulation or pseudocopulation occurs
in November and December, well before the breeding season, and seems to be functional in strengthening the pair bond. Usually the roosting hole of the male, or, in a clan, of the dominant male, becomes the nesting tree, and it may be used year after year. Occasionally the female’s roosting hole is used for nesting (Ligon, 1970). A roosting hole excavated by one male in January became the roosting site of another male the next year and was then used as a nest by the second male. Both sexes may excavate at a site to be used as a nest, and helpers also may be active. The nest is excavated between 12 and 100 feet up, usually in a living pine (Baker, 1971); the average height is 30 to 50 feet, and the pine is 59 to 167 years old (usually 76 to 92 years old). Bent (1939) mentioned many nests in deciduous trees in past times, but such trees are rarely if ever utilized today. The cavity is 8 to 12 inches deep, with an entrance 2 inches in diameter; the entry tunnel slants upward, preventing pitch as well as water from entering the nest. Nesting begins as early as February along the southern coast, but April to June is the usual nesting period elsewhere. The birds drill and maintain open pits above and around the entrance to the nest, such that resin flows freely. As this hardens, it is chipped away, so that flow continues. Much loose bark is stripped from the trunk of the tree to a great distance above and below the nest (the resin and stripped bark render the nest tree very conspicuous to humans). The resin and smoothed bark apparently function to repel arboreal snakes, a major predator (Dennis, 1971; J. A. Jackson, 1974), and possibly to some extent other predators. Copulation occurs in March through May and may be “triggered” by a territorial squabble (Ligon, 1970). The female perches and solicits either horizontally or perpendicularly; the male mounts and gradually falls off to the left, tail twisted under to enable cloacal contact; both birds may fall off the branch as copulation ends. Two to five, usually three or four, eggs are laid in April to June; these are incubated before the last egg is laid, and early-hatching birds usually gain an advantage (rarely are more than one or two young reared). Incubation is by both parents; Ligon (1970) stated that there is no evidence of helpers ever incubating at clan nests, but Lay, et al. (1971) mentioned two males incubating at one nest. According to Ligon (1970), the period of incubation may be as short as 10 days, but Beckett (1971) and others reported an incubation period of 12 to 13 days. The hatchling young are brooded almost continuously for the first four days, developing rapidly; they attain a weight of 40 grams by their twelfth to fourteenth day of age. Nest sanitation is mainly or entirely by the dominant male who roosts in the nest, the fecal sacs being carried away and discarded some distance from the nest.

The male parent feeds more than the female, up to three times as often; however, one helper male fed more often than the presumed parental male (Baker, 1971). The rate of feeding at a nest with helpers was from 5 to 27 times per hour; one bird (a helper) carried food to the young 18 times within one hour. Unlike the situation in related species, the feeding rate is great in the middle of the day and less early and late in the day. Sometimes helpers, where present, do not feed the young, but may pass food to other helpers or the parents (Beckett, 1971). Small food items (insects) are fed to younger birds, older nestlings getting larger insects and even some fruits (e.g., blueberries [Ligon, 1970]).

The nesting period is 22 to 28 days, according to Beckett (1971), or 26 to 29 days, according to Ligon (1971). Fledged birds follow the adults about and may forage a little after three days. However, they are dependent upon the adults for a long time, begging food 5 months after fledging and even the following year, as noted earlier. The fledglings appear to learn foraging techniques from the adults, even cooperatively assisting in scaling of large pieces of bark (Ligon, 1970, p. 271). The annual molt follows nesting, mainly in July to September.
Roosting. The importance of the roosting trees was noted by Ligon (1971). These are used for many years and are defended vigorously; some are used for nesting. Only one bird roosts in a hole. Some birds do not utilize holes but roost high in trees under overhanging branches. Such open sites are preferred over holes in dead trees. The woodpeckers excavate their roosting holes at any season, and completion may be delayed, sometimes for a year. One young male spent parts of December to April excavating a roosting hole; he acted as a helper to his parents in the ensuing breeding season (Ligon, 1970).

Taxonomy. Related to the *Picoides scalaris* - *nuttallii* - *pubescens* complex on the one hand, and more distantly to *P. villosus* and its relatives. Obviously rather specialized (e.g., in sociality, territorial defense in pairs, specialized nesting, habitat, long tail, nape and face patterns), *borealis* shares some vocal characters with the *scalaris* - *nuttallii* group; its dorsal barring, head pattern, and markings of the underparts particularly resemble those of *P. nuttallii*. It segregates habitat with *pubescens* in Louisiana (suggesting competition between rather close relatives), whereas *villosus* and *borealis* show no such segregation (Morse, 1972). Nevertheless, it is taxonomically rather isolated from its relatives. I treat *borealis* as monotypic (see also J. A. Jackson, 1971, p. 12); the southern Florida population has been treated as subspecifically distinct, but it differs (in smaller size) by only 4 percent from more northern birds. Also, the variation is clinal, with considerable overlap in measurements; so I see no merit in formal treatment of subspecies.

References

**STRICKLAND'S WOODPECKER**

*Picoides stricklandi*

Color Plate 54

Range Summary. Southwestern North America.

Diagnostic Features. Little to Small, 34 to 51 grams, wing length 103 to 120 millimeters. A brown woodpecker with heavy spots, spot-streaks and bars on the underparts. Brown ear covert patch, bordered above (anteriorly), below, and posteriorly by white. Crown and nape darker than body. Small white bars in wings; outer two tail feathers barred deep brown and white. Males have red nape patch.

Description. Bill rather long, straight, with a chisel-tip, and broad across nostrils. Above, brown to blackish brown ("aztecus," *stricklandi*), dark in fresh plumage, but fading to paler brown in worn birds; middle and lower back to rump white with brown or blackish brown bars in *stricklandi* and "aztecus," but more than half of birds of the *arizonae* group show evidence of barring; uppertail coverts brown to blackish, unmarked or with few white spots. Wings brown with small white bar-spots on outer vanes of primaries and broad white bands on the inner edges of all the wing flight feathers; below, barred pale brown and white. Shafts brown or horny brown above, dusky below with paler tips of wings, and whitish in white areas of outer tail. Tail darker than back, deep brown to blackish, with white barring on the outer two or three (outer tips of three only) feathers; paler below. Tail/wing ratio 0.54 to
0.65. Crown brown to blackish brown, usually paling on forehead where vague spotting is evident; nasal tufts mixed dusky and white. Brown ear covert patch connecting anteriorly through eye to forecrown, and dorsally at rear to front of nape. White lores, continuing as stripe under ear coverts, expanding on sides of neck to reach nape dorsally; also white line from just over eye posteriorly to the connection of brown crown and ear coverts. Malar mainly brown with some white streaks. Throat white, bearing few to many fine spots. Underparts variably marked, even in a single population, from mainly white with brown streak-spots, or droplet-spots on breast and sides, and brown spot-bars on abdomen to fully spotted or streak-spotted on the breast with heavy abdominal barring (worn birds have lost the light tips of the feathers and always are much more marked and darker than fresh-plumaged birds). Undertail coverts barred brown and white.

Sexual features: Males 6 percent heavier than females, with slightly longer wings and tail, but 9 to 16 percent longer bill than females. Male has narrow red nape patch in arizonea group, this being broader, extending to the hindcrown in the stricklandi group; the females lack red on the head. Immatures are darker ventrally with larger spot-streaks, more streaking, and stronger abdominal barring than adults; the tail is darker because of broader brown bars; and the dark hindneck mark is more extensive. Males have the anterior mid-crown to the front of the nape tipped with orange-red, whereas females have dull orange-red concentrated on the hindcrown (sometimes there is but a little red there), and extending anteriorly only as scattered tips of red on the sides of the midcrown. Eyes brown; legs and feet greenish gray; bill horn-brown, blackish on culmen.

Distribution and Habitat. Resident from the mountains of southeastern Arizona south through the Sierra Madre Occidental of Sonora, Chihuahua, Sinaloa, and Durango to Nayarit, Jalisco, and Michoacán, with scattered populations farther east in Mexico, Morelos, the Federal District, and on the Veracruz-Puebla border. It ranges from as low as 4000 feet in the northwestern part of its range to 13,500 feet in south-central Mexico (the stricklandi group in this area only occasionally occurs down to 8500 feet, whereas the arizonea group, ranging south to Michoacán, does not occur above 8000 feet [Davis, 1965]). Its close relative, P. villosus, occurs elevationally above the arizonea group but generally below the stricklandi group. Strickland's Woodpecker favors oak woods and pine-oak woodland, preferring oaks in the northwestern part of its range and pines in the southeastern region (in the latter, pines are prevalent and oaks are scarce).

Foraging Habits. Feeds in diverse ways, but excavates less frequently than its relative, P. villosus. The Strickland's Woodpecker commonly pries and probes, flaking off pieces of bark, then foraging on insects that are exposed by this technique. Occasionally the birds scratch with both feet downward on a trunk to free pieces of bark (Ligon, 1968a). Often they hang upside down, feeding under branches. They glean and probe among pine branchlets and needles; pry, probe, and tap in the bark of oaks; and probe into agave flower blossoms. Members of a pair do not feed together but maintain distant vocal contact. One or two birds may join interspecific foraging flocks of Bush tits (Psaltriparus minimus), Bridled Tits (Parus wollweberi), and White-breasted Nuthatches (Sitta carolinensis). There is seasonal change in foraging (Davis, 1965) in Arizona, the woodpeckers shifting from live trees to dead trees with the advent of the summer rains (larvae of wood-boring insects move about and prepare to pupate), and tapping becomes more common. Ligon (1968b) found sexual differences in foraging, males spending 74 percent of their foraging time on tree trunks and 26 percent in limbs and branches and twigs, whereas females utilized trunks but 39 percent of the time, concentrating more on limbs and branches (43 percent) and on twigs (18
percent). He also noted that males tend to peer into and examine crevices, to probe more often, and to excavate occasionally; females flake off bark more frequently, do less searching in crevices and excavating, and move from tree to tree more often than do males.* Diverse beetle larvae (cerambycids, weevils, and other curculionids, etc.) and other insects comprise the bulk of the diet, but fruits and some acorns are eaten in season (Bent, 1939).

Voice. Both sexes drum, but the male does so more frequently and in longer series. Territorial drumming occurs from specific drumming posts, usually a tall stub; it is loud and in long series. The drumming often is interspersed with Rattle Calls. There are about 21.5 beats per roll, and the rate is 27 beats per second. Bursts are from 0.75 to nearly 2 seconds in duration. Series of bursts may be at 3 to 7 per minute. Shorter bursts (average 11.8 beats per burst) are given by birds disturbed at a nest. In addition to territorial drumming that is spontaneous in the pair-formation period, drumming is used in reaction to drumming, to playback of drumming, to the approach of conspecifics, to call notes, to Rattle Calls, and to Kweek Calls (Winkler and Short, 1978). Tapping is a slow burst of two to 11 beats given by the male of a pair at the nest entrance, usually after Gliding Display Flights to the unfinished nest. It stimulates approach by the female, but also frequently caused Melanerpes formicivorus to supplant a tapping male. The Peep Call is very similar to that call note of P. villosus. The fundamental tone peak is at about 3.0 kilohertz, and it is prolonged; the note is 0.057 to 0.076 second in duration (Winkler and Short, 1978). It is a common call in all situations of disturbance; as a response to Rattle Calls, call notes, and drumming; during nest relief; and in encounters generally. The call notes of the Mexican striklandi group sound “exactly like those of arizonae” (i.e., the arizonae group [Davis, 1965, p. 573]). The Rattle Call is long, loud, and harsh, averaging 15.5 notes (7 to 30) per call. The initial note either is a call note or a note transitional between that and a Rattle Call note. The notes of this call show a frequency modulation, with a peak at 1.8 to 2.3 kilohertz, a duration of 0.053 to 0.076 second, and a tempo of 7 notes per second. Mated birds often give this call and usually evoke a responding Rattle Call or, from the female, a Kweek Call. Drumming, call notes, and Kweek Calls also elicit a Rattle Call. The response to playback of a Rattle Call is approach to the source, Rattle Calls, frequent call notes, and drumming. In this woodpecker the Short Rattle Call is essentially a short version of the Rattle Call, uttered infrequently during encounters; there is a very great interval (0.038 second) between the initial call note and the rattle notes of the main part of the call. The Kweek Call is a loud “kweek” given singly or (usually) in series. The duration of a note is 0.071 to 0.136 second, with a long (0.045 to 0.106 second) peak, inverted, U-shaped sonographically; the frequency of the terminal peak is 2.2 to 3.1 kilohertz. The Kweek Call shows transition to the Wicka Call. It is used in response to drumming and Rattle Calls, and especially by females in these responses; it also occurs during encounters. The Wicka Call contains notes with three elements: an initial, short, inverted, V-shaped element; a low element; and a final inverted, U-shaped element, sounding in full like “twuit” (Winkler, in Winkler and Short, 1978). The notes are given in series at about 4.5 notes per second and are typical of encounters at close range. The Twitter Call is a series of kweeklike notes, accompanying Head Swinging Displays during encounters. Notes are pitched at 1.4 to 2.2 kilohertz, last 0.019 to 0.091 second, and are uttered at 4 to 12 notes per second (variation is between calls, not within any given call). There is a tendency toward paired elements, resembling Wicka Call notes, and transitions to and combinations with Wicka and Wad Calls are frequent. The Wad Call is variable, sounding like

*Winkler (1979) recently extended and refined information on foraging.
Picoides stricklandi

317

“tyet,” or even a noisier “tshd,” and having an initial, dropping, clicking element, a noisy main section, and a sharp final element. Notes are 0.060 to 0.106 second in duration, pitched at 0.98 to 1.48 kilohertz (fundamental tone), and uttered singly or in loose series at a tempo of 3 or 4 notes per second. It is frequently uttered in close contact situations involving paired birds and in the Gliding Display Flight about the nest; it also occurs during encounters, shows transitions to the Twitter Call, and may be given in response to drumming (Winkler, in Winkler and Short, 1978). Chirp Calls of nestlings, and probably other calls of young birds, resemble those of P. villosus. Davis (1965, p. 573), in reference to all vocalizations heard from Arizona stricklandi, stated that its “notes sounded identical to those I had heard given by both arizonae and stricklandi in Mexico.”

Displays. Very poorly known, presumed to resemble those of P. villosus. Wing Flicking and Wing Spreading Displays during conflicts and approaches of Mexican birds were observed by Ligon (1968a). Various bill directing and retracting postures and movements are likely to occur. Winkler (in Winkler and Short, 1978) observed frequent Head Swinging Displays; he also documents occurrence of a Gliding Display Flight, in which the wings are held in place as a bird glides to its mate at the nest. The tail is not spread in Wing Flicking and Wing Spreading displays during encounters (Ligon, 1968a), but it is not known under what circumstances it occurs.

Interspecific Interactions. I noted earlier that the Acorn Woodpecker (Melanerpes formicivorus) may react to tapping by stricklandi, supplanting the latter. Bent (1939) mentioned a flicker (Colaptes auratus) appropriating a nest of stricklandi. Interactions with its congeners are likely but have not been documented. Strickland’s Woodpecker largely or entirely is isolated from P. villosus during the breeding season in the north but overlaps somewhat with it in Mexico, especially in Veracruz and about Mexico City (in the last area the two species differ most in bill size and shape). Likewise, in the northwestern region P. scalaris essentially breeds allopatrically, at lower levels than stricklandi, but the former occurs to some extent within the altitudinal range of stricklandi in Mexico (Davis, 1965).

Breeding. Territorial relations of paired birds are not known for fall and early winter. Ligon (1968a) described interactions of pairs at the border of their territories, females not interacting but males displaying strongly. He also mentioned that female-female interactions do occur at territorial borders. Excavation begins as early as January in Arizona and is by the male or by both sexes. Drumming and tapping are common at the site as the excavating progresses, and Gliding Display Flights mark the later stages of completion of the nest. The nesting cavity is 9 to 50 feet above ground in a dead stub of a large tree, usually, but nests also are excavated in agave stalks at lower heights. Oaks, sycamores, walnuts, maples, and agaves are used in Arizona; and pines are most frequently used in central Mexico. Nesting is primarily in April and May. Eggs number three or four and are incubated for 14 days by both parents (Bent, 1939). Most aspects of feeding the young, nestling development, and fledging are not known. Fledged birds follow parents about for some time, into July, after which family parties break up. Molt occurs in July to October.

Taxonomy. Closely related to Picoides villosus, with which it is partly sympatric. The two racial groups, stricklandi and arizonae, usually are treated as separate species, but I concur with Davis (1965), who cited the evidence pro and con, that they best are treated as conspecific. Their vocalizations are very similar or identical, and their coloration and morphology generally show greater similarities than, say, P. scalaris with P. nuttallii. The barred back of stricklandi is suggested in many specimens of the arizonae group. Differences between the stricklandi and arizonae groups stressed by Ligon (1968a) are subject to
interpretation on the basis of geographic isolation and adaptation to different habitats (e.g., stricklandi to more humid conditions). Morphological features of the bill, and some proportions differing in the stricklandi group, relate to its adaptation to living in pines. Counter-selection for adaptation to oaks, rather than pines, in the northern populations of the arizonae group, through the medium of gene flow into southern, more pine-dependent populations of that group, probably has prevented the latter from diverging to the degree shown by the stricklandi group (or, rather, if it is the northern arizonae group that has diverged from the ancestral form, gene flow has "carried" some of its features through the southern populations, such that both have diverged from stricklandi). The stricklandi group is characterized by its blacker, less brown coloration; smaller bill; less barred outer tail feathers; and broader red nape patch of males. In view of the conspecificity of these well-marked forms, I consider it especially inappropriate to recognize nomenclaturally subspecies that involve simple clinal variation with great overlap and geographical ranges that cannot be defined with preciseness because of the variation. Thus, I treat the stricklandi group as "monotypic," including the single subspecies stricklandi, recognizing that eastern populations tend to have less heavily streaked and barred underparts than those ("aztecs") from farther west (intermediate populations exist, and variation is clinal, involving essentially one trait). In the arizonae group I recognize arizonae, occupying southeastern Arizona to northern Sinaloa and adjacent Durango, and fraterculus (including "websteri") from southern Sinaloa and adjacent Durango to Michoacán. These are closely similar in color, perhaps averaging darker in fraterculus, but the latter is smaller (15 percent lighter in weight and 10 percent shorter wings, tail, and bill than Arizona birds, although variation is smoothly clinal; the entire southern Sonora and Sinaloa-Durango population must be considered intergradient). It seems to me impossible to characterize and delimit a subspecies between arizonae and fraterculus. Thus, three subspecies are recognized.

Reference

HAIRY WOODPECKER

*Picoides villosus*

Color Plate 55

Range Summary. North to Middle America.

Diagnostic Features. Little to Small, 38 to 94 grams (septentrionalis largest; sanctorum smallest, but approached by jardini, piger, maynardi, and southern audubonii); wing length 98 to 139 millimeters. White to brown below, unmarked in most races; outer tail feathers white to buff or brown, usually unmarked. Black above with white to brown center of back (barred in few subspecies). White and black feathered eyeering. Black line through ear coverts and from rear of malar to back; white to brown line over eye and between malar and ear coverts. Narrow red nape patch in male. Where sympatric with Downy Woodpecker (*P. pubescens*), it has longer, more massive bill and unmarked outer tail feathers.

Description. Bill long, slightly curved along culmen, broad across nostrils, with a chisel-tip. Geographically, varies considerably in size and color, especially color of pale areas. Crown, sides of back, rump, uppertail coverts, and most of wings are black; center of back variously white to buff (latter especially in harrisi, jardini, and sanctorum); back streaked in the pale
area in piger and terraenovae and barred in picoideus. Wings with pale barring on primaries, varying in size of bars; coverts with large white spots (septentrionalis, villosus, audubonii, maynardi) or white to buffy white spots reduced in other races or even lacking in some sanctorum, jardinii, icastus, orius, hyloscopus, and harrisii. Underwings barred black and white, coverts whiter or buffier (in browner races). Shafts black above, except white in outer rectrices; below, dusky, whitening at tips of primaries and secondaries, white in outer tail, and black in inner tail feathers. Tail black on inner two feathers, black base of outer feathers expanding inwardly, black sometimes reaching tip of third rectrix; outer feathers mainly white to brown (outer or fifth), becoming blacker inwardly to rectrix 3; usually outer feathers are unmarked, but sporadic birds of all races may show a spot or mark — some specimens of terraenovae and virtually all of piger and picoideus show some barring in outer rectrices. Tail/wing ratio 0.52 to 0.71 (extremes attained by sanctorum). Nasal tufts white with black tips of hairlike long feathers (white-bellied races), dusky or buffier in darker-bellied races, and restricted by black encroachment from crown in sanctorum, jardinii, and piger. Mixed black and white ring around eye. Black before eye and in broad band through ear coverts; malar anteriorly mixed buff or white and black, becoming even broader and fully black posteriorly, broadly joining black of back. Line from over eye to sides of nape usually white (buff tinged in sanctorum and other dark races) and broad, connecting with sides of nape, but narrower and sometimes very reduced posteriorly in sanctorum and jardinii. Broad to moderate white or buffy band from lores under eye and around ear covert patch to sides of neck, occasionally (septentrionalis) joining pale line over eye at rear of ear coverts. Throat white to buff or brownish. Underparts as throat, or paler; whitest in septentrionalis; tinged slightly gray or buff in villosus, audubonii, terraenovae, maynardi, and orius; buffier in piger and icastus; still more buff in sitkensis and hyloscopus; deep buff-brown in picoideus and jardinii; gray-brown in harrisii; and variably chocolatey buff to buff-brown (sometimes with white along flanks) in sanctorum. Underparts usually bear no marks other than a black extension onto sides of breast from malar region, but scattered birds of all races show streaks emanating from that lateral breast mark, and spot-streaks or streaks typically are found on the sides of the breast in piger, terraenovae, picoideus, sanctorum, and jardinii; flanks streaked in some birds of all races, but usually so in maynardi, piger, and terraenovae, and even barred in picoideus. Undertail coverts unmarked buff to white.

Sexual features: Males 12 to 22 percent heavier than females, with 10 to 16 percent longer bill, slightly to somewhat longer wings, but a tail nearly equal to or shorter than that of females; males have narrow red to red-orange nape patch, lacking in females. Immatures are browner, less black than adults; they are darker below, race for race, than adults; and they usually show some indication of streaks or bars on the underparts (young of terraenovae and picoideus generally are heavily barred on flanks) and barring in the outer rectrices. Sexes differ in that males have a moderate to large orange or orange-red patch on the center of the crown, and females have a much smaller red area on the crown. Eyes deep brown or reddish brown in adults, pale gray or olive in nestling birds. Legs and feet variably bluish gray, slate-gray, greenish slate, or black; claws black. Bill from deep gray to slaty black, paling (grayer) on lower bill.

Distribution and Habitat. Ranges across North America from tree line in Canada and southern Alaska south through the wooded portions of North America as far as northern Baja California, the Gulf Coast, several of the Bahama Islands (Andros, Little Andros, Abaco), Florida, and highland continental Mexico; thence through the Middle American
hIGHLANDS AND PINEWOODS TO COSTA RICA AND WESTERN PANAMA. IT IS VERY DIVERSE IN HABITATS, FROM OPEN JUNIPER WOODLAND IN THE FAR WEST TO VARIOUS CONIFEROUS FORESTS, RIVERINE FORESTS IN THE GREAT PLAINS AND ELSEWHERE, AND VARIOUS HARDWOOD AND MIXED DECIDUOUS-CONIFEROUS FORESTS OF THE EAST. IT FAVORS PINEWOODS BUT ALSO RANGES INTO HUMID MONTANE FOREST IN MIDDLE AMERICA. OCCURS FROM SEA LEVEL TO TIMBERLINE IN THE EAST; FROM SEA LEVEL TO 9000 FEET IN THE NORTHWEST AND TO 9500 FEET IN WYOMING; INCREASINGLY MONTANE IN THE SOUTHWEST (7000 TO 9000 FEET IN ARIZONA, USUALLY ABOVE 4700 FEET IN BAJA CALIFORNIA) AND MIDDLE AMERICA (ABOVE 6000 FEET IN MOST OF MEXICO, OVER 7000 FEET IN CENTRAL MEXICO, REACHING 10,000 FEET IN CHIHUAHUA, 11,300 FEET IN MICHOCÁN, TO 10,000 FEET IN CENTRAL MEXICO, REACHING 12,000 FEET IN VERACRUZ, FROM 3000 TO 9500 FEET IN GUATEMALA, FROM 5000 TO 11,000 FEET IN COSTA RICA, AND FROM 5200 TO 10,200 FEET IN CHIRIQUI, PANAMA). THERE IS SOME SEASONAL MOVEMENT OF AT LEAST SOME BIRDS IN THE FAR NORTH, AND DOWNSLOPE IN THE WEST, THE SOUTHWEST, AND MEXICO.

FORAGING HABITS. FORAGES ON THE TRUNKS AND BRANCHES AND IN THE FOLIAGE OF DIVERSE TREES AND BUSHES AT ALL HEIGHTS FROM THE GROUND; ON DEAD TREES, STUMPS, AND STUBS; ON VINES, BAMBOO, REEDS, AND EVEN SUGAR CANE (BENT, 1939); AND ON ROTTING BRANCHES AND OTHER FALLEN DEBRIS ON THE GROUND. FORAGING IS BY SCANNING, TAPPING, PROBING AND PRYING, SCALING OF BARK, AND OFTEN (MORE OFTEN THAN ITS AMERICAN CONGENERS EXCEPT P. ARCTICUS AND P. TRIDACTYLUS) BY EXCAVATING DEEP INTO THE BARK. IN CALIFORNIA IT MAY UTILIZE JOSHUA TREES (YUCCA BREVIFOLIA), TAPPING ON THE TRUNK AND BRANCHES AND PECKING AND TEARING APART OLD FRUITING CLUSTERS WITH MORE FORCE AND SPEED THAN P. SCALARIS. DURING SPRING IN THE WEST WHEN LEAVES ARE BuddING, IT FORAGES ON THE BUDS TO GET AT INSECTS, HAMMERING AT THEM AND TEARING THEM APART, IN CONTRAST TO THE PROBING AND SOFT TAPPING ON BUDS BY P. PUBESCENS AND P. SCALARIS (SHORT, 1971f). FEEDING SINGLY, OR LESS COMMONLY IN PAIRS, IT GENERALLY SEEMS NOT TO SHOW STRONG PREFERENCES FOR CERTAIN TREES, EXCEPT THAT IT CHOOSES DECAYED AND DEAD TREES OF VARIOUS TYPES; IN THE SOUTHWEST AND IN CENTRAL AMERICA IT IS ASSOCIATED FREQUENTLY WITH PINEWOODS. IT DOES REQUIRE LARGER TREES THAN DOES BROADLY SYMPATRIC PUBESCENS. KILHAM (1973) FOUND THAT FEMALE HAIRY WOODPECKERS IN THE NORTHEASTERN STATES PREFERENTIALLY FEED ON DEAD ELMS, WHERE THESE TREES ARE AVAILABLE, DURING AUGUST TO NOVEMBER AND FEBRUARY TO APRIL. HE NOTED THAT FEMALES FEED SUPERFICIALLY, MOVING RAPIDLY FROM TREE TO TREE, SCALING BARK AND TAPPING BRIEFLY, WHEREAS MALES WERE MORE DELIBERATE, EXCAVATING DEEPLY AND REMAINING FOR LONG PERIODS AT A FEEDING SITE. WHEN INSECTS EMERGE IN THE SPRING, BOTH SEXES SHIFT TO GLEANING, PROBING, AND OTHER MEANS OF OBTAINING INSECTS AT THE SURFACE. IN MIDDLE AMERICA THEY ASSOCIATE WITH MIXED SPECIES FORAGING FLOCKS DURING THE NORTHERN WINTER. THE DIET IS MAINLY INSECTIVOROUS (75 TO 95 PERCENT ACCORDING TO VARIOUS AUTHORS), FROM A THIRD TO A HALF OF ALL FOOD CONSUMED REPRESENTING LARVAE OF WOOD-BORING INSECTS, MAINLY CERAMBYCID, BUPRESTID, CURCULIONID, AND SColytID BEETLES (BENT, 1939; OTVOS, 1967) BUT ALSO OTHER BEETLES, ANTS (17 PERCENT OF DIET ACCORDING TO BENT), CATERPILLARS, ROACHES, SOME SPIDERS, AND MILLipedES. PLANT FOODS CONSUMED INCLUDE FRUITS AND SEEDS, SEASONALLY — NAMELY BLACKBERRIES; RASPBERRIES; SOUR GUM BERRIES; BERRIES OF VIRGINIA CREEPER, POISON IVY, AND POISON SUMAC; SOME CORN, ACorns, HAZELNUTS, AND BeeCOnUTS; AND THE SEEDS OF VARIOUS CONIFERS. SUET IS TAKEN AT FEEDING STATIONS PROVIDED BY THOUGHTFUL HUMANS. SUGAR MAY BE EATEN IN DRILLING INTO SUGAR CANE, AND SOME SAP IS CONSUMED AT DAMAGE FISSURES IN TREES AND AT SAPSUCKER (SPIHYRAPICUS) SAP HOLES (KILHAM, 1965).

VOICE. RUSTLING OF THE WINGS APPARENTLY IS A SIGNAL, A "BRRRUP" NOISE, GIVEN BY DISTURBED BIRDS, BY DISPLAYING BIRDS IN FLIGHT DURING ENCOUNTERS, IN LANDING OR DEPARTING NEAR THE NEST IF THE MATE IS NEARBY, AND PERHAPS AS A LOCATION SOUND IN LEADING JUVENAL BIRDS (KILHAM, 1966a, P. 253). RITUAL TAPPING OCCURS AT 2 TO 3 BEATS PER SECOND IN THE PAIR-FORMATION PERIOD.
Picoides villosus

This sometimes is associated with the nest site (Kilham, 1974) but is given away from there as well (Kilham, 1966a). It also marks some changeovers in excavation of a nest, and Kilham (1968, p. 294-295) noted a male tapping at the nest entrance after feeding the young. Displacement tapping or pecking occurs frequently when the birds are disturbed (Lawrence, 1967). Drumming occurs sporadically in the fall and becomes more frequent in late winter and spring. Kilham (1966a) studied one female that drummed hundreds of times a day, as much as 54 times in 5 minutes, in attracting a prospective mate to her foraging territory in the fall and winter. From one to 11 bursts ordinarily are given in 1 minute, but Kilham (1968) reported 16 to 20 bursts a minute from adults disturbed at the nest. The drumming is variable and at times indistinguishable from that of P. pubescens; usually it is more rapid in tempo in villosus (Short, 1974c, p. 15). Both species show a slowdown throughout a burst. Average bursts last 0.9 second and contain 23 beats. It may be given at special sites around the margin of a territory, but it also is delivered during agonistic encounters associated with Rattle Calls, Kweek Calls, and drumming, and during disturbances at the nest. The Peek Call of villosus is peculiar in that the fundamental tone, peaking at 3.0 kilohertz, is faint or absent in most calls; hence the emphasis is decidedly high pitched, on the initial harmonic tone at 5.8 to 6.0 kilohertz. At times the peak itself is lacking entirely, yielding a sharp clicking note (representing the rising and falling legs of the note, sonographically) very similar in form to the Kyik Call of P. arcticus (Winkler and Short, 1978). The Peek Call is 0.049 to 0.076 second in duration, and it is uttered as a location call, as an agonistic and alarm note at any disturbance, and during aggressive encounters in association with Rattle and other calls; fledged birds employ it toward their parents, as well. This is the “speak” note of Kilham (1966a, p. 251, and elsewhere). The Rattle Call, often termed the whinny or sputter (Kilham, 1966a), is introduced by a call note (Peek Call), followed by 19 to 40 notes resembling call notes but pitched lower (1.6 to 2.4 kilohertz; often pitched at the higher frequencies initially, then falling somewhat) and of shorter duration (0.022 to 0.038 second, average 0.031 second versus about 0.060, on the average, for call notes). The tempo is at 17 to 20 notes per second. Rattle Calls mark agonistic encounters and may be challenges to intruders. Short Rattle Calls are common in fledging birds and are used as alarm calls (see Kilham, 1960; Lawrence, 1967) by adults. There is an initial call note, as in the Rattle Call, but preceding the other notes by a greater interval than in the Rattle; then 5 to 14 Rattle-like notes that are characterized by multiple (double, triple) peaks (Winkler and Short, 1978). There is a drop in pitch toward the end of the call. The Kweek Call closely resembles that of P. striklandi, having a short initial segment and a long, loud, inverted U-shaped main portion (see Short, 1971f, p. 83, fig. 25B). It is variable but seems always to be uttered in series, “kweek, kweek, kweek,” at about 3.5 notes per second (notes about 0.10 to 0.15 second in duration). Kweek Calls function as threat displays (Short, 1971f), often in concert with Flutter Aerial Displays, preceding an attack and are associated with Rattle Calls. They are employed interspecifically, as against P. nuttallii (Short, 1971f, p. 96). Wicka Calls, not analyzed sonographically, are well known in villosus (“wick-a-wick-a”; see Kilham, 1966a, p. 252 and also aggressive-social notes of Lawrence, 1967) and serve in association with Head Swinging and other displays during encounters at relatively close range. A similar call, the Twitter Call, containing double-peaked notes in series, like a fast Wicka Call, with compressed notes, is given under similar circumstances during encounters. Wicka Calls are well known as the “jeek,” “tewk” or “teuk,” “eejew-jew,” “intimate” notes of Kilham (1960, p. 262; 1966a, p. 252), Lawrence (1967, p. 22), and Short (1971f, p. 89). There are two types (Winkler and Short, 1978): a smacking Wicka Call that emphasizes a strong, clicking,
initial dropping element over a range of frequencies and a faint terminal element with no central portion, and a type that emphasizes a middle portion. Both notes are given in series. They are low pitched in the fundamental tone (0.53 to 0.82 kilohertz), and their average duration (0.064 to 0.066 second) is about the same. Both forms occur in conflict situations, especially between mated birds, and in association with aerial displays and with ritual tapping. The nonsmacking form also is found in association with copulations, perhaps mainly being uttered by the female (Kilham, 1966a); both often are associated with nest-site ceremonies, and a strongly sexual component possibly is involved. Short (1971f, p. 89) reported “tewk” notes from a male villosus in conflict with a male nuttallii, and it may be that appeasement, of major importance in pair-formation activities, is a major function served by these notes. Chirp and Loud Chirp calls of young villosus closely resemble those of striicklandi, tridactylus, and other congeners, being series of short, three-parted notes. The Chirp Call is the “begging” and general disturbance call of nestlings, and the Loud Chirp Call is the “begging” call of the late nestling and fledgling period. The latter call contains longer, higher-pitched, louder notes emphasizing the main portion of the note rather than the initial and terminal parts (Winkler and Short, 1978). Nestling and fledgling birds occasionally utter a related call, the Squeak Call, being essentially a long (0.06- to 0.09-second) Chirp or call note with a squeaky tone, pitched at 2.3 kilohertz. It is uttered after feeding when the parents are nearby.

Displays. Various displays have been described, especially by Kilham (1960, 1966a) and Lawrence (1967). These are discussed in the framework provided by Short (e.g., 1971f; 1974c). The position of the head and bill is fundamental in displays, and bill positioning postures are frequent in encounters of low intensity. Bill Directing is commonly observed, the aggressive bird leaning forward, plumage sleeked, extending the bill and head forward, usually toward an antagonist. Bill Directing may immediately precede an attack, in which case the bill may be open. The Head Raised Posture (see fig. 4a of Lawrence, 1967, p. 12, and fig. 1 of Kilham, 1969, p. 170) is aggressive, perhaps emphasizing appeasement; when facing an antagonist, the uplifted bill is less threatening than in Bill Directing, and the crest (of males) is not visible from the front. Head Raised Postures directed away from an opponent assume a Head Turned attitude, emphasizing the raised bill and showing clearly the sex of the displaying bird. Crest Raising at times accompanies the previous displays and those following (see fig. 4c of Lawrence, 1967, p. 12). It clearly shows the sex of the displaying bird and the extent of its “threat” (e.g., aggressive full Crest Raising with sleeked plumage versus less aggressive half raised crest, partly fluffed plumage). Head Bobbing Displays (fig. 4c of Lawrence, 1967, p. 12) involve movement and bill position. A male bobbed its head twice, then gave a Wicka Call and Head Swinging at a female (Short, 1971f, p. 77). Skutch (1955, p. 27) also described up-down head movements, with sideways movements (Head Swinging). Head Swinging is another agonistic display emphasizing the position of the bill, alternatingly forward (attack) and to the sides (tendency to flee). Such swinging movements were reported by Bent (1939) and figured by Lawrence (1967, p. 12, fig. 4b). The head may be held high (escape tendency), as in some “bill-waving dances” Kilham (1966a, 1969) has described and I have reported (Short, 1971f, p. 78) for a male villosus in simultaneous Head Swinging displays during an encounter with a male P. nuttallii. Kweek, Wicka, or Wad calls may accompany Head Swinging. The Wing Flicking of aggressive birds preparing to attack has been noted by Kilham (1966a) and Lawrence (1967) and was mentioned in this description by Kilham (1969, p. 171) of an encounter between two males: “The two males resembled puppets operated by strings as they faced each other, a
short distance apart on a limb, with bills up (Head Raised) and tail spread (Tail Spreading), then started jerking heads to and fro (Head Swinging), half-starting their wings (Wing Flicking) and making toy-like chewk, chewk notes.” Wing Spreading Displays were noted by Bent (1939) and have been discussed by Kilham (1966a; 1969, p. 170) and Short (1971f, p. 78). The wings are spread in an encounter by both attacking birds moving on foot or in landing beside an opponent after a Flutter Aerial Display, or by a bird assuming the display in defense. Flutter Aerial Displays (the floating and flutter flights of Kilham, 1969) incorporate Wing Spreading into a stilted flight in which the wings are alternately fluttered and held fixed. It is used in conflicts, even interspecifically (against P. nuttallii, Short, 1971f, p. 96), and may be given by the aggressor or by a pursued woodpecker (Kilham, 1969, p. 171) I also observed it in use by a female, Kweek-calling, as she flew to a spot where her mate was; copulation ensued. I have not encountered the so-called courtship flights of Kilham (1966a) or “duet flights” (1960, p. 262) he described, but these apparently are not a major display because he observed them only in Maryland populations, not in his well-studied New Hampshire birds (Kilham, 1966a, p. 264). Tail Spreading, figured by Lawrence (1967, p. 12, fig. 46) is a spreading of the tail, sometimes involving side-to-side movement of the spread tail in conjunction with Head Swinging Displays. The Tail Spreading discloses the white or buff outer tail edges. I believe this to be an appeasement display, as it is pronounced in submissive birds and reduced or absent in aggressive woodpeckers during an encounter (Short, 1971f, p. 80).

**Interspecific Interactions.** Interactions with mammals such as flying squirrels (*Glaucomys*, sp.) and Starlings (*Sturnus vulgaris*) are frequent and have been documented by Kilham (1968). That author reported a case of Starlings dispossessing a Hairy Woodpecker pair from two successive nest holes, forcing that pair to excavate a third nest, at which they were successful. Kilham also noted that such pressure by Starlings affects the general behavior of the woodpeckers. Bill Directing and Head Swinging displays were used against Starlings (Kilham, 1968, p. 289). Other woodpeckers than congeners may interact with *villosus*. I have seen Northern Flickers (*Colaptes auratus*) driven from *villosus* nest trees, and vice versa. Kilham (1969, p. 180) reported an interesting conflict between Yellow-bellied Sapsuckers (*Sphyrapicus varius*) and *P. villosus*. A pair of the latter had excavated a nest when a male sapsucker visited the tree, perching above the nest at which the female *villosus* watched. The sapsucker attacked and drove the Hairy away. The next day, a similar occurrence transpired; this time both birds fell, grappling to the ground. The male sapsucker drove the female Hairy away from the tree, chasing it. The male *villosus* arrived, however, and the sapsucker attacked it; both fell, clutching each other, to the ground, but the Hairy Woodpecker then chased the sapsucker away.

Among congeners, many interactions occur with the broadly sympatric *P. pubescens*. Usually no interactions occur, and these species occupy overlapping territories without aggression. At feeding stations the much larger *villosus* is dominant, but occasionally, near a nest of *pubescens*, the latter will drive *villosus* away. Lawrence (1967, p. 59) cited a case of two female Downy Woodpeckers engaged in an encounter in a tree, when a female Hairy happened to fly to the same tree; the Downies simultaneously redirected their attack together driving the female Hairy away. The latter returned to the tree and again was besieged and chased away by the two *pubescens*, which then resumed their intraspecific encounter. In the west, *villosus* usually is segregated elevationally and by habitat from *P. stricklandi*, but it does overlap in some places and in the nonbreeding season (Davis, 1965). The Hairy overlaps territorially with *P. albolavatus* and usually with *P. nuttallii,*
although interspecific territoriality, with intense encounters, was documented in one case in Baja California between *nuttallii* and *villosus* (see discussion under *nuttallii*, p. 300, and Short, 1971f, pp. 95–96). The Hairy Woodpeckers employed Peek Calls, drumming, Kweek Calls, Wicka Calls, Bill Directing, Head Bobbing, Wing Flicking, and Flutter Aerial Displays interspecifically against *nuttallii* in this case and in seven other interactions in California (Short, 1971f, p. 95). I never saw *nuttallii* fully supplant a *villosus*, but in Baja California the persistence of several pairs of *nuttallii* constantly interacting sex-for-sex with *villosus* disrupted the latter. The Hairy Woodpecker interacts with the three-toed woodpeckers *P. arcticus* and *P. tridactylus* (Short, 1974c, p. 38) and may hold interspecific territories with them — this needs verification. Interactions of *villosus* with *arcticus* are marked by dominance of the latter, which is larger sex for sex. I noted Peek Calls, Rattle Calls, and Wing Spreading Displays by *villosus* against *arcticus*.

**Breeding.** Pairing occurs through the winter in the North, with breeding in March through June there; in Middle America breeding is earlier, in February and March, and possibly earlier (Skutch, 1955). In the Northeast, females maintain a fall and winter territory that may be only 250 meters on a side; the mate of each female that has previously bred usually maintains an adjacent territory. The female's territory becomes the focal point of the eventual breeding territory. The female drums in this territory. Both members of a prospective pair begin drumming more frequently, in duets, early in the year; new pairs drum much more than older pairs. From January on, the birds forage in pairs during part of each day. The breeding territory is established by March, at which time the female may tap at symbolic nest sites, often in trees not suitable for nesting (Kilham, 1966a). The male may fly in Flutter Aerial Display to the tapping female. False copulations then may ensue. Females begin to tap at possible nest sites, attracting males to them, and they probably select the actual site in most cases. Both sexes excavate the nest (perhaps unequally, the female less so [Lawrence, 1967]), which either is newly constructed each year or, if an old cavity is used, is reshaped and reworked. About 1 to 3 weeks are required for the excavating, depending to some extent on the hardness of the wood. The progress is more leisurely in previously mated pairs, which commence excavating earlier than newly mated pairs. Wood chips are tossed out the opening and are rarely carried a short distance away. The nest is in diverse sites, from 4 to 60 or more feet above ground. Deciduous trees, usually alive, are selected in the East, including maples, poplars, butternuts, beeches, hornbeams, birches, oaks, and orchard trees; sometimes dead branches or trees are used. In the West nests are mainly in conifers, and usually dead ones, and in Central America dead trees and stubs also are the usual nesting site. There is some evidence (Kilham, 1968) that individual pairs choose the same tree species yearly. The nest is 10 to 15 inches in depth, with an opening about 2 inches across for North American birds. Copulation, figured by Kilham (1966a, p. 255, fig. 1), usually is initiated by the female. She may tap to attract the male, which may drum or approach directly; she may fly in Flutter Aerial Display, giving a Kweek Call, to the vicinity of the male; or, if near the nest with the male nearby, she may give Wad (Tewk) Calls from a prospective copulatory site. Once they are in proximity, the female usually utters Wad (Tewk) Calls, perches crosswise on a branch, crouches, lifts her tail, and solicits; the male “wobbles” his way toward her, not in flight as in *pubescens*. Wing Flicks, calls (either Wad or Wicka Call), may Head Swing, then mounts her from the side. Copulation is shorter than in *pubescens*, about 6 to 10 seconds (Kilham, 1974a), and it may occur near the nest or away from it. The female may give a pantomime of copulatory movements at a ceremonial “nest” site (as noted earlier, sites unsuitable for a nest) a month or more before actual copulation,
which has been observed as early as 29 February by Kilham (1966a). There is some evidence (Kilham, 1969, p. 175) that territorial encounters of males stimulate copulation attempts when the female is nearby — a male broke from such an encounter to copulate with its mate. Eggs number three to six, usually being four in the North and three in Middle America. Incubation is shared, the male incubating at night, and it lasts 14 to 15 days (Bent, 1939). According to Kilham (1968), the female forages initially in the morning before replacing the male on the eggs, and she is replaced by the male for the night sufficiently early to enable her to feed before dark. Nestlings develop rapidly; at 18 days of age, however, they still retain remnants of the white “egg tooth” at the tip of the bill and have the fleshy mounds at the corners of the bill. The parents share feeding and give Wad Calls, sometimes with Head Swinging, when they happen to meet at the nest or in nest relief during incubation (Lawrence, 1967) — the approaching bird may arrive with crest erect, and the departing bird may exit in Flutter Aerial Display. Insects are carried in the bill, singly or in numbers. The feeding rate varies greatly, from five to 25 times per hour (Lawrence, 1967), averaging 10.4 times per hour. Lawrence found that feeding often occurred every 2 minutes or so, and rarely (3.5 percent of time) were there gaps of over 20 minutes. She noted that the male fed slightly more often than the female, but this varies; I once saw a female feed five times consecutively in 11 minutes, and Kilham (1968) had females feeding three or four times as often as males. The male appears to carry more food in its bill, it often excavates for this food, and it secures food farther from the nest than the female (this allows him to “patrol” the territory to some extent). The female carries less food, forages closer to the nest, and secures food more often by gleaning and probing (Kilham, 1968, p. 288). The male tends to dominate when both adults are at the nest. The female generally is more attentive to the young, but in time of danger the male assumes the main defensive role (Kilham, 1968, p. 288). Fecal material is carried from the nest by both sexes, but mainly by the male, according to Kilham, who found that the fecal sacs tend to be weaker than in P. pubescens and more covered with sawdust. Lawrence (1967) found that birds carried the sacs in Flutter Aerial Display to a particular area near the nest, where they were discarded; I have not found this to be true of birds I studied (sacs carried in different directions, no display). Skutch (1955) noted that nest sanitation ceased in his Central American Hairy Woodpeckers at about 17 days after the hatching of the young. Fledging occurs at 28 to 30 days of age (Bent, 1939; Skutch, 1955; Lawrence, 1967). Fledglings can forage to some extent by 3 days of age, but usually follow the adults for a considerable time. Kilham (1968, p. 297) stated: “Under usual circumstances Hairy Woodpeckers cease to share the job of feeding their young after nest-leaving, and are followed about in succeeding weeks by a particular offspring which is cared for entirely by one parent.” This implies that but two young can survive. The molt follows nesting, usually from July to October (May to August in Central America) and is complete in adults, but secondary feathers and some wing coverts of the juvenile plumage are retained until young birds are over 1 year old and undergo that year’s (annual) molt.

Roosting. Individuals roost singly in holes they excavate or in old cavities; Skutch (1955) found that males tend to have new cavities, females old ones. Most Central American roosting holes are in decayed or dead trees at the edge of forests or in fire-killed stubs.

Taxonomy. The Hairy Woodpecker is related most closely to P. stricklandi, to P. albolarvatus, and to the three-toed woodpeckers P. tridactylus and P. arcticus (Short, 1971f; 1974c). It is more distantly related to P. borealis and to the scalaris - nuttallii - pubescens group. Hybridization with P. scalaris occurred once (A. H. Miller, 1955; see also Short,
1971f, p. 62) in a situation where the latter species was outside its range; the hybrid closely resembles hybrids of *P. pubescens* and *P. nuttallii*. The often-remarked similarity of broadly sympatric *P. pubescens* with *villosus* is attributed to parallelism, perhaps enforced now or in the past by selection maintaining or enhancing their similarities. Actually, *pubescens* and *villosus* are quite different in habits (foraging behavior, territorial requirements, habitat, aspects of pair formation, and nesting behavior); *villosus* is much larger, has a much heavier bill, and generally lacks black in the outer tail. Kilham (1966a, p. 262), remarking on the courtship, pair formation, displays, some vocalizations, and copulatory behavior of *villosus*, stated: “All of these patterns of behavior are in marked contrast to those of the related Downy Woodpecker.” These differences in fact permit the broad sympathy of these species that we observe and argue against relationship between them being at all as close as that obtaining among largely allopatric, habitat-segregated, hybridizing *P. scalaris*, *P. nuttallii*, and *P. pubescens*. The Hairy Woodpecker seems particularly closely related to *P. stricklandi* and to *P. tridactylus* (Short, 1974c; also note resemblances of *P. v. picoideus*, juvenile *P. v. terraenovae*, and *P. s. stricklandi* to *P. tridactylus*). As is often the case in American birds, many races have been described, some of them very weakly characterized and of little or no significance. Insular subspecies are particularly well marked, and *villosus* seems to represent an ancient lineage, tying in phylogenetically with most of the American pied woodpeckers. Two subspecies occupy certain of the Bahamas: *piger* of Abaco, Mores and Grand Bahama islands, and *maynardi* of Andros and New Providence islands. The former is distinctive in its brownish throat contrasting with a pale breast; its dusky sides and flanks are barred and streaked blackish, and there are usually one or two bars on the white part of the fourth rectrix. In size, *piger* almost matches southern Middle American *sanctorum* as the smallest of Hairy Woodpeckers. In contrast, *maynardi* closely resembles mainland *villosus* (*P. v. audubonii*), being much paler below than *piger* (although showing some buff on breast); it lacks the markings on the sides and flanks; the outer tail area is unmarked white; and the back is whiter. It differs from *P. v. audubonii* in its slightly buffy tone below, its slightly smaller size, and its markedly (12 to 15 percent) shorter bill. Southeastern continental *audubonii* is grayish buff tinted below and less white than more northern *villosus*; it is blacker dorsally and is smaller (9 percent shorter wings and tail); its range is from eastern Texas, southern Arkansas and western Kentucky, up the Mississippi River to southern Illinois and southern Indiana, and east and southeast to Florida, the Carolinas, and southeastern Virginia. Whiter, larger *villosus* occurs north of *audubonii*, with which it intergrades, to eastern North Dakota, Minnesota, southern Ontario, southern Quebec, and Nova Scotia, and west to eastern Colorado, central Texas, and the Ozark Mountains. Forested Newfoundland is occupied by *terraenovae*, slightly grayer below with a tinge of buff compared with *villosus*, but blacker generally with reduced white wing markings, narrower white on the back with some black markings there, narrower white face markings, and finely streaked flanks. Juveniles of the race are distinctly buffy below with strong barring on the flanks and streaks on the sides; they are so black that they closely resemble *P. tridactylus*. Occupying a vast range is *septentrionalis*, occurring from the northern tree line in Alaska and across Canada, southward to southern Canada in the East, Lake Superior, northern North Dakota, Montana, eastern and south-central British Columbia, and south to northeastern Oregon, eastern Nevada, central Utah, western South Dakota, Colorado, and north-central New Mexico. This race is white like *villosus* but is longer winged (by 8 percent), is longer tailed (by 10 percent), and has a larger bill than *villosus*. I find no constant differences between Rocky Mountain birds (“*monticola*”) and northern *septentrionalis* (there is a slight tendency toward buffy
traces below in southern Rocky Mountain birds), and these are merged. In the Northwest, picoideus of the Queen Charlotte Islands is distinctively barred across the back, like P. tridactylus; it is strongly streaked on the sides and flanks, has traces to strong barring in the outer tail area, and is very dark below (darker than sitkensis, near harrisi, but browner, less gray). The southeastern Alaskan coast and northern British Columbian coast form the range of dark sitkensis, resembling harrisi, but buffer, less gray and brown below; the wings are more spotted and barred with white than in harrisi, tending toward septentrionalis-villosus. More southern picoideus and harrisi are slightly smaller than sitkensis, which approaches septentrionalis in size. Picoides villosus harrisi occurs from southern coastal British Columbia southward coastally to Northwestern California. As with many forms from this humid area, it is very dark, gray-brown, on all paler surfaces; it is blacker dorsally than sitkensis, with much reduced spotting in the wings (this trait characterizes the remaining races to be discussed). It also is longer billed than sitkensis, although smaller in size generally. Racial variation in the western United States is complex, and I am unsatisfied with my tentative results. Western California south to northern Baja California is occupied by birds of the race hyloscopus, barely smaller (3 to 5 percent) than harrisi, paler below, buffer (less gray-brown) with a whitish tone; most individuals are separable on a color basis alone (“scrippseae” is a synonym [Short and Crossin, 1967, p. 292]). The Cascade Mountains of southern British Columbia southward through central Oregon to the Sierra Nevadas of eastern California, the mountains of southeastern California, Nevada, southern Utah, northern and central Arizona, western and central New Mexico, and extreme western Texas form the range of variable orius, intermediate between septentrionalis and hyloscopus in size (8 percent longer wings and tail than hyloscopus, 5 percent smaller than septentrionalis). This race is paler, less than hyloscopus; but, like that form, harrisi, and others, and unlike septentrionalis, it has reduced white wing markings; its bill is as long as in septentrionalis, despite its smaller size; and it is buffer below than that form, tending toward icastus and hyloscopus. I cannot separate “leucothorectis” (New Mexico, Arizona), based on molting and subadult birds, from more northern, western orius, nor could Phillips et al. (1964). Southeastern Arizona, southwestern New Mexico, and Mexico from the northwestern border (Sonora, Chihuahua) and southern Coahuila to Durango, Jalisco, and Zacatecas form the range of icastus, barely paler than hyloscopus, but buffer below than orius and slightly shorter winged and shorter tailed than orius but with a distinctly shorter (by 12 percent) bill. This race intergrades with jardinii (includes “intermedius,” which applies to intergradient jardinii ≈ icastus, “enissomenus” of Guerrero, and “hylobates” of Morelos) of San Luis Potosi, Tamaulipas, and Veracruz to Oaxaca, Guerrero, and Jalisco. This endemic Mexican race, like sanctorum, harrisi, hyloscopus, orius, and icastus, has little white in the wings; it is smaller and much darker below than icastus and blacker about the head with narrower pale markings. Finally, Middle America from Chiapas through Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and western Panama is occupied by sanctorum, a variable form somewhat darker below than jardinii and 12 percent shorter winged and 15 percent shorter tailed (the bill is proportionately long, being only slightly shorter than in jardinii) than that race. Monroe (1968, pp. 218-219) showed that “fumeus” and “parvulus” were synonyms of sanctorum; Nicaraguan birds are particularly whiter on the flanks, but some such variants are found in Guatemala and Honduras as well, there being great variation in sanctorum generally. It remains only to state that Panama and Costa Rican birds (“extimus”) match sanctorum in color and barely tend to be smaller (wings and tail 3 percent shorter) in size than Honduran-Nicaraguan sanctorum. Birds from Chiapas to Panama are so closely similar in size and color
variation insures such overlap that I see no justification for separating any subpopulation racially; hence I treat all of these populations as P. v. sanctorum.

References

WHITE-HEADED WOODPECKER

_Picoides albolarvatus_

Color Plate 53

Range Summary. Western North America.

Diagnostic Features. Small, 50 to 79 grams, wing length 118 to 130 millimeters. Distinctive, all-black woodpecker with a white head and throat and a large white wing patch. Males have narrow red nape patch.

Description. Bill rather long, slightly curved along culmen, chisel-tipped, and broad at the base. Entire upperparts, rump, all of tail, most of wings, and all of underparts except throat are black with a slight blue gloss. Wings with large white patch formed across feather vanes at bases to centers of primaries; sometimes black along inner primary shafts separates one or two white spots on these primaries. Shafts brownish black, becoming paler in white area of wings; below, blackish in tail, dusky at base, dusky brown in wings, but white appears in parts of the white wing-patch area. Head white, usually creamy or faintly Buffy in tone, and clearer white on sides of head and throat than on crown; crown feathers black based, sometimes showing through; black usually evident as obscure line in ear coverts, extending backward to nape; very worn birds often show gray or black patchiness on crown and dark line behind and above eye posteriorly. Underparts black from breast to undertail coverts; occasionally there is a narrow white edging of some feathers.

Sexual features: Males 10 percent heavier than females, wings and tail slightly longer than in female, but bill 8 percent (albolarvatus) to 14.5 percent (gravirostris) longer in males. Males have narrow red nape patch; nape white in females. Immatures browner than adults, less shiny black; white in wings tends to be more extensive toward tips of primaries but is broken up by black cross-bars to a greater or lesser extent (wings may appear white spotted in field). A few juvenal-plumaged birds show faint, pale ventral barring on the abdomen. Young males have extensive orange-red from the center of the crown to the nape. Females vary from barely a trace of red on the hindcrown to a condition approaching or equaling that of less red males (a few females may lack red entirely). Eyes brownish red to dull red, legs and feet grayish olive to olive-gray, bill slaty black.

Distribution and Habitat. Mountains of western North America from southern interior British Columbia (uncommonly) through central Washington and Idaho, to Oregon, western Nevada, and California as far south as the Cuyamaca Mountains. Inhabits coniferous forests in which pines are a major element, especially ponderosa pine (Pinus ponderosa); generally
in pine, fir, and mountain hemlock woods, utilizing Coulter pines (Pinus coulteri), Jeffrey pines (P. jeffreyi), incense cedar (Calocedrus), sugar pines, sequoias, and Douglas firs, in addition to ponderosa pines. It occurs from about 3500 feet (California) to an elevation of 9000 feet, showing some postbreeding downslope movement from higher elevations for the winter.

**Foraging Habits.** Studies of this woodpecker have concentrated on its foraging. The sexes appear to forage separately, with somewhat different foraging sites in the southwestern corner of the range (race gravirostris), but similar foraging modes and sites elsewhere (Idaho [Ligon, 1973]). Perhaps where ponderosa pines are the main feeding tree, there may be little divergence possible between the sexes in foraging. Both sexes pry, probe, scan, and flake bark from trees; they often are quiet, and excavating and loud tapping are not common. Ligon (1973) found that in Idaho both sexes fed on seeds in cones, primarily on ponderosa pines, the sexes often coming together in April (and possibly through the winter). By June they were foraging for insects in the clusters of growing needles. In August they shifted to trunk foraging and to growing new cones — these were opened and seeds eaten (he found that females often visited cones opened by males). The sexes overlapped completely in foraging, although females tended to approach the ground more than did males.

In contrast, Hilkevitch (unpubl. ms.) found that in southern California, although feeding similarly, females preferred ponderosa pines and incense cedars, whereas males preferred Coulter pines, showing less interest in incense cedars and ponderosa pines. However, females shifted to Coulter pines in April to September, thus being near the males in the breeding period. The females used the trunks of Coulter pines, males using the cones, exclusively. Ligon (1973, p. 866) reported a male driving a female from a cone three times; thus, part of the segregation in foraging may be attributable to active male dominance. Over half the food consists of vegetable matter, mainly pine seeds, which at times makes up to 90 percent of its diet. The animal food consists of spiders, boring beetles, fly larvae, and other insects (Bent, 1939). Flycatching also was reported by Bent. The foraging results in much pitch getting on the plumage, this being transferred to eggs in the nesting period, discoloring them. Drinking of water has been reported frequently, perhaps a reflection of the strong vegetable diet of this woodpecker.

**Voice.** Both sexes drum in bursts of 25 or 30 beats, given at about 22 beats per second. It particularly marks territorial encounters, but also may be employed in courtship (G. Robinson, 1957). Ritual tapping at a nest hole by a male, after flights to it with Kweek and Twitter calls, was noted several times a day by Winkler (personal comm.), the tapping being very soft and deliberate. The call note usually is a double-noted call or Peek-it Call (Short, 1971f), somewhat similar to the Pitit Call of P. nuttallii. Recorded notes are 0.038 and 0.03 second in duration, respectively, for the first and second note; the latter peaks at 2.3 kilohertz (Winkler and Short, 1978). Sometimes triple notes are given and longer series that grade into Rattle Calls. The call, a location note and aggressive note, was associated with Rattle and Short Rattle calls. Only poor examples of recordings of Rattle Calls exist, but these are similar generally to that of P. villosus. Notes are pitched at 2.9 kilohertz and are 0.023 to 0.038 second in duration; some notes show double peaks. The Rattle was associated with single and double call notes and with Short Rattle Calls uttered during a conflict (Winkler and Short, 1978). The Short Rattle Call contains four to 11 notes, closely resembling those of the Rattle Call but showing more frequency modulation. There may be a drop in pitch through the call. Series of Short Rattles were uttered by an individual perched near an encounter among three other White-headed Woodpeckers. Kweek Calls are of two types and
resemble those of *P. villosus* and *P. stricklandi*. One type, given in series, contains notes 0.075 to 0.091 second in duration, each having three sections — a lead, dropping element; an inverted, U-shaped element; and a terminal dropping element. The pitch of the main element's peak is at 1.8 kilohertz, and harmonics are strong. The tempo of the notes is about 4.8 per second. The second type, delivered during agonistic encounters, contains a dropping element, followed by a loud, slowly rising element, then a terminal, inverted, U-shaped element. Notes are longer, 0.11 to 0.15 second in duration, and given slightly faster, at 5.2 per second. Emphasis is on the slowly rising central portion in the second and third harmonic tones and in the strong peak of the terminal element at 4.5 kilohertz (other harmonics and fundamental tone weak or absent in this element). Both calls are thought to be agonistic in function. The second type is associated with Twitter Calls and with Flutter Aerial Displays. Wicka Calls have not been described. Twitter Calls are like those described for *stricklandi* and resemble much shortened (0.09 second), well-separated, Kweeklike (Type II) notes in series at 4.5 per second. The peak of the terminal loud element is at 1.6 or 1.7 kilohertz, with a strong initial harmonic tone. Twitter Calls are used in conflicts at close range. Wad Calls sounding like "tyet" (Winkler and Short, 1978) are given in series, in combination with Kweek Calls, during Flutter Aerial Displays, and in nest demonstrating. Notes are pitched at 0.65 to 1.07 kilohertz and last 0.072 to 0.098 second.

**Displays.** Poorly known. In southern California Winkler (personal comm.) observed Head Swinging Displays and Flutter Aerial Displays of the form found in *P. villosus*. The Flutter Aerial Displays were employed during conflicts and in nest demonstration, a paired bird, usually the male, flying in Flutter Aerial Display toward the hole, uttering Kweek Calls, then Twitter Calls as it landed. He also noted the display in a bird "flying by" an encounter involving two other individuals, an inciting behavior I observed in *P. scalaris* and *P. nuttallii* (Short, 1971f).

**Interspecific Interactions.** Ligon (1973) reported interactions with Pygmy Nuthatches (*Sitta pygmaea*) and Red Crossbills (*Loxia curvirostra*), a female *albolarvatus* attacking and driving them from a pine cone; both are potential competitors for pine seeds. He also noted various interactions of *albolarvatus* and *P. villosus*, perhaps the closest relative of *albolarvatus*. In October, Ligon (1973, p. 865) found both woodpeckers foraging in trees subjected to insect infestation. Males of both species, and females of *villosus*, attacked the trunks of the ravaged trees, and stomachs of these contained nearly 100 percent bark beetles (scolytid beetles). Females of *albolarvatus*, however, fed in the tops of the same trees on pine seeds, their stomachs showing no beetles and 60 to 70 percent pine seeds. Ligon observed *villosus* using *albolarvatus* to locate seed-containing cones. He saw a male *villosus* twice supplant a female *albolarvatus* on cones. A female *villosus* supplanted a female *albolarvatus* on a cone but, at a cluster of cones, was supplanted by a male *albolarvatus* (Ligon, 1973, p. 866). In another encounter, a female *villosus* flew at a male *albolarvatus*, but the latter held its place, and the female was obliged to fly away. Males of *albolarvatus* seem dominant to females of *villosus*.

**Breeding.** Much remains to be learned about this woodpecker. Nests are constructed in various trees, especially in pine stubs, but also in fence posts (Bent, 1939), aspens, and decaying oaks (Bent, 1939, p. 99, noted a nest in the standing branch of a dead oak tree lying on the ground in a meadow). The nest is 2 to 25 feet above ground, usually at 6-15 feet. Females and males may tap at the nest site, and displays about the nest are important in pairing and probably in physiological synchronization of the mated birds for reproduction. Mid-May to June is the usual nesting period. A new cavity apparently is excavated yearly.
The eggs number three to seven, usually four or five, often becoming pitch colored from the brooding adults' dirty plumage. Incubation by both sexes takes place over 14 days. Both sexes feed the young and carry fecal material from the nest. The feeding interval of 15 minutes noted by Bent (1939, p. 100) may not be typical. Young leave the nest in about 26 days (J. Winter, personal comm.), usually in early July. Nothing is known of relations between fledglings and adults. The molt occurs from July to October.

Taxonomy. Although distinct in plumage, its coloration is largely affected by melanism, causing reduction of color patterns that might suggest relationships. Its habits and behavior, including vocalizations suggest that it is related to *P. villosus* and *P. stricklandi*. With some reluctance, I treat two subspecies: *albolarvatus*, from most of the range of the species, and *gravirostris* of the mountains about Los Angeles and San Diego (Cuyamaca, Santa Rosa, San Jacinto, San Bernardino, and San Gabriel mountains). There is no color difference, and wing length is approximately equal in the two forms. However, *gravirostris* is distinctly longer tailed (4 to 5 percent, giving tail/wing ratio 7 percent greater); its bill is 11 percent longer than that of *albolarvatus* in males and 5 percent longer in females. The sexes differ in bill length by only 8 percent in *albolarvatus*, roughly equivalent to the weight difference between the sexes; but they differ by nearly 15 percent in *gravirostris*. Because the latter is geographically isolated from *albolarvatus*, and its foraging and sexual differences are reflected morphologically, I maintain the two subspecies.

References

THREE-TOED WOODPECKER

*Picoides tridactylus*

**Color Plate 56**

**Range Summary.** Northern Hemisphere.

**Diagnostic Features.** Small, 46 to 76 grams, wing length 107 to 133 millimeters. A black and white woodpecker associated usually with northern coniferous or mixed forest; below, white with bars and streaks on flanks and sides. Above, black or brownish black with white patch down center of back (white barred or obscured in some races). Black ear covert patch with white above and below it, crown usually has white or gray-white visible on edges and forehead. Outer tail feathers white, barred or not. Male has yellow patch on crown. Distinguished from sympatric North American *arcticus* by white bars or spots on back. Toes three in number per foot.

**Description.** Bill long, very broad across nostrils, straight along culmen, and chisel-tipped. Variable geographically, especially in amount of black versus white in plumage. Back brownish black on sides and upperside coverts; usually white or mainly white down center of back — broadly so in *tridactylus*, *crissoleucus*, and *albidior*; moderately so in *alpinus* and *dorsalis*; narrowly so in *funebris*. Barred black in *fasciatus* and mainly to entirely black in *bacatus* (black races usually have white bars on rump, white spots on upperside coverts, except very black *bacatus*). Wings brownish black, blacker on lesser coverts, barred or bar-spotted on flight feathers (fine white spots in very black *funebris* and *bacatus*); coverts unmarked or with few white spots; and, underwings dusky, barred white. Shafts horn-brown
in wings and base of tail, blackish at tail tip, white at tips of outer rectrices; below dusky at tips of wings, dull white at bases, dusky in tail with whitish center, becoming black at tips of dark feathers and white at tips of white feathers. Tail black on central two pairs and bases of others (to tips of third pair in some); white at least as bars on outer two rectrices in all races; and, occasionally, there are a few white bars present on black central feathers, even central pair. Outer feathers white toward tips, with few or no black bars in albidior and in American races (in bacatus the outer feathers are mainly white, but 15 percent show black barring strong enough to be conspicuous in field); white with narrow black bars, sometimes breaking at tips in crissoleucus; white with variably broad black bars in tridactylus; black and white bars more or less equal in alpinus; and black with narrow white bars in funebris. Tail/wing ratio 0.59 to 0.72. Malar stripe usually white with black flecks anteriorly, becoming blacker and broadening to join the black of back at wings and sending black band to sides of breast; blacker in funebris, alpinus, and American races. White line below eye and over malar, broad in most races, but sharply reduced in some American birds of the three races, especially in bacatus generally; connecting with broad (whiter races) to narrow (blacker races) white band across upper back and lower hindneck, thus isolating black ear patch and crown from back. Ear coverts with broad black band, surrounded by white below, at rear, and usually above; white line over and behind eye usually broad, but narrow in some alpinus, in funebris, fasciatus, and dorsalis, and very narrow or even obsolete in bacatus. Black in front of and over eye to crown. Nasal tufts mixed black and white, very long. Forehead, lores, usually mixed black and white, but may be all black in bacatus. Hindcrown and sides of crown shiny black, darker than black of wings and back, with few to many white flecks in fore part of hindcrown, and laterally, except in some bacatus. Throat white, feathers of gular area long and overlap basal third of bill. White below, sometimes with slight buffy or gray tinge; center of breast to abdomen clear white in most forms, but narrower on abdomen of alpinus and American races (sometimes broken by bars); funebris differs from all in having mainly black underparts, with fine white spots or bar-spots, sharply setting off patch of buffy white on throat and forebreast. Flanks barred evenly in fasciatus and bacatus, resembling P. arcticus; barred less regularly and often with streaking in alpinus and dorsalis, mainly white variably finely to moderately streaked and barred in tridactylus; and clear white with only traces of streaks, or none, in albidior and crissoleucus (flanks and sides black with few white spots in funebris). Sides variable, mainly evenly barred in fasciatus and bacatus, but with streaking evident in dorsalis, strong in alpinus, variable streaking in tridactylus, and no streaks or only traces of them in crissoleucus and albidior; anterior sides black, connecting with malar black.

Sexual features: Males 8 percent (fasciatus) to 11 percent (dorsalis and tridactylus) heavier than females, wings but slightly longer, tail barely longer to slightly shorter, and bill 6 percent (albidior and crissoleucus) or more usually 8 to 12 percent (other races) longer than that of females (note that bill length differences roughly equal the size difference between sexes, which have nearly same wing and tail length — females thus are slimmer and proportionately longer winged and tailed than males). Male has variably sized dull yellow to golden yellow central crown patch (yellow is at tips of often barred base feathers, so some white and black may show through); white spots, flecks, or even white lateral lines surround the crown patch, these being broad in whiter races and very narrow (blacker, few white spots) in dark races such as funebris. Females lack yellow on the crown, which usually has gray-white tips of feathers black-barred at their bases, often forming a whitish crown patch sharply set off from the black hindcrown; but crown is variable, may be mainly black with
white spots, which are smaller in the blacker races, and some *bacatus* even have an entirely black crown and forehead. Eyes brownish red to deep red, legs and feet gray, bill slaty or gray-black with paler (grayish) base.

**Distribution and Habitat.** Ranges across North America from the limit of trees southward in the far West to southern Oregon in the Cascade Mountains; to Idaho; in the Rocky Mountains south to New Mexico and northern Arizona; and, farther east, south to Minnesota, southern Ontario, the Adirondack Mountains of New York, and northern New England. In Eurasia it occurs from tree line in the north, southward to southern Scandinavia, Latvia, the Moscow region, the Tomsk region of western Siberia, the Tian Shan and Ala Tau ranges of mountains, northern Mongolia, Manchuria, southeastern Siberia (Amur Basin), northeastern Korea, and Sakhalin. Isolated populations occur in the Alps, Carpathian Mountains, and mountains of the Balkans to northern Greece and Bulgaria in Europe, in the forests of Kamchatka, on Hokkaido in Japan, and in mountainous western China (Tibetan border to Sikang, Szechwan, northwestern Yunnan, and southern Kansu). Northern populations and high mountain populations show some migratory movement, sometimes only irruptively (because of overpopulation after insect epidemics or failure of insect populations in northern or montane areas). As Bock and Bock (1974b) showed, the distribution of *tridactylus* is closely tied to the distribution of spruce (*Picea*) trees; Ruge and Weber (1974b) reported it immigrating into new areas of spruce growth. Forests containing white pines, lodgepole pines, yellow pines, alpine fir, larch (tamarack, *Larix*), and Engelmann spruce also are utilized in North America. It tends to occur higher than *P. arcticus* in western North American areas where both are found, favoring spruce and fir forests, whereas *arcticus* ranges more often into pines at lower elevations, and in other areas favors denser, less open forests than *arcticus*. It reaches sea level in the north but is montane southerly, occurring to 1920 meters or more in the Alps (Ruge, 1974), to 4000 meters in southwestern China (Ali and Ripley, 1970), to 9000 feet in the Rocky Mountains, and from 1200 to 4000 feet or more in the Adirondack Mountains.

**Foraging Habits.** Feeds, often quietly, in live and dead spruce and other conifers, more often than *P. arcticus* on live trees. In the Adirondack Mountains it tends to forage higher in trees than does *arcticus*, less often going to low, dense growth or branches and logs on the ground. Foraging is by tapping, laterally directed probe-tapping that flakes off pieces of bark, by gleaning, and by excavating. It often pauses for long periods. Birds feed singly, or the members of a pair may forage side by side in the same tree (Short, 1974c). During insect infestations they may congregate in large numbers. Massey and Wygant (1973), partly following Baldwin (1968), showed that in Colorado abundance of *tridactylus* was correlated with abundance of the spruce bark beetle (*Dendroctonus obesus*) and that the woodpecker contributes substantially to keeping this pest under control. Densities of from one or two birds per 100 acres increased to up to 30 or even 45 birds per acre under epidemic conditions of the spruce bark beetle. The woodpecker accounted for 28 percent mortality of this beetle under low population density, up to 84 percent under outbreak conditions of the beetle’s population density, and 53 percent mortality under epidemic conditions (density of 1,600,000 beetles per acre!). The beetles are obtained by bark stripping of affected trees; this not only enables the woodpeckers to take large numbers of the beetles (the woodpeckers take 98 or even 100 percent of beetles on heavily affected trees, 75 percent on moderately affected trees, and 40 percent on trees slightly infested with the beetles), but the bark stripping dries out the tree, rendering it less favorable for the beetles. Thus, this
woodpecker is very important in control of destructive forest insects. About 75 percent of the diet (Bent, 1939) generally is composed of wood-boring insect larvae, mainly beetles, but also moth larvae. Bent (1939) reported that an individual of *P. tridactylus dorsalis* may consume 13,675 “grubs” in a year. Other insects make up most of the rest of the diet; fruits occasionally are taken, some tree cambium is ingested, and sap is taken as well. In North America the sap is eaten at sapsucker (*Sphyrapicus*) pits, but in Eurasia *tridactylus* digs irregularly arranged pits during the spring in lindens (*Tilia*), maples (*Acer*), birches (*Betula*), and other trees to obtain sap (Turček, 1954; Ruge, 1973).

**Voice.** Both sexes drum, with some sexual differences: males of *alpinus* (Europe) drum in 19.7 beats per burst; females in 21.2 beats per burst, there being 14 to 26 beats in a drumming burst lasting 0.8 to 1.8 second (average 1.29 second [Ruge, 1975]). I did not detect sexual differences in few drummings of North American *bacatus* that drummed more slowly, but variably; there are fast and moderate drummings that average 14.3 beats and 12.7 beats per second, respectively, and show a 25 percent increase in tempo through the burst; and there is moderate drumming, at 12.2 beads per second, with no shift in tempo. North American drumming involved seven to 27 beats (average 15.8), over 0.67 to 1.83 second (average 1.24 second [Short, 1974c]). Ruge (1975) found that European birds also show the speedup in tempo characterizing two categories of North American birds’ drumming, and his data for duration and number of beats also are similar. However, North American *bacatus* also have slow drumming, at 8.76 beats per second, lasting 1.31 second and containing an average of 11.4 beats per burst; there is no change in tempo. The slow drumming seems to be used between paired birds, as location signals or to initiate contacts for breeding, whereas the moderate and fast drumming is used intraspecifically and interspecifically (to *P. arcticus*) in aggressive interactions, territorial proclamation, and to denote the location of the signaling bird to its neighbors. The Pik Call of North American *tridactylus* (“pik,” “kik,” “peep” [Short, 1974c, p. 19]) differs from the call note (“gug,” “gig” [Lanz, 1950, p. 140] and “kjüü” [Scherzinger, 1972, p. 207]) of European birds, being higher pitched (peak 2.8 kilohertz versus 1.9 kilohertz) and shorter (average 0.030 versus 0.048 second duration) than that of European *P. t. alpinus*. This is a sharp note serving as a location call and denoting mild aggression. The Scolding Call is a rapid series of call-notetlike elements, peaking at 1.9 kilohertz, the elements being 0.046 second in duration in European birds. Scolding is uttered in response to disturbances at the nest. The Rattle Call is a series of six to 26 notes uttered in 0.5 to 2.5 seconds (average 1.1 seconds) at 10.7 to 11.9 notes per second (Short, 1974c). The notes resemble call notes, but are shorter (0.025 to 0.03 second) and higher in pitch (2.1 to 2.5 kilohertz). This call is a threat used in encounters and territorial proclamation; it may be employed interspecifically (against *P. arcticus* [Short, 1974c]). Bent (1939, p. 120) noted that the Rattle Call resembles that of *villosus* but is less sharp and loud and that one gave a Rattle “similar to the Kingfisher-like rattle of the Hairy Woodpecker” (1939, p. 121). A Short Rattle Call, faster and shorter than the Rattle Call, is known (Winkler and Short, 1978) but not its context. The Kweek Call resembles that of *P. villosus*, but no recordings are available for analysis. Uttered in series, it is given in aggressive encounters, even against other species (*P. arcticus* [Short, 1974c]). The Wicka Call or “keckern” of Ruge (1975, p. 77, upper figure) resembles this call in *stricklandi*, especially, and consists of series of notes uttered during encounters, often with Head Swinging Displays (Winkler and Short, 1978). A Twitter Call, resembling those of *stricklandi* and *albolarvatus* (and probably *villosus*), is given during interactions between members of a pair, sometimes with Head Swinging (Scherzinger, 1972; see also Ruge, 1975, and Winkler and
Short, 1978). Wad Calls also occur but remain to be characterized; they may resemble such calls in *P. pubescens*. Nestlings give a Chirp Call series very like those of *P. borealis, P. stricklandii*, and *P. villosus*, the notes being short and inverted V shaped; the Loud Chirp Call or begging call is similar but higher pitched and louder than the Chirp Call (Winkler and Short, 1978). Fledgling birds give Squeaking Calls, similar to Loud Chirp Calls, but noisier, pitched at 1.9 kilohertz and with notes averaging 0.078 second in duration. This call may accompany aggressive interactions between young and adults. A Screech Call is known from nestlings disturbed by a human hand placed at the nest opening (Scherzinger, personal comm.); it resembles the noisy Distress Call of adults. The latter call, given by woodpeckers caught and held, is a long note, about 0.33 second in duration, and is noisy over a wide range of frequencies (emphasis about 1.2 kilohertz [Winkler and Short, 1978]).

**Displays.** Most of the repertoire of *P. villosus* has been documented in *P. tridactylus* (Short, 1974c). Bill Directing is employed in aggressive encounters and may be used interspecifically (against *P. arcticus*). Ruge (1968, p. 120, fig. 8b) illustrated this display, shown as part of a Head Swinging Display. A Bill Lowered Posture in response to displays of a female *P. arcticus* is like that of *arcticus* but lacks the “hunched” aspect of that bird’s display. Crest Raising, figured by Ruge (1968, p. 120, fig. 8a) is used in both sexes, advertising the sex of a bird in aggressive encounters; it too is used against *P. arcticus*. Head Swinging was described by Ruge (1968, p. 119) as Kopffpendeln and by Scherzinger (1972, p. 208) as Kopfschwenken. The conspicuous, side-to-side Head Swinging Display is associated with Rattle and Wicka calls and is given less frequently in association with Wing Spreading than in *P. arcticus* (Short, 1974c). Used against *arcticus*, the displaying *tridactylus* held the head very high, *arcticus* being larger and very aggressive. Wing Spreading Displays occur with Pik, Kweek, or Rattle calls and are less ritualized, with little or no hunching of the type found in *P. arcticus*. The wings may be held out and up or flailed at an opponent, rendering the spotted wings very conspicuous. Wing Flicking Displays probably occur but have not been documented. A Flutter Aerial Display, probably uttered with a Kweek Call, occurs in aggressive encounters. It was employed by a female in a flight to a nest being excavated by a female *P. arcticus*, initiating a fierce encounter. Finally, Tail Spreading Displays were evident in both attacking and fleeing birds during encounters with *P. arcticus*. I note that the tail pattern in most American individuals of *tridactylus* is virtually identical to that of *P. arcticus* and *P. villosus*.

**Interspecific Interactions.** Various authors have noted interactions of squirrels with Three-toed Woodpeckers (Ruge, 1971c). Tree Swallows (*Iridoprocne bicolor*) utilize old nests of *tridactylus* (Gibbon, 1966) and may attempt to take over active nests. Interactions with *P. major* in Europe occur at times where the two are sympatric (Ruge, 1971c, p. 268). Gibbon (1966, p. 226) mentioned an encounter between a female *P. villosus* and a male of *P. tridactylus*. Strongly aggressive encounters in sympathy with *P. arcticus* have been suggested earlier and were discussed by Short (1974c, pp. 35-36). The larger *arcticus* is dominant to *tridactylus*, which is more a bird of dense, wet woods than is *arcticus*, which favors open places with standing and fallen dead trees (observations in upper New York State). During encounters, males of *arcticus* dominated males of *tridactylus* and strongly dominated females of *tridactylus*. I found females of *arcticus* about a match for males of *tridactylus* and dominant over females of the latter species. Aggressive actions were initiated by *tridactylus* invading the area about an *arcticus* nest; eventually the *tridactylus* pair moved out of the area, leaving the *arcticus* pair nesting there. Drumming, supplanting, Kweek Calls, Pik Calls, Flutter Aerial Displays, Wing Spreading Displays, Head Swinging Displays, and Rattle Calls
were used interspecifically against *arcticus*; the birds often grappled, falling to the ground, as noted also by Gibbon (1966, p. 226). Such aggression may account for the fact that, despite apparently massive sympaty of the two species, they rarely occur together; rather, one or the other is much more common than its relative.

**Breeding.** Breeds in May and June in most or all of its range; in the Adirondacks of New York it seems to nest later than *P. villosus*. Ruge and Weber (1974b) and Bürkli, et al. (1975) found that in central Europe this species holds breeding territories of about 2.3 square kilometers, with a home range of about 100 hectares in which they shift their breeding activities from year to year. Essentially nothing is known of pair-formation activities. The nest is excavated by both sexes, and a new one is excavated yearly (Ruge, 1974). The entrance is 4.5 to 4.7 centimeters across and is beveled at the lower edge; the nest is 25 to 30 centimeters deep and about 11 centimeters in diameter (Bent, 1939). It is situated from 1 to 15 meters up (mainly 1 to 5 meters above ground) a dead or, uncommonly, a live tree (Bent, 1939; Gibbon, 1966; La France, 1973; Ruge, 1974). Trees used include spruce, larch, pine, balsam, cedar, and aspen; in Switzerland the spruce, *Picea abies*, and cembra pine, *Pinus cembra*, commonly are utilized (Ruge, 1974). In the Adirondack Mountains most nests are in dead stumps standing in flooded areas. Eggs number, on the average, three to four in Europe and four or occasionally five in North America. Egg laying occurs in May and June and is later at higher elevations in any given region (Ruge, 1974). If a clutch is lost, according to Ruge, it is not replaced. Incubation is by both sexes and takes place over 12 to 14 days. The male incubates at night, and both parents share diurnal incubating, with changeover about every 200 minutes (Ruge, 1974). The hatchling young are brooded equally by their parents continuously for the first 4 days, and thereafter brooding diminishes, ceasing during the day at about 11 days after hatching (Ruge, 1971c). The male broods at night until the seventeenth day after hatching, then sleeps elsewhere. The nestlings develop rapidly, with ears opening at 6 to 8 days of age and eyes opening at 8 to 10 days (Ruge, 1971c). Both sexes remove fecal material from the nest up to the eighteenth day after hatching; the role of the sexes in this task varies from nest to nest (Ruge, 1971c), but Gibbon (1966) reported 16 removals by a male and none by the female at a nest in New Brunswick, so the male generally may be more active in this role than the female. Gibbon (1966) also found that the male fed the young 2.36 times more than the female, and he gave rates of seven to 11 feedings per hour on one day in June (see data for *P. arcticus*). Lanz (1950) also noted that the male fed more than the female, but Ruge (1971c) found that early in the nestling period both sexes fed equally, after which the female gradually diminished her efforts, finally ceasing feeding altogether (in four of five nestlings). The young fledge in 22 to 26 days (Ruge, 1971c) and are attended by adults for a long period, at least 33 days and possibly up to 2 months (Bürkli, et al., 1975). The molt takes place in July through September or early October. Juvenile birds molt from just after hatching (the first five primaries are molted from an age of 8 to 13 days [Ruge, 1969a]) in June and July to late August; the postjuvenal molt is complete except for the secondaries, all or essentially all (one or two may be replaced) of which are retained for a full year (Ruge, 1969a), as in *P. villosus* and *P. pubescens* (George, 1972).

**Taxonomy.** Related closely to sympatric *P. arcticus* and also to *P. villosus* and its allies (Short, 1971f; 1974c). The behavior of *tridactylus* is closely similar to that of *villosus* and other American *Picoides* and shows fewer derived traits (displays, vocalizations) than does that of *P. arcticus*. There are five Palearctic races in three groups, and three Nearctic subspecies. Nominate *tridactylus* occupies Scandinavia, Latvia, and northwestern Russia and
extends across the southern taiga to the Altai mountains, northern Mongolia, Manchuria, southeastern Siberia, and Sakhalin Island (Vaurie, 1959c). Eastern Siberian and Sakhalin birds are a trifle larger and longer billed than those from Europe. Closely allied to it is crissoleucus of the northern Siberian taiga from the Ural Mountains to the Sea of Okhotsk. This very slightly larger form is whiter on the back, with more white in the wings than tridactylus, and the flanks and sides show no markings or but traces of bars and streaks; the outer tail is whiter with sparse black bars, and the female's crown is whiter, less black. Also allied to tridactylus is even whiter abidior, more or less isolated in Kamchatka and having no ventral markings, an unmarked outer tail (as in the American subspecies), and with bigger, even confluent white wing markings and white spots on the wing coverts; this race averages smaller than tridactylus and crissoleucus. Isolated south of these whiter, northern races are several somewhat larger, blacker populations. I find no constant differences between central and southern European montane birds and those from the Tian Shan ("tianschanicus"), there being great overlap in the supposed "slight differences" cited by Vaurie (1959c, p. 22). Characters stated (see Vaurie, 1959c) for dark isolates in northeastern Korea ("kurodai") and Hokkaido ("inouyei") do not distinguish them from "tianschanicus," and I therefore treat all of these as representing P. t. alpinus. This form is blacker generally than the three races of the tridactylus group, the white of the back is narrower and partly or even fully barred, the flanks are blacker and barred white on black (rather than black on white as in the northern races), the sides mainly are black with white spots and bars (not white with black bars and streaks as in tridactylus), and the outer tail black bars are broader. Southwestern China to Tibet is the range of a much blacker race, funebris, being strongly barred dorsally, with fewer, smaller white wing spots, narrower white bars in the outer tail, a buffy white throat patch, and a sharply contrasting black breast and abdomen with white spots and bar-spots. Picoides tridactylus dorsalis of the American subspecies most closely resembles Eurasian forms in size and color, being black barred on the flanks and black streaked on the sides. It lacks barring on the outer rectrices, however; its white face marks are narrower and the head blacker than in the tridactylus group; and the white of the back is narrower. From alpinus it differs in being less black marked below, with more black on the crown of females and a blacker head pattern generally, and it lacks bars in the outer rectrices that are so strongly barred in alpinus (and funebris). This race occurs in the Rocky Mountain region from Montana to Arizona and New Mexico. Somewhat smaller than dorsalis, and also with white outer rectrices, is fasciatus of western North America from Alaska and Yukon south through British Columbia to Oregon. This race differs from dorsalis in its partial black back barring and very regular, strong barring on the sides and flanks; its face is blacker with white markings more restricted. From Alberta east across Canada to Labrador and Newfoundland, and south to Minnesota, New York, and New England occurs bacatus, the smallest of all races of the species (wings 6 to 9 percent shorter, tail 5 to 7 percent shorter, bill 8 to 9 percent shorter than dorsalis, but only slightly smaller than fasciatus). This subspecies differs from fasciatus in reduction of the white on the back to scattered small spots (sometimes only a spot or two, thus very similar to black-backed P. arcticus) and in its blacker head; the white line over the eye is broken or obsolete and that under the eye is very narrow, and the white marks on the crown of females are fine or sometimes even lacking.

References

BLACK-BACKED WOODPECKER

Picoides arcticus

Color Plate 56


Diagnostic Features. Small, 61 to 88 grams (23 to 33 percent heavier than P. tridactylus, on the average), wing length 119 to 132 millimeters. Mainly shiny black above and white below with evenly black-barred sides, white spots in the primaries, and white outer tail tips (as P. villosus and most P. tridactylus). There is a white line below the eye, but none or only traces above the eye. Males have yellow patch on center of crown. Differs from sympatric P. tridactylus by larger size, lack of contrast between black of head and body, absence of white on the hindneck, solidly black back, and lack of white line over eye; differs from very black individuals of eastern North American P. t. bacatus that essentially may lack white on the back by lack of contrast between head and back, and clearer, broader white line from lores rearward under eye, as well as lack of white on the hindneck. Has only three toes on each foot.

Description. Bill long, rather flat, broad across nostrils, chisel-tipped, and straight along culmen. Above, black glossed with blue, rarely with a few white tips on black rump feathers, continuous onto wings, tail, crown, and sides. Wings black with narrow white spot-bans on primaries, reduced or lacking on secondaries; below, dusky, barred with white. Shaft black or brownish black, white in outer tail; below, dusky to brown (tail), except white in white areas of tail. Tail black, outer three pairs with white toward tip, expanding outwardly; very tips of third and fourth pairs may be black; the white area is unmarked or rarely there is a basal bar; below, paler. Tail/wing ratio 0.60 to 0.69. Anterior nasal tufts and top of head glossy blue-black (see Sexual features), with faint trace of white line in some birds behind and over eye; rear of nasal tufts, lores, and line under eye, white, surrounded by black ear coverts, black sides of neck at rear, and white-spotted (sometimes spots reduced or lacking) black malar. Nasal tufts and gular feathers long, covering base of bill. Throat clear white, extending over breast, and more narrowly and with grayish tone over center of abdomen to undertail coverts. Flanks and sides barred black on white, the bars being less even on the sides where there may be some indication of black streaking as well; black on anterior sides connects with malar and dorsally with black of back.

Sexual features: Male 6 to 7 percent heavier than female, slightly longer winged and, barely if at all, longer tailed, but with the bill 5 to 10 percent longer. Male has yellow to golden yellow patch on center of crown, more restricted than in P. tridactylus, more anteriorly located, less regular in shape, and with less associated white flecking (white occasional on forehead). Females lack the yellow, having an entirely black crown. Immatures less glossy, browner, with paler, less regular ventral barring and more white in the wings; both sexes show yellow (or orange-yellow or golden) in the crown, less than in adult males, forming a patch in young males but more restricted, usually only scattered spots, or even no yellow, in females. Eyes reddish brown to brown; legs and feet deep gray, slaty, or bluish
gray (toes three in number); bill slaty above, paler gray below, to light gray or even horn-gray at base of lower bill.

**Distribution and Habitat.** Occurs in coniferous forests across North America, not reaching as far north as *P. tridactylus*. From central Alaska, southern Mackenzie, northern Manitoba, James Bay, northern Quebec, southern Labrador, and Newfoundland south in the Cascade Mountains to northern California, to central California in the Sierra Nevada, reaching western Nevada, south in the Rocky Mountains only to Montana and northwestern Wyoming, the Black Hills of South Dakota, northern Minnesota, northern Wisconsin, northern Michigan, southern Ontario, northern New York, and northern New England. It is variably locally common to rare in various parts of its vast range. Irruptively moves southward some years, because of either lack of insect prey or woodpecker population buildup, rarely reaching Nebraska, Ohio, and New Jersey. This woodpecker favors areas of dead or dying coniferous trees (it especially shows a predilection for burned or flooded areas with standing dead trees), and it may nest in concentrations, the nests close together when dead trees and, presumably, associated insects are common. Occurs in spruce bogs, tamarack, northern pine forests, red fir, mountain hemlock, western Douglas fir, ponderosa pine, and lodgepole pine forests. It occurs from sea level to 4200 feet or more in the East and becomes strictly montane in the southern part of its western range, occurring from 4000 to 7800 feet in southern Oregon (Farner, 1952), from 4000 to 10,200 feet in California, and above 4500 feet in South Dakota.

**Foraging Habits.** This woodpecker taps, excavates, and pries and taps to flake off bark of dead trees, as well as gleaning for insects. Flycatching occurs rarely (Farner, 1952, p. 66), the woodpecker acting in a manner “very similar to that of the Lewis Woodpecker” (*Melanerpes lewis*). Bark flaking is common and was described by Bent (1939, p. 111); the birds gradually may expose the entire dead tree by denuding it of bark. The Black-back often works steadily in one place and, using drier, more dead wood than *P. tridactylus*, frequently in more open situations, its workings are louder and the bird more conspicuous than *tridactylus*. Foraging sites tend to be lower in live and dead trees and more often in dead trees than *tridactylus*; in addition, *arcticus* much more frequently utilizes dense low dead growth and fallen, rotting logs than does *tridactylus*. Birds use various trees, including those just mentioned; dead or dying deciduous trees also are used, including birch (*Betula*). Individuals may hop about on the ground, working over small and large fallen branches, and on the bases of trees (Kilham, 1966b; Short, 1974c). When feeding the young, adult females at least do much gleaning and probing in crevices and under loose bark, seeking insects. The food of both *tridactylus* and *arcticus* is largely of wood-boring larval beetles of the Cerambycidae and Buprestidae. Other insects are obtained, especially in the spring and early summer; fruits, nuts, and fibrous woody material comprise less than 12 percent of the diet, the remainder being of insects and some spiders.

**Voice.** Drumming and vocalizations have been discussed and analyzed by Short (1974c) and Winkler and Short (1978). Both sexes drum, the females less often so, at least about the nest, whence come most of the available data. The drumming varies in quality depending upon the site. Characteristically there is a 5 to 25 percent speedup in tempo in a burst, the bursts average 27.11 (range 11 to 36) beats per burst, they last from 0.58 to 2.03 seconds, and the number of beats per second ranges from 16 to 22.5. Females tend to drum in shorter bursts, at a greater tempo, averaging 19.95 versus the males’ 18.19 beats per second, but variation produces great overlap. During nest construction and feeding of the young, a favored drumming site situated near the nest is used so much that it is pockmarked from the
drumming (Short, 1974c, p. 12). However, drumming regularly occurred elsewhere, with little or no attempt to seek an optimum site. During feeding of the young, drumming is strongly concentrated in the morning. Drumming occurs in response to an intruder (human or other) and on arrival of the mate at the nest when its partner is there; it serves as a territorial or location signal, being given spontaneously or in response to drumming or actions of conspecific or other woodpeckers (e.g., to Northern Flickers, Colaptes auratus; Hairy Woodpeckers, Picoides villosus; and Three-toed Woodpeckers, P. tridactylus). The call note of arcticus is a distinctive, very fast, double clicking note, in which the central portion of the inverted U or V spectrographically essentially is lacking; the call is rendered the Kyik Call by Short (1974c, pp. 18–19). The main clicking element is but 0.008 second in duration, with sound at diverse frequencies. This call marks encounters intra- and interspecifically, it may occur associated with copulation, and it is an aggressive response to intruders. Perhaps the most complex of all pied woodpecker vocalizations is an elaborate Rattle Call, termed the Scream-Rattle-Snarl Call Complex by Short (1974c, pp. 23–28); this call functionally replaces both the Rattle and Kweek calls of other pied woodpeckers. Rarely is a Rattle portion uttered alone, but one may hear a Snarl Call, a Rattle-Snarl Call, a Scream-Rattle Call, and, more commonly, the full Scream-Rattle-Snarl Call. Snarl and Rattle notes are similar, vertical, fast notes, a Snarl being a very fast Rattle. Snarl Calls are 0.06 to 0.85 second long and may have three to 40 (average nine) notes; shorter calls average 48.9 notes per second; longer ones, 41.3 notes per second. Most emphasis is at 1.5 to 2.1 kilohertz. The notes vary in pitch; hence there is irregularity in the snarling sound of the call. Snarls are weak and appear to be low-intensity threat-submissive vocalizations. Snarl-Rattle Calls show clearly the lower pitch of Rattle elements, Rattle notes averaging 27.6 to 32.5 notes per second in tempo, followed by Snarl notes at 39.6 to 47.0 notes per second; the combined call is 0.44 to 0.95 second in duration. Rattle Calls do not overlap in tempo with Snarl Calls. Scream notes are loud and introduce either a Scream-Rattle or Scream-Rattle-Snarl Call; the notes resemble vertical Rattle notes (they show intermediacy when the Scream shifts to the Rattle), but initial notes in a series are more nearly horizontal with definite emphasis at 2.1 to 2.6 kilohertz. Subsequent Scream notes drop in pitch and speed up; their rate varies from 12.7 to 22.2 notes per second. The Scream notes resemble some Distress Calls and Wad Calls of P. pubescens, P. villosus, and other pied woodpeckers. There are two to 10 Scream notes in the Scream portion of a call; the Scream always precedes a Rattle portion. The full Scream-Rattle-Snarl Call is 0.94 to 1.74 seconds in duration, containing two to 10 Scream, eight to 23 Rattle, and seven to 21 Snarl notes. Rendered “pet-pet-wree-oo” and “kick-kick-wre-oo” by Kilham (1966, p. 309), this call and its components were figured sonographically by Short (1974c, pp. 16, 25). Full Scream-Rattle-Snarl Calls are associated closely with Wing Spreading Displays and a Hunched Posture in a display complex used in aggressive encounters intraspecifically and against Tree Swallows (Iridoprocne bicolor), Hairy Woodpeckers, and Three-toed Woodpeckers (Short, 1974c). This complex is an intense threat display, perhaps with both vocal (Snarl) and visual (Hunched Posture) appeasement aspects that make it appropriate to consider the Scream-Rattle-Snarl Call as a replacement of both Rattle and Kweek calls of other congenic species. A Short Rattle Call (the Kyik-ek Call of Short, 1974c) is a grating series of two to four notes, the first of which usually is very like a call note; other notes each contain two to nine vertical elements given at a rate of 67 to 103 per second. The notes vary from 0.03 to 0.12 second, depending on the number of elements contained, and calls are about 0.3 second in duration. Very often these calls are given in series of three or four calls, especially by disturbed females, under conditions in which males
uttered Kyik Calls. Only one Wicka Call, unanalyzed, was heard during an encounter between two birds. The Wad Call, termed by Short (1974c) the Yeh Call Complex, is a series of soft "yeh," "yik," or "yek" notes uttered during encounters between members of a pair at a nest, as well as in aggressive encounters generally. The notes are vertical, often with two or three compounded elements; they are sharp and clicking in some calls and weaker with more definite pitch emphasis in others. Depending upon the number of notes (up to eight may occur), the calls are up to 0.13 second in duration. Calls of the young include a Chirp Call (Rattlelike, vertical, clicking notes, inverted, V shaped sonographically) and much louder, more irregular Loud Chirp Calls given during feeding by adults. These were treated as juvinal Rattle Calls by Short (1974c).

Displays. These have been discussed by Short (1974c) and are summarized here. The Bill Directing and Bill Raised postures occur precisely as in other congeners and are used interspecifically as well (against _P. tridactylus_). A Bill Lowered Posture (head down, bill pointing below the horizontal) exposes the crown and may be associated with Crest Raising. This posture appears more ritualized than in _P. villosus_ and _P. tridactylus_; it is associated with the Hunched Posture, and both occur in Wing Spreading-Scream-Rattle-Snarl Display Complexes. The Bill Lowered Posture may be an appeasement display. The Hunched Posture is distinctive in this group of woodpeckers, involving the arching of the back coupled with a Bill Lowered Posture. It too appears to be a submissive or appeasement display, either by itself or balancing more threatening Wing Spreading in a compound display. Crest Raising is frequent and presents the center of the crown in a forward aspect toward an antagonist. Males maintain a more or less erect crest in the presence of females, generally, and in conjunction with various other displays; females employ Crest Raising, perhaps to lessen the male's aggression, associated with Scream-Rattle-Snarl Calls and Wing Spreading Displays (and with Hunched and Bill Lowered postures). Head Swinging Displays are muted or are largely replaced by Wing Spreading-Scream-Rattle-Snarl displays. I have seen two cases of Head Swinging directed at nestlings by a female _arcticus_, with no associated displays. It is a slow, side-to-side swinging of the head and bill, the bill directed forward. Aspects of this display are evident in the side-to-side weavng of Wing Spreading, aggressive birds moving to attack. Most conspicuous of the displays of _arcticus_ is Wing Spreading, usually seen in a highly ritualized display complex that includes the Hunched Posture, Crest Raising, Lowered Bill Posture, perhaps Head Swinging, and the Scream-Rattle-Snarl Call. It may be employed in a zig-zagging attack (as in _P. mutellii_ [Short, 1971f, fig. 20g]). The completeness of the display complex is related to the completeness of the accompanying Scream-Rattle or Scream-Rattle-Snarl Call. I noted that, when the full Scream-Rattle-Snarl Call was given, the spread wings were waved jerkily at the beginning of each of the three phases of the call. The Snarl elements, the Hunched Posture, and the Bill Lowered Posture seem to be appeasement aspects, balancing the threat of the rest of this display complex. The overall display is used aggressively in intense encounters against conspecifics, other bird species, and even human intruders. The Flutter Aerial Display is like that described for other species of _Picoides_. The female employed this display in flights to the nest when her mate was there, often supplanting him as she landed. It was used in chases between paired birds and by a male _arcticus_ flying at a female _tridactylus_. The Flutter Aerial Display, accompanied in other pied woodpeckers by Kweek Calls, is accompanied by Wad Calls, Snarl Calls, or Scream-Rattle-Snarl Calls; and the displaying bird, when landing near another bird, often switches to a full Wing Spreading Display with a Scream-Rattle-Snarl Call. Tail Spreading, disclosing the
white tips of the outer tail, was frequently seen, especially in submissive birds in encounters and with Flutter Aerial Displays when used, usually by a female, in an inciting flyby of her mate when he is engaged in an encounter with another male. Attacks are accompanied by sleeked plumage and may involve actual contact in supplanting attacks characterized by Flutter Aerial Display directly at an opponent.

**Interspecific Interactions.** These have been described by Short (involving *P. tridactylus* [1974c, pp. 35-37] and Hairy Woodpeckers, Northern Flickers, Yellow-bellied Sapsuckers, and Tree Swallows [pp. 37-38]). Some of the *tridactylus-arcticus* interactions have been discussed under the former species. Suffice it to say that the larger *arcticus* is dominant, aggressive, and ultimately may exclude *tridactylus* from its home range in the breeding season; i.e., it may be interspecifically territorial against *tridactylus* and, in favorable habitats, may exclude *tridactylus* (this may explain, in part, the fact that one or the other usually is by far the commoner species in any given area, despite their extensive, supposed sympathy, the other species being decidedly rare). Hairy Woodpeckers also are attacked with vigor within the territory of *arcticus*, even when passing through and foraging quietly. It may be that *villosus* too would be excluded from a territory of an *arcticus* pair. Scream-Rattle-Snarl Calls, supplanting attacks with Flutter Aerial Displays and Wing Spreading, were employed against intruding Hairy Woodpeckers. So aggressive is *arcticus* that, after an encounter with *villosus* involving both members of the *arcticus* pair, the female of the pair "carried over" her aggression toward *villosus* after that bird had left the area, and she vigorously attacked her mate, giving him a Scream-Rattle-Snarl Call and Wing Spreading at close range (he quickly responded in kind, and their wings actually beat against one another, momentarily). Flickers and sapsuckers, either passing through an *arcticus* territory or drumming too near the nest of *arcticus* elicit at least a drumming response. One male Blackback could not tolerate three displaying flickers on a stub 50 meters from its nest—it flew at the two uppermost flickers, causing them to fly, and supplanted them; then it turned at the remaining (male) flicker, Bill Directing, attacked, and supplanted it. Competition with Tree Swallows is evident, the Tree Swallows tending to "pester" Black-backs at their nest, occasionally, and to investigate the nest hole if the woodpeckers are away. A pair of *arcticus* inspecting an old woodpecker hole in a stub not far from nesting Tree Swallows was besieged by a flock of these birds and driven into nearby woods. It seems likely that aggression is heightened in *arcticus* because it nests in exposed sites, dead trees standing in the open, and their excavations attract various other hole nesters, either to the holes they drill or to the presumably favorable nesting tree; hence they may attack any would-be nest competitor.

**Breeding.** Nesting takes place almost entirely in May and June, with excavation of the nest in April to May and fledging in June and July throughout its range. Pair formation and early territorial behavior have not been described. Apparently, members may congregate and breed in close proximity under favorable conditions (Bent, 1939). Nest excavation is by both sexes, although the male seems to do most of the work (Short, 1974c). The nest usually is excavated in a dead tree or stub, often in an open (burned, flooded) area with other standing dead trees. Diverse conifers, or occasionally birches or other dead deciduous trees, may be used. Bent (1939) mentioned three nests in living trees, two in cedar, and one in a Douglas fir; most nests are in pines and spruces. The nest usually is low, from 2 to 15 feet off the ground, but Bent (1939) reported nests at 25 feet, at 50 feet (California), and 80 feet (British Columbia). Bent (1939), Erskine (1959), and others have noted that the bark usually is cleared, if any was there before nesting, from the area about the entrance to the nest. This may hinder potential predators and also may make it more difficult for potential nest-hole
competitors to take over a cavity. The nest is 9 to 13 inches deep, 1 1/2 to 2 inches in diameter at the entrance, and 4 to 6 inches in internal diameter. Two to six eggs have been reported, but three or four is the usual number. Both sexes incubate, but the female may take shorter shifts during the day; and, of course, the male incubates at night. The period required for incubation has not been established but very likely is 12 to 14 days. The adults brood the nestlings at first, both sexes being involved (Mayfield, 1958). The male broods the young at night until late in the nestling stage, then ceases to enter the nest for the night. Fecal sacs are removed by both adults, mainly the male, who may remove them consecutively, as many as five times in succession (possibly from five nestlings?). Over 4 days a male removed fecal sacs on half his visits to the nest, the female at only 3 percent of her visits. I observed 400 feedings at a nest containing four or five young 10 to 18 days old, during five consecutive days, with 1933 minutes of observation. Adults turn the head laterally at right angles to the bill of the young to deliver food (see figure in Taylor, 1958). Diverse insects, adults and larvae, are carried in the bill, and females carry fewer insects, making more trips to the nest and foraging closer to the nest, than the males. The latter forage farther away and come back less frequently, but with more and larger food items. It is possible that some food is carried in the male’s esophagus, as he appears to “cough up” more food after feeding one nestling and then feeds another (the female ordinarily feeds only one young at a visit). Feeding is greatest in the morning, especially in the first few hours; it tapers off at midday and picks up somewhat late in the day (afternoon), then tapers off again as darkness approaches. The minimum number of feedings was four, the maximum 25 in one hour; averages for different times of 5 days ranged from 19.7 for the first hour to eight over the noon hour. The female fed more than the male each day, from 54 to 63 percent of the feedings, and 59 percent overall. She also stayed away from the nest less often for extended periods. Nevertheless, I estimate that the male feeds at least as much as, and probably considerably more than (up to two thirds of total food), the female, by carrying more and larger food items. The young are aggressive (see Bourdo and Hesterberg, 1951, and Kilham, 1966b) and extremely vocal; at least one of them called almost constantly throughout the day. They also make entering the nest for sanitation a difficult chore, waving and hitting at the entering adult (perhaps this relates to the larger male performing most of this chore). There is no information concerning fledging (at perhaps 25 days, but remains to be established) and postfledging behavior, although the young presumably follow the adults about for several weeks after fledging. The molt occurs from late July through early October.

Taxonomy. Related closely to sympatric P. tridactylus, and more specialized in its vocal and visual displays, tridactylus more nearly resembling P. villosus (Short, 1974c). P. arcticus evolved in North America from an ancestor in common with P. tridactylus, which has secondarily invaded the Nearctic from Eurasia (Short, 1974c) via Alaska (Bock and Bock, 1974b). I find no basis for distinguishing a thin-billed Cascade-Sierra Nevada race (“tenuirostris”) and treat the species as monotypic.

Reference
Tribe Colaptini

Genus Veniliornis Bonaparte

The 12 species of this neotropical genus are patterned mainly in greenish, with spots and bars, and often with some red on the upperparts. The red and green coloration distinguishes Veniliornis from Picoides; all species but dignus have dark feather shafts, lacking yellow color. Sexual dimorphism involves crown color (often red versus black or red-spotted versus white-spotted). The bill is short, straight, and not curved along the culmen. The tip is somewhat chisel shaped, and the nostrils are under a lateral ridge; the bill base is broad. The tail is stiffened, but not greatly so (barbs not very stiffened), and the feather vanes are concave below. The toes are typical of the family and four in number; the hallux is one-quarter the length of toe 4, and the claws are long.

SCARLET-BACKED WOODPECKER

Veniliornis callonotus

Color Plate 57

Range Summary. South America.

Diagnostic Features. Little, weight 23 to 33 grams, wing length 71 to 81 millimeters. Distinctively red above and white below; underparts unbarred (callonotus) or lightly barred with black; brown mark on white ear coverts.

Description. Bill rather long and broad. Red above, feathers with brown base. Wings as upperparts, but flight feathers brown with narrow white scallops or bars on inner vanes. Shafts dull whitish. Tail/wing ratio 0.58 to 0.66. Tail brown, central feathers black, outer ones pale yellowish white with narrow black bars. Ear coverts white with broad brown center line, darker brown or blackish in southern (major) populations. Malar and throat white, with or without obscure narrow bars. Below, white (callonotus) or white with faint, narrow black bars (three or four per feather) from breast to undertail coverts (major; intermediates found in southern Ecuador and adjacent Peru [Chapman, 1926]).

Sexual features: Males with red-tipped black crown. Females lack red on black crown. Immatures more mottled above than adults, having broad olive or gray-olive feather bases showing through. Males with red on head restricted to small spots on anterior crown; no nape patch; ear covert patch broader, more diffuse; buffer below. Eyes brown ("carmine" in one, "blue" in another specimen); legs and feet greenish; bill gray at base and above, becoming white at tip and below.

Distribution and Habitat. Western Ecuador and northwestern Peru form the main range of this species, which extends inland to the arid upper Marañon Valley of northern Peru. Habitat is arid scrub vegetation, including trees, bushes, and cacti.

Behavior. Unknown. Immatures in collections date from May to October for major and July to September for callonotus. Molting birds occur in November. One immature male from Ecuador has its bill fully twisted 45 degrees to one side; the reason for the deformity is unknown.

Taxonomy. Relationships unclear. It is probably not especially closely related to the red-backed, small, short-tailed V. sanguineus. Polytypic, with two intergrading races, the paler eared, white-breasted, northern callonotus, which shows obscure or no barring below, and
southern *major*, which has browner “ears” and fine blackish barring on the breast. The two interbreed in southern Ecuador (Chapman, 1926).

**YELLOW-VENTED WOODPECKER**

*Veniliornis dignus*

**Color Plate 58**

**Range Summary.** South America.

**Diagnostic Features.** Little to Small, weight 35 to 40 grams (*dignus*) and 46 grams (*valdizani*); wing length 92 to 102 millimeters. Resembles somewhat the larger *Piculus rivolii*, but back not crimson. Similar to higher altitude *V. nigriceps*, but broader white stripes on face, red nape in both sexes also extending onto sides of neck, belly yellow, usually unbarred, larger wing covert spots, and bill blacker.

**Description.** Bill broad between nostrils, variable in length (see Taxonomy). Above, bronzy yellow-green with variable, scattered red edges, especially on the upper back; occasionally with narrow pale shaft streaks; rump barred weakly (*valdizani*) or distinctly. Wings brown on flight feathers, otherwise above as back with weak to strong, angular yellow spots on coverts, spots often red bordered; inner vanes barred pale yellow and brown. Shafts under wings and tail yellow throughout, except dusky tips, and dorsal surface dusky. Tail blackish with barring on outer two pairs; not highly specialized. Tail/wing ratio 0.57 to 0.63. Nape red, extending onto sides of neck. Wide white stripe over and under eye. Ear coverts olive-black, forming rather narrow patch between white stripes just mentioned. Forehead greenish, nasal tufts buffy, lores white. Chin blackish, tending to white spots and black streaks, not barred as throat and breast. Malar as chin. Below, barred strongly with olive-black anteriorly (throat, breast); belly unbarred yellow or yellow centered with barred flanks.

Sexual features: Male with black crown overlain by red to nape. Female with olive-tinged black crown. Immatures duller, greener above, female with some red in crown. Eyes brown to reddish chestnut; legs and feet olive-gray; bill black, paler at base.

**Distribution and Habitat.** Found from north-central Colombia and southwestern Venezuela south along lower Andean slopes to eastern Peru. Habitat is subtropical forest on mountain slopes, rarely to 6000 feet.

**Behavior.** Little known. Nesting occurs prior to October in Ecuador (molting birds, *baezae*). A July Peruvian specimen (*valdizani*) had slightly enlarged testes. Two specimens of Venezuelan “*abdominalis*” were molting in January. In Colombia, Miller (1963, pp. 19-20) reported molting birds in November, a male breeding in April, and a postbreeding female taken in April. Miller (1963, pp. 19-20) mentions that the Yellow-vented Woodpecker taps frequently in its arboreal foraging but that the tapping is weak. Foraging occurred at 10 to 40 feet above ground in primary forest and secondgrowth, but always where the forest was canopyed.

**Taxonomy.** Related closely to *V. nigriceps*, more distantly to *V. passerinus* and the *V. affinis* complex. Shares black crown and ear patch with white face stripes with *V. nigriceps*; its uppersparts are identical to those of *V. nigriceps* except for the stronger rump barring; and its barred breast and throat, as well as its chin and tail patterns, closely resemble those of *V. nigriceps*. Polytypic, races weakly marked. Northern *V. d. dignus*, including Venezuelan *abdominalis* (Phelps and Phelps, 1956) (its characters are attributable to individual variation), has a moderately long bill and its belly is less barred laterally. *V. d. valdizani* of Peru is
long billed and resembles *dignus* in its olive ventral barring. Ecuadorian *V. d. baezae* has a short bill, it tends to be barred more on the flanks, and its ventral bars are blacker than in the other races. The races vary slightly in size.

**BAR-BELLIED WOODPECKER**

*Veniliornis nigriceps*

**Color Plate 58**

**Range Summary.** South America.

**Diagnostic Features.** Small, weight 45 grams (*pectoralis*); wing length 95 to 106 millimeters. Resembles slightly smaller *V. dignus*, a lower elevation species with which it overlaps; but it has proportionately longer tail, has narrower white face stripes, lacks a red nape (female) and lacks red on the sides of the neck (both sexes), and has fully barred belly, small (or no) wing covert spots, and paler bill.

**Description.** Bill long, broad between nostrils. Above, identical with *V. dignus* except rump and uppertail coverts spotted or obscurely barred. Wings brown on flight feathers, bronzy green on edges, and coverts with very fine, or no, pale streaks on coverts; underwing barred as in *V. dignus*, but whitish and brown without yellow tone. Shafts much duskier than in *V. dignus*; underside of outer tail feathers and tail and wing flight feather bases whitish with trace of yellow. Tail as *V. dignus*, but lacks yellow suffusion found in *dignus*. Tail relatively unspotted. Tail/ wing ratio 0.60 to 0.72. Sides of neck often gold tipped on underlying checkered olive and white pattern. Stripes over and under eye white, but narrow; ear coverts olive-brown, narrowly streaked whitish, forming broad, dark ear stripe. Forehead pale olive, nasal tufts brownish, lores white, edged black. Chin and throat dark, former streaked and latter barred. Malar as chin. Below, barred dark olive (blackish) and buff-white, the black bars broader than pale bars in races other than *equifasciatus*; dark bars less broad posteriorly, but belly fully barred.

Sexual features: Male with black crown overlain with red and with red nape, not extending onto sides of neck. Female lacks red on black or blackish olive crown and nape (no nape patch of red, although dull red edges often appear, as on back). Immatures are greener with duller coloration generally; their tails are more barred; males have red all over the crown, but not the nape, and females have less red on the crown and a blacker based crown than adults. Eyes dark red to brown; legs and feet gray; bill gray to blue-gray, darker above and lighter below.

**Distribution and Habitat.** Mountains of Colombia south along Andes to Cochabamba, Bolivia. Inhabits montane forests between 6000 and 12,000 feet in elevation, essentially above altitudes at which *V. dignus* is found.

**Behavior.** Unknown. Breeding occurs in February and March in Equador (*equifasciatus*), April and May in Bolivia (*nigriceps*), and perhaps in August and September in Peru (*pectoralis*).

**Taxonomy.** Closely related to *V. dignus* (see p. 345). Polytypic. The three races are moderately distinctive. Northern *V. nigriceps equifasciatus* is paler below than other races because its olive bars are shallower. Otherwise it resembles the much more heavily barred Peruvian *pectoralis*. Like *pectoralis*, Bolivian *nigriceps* is heavily barred below, but it differs from both northern races in that females are black crowned rather than olive to blackish olive crowned, as they are in *pectoralis* and *equifasciatus*. 
SMOKY-BROWN WOODPECKER

Veniliornis fumigatus

Color Plate 57

Range Summary. New World tropics.

Diagnostic Features. Little; weight 36 to 42 grams (oleagineus), 33 to 35 grams (sanguinolentus), and 35 to 49 grams (fumigatus); wing length 80 to 105 millimeters (80 to 92 millimeters, sanguinolentus; 87 to 95 millimeters, reichenbachi; 88 to 99 millimeters, fumigatus; and 94 to 105 millimeters, oleagineus and obscuratus). Uniform brownish coloration throughout, including the solidly colored underparts (except belly), and usually paler ear coverts are diagnostic.

Description. Bill moderately long, broad between nostrils. Variable above from yellow-green tinged brown to dull olive-brown, suffused often with red and darker on the upper back (browner back when worn). Wing coverts green-brown, often with some red; flight feathers brown or olive-brown, barred white on inner vanes. Shafts brown except tips of wing feathers and bases of tail feathers. Tail unmarked blackish brown, paling to light brown on outer tail, and not highly modified. Tail/wing ratio 0.54 to 0.61, tending to be greater (tail proportionately longer) in females. Malar region and chin paler than rest of underparts, including throat, being buffy brown to brown and usually bearing vague to distinct narrow black bars. Ear coverts variable but usually distinctly paler than adjacent neck and breast, especially below eye (whitish in oleagineus). Nasal tufts brown; lores pale brown to whitish, like ear coverts. Line over eye brown, paler in races and individuals with paler ear coverts. Below, variable yellow-brown, olive brown to sooty brown on throat and breast, paling considerably on belly, occasionally to whitish buff; breast tinged yellow-green or reddish, and belly vaguely barred in some individuals.

Sexual features: Male with red nape and tips of gray- to black-based crown feathers; female lacks red, has brown to brown-black crown with green tinge, occasionally with fine, obscure white spots. Immatures of both sexes have red in crown, restricted anteriorly in females but reaching nape in males. Outer primary broader and usually longer than in adults, but narrowed outer tail feathers less marked than Zimmer (1942) has suggested. The occurrence of a dark, sooty plumage in immature males, pointed out by Zimmer (1942) and suggested by him to represent a color phase, seems to be the plumage of all juvenal males, exceptions being missexed females. Immature females are like adults, but duller and less richly colored. Eyes brown to red-brown, legs and feet grayish, and bill blue-black to black above and gray below.

Distribution and Habitat. Ranges from San Luis Potosi, Mexico, south to Panama, and in South America from mountains of northern Venezuela and Colombia south along the Andes to Bolivia. Found in forests from near sea level to 3000 meters; mainly associated with forested mountain slopes, where found especially about clearings and edges, e.g., from 900 to 1500 meters at Rancho Grande, Venezuela (Schäfer and Phelps, 1954).

Foraging Habits. Seemingly this woodpecker pecks and taps to obtain food, but comments of Slud ("it may move amid the foliage like an arboreal ovenbird" [1964, p. 193]) suggest that it glean's to some extent from the surface of foliage and twigs. The birds forage singly or in pairs in forests but perhaps mainly at forest edges, in clearings, in secondgrowth, thickets and brush, and occasionally in quite open country. Neither Slud (1964) nor Wetmore (1968) consider it truly a forest bird in Central America, and A. H. Miller (1963, p. 19) mentions it
feeding in pastures from "4 up to 40 feet above ground" in Colombia. In Costa Rica its range complements that of its relative, *V. kirkii*.

**Voice.** According to Miller (1963, p. 19) there are three major vocalizations; "a single *chuck*," a "rattling, piping sequence," and "during aggression a sucking *whicker*." These seem to be respectively a call note, a Rattle or Long Call, and a Wicka-type call. The Long Call is described by Slud (1964, p. 193) as a "harsh buzzy rasping call, a series of up to 10 notes... a rapidly given 'zur zur zur zur'... [or] varied to a 'tchip, tchip, zr-rr-r-ruh kuh kuh kuh kuh kuh kuh.'" Skutch (1969, p. 422) describes this call as a "queer, wooden rattle." Drumming is reported by Wetmore (1968) as very rapid.

**Displays.** Displays are little known, the only reported nonvocal display being an aggressive sidling around the trunk and the spreading of one wing on the part of one bird against a woodcreeper (Miller, 1963).

**Breeding.** In Colombia, *V. fumigatus fumigatus* was reported nesting in April by Miller (1963). The nest was excavated between 11 and 27 April near the top of a 5-foot tall fence post at the edge of a brushy pasture 50 yards outside the forest. The 10-inch-deep cavity was ready for eggs on 27 April, but one of the birds apparently was killed by a predator at the cavity on that day, and nesting did not occur. That this was a nest-to-be is indicated by aggression shown to a third bird near the site on 26 March, by the excavation apparently by both male and female, and by roosting in the hole by one of the birds, presumably the male. Nesting is from February to March at Rancho Grande, Venezuela (*reichenbachi* [Schäfer and Phelps, 1954]), and from March to June in Middle America. Postbreeding, molting birds are known from June to October in Central America (*sanguinolentus*) and October to December in northern South America (*reichenbachi* and *fumigatus*).

**Taxonomy.** Relationships uncertain, but probably rather closely related to *V. passerinus* and its relatives. Polytypic, varying somewhat in size and intensity and tone of color. *V. f. oleagineus* is brown with pale ear coverts becoming whitish about the eyes. *V. f. sanguinolentus* is smaller and a deeper, richer brown with buffy ear coverts lacking white. South American races are similar and vary from large and dark (more gray-brown, *obscuratus*) to small and brown (*reichenbachi*), but none show white about the eyes. Zimmer (1942) characterized the South American races.

**Reference**

**LITTLE WOODPECKER**

*Veniliornis [passerinus] passerinus*

**Color Plate 59**

**Range Summary.** South America.

**Diagnostic Features.** Little, weight 30 to 36 grams (*olivinus*). Wing length 71 to 95 millimeters. Lacks gold or red on sides of neck. Ear coverts dusky buff with pale shaft streaks so fine that ear coverts appear unicolored. Tail barring restricted to outer feathers. Females lack nape patch (no red on head) and males have large forehead patch (olive- or gray-brown) in front of red cap.

**Description.** Bill moderately long, broad between nostrils. Size varies considerably, largest race (*olivinus*) one-fifth longer winged than smallest races (*insignis* and *passerinus*). Variable above, bronze to yellow-green, very fine shaft streaks present or lacking; red feather tipping
is sporadic; bars absent to moderately strong, yellow and green, often evident on rump if not elsewhere. Wings colored as back; flight feathers brown except for greenish edges and white-barred inner vanes; coverts above variously unmarked, finely spotted, streaked, barred, or edged with red. Tail brown, barred yellowish dusky white; bars faint on central feathers. Tail/wing ratio 0.51 to 0.65, variation individual. Malar region, chin variably spotted or streaked, not barred, and paler than barred throat. Ear coverts dusky to olive, unbarred, with obscure fine streaks, appearing uniform in color. Sides of neck olive or green in darker races, but whitish with olive marks in the paler, more spotted forms. White stripes over and under eye present, partial (under eye only), or lacking entirely (passerinus, diversus, and insignis). Variably barred below with olive, green-olive, or gray-olive and buffy white; dark bars broader on breast, varying racially; in fidelis and modestus breast barring irregular or bars scalloped, distinctly different in pattern from abdomen.

Sexual features: Male with red nape and crown red variably from anterior crown to nape (most races), or hindcrown to nape (olivinus; diversus and insignis somewhat intermediate). Female nape, crown, and forehead (and male forehead, as well as forecrown of some males) brown to brown-gray, with or without fine pale spots, and lacking red. Immatures have less regular barring on breast, tending to be scalloped or irregular and unlike the belly; both sexes have red on the crown, but not the nape, and the male has more red than the female. Eyes brown or dark brown in adults, gray to milky blue in juveniles; legs and feet gray; bill black.

Distribution and Habitat. Widespread from eastern Colombia, Venezuela, and the Guianas southward east of the Andes to east-central Bolivia (Santa Cruz), Paraguay, Santa Fe and Corrientes, Argentina, and Rio Grande do Sul, Brazil. Found in lowland forest, woods, and scrub, as well as savannas.

Foraging Habits. Taps, probes, excavates, and gleans insects on trees, saplings, and bamboos at all heights. Where bamboos occur, it seems to prefer feeding on them, tapping and excavating tiny holes about the nodes, probably preying upon ants.

Voice. A territorial Long Call, rendered in my notes as “wi-wi-wi-wi-wi-wi-wi,” was uttered frequently during October in Argentina. The call was associated with drumming, and it also was given by a male excavating a presumed nesting cavity when I approached it too closely. Another call is the Wicka Call, variously rendered “wik-wik-wik-wik-wick” and “wick-a, wick-a.” This low call was given by one or both of two males engaged in agonistic encounters described in the following section.

Displays. Two males 10 centimeters apart faced each other, and one male swung its head from side to side slightly as both called the low “wik-wik” call just mentioned. Both birds then spread their wings above their heads and moved toward each other, the upper bird sidling and swinging its head, and both again called a “wik” call. They then flew off in pursuit. Another brief encounter occurred when a male and female were approached by a second male as they foraged near one another. The incoming male perched beside the male (the female fled), which swung its head rhythmically from side to side, spread its tail halfway, called “wick-a, wick-a,” then lunged at the intruder. The latter also had swung its head, and it may have called too. Its response to the lunge was a flight, with the first male in pursuit.

Breeding. Birds excavating nests and nests containing young were seen in northern Argentina (race olivinus) during October. Adult specimens taken during that month had enlarged gonads and either were in, or were approaching, breeding condition. The enlarged testes of males are asymmetrical, the left one being long and curved and the right one oval. A male partly excavated a cavity 13 meters up a dead stub within riverside woods in Argentina on
13 October. On an island in the Parana River a male fed two half-grown young birds inside a nest 5 meters above ground on 27 October. Other cavities and some presumed nests were in bamboo. No more than two young birds were seen with adults. Immature birds are known of passerinus during October, of insignis and modestus during January, of agilis in July to December, of tapajoensis in September, of taenionotus in November, and of olivinus from June (Mato Grosso) and October (Argentina). The annual molt occurs at different times in diverse races (November and December in passerinus, March in insignis, February and March in olivinus).

Taxonomy. Forms a superspecies with V. frontalis, which it meets. An adult V. p. olivinus and a juvenile P. frontalis were taken 23 October and 24 October 1951 at Vermejo, Santa Cruz, Bolivia. Two adult males of V. p. olivinus were collected at Todos Santos on the Rio Chapare, Bolivia, on 4 August and 9 September 1937, and a male of frontalis was collected there on 9 August 1937— the latter male tends toward V. passerinus in its size, the restriction of the crown patch, and the greenish in the (black) ventral bars, so some hybridization is suggested. Their interactions merit study. V. spilogaster and V. sanguineus, as well as the V. affinis complex, seem somewhat closely related to V. passerinus. Strongly polytypic. The subspecies differ in general color, degree of barring, amount of spotting on wing coverts, presence or absence of face stripes, and the extent of the male’s red crown patch, as well as in size. Southern V. p. olivinus is the largest form. It generally lacks facial stripes (except anterior part of stripe below eye in some) and has very broad, blackish ventral barring and a restricted male crown patch. V. p. taenionotus of eastern Brazil is a much yellower, smaller subspecies, characterized by narrow dark bars (hence whiter) below and barring on the back. These distinct races intergrade through intervening populations (“transfluvialis”). V. p. fidelis, another well-marked subspecies, has strong white face stripes, large spots on wing coverts, and a dark breast with marks in the shape of spot-bars, very distinct from the belly and reminiscent of V. spilogaster. Other more or less distinct subspecies are V. p. insignis, agilis, modestus, diversus, passerinus, and tapajoensis (see Zimmer, 1942, pp. 1-5).

Reference

DOT-FRONTED WOODPECKER

Veniliornis | passerinus | frontalis

Color Plate 59

Range Summary. South-central South America.

Diagnostic Features. Little, weight 30 to 36 grams, wing length 89 to 97 millimeters. Like V. passerinus, which it barely meets (V. p. olivinus) in Bolivia, but slightly larger, barred with whitish above, and heavily spotted with white on forehead and forecrown of male and entire top of female’s head. Also, tail more fully barred than in V. passerinus, ear coverts distinctly streaked and hence bicolored, and grayer, less olive ventral barring; males have red extending farther forward on crown than in V. p. olivinus.

Description. Bill long and broad between nostrils. Above, yellow-green, in fresh plumage three-toned (yellow-olive bars, pale whitish yellow bar-streaks, and golden-yellow tips); red absent; bars vary, sometimes more spotted than barred. Wings as in V. passerinus but yellower, coverts with pale wedge-spots and no red evident. Tail barred brown and dusky white with yellowish tone, vague but present on central feathers. Shafts as in V. passerinus.
Veniliornis spilogaster

Tail/wing ratio 0.57 to 0.67. Tail proportionately longer than in adjacent *V. passerinus olivinus*. White chin and malar region with broad olive-gray spot-streaks. Ear coverts buffy brown, broadly streaked, and barred at tips and posteriorly on sides of neck. White stripes over and under eye, although encroached upon by olive-gray spots. Below, barred throat to tail with olive-gray bars deeper than white bars.

Sexual features: Male with broadly red-tipped gray crown and nape feathers; forehead of male and entire top of female's head gray-brown to olive, spotted with white, becoming streaked on female's nape. Immatures grayer and less green above; both sexes have red on the crown, but not the nape, females having less red than males. Eyes brown, legs dark gray, bill slaty or gray-black (paler below).

**Distribution and Habitat.** From Cochabamba and western Santa Cruz, Bolivia, south along Andean slopes as far as Tucumán, Argentina. Inhabits the forested lower eastern slopes of the Andes in subtropical forest, wandering downslope in the nonbreeding season (fide C. C. Olrog).

**Behavior.** Unknown. Juvenal birds are known from October in Santa Cruz and September in Tucumán, and Chuquisaca (Bolivia) adults had regressing gonads in November. Molting individuals have been noted in March, June, and November (tail molt).

**Taxonomy.** Forms a superspecies with *V. passerinus* (see p. 350). The pale, spotted, and barred *V. frontalis* resembles the xeric zone *V. passerinus taenionotus* of eastern Brazil, and it somewhat resembles *V. maculifrons* as well. Monotypic.

**WHITE-SPOTTED WOODPECKER**

*Veniliornis spilogaster*

**Color Plate 60**

**Range Summary.** South America.

**Diagnostic Features.** Size Little, weight 38 to 45 grams, wing length 90 to 105 millimeters. Distinctly olive-green rather than yellow-green overall, with definite barring evident above and below. Ventrally dark breasted, bars irregular and tending to be spotlike. White malar stripes and superciliary stripe. Tail fully barred.

**Description.** Bill rather long, broad between nostrils; sexes differ appreciably, bill being longer in male. Above, olive-green with pale yellow-white bars or, on rump and sometimes upper back, spots. Wings olive to brown (flight feathers), barred with yellow-white on upper coverts (sometimes spotlike) to white on flight feathers and underwing coverts. Wear and fading make barring more conspicuous, pale bars whiter. Shafts brownish above, whitish horn color below. Tail/wing ratio 0.60 to 0.66. Tail not strongly modified, brown with narrow to moderate dusky-white bars on all feathers. Nasal feather tuft buffy. No nape patch; nape often with fine white spots. Chin and throat variably very white with narrow olive to olive-brown streaks or darker with broad streaks. Ear coverts brown with white shafts expanded to spots at feather tips (worn birds browner, less spotted). Malar stripes vary from conspicuous brown marks with few fine white streaks to inconspicuous, evenly streaked brown and white. Narrow white stripes separate (subocular stripe) the malar area and ear coverts and (superciliary stripe) the ear coverts and crown. Below, dark olive with pale yellow-white bars on belly and undertail coverts, giving way on breast to lateral bars (not touching shafts) or even spots restricted to feather edges (birds become darker as the paler edges wear off).
Sexual features: Males with blackish brown crown very finely tipped with narrow red streaks. Female with olive-brown crown and white shaft streaks forming fine spots at tip (wear reduces these marks, especially in males, which may lose all red). Immatures like adults but dorsal markings reduced and more spotlike. Eyes chestnut; legs and feet olive; bill black above, gray below.

**Distribution and Habitat.** South America, in southernmost Brazil and adjacent Paraguay, Argentina, and Uruguay. Ranges from Rio de Janeiro and Minas Gerais through São Paulo to eastern Paraguay, Misiones, and eastern Corrientes, Argentina, and Uruguay. The habitat of the White-spotted Woodpecker is various types of woodland and forest in lowlands. In northeastern Corrientes this species extends from riverine forest into small, isolated, cutover woodlots up to a kilometer or more from extensive forests.

**Behavior.** The White-spotted Woodpecker forages by tapping and excavating in the bark of saplings and trees at various heights. Specimens from Corrientes, Argentina, contained various grubs, including coleopterous larvae, in their stomachs. One vocalization heard in response to my intrusion upon several birds was a “pic” call note (Short, 1970a). In northeastern Argentina nesting commences in late October, as judged by enlarging gonads of several specimens taken in September and early October. Molting takes place from January through May in northeastern Argentina.

**Taxonomy.** Relationships need study, but *V. spilogaster* resembles somewhat the white face-striped races of *V. passerinus* and especially *V. frontalis*, and these may be its closest relatives. Some specimens of *V. passerinus olivinus* have restricted breast bars with expanded pale shaft spots, suggesting *V. spilogaster*. Monotypic.

### BLOOD-COLORED WOODPECKER

*Veniliornis sanguineus*

**Color Plate 60**

**Range Summary.** South America.

**Diagnostic Features.** Little, weight 23 to 30 grams, wing length 72 to 78 millimeters. Red above, feathers with brown bases. Heavily barred below; black bars broader on breast, white bars broader on belly.

**Description.** Bill long for size of bird, broad between nostrils. Above, green-brown overlain with red throughout. Wings above like upperparts, sometimes with green edging of primaries, with very fine pale dots in coverts; underwing barred throughout, including brown flight feathers. Shafts dusky above, pale whitish in wings and base of tail. Tail/wing ratio 0.55 to 0.60. Tail unspecialized; brown throughout. Nape red as back. Throat barred light brown and blackish. Ear coverts brown with obscure fine white shaft streaks. Malar region as throat. Barred below with three gray and three white bars per feather; dark bars two to three times as deep as light ones on breast, light bars becoming slightly deeper than dark bars on belly.

Sexual features: Male with brownish crown feathers broadly edged with red. Female lacks red, having crown brown with small white spots. Immatures duller with lax plumage, showing larger spots in wing coverts; outer primary larger than in adults, in length to half as long as adjacent (ninth) primary. Eyes red-brown; legs and feet gray-black; bill gray above and at base, pale horn color at tip and edges.
**Distribution and Habitat.** Limited to northeastern South America in Guyana, Surinam, and French Guiana. Inhabits lowland forests, including mangroves and coffee plantations (Haverschmidt, 1953).

**Foraging Habits.** Birds forage singly or in pairs in diverse trees and shrubs. Ants, spiders, lepidopterous larvae, and coleopterans are known to comprise their diet.

**Voice.** According to Haverschmidt (1953), both sexes drum. The call note is a “keek” (Haverschmidt, 1968), and it also delivers a Long Call noted by Snyder (1966, p. 160) as a “rapid, thin, rather wooden series ‘wih-wih-wih-wih-wih...’ to 16 notes.”

**Breeding.** Nesting occurs in Surinam following the molt (January to March), generally between May and October but occasionally earlier (February [Haverschmidt, 1953]). Copulation was observed on 10 June by Haverschmidt; a male mounted the sideways-perching female on a branch. Shortly thereafter the birds roosted together. A nest found on 3 October was 1.37 meters above ground in a tree 15 centimeters thick at the nest cavity, the entrance diameter of which was 3 centimeters. The chamber’s depth was 13 centimeters. Both sexes incubated eggs, which hatched about 11 October. Again, both male and female fed the young (about equally), carrying rather few, or even single, insects (or arthropods, including caterpillars and spiders). Excrement is carried from the nest by adults after feeding the young, which rattled loudly and constantly when there was a disturbance near the cavity entrance. Adults often stayed for some time with the young after feeding, and the female frequently remained until the male appeared with food (Haverschmidt, 1953).

**Roosting.** A male and a female took turns excavating what turned out to be a roosting cavity, prepared during late March to late May. On 10 June the male and female reported copulating (above) were noted to enter the cavity they presumably had excavated. On 24 June to 8 July three birds entered the roosting hole, and these were determined on 8 July to be a male and two females. After that date only two birds (sex uncertain) used the cavity nightly. Roosting continued in that hole for nearly 8 months, until 4 February, after which the birds were not again seen.

**Taxonomy.** This woodpecker has no very close relatives. Its small size; the spotted, brown crown in the female; the broad, dark but dusky barring below; and other features suggest a relationship with V. passerinus, but studies are needed to establish this. The Blood-colored Woodpecker is monotypic.

**Reference**

**YELLOW-EARED WOODPECKER**

*Veniliornis [affinis] maculifrons*

**Color Plate 61**

**Range Summary.** Eastern South America.

**Diagnostic Features.** Little, wing length 90 to 96 millimeters. Like possibly sympatric *V. spilogaster*, but less olive, more yellow-green with pale dorsal spots, not bars. Underparts barred, paler, and less olive than *spilogaster*. Males differ from *spilogaster* in having a red nape patch and red rear of the crown, not red over the entire crown. Females have a golden nape patch, lacking in *spilogaster*. Even more like closely related, possibly sympatric *V. affinis*, but male forecrown and female crown white spotted, nape yellower, ear coverts more
olive-white and not buff, upperparts generally greener, less golden or bronze hued, and white line present over eye.

**Description.** Bill long, rather broad between nostrils. Above, yellow-green to bronze-green, without any red, showing obscure bars or spot-bars throughout, but becoming definite on the rump. Wings like back above except flight feathers brown with white bars on inner and outer (except ninth primary) vanes and with faint streaklike pale spots evident on the coverts. Shafts pale dusky underneath and at bases, becoming brown dorsally. Tail/wing ratio 0.53 to 0.60. Tail brown with bars evident on all feathers, although subtle above (bars more distinct than in *cassini*). Nape golden-yellow or yellow, less gold than in *V. affinis* (or *V. kirki* and *V. cassini*), spreading onto the sides of the neck and rear of ear coverts, which are dark with whitish center streaks. Very narrow white superciliary present. Chin spotted, whiter than throat, which is barred; malar like chin. Below, barred dull olive or gray-olive and dull white, darker bars deeper anteriorly but equal to or shallower than white bars in rear.

Sexual features: Male’s crown brown with white shaft streaks enlarging to spots at tips of forehead feathers, otherwise tipped with red ever more broadly to the rear, where red patch is formed adjacent to gold nape (very worn birds lose red tips anteriorly, having fore-crown white spotted and hinder-crown red). Females with crown olive, having fine white shaft streaks forming small spots at tips, these being gold at rear, thus forming larger gold crown-nape patch than in males. Immatures duller, greener above, showing more barring dorsally than adults; nape patch weaker, less gold; bars below less even, irregular, and somewhat chevron shaped. Bill blackish above and below; eye color and color of legs not reported.

**Distribution and Habitat.** Found only in Rio de Janeiro, Minas Gerais, and Espirito Santo, Brazil. Habitat presumably forest, but not known.

**Behavior.** Completely unknown. Study of its habits would shed light on its restricted distribution. Museum skins indicate nesting in September and October, and the annual molt occurs in January to March.

**Taxonomy.** Forms a superspecies with allopatriic *V. kirki*, *V. cassini*, and *V. affinis* (see Taxonomy under *V. affinis*). Possibly meets *V. affinis* in Espirito Santo or in Rio de Janeiro. *V. maculifrons* is the most distinctive of the *V. affinis* complex, but its similarities with that group outweigh its differences and its tendencies toward the *V. passerinus* complex and *V. spilogaster*. *V. maculifrons* is monotypic.

**RED-STAINED WOODPECKER**

*Veniliornis [affinis] affinis*

**Color Plate 61**

**Range Summary.** South America.

**Diagnostic Features.** Little, weight 35 to 43 grams (*hilaris* and *ruficeps*), wing length 85 to 102 millimeters. Lacks red rump of *V. kirki*, is more golden naped and less spotted and barred than *V. maculifrons*, and has a blacker bill and buffer breast than *V. cassini*, its close relatives. Distinguished from all three by generally buffer face (ear coverts and about eye).

**Description.** Bill moderately long, broad across nostrils. Above, greenish (*orenocensis*) to gold-green or bronzy, often suffused with red; pale yellowish shaft streaks obscure (*orenocensis* and *chocoensis*) to moderately developed (*ruficeps* and *affinis*), sometimes broadening to suggest bars (approaching *V. maculifrons*); rump and uppertail coverts barred
obscurly to strongly. Wing coverts as back, with streaklike to barred yellowish spots (affinis and ruficeps) or obscure spots (orenocensis, chocoensis, and hilaris), and coverts tipped with red broadly (hilaris), moderately (ruficeps), or weakly if at all (affinis, chocoensis, and orenocensis). Wing flight feathers brown with strong buffy white barring. Shafts brown above, whitish under wings and tail, with trace of yellow, but dusky at tips. Tail brown with pale barring on all feathers, but weak on central feathers in some. Tail/wing ratio 0.52 to 0.64; tail not markedly specialized. Nape dull golden yellow, extending to sides of neck and tips of ear coverts. Nasal tuft, ear coverts, lores, line over eye, malar region, and area below eyes buffy to cinnamon buff, vaguely olive streaked at rear of malars and ear coverts. Some birds stained greenish yellow over most of head, probably from feeding activities. Chin unmarked, spotted, or barred, but whiter than throat, which is barred dark olive and buff or whitish-buff. Below, barred olive to black and dull whitish, but breast usually suffused strongly with buff.

Sexual features: Very broadly red-tipped, blackish based crown in males. Females have olive to brown crown with fine, obscure streaks sometimes evident anteriorly and definite gold streaks joining the nape patch at rear. Immatures red-crowned, females with but scattered red tips about the center of the crown, but males more fully, though less than adults; ear coverts streaked more strongly; outer primary longer and wider; and plumage soft and lax. Eyes brown or red-brown; legs and feet olive-gray or gray-green; bill black above, slate-gray below, paler at lower edge of lower bill.

Distribution and Habitat. Widespread in South America from the Orinoco Valley of Venezuela and eastern and northwestern Colombia through eastern Ecuador, eastern Peru, and Amazonian Brazil south to Pernambuco, Espirito Santo, and Mato Grosso, Brazil, and northern Bolivia. Frequents diverse forests within the vast region.

Behavior. Poorly known. Forages in forest trees. Broadly overlaps in range with V. passerinus; but in eastern Peru, at least, the two are only marginally together, for V. affinis prefers the forest and V. passerinus prefers edges and secondgrowth (J. Weske, personal commun.). Immatures are known from Bolivia (hilaris) in October and November, in western Amazonia (hilaris) during July, in Espirito Santo (affinis) in November, and in central Amazonia (ruficeps) during September to December. I noted molting specimens of orenocensis during October and November and of ruficeps from April to June.

Taxonomy. Forms a superspecies with largely allopatric V. cassini, V. kirkii, and V. maculifrons. It barely overlaps with V. cassini in the Rio Negro region, is allopatric with V. kirkii, and may contact V. maculifrons in Espirito Santo or Rio de Janeiro (no sympathy documented). All of these resemble one another closely; they have a gold to yellow nape patch extending to the sides of the neck, a similar bill, generally weak facial stripes (over and under eye), and, usually, spotted underwing coverts. V. affinis is polytypic, with two groups of races paralleling each other. The northwestern group, characterized by weak or obscure wing covert spotting, contains a larger race (hilaris) with prominent red wing markings and two smaller races (chocoensis and orenocensis) lacking them. The southeastern group has prominent pale marks on the wing coverts; a small race (affinis) has red edging of the wing coverts suppressed, whereas large ruficeps has this edging prominent. V. a. ruficeps and hilaris intergrade in the Rio Madeira region and Mato Grosso (Glydenstolpe, 1945). The supposed race caquetanus of southeastern Colombia tentatively is considered a synonym of orenocensis (actually orenocensis intergradient with hilaris), based on a subadult-plumaged bird, and the subspecies chocoensis of northwestern Colombia is considered a race of V. affinis and not of V. cassini (Short, 1974b).
GOLDEN-COLLARED WOODPECKER

Veniliornis [affinis] cassini

Color Plate 61

Range Summary. Northern South America.

Diagnostic Features. Little, weight 24 to 38 grams (Venezuela, Guyana, and Surinam [Haverschmidt, 1968]), wing length 90 to 102 millimeters. Very like closely related V. affinis, green to bronzy yellow-green above, barred below, but pronounced nape patch generally more golden, brighter, and spreading to sides of neck behind ear coverts; wing shafts below paler, less dusky at tips; small buffy white spots on wing coverts, which lack red (adjacent races of affinis have unmarked coverts, coverts with fine white streaks, or red-tipped covert feathers); clearer white, less buffy below with more regular, black barring below; ear coverts whiter, less buff than V. affinis; central uppertail coverts green, unbarred, but occasionally white spotted; bill paler.

Description. Bill rather long, moderately broad between nostrils. Above, green to yellow-green, less bronze and more yellow than V. affinis and rarely with visible reddish tips; rump as back or obscurely barred, not extending onto tail coverts. Wing flight feathers brown, edged green; upper coverts with a terminal, round buffy spot and sometimes a basal spot on some or all feathers, but no red; underwing coverts barred, flight feathers broadly white barred on inner vanes. Shafts pale yellow below, yellower at bases of tail feathers; brown above, except bases of tail pale. Tail brown with pale dusky bars obscure above, stronger below and on outer feathers. Tail/wing ratio 0.55 to 0.64. Nasal tufts buffy brown. Posterior nape gold, extending onto sides of neck and tips of ear coverts, latter otherwise buffy white centered with olive edges, forming streaks (two tones). Chin spotted to barred blackish, but whiter than barred throat. Malar area as throat. Very narrow, vague buffy white line over eye. Barred below with brownish black to black on buffy white or white background; breast with only slight buff tone; dark bars broader on breast, narrower to rear, but regular throughout.

Sexual features: Male with gray-black crown feathers narrowly tipped red, becoming broader and forming a red band on front of nape (before gold hind-nape patch). Females have gray to greenish brown crown, sometimes edged dull gold at feather tips, posteriorly becoming heavily gold-white spotted on hindcrown, merging into gold nape. Immatures as adults, but greener above with yellower, less golden nape, browner ear coverts, and less spotted, more pale-streaked wing coverts. Eyes brown to red (?). Legs and feet variously indicated on specimen labels as olive-gray or blue-gray to blackish. Bill gray or gray-black at base, lightening toward tip and edges (to “pale horn” or “bone white”).

Distribution and Habitat. Northern South America in the Guianas, southern and southeastern Venezuela (Bolivar, Amazonas), and northeastern Brazil north of the Amazon from the Rio Negro to Amapa. Habitat is forested regions, occurring in shrubbery and clearings but usually within the forest itself.

Behavior. Essentially unknown. Reported to feed on coleopterous larvae (Haverschmidt, 1968), usually high in trees (Snyder, 1966).

Taxonomy. Forms a superspecies with all species V. kirkii, V. affinis, and V. maculifrons, overlapping with V. affinis in the Rio Negro region of Brazil. Considered monotypic, the putative races caquetanus and chocoensis being treated as forms of V. affinis (see p. 355).
RED-RUMPED WOODPECKER

Veniliornis [affinis] kirkii

Color Plate 61

Range Summary. New World tropics.

Diagnostic Features. Little, weight 32 to 42 grams (V. k. kirkii), wing length 78 to 97 millimeters. Yellow-green above with red rump and barred fully below. Differs from V. cassini by red rump and olive rather than black ventral bars and from V. affinis chocoensis, with which it is sympatric, by its red rump and two-toned ear coverts (streaked, not buffy).

Description. Bill rather long, broad across nostrils. Above, green to yellow-green, often edged with red, and with pale yellow shaft streaks evident or obscure; rump and uppertail coverts crimson. Wing coverts like back, with obscure to conspicuous angled pale spots; flight feathers brown, edged in green and barred brown and white on inner vanes. Tail blackish brown with obscure bars on central feathers, becoming pale brown with bars on outer feathers. Tail/wing ratio 0.57 to 0.65. Shafts whitish under wings and tail, especially toward feather bases, and dusky toward tips; brown above. Nape yellow-gold extending to sides of neck and rear of ear coverts, which are olive with narrow to broad white shaft streaks. Forehead and lores brownish to buffy. Chin spotted to barred like throat (monticola, kirkii, and continentalis) or less marked and paler (neglectus and cecilii — pure white on few of latter). Below, barred throughout with dark olive (blackish in monticola), lacking buffy tone of V. affinis, and white bars broader posteriorly.

Sexual features: Rather broadly red-tipped, gray-black crown, red merging into nape at rear in males. Female crown blackish with traces of green, spotted near nape patch and occasionally (obscurely) farther forward. Immatures as adults but red on crown in both sexes, more limited in females. Eyes red-brown to dark brown (pinkish white or gray outer ring reported in Trinidad birds). Legs and feet variously noted as gray with tinge of green or bluish. Bill dark above, usually black, and paler (gray, horn color, whitish) below.

Distribution and Habitat. Occurs from southern Costa Rica south to western Ecuador, lowland Colombia, northern Venezuela, Trinidad, Tobago, and on mounts Uei Tepui and Roraima in southeastern Venezuela. Its habitat is little-disturbed lowland forest, except for V. k. monticola, which occupies forested mountain slopes at about 4200 feet and up to 6000 feet.

Foraging Habits. Forages high in trees, tapping frequently to extract food from bark. Pairs forage together, or apart, and parties of up to four birds have been noted (Wetmore, 1968). In Panama this woodpecker may feed with mixed species foraging flocks, including various ant-wrens, flycatchers, and tanagers.

Voice. The Red-rumped Woodpecker drums rapidly in long bursts, "a quick tattoo, made with great rapidity, slightly longer in duration than that of other woodpeckers of Panama" (Wetmore, 1968, p. 573). Its vocalizations, discussed by Slud (1964, p. 194), include a nasal, resonant "keeer," showing resemblance to notes of the flycatcher Pitangus sulphuratus and the "keeek" of Piculus rubiginosus, a "strong, tapered, javlike or gnatcatcher-like 'myehh,'" and a keeerlike, nasal two- to usually four-note call ending "either with or without a much weaker, sawing and throaty 'yuk' or 'yk.'" The last call apparently is that referred to by Chapman (1894, p. 61) as a "strong, high, penetrating chee, chee, chee."

Breeding. Few data are available. At Rancho Grande, Venezuela (continentalis), it nests during February and March (Schäfer and Phelps, 1954). In Panama, cecilii seems to nest
from December through March, followed by the annual molt (April, July). Three nests were reported by ffrench (1973) on Trinidad between December and February, but he noted newly fledged young in April and I have seen April immatures from there. The clutch of three eggs is laid in a hole excavated in a tree 10 to 25 feet above ground (ffrench, 1973). Molting adults from Roraima (monticola) were collected in January, and molting Trinidad birds are known from June and September, according to ffrench.

**Taxonomy.** Forms a superspecies with *V. affinis*, *V. cassini*, and *V. maculifrons* (see *V. affinis*, p. 355). The Red-rumped Woodpecker occurs with *V. affinis* in western Colombia, but otherwise is allopatric with that species. Otherwise, it is allopatric with *V. maculifrons* and *V. cassini*, although *V. k. monticola* occurs in mountains altitudinally above *V. cassini* in southern Venezuela. This species is polytypic. The large, heavily barred, dark *V. k. monticola* is distinctive. Other races vary somewhat in size and ventral barring and in the extent of spotting on the wing coverts. *V. k. kirkii* of Trinidad and Tobago is large and heavily barred with spotted coverts; *continentalis* is smaller with more white (broader white bars) below; and the other races, *ceciliii* and *neglectus*, are small and differ in barring and whiteness of the chin.

**Genus Piculus Spix**

A neotropical genus of seven species characterized by green or bronzy dorsal coloration and yellowish to rusty shaft color, with a relatively pointed bill and curved culmen. The underparts are barred or spotted. The bill is moderately short, narrow to moderately broad across the nostrils, and pointed or slightly chiseled at the tip. The sexual dimorphism in pattern involves a malar stripe (in males, and lacking or differing in color in females) and in some cases also the color of the crown-nape. The tail is moderately specialized and shows little concavity below. The feet are typical of picids and have a hallux one-third the length of the fourth toe; the claws are strongly developed.

**WHITE-THROATED WOODPECKER**

*Piculus leucolaemus*

**Color Plate 62**

**Range Summary.** New World tropics.

**Diagnostic Features.** Small, weight 51.6 grams (Costa Rican female), wing length 103 to 114 millimeters (*simplex* and *callopterus*) and 108 to 121 millimeters (other races). Greenish above, variously barred and spotted below like *P. flavigula* but has green or golden-green ear coverts; males have broader, more extensive red malar patches; it lacks a yellow throat, is more bronzy and less yellow above, and has breast darker with droplet-shaped marks or wedges smaller than in *P. flavigula*. Where sympatric with latter, *P. leucolaemus* usually smaller in size.

**Description.** Bill as in *P. flavigula*: short, slightly curved culmen, rather narrow across nostrils. Size variation not great, northern races smaller. Above, bronze-green, with yellower edges in fresh plumage; rump as back or with faint buff spots or vague barring. Wings as back but more bronzy, flight feathers brown; pale cinnamon patch on inner vanes of primaries, secondaries, and underwing coverts, unbarred or with some barring (*callopterus* and *simplex*). Shafts of wings dark above and pale below, cinnamon where patch occurs; tail shafts pale
Piculus leucolaemus

yellow, almost flesh colored. Tail not narrowed, blackish with green edges; in some birds of all races outer large tail feathers show cinnamon streaks near shafts, sometimes expanding. Tail/wing ratio 0.51 to 0.60. Nape and hindcrown red. Throat white to dull greenish, unmarked or more usually with faint spots, streaks, or bars. Ear coverts green, brown-green, or gold-green, somewhat obscured by gold in some cases and bordered below by a wide golden (subocular) stripe, a narrow yellow-white stripe restricted anteriorly (callopterus and immatures of simplex), or stripe lacking (adults of simplex). Lores green or gold-green to red (males of simplex). Below, barred evenly on abdomen to lower breast, usually set off from darker upper breast, which is green with pale spot-bars or wedges, but more nearly barred in females, generally, and in some callopterus and a few simplex.

Sexual features: Males with red malar stripes, extending onto lores in simplex, and with crown entirely red, as nape and hindcrown. Females have green or yellow-green malar stripes and fore- and midcrown green or yellow-green meeting red hindcrown and nape. Immatures differ from adults in the usual ways and are also darker above and below (breast greener, light wedges smaller, more spotlike). Eyes red-brown to white or bluish white (simplex [see Wetmore, 1968, p. 536]). Legs and feet gray to greenish black; bill blue-gray.

Distribution and Habitat. Occurs from Honduras to eastern Colombia, central and western Amazonian Brazil (east to Villa Bella Imperatriz), eastern Peru and northern Bolivia, and west of the Andes south to western Ecuador. Favors lowland forests especially in foothills of mountains and about their bases.

Behavior. Little known. Slud (1964) reports its feeding at or below the medium level of trees, pecking at them (Costa Rica, simplex). In Panama they (callopterus) reminded Wetmore (1968, p. 539) of Downy Woodpeckers (Picoides pubescens), "as they worked quietly over the trunks of trees in dense forest, pecking steadily at the wood." Two stomachs of callopterus contained ants. No displays have been described. Young birds are known from Nicaragua in March (simplex).

Taxonomy. Closely related to P. flavigula with which it overlaps in Amazonian Brazil, eastern Ecuador, and eastern Peru. Strongly polytypic. Two South American races are closely alike (leucolaemus and litae). P. l. leucolaemus includes australis Carriker, which is paler and greener, less black, but greatly overlaps leucolaemus. Central American simplex, usually treated as a species, differs mainly in having pale eyes and lacking a pale (subocular) stripe below the ear coverts. It also is darker threated and has red expanding from the malar onto the lores. Juvenile specimens of simplex show a small white malar stripe nearly like that of callopterus, and they also are barred, including the throat. P. l. callopterus of Panama is very like immatures of simplex and indeed is intermediate in barring of wings and underparts and in the malar stripe between simplex and the two South American races. Like other races of P. leucolaemus, simplex has a tendency for cinnamon markings in the tail. In size and bill shape it is identical with callopterus. Although callopterus and simplex supposedly occur in Veraguas, Panama, it is open to serious question that the sole (old) specimen of callopterus reported for Veraguas actually came from there (Wetmore, 1968, p. 538). These two races thus seem entirely allopatric. As for the eye color of simplex and the other races of P. leucolaemus, it varies somewhat within simplex (blue in some Costa Rican birds according to Slud [1964] and white in Panama birds [Wetmore, 1968]), and both dark and white eyes are known in different races of related P. chrysochloros. The nature of the variation among simplex, callopterus, leucolaemus, and litae, their allopatry, and consideration of the considerable variation evident in other species of Piculus (rubiginosus, flavigula, and chrysochloros) prompt me to merge P. simplex in P. leucolaemus. A putative race allophyeus,
the apparently isolated northernmost population of the *P. leucaelaemus* complex in northern Honduras, is known from only two male specimens (Monroe, 1968). Until it is better known, I prefer not to recognize it, noting that its supposed small size (wing length 111, 112 millimeters) is incorrect, for those two measurements exceed the average for males of both *simplex* and *callopterus* (Panamanian birds [Wetmore, 1968] and measurements of *simplex* specimens in the American Museum of Natural History).

Reference

**YELLOW-THROATED WOODPECKER**

*Piculus flavigula*

**Color Plate 63**

**Range Summary.** South America.

**Diagnostic Features.** Small, weight 45 to 67 grams (*flavigula* [Haverschmidt, 1968]; Brazil and Ecuador), wing length 104 to 128 millimeters. Resembles *P. leucaelaemus* in being greenish above and variously marked below. Distinguished by yellow throat and ear coverts (entire head mixed yellow or gold and red); malar stripes of males either lacking or very small and restricted anteriorly; breast more nearly barred with spots (when present) more or less wedge shaped, large; and above, less bronze and more yellow.

**Description.** Bill rather short, narrow across nostrils, like *P. leucaelaemus*. Size somewhat variable geographically. Green to yellow-green upperparts, including rump; latter sometimes with pale buff spots in centers of feathers. Wings green, less yellow than back; flight feathers blackish with inner vanes having cinnamon patches; underwing cinnamon patch unbarred, but whiter underwing coverts often barred. Shafts of wings and tail brown or dusky above except bases of tail feathers, which are pale whitish to yellowish like underside of shafts. Tail as *P. leucaelaemus* but paler on vanes below. Tail/wing ratio 0.51 to 0.57. Nape and hindcrown red. Throat whitish yellow to golden yellow; bars show at rear. Ear coverts gold, passing around nape posteriorly and connected with like-colored stripe below (subocular); with throat; and, in female, with the malar stripe (female’s head mainly yellow-gold). Breast with black-bordered white bars, triangles, or droplet-streaks on green background. Belly finely black barred, bars sometimes squamate, on white background.

Sexual features: Males 5 percent heavier than females. In *flavigula* males have a short, red malar patch and a fully red crown and nape, whereas females have the malar colored like the throat (gold) and the forecrown and midcrown yellow tipped over a greenish base; *magnus* is like *flavigula*, but males have no red malar patches, hence differ from females only in crown color; in *erythrops* males the red extends over the sides of the head and onto the throat from the red crown and malar patches, and females have a gold forecrown, throat, and malar stripes (usually with red flecking on the throat). Immatures are greener, much less yellow above, and less gold and yellow on the head (females have green crowns, not yellow-tipped, for instance). Also, they are darker below with less heavy barring and smaller white markings than adults. A pattern of barring and pale spots is evident under the yellow on their throats. In this species the eyes are brown, legs and feet are green-gray, and bill is black above and gray below.

**Distribution and Habitat.** Found east of the Andes from Colombia and the Guianas south through Amazonia and eastern Peru to Mato Grosso and São Paulo. Habitat is lowland forest
of various types from wet forest and its edges to dry tropical scrub forest (caatinga of eastern Brazil).

**Behavior.** Unstudied; nothing known of its displays, foraging habits, etc. Along the Amazon, in western Amazonia, and into Bolivia breeding occurs from August to December, followed by the annual molt. In the Guianas nesting occurs earlier, probably in May and June, as fledged immatures are known from early July to September. Ants are recorded from the stomachs of Surinam specimens (Haverschmidt, 1968).

**Taxonomy.** Related rather closely to *P. leucolaemus*, with which it overlaps somewhat in range. The three well-marked races differ in head pattern, including the sexually dimorphic markings (see Description). *P. f. flavigula* and *magnus* are much alike in size and color except for the malar stripe difference; they intergrade in the region of the Tapajoz River of Brazil. *P. f. erythropis* of east-central Brazil (Pernambuco and Minas Gerais to São Paulo) is more distinct, differing in its smaller size (wing length 104 to 118 millimeters versus 108 to 128 millimeters for the other races), as well as its expanded red on the head and the fully barred (contrasted with the spot- or wedge-barred breast of *flavigula* and *magnus*) underparts.

**GOLDEN-GREEN WOODPECKER**

*Piculus [chrysochloros] chrysochloros*

**Color Plate 64**

**Range Summary.** South America and Panama.

**Diagnostic Features.** Small, but variable, 55 grams in *P. chrysochloros chrysochloros* to 91 grams in *P. c. capistratus* (Haverschmidt, 1968); wing length 120 to 126 millimeters in *P. c. aurosus* (Wetmore, 1968), 115 to 125 millimeters in *P. c. chrysochloros*, and 130 to 152 millimeters in races such as *capistratus*, *polyzonus*, and *hypochryseus*. Like related White-browed Woodpecker but differs as follows: bars below with a decided yellow cast; no superciliary stripe; cinnamon underwing patch unbarred; in some races (*chrysochloros*), white eyes; and, females lacking red malar patches.

**Description.** Bill moderately long, slightly curved and moderately wide across nostrils. Racially variable in size (see Taxonomy). Above, olive-green to yellow-green. Wings green; cinnamon patch on inner vanes of flight feathers beneath wings, and pale bend of wing both unbarred (bend of wing barred in some *capistratus* and *guianensis*). Shafts of tail feathers pale yellow at bases and below, dusky above as are those of wings. Tail green to green-brown. Tail/wing ratio 0.48 to 0.55 in larger races, 0.55 to 0.65 in smaller races. Nape patch red or yellow. Throat pale yellowish, unbarred or barred. Ear coverts, when forming a patch, green bordered below by yellow-white (subocular) stripe, but continuous with crown above (no superciliary stripe). Below barred with green to blackish and yellow.

Sexual features: Sexes differ in crown color, in malar color, or in both: males invariably have a red crown (connecting with nape feathers) and usually red malar stripes, but the latter may be partly or fully green (*paraensis*); the crown of females is green, green overlain with gold, or red, and their malar stripes are either green or green tipped with gold. In some races the face or even the entire head of females is yellow, obscuring the head pattern. The variation in sexual features is geographic, and there also is considerable individual variation (see discussion following). Immatures like adults but plumage more lax, softer; outer primary larger, rounder than in adults. Eyes white in *chrysochloros*, brown in *capistratus*
(Haverschmidt, 1968; young birds?). Legs and feet gray-green, bill blackish with paler (gray) base.

**Distribution and Habitat.** Ranges from eastern Panama through adjacent Colombia and South America east of the Andes south to Rio de Janeiro on the coast, and inland to Santiago del Estero and Santa Fe, Argentina. Occupies diverse habitats including woodlands, scrub woodland, trees in savannas, and forests, but only in lowlands.

**Behavior.** Not well known. Forages for ants in trees by gleaning from the surface and by tapping or excavating an opening into subsurface ant tunnels, then “tonguing” ants into the bill for up to 20 minutes without moving. Nests are constructed in trees and in arboreal termite and ant nests. One nest was found in Formosa, Argentina, during September. It was in a 30 by 50 centimeter ant or termite nest 3 meters above ground.

**Taxonomy.** Forms a superspecies with *P. aurulentus* (see below). Unlike their relatives (*P. simplex, P. flavigula, and P. leucolaemus*), these two species are evenly barred below with no spots or spotlike bars. Strongly polypytic. Races vary in color and size. The northern races *aurosus* and *xanthochlorus* are small and show extreme golden yellow in the throat, face, and (female) crown. Far to the south, the southernmost races, small *chrysochloros* and large *polyzonus* (which could contact large *P. aurulentus*), are very yellow below compared with Amazonian races, but they lack the yellow expansion on the head of the northernmost races. The fairly large *paraensis* of eastern Brazil resembles smaller *xanthochlorus* in the amount of yellow on its head. Amazonian and Guianan subspecies (*capistratus, guianensis, laemostictus, and hypochryseus*) are large and tend to be darker (greener) and less yellow throughout, sometimes with barring extending onto throat (*capistratus*).

**Reference**

**WHITE-BROWED WOODPECKER**

*Picus [chrysochloros] aurulentus*

**Color Plate 64**

**Range Summary.** South America.

**Diagnostic Features.** Small, weight about 70 grams, wing length 115 to 124 millimeters. Resembles its close relative the Golden-green Woodpecker, which it probably meets in eastern Brazil, differing as follows: bars below olive-gray and white, lacking yellow cast; golden white supercilialy stripe present; underwings barred cinnamon and black; eyes chestnut; and malar stripes red in females as well as males.

**Description.** Bill slightly curved, fairly wide across nostrils, moderate in length. Above, olive-green throughout, sometimes bronzy. Wings olive-green, with black barring on the outer half or more of the pale cinnamon underwing patch; bend of wing also barred underneath. Wing and tail shafts dark, latter with pale centers. Tail black. Tail/wing ratio 0.61 to 0.67. Nape and malar stripes red. Throat unbarred, gold-white. Green ear coverts bordered by golden white stripes below (subocular stripe) and above (superciliary stripe). Barred below, as noted in diagnosis.

Sexual features: Males with crown red and malar red extended commonly onto chin. Females with green or sometimes golden green crown, red restricted to nape and malar patches. Immatures differ from adults as in *P. chrysochloros*. Eyes chestnut; legs and feet gray-black; bill black above, dusky below.
**Piculus [rubiginosus] rubiginosus**

**Distribution and Habitat.** Restricted to east-central South America from Minas Gerais and Rio de Janeiro, Brazil, south to eastern Paraguay, Misiones and northeastern Corrientes, Argentina (Short, 1971h), and Rio Grande do Sul, Brazil. A lowland and hilly slope woodland (moist subtropical forest) inhabitant, occurring in dense secondgrowth and woodland edges as well.

**Behavior.** Very little known. It forages for ants and perhaps other insects by gleanining and tapping at the bark of trees. Stomach contents of one specimen yielded only ants, ant eggs, and ant larvae. On 27 September one nest was found in an isolated forest patch in pastures in Corrientes, Argentina, but it was not studied (Short, 1970a, 1971h). The apparent nest, at which a male and female were seen, was 7 meters up a live tree at the edge of the woods. The male was obtained and had large gonads and a well-developed brood patch.

**Taxonomy.** Forms a superspecies with *P. chrysochloros*, which is allopatric and very similar in color pattern. Where the two species approach each other and perhaps meet (Minas Gerais, Rio de Janeiro), *aurulentus* is substantially larger than geographically very variable (including size) *chrysochloros*. Monotypic.

**Reference**


**GOLDEN-Olive WOODPECKER**

*Piculus [rubiginosus] rubiginosus*

**Color Plate 65**

**Range Summary.** New World tropics.

**Diagnostic Features.** Size generally Small, some races Little; 51 to 72 grams in *meridensis, rubripileus, trinitatis,* and *tobagensis*; 78 to 86 grams in *yucatanensis*; and 69 to 82 grams in *aeruginosus*; wing length 96 to 135 millimeters. Above, bronze-green to green, upper back unbarred. Wing edges bronzyl. Barred below. Tail less yellow, dusky than in *P. auricularis*. Red nape and sides of crown; in some races entire crown red. Male has red malar stripes. Does not occur with related *P. auricularis*.

**Description.** Bill variable, generally moderately long, wide, and with a curved culmen, but *P. r. tucumanus* has a straight, thin bill (approaching *P. auricularis*). Size variable from Little *trinitatis* to Small, such as the subspecies *chrysogaster* and *aeruginosus*. Above, green (*viridissimus* and *aeruginosus*), bronze-green (most races), or bronze tipped with red (*canipileus* and *meridensis*); barred strongly or moderately (most races) to very weakly (*maximus* and *aeruginosus*) on the rump, which generally is paler than the rest of the back. Wings green, edged with bronze (e.g., *aeruginosus*), bronze-green (most races), or bronze with some red (races with red on back). Shafts and to some extent ventral vanes of flight feathers and tail yellow, but tail moderately to mainly dusky below. Tail greenish dusky with some yellow below, but tip dusky ventrally. Tail/wing ratio 0.55 to 0.66, ranging up to 0.73 in *aeruginosus*. Crown gray-black or dark gray, bordered with red laterally and at rear, or fully red (red at tips of gray feathers). Nape patch red, extending onto crown and especially over the eyes to the lores. Throat streaked, gray to black and white; dark streaks narrow (whiter throat) to broad (blackish throat); broader streaks are concave in their middle portions, tending to form white spots amid the streaks (e.g., *trinitatis* and *rubripileus*), or even fine spots on a fully black background ("pacificus," *guianae, gularis,* and some *rubripileus*). Rarely the throat is all black (few *gularis* and *rubripileus*). Ear coverts white to buff or olive, barred
or not at rear. Lores buffy white, usually red above and to rear. Variable below, but always barred black and white (tucumanus), olive and pale green-white, or green, black, and white (yucatanensis); abdomen less barred than breast, hence paler or clear centrally (coloratus) or even unmarked, bright yellow (chrysogaster, very like P. rivolii).

Sexual features: Males with red malar patches, often expanded posteriorly, and males have, race for race, more red on the crown than females. Latter have malar region colored like throat, but pale markings smaller; malar tends to be blacker than throat. Immature birds are patterned like adults, with the usual fluffier plumage; they tend to show a black mark over the lores, as in Colaptes. Eyes dull red, legs and feet gray, bill dark gray to black.

Distribution and Habitat. Found from Mexico to Argentina. In Central America from Tamaulipas, Veracruz, and Oaxaca southward. Its South American range chieflv lies along the northern coast from Guyana westward,* and along the Andes (slopes) south to Tucumán, Argentina. It prefers the subtropical forests throughout its range generally, but it ranges into the lowlands in some places and also upward into the temperate zone (to 7000 feet). Forests and forest edges form its habitat. In Costa Rica it occurs in coffee plantations as well as in epiphyte-laden forest between 1500 and 6000 feet, but mainly between 2000 and 4000 feet (Slud, 1964).

Foraging Habits. Forages in trees among epiphytes and mosses. Slud (1964, p. 187) describes its feeding in Costa Rica as follows: “Instead of habitually climbing trunks it tends to move about like a woodhewer or ovenbird among mossy limbs, airplants, hangings..., leafy twigs, and woody vines.” The same form has been known to eat “blackberries” in Panama (Wetmore, 1968), but its food almost certainly consists mainly of insects. Sutton (1951, pp. 88–89) mentions their “hitching along the lichen-covered boughs, tapping quietly at the bark” (race aeruginosus), presumably seeking insects. In Trinidad, ffrench reported the species feeding on larvae of wood-boring beetles and ants, the latter “sometimes taken from the ground” (1973, p. 269).

Voice. Vocalizations reported include a loud “keek” or “back,” (“wheep” [ffrench, 1973]), a whining “choo-ûr choo ûr,” a rolling R (“wrrrrrrrr” [Snyder, 1966]), and a trill (Slud, 1964); and Sutton (1951) mentions that members of his field party repeatedly mistook a call of P. r. aeruginosus for the Long Call of the Northern Flicker (Colaptes auratus). Skutch (1956) described its trill as longer than the rattle of Picoides villosus or that of Veniliornis fumigatus. Two birds together give a “subdued wit-wit or woit-woit” (ffrench, 1973, p. 269).

Displays. Little known. Sutton described P. r. aeruginosus as being flickerlike (i.e., like Colaptes auratus) in behavior, including displays, vocalizations, and the tendency to perch crosswise on branches. Displays of that form are described by Sutton (1951, pp. 88–89), apparently agonistic behavior involving three or four birds that “spread their wings and tails, and bob and bow at each other while calling excitedly, interrupting their ‘dance’ with brief periods of statuesque motionlessness.”

Breeding. Skutch (1956) described the nesting habits of Golden-olive Woodpeckers in Costa Rica, where breeding occurs in April. A female assumed a newly excavated cavity above its own old roosting hole in a rotten stub 13 feet high. The new hole may have been excavated by a male Hairy Woodpecker (Picoides villosus) which occupied that hole for a few days after it was discovered by Skutch. The female rubiginosus roosted for some days in the hole; then nesting commenced, and the bird’s mate began roosting in the nest.

*Recently reported (S. Stokes, in litt.) from Brownsberg National Park, Surinam.
presumably incubating eggs. During the day the female incubates more than the male. Four young hatched on 16–17 April and were fed at a rate of about once an hour. Both adults fed the young by regurgitation. Two juveniles disappeared within a few days, and another shortly died. Nest sanitation was practiced until the young came to the nest entrance (at age 21 days) to be fed, and then it ceased. The adult male roosted nightly with the juvenile in the nest, and it continued to roost there after the young bird left the nest. The surviving juvenile was frightened from the nest, flying well, at an age of 24 days. Another nest mentioned by Skutch was found in Ecuador during October. Sutton (1951) found P. r. aeruginosus nesting in oak trees and in a sweet-gum (Liquidambar) during May in Tamaulipas, Mexico. Three young birds were in a nest cavity near the top of the sweet-gum tree. Trinidad birds nest from March to May and molt thereafter until September (ffrench, 1973). The clutch on Trinidad is two to three eggs that are laid in a hole excavated 4 to 60 feet above ground (ffrench, 1973).

**Taxonomy.** Forms a superspecies with closely related, possibly conspecific P. auricularis (Baptista, 1978), which it appears not to contact in Oaxaca. Strongly polytypic, with well-differentiated races, including aeruginosus, rubripileus, tucumanus, chrysogaster, and nigriiceps. P. r. aeruginosus is judged to be no more distinct than other races such as tucumanus, and it shares the sexual dimorphic pattern of other races of rubiginosus (in this respect, and in others, P. auricularis is distinctive and hence is separated specifically although it too may prove to be conspecific with rubiginosus). Peters (1948) listed 20 subspecies of rubiginosus; four others since have been described, and I treat aeruginosus as another, giving 25 "subspecies," 19 of which I consider valid.

There are two Middle American subspecies. The widespread yucatanensis (maximus, differens, and uropygialis are synonyms of yucatanensis) is olive-green barred below, bronzy green above, with a black-streaked white throat, a barred rump, and a moderate extension of red on the crown (males). There is size variation, birds ("maximus") of highland western Guatemala and Chiapas, Mexico, tending to be slightly larger and possibly a trifle greener than lowland birds, and lowland yucatanensis grading in size from large in Oaxaca and southern Veracruz to small in western Panama. It seems to serve no purpose further to split yucatanensis, which is quite variable. Northeastern Mexico (Tamaulipas to Veracruz and Puebla) forms the range of proportionately long-tailed aeruginosus. In South America occur the remainder of the subspecies, which may be grouped tentatively as follows: Southernmost tucumanus of mountain slopes from southern Bolivia to Tucumán, northwestern Argentina, is a distinctive, large, green-backed, gray form with heavy dark ventral barring and a very pale yellow background below. The canipileus group contains three subspecies marked by a bright yellow abdomen showing a pronounced loss of barring and a barred or scaly rump. The southern race canipileus of northern Bolivia and southeastern Bolivia has moderate red on the male’s crown and bright yellow on the abdomen with some (weak) barring. Central Peruvian chrysogaster has a clear, bright yellow abdomen and much red (bronze on back) on the back and crown (male); and north-central Peruvian coloratus is similar but less bronze above, with restricted red on the male’s crown and the bright yellow abdomen clear only in the center (barred flanks). The next northern group is strongly black throated, with a duller yellow abdomen and a fully red-tipped crown of the male. Piculus r. gularis (including pacificus) is large and very black throated, occurring in the central and western Andes of southern Colombia, including the Cauca Valley; very variable rubripileus of western Ecuador, northwestern Peru, and the southwestern tip of Colombia is smaller, has heavy blackish breast barring, and a variable but mainly black throat. Next, to the north and east occurs a group having a black-streaked white throat, green breast bars, a barred rump, and moderate
red in the male's crown. The western form, *buenavistae* of the Andean slopes of eastern Colombia and eastern Ecuador, is very large with a bronzey, even reddish back. *Piculus r. meridensis* of northwestern Venezuela is somewhat smaller with a less bronzey back. Still smaller with a greener back, a less red crown in males, and blackish tinged breast bars is nominate *rubiginosus* of the mountains of north-central and northeastern Venezuela. This last form in its traits leads into the remaining and large *guianae* group of races. Included here are *alleni* of the Santa Marta area of Colombia, *tobagensis* of Tobago, *trinitatis* of Trinidad, *deltanus* of the Amacuro Delta (Venezuela), *paraquensis* of south-central Venezulcan mountains, *viridissimus* of the high plateau of Auyen-tepui, southern Venezuela, *guianae* of eastern Venezuela and adjacent Guyana, and *nigriceps* (including *poliocephalus* and *fortirostris*) of mountains in Guyana (Acary Mountains) and Surinam. This group has little or no barring on the rump, blackish breast barring, and a white-spotted black throat, as well as showing a tendency for reduction of red in the crown of males. *Piculus r. allenii* has the reddest crown (moderately expanded red) of these races, the narrowest (but blackish) breast bars, and a bronze-gold back showing red. The island races *trinitatis* and *tobagensis* resemble each other, and both resemble *paraquensis*, but the breast barring is less black; *tobagensis* is distinctly larger than very small *trinitatis*. These island races tend toward the *meridensis* group in their greener, less black ventral barring. *Piculus r. paraquensis* is large with a strongly bronze back. The Amacuro Delta *deltanus*, a weak race, resembles *guianae* but is smaller with larger white throat spots and a greener back. Restricted in range, *viridissimus* is large and very green backed, its breast is very black with a whitish background, and males have restricted red in the crown. The subspecies *guianae* is large, with a slightly bronzey green back and moderately red (male) crown. Finally, *nigriceps*, somewhat variable among its isolated subpopulations ("crassirostris" and "poliocephalus"), resembles *guianae* generally but has very reduced red (some females have none) in the crown, which is dark gray to black and is green above with barely any traces of bronze.

References

GRAY-CROWNED WOODPECKER

*Piculus [rubiginosus] auricularis*

Color Plate 65

Range Summary. Mexico.

**Diagnostic Features.** Small, weight 52 to 68 grams (Nayarit; Oaxaca, Mexico, *fide* Lowery, Kiff), wing length 115 to 120 millimeters. Green above with grayish cast (not bronzey) and barring on rump and upper back. Shafts of flight feathers and underwing and undertail surfaces yellow. Barred olive and greenish white below, including sides of neck. No red on nape. Male with red malar stripes.

**Description.** Bill relatively thin, culmen nearly straight. Above, green with barring evident on rump and upper back. Wings golden olive, tips of flight feathers darker. Wing and tail shafts and vanes yellow ventrally, with pale yellow patch formed by inner vanes of flight feathers. Tail/wing ratio as in most *P. rubiginosus*, 0.57 to 0.63. Tail brown with golden

Sexual features: Males with red malar patches, and most have a red spot or small patch on lores, sometimes continuing as fine line over and behind eyes and onto nape. Females lack red, the malar areas being colored like the throat. Juveniles presumably differ from adults as in *rubiginosus*. Eye color hazel, legs and feet greenish-gray, bill blackish.

**Distribution and Habitat.** Restricted to western Mexico from southeastern Sonora to western Oaxaca (specimens, Louisiana State Museum). Habitat is barrancas and slopes of mountains in evergreen forest and lower pine-oak woodland up to 6400 feet elevation.

**Behavior.** Essentially unknown, presumed to be similar to that of *rubiginosus*. Specimens with enlarged gonads were collected in March and April, and a Sinaloan female (29 March) had laid eggs.

**Taxonomy.** Forms a superspecies with *P. rubiginosus*, and very likely conspecific with it. Its features include a rather straight, narrow bill (matched by some races of *rubiginosus*); its greener, less bronze color (not matched by *rubiginosus* races, even those in arid regions); its more prominent yellow underwing and undertail surfaces; and especially its lack of red on the crown and nape. The latter feature may affect sexual interactions important in forming a pair bond, and likely difficulties thus posed for interbreeding of *auricularis* and *rubiginosus* are my main basis for tentatively retaining them as separate species (*P. r. aeruginosus*, often considered as a species, differs not at all from *rubiginosus* in sexually dimorphic features). *P. auricularis* is monotypic, the supposed race *sonoriensis* being based on worn (grayer) specimens.

**CRIMSON-MANTLED WOODPECKER**

*Piculus rivolii*

**Color Plate 66**

**Range Summary.** South America.

**Diagnostic Features.** Small to Medium; weight 85 to 97 grams (*P. r. brevirostris*), 100 to 112 grams (*P. r. rivolii*); wing length 120 to 145 millimeters. Red upperparts, including crown in most races. Black tail. Underparts barred or scalloped anteriorly, yellow with no marks posteriorly, like *P. rubiginosus chrysogaster*, but red or yellow usually shows on breast.

**Description.** Bill moderately long, usually broad based (but variable), and curved culmen very like *Colaptes*. Upperparts red with olive bases showing through (more so when plumage is worn); red most pronounced on nape. Lower back olive, often barred black; rump and uppertail coverts black. Wings red over olive or yellow-green bases and insides of coverts; flight feathers brown with olive outer vanes margined red, or (*atriceps*) outer vanes all olive-green. Shafts and bases of tail feathers pale yellow, wings yellow shafted below, and underwings with unbarred, pale yellow patch. Tail long (tail/wing ratio 0.68 to 0.78), all black, unspecialized. Nape red. Throat black with or without white spots. Ear coverts, lores, and supercilii stripe yellow-white to olive. Breast barred with curving marks presenting a scalloped appearance; edges of bars either red or (*atriceps*) yellow; and when these wear off, birds become black breasted. Belly yellow to gold, unmarked or with lateral black spotting; undertail barred or unbarred, flanks usually barred.
Sexual features: Males have red malar patches; females have black ones. In most races the male’s crown is black tipped with red (subject to wear), but in atriceps both sexes have a black crown, as do females of other races (females of quindiana have some red on the crown). Juvenile birds are duller black, yellow and red; they lack red on the breast, and males have narrower red tips on the crown (crown blacker) feathers. Their appearance is more mottled black, olive and red above. Shafts of wing feathers are paler yellow in young birds. The young have the fluffier plumage and large outermost primary characteristic of young woodpeckers. Eyes red-brown to brown, legs and feet pale gray, bill black.

Distribution and Habitat. Restricted to South America from mountains of western Venezuela through the northern Andes, along the eastern Andes of Peru, and to Cochabamba, Bolivia. Habitat is moist montane forests occurring up to the tree line (10,000 feet in Peru) and downward into subtropical wet forests of the foothills.

Behavior. Little known. Despite its bright colors, this species is inconspicuous, for it moves slowly and forages often in mosses and brightly colored epiphytes, thus avoiding detection. Foraging mainly is by gleaning, probing, and weak tapping; so its activities produce little noise, and it is not a vocal species, assisting it in remaining undetected. The major food is ants, including their eggs, pupae, and larvae; but spiders, millipedes, and beetle larvae, as well as fruit or other plant material of some type, also are taken. These items seem to be obtained at the surface of the bark, or near it, in crevices, and among debris in epiphytes and mosses, for the Crimson-mantle rarely taps in a sustained fashion or excavates for subsurface insects. Drumming is infrequent and rather slow. I heard a long “kick-kick-kick—” from the female of a nesting pair in Peru, and Zimmer (1930, p. 309) reported a rolling “chir-r-r-r-r” and a “ka-weép, ka-weép” from Peruvian birds. Its presumed (kick call) Long Call resembles that of Colaptes auratus. Nesting occurs at diverse times of the year, perhaps mainly from June to November in central Peru. Near Huánuco, Peru, a nest was found in August. Pairs are quiet about the nest, responding to an intruder (the author) by sporadic drumming, but not by calling.

Taxonomy. Its head and breast patterns, other color patterns, size, bill structure, feet, tail, and aspects of its behavior resemble those of the forest flickers of the genus Colaptes, as well as Piculus rubiginosus, its closest relative. Its red back distinguishes it from smaller rubiginosus, with which it does occur. Its quiet demeanor, unbarred back and tail, and somewhat strong bill ally it with Piculus rather than Colaptes — it has been placed in its own genus, Hypoxanthus, between Piculus and Colaptes. Moderately polytypic. Five subspecies include rivoli, quindiana, meridiae, and brevirostris, which show minor variation, and distinctive, southern atriceps. The last subspecies has reduced red on the head and body, being more bronze-green. Its wings are essentially green, with no red. Males of atriceps are black crowned like females, and thus only the malar patches distinguish the sexes. There is no red, only yellow edging on the breast feathers. P. r. brevirostris tends to be intermediate between atriceps and other races.

Reference

Genus Colaptes Vigors

The eight species of Colaptes occupy the Americas and are characterized by terrestrial feeding habits; conspicuous displays; loud vocalizations (species of Piculus are quiet and
arboreal); yellow or orange shaft color; dorsal and often ventral barring (or spotting); a long, pointed bill; and sexual dimorphism based upon the malar patch. The bill is pointed, curved along the culmen, narrow across the nostrils, and moderately to very long. The skull is relatively weak, with no bony infolding at the base of the upper bill. The tail is long and stiffened, but flat (not concave), hence not very specialized. The feet are comparatively large; the hallux is one-half the length of the fourth toe; and claws are strongly developed. Several species are ground nesting and semisocial in habits.

**BLACK-NECKED FLICKER**

*Colaptes atricollis*

**Color Plate 67**

**Range Summary.** Western South America.

**Diagnostic Features.** Size Small, weight 73 to 90 grams (*atricollis*), wing length 113 to 123 millimeters. Barred above and below, with black throat and upper breast. Background color green to whitish brown above, yellowish below. White cheek patch; red nape.

**Description.** Bill narrow across nostrils, curved along culmen, pointed at tip. Above, bronzy green with narrow brown bars (*atricollis*) or mixed greenish to yellowish brown with broad brown bars (*peruvianus*; worn birds whitish); rump paler, showing more yellow or white; uppertail coverts barred brown and white. Wings as back dorsally, except flight feathers mainly brown with yellowish white bars; underwings pale yellow, barred near bend of wing. Shafts yellow under wings and tail and yellow dorsally, although tinged olive (especially *atricollis*). Tail long and brown, outer feathers and central pair barred whitish; pale bars below are whitish yellow. Tail/wing ratio 0.72 to 0.83. Crown gray in center, blackish at edges (females), becoming red from hindcrown to nape. Ear coverts, lores, and area over eyes yellowish white. Throat and chin black (gray feather bases). Underparts black from throat to upper breast, becoming barred on breast; black bars strong on breast, moderate on sides and flanks, weak (fewer, narrower) or even absent (or reduced to spots; some *peruvianus*) on abdomen; background pale yellow to whitish; undertail coverts barred.

Sexual features: Male with red malar patches and red of hindcrown extending forward above the eyes to the forehead (occasionally entire crown tipped red). Female lacks red in malar region (black as throat), and red is restricted to hindcrown and nape. Immatures very variably barred, duller in plumage, with paler yellow shafts; top of head entirely red, often showing bars; black over lores; malar region black or mixed red and black (do sexes differ?). Eyes chestnut to brown; legs and feet pale greenish gray; and bill dull black, paler at its base.

**Distribution and Habitat.** Endemic to Peru, with populations isolated in the western slope of the Andes (*atricollis*) from Libertad and Ancash south to Arequipa, and east of the western Andes (*peruvianus*) in the Marañón Valley from Piura south to Ancash and northwestern Huánuco. The western population occupies scrub woodland and remnant riparian and temperate forest (as at Zaraté, above Lima) up to an elevation of 2800 meters. The eastern population inhabits desert and scrub woodland between elevations of 1700 and 3400 meters.

**Foraging Habits.** Little known. Probes and gleans, mainly for ants in various trees (including orchard trees, e.g., apple trees), occasionally tapping holes in dead branches, presumably to obtain ants therein. Fresh dirt on bills of specimens suggests ground foraging, but it has not been seen on the ground. The contents of one stomach consisted entirely of ants.
Voice. Drumming has not been observed, but is likely to occur. A Peah Call very like that of Colaptes auratus was uttered frequently, suggesting a function other than that of an alarm call. A series of “wik” notes forms the Long Call, a territorial and perhaps location call similar to that of other flickers. At 12 to 13 notes per second this call lasts 1.0 to 1.5 seconds, faster and with greater amplitude range than the Long Call of related C. punctigula (Short, 1972b).

Breeding. Nests are excavated in trees and telegraph poles (atricollis) and in large, columnar cacti (peruvianus). Immature birds are known from the Marañon Valley between November and February, and a male of atricollis collected in August east of Lima had completed nesting (refeathering brood patch, regressing testes). Molting of atricollis occurs in July and August. During August, a postnesting adult male excavated a presumed roosting hole in a telegraph pole surrounded by cultivated trees, entering the cavity to excavate, and tossing out large chips of wood.

Taxonomy. Related rather closely to the forest flickers C. melanochloros and C. punctigula, from which it differs in having a black throat, barring below, and gray in the crown; it is longer tailed than punctigula and resembles forest forms of melanochloros. The inland race peruvianus (including lymani) is browner and whiter (less green) above, with broader bars than western atricollis; its underparts are less fully barred, and its feather shafts lack the dark (olive) pigment usually found in atricollis.

Reference

SPOT-BREASTED FLICKER

Colaptes [punctigula] punctigula

Color Plate 68

Range Summary. Northern South America.

Diagnostic Features. Size Small, weight 50 to 79 grams (various races), wing length 99 to 118 millimeters. Barred above on green background and spotted below on greenish yellow background; breast darker than rest of underparts. Throat scaly to streaked black and white, white cheek patch, nape red.

Description. Bill rather short, culmen curved, narrow across nostrils, tip pointed. There is considerable variation in size and color. Above, greenish bronze to yellowish green, occasionally with red traces, barred narrowly (rarely almost unbarred, ujghelyii) to moderately with brownish black; rump less barred, often sparsely spotted and yellower, less green, frequently edged with gold or orange-red; uppertail coverts as rump, but moderately barred or chevon marked. Wings as back; flight feathers brown with weak to moderate pale bars, especially on secondaries; pale whitish yellow below, with few or no dark spots or bars under bend of wing. Shafts yellow, except tips of tail feathers, which are brown. Brown tail, outer feathers barred strongly, and sometimes central feathers barred weakly with green to yellow; suffused yellow below on outer feathers and bases of inner feathers, and brown bars. Tail/wing ratio 0.56 to 0.66. Crown black, becoming red at rear to nape; ear coverts and over eyes white to lores and base of bill. Throat variable, black with small to moderate white spots on outer vanes of feathers to white with black streaks along shafts. Yellowish olive on breast, becoming yellow on lower breast and paling further on abdomen; spotted black, most
heavily on breast and sparsely or not at all on abdomen; undertail coverts yellow with black spots or bar-spots.

Sexual features: Male with malar stripes black, overlain with red, and sometimes showing red laterally on the crown or rarely (especially in uihelyi) over entire crown. Female lacks red in malars (which are marked like throat, but blacker) and on the midcrown to forehead. Immatures as adults but markings below are larger and less regular; underparts paler, duller, less yellow and more green; back and rump greener and duller, less bronze; shafts pale yellow. Immature males have mixed black and red malar stripes, and females have these blacker than the throat, with no trace of red. Eyes rusty brown, legs and feet yellowish green-gray, and bill dull black.

**Distribution and Habitat.** Northern South America from Panamá to Colombia, eastern Peru, northern Bolivia, and Amazonian Brazil (east to mouth of Amazon River, south to Pará, and northern Mato Grosso). Occupies forested regions of lowlands (below 800 meters in elevation) but is especially common at forest edges, in secondgrowth, along streams, and at woodland borders of pastures and cultivated areas.

**Foraging Habits.** Feeds in trees by gleaning, probing, and tapping and also forages on the ground, hopping about and probing and flicking the bill to extract ants from the soil. The diet consists mainly or entirely of ants (all stages, including eggs). This flicker seems not to excavate or tap in a prolonged manner in trees.

**Voice.** No instrumental drumming was observed. A whistled “whew,” often uttered during interactions between members of a pair, is one major vocalization (Whistled Call). A pair meeting at their nest gave a Wicka Call (“ta-wik, ta-wik” and “week-a, week-a” and others) with displays. The Wick Call is a Wicka Call-like series uttered during aggressive encounters and as a response to a Long Call. Six to 10 notes at a rate of about six per second are contained in this call. The notes have two elements spectrographically, a vertical element, and a rising element. The Long Call, used in territorial proclamation, is a rather mechanical, rattleslike call, with notes uttered at eight to nine per second, somewhat slower than in *C. atricollis*.

**Displays.** Bill Directing Postures were used by a male in supplanting its mate near the entrance to a nest cavity. Head Swinging Displays, involving the repeated side-to-side movement of the head, occurred both in aggressive interactions and in postcopulatory actions between mates, accompanied by Wicka Calls. Two males employed Head Bobbing, the up-down movement of the head and bill, with Head Swinging and low Wicka Calls in an aggressive encounter. The tail also was spread partly (Tail Spreading Display) during this and other encounters. This flicker also uses a Gaping Posture in attacks on rivals, the bill being held open before the bird lunges at its antagonist.

**Breeding.** Nests are excavated in live or dead trees or in fence posts. Little is known of actual nesting behavior, other than that pairs nest territorially, and both sexes are involved in excavating and in activities (courtship) at the nest site. The breeding season varies as follows (based on juvenile birds and on a few gonadal data): September to December in Venezuela (*puncticeps*); January in Colombia (*striatigularis*); June in Colombia (*uihelyi*); August to October in the Guianas (*punctigula*); July in Colombia (*guttatus*); and September on the Rio Negro of Brazil, June to October along the Amazon, April to July along the Rio Madeira, and February to September in eastern Peru (all *guttatus*). Nothing is known of postnesting or of postbreeding social behavior. Molting in all races follows the breeding season.

**Taxonomy.** Closely related to allopatrik C. melanochloros and forms a superspecies with it. They are not known to meet. Their chief differences are in throat and breast color and in
several vocalizations; some immature specimens almost exactly match *C. melanochloros nattereri*. I recognize six subspecies of *C. punctigula*: Venezuelan *zulieae* is very small, dully colored dorsally, with a quite white throat and sparse ventral spotting. Colombian *ujhelyii* is the most distinctive subspecies, with much red in the crown of males and red and orange on the breast in both sexes; the throat is mainly white with black streaks (like *C. melanochloros*), the dorsal barring is reduced or even lacking, and the plumage generally is very bright. Venezuelan *punctipectus* is dully colored below with reduced spotting (spots fine, few), has a variable but "scaly" (white spots large) throat, and its back is green without the golden bronze tone of other races. Colombian and Panamanian *striatigularis* is another very white-throated race with strong red and orange on the breast and rump and moderate to heavy ventral spotting. Guianan *punctigula* is distinctly smaller than the other races and has a white-spotted black throat and fine spots on dull underparts. Amazonian *guttatus* (includes *rubidipunctus* and *speciosus*) is variable, but the variation is individual as shown by large series from single localities; this form is very olive on the breast, with a white-scaled black throat, moderate to heavy ventral spotting, and a dull rump contrasting less with the back than in other races.

Reference

GREEN-BARRED FLICKER

*Colaptes [punctigula] melanochloros*

Color Plate 68

Range Summary. Central South America.

Diagnostic Features. Size Small to Medium; recorded weights for larger forms are 106 to 150 grams (*nigroviridis, nigroviridis* × *melanochloros*, and *melanochloros*) and 154 to 178 grams (*leucofrenatus*, southern Buenos Aires); wing length 111 ("mariae") to 162 millimeters. Variable in color, but barred above and spotted below with red nape patch, white to olive cheeks, and throat streaked black and white. Background color green to buff above and pale green to white below. Feeds partly on ground (some races).

Description. Bill rather long, culmen curved, narrow between nostrils, pointed tip. Above, barred dark brown on yellowish green (*melanochloros*) to pale brown and buff or even golden brown (some *leucofrenatus*); rump less barred, sometimes spotted on yellowish green to white (some *leucofrenatus*) background; uppertail coverts barred black and buff or white. Wings as back but flight feathers browner, bearing narrow pale bars; below, suffused yellow on white, sometimes spotted on bend of wings. Shafts yellow below and yellow above except for olive in upper wings of *melanochloros* and black or dusky toward tips of most inner tail feathers. Tail black with pale bars on outer feathers and sometimes edges of all feathers; below, black with pale bars often suffused yellow. Tail/wing ratio variable—0.59 to 0.68 in *melanolaimus* group, 0.57 to 0.71 in *nattereri*, and 0.70 to 0.78 in *melanochloros*. Top of head black except hindcrown red; nape red. Ear coverts, lores, and line over eye are white, buffy, or olive. Throat streaked black and yellowish white, the black streaks merging laterally at rear (near malar patch) in *melanolaimus* group and especially so in *C. m. melanolaimus*. Yellow-green to yellowish white below, darkest anteriorly, but also tending toward brighter breast, becoming golden or even orange in *melanolaimus* and *leucofrenatus*. 
Sides and flanks barred, strongly in *leucofrenatus*; rest of underparts usually spotted, but varying from fine spots in many *nattereri* to large chevron spots or spot-bars in *leucofrenatus* and *nigroviridis*. Abdomen with smaller, narrower spots or unmarked.

Sexual features: Male with red overlaying black malar feathers. Malar of female lacks red and is streaked like throat, but always blacker (nearly all black in forms with broad black throat streaks). Tail longer proportionately in females. Immatures more strongly marked above and below, bars broader, spots more barlike; less brightly colored race for race; shafts paler yellow (see Short, 1972b, p. 14). Eyes brown to chestnut; legs and feet gray, often with a green or yellowish green cast; bill black.

**Distribution and Habitat.** South America from Marajo Island at the mouth of the Amazon, Maranhão, and the northeastern corner of Brazil south to the fringe of Patagonia and Uruguay and west to the Andean foothills of Argentina, upland valleys of Bolivia, and Mato Grosso. It is a lowland species except for *melanolaimus*, which occupies arid valleys to an elevation of 9000 feet in Bolivia. Habitats occupied are diverse. *C. m. melanochloros* occupies moist lowland and hill forest. *C. m. nattereri* inhabits savannas of the campo cerrado (central Brazil), the caatinga, and forest fringes. *C. m. nigroviridis* is found in the chaco woodlands and riverine forest. *C. m. melanolaimus* frequents arid scrub woodland, *C. m. leucofrenatus* favors riverine woods and isolated woodlands within the pampas and xeric scrub inland and south to Patagonia.

**Foraging Habits.** Ants form the great majority of food items; only spiders otherwise have been reported in their diet (see Short, 1972b, pp. 81-82). The ants are obtained by surface gleaning, probing in the bark, and tapping to effect openings into ant chambers in trees. The *melanolaimus* group also forages for ants on the ground, digging and swiping with the bill, sometimes in association with the Campo Flicker (see Interspecific Interactions). Much arboreal foraging is accomplished at low heights, especially in dense woods. Bamboos and palms, as well as broad-leaved trees, are used by foraging birds.

**Voice.** The Green-barred Flicker drums, perhaps less commonly than does the Northern Flicker (*Colaptes auratus*) and more slowly than that species. An alarm "peah" call resembling that of *C. auratus* also is known. So far, a Whistled Call, found in related *C. punctigula*, has not been ascribed to *melanochloros*. Low "ta-wik, ta-wik" notes by members of a pair at a nest represent a Wicka Call, resembling that of *C. auratus*. A Wik Call (see *C. punctigula*) is unknown in *C. melanochloros*, but may occur. The Long Call of *melanochloros* is a series of simple notes given at about 10 notes per second, the notes being very like those of *C. auratus*.

**Displays.** Displays used in aggressive encounters include Swinging, Head Bobbing, Tail Spreading, and Wing Flicking, all of which occur in other flickers. A rhythmic, side-to-side movement of the head and bill and of the body characterize the Swinging Display. The Head Bobbing Display is similar, but in a vertical plane. Both these displays emphasize the head markings. Tail Spreading varies from slight spreading apart of the feathers to a full spreading and turning of the tail to direct its underside at an antagonist, flashing the partly yellow undertail surface. Wing Flicking is a rapid in-out movement of the wings that reveals a flash of yellow from the undersurface of the wings. This last display may serve as an alarm as well as an aggressive function. Head Bobbing and Swinging occur both between mated birds and in sex-for-sex aggressive encounters.

**Interspecific Interactions.** There is a definite tendency for Green-barred Flickers of more open areas (*melanolaimus* group) to associate in ground foraging with the more terrestrial
Camp Field (C. campestris; Short, 1969c). One bird or a pair of Green-barred Fielders may feed with three or four Campo Fielders at an ant hill. The former species is somewhat awkward and less wary than the terrestrial better adapted Campo Fielder, and it seems to benefit directly from the association (Green-barred Fielders feeding with Campo Fielders may be less prone to predation than those feeding alone on the ground in the open).

**Breeding.** Nests are excavated in trees, cacti, or telegraph poles. These may be near human habitations where the fielders are not disturbed. Pairs are territorial, and intruding birds of the same species are attacked sex-for-sex by the resident pair. Breeding commences in late August to September or as late as November (in southern leucofrenatus) and lasts until January in populations from southern Brazil, Mato Grosso, and Bolivia southward (some nattereri, most melanochloros, and all races of melanolaimus group). Northern populations (nattereri) breed earlier. Diverse trees both live and dead are used for nests, which are usually 2 meters or more above the ground. The terrestrially foraging races often place the nest at the edge of a woodland, near open foraging habitat. Four seems to be the common number of eggs laid. Both adults share in incubation and in the feeding of young birds, which is by regurgitation of ants held in the esophagus. Molting follows the nesting period and lasts until May in some populations. Little is known of postbreeding and nonbreeding season activities.

**Migration.** Elsewhere I have indicated (Short, 1972b, pp. 27-28, 30) that the southernmost populations of C. m. leucofrenatus may be partly migratory. Birds from the Patagonian fringes (Río Negro, southern Buenos Aires, La Pampa, Neuquén) and montane Cordoba birds may migrate northward as far as Santiago del Estero.

**Taxonomy.** Related closely to C. punctigula, which forms a superspecies with C. melanochloros. The two allospecies appear not to meet. Two racial groups occur: the forest and savanna melanochloros group (subspecies melanochloros and nattereri) and the chaco-scrubland-pampas melanolaimus group (subspecies melanolaimus, nigroviridis, and leucofrenatus; see Short, 1972b). The two groups differ in several aspects of coloration, the melanochloros group generally having a greener back and greener underparts, olive (versus white) ear coverts, dusky or olive in the upperwing shafts (versus yellow), proportionately longer tail, and lack of a golden or orange tinge on the breast and coalescing black marks at the rear of the malar patch. The melanochloros group is entirely arboreal, as far as is known, the melanolaimus group being partly terrestrial in its feeding. Races of the melanochloros group are well marked (nattereri is smaller, shorter tailed, less green and more yellow than melanochloros) and intergrade over a vast area between the campo-caatinga and southeastern Brazilian forest. The subspecies of the melanolaimus group are less well marked (leucofrenatus tends to be larger, browner, less green, and whiter over all; melanolaimus is greener and more black on the throat and malar areas and tends to have a longer bill; and nigroviridis also is rather green, with subdued gold on the breast and less black in the throat and malar areas). These subspecies intergrade, although melanolaimus seems rather isolated from the others geographically and ecologically. The two racial groups interbreed along the Parana and Uruguay rivers, sporadically in Rio Grande do Sul, and perhaps as well in Paraguay. Hybridization is of the hybrid zone type (Short, 1969a,b), implying that the groups are conspecific.

**References**
**NORTHERN (COMMON) FLICKER**

*Colaptes auratus*

**Color Plate 69**

**Other Names.** Include Yellow-shafted Flicker (*auratus* group), Red-shafted Flicker (*cafer* group), Gilded Flicker (*chrysoides* group), and 60 or more old names (e.g., Yellowhammer, Golden-winged Woodpecker).

**Range Summary.** North and Middle America.

**Diagnostic Features.** Size mainly Medium; weight 92 (gundlachi) to 193 grams (northern *luteus*, hybrids of *luteus* and *collaris*, and probably *cafer*), but individuals vary by as much as 45 grams at a single locality. Wing length 122 to 176 millimeters, varying racially. Contrasting throat and crown with black or red malar “moustaches” in males; large, somewhat crescentic black breast patch. Barred brown above, black spotted on whitish below; underwings and undertail surfaces yellow to pink. Regularly feeds on ground.

**Description.** Bill moderately long, curved culmen, narrow across nostrils, pointed at tip. Varies in size and color geographically. Above, barred usually in two tones of brown (tricolored blackish brown, brown and buff in *mexicanoides*), rarely tinged greenish or even reddish in *chrysocaulosus* group; rump white, usually unmarked or with few black spots or bars, but strongly barred or spotted in some birds and usually so in *mexicanoides* and in *chrysocaulosus* group; uppertail coverts diversely patterned, white with black bars, chevrons, “horseshoes,” or other marks (Short, 1965b, fig. 1). Wing coverts as back, flight feathers blackish brown with narrow pale brown bars; suffused yellow to orange to salmon pink below, overlying a pale patch, with coverts spotted or barred. Shafts yellow, gold, orange, or pinkish in the various forms and their hybrids, both above and below except at tips of tail feathers and along uppertail shafts toward tips. Tail blackish brown, tipped buffy white in fresh plumage and edged with buffy white; often with white or buffy bars on outer vane of outer feathers and inner vane of central pair; below, yellow to pink toward base and black at tip. Tail-wing ratio 0.62 to 0.74, averaging 0.69 generally in *auratus* and *cafer* groups, slightly less in *chrysoides* group, slightly greater (0.68 to 0.76) in *mexicanus* of *cafer* group, and significantly higher in insular *rufipileus* (mean 0.748) and *chrysocaulosus* (0.754) and in Middle American *mexicanoides* (mean 0.753). Crown gray in *auratus* and *chrysocaulosus* groups, sometimes tinged olive, brown of various shades in the *cafer* group, cinnamon-tan in the *chrysoides* group, and rusty cinnamon-brown in *mexicanoides*. Nape with (*auratus* and *chrysocaulosus* groups) or without (all other races, usually) narrow red patch. Buffly cinnamon lores and line over eyes; ear coverts and area under eye fawn-tan in *auratus* and *chrysocaulosus* groups and gray in others. Throat pale tan in *auratus* and *chrysocaulosus* groups and various shades of gray in others. Breast anteriorly marked by a black patch that is crescentic in the *auratus* and *cafer* groups, but deeper and more rounded in others; rest of underparts white with weak to strong buffy yellow to pinkish cast (varying racially) and marked with black spots (rounder in *auratus* and *cafer* groups, more bar shaped in others), becoming chordate bar-spots on flanks, the markings occasionally reduced to sparse spots or streak-spots. Chordate bars or bars on undertail coverts.

Sexual features: Males differ from females in having malar patches red in *cafer*, *chrysoides*, and *mexicanoides* groups; mixed black and red in hybrids of the *cafer* and *auratus* groups, and in many *mexicanoides*; or black (sometimes with red traces) in *auratus* and *chrysocaulosus* groups. Females usually lack red or black in the malar patches, which are concolored (tan) with the throat and ear coverts in the *auratus* and *chrysocaulosus* groups
and also so concolored (gray) in many females of the *cafer* and *chrysoïdes* groups. Females of *mexicanoides* have cinnamon-tan malar patches often bearing fine blackish or gray streaks, and some females of the *cafer* and *chrysoïdes* groups also have tan or cinnamon malar patches that contrast with the gray of the throat and ear coverts. Females are slightly smaller than males, and they tend to have a shallower breast patch, deeper back bars, less round ventral spots, and more barring below. Immatures with shaft color paler yellow to pink than adults; often with gray or black mark over the lores; breast patch less regular; markings below less spotted, more barred; variable in throat color, ear covert color, and crown color, especially in *auratus* and *cafer* groups, in which young often have mixed *auratus-cafer* colors; and crown sometimes finely barred. Immature males with malar marks as in adults, but sometimes anteriorly obscured by gray or tan, frequently showing moderate to strong red on forecrown and generally red on hindcrown; females vary, resembling immature males in the *auratus* and *chrysocaulus* groups, except that incoming tan feathers usually render the black less boldly marked than in males, and generally resembling adult females in other groups, although frequently showing traces of black or red in the malar areas. Immature females often show some red on the crown, but usually it is much less than in males. Hatchling birds have an enlarged "pad" on the "heel," or tarsal joint, and a pale swollen area at the corners of the bill, possibly functional in directing the adults' feeding efforts in the proper direction. Eyes various shades of brown to red-brown, legs and feet pale grayish with green to blue tone, and bill slate-gray-black to black.

**Distribution and Habitat.** North America from the limit of trees in Alaska and across Canada southward through all regions except extensive treeless plains and some coastal islands to the Florida keys, Cuba, Grand Cayman, Texas, Sinaloa, and Baja California, becoming montane in Mexico, and southward through the highlands to Nicaragua. (Only the Mourning Dove, *Zenaida macroura*, also nests in the 49 mainland United States.) The North American *cafer* and *auratus* groups are largely migratory, wintering in the southern United States and Mexico. Its habitats are diverse, from shrub deserts and tree-bordered streams of the Great Plains to everglade hammocks, city parks, montane fir forests, and farm pastures. Requirements include terrain suitably open for ground feeding and nest sites (trees, telegraph poles, fence posts, cacti about 5 inches in diameter or greater, or nest boxes). Prefers woodland edges bordering open country, particularly old woodlots and areas with many dead trees adjacent to grassland or other open lands. Found from sea level to mountain evergreen forests, even to timberline, and restricted to montane pine-oak woodland in Middle America. Cuban and Grand Cayman birds are less terrestrial and frequent woodlands, even mangroves.

**Foraging Habits.** The vast bulk of the diet during much of the year consists of ants (and their eggs, pupae, and larvae) obtained as the flickers hop about on the ground, and these are the chief food fed to the young (by regurgitation). Cuban and Grand Cayman birds forage for ants in trees, and other forms do so at times. Termites, beetle adults and larvae, crickets, aphids, caterpillars, and other insects also are obtained from the ground or in trees. Occasionally flickers indulge in flycatching when certain insects are swarming, as termites and scarab beetles. Ground feeding is by swiping and probing with the bill, utilizing the long, sticky tongue to extend its food-gathering range into ant tunnels and chambers. Animal food is supplemented by various plant items, especially berries and other fruits, which make up a large part of the diet in the fall and winter. Such fruits include various viburnums, Virginia creeper, poison ivy, sumac, hackberry, dogwood, elderberries, grapes, cherries, mountain ash, cactus fruits, and others (even oranges and avocados). It occasionally to commonly eats
acorns, beechnuts, other nuts, and corn and other grains. Captive birds can be maintained on dog meal, vitamins, various fruits, and sweet potatoes or carrots.

**Voice.** Drums territorially just before, during, and through the breeding season. Both sexes drum, and the drumming is of even, steady cadence, but rather weak for the flicker’s size. The drumming bouts average about 1.0 second (0.4–1.6 seconds) in duration, at a tempo of 22 beats per second. Favored stubs or other sites, even buildings and television antennae, are used for drumming. The Whurde Call is a soft “anxiety” vocalization, consisting of a short series of mechanical “wa-wa-wa” notes uttered particularly in flight, as when an adult returning to its nest observes that its mate is present at the nest or when a flicker is mildly disturbed by an intruding human. The single-noted Peah Call is an alarm-threat display, the alarm version being loud, 0.20 to 0.45 second in duration, with strong overtones and characterized by an often stepwise diminishment in pitch. The Wicka Call is a variable, agonistic, and pair-formation vocalization, containing series of two basic types of notes: spectrographically an inverted, U-shaped note and a rising (or dropping) note with prominent overtones giving a banded effect on sonagrams. The call, often sounding like “ta-week, ta-week, ta-week” or “wik-a, wik-a, wik-a,” may be loud or muted and is associated with Swinging and Bobbing displays in encounters between flickers perched near one another. Wicka Calls may be heard throughout the year but are most frequently heard during territorial encounters early in the breeding season. The Long Call is the familiar territorial “song,” used in proclamation of territories and attraction of prospective mates. This consists of a short to long series of “wik” notes that vary somewhat in their features. Long Calls may be heard from the prebreeding period until the breakup of family groups and migration (e.g., until early September in New York). They last up to 6 seconds and contain three to 65 or more notes, uttered at seven to 11 notes per second. The notes produce simple, mechanical sounds that easily can be imitated by humans whistling “whit-whit-whit,” often evoking a response from a nearby flicker. The insistent hissinglike calls of nestling flickers may serve several functions, such as distracting a possible predator, in addition to informing adults of the state of hunger of the young birds.

**Displays.** Aggressive displays may be simple or complex, a simple display being Bill Directing. This posture, in which the bill is pointed at an antagonist and the head inclined forward, is a direct threat and usually results in the other bird backing away. A simple poking of the bill at an opponent (Bill Poking) has the same effect, the weak blow often not landing before the other bird darts away. Head Swinging, the side-to-side movement of the head and body with the bill generally directed at an opponent, is a conspicuous display incorporating the simpler Bill Directing. More aggressive birds swing in a narrow, forward arc with the head held nearly horizontally. Less threat is implied by wider swings with the head held upward, and such swinging also characterizes intense encounters between evenly matched adversaries. Head Bobbing is the up-down display movement of the head and bill, emphasizing at the horizontal a direct threat to poke with the bill and at a high or low position the withdrawal of the “weapon” (bill). It is less frequent than Head Swinging, but nevertheless is common, and often is incorporated into a display complex with Head Swinging, the displaying bird rendering the bobs of the head as it swings from side to side. Both displays are seen in the spring during interactions between birds, usually of the same sex, vying for a territory or mate; but they also occur to a lesser extent throughout the year. Intense Head Swinging and Head Bobbing are augmented at times by a Tail Spreading Display, which at high intensity involves the full spreading and forward directing of the bright undersurface (under the bird’s perch) toward the antagonist, the tail being turned in time with the swinging body. It is
most frequently seen early in the breeding season during encounters between two birds displaying in the presence of a bird (prospective mate) of the opposite sex. Another agonistic display is Wing Flicking, a quick opening and closing of the wings that usually shows a flash of underwing color. This threat display often precedes an attack and is rendered usually by the dominant individual in an encounter. Gaping is a less intense threat display involving the bill held in an open position and pointed at an antagonist—it often precedes Bill Poking or a supplanting attack.

**Interspecific Interactions.** The Northern Flicker usually is rather tolerant of other species, including smaller woodpeckers about its nesting tree, although some species are rather aggressive toward flickers, especially Red-headed Woodpeckers (*Melanerpes erythrocephalus*) and Lewis’ Woodpeckers (*M. lewis*). Aggression by other species in search of nesting holes occasionally occurs, as when an Ash-throated Flycatcher (*Myiarchus cinerascens*) pair entered and took over a flicker nest. destroyed the eggs, and nested therein. Screech Owls (*Otus asio*) may fight with flickers for cavities the latter have excavated and are successful if they manage to get inside. But Starlings (*Sturnus vulgaris*) are the bane of flickers and other hole nesters, frequently dispossessing them of their cavities. Now that the Starling has invaded the Southwest, even the desert cactus-nesting flickers are subjected to this relatively new pressure. The battles for the possession of cavities occasionally may lead to the death of flickers (Shelley, 1935) or Starlings (McAtee, 1940). The Starling and several species of Mimidae frequently mimic the Wicka Call and occasionally the Long Call notes of Northern Flickers. There is no information concerning interactions of Northern and Fernandina’s flickers on Cuba, the only place where another flicker is sympatric with the Northern, although it is known that the Northern is more arboreal than Fernandina’s (and more arboreal than other conspecific populations) in Cuba. Virtually all of the hawks (*Buteo* and *Accipiter*), Golden Eagles (*Aquila chrysaetos*), harriers, all falcons except the American Kestrel (*Falco sparverius*), and owls (including on occasion Screech Owls) prey upon this common woodpecker, as did Indians in earlier times (especially along coasts during migration) and market hunters a century ago.

**Breeding.** The nesting season commences in February or March in southern states and the Southwest, in April and May in the West Indies and Middle America and farther north on the continent, and to June or later in the northern portion of its range. Migrant populations undergo a flurry of territorial and pair-formation activity for 2 weeks or so after their return to the breeding grounds, as other, northward migrants continue to pass through the area. Pairs are formed with little “courtship” as such. Males proclaim a territory, and females move through these territories, calling. Pair formation seems related to encounters, less aggressive between the sexes, but with heightened aggression in unisexual encounters when a member of the other sex is present nearby. A series of encounters with intruders, sex-to-sex, before a prospective mate probably is important in strengthening an incipient pair bond formed through frequent, mildly aggressive encounters between the female, attracted to a male’s territory, and the male, which tends to move about the territory with her. Copulation occurs regularly, often every half hour or so through the day: whenever one or the other of the adults tires of feeding and flies up to a perch and calls, the other may fly to it; and after Wicka Calls and Head Swinging, the male approaches the usually sideways-turned female and mounts for several seconds.

The nest is excavated in a tree, usually in a dead portion (or a dead tree or stub); in a fence post or telegraph pole; or in a cactus. Sometimes flickers utilize nest boxes put up for them; and rarely they may use crevices, earthen banks, or even old haystacks. Very rarely
they lay eggs and attempt to complete a clutch on the open ground (Brown, 1972). Willows, cottonwoods, and pines are among trees favored for nesting. The entrance may be at any height, although it is usually 2 to 5 meters above the ground. Both sexes excavate the nesting cavity, which may be up to several feet below the entrance. The nesting chamber may be as narrow as 10 centimeters in diameter. A very variable territory includes the nest site, and in some situations the nest may be at the edge of the territory. Where dense woods border on good feeding areas, several pairs of flickers may nest quite close together (within 50 meters or so) in the forest, which is not used for feeding, resulting in very small nesting territories effectively away from foraging grounds.

Three to 12 or even more eggs are laid; southern populations have smaller clutches, and three to five eggs is the usual clutch of the desert *chrysoides* group. As many as 19 young have been found in a flicker’s nest. Flickers are indeterminate layers; and, if an egg is removed each day after laying, a single female may be induced to continue laying to “complete” her clutch. In this way a female once was induced to lay 71 eggs in 73 days (C. L. Phillips, 1887). Both adults incubate the eggs, the males at night and both male and female alternately during the day. Changeover of incubating birds is marked by mutual displays and sometimes by copulation. The incubation period is 11 to 16 days.

The young hatch blind and naked and are fed by both adults by means of regurgitation, ants being the primary food. Regurgitative feeding requires fewer trips to the nest than feeding of items directly from the bill, and one or two feedings an hour are typical of most of each day. Adults brood the young regularly, especially in cold or wet weather; the male spends each night in the nest, presumably brooding the young. The nestlings are induced to defecate by prodding of the adult’s bill, and the resulting fecal material either is eaten in the first few days after hatching or, later, the fecal “sac” is carried from the nest. The hatchlings lie in the nest facing one another, necks intertwined, probably conserving heat, for the first week to 10 days, after which they begin to move about more frequently. Feeding takes place within the nest until the young can climb to the entrance and is accomplished by insertion of the adult’s bill into that of the young, turned at a right angle to the young bird’s bill. The young remain in the nest for about 4 weeks, when they fledge, leaving the nest. They scatter about the area, and their piercing calls at this time are a familiar woodland sound. Adults locate the birds by going to these sounds or by flying to a tree near one or more young, which then join the adult and are fed. Considerable aggression is involved in feeding, with Wicka Calls and some Head Swinging Displays.

The young that survive the rigors of the postfledging period commence feeding on their own through following the adults to suitable ant-infested areas, and family groups soon begin to cluster about more optimal feeding sites. The young begin the postjuvenal molt, and adults begin their annual molt at this time. The postjuvenal molt is complete except for secondary feathers of the wings, in which case the pale-shafted juvenile feathers are retained until the next year’s annual molt. Molt is complete in October, or November, during migration in northern races.

**Roosting.** Females roost in holes excavated by them or in old holes while males are roosting in the nest and brooding young. Newly independent young roost under hanging limbs or in unused old holes for a time. Very little is known of winter roosting by adults and by the young of the year. Some migrant birds excavate new holes in their winter quarters, even occasionally choosing human habitations or other buildings in which to excavate roosting holes, causing some damage. It is not known what interactions occur between resident and wintering flickers in the southern United States and Mexico.
Migration. Most populations of the *cafer* group (from California, Arizona, and Oklahoma northward) and of the *auratus* group (north of Georgia and Oklahoma) migrate southward for the winter. Family groups concentrate in larger flocks during the late summer, and these groups begin movement southward late in August. Migration lasts until late October and even November. The migrants move during the day, and at shore points in the east one may on favorable days see wave after wave of flickers pass low overhead. There is a great concentration of wintering flickers in such states as Florida and Texas and in the deserts of the Southwest (where *cafer* group flickers winter among flickers of the *chrysoides* group). In northern Florida one may find wintering flickers from as far away as Newfoundland, Ontario, and Saskatchewan. Spring migration is underway in March and continues until late May in the far north.

Taxonomy. The Northern Flicker is not related closely to others of its genus. Its nearest relatives probably are the green flickers (*Colaptes punctigula* and *C. atricollis*; Short, 1972b). The Northern Flicker is composed of five distinctive subpopulations: the subspecies groups *chrysocaulosus* (Cuba and Grand Cayman), *auratus* (eastern and northern North America), *cafer* (western North America and Mexico), *chrysoides* (desert southwestern United States and northwestern Mexico), and *mexicanoides* (highland southern Mexico to Nicaragua). Wherever these are in contact (*auratus* group with *cafer* group, *cafer* group with *chrysoides* group), they interbreed freely, indicating that they belong to but one species. The *chrysocaulosus* group (Short, 1965b) is yellow shafted and highly arboreal, with more barring in the tail, more barlike ventral spots, a deeper breast patch, more olive or greenish above, a barred or spotted rump, more rounded wings and proportionately longer tail, and stronger legs than the continental *auratus* and *cafer* groups. Although yellow shafted, the yellow is more golden than in the *auratus* group. The *chrysocaulosus* group has stronger tubercles on the ulna, and in that respect and in a tendency toward green coloration of the back, it resembles the green flickers mentioned earlier. It also resembles the *mexicanoides* group in its more barred tendency below and in its spotted rump patch, and it resembles the *chrysoides* and *mexicanoides* groups in its rounder, less crescentic breast patch, suggesting that the *cafer* and *auratus* groups have evolved further from the ancestor of the species than have the other groups. There are two subspecies of the *chrysocaulosus* group: *chrysocaulosus* on Cuba and *gundlachi* on Grand Cayman. The latter is much smaller with a proportionately shorter tail. The eastern North American *auratus* group is yellow shafted and, like the *chrysocaulosus* group, has black malar stripes (males) and red nape patch, tan cheeks and throat, and a grayish crown. There is clinal variation in size, with a southern race (*auratus*) somewhat smaller than more northern birds (*luteus*).

Hybridization of *auratus* and *cafer* groups takes place over a vast area from Oklahoma northward through the plains to Montana and northwest to British Columbia, and there are probably several millions of hybrids. Gene flow from the hybrid zone extends from coast to coast, with diminishing incidence of *cafer* traits eastward from the zone and of *auratus* characteristics to the west (Short, 1965a, 1971b). The extensive hybridization of these flickers has attracted attention ever since they were discovered by Audubon's party on the Missouri River in 1843. The *cafer* group resembles the *auratus* group but has red malar stripes (male), pinkish salmon-colored shafts, no nape patch, gray cheeks and throat, and a brown crown. Its subspecies include a dark northwest coastal form (*cafer*); a pale subspecies (*collaris*) inland and in California; an extinct rufous-crowned, island race (Guadalupe Island, *rufipileus*); a smaller, browner Mexican highland form (*mexicanus*); and a still smaller, grayer subspecies (*nanus*) in northeastern Mexico. The *chrysoides* subspecies group differs from the
cafer group in smaller size (compared with adjacent cafer-group populations), more rusty crown, its yellow shafts, narrower back bars, more black-tipped tail, a rounder breast patch, more transverse spotting below, paler back color, nonmigratory habits, and smaller clutch size. Present conditions severely limit contact between the chrysoides and cafer groups, but a hybrid zone exists along one Arizona river; and isolated or semi-isolated “hybrid swarm” populations, each with its own (hybrid) features, exist in several river valleys of Arizona and in Baja California. Subspecies of the chrysoides group include a large northern race (meansi); a more heavily barred, smaller Sonoran-Sinaloan subspecies (tenebrosus); a brown, moderately barred northern Baja California form (brunnescens); and a small, pale subspecies from southern Baja California (chrysoides). Isolated in highland Middle America is the mexicanoides group, characterized by orange-red shafts, a head pattern generally like the cafer and chrysoides groups, but with mixed black and red malar stripes in males, back bars that are broader than in other groups (and more numerous), and a tricolored rather than bicolored back; like the chrysocaulosus group it has very rounded wings, barlike breast markings, and a deep, less crescentic breast patch. Variation in this group is clinal, and I recognize only one subspecies, mexicanoides (Short, 1967).

References

FERNANDINA'S FlickER

Colaptes fernandinae

Color Plate 70

Range Summary. Cuba.

Diagnostic Features. Size Medium, wing length 138 to 157 millimeters. Barred brown and yellowish white above and below. Throat streaked black and white, cheeks tan, crown tan with black streaks. Forages on the ground.

Description. Bill long, narrow across nostrils, curved along culmen, and pointed at tip; nostrils exposed, not obscured by feathering as in other Colaptes. Above, barred blackish brown on a pale yellowish white to buffy yellow background; bars narrower, background whiter on rump; uppertail coverts with narrow, numerous bars. Wings barred as back, flight feathers brown with narrow yellowish buff bars; underwings strongly suffused yellow over barred pattern; coverts finely barred with black; outer primary rather long. Shafts yellow below and brown above, except for yellow bases of central tail feathers and tips of outer tail feathers. Fully barred tail, moderate brownish black bars alternating with narrow buffy yellow bars; undertail strongly suffused yellow throughout. Tail/wing ratio 0.77 to 0.87. Crown buff to cinnamon with narrow black shaft streaks; nape as crown, but occasionally with red traces (males). Ear coverts buff, becoming cinnamon posteriorly and buffy white under eyes; lores and line over eye are buffy white. Throat white with broad black streaks along feather shafts, the streaks shifting to spots, then bars abruptly at the rear. Below yellowish white, brightest yellow on abdomen, barred brown throughout, but weakest on abdomen.
Sexual features: Malar areas black or black with some red in males. Females have malar region streaked like the throat. Immatures are duller than adults, with paler yellow shafts, broader dark bars ventrally, browner and less black dorsal barring, and the crown and ear coverts deeper cinnamon in color. Eyes brown, legs and feet gray, and bill black.

Distribution and Habitat. Restricted to mainland Cuba, where found in lowlands, originally throughout the island. Apparently rare in most of Cuba today; its range and occurrence are in need of documentation. Frequents dry, open savannas and pastures with scattered palms and other trees (Short, 1965b, p. 6).

Behavior. Very poorly known. It is reported (O. Garrido, personal comm.) that this flicker nests in palm and other trees. Apparently it forages much of the time on the ground, presumably on ants, and is more terrestrial than is the Cuban form of Northern Flicker (Colaptes auratus chrysocaulosus). Vocal data, information about nesting, and other facets of its life history are unknown. Nesting occurs in March to June, followed by the annual molt in July to October. Tail molt starts with the second pair and progresses outward, except that the sixth pair is molted after the third pair; the first pair is molted last. Wing molt is typical for the genus, with two molt centers in the secondary feathers (initiating at the eighth feather; and after three or four feathers are molted in that region, molt commences inward from the first feather).

Taxonomy. Considered congeneric with Colaptes rather than in the monotypic genus Nesoceles Sclater and Salvin. It is rather isolated among the flickers, apparently representing an invasion of Cuba from North America considerably antedating the evolution of Colaptes auratus. It probably evolved from an ancestor in common with that which gave rise to auratus, atricollis, melanochloros, and punctigula. Its unfeathered nostrils, streaked crown, and fully barred tail set it apart from other flickers, but these and other morphological features are considered to merit no more than subgeneric recognition for Nesoceles. There is some incipient geographic variation (Short, 1965b, pp. 30, 31). Interactions with C. auratus chrysocaulosus on Cuba would make an interesting study.

Reference

CHILEAN FLICKER

Colaptes pitius

Color Plate 70

Range Summary. Southern South America.

Diagnostic Features. Size Medium, weight 146 to 163 grams, wing length 145 to 160 millimeters. Nondescript; heavily barred brown and white above and below; white rump. Crown gray and throat and face pale. Only ground-feeding woodpecker in its range.

Description. Bill rather long, narrow between the nostrils, curved on culmen, and pointed at tip. Barred above with broad blackish brown and narrow white bars (worn birds may appear entirely brown); rump white, sometimes with scattered black spots or bars; black and white barred uppertail coverts, but shorter coverts all white. Wings as back, flight feathers brown with narrow white bars; below, suffused yellow on pale coverts and bases of flight feathers; some barring at bend of wing. Shafts yellow below in wings and at bases and along sides of tail feather shafts; above, black or dusky. Tail brownish black with narrow white
bars on central and outer pairs of feathers. Tail/wing ratio 0.68 to 0.79. Crown slate-gray, the shafts darker (nearly streaked) and sides also blacker; nape as crown, occasionally with red traces. Ear coverts to nostrils and lores buffy. Throat anteriorlybuffy white, becoming barred with black at rear. Creamy white below with broad bars (nearly spotlike on abdomen), tending to converge into a patch on breast and weakest on the abdomen (sometimes unbarred in center); sides and flanks barred, as are undertail coverts.

Sexual features: Weakly developed. Males have buffy malar areas finely peppered with black or black and red (not visible at a distance); females lack black or red, malar buffy as ear coverts. Immature as adults, but dark bars broader above and broad but more spotlike below; shafts paler yellow; crown blacker than adults (less gray), the tips bearing fine buffy bars. Sexes differ as adults. Eyes yellow to lemon-yellow in adults, brown in immatures. Legs and feet gray to greenish gray. Bill black.

Distribution and Habitat. Southwestern South America, inhabiting the Fuegian forest and scrub along streams of the steppes of central and southern Chile and the Andean slopes of adjacent Argentina from Neuquén south to Santa Cruz. Its extension out of the forest and into riparian scrub is limited by its need for trees of sufficient size in which to excavate a nest.

Foraging Habits. Feeds primarily on the ground but flies to trees when alarmed, hence not found far from trees. Some arboreal foraging also has been reported. Ground foraging involves pecking, swiping, and digging into soil with the bill. Movements on the ground entirely were by hopping, not walking. Foods include mainly ants (larvae, eggs, pupae, and adults) but also scorpions and beetle larvae (Short, 1972b).

Voice. Not known to drum. A Whistled Call is given singly or in series ("kwee-kwee- kwee"), similar to the louder, more regular call of *C. rupicola*. A Wicka Call ("week-a, week-a, week-a," "pi-kwee, pi-kwee") was uttered during an encounter between a male and a female. The Long Call is a high-pitched, long series of wick notes very like that of *Colaptes auratus* and functioning in similar circumstances.

Displays. A Head Swinging Display was seen on several occasions, coupled with a Tail Spreading Display as a male and female perched close together and called. The two birds simultaneously swung their heads widely from side to side and kept their tail feathers spread apart. Incipient Head Bobbing Displays were noted on several occasions, once with a Head Swinging Display between birds of unknown sex. Other displays remain to be investigated and compared with those of related *C. rupicola* and of the other flickers.

Breeding. Nesting occurs in October to December. In the region about San Carlos de Bariloche, Río Negro, Argentina, egg laying was still taking place in late November, although other nests contained young birds. Nests are excavated in dead trees and stubs within and outside forests and scrub. Four to six eggs commonly form the clutch. Five young flickers, including one newly hatched, weighed 20.3, 19.9, 16.9, 9.6, and 4.9 grams (last a hatchling) on 19 November. The difference in weight among these birds suggests that incubation may begin prior to completion of the clutch; perhaps males, which occupy the nests at night, commence incubating before the female has completed laying the eggs. Nesting is not social, and the flickers appear highly territorial. Postnesting behavior largely is unknown. The annual molt follows the nesting season and generally lasts until April or May.

Taxonomy. Related somewhat closely to *C. rupicola*, but these differ too much to be considered allospecies of a superspecies, although their ranges might be considered complementary. *C. pittius* is less social and less terrestrially adapted than is *rupicola* (or *campestris*).
It differs behaviorally from *rupicola* (in vocalizations, especially). Its basic color patterns, including the gray crown and barring of the crown in immatures, somewhat resemble those of *rupicola*; and like that species it has pale eyes. I consider the Chilean Flicker as monotypic, the eastern (Argentine) population differing little if at all from the Chilean population. There is an apparent difference in relative tail length (tail proportionately shorter in eastern birds), but other characters of the supposed eastern subspecies (*cachinnans*) are not substantiated.

Reference

**ANDEAN FLICKER**

*Colaptes rupicola*

**Color Plate 71**

**Range** Plate 71

Western South America.

**Diagnostic Summary.** Medium to Large, weight 142 to 204 grams, wing length 156 to 174 millimeters. Generally the only woodpecker in its open habitat. Entirely terrestrial in habits, though displaying in trees if available. Barred brown and white above; below, cinnamon-buff to white with bars or spot-bars largely restricted to breast. Pale face, gray crown. Bill long. Loud, ringing calls.

**Description.** Bill very long (species prone to abnormal modifications of bill), broad at base, narrow across nostrils, curved along culmen, and pointed at tip. Above, tricolored with brown, edged pale brown, and buffy white bars; rump buffy white, occasionally with bars; uppertail coverts white with narrow dark bars. Wings brown, coverts barred as back, flight feathers brownish black with narrow buff bars; below, buffy yellow-white, forming a patch, with few bars or spots near bend of wing. Shafts golden yellow above and below in wings and at tail bases (black toward tail tip). Tail black with variable, narrow buff bars in central and outer pairs; similar below with more barred outer pair sometimes suffused with yellow. Tail/wing ratio 0.58 to 0.76. Crown slate-gray, blacker at sides; narrow red nape patch present in *puna*, generally lacking in *rupicola* and *cinereicapillus*. Ear coverts, line over eye to bill and lores deep cinnamon (*cinereicapillus*) to whitish buff (other races). Throat unmarked and like the ear coverts in color, or with a few (posterior) bars; the gular region is partly gray in all *cinereicapillus* and shows gray in some birds of other races. Below, buffy cinnamon (*cinereicapillus*), golden buff to whitish buff (*puná*), or mainly white (*rupicola*), always paler on abdomen and darker on breast; markings usually restricted to breast but sometimes extending onto sides or to rear of malar areas and consisting of shallow bars (*cinereicapillus*) or, variably, deeper chevon bars or bar-spots (other races). Undertail coverts unmarked or with few bars on background color as abdomen.

Sexual features: Malar region with gray-black feathers broadly tipped red at rear of patch in males and lacking this red in females (males of *rupicola* occasionally have red nape patch traces). Immatures like adults but duller, more often with red in nape (*cinereicapillus* and *rupicola*); ventral marks more extensive, often invading flanks and sides, and frequently vaguely barred from flanks onto abdomen; shafts paler yellow; crown usually shows at least a trace of a fine, buffy bar at tips of feathers, especially at rear, but less so than *pitius*. The sexes differ as in adults. Eyes lemon-yellow; red-brown in immatures. Legs and feet dull yellowish green (*puná*) to pale orange-yellow (*cinereicapillus*). Bill black.
**Distribution and Habitat.** Found in the Andes of South America from western Amazonas and eastern Piura, northern Peru, southward generally above the upper limit of forests, to the northeastern corner of Chile and Tucumán and Catamarca, Argentina. It occurs as low as 2200 meters in northern Peru and may reach 2000 meters in Argentina, but this may reflect postbreeding, downslope movements. Generally found above 3000 meters (perhaps regularly lower in northern Peru) and reaches elevations of 5000 meters or more. This flicker inhabits the puna grasslands and areas of cultivation, but it requires hill or mountain slopes or some earthen banks for nesting or old buildings or other places suitable for roosting; thus it may be somewhat local. **In areas of rocky slopes and adjacent extensive, especially wet puna it is a common, conspicuous, and wary bird.**

**Foraging Behavior.** Entirely ground foraging, walking about in open areas and hopping or bounding where grass is taller or the ground is irregular. It ranges through open areas away from outcrops, especially when it is not breeding, but flies to them or to isolated rocks or other perches when disturbed. Probing and swiping with its bill, it causes dirt to fly about as it feeds. Birds have been seen to dig 5 centimeters deep after larvae. This is the only flicker not dependent upon ants, as most of its diet is composed of lepidopterous and coleopterous larvae; these larvae range to 3 centimeters long, and up to 29 were found in one stomach. Several small seeds and some unidentified adult insects also were found with lepidopterous larvae and stones in one stomach, and 26 stomachs contained only the large larvae previously mentioned. Dorst (1956) reported a diet of coleopterous larvae and also lepidopterous larvae and spiders in *C. r. puna* of southern Peru. Ants appear to be uncommon, or at any rate were unrepresented in 29 stomachs of *puna* and *cinereicapillus* at the time of my studies. Several Andean Flickers perched in trees (eucalyptus) but did not forage there.

**Voice.** This flicker is not known to drum and normally does not encounter surfaces suitable for drumming. The common call in *C. rupicola rupicola* and *puna* is a pure, whistled "tew-tew-tew," resembling the call of the Greater Yellowlegs (*Tringa melanoleuca*), but this may vary racially as *C. r. cinereicapillus* was heard to give only one ("kwee-kwee") similar vocalization. This seems to be an alarm-aggressive note. Loosely connected series of "peek" notes were heard on several occasions (both from *puna* and *cinereicapillus*) and form a little known Peak Call of uncertain function. These calls are given in series of three to seven notes, or singly. The Peak Calls of *C. r. puna* and *cinereicapillus* differ in the tone emphasized, in the duration of the notes, and in their tempo in series, although they are similar in form and sound very similar. Wicka Calls uttered during aggressive encounters between displaying birds were heard, but not commonly, in *puna* ("chew-aaa" or a loud, nasal "ou-é, ou-é" [Dorst, 1956]) and only once in *cinereicapillus* ("kwa-kwa-kwa"). Their notes spectrographically resemble more horizontal elements of Wicka Calls of flickers other than *campestris* (and probably *pitius*). A loud and important call, the Quoick Call, is known only from *C. r. puna*. Rendered "quick" or "cloict," it is long (to 0.25 second or even 0.5 second in a form repeating the terminal element, "quoi-ik-ik"). Associated with Peak Calls, and somewhat resembling the Wick Call of *C. campestris*, the Quoick Call appears to be more aggressive and less a localization note than the Peak Call. The Long Call also varies geographically, that of *cinereicapillus* being more regular, longer, faster, and lower pitched (a "brrrrridip," containing 17 to 66 notes given at 19 to 20 per second), whereas the Long Call of *puna* is somewhat irregular, shorter, slower, and higher pitched (a "bi-di-di-di-di-dit," containing 12 to 53 notes, usually at 14 to 15 notes per second). The notes are similar in form in the two races. The function of the call remains open for study, since pairs tend to be colonial and hence are not highly territorial.
Displays. Head Swinging Displays are commonly seen when two flickers approach each other closely, the head and bill of each moving through a variable arc from side to side. Head Bobbing accompanied Head Swinging in more intense displays. A male used both simultaneously before a female that half faced away, but spread its tail (Tail Spreading Display). To some extent, Head Bobbing also occurs without Head Swinging and seems less ritualized than in C. auratus. A Bill Directing Posture was used on several occasions, the bill being pointed at an adversary. Tail Spreading Displays were common and were observed during almost all encounters. Unritualized Wing Flicking occurs in disturbed birds, but may be a display.

Breeding. The nesting season begins in September, at least in some parts of Peru, where breeding seems squeezed between the midwinter cold (July and August) and the heavy rains and snows of summer (December to March). In other areas, such as southern Peru (Dorst, 1956), nesting occurs in summer. There may be altitudinal variation in the time of nesting, even in one region. Nests are excavated in rocky ledges and cliff faces, stream banks, and road cuts, often but probably not exclusively in colonies of up to 10 or 12 pairs. Apparently the territories are reduced to the nesting site within such colonies, and nests may be as little as 50 centimeters apart. Dorst (1956) has illustrated the nesting cavity, which may extend 150 centimeters into the bank. The tunnel leading inward from the elliptical entrance (which averages 9 centimeters wide by 12 centimeters high) is at an upward angle and often turns to one side before reaching the 30-centimeter-wide nesting chamber. The newly hatched young number two to four and have an “egg tooth,” a swelling on the commissure of the bill, and an enlarged “heel” (tibio-tarsal) pad, all of which subsequently are lost. Fecal sacs are taken from the nests, which are kept clean. Both adults feed the young various beetle and moth larvae (see Foraging Behavior). Postfledging and postbreeding behavior has not been studied. It is known that nonbreeding birds excavate roosting holes (Short, 1971g, fig. 11) in old adobe buildings, often in numbers, and thus occupy areas in which they do not breed. Downslope movements, probably actual migrations, occur in the fall, winter, and spring and undoubtedly account for some of the low altitudinal occurrences of this flicker. Dorst (1956) reported movements of Andean Flickers through passes; and at Huarón, Peru, flickers were seen first on 10 December and became abundant on 13 December. Molting is very variable and has been encountered in birds from all months except October and November, although predominantly occurring from January to May. The considerable flying necessitated by the activities and habitats of this flicker may have promoted evolution of a protracted wing molt and, consequently, minimal interference with flight.

Taxonomy. Related rather closely to Colaptes pittius (see p. 382). There are three distinct subspecies arrayed from north to south and engaged in secondary contacts. The northern cinereicapillus is the largest race and the most distinct, characterized by its deep cinnamon underparts and face, very shallow but broad barring on the breast, a relatively long tail, lack of a nape patch, yellower tail shafts, more irregular tail and tail-covert barring, orange-yellow legs, and more gray in the gular region. It also differs considerably in vocalizations and perhaps somewhat in displays from the more southern races. Southern populations tend toward puna, with which it hybridizes in a narrow (because of limited habitat) zone of Huánuco and Cerro de Pasco, Peru. Central puna and southern rupicola resemble each other closely, but puna is darker above, is more buffy below and on the face, has deeper breast bars and fewer tail bars, and has a red nape patch that is lacking in most rupicola. Both of these races are paler below, with deeper, more chordate breast bars, a relatively shorter tail, more regular tail barring, less yellow tail shafts, less gular gray, and darker legs than
Colaptes campestris

*cinereicapillus. C. r. puna* meets and interbreeds with *rupicola* about the southern end of Lake Titicaca (Peruvian-Bolivian border).

**References**


**CAMPO FLICKER**

*Colaptes campestris*

**Color Plate 71**

**Range** Central South America.

**Diagnostic Summary.** Central South America.

**Diagnostic Features.** Size Medium to Large, weight 145 to 192 grams, wing length 143 to 177 millimeters. A mainly brown-barred flicker found in open country on the ground. A gold patch on the upper breast connects with the ear patch; crown and nape black; throat buffy white or black.

**Description.** Bill moderately long, broad at base, curved on culmen, narrow across nostrils, and pointed at tip. Above, tricolored, barred broadly dark brown, with narrower pale brown and buffy white bars. Rump white with few to many black bars or bar-spots; upper-tail coverts equally barred brown and white. Wings brown, barred on coverts as back, bars of buffy white on flight feathers; underwings suffused yellow over large white patch, few spots at bend of wing. Shafts yellow above and below in wings, but black in tail except bases and sides of bases (occasionally at tips of outer pair), which show yellow. Tail brownish black, narrow buff bars on outer feather edges, especially on outer pair, and inner edges of central pair; similar but duller below with some yellow suffusion on pale bars of some. Tail/wing ratio 0.63 to 0.74. Crown and nape black; hindneck yellow-gold connecting with breast patch. Ear coverts gold at rear, becoming buffy white near eyes; lores to bill buffy white. Throat buffy white (*campestroides*) to black or black with (anterior) white streaks (*campestris*). Below, pale yellowish white in fresh plumage, often becoming excessively soiled (matching the ground color of the region in which they live) in worn plumage; varying from fully barred to chevron barred or narrowly barred on breast; sides and flanks sparsely spot-barred on nearly clear white abdomen. Gold to orange-gold patch on upper breast, continuing around sides of neck and rear of throat to ear coverts and hindneck. Undertail coverts barred.

**Sexual features:** Male has malar areas mixed buffy (especially anteriorly), red, and black. Female lacks red in malar areas, which are buffy with black streaks that often are restricted to the rear. Immatures have dorsal barring in two tones only (dark and pale brown); duller white below with broader dark bars than in adult; gold of breast yellower, more restricted than in adults; shafts paler yellow. Sexes differ in immatures as in adults. Eyes reddish brown to chestnut-brown, legs and feet greenish gray, bill black.

**Distribution and Habitat.** Eastern South America, with small isolated populations in southern Surinam and the lower Amazon Valley, and from Maranhão, Mato Grosso, and eastern Bolivia southward through Brazil and Paraguay to Mendoza and Río Negro, Argentina, and
Uruguay. Found in grasslands, savannas, campos, and cultivated fields, penetrating forested areas wherever there are clearings. The species is confined to lowlands.

**Foraging Habits.** Feeds on the ground almost entirely, eating ants. No other food items are known from stomachs examined. The flickers hop and bound about uneven terrain and up and down anthills, but they walk readily where the terrain permits. Several birds often forage together, and Green-barred Flickers (*Colaptes melanochloros*; see p. 373) tend to associate with them.

**Voice.** Does not drum with its bill. A Peah Call somewhat resembling that of *Colaptes auratus* was heard on several occasions ("pya," "kyow"), but its function is not known. A Whistled Call is less frequent than its counterpart in *C. pitius* and *C. rupicola*, and it somewhat resembles the Whistled Call of the latter species. A common call that may occur seasonally, and so far known only from *C. campestris campestris*, is the Week Call, an irregular series of "week" or "keep" notes uttered at a rate of three or four per second. Spectrographically these notes are tall and peaked, but dropping, with strong overtones. These notes somewhat resemble the Peek Call notes of *C. rupicola*. This may be a location call. Low Wicka Calls ("we-a, we-a," "kwih, kya-wi, kya-wi") of *campestris* resemble the rising notes of Wicka Calls in *C. auratus*. These calls occur in close interactions among birds of the same or different sexes, often involving three or four displaying individuals. A Wick Call is a strong series of four to 12 or more rising notes given at five notes per second. The notes are regularly spaced and have strong overtones. Initial notes of this call resemble Wicka Call notes very closely, whereas most of the notes resemble Long Call notes (they are slower, with stronger overtones and a different emphasis). The Long Call of *C. campestris* contains simple, rising notes with weak or no overtones, uttered at eight to 10 notes per second. This is a proclamation call or song used by both sexes in announcing their presence. Others of the calls described require functional analysis.

**Displays.** Flickers feeding in proximity may displace one another by use of Bill Poking Displays, which are movements of the bill toward an antagonist as if to peck it. The poking usually does not reach the body of the bird that is attacked, for the latter individual backs away rapidly. A Bill Directing Posture sometimes is used, in which the bill is held pointed at an antagonist, but not moved. This posture often suffices to cause a submissive bird to turn away at the approach of a dominant flicker. Only weak Head Swinging Displays were observed, mainly between members of a pair or prospective pair. A male gave a precopulatory Head Swinging Display before two birds, then mounted one of them. Very commonly seen are Wing Flicking Displays, the wing or wings being rapidly extended partway out, then brought in. An alarmed flicker may flick its wings almost continuously. In aggressive encounters, there is a rapid and often full extension of one or both wings, accompanying calls and other displays (Head Swinging). Wing Flicking is most ritualized in this flicker, compared with its congeners.

**Breeding.** Nesting commences in late August in northern Argentina. Pairs are somewhat social, particularly where nesting sites are at a premium. If available, dead trees or stubs are used for excavation of nests, and a small patch of dead or partly dead trees may attract numbers of these flickers. Nevertheless, nests are not placed in close colonies but are scattered at intervals (there may be as many as four nests in a 70-yard line of trees, the nests situated about in every third tree [one instance in Corrientes, Argentina]). Fence or telegraph poles also are used; and where even these are lacking, this flicker excavates nests in road banks or other earthen banks or in termite nests on the ground. These raised sites are
less apt to be flooded than are nests excavated in flat ground. There is a suggestion that helpers occur occasionally at nests, resulting in trios of birds associated with a single nest.

Four or five eggs are laid and are incubated by both adults. Most of these data pertain to the southern race, *campestroides* — the northern *campestris* should not differ markedly. The young remain with the parents for some time, and family groups may combine into larger parties under favorable feeding conditions. Southern Surinam *campestris* nests in January to April. The annual molt occurs between February and May, with some geographical variation.

**Taxonomy.** Related to *C. pitius* and *C. rupicola*, but not so closely as those two are to each other. Two races occur, which usually are treated as species. Northern *campestris* of the campo cerrado, caatinga, and southeastern Brazilian forests is resident south to central Paraguay and southern Parana and Santa Catarina, Brazil. Southern *campestroides* inhabits the pampas area, generally, and extends north to central Paraguay, Misiones, Argentina, and northern Rio Grande do Sul, Brazil. These forms differ no more than very weak subspecies in their various traits; the basic difference involves throat color, which is black (often slightly flecked white anteriorly) in *campestris* and white in *campestroides*. Contact between them is limited by major forest barriers, which are subject to human modification probably increasing the extent of their contact. Specimens of the two forms from near their area of contact converge upon one another in throat color. Actual hybridization is known from south-central Paraguay (Short, 1972b) and probably occurs sporadically in Misiones and Santa Catarina, in which cleared areas appear to be undergoing an invasion by both *campestris* and *campestroides*. A hybrid zone seems to obtain in Paraguay and is the chief basis for merging these very similar forms in one species.

**Reference**


**Genus Celeus Boie**

The 11 species of *Celeus* are found in the New World tropics, except for *C. brachyurus*, which inhabits southern Asian forests. These species are mainly rusty brown to black and white or cream colored, usually are barred, and have a crest. The bill is short or medium, varying from very curved to almost straight (*C. torquatus*) along the culmen; the area between the nostrils is narrow; the tip is pointed to moderately chisel-tipped; and there is no feathering over the nostrils. The tail is slightly concave, or flat, and moderately specialized at the tip. The fourth toe is shorter than or equal to the anterior toes, and the hallux is short, one-quarter to one-third the length of the fourth toe, except in *brachyurus*, in which it is very short, almost vestigial. Sexual dimorphism involves the malar (and often loral and subocular) region, being red in males and black or concolored with the head in females; the nape also is red in males of *spectabilis*. Ants are a primary food. The Asian species, formerly placed in *Microptemus*, is structurally, in plumage pattern, nesting behavior, foraging, vocalizations, and other ways, so like other *Celeus* and different from other picids as to demand congeneric treatment with *Celeus*. 
RUFOUS WOODPECKER

Celeus brachyurus

Color Plate 72

Range Summary. Southern Asia.

Diagnostic Features. Small to Medium, weight 55 to 84 grams (squamigularis, badiosus), 82 to 107 grams (jerdonii), and 92 to 114 grams (phaioceps); wing length 102 to 136 millimeters. Entire head and body rufous to sooty or chestnut; head often paler and underparts darker. Black bars on wings and tail and often on back and abdomen. Moderate crest; bill blackish. Throat scaly or streaked, sometimes obscurely.

Description. Bill rather short, curved, narrow across nostrils. Plumage often soiled with dirt or fluid materials from trees and usually smelling of formic acid as a result of manipulating and living with ants. Variable above, from cinnamon-rufous or chestnut, with or without barring, to sooty or blackish with narrow rufous bars; uppertail coverts barred rufous and black. Wings barred rufous to chestnut and black, but barring often obscure on coverts and inner flight feathers in birds with reduced back barring; underwings cinnamon to rufous with black bars. Shafts cinnamon or pale tan to rufous below; darker above, especially in tail and where black bars meet shafts. Tail mainly rufous or chestnut with narrow to broad black bars, except black with narrow rufous bars in badiosus. Tail/wing ratio 0.44 to 0.60; varies geographically. Crown and crest vary and may be concolored with the back or distinctly darker (sooty) or paler (buffy); streaks absent, obscure, or well marked, dark, and wedge-like along shafts with pale feather margins in races such as squamigularis and annamensis. Neck, ear coverts, and lores buffy to chestnut, without markings. Throat usually streaked or "scaly," feathers with brown to black central streaks or wedges and broad to narrow paler borders; edges may wear away or be suffused with rufous, reducing contrast and obscuring markings; scaly throat with black base of feathers, chestnut tip, and buff edges, thus tricolored in badiosus. Below, rufous to sooty chestnut, usually duller and often paler to rear; breast usually unmarked (small spots near feather tips in "celanephis"); abdomen and flanks with barring absent, vague, or strong (especially strong in squamigularis); undertail coverts always barred black and rufous.

Sexual features: Male has dull red tips of feathers under eyes to front of ear coverts and upper edge of malar area, usually forming an irregular, inconspicuous patch. Female lacks red. Immatures very like adults, but show less barring generally and obscure streaking of the throat. Eyes reddish brown to brown; skin around eyes gray. Legs and feet brownish green to bluish green. Bill black or brown above, paler below, either gray or else grayish at base and whitish toward tip; mouth grayish pink; tongue orange-yellow.

Distribution and Habitat. Southern Asia from southern slopes of Himalayan Mountains and southern China to Ceylon, Burma, Malaya, Java, Sumatra, Borneo, Thailand, Viet Nam, and Hainan. Frequents primary forest, where found at all heights in trees and shrubs, and also second growth, palm groves, gardens, cultivated trees, scrub woodland, bamboo, and mangroves. It ranges to 3500 feet elevation on Ceylon, 4500 feet in southern India, and 6000 feet along the edge of the Himalayan Mountains. In Burma it seems not to be found above 2000 feet (Stanford and Mayr, 1941). It ranges sporadically to 3000 feet in most of Southeast Asia, but largely is found below 2000 feet. In Borneo it has been taken up to 5700 feet (Harrisson, in litt.).

Foraging Habits. Forages in diverse sites from dung hills, ant hills, and termite mounds on the ground (India) to the foliage of tall forest trees. In the eastern part of its range it rarely
if ever descends to the ground. Fallen, rotting logs; clinging vines; saplings; bamboo stems; and trunks, branches, and twigs of trees are visited. In bamboos it concentrates attention on the nodes of the stems. In coconut palms it probes into palm frond scars on the trunk, at the bases of fronds and coconut clusters, and in holes in the coconuts (it is a moot point whether it excavates the holes). Rough or broken places on tree trunks and broken ends of branches and twigs are favorite feeding sites. Large termite and ant nests, particularly of ants of the genus *Crematogaster* that construct cartonlike nests in trees, are pecked and torn by feeding Rufous Woodpeckers. Most foraging is by gleaning and probing, with an occasional peck. Ant nests may be torn apart with repeated pecks, the birds plucking ants that rush out. At such ant nests the woodpecker flutters and stamps its feet, occasionally flying to a nearby branch to pick ants from its body (De Zyla, 1973). Small carton-nests may be torn apart completely by foraging Rufous Woodpeckers. When gleaning in trees these birds move quickly, often hopping about and perching crosswise, sometimes joining interspecies foraging flocks. Members of a pair feed together or apart. Occasionally they pause for a long period, motionless. Various ants, especially of the genera *Crematogaster* and *Phidole*, make up much of the diet; but termites, and probably other insects, are taken. Ali and Ripley (1970, p. 180) mentioned 2600 *Crematogaster subnuda* in the stomach of a single bird. Figs, and probably other fruits, are eaten. Nectar of various flowers (for example, *Erythrina*) also is utilized, and "sapsucking" on the stems of banana plants has been reported (Ali and Ripley, 1970).

**Voice.** Drumming is characteristically a burst of beats that commences rapidly, then slows down, rendered "bd-d-b-d—d—dt" and sounding like the starting, faltering, and failing of a motor bike engine (Short, 1973d). Bursts contain 10 to 30 beats lasting about 1.5 to 5.0 seconds. There is a shift from beats at 13 to 15 per second initially to 4.5 to 9.0 beats per second at the end of a burst. This slowdown makes its drumming easily distinguishable from that of other woodpeckers. Apparently, drumming is restricted to a 1- to 2-month period prior to the breeding season. It is not used by members of a pair to maintain contact; both sexes drum, but drumming seems to function mainly in territorial proclamation and not in pair maintenance and synchronization of breeding. The Keek Call is a series of three or four "keek" notes spaced about 0.3 second apart, with emphasis at 3.2 kilohertz, and resembling Keek Calls of species of *Picus*. Lone birds give this call, which may function as a contact note. A faster call, the Kweek Call, contains four or five notes that are twice as long as Keek Call notes and is uttered at about three notes per second (call about 1.5 or 1.6 seconds in duration). Apparently this is an agonistic vocalization, given during encounters. Wicka Calls are weak, somewhat variable calls ("ch-ch-ch—" to "whi-chi, wi-che, wi-cha—") also serving an agonistic function, occurring in encounters between birds of the same sex and between members of a pair. There are two distinct notes, the "wi" and the "chew" notes, given in mixed series or in calls having only one note or the other. The Long Call is a four- to 16-note "pee" or "kee" series, serving as a "song." Long Calls are 0.3 to 2.0 seconds in duration, the notes being delivered at seven to 12 notes per second. Initial notes are slightly higher pitched and longer than terminal notes. Rapid calls have notes almost connected, giving a continuous, punctuated sound ("Kee-ee-ee-ee"). The Long Call is used sporadically by foraging, territorial Rufous Woodpeckers, and it is the usual response to Long Calls of conspecific birds; it also is employed as a response to calls of other woodpeckers (for example, *Picus vittatus*, *Dinopium javanense*, and *Meiglyptes tukki*).

**Displays.** Poorly known. I have seen Head Swinging Displays accompanying Wicka Calls, the Head Swinging being pronounced in unisexual encounters and only slight during encounters between paired Rufous Woodpeckers. A female responded to drumming by her
nearby mate by flying toward him and landing with the tail spread (Tail Spreading Display), then Head Swinging and giving Wicka Calls. Bill positioning displays and postures probably also occur, but remain to be described.

**Interspecific Interactions.** Much has been written of the relationship between Rufous Woodpeckers and carton-nest ants (*Crematogaster*). In much of the range of this woodpecker it nests in holes excavated in carton nests occupied by these ants. Apparently the ants are usually living in the nests that the woodpeckers utilize, for W. W. A. Phillips (1953, p. 130) pointed out that two thirds of such ant nests one encounters are no longer occupied by the ants, but not one Rufous Woodpecker nest in 10 is excavated in deserted ant nests. Certainly the birds successfully lay eggs and rear young in ant-occupied nests. Some have suggested that the plumage or body of the woodpeckers somehow inhibits attacks by ants, and even that the diet of Rufous Woodpeckers may so affect their eggs as to make them unattractive to the ants (W. W. A. Phillips, 1953). The woodpeckers do not feed at the ant nest they occupy, except that they do eat ants uncovered when excavating their nesting cavity, as well as any ants encountered about the nest entrance (De Zylva, 1973). That the young birds are not immune to the attacks of ants is clear from the observations of a nest by De Zylva. All went well with the woodpecker's nesting endeavors until heavy rain broke away part of the ants' nest where the adult woodpeckers landed when they came to their nest. After this, ants were observed to be active at the broken area, and the adult birds made special efforts to pick up ants at this site before moving into their nest. Within several days the young birds in the nest were no longer heard, and De Zylva found that the ants had eaten them, then covered over their bones within the abandoned woodpecker nest. Thus, a disturbance may trigger a disaster, upsetting the balance between ants and woodpeckers.

**Breeding.** The breeding season is from February to April in Malaya and Sumatra; from April to June in Burma, southern China, Nepal, and northern India; from January to April in Thailand; and from February to May in Ceylon (De Zylva, 1973) and southern India. The nest is usually constructed in the carton nests of ants (especially *Crematogaster*), at heights in trees from 10 to 40 feet, although the nests occasionally are excavated in the trees themselves in northern India (Ali and Ripley, 1970) and Malaya (Chasen, 1939), and apparently stubs of live trees commonly are utilized for excavation in southern China (Caldwell and Caldwell, 1931). Two eggs normally compose the clutch in southern areas, two or three eggs are laid farther north, and five to seven eggs are reported to be laid in China (Caldwell and Caldwell, 1931). The eggs are nearly exactly oval and are translucent, becoming discolored (brownish) rapidly. The incubation period is 12 to 14 days (20 days reported by De Zylva, 1973), and both adults incubate the eggs. The nestlings are fed by regurgitation, presumably mostly ants, ant larvae, pupae, and eggs. Nothing is known of the behavior of the fledged young and of family parties. Molt occurs from September to February, mainly from September to November.

**Taxonomy.** Related, albeit distantly, to the New World species of *Celeus*, especially the short-crested *C. loricatus* and the *C. grannicus* group (note, for example, the patterned tail of *loricatus* and *undatus*, the location of the malar-orbital red mark of males of *undatus*, and the sometimes squamate markings of the crown and throat of *loricatus* and *grannicus*). There is considerable individual variation that complicates understanding of geographic variation. Three subspecies occupy the Indian subcontinent: In northwestern India there is *humii*, a large, pale, streak-throated form with a grayish head; *jerdonii*, a smaller, darker, scaly-throated race, ranges from Bombay south in western and southern India to Ceylon; and *phatioceps*, a large, rather dark rufous form with a brown head occupies northern India and
Nepal and extends eastward through Assam to Burma and Thailand. Southern peninsular Thailand, Malaya, and Sumatra form the range of *squamigularis*, a rather small, pale (in comparison with northern races) subspecies with a barred abdomen; I do not recognize "badius" and "celaenephis" as separable from *squamigularis*, although Sumatran birds are less barred ventrally. On Java is found *C. b. brachyurus*, weakly differentiated from *squamigularis* by its reduced ventral barring and longer tail. Bornean birds (*C. brachyurus badiosus*) are distinctly longer billed and slightly longer legged than *squamigularis* and *brachyurus*; *badiosus* also is characterized by a very black tail, a tricolored throat (chestnut, black, buff), reduced barring on the back, and vague or obsolescent abdominal barring. The northeastern subspecies *fokiensis* of southern China and North Viet Nam and *holroydi* of Hainan are distinctly longer tailed proportionately than all other races of *Celeus brachyurus*, having a tail/wing ratio of 0.55 or more; *fokiensis* is sooty colored on the abdomen and grayish chestnut on the breast, with broad light and dark streaks on the throat; whereas considerably smaller *holroydi* is very dark, but more chestnut (less grayish) below, with brown (not black) throat streaks and a weakly streaked crown. *Celeus brachyurus annamensis* of Laos, South Viet Nam, and Cambodia resembles *fokiensis* in its dark coloration, but it is slightly smaller and proportionately shorter tailed (intermediate in tail/wing ratio between *fokiensis-holroydi* and all other races of *C. brachyurus*).

References

CINNAMON WOODPECKER

*Celeus loricatus*

Color Plate 73

Range Summary. Costa Rica to Ecuador.

Diagnostic Features. Small, weight 77 grams (one *C. l. loricatus*), wing length 106 to 127 millimeters. Rufous above, cinnamon to buff below; barring usually weak above, "scalloped" chordate bars to almost unmarked below. Cinnamon and black barred tail. Males with red throat and malar area. Head with moderate crest concolored with back.

Description. Bill moderately long, gently curved along culmen, tip barely chisel-shaped, rather narrow across nostrils. Above, chestnut-rufous, barred moderately (*loricatus*), weakly (most races), or not at all (some *innotatus*) with black; rump paler, more cinnamon, bearing moderate to heavy barring except in *innotatus*; uppertail coverts cinnamon-rufous, usually barred with black. Wings chestnut-rufous, flight feathers barred and tipped with black; coverts and secondaries usually more black barred than back, but this barring absent in some *innotatus*; underwings cinnamon with black bars and tips. Shafts black to rufous-brown above; cinnamon-buff to blackish (where feathers bear black) below. Tail black tipped and barred black and cinnamon-buff, the dark bars being broader in all races but *innotatus*; undertail paler. Tail/wing ratio 0.50 to 0.60. Moderate crest, crown, and lores colored as back, but not barred, rather bearing broad, variably long black shaft streaks on the anterior crown and lores, these streaks sometimes reaching hindcrown and sometimes very restricted to bases of feathers or even lacking (*innotatus*). Ear coverts and area under eye chestnut-rufous to rufous. Hindthroat rufous-cinnamon, usually bearing few black marks, but
sometimes barred. Underparts paler than back and paling distinctly from rusty cinnamon breast to pale cinnamon or even buffy cream-colored abdomen; breast markings usually wedge- or horseshoe-shaped black bars (reduced to a few spots in innotatus), the pale area inside the wedge being distinctly paler than the feather tips; flanks and abdomen with more barlike markings that are strong in loricatus and diversus, weak in mentalis, and lacking in innotatus. Undertail coverts as abdomen.

Sexual features: Male has black-based, red-tipped feathers on anterior throat, chin, and malar area (not under eyes); and most males show faint to bright red coloring behind and above the eyes and faint red at the sides of the crest (approaching C. spectabilis). Females entirely lack red, the throat, chin, and malar areas being cinnamon-rufous, rarely with a few black spots. Immatures resemble adults, but males have more red in the nape and face. Eyes red to brown (latter possibly subadults). Legs and feet greenish gray. Bill varies from black above and gray below to gray above and greenish to yellowish below.

Distribution and Habitat. Nicaragua south through Costa Rica and Panama to northern and western Colombia, and northwestern Ecuador. Inhabits lowland forest, edges, and clearings up to an altitude of 2500 feet (Panama).

Foraging Habits. Forages singly or in pairs, sometimes joining mixed species foraging flocks. Foraging sites often include saplings and bushes, and especially at swollen twig junctions occupied by ants (Slud, 1964). Although a bird of primary forest, it sometimes feeds in the open, visiting lone Cecropia trees (Wetmore, 1968). Ants form a great part of the diet, but some fruits are taken, as ripe bananas (Wetmore, 1968).

Voice. Drums in bursts resembling those of Melanerpes pucherani, but less long and somewhat slower (Wetmore, 1968). Slud (1964, p. 189) has described six calls, noting that loricatus differs vocally very greatly from castaneus. One is a ‘‘splink.splink.splink.splink.splink.’’, speeding up while falling and weakening,’’ used apparently as a contact note. Another is a ‘‘squeaky ‘titit-tō’d.’’ A third is a ‘‘hard ‘chikikikrīk.’’’ There also are a ‘‘reedy clinking rattle,’’ a ‘‘rippling rattle a bit lower pitched and not so hard as that of the parrot Amazona autumnalis,’’ and a ‘‘chwēe-tītī’’ much like that of the tanager Piranga flava (Slud, 1964).

Breeding. Slud (1964) observed a male and female excavating a hole in a thin tree trunk during October in Costa Rica (diversus). Wetmore (1968) mentioned eggs laid in March in Panama (mentalis). There are October immature specimens of Colombian loricatus. The annual molt occurs during September to February in Colombia and from October to March in Ecuadorean loricatus. Molting specimens of innotatus are known from December and January and those of mentalis from December to February. Northern diversus completes its molt during December (Costa Rica).

Taxonomy. Related somewhat distantly to Celeus grammicus and C. undatus, neither of which it meets. Subspecies are not strongly marked, differing mainly in the degree of ventral barring. Weakly barred innotatus, including the virtually unbarred extreme “degener,” occupying the Magdalena Valley region and adjacent western slopes of the eastern Colombian Andes, and mentalis of most of Panama and northwesternmost Colombia are interspersed between strongly barred diversus of Nicaragua to western Panama and loricatus of western Colombia and western Ecuador. The northern diversus differs from the southern loricatus in its somewhat sparser barring and the darker tone of its underparts; diversus also is larger than the other three subspecies. Celeus loricatus mentalis is less barred below than loricatus or diversus, and its upperparts (especially upper back) also are less marked; mentalis is smaller and is paler below than diversus. The extreme unbarred form, innotatus, resembles
mentalis but is less barred above and below. There is considerable variation within each form, especially in innotatus, such that I see no merit in recognizing the nearly unmarked extreme of innotatus, namely, “degener” of Santander, Colombia.

References

**WAVED WOODPECKER**

*Celeus [undatus] undatus*

Color Plate 73

**Range Summary.** Northeastern South America.

**Diagnostic Features.** Small, 58 to 73 grams, wing length 107 to 118 millimeters. Barred rufous or cinnamon and black; barring complete on rump and on underparts (including abdomen and flanks), and black bars wavy, chordate, or otherwise irregular on breast. Head usually paler than body, buffy to cinnamon. Tail more strongly barred rufous and black than in *C. grammicus*. Bill black or pale.

**Description.** Bill rather short, curved along culmen, rather narrow across nostrils, almost pointed at tip. Above, chestnut (*amacurensis*) or chestnut-rufous to yellowish buffy, usually but not always paler (sometimes yellower) on rump; heavily barred, dark bars nearly as deep as paler bars; bars often as chordate spot-bars on rump. Wings barred black and cinnamon to rufous, with blackish tips of outer flight feathers; coverts below are yellowish to cinnamon, becoming barred on flight feather bases, which have gray-brown tips. Shafts blackish brown above (cinnamon-rufous where that color occurs on vanes); below, dull brown with pale center of shafts in tail and pale yellowish white to dull brown in wings. Tail rufous and black barred basally, blackish brown at tips (rarely barred to tips); duller below, at times with yellowish cast. Tail/wing ratio 0.55 to 0.63. Moderate crest; crown cinnamon to buffy and unmarked or check-barred in *undatus*, unmarked in *amacurensis*, and streaked black in *multifasciatus*; forehead and lores less marked or unmarked in birds of all races. Ear coverts and sides of neck marked with fine spots or bars (*undatus* and *amacurensis*) or streaked (*multifasciatus*), and background paler than crown. Throat cinnamon to buff, bearing bars or check marks (*undatus* and *amacurensis*) or streaks (*multifasciatus*), the markings stronger posteriorly. Below, chestnut-rufous (*amacurensis*) or rufous to cinnamon-buff on breast, paling to buffy or yellowish buff on abdomen and flanks, and barred throughout, the bars narrow and regular on abdomen but broad, irregular, even chordate or wedge shaped on breast; sometimes breast feathers are black with a narrow rufous edge that wears off, leaving black breast “patch.”

**Sexual features:** Male with red anterior and middle malar area, the red extending under eye and to anterior ear coverts. Female lacks red, areas red in male being colored like ear coverts. Immatures duller, rump less barred; head markings muted and irregular. Eyes reddish brown to red; legs and feet greenish gray; bill yellow to yellowish green in *undatus* and *amacurensis* and blackish gray above and gray based and gray tipped below with a yellowish central area in *multifasciatus*.

**Distribution and Habitat.** From easternmost Venezuela (Paria Peninsula, Amacuro Delta, eastern edge of Bolivar) and the Guianas southward to the middle and lower Rio Negro, the
Amazon River, and south of the Amazon River to the lower Tocantins River and eastern Para.

Behavior. Poorly known. Feeds in treetops on ants, mainly Formicinæ and Myrmicinæ, termites, and some seeds (Haverschmidt, 1968). That author reported that both sexes drum. Breeding takes place during July and August in Surinam. Molting, presumed to follow the breeding season, occurs in May to September in \textit{multifasciatus} and July to September in \textit{undatus} (Guyana).

Taxonomy. Forms a superspecies with \textit{C. grammicus} (see below). There are three moderately distinct subspecies: \textit{undatus} of the Guianas, adjacent eastern Venezuela, and north-eastern Brazil (north of the Amazon); \textit{amacurensis} of the Amacuro Delta, Venezuela; and \textit{multifasciatus} in Para and westward in Brazil to the Tocantins River. \textit{Celeus u. amacurensis} is darker, more chestnut, and less buff (tending toward \textit{C. grammicus}), with a cinnamon throat, unmarked crown and crest concolored with the back, and a barred but cinnamon-rufous rump lacking traces of yellow. The southeastern race, \textit{multifasciatus}, differs from the other two subspecies in its slightly larger size but proportionately shorter tail, dark rather than pale bill, paler buffy back with a yellowish cast, a black-streaked (not check-barred) crown, streaked throat, paler underparts, and less heavily black-marked breast.

**SCALY-BREASTED WOODPECKER**

\textit{Celeus [undatus] grammicus}

Color Plate 73

Range Summary. Northern South America.

Diagnostic Features. Small, weight 77 to 82 grams (Ecuador), wing length 117 to 138 millimeters. Mainly cinnamon-rufous to chestnut, the head as dark as or darker than the body. Black bars above and below, sometimes heavy on breast. Rump usually unbarred, varying in color from cinnamon to greenish yellow; barring often reduced on lower abdomen and thighs. Bill pale. Crest moderate.

Description. Bill rather short, curved along culmen, rather narrow across nostrils, small chisel-tip. Above, usually cinnamon, rufous, or chestnut, palest in \textit{latifasciatus}; feathers yellowish white at bases in some birds, these showing through at surface; black bars above are broad, narrow, or obsolete (especially \textit{verreauxi}); rump somewhat to much paler than back, usually unmarked, and varying from rufous-cinnamon to greenish yellow, rarely tipped red; uppertail coverts rufous or chestnut, sometimes barred. Wings colored as back on coverts and inner secondaries, but always barred, even in clear-backed specimens; chestnut or rufous reduced to edging of outer secondaries and primaries, which are blackish and have at their bases a pale cinnamon to yellowish area; greater coverts and alula sometimes brown; underwings dull brown at tips, becoming cinnamon to greenish yellow basally, especially on coverts. Shafts chestnut to blackish brown above and, in tail, below; base of tail and wing shafts below are dull grayish white to pale yellowish. Tail brownish black, the bases edged with chestnut or the entire basal area chestnut, occasionally with black bars; brown below with cinnamon where chestnut above, sometimes with yellowish cast on brown. Tail/wing ratio 0.52 to 0.65. Moderate crest; crown and crest cinnamon-rufous to chestnut, as dark as or (usually) darker than back, the feathers often streaked black basally, rarely checked and streaked with black throughout. Lores chestnut to black; ear coverts and sides of neck chestnut or rufous with or without small black checks. Throat cinnamon to chestnut, but chin often very black, and rear of throat usually checked or barred black; entire throat
sometimes black checked. Underparts cinnamon to chestnut, often appreciably lighter (cinnamon, buff, yellowish cinnamon) on flanks; black bars or chordate wedges, variable in depth, but deepest on chest (which rarely is almost black) and shallower posteriorly; abdomen and thighs, sometimes also flanks, usually sparsely spotted or barred, or even unmarked. Undertail feathers cinnamon to rufous, usually unbarred.

Sexual features: Male has red feathering in the malar area and immediately adjacent border of throat, under eyes, and front edge of ear coverts (rarely red reaches area over eye to its rear). Female lacks red, malar and adjacent areas being colored as ear coverts. Immatures resemble adults, but usually have broader dorsal barring and moderate or extensive black on head, the black often forming a patch around base of bill and usually occurring as checks or bars in much of the crown, crest, ear coverts, and all the throat. The upperparts of immature birds often are paler than in adults. Sexes as in adults, although very young birds may be colored alike, the red of males appearing late in the nestling period. Eyes red in adults. Legs and feet dark green. Bill from greenish white to yellowish green.

Distribution and Habitat. Ranges from south-central Venezuela, the Rio Negro region of northwestern Brazil, and the Amazon region east to Santarem and the Tapajoz River, and northern Mato Grosso west to Beni, Bolivia, eastern Peru, eastern Ecuador, southeastern Colombia, and southwestern Venezuela. Found in lowland primary forest up to an elevation of 2000 feet in most areas, but J. Fitzpatrick informs me that he recently collected specimens on a ridge crest at 1140 meters elevation in southeastern Peru.

Behavior. Little known. Forages in vines and in the upper branches of forest trees by quick tapping and probing, according to P. O'Brien, who observed a female “anting” on a branch in Peru. It picked wood chips or dust or insects from the branch and rubbed the material through its rump feathers, thighs, breast, and wings. Immature birds are known during March for subcervinus (Mato Grosso), May for verreauxi (eastern Ecuador), March for Peruvian grammicus, March to May for Venezuelan grammicus, and June to August for grammicus from Rio Negro, Brazil. Molting occurs during July and August in Amazonian and Madeira River subcervinus, during September in Bolivian and Peruvian latifasciatus, September and October in Peruvian grammicus, June to September in Rio Negro area grammicus, and October to February in southern Venezuelan grammicus.

Taxonomy. Forms a superspecies with C. undatus, with which it is parapatric; the two meet, apparently, along the Rio Negro of Brazil, and they approach each other closely in the lower Amazon region and near the Guiana border of Venezuela. Recognizable subspecies include the wide-ranging grammicus of Venezuela to the Amazon River and of northeastern Peru, verreauxi of eastern Ecuador and adjacent northeastern Peru, subcervinus of Amazonia from the Amazon River to Mato Grosso, and latifasciatus of southeastern Peru to Beni, Bolivia, and the upper Madeira River of Brazil. Celeus grammicus verreauxi closely resembles grammicus but is much less barred dorsally. The subspecies subcervinus resembles grammicus but is rufous-cinnamon to buff on the rump and flanks, lacking the yellow or greenish yellow tint found in grammicus. The most distinct form, latifasciatus, is very pale cinnamon above, with buffy or yellow showing at the feather bases; the rump is paler than in other races, and the back is broadly barred. The putative subspecies undulatus of the Caura River area in Venezuela is based on an unusually small individual (which is matched by several other specimens of grammicus) that has reduced barring, as do about 15 percent of grammicus. The yellow cast of the rump and flanks (Todd, 1937) in this specimen is a common trait of grammicus, and I find that Friedmann (1948) was correct in questioning the validity of undulatus, which I consider a synonym of C. g. grammicus.
CHESTNUT-COLORED WOODPECKER

Celeus [elegans] castaneus

Color Plate 74

Range Summary. Central America.

Diagnostic Features. Small to Medium, weight 80 to 105 grams, wing length 120 to 135 millimeters. Body chestnut or chestnut-rufous with black bars that may be few or lacking on wings and back. Head and crest paler than body, usually buffy cinnamon. Dark tips of wings and tail. Bill pale. Red on face of male.

Description. Bill moderately long, somewhat curved along culmen, barely chisel-tipped, rather narrow across nostrils. Above, chestnut or rufous-chestnut, paling on rump to yellow buffy cinnamon; black bars not fully as wide as feathers, from numerous to few on back, rump usually unbarred or with few spots or bars; upperside covert tips chestnut with dark chestnut to rufous, usually with some black barring on coverts, but none or a few spots or bars on secondaries; below brown tipped with large basal patch cinnamon to (coverts) yellowish in color. Shafts dark brown to rufous, matching surrounding vane color but showing some pale yellow at base of tail; below, cinnamon to horn color, yellowish at base of tail. The tail is chestnut at base with brown to black tip, paler below, rarely with black marks in chestnut or cinnamon areas. Tail/wing ratio 0.59 to 0.69. Head and rather long crested cinnamon-buff to cinnamon, a trifle darker on throat (see Sexual features). Below, chestnut to rufous-chestnut, the feathers with cream-colored to yellow bases that are very large and visible on the flanks (chestnut tips reduced); horseshoe-shaped, chordate, or regular black bars throughout, the bars narrower posteriorly.

Sexual features: Male has broad red malar area and red under eyes, on lores, often about base of bill below and nostrils above, and over eye, the latter extending backward along sides of crest in many birds. Females lack red, entire head uncolored (cinnamon-buff to cinnamon). Immatures as adults but duller, often with less barring on abdomen and showing black barring in the malar region and sometimes the lores and under the eyes. No very young birds seen; sexes may be alike, but male soon shows incoming red feathering of anterior malar area. Eyes reddish brown to brown, skin about eye gray to black. Legs and feet greenish gray to olive. Bill variable, pale green or greenish white to yellowish with a pale tip and a gray, green, or blue base.

Distribution and Habitat. Resident from Veracruz and Oaxaca, Mexico, southward in lowland tropical forests through Central America to northwestern Costa Rica and western Panama. Ranges from sea level to about 2400 feet (Honduras) in elevation, in dense forest (Wetmore, 1968) and forest edges (Slud, 1964).

Behavior. Not well known. Feeds in the middle and upper levels of trees, ranging to lower levels at forest edges. Found alone and in pairs, it prefers thicker branches and trunks than does sympatric C. loricatus (Slud, 1964). Wetmore (1968, p. 541) referred to their “persistent pecking as they worked over the trees.” Slud (1964, p. 188) found that it “regularly clings to foliage as does an arboreal ovenbird, and sometimes it moves sideways along a twig.” He noted it was less common and quieter than was C. loricatus. Wetmore noticed very large salivary glands, usually associated with ant-eating habits. He reported that it damages cacao fruits. Stomach contents include unknown seeds, drupes, ants, “clear-winged insects,” and other insects (from various specimen labels). Wetmore (1968) described
its call as "a low kwar," apparently the equivalent of the "nasal 'skahr' " mentioned by Slud (1964) as being "succeeded on a lower level by a weaker 'heh-heh-heh.' " Slud also described two other calls: "a sharp double squeak" and a "yelped and whistled 'howp' having the quality of the cry of a trogon, such as Trogon rufus" that "may be given at regular little intervals and is usually followed immediately by a snickering little 'riip' or 'rprprp.'" The breeding season is in March to June in Oaxaca, February to August in Guatemala, May and June in Nicaragua, July in Costa Rica, and May to July in Panama. Molt follows breeding, lasting to December in Mexico, October in Guatemala, September in Honduras, from July to January in Nicaragua, until December in Costa Rica, and September or October in Panama.

Taxonomy. Forms a superspecies with C. elegans, C. lugubris, and C. flavescens (Short, 1972a), all of which are similarly patterned South American species. It differs from those species in its ventral barring, the chestnut base of its tail, and the expansive red facial area of males. The species is monotypic.

CHESTNUT WOODPECKER

Celeus [elegans] elegans

Color Plate 74

Range Summary. Northern South America.

Diagnostic Features. Medium, weight 122 to 172 grams, except 94 to 139 grams in leotaudi (french, 1973). Wing length 147 to 173 millimeters, except leotaudi (132 to 145 millimeters). Rufous to blackish chestnut in color except for black tail and wing tips, sometimes yellowish white or cinnamon-cream rump, and cinnamon to cream flanks and underwing coverts. Crown paler than rest of body in some birds. Bill yellowish. Barron on inner secondaries, sometimes expanding to back and wing coverts.

Description. Bill rather short, curved along culmen, slightly chisel-tipped and rather narrow across nostrils. Rufous to sooty or blackish chestnut on back, unbarred or (especially elegans and jumana) with vague to light black bars; sometimes (elegans group) with buff or cream as well as blackish bars and cream streak-spots on shafts; rarely back feathers very yellow based and showing through, giving yellow-rufous color. Rump usually forming a patch of creamy yellow, buffy white, or cinnamon-yellow, occasionally tipped with red, but uncommonly only slightly paler than back with no evident patch (some birds of jumana group). Uppertail coverts variable, but showing some rufous at least at tips and on outer vanes; may be entirely rufous or mostly concolored with rump. Wing flight feathers entirely or mainly rufous to chestnut near body, to mainly blackish brown on outer primaries; primaries with rufous or chestnut bars at base of inner vanes, secondaries with brown bars on inner (occasionally onto outer) vanes; (a few birds lack all barring); the paler bars near bases of feathers often show buffy yellow or creamy white. Coverts as back, darker toward wing edge, sometimes with cream shaft streaks or irregular spots; "wrist" area pale, mixed cream and rufous or tricolor cream, rufous, and brown; underwings brown tipped with yellow or cream to cinnamon patch at base and on coverts, usually showing barring. Shafts rufous or brown above except pale yellow at tail base; below, brown at tail tips, rest dusky to yellow-white, especially showing pale yellow at bases of tail and primary feathers. Tail blackish brown, duskier below; outer (small) tail feathers rufous, rufous and black, or black with rufous bar or streak; one specimen has 13 rectrices, seven on right side. Tail/wing ratio 0.54 to 0.65. Head and short (jumana group) to long (elegans group) crest rufous to chestnut, except crown and
CHESTNUT WOODPECKER

crest buff-cream to cinnamon-buff in *elegans*, cinnamon or yellow-cinnamon in *leotaudi* and *hellmayri*, and sometimes with sooty black about ear coverts and lores (*citreopygius*). Below as dark as or darker than back, rufous to sooty (sometimes a vague green tone) chestnut on throat to undertail coverts (varying in some birds, if so darkest on breast), sometimes with vague black mottling or obscure barring; sides to flanks and thighs cinnamon-cream to yellowish, usually connecting with rump patch (if present), and with no, weak, or moderate black bars on flanks.

Sexual features: Male with broad red malar mark, sometimes also with red traces on forehead, and red edging of rump feathers. Females lack red on face, rarely show red in rump. Immatures as adults, and variable, but usually have underparts mottled with sooty or black or dark chestnut; head shows black about base of bill, lores, chin, under eyes, and sometimes on ear coverts and throat; sexes may be similar initially, male soon showing red incoming malar feathers and, uncommonly, red on forehead, over eyes, and along sides of crest. Eyes reddish brown to red (one immature with “yellow” indicated!). Legs and feet olive to grayish black. Bill dull white with gray about nostrils and base, mainly yellow with greenish at the base, or greenish yellow, darker at the base.

**Distribution and Habitat.** Forested lowlands below 2500 feet elevation from eastern Colombia, Venezuela, and the Guianas south beyond the Amazon River to Maranhão, northern Mato Grosso, Rondonia, northern Bolivia, and southeastern Peru.

**Behavior.** Little known. P. O'Brien reports from Peru that both sexes drum fast and loudly and that paired birds forage together. ffrench (1973, p. 270) reported that it drums loudly from November to February on Trinidad and gives a “harsh, disyllabic squawk, more reminiscent of a chicken or parrot than a woodpecker.” That author regarded it as “noisy” (others have called it quiet) and mentioned its occurrence in groups of up to five, feeding mainly in “the lower branches of forest trees.” Ants, termites, and some fruits, including Cecropia fruits (Haverschmidt, 1968; ffrench, 1973) and various citrus fruits (Bull, personal comm.) are eaten. The few details of nesting behavior are given by ffrench. Breeding on Trinidad is in April and May, the nest being constructed usually in a dead tree, with an opening about 2 inches across and a nest chamber up to 12 inches below the opening. On Trinidad the clutch consists of three eggs. Elsewhere breeding occurs generally from March to July throughout its range, except that I have seen an immature December specimen from the Tocantins River, Brazil. Molt follows breeding; and, as noted by ffrench, it is protracted. Molting on Trinidad occurs from July to November, according to ffrench (1973), but signs of molt are evident in a February specimen; so molt may take place over as much as 8 months. Molting specimens from one locality in Peru (representing *citreopygius*) bear dates in July, August, October, and late December. Otherwise, July to November covers the molting period in Peru, as do June and July in Ecuador (*citreopygius*), September to December in the region about the Amazon River (*elegans* and *jumana*), the Uaupes River, the Rio Negro area, and Venezuela (all these last are *jumana*). However, *jumana* from Para molt during March to May, Tapajoz River birds in June and July, Tefe specimens from May to August, and Madeira River birds from June to September. August to December covers the molting period of *elegans* from the Guianas.

**Taxonomy.** Forms a superspecies with *C. castaneus*, *C. flavescens*, and *C. lugubris* and has hybridized several times with *lugubris* in Mato Grosso (Short, 1972a). Within *elegans* are two distinct racial groups that have been considered separate species. The *elegans* group of easternmost Venezuela, Trinidad, the Guianas, and northeastern Brazil (north of the Amazon) generally is long crested with crown color varying from cinnamon-rufous to nearly
white, but always distinctly paler than the rest of the head. The short-crested *jumana* of Colombia, most of Venezuela, northwestern Brazil, eastern Ecuador, eastern Peru, northern Bolivia, and Amazonian Brazil south of the Amazon to Maranhão and Mato Grosso has the crown concolored with the rest of the (dark) head. Races of the *elegans* group include pale-crowned *elegans* of French Guiana, adjacent Surinam, and northeastern Brazil; darker crowned *hellmayri* (including *approximans*) of eastern Venezuela, Guyana, and most of Surinam; *deltanus* of the Amacuro Delta of Venezuela, the darkest crowned of the *elegans* group, but with the long crest of that group; and very small *leotaudi* of Trinidad. The *jumana* group contains two subspecies: eastern *jumana* (Venezuela, eastern Colombia, northwestern Brazil, northern Bolivia, and Amazonian Brazil south of the Amazon) and western *citreopygius* (eastern Peru, eastern Ecuador). These last two subspecies differ somewhat in color and markings, *citreopygius* being darker (blackier, more chestnut, less rufous), with less yellow in the rump and flanks, and reduced barring in the wings and back. Northern, eastern Venezuelan birds from the Paria Peninsula, separated from *C. elegans elegans* geographically by the subspecies *deltanus*, have a pale crown and crest and show whiter (less yellow) flanks and underwings; they should be studied with more material than I have available.

**PALE-CRESTED WOODPECKER**

*Celeus [elegans] lugubris*

**Color Plate 74**

**Range Summary.** Central South America.

**Diagnostic Features.** Medium, weight 110 to 140 grams, wing length 137 to 152 millimeters. Blonde head with long crest, often brown around eyes, and malar area red (males) or brown (females). Unbarred black to mixed sooty and rufous below. Back barred blonde and rusty brown to black. Rump blonde. Wings show rufous and black bars on secondaries.

**Description.** Bill moderately long, somewhat curved along culmen, slightly chisel-tipped, and rather narrow across nostrils. Back black to rusty or sooty brown with usually narrow blonde to cinnamon-buff bars, sometimes expanded along shafts as streaks; rump blonde to cinnamon-cream or buffy cream; upper tail coverts rufous, usually showing at least some black spots or bars, sometimes heavily barred. Wing coverts as back; flight feathers brown or blackish, becoming barred basally and all barred on inner secondaries, the dark bars being black or brown and the pale bars chestnut or rufous, sometimes showing cream or buff; underwings dull cream or cinnamon at base, becoming brown with pale cinnamon to buffy white bars on flight feathers. Shaft s rufous to black above, dull white at bases below, sometimes with trace of yellow, and horn-brown to brown toward tips. Tail black, duller below, except outer (small) rectrices chestnut or rufous with black bars or spots. Tail/wing ratio 0.56 to 0.64. Head mainly blonde, varying to buffy blonde or even with cinnamon tinge, and long crest; lores, feathers near nostrils, under eyes, anterior ear coverts usually show from traces of brown to strong chocolate-brown coloring with buff edges or tips; throat and chin as head, but sometimes with brown feathering and often with connecting brown from malar area to breast. Underparts vary from sooty black to sooty rufous and may be mixed with narrow edges and shaft bar-streaks colored rufous-chestnut; flanks and sides as underparts, but grading into blonde dorsally, often showing black or black and rufous and cream bars; thighs barred brown and cream to mainly blonde-cream; undertail coverts rufous and black barred, or otherwise marked in these colors.
Sexual features: Male with red malar area, sometimes extending under eyes and occasionally with red flecking in forehead and over eyes to crest. Female lacks red, malar mixed brown and blonde in a scaled or barred pattern. Immatures as adults, but with more black in irregular patches on the head and less even, irregular barring. Eyes dark red to reddish brown or chestnut, legs and feet gray, and bill horn colored or grayish black above and dark ivory below.

**Distribution and Habitat.** From Beni, Bolivia, and central Mato Grosso, Brazil, southward through Paraguay (except far east) to Tucumán, Chaco, and Corrientes, Argentina. Habitat is dry thorn scrub and forests of the chaco and riparian woodlands at low elevations.

**Foraging Habits.** Feeds mainly by probing, gleaning, tapping, and excavating in trees. Most of the last two activities are confined to dead branches and twigs. Once a hole is made into a tunnel occupied by ants, feeding may be entirely by “tonguing” the ants into the bill for minutes at a time with no other movement. Contents of two stomachs were ants (workers, brood, soldiers of as many as three species of Dolichoderus, several species of Crematogaster, and a species of Camponotus [fide W. L. Brown, Jr.]), and it is certain that ants form the primary food of this species.

**Voice.** Drums weakly. The only call known to me is a “wee-wee-week” uttered by individual birds (Short, 1970a, p. 23).

**Breeding.** Almost unknown. Nests apparently are excavated either in trees or in tree-ant nests between 4 and 10 meters off the ground. Breeding occurs from September to November or later in the southern part of its range.

**Taxonomy.** Forms a superspecies with C. castaneus, C. elegans, and C. flavescens. Its pale, dorsal barring, rufous to sooty back, and barred rufous secondaries distinguish it from its allospecies. Several hybrids are known with C. elegans in Mato Grosso, and there are two birds representing possible hybrids of C. lugubris x C. flavescens, but hybridization is not extensive (Short, 1972a). There are two subspecies of C. lugubris: slightly larger and blacker kerri of Paraguay and southernmost Mato Grosso southward and smaller, more rufous lugubris of west-central Mato Grosso and eastern Bolivia.

**References**

**BLOND-CRESTED WOODPECKER**

*Celeus [elegans] flavescens*

**Color Plate 74**

**Range Summary.** Eastern South America.

**Diagnostic Features.** Medium, weight 165 grams (*flavescens*), wing length 133 to 165 millimeters. Creamy white to cinnamon-buff, long crest and head. Barred black and white to cinnamon above. Underparts black or sooty, sometimes with fine rusty, buff, or white edges; flanks barred, “thighs” pale. Tail black, bill blackish.

**Description.** Bill moderately long, almost pointed, curved along culmen, and moderately narrow across nostrils. Variable in size and color. Above, black with narrow white bars (*flavescens*), white to buffy white with narrow, irregular black bars (*intercedens*) or buffy to
Celeus [elegans] flavescens

cinnamon with variable black chordate spots (ochraceus); rump buffy or creamy white to
cinnamon, varying racially; uppertail coverts black with pale bars. Wings black with narrow
white bars, strongest on coverts and secondaries (flavescens) to black on primaries with bars
and cinnamon or buff with black spot-bars or bars on secondaries and coverts (ochraceus;
ochraceus and intercedens sometimes show rufous on secondaries and inner primaries).
Underwings paler with unmarked buffy or creamy coverts. Shafts black or dusky above
except whitish at tail base and pale where pale bars cross flight feathers; dusky below,
becoming white at bases. Tail black, duller below; outer (small) rectrix black with edging or
bars that vary from white to buff (never rufous). Tail/ wing ratio 0.56 to 0.65. Head and
long crest white, cream colored, buffy, or cinnamon (last two in ochraceus), except for
malars (see Sexual features) and for few spots of black in lores, although ochraceus some-
times shows black more extensively about eyes, approaching C. lugubris. Underparts from
hindthroat (where connecting with malars) to abdomen colored black (flavescens and
intercedens) or sooty (ochraceus), rarely with faint white edges in flavescens and more
frequently with buffy or cinnamon edges in ochraceus. Flanks black to sooty but usually
showing slight to strong barring (white in flavescens to cinnamon-buff in ochraceus); thighs
white to cinnamon, often spotted black; undertail coverts as underparts, but usually edged
white or buff.

Sexual features: Males with red malar, sometimes expanded to area under eyes. Females
lack red, have malars black-streaked on white to cinnamon background. Immatures duller,
with more black on head, race for race (ochraceus sometimes with most of head brownish
black). Eyes reddish brown to red; legs and feet bluish gray; bill blue-gray to black, paling to
grayish white below.

Distribution and Habitat. From the lower Amazon River (south side) and Tocantins River,
Para, and Maranhão southward and southwestward through eastern Brazil to the eastern
border of southern Mato Grosso, easternmost Paraguay, Misiones, Argentina, and Rio
Grande do Sul, Brazil. Habitat lowland and hill forests and woodlands, including dry scrub
of caatinga.

Behavior. Almost unknown, but presumed to be very like C. lugubris (see p. 402). Speci-
men labels indicate ants and fruits (unidentified) as dietary items. Breeding occurs in Octo-
ber and November in the southern part of the range (flavescens), but in April to June in
Piauhy and Maranhão (ochraceus). Molting birds are known from May to July in Maranhão
and Bahia, in November along the Amazon and in Ceará (all ochraceus), May to October in
Bahia and Minas Gerais (intercedens), and April to June in São Paulo, Parana, and Santa
Catarina (flavescens).

Taxonomy. Forms a superspecies with C. castaneus, C. elegans, and C. lugubris (see pp.
398–402). This species differs from the others in its dark bill, black plumage, black (lacking
rufous or chestnut) outer tail feathers, little or no rufous in the wings, strongly barred back,
and very pale head. It meets C. lugubris in Paraguay and perhaps Mato Grosso with little or
no hybridization, although the contact area is poorly known. Slight overlap occurs between
C. flavescens and C. elegans in the lower Amazon region, and no hybrids have been found
(Short, 1972a). Three races of C. flavescens are recognized: Large, black and white flavescens
occurs in Parana, eastern Paraguay, and Brazil south from São Paulo and Rio de Janeiro.
Considerably smaller (all measurements, little overlap), more cinnamon and buff ochraceus,
which has very reduced dorsal markings, occurs in the lower Amazon region, Maranhão,
Ceará, Piauhy, and eastern Bahia. This form approaches C. lugubris in size and in its rufous
tendency, but it has the outer rectrix color, bill color, and other patterns of C. flavescens.
These two distinct subspecies are connected by *intercedens*, intermediate in size and dorsal barring and with some of the rust tinge of *ochraceus*, but generally black and white like *flavescens*. This race is found in Goias, Minas Gerais, western Bahia, and the fringes of adjacent Brazilian states. I recognize it, despite its intermediacy, because it appears somewhat stabilized and because *flavescens* and *ochraceus* appear to intergrade directly over a short distance in southeastern Bahia and Espirito Santo without an intervening, stable intermediate (“*intercedens*”) population.

**CREAM-COLORED WOODPECKER**

*Celeus flavus*

**Color Plate 75**

**Range Summary.** Northern South America.

**Diagnostic Features.** Medium size, weight 95 to 131 grams (Surinam, Brazil, Ecuador), wing length 132 to 151 millimeters. Mainly cream colored, yellowish white, or buffy white (never pure white as in *Melanerpes candidus*) with rufous to brown wings and a blackish tail. Males with red “moustache.” Some birds show brown markings on breast, head, or back.

**Description.** Bill strongly curved with sharp edge of culmen, slight chisel-tip, rather narrow across nostrils. Head, neck, back, rump, tail coverts, and underparts cream colored, pale yellowish, or buffy to cinnamon white (these have been called color phases, but intermediate colors are observed); often several brown feathers are visible on the head, breast, or upper back, the bases of which are brownish in many birds; buffy white-tipped feathers with broad brown centers and bases are usually found on the upper back and breast of *subflavus*. Pale feathers of head and body often soiled or discolored. Wings very variable; some birds have upperwings almost entirely brown with cream or buff inner secondaries; flight feathers usually blackish brown with large buffy to chestnut patch on inner vane or (inner secondaries) mainly to entirely cinnamon rufous. Primaries paler on outer vanes when not edged with rufous or chestnut. Inner secondaries rarely with brown bar or two. Upperwing coverts brown, brown based with cream or buff tips, or (*tectricialis*) mainly buff, cream, or yellowish. Underwing brown with base creamy to cinnamon-buff. Shafts brown to black above, duller below with pale center and bases, latter sometimes yellow. Tail entirely blackish brown, occasionally with pale bars in outer (small) feather. Tail/wing ratio 0.58 to 0.71.

Sexual features: Male has red, or occasionally red with some black, malar patch (feather bases pale, giving streaked effect). Female lacks red, malar concolored with rest of head and body. Immatures resemble adults but tend to be buffy or cinnamon-buff in color; inner flight feathers often partly barred. I have not seen very small (nestling) birds, but it appears that young males resemble females but early begin to show some red spotting in the malar area. Eyes brown (possibly subadult birds), reddish brown, or red. Legs and feet gray to green. Bill yellow to yellowish green.

**Distribution and Habitat.** South America from eastern Colombia, Venezuela, and the Guianas south through eastern Ecuador, eastern Peru, and Amazonian Brazil to Beni, Bolivia, and to Mato Grosso and Espirito Santo, Brazil. Frequents lowland forests, savannas, mangroves, and coffee plantations (Haverschmidt, 1968).

**Behavior.** Poorly known. According to Haverschmidt (1968, p. 215), favors lower heights in trees for foraging and seems “less solitary than other woodpeckers.” Haverschmidt (1968) rendered its laughing call a “Huuu huuu,” and Snyder (1966, p. 158) mentioned two calls:
Celeus spectabilis

405

a "Wutchuk—kee-hoo-hoo-hoo," and also a "Kiu-kiu-kiu-kiu." In Peru, P. O'Brien found
them always in pairs or trios, the paired birds feeding side by side. She reported one call as
a "wheet wheet wheet," each note upslurred. Immature birds date from May to July in parts
of Venezuela and the Guianas, but a young male from Altagracia, Venezuela, was taken
4 December. July immatures represent northwestern Brazil. The annual molt is prolonged.
Amazon River birds molt from August to January, Madeira River birds molt in June to
October, and Tapajoz River woodpeckers molt in May to August. A molting Bolivian bird
was taken 22 July. Molting specimens from Peru represent dates from August to November.
November to January covers the molting period in the Guianas. Venezuelan birds generally
are in molt from October to December, but specimens from Maripo and Caicara collected
during April and May are molting. The subspecies tectricialis molts from August to October.
Breeding presumably precedes the molting period in these areas.

Taxonomy. This species has no very close relatives. The Celeus elegans group probably
includes its nearest extant relatives. This species is very variable; and, recognizing this fact,
it seems futile to attempt to delimit numerous subspecies. Traylor (1958) mentioned yellow
and buff color phases, but he also recognized intermediate specimens, and it seems rather
likely that there simply is great individual variation. I recognize four subspecies, with a vast
area populated by intermediates existing among three of them. Northern South America
generally is inhabited by C. f. flavus, which has strong rufous coloring in the flight feathers
of the wings. Eastern Peru is occupied by slightly larger C. f. peruvianus, in which the rufous
of the wings is entirely or almost entirely replaced by brownish or, on the inner secondaries,
by yellowish cream. Maranhão, Brazil, is inhabited by C. f. tectricialis, about the size of
flavus but with very reduced rufous in the wings (approaching peruvianus) and with wing
covers mixed brown and cream or entirely brown. The Tocantins River area is populated
by woodpeckers closely resembling tectricialis, but tending somewhat toward flavus. The
intervening area among these races is a zone of intergradation, that is, between flavus and
peruvianus in northwestern Brazil, northeastern Peru, eastern Ecuador, and adjacent south-
eastern Colombia; between flavus and tectricialis south of the Amazon in eastern Brazil
("inornatus"); and among tectricialis, flavus, and peruvianus south of the Amazon in western
Brazil. There is an intrusion of flavus influence south of the Amazon along the Madeira River
and to Bolivia, this area being geographically far from tectricialis and peruvianus. I do not
recognize inornatus of the lower Amazon region ("this race is phenomenally variable"
[Griscom and Greenway, 1941, p. 205]), as the population involved is variable and inter-
mediate between tectricialis and flavus. Bahia and Espírito Santo form the range of C. f.
subflavus, an apparently geographically isolated subspecies characterized by large size,
absence of rufous and cinnamon in the wings, mixed brown and cream wing covers, and
a strong intrusion of brown on the upper back and breast.

RUFIOUS-HEADED WOODPECKER

Celeus spectabilis

Color Plate 75

Range Summary. South America.

Diagnostic Features. Medium, weight 111 grams (exsul), wing length 136 to 153 milli-
 meters. Rufous or rufous-chestnut head (males with red malar area and both sexes may show
red in crest) and long crest, sharply set off by pale neck and black rear of throat. Barred to
nearly unbarred with black patch on breast, all black tail and rufous-chestnut flight feathers of wings.

**Description.** Bill lightly curved along culmen, moderately broad across nostrils, and chisel-tipped. Geographically variable in barring and size. Above, barred black and buffy to cinnamon-cream, the black bars broader generally in *spectabilis*, more or less equal to pale bars or bar-spots in *exsul*, and nearly obsolescent in buffy cream-backed *obrieni*; rump and uppertail coverts unmarked (or few black streaks) cinnamon or cinnamon-buff. Wing coverts heavily barred black and cream (black bars broader, but chordate and smaller in *obrieni*); primaries brownish black with rufous base becoming larger on inner feathers; secondaries rufous to chestnut with broad to narrow black tip, but tertial feathers partly black and cream barred (tertials buffy cream with irregular black spot-streaks in *obrieni*). Underwing coverts cinnamon to buff with black bars or (*obrieni*) unmarked; rest of underwings cinnamon to rufous with brown tips. Shafts blackish brown, rufous, or buffy (matching color of vanes) above; paler below, especially on wings, where dull whitish in brown areas, cinnamon in rufous areas. Tail black, paler below; outer (small) feather mainly black with few or no pale bars, or (*obrieni*) buffy cinnamon with black markings. Tail/wing ratio 0.60 to 0.71. Head and crest cinnamon-rufous to rufous-chestnut, including long crest (see Sexual features). Rearmost throat black; side of neck with unmarked buffy cream area, even in heavily barred birds; hindneck barred or (*obrieni*) cream colored. Underparts variable, but always with large black area on breast; the black patch gradually gives way to heavy barring posteriorly in *spectabilis* but shifts abruptly on the breast to chordate barring in *exsul* and *obrieni*; lower breast to undertail coverts heavily barred, but bars narrower and more chordate posteriorly (even spotlike on tail coverts) in *spectabilis*, markings restricted to chordate barring on midbreast with some abdominal spots and flank bars in *exsul*, and markings very reduced (few bars near black breast patch) in *obrieni*, which is almost immaculate cinnamon-cream colored below.

Sexual features: Male with broad red malar area and red variably from over eyes posteriorly into crest, there mixing with rufous coloring. Female lacks red in the malar area and lacks red or shows traces of red (much less than in males) in the sides of the crest. Immatures show black about the base of the bill (forehead into crown, lores, chin, area around eyes except at rear, and extending in some cases along malar area to breast); they show more red on the head, sex for sex, than adults; it is not known if males have a red malar area or resemble females in lacking it. Eyes brown, legs and feet olive-green to grayish green. Bill pale yellowish olive (may be more yellow in *obrieni*) or ivory-olive, darkening to grayish at base; seems generally darker in immatures.

**Distribution and Habitat.** Eastern Ecuador and eastern Peru to northern Bolivia (Beni, Cochabamba), and also in western Piauhy, Brazil. Apparently somewhat rare, as it is known from fewer than a dozen localities. Found in lowland forests up to an elevation of 1000 feet, the habitat varying perhaps from wet forest to seasonally dry forest (Yarinacocha, Peru, and Piauhy, Brazil).

**Behavior.** Almost unknown. One report of its habits was provided by O'Neill (1969, p. 6), who found that Rufous-headed Woodpeckers work alone or in pairs, tapping occasionally as they "carefully go over a limb or palm leaf in search of food." At Yarinacocha it feeds in middle and upper levels of inundated forest (O'Neill and Pearson, 1974). P. O'Brien found that it feeds low in dense woods, tapping rather loudly as it feeds and quickly darting into undergrowth when disturbed. She observed one bird foraging on a fallen log. The breadth across nostrils of specimens suggests that it pecks and taps more than most species of *Celeus*
(except *torquatus*). Immature birds are known from eastern Peru (Kusuí, Amazonas) during August and from eastern Ecuador (Conambo River) during November. Molting eastern Peruvian birds represent the months of November and March.

**Taxonomy.** Relationships within *Celeus* are unclear, but I suggest (Short, 1973e) that it may be related to the *elegans* group and to *C. torquatus*. *Celeus loricatus* possibly is another rather close relative. There are three subspecies: *spectabilis* of eastern Ecuador and northeastern Peru; *exsul* of southeastern Peru and northern Bolivia; and *obrieni*, known from one specimen from Uruçuí, Piauhy, Brazil. *Celeus s. spectabilis* and *exsul* intergrade in northern Loreto and Amazonas, Peru. These two races are similar in size but differ in pattern, *exsul* being less strongly barred dorsally and much less marked on the lower breast and abdomen, whereas *spectabilis* is heavily barred above and below. *Celeus spectabilis obrieni* is less marked even than *exsul*, showing only a few bars on its (upper) back and several bars on the breast, but otherwise having an immaculate lower breast, abdomen, and undertail coverts. There are other color differences, such as the pale tertials of *obrieni* (see earlier Description), and *obrieni* is smaller (shorter wings, tail, tarsus, and especially bill) than *exsul* and *spectabilis*.

**RINGED WOODPECKER**

*Celeus torquatus*

**Color Plate 76**

**Range Summary.** Northern South America.

**Diagnostic Features.** Medium, weight 107 to 124 grams (*torquatus*), wing length 145 to 161 millimeters. Moderate crest, buffy to cinnamon head paler than back. Black breast patch. Rufous wings and back with bars strong to nearly absent; abdomen unbarred or barred. Tail barred black and rufous.

**Description.** Bill almost straight, chisel-tipped, and moderately broad between nostrils. Above, chestnut-rufous to rufous, unmarked except for black upper back in *torquatus*, but weakly to strongly barred black in *occidentalis* and very heavily barred black in *tinnunculus*. Wings with blackish brown tips of primaries and alular feathers; rest of primaries barred black and rufous; coverts unmarked rufous to heavily black barred in barred-backed races; secondaries rufous with small bars in *torquatus*, moderate bars in *occidentalis*, and heavy bars in *tinnunculus*. Underwings with brown-tipped primaries and cinnamon patch on coverts and base of flight feathers, barred weakly (*torquatus*) to strongly (*tinnunculus*). Shafts chestnut to black above (pale at base of tail), cinnamon to black below. Tail with black tip, rest barred rufous and black, the black bars narrow in less barred races, broad in *tinnunculus*, which has outer tail feathers nearly all black. Tail/wing ratio 0.59 to 0.67. Moderate crest and entire head (see Sexual features) cinnamon-buff (*tinnunculus*) to rufous-cinnamon, except black at rear of throat (variably extending to midthroat), and black on hindneck and sides of neck (*torquatus, tinnunculus, some occidentalis*). Below, black patch on breast and rear of throat, sharply set off from immaculate buffy cinnamon rear of breast and abdomen in *torquatus* but breaking up into heavy black barring on rear of breast, to narrower bars (even reduced, forming large cinnamon areas in some) on abdomen, flanks, and undertail coverts in other races. Abdominal background varies from buff to rufous-cinnamon.

Sexual features: Males with red malar patches, also occasionally showing red in sides of
crest and on lores and forehead. Females lack red coloring. Immatures resemble adults but are more barred race for race, have black of the throat continuing to the bill, and show black on the lores, forehead, malar area, and about the eyes (males may initially resemble females, but no very young birds seen). Eyes reddish brown to red. Legs and feet dark gray. Bill gray, darker above, paler (to grayish white) below, to greenish yellow (Haverschmidt, 1968).

**Distribution and Habitat.** From eastern Colombia, Venezuela, and the Guianas southward east of the Andes to eastern Peru, northern Bolivia, and Amazonian Brazil south to Mato Grosso and Maranhão; also an isolate in Bahia, eastern Brazil. Frequents lowland forests, reaching an elevation of at least 1400 feet.

**Behavior.** Almost unknown. Reported as feeding on ants by Haverschmidt (1968); its strong, rather straight bill suggests that it pecks and perhaps excavates to some extent. Young are known during September in eastern Brazil. Molting birds date from April and May in Peru and from October in Venezuela (occidentalis), September along the Amazon (occidentalis), August to October in Venezuela (torquatus), and December to March in the Guianas (torquatus).

**Taxonomy.** Probably related most closely to *C. spectabilis*, which resembles it in several features of color pattern as well as bill structure. Three races seem recognizable: *torquatus* of eastern Venezuela, the Guianas, northeastern Brazil north of the Amazon, and Para south of it; *occidentalis* in southern Venezuela, western Brazil, eastern Peru, northern Bolivia, and central Amazonian Brazil; and *tinnunculus* in Bahia. *Celeus t. torquatus* is distinct because of its unmarked lower breast and abdomen and its nearly unmarked or unmarked back and rump, as well as a complete black ring from the breast around the neck. The race *occidentalis* is moderately to heavily barred below and shows variation in dorsal barring and in the extent of black, if any, on the upper back and hindneck. Considering the strong differentiation among the three subspecies treated here, "angustus" of the Tapajoz-Madeira river area is not distinctive, only tending to be less barred above than typical *occidentalis*, and I do not recognize angustus. Isolated *tinnunculus* is generally barred, approaching *occidentalis*, but its barring is much stronger, rendering this form blacker, the head is paler, and its outer tail feathers are mainly or entirely black, not rufous with black bars as in the other two races. Intergradation of *torquatus* and *occidentalis* occurs in the vicinity of the Xingu River, Brazil, and presumably in northern Brazil and Venezuela. Other than in these several plumage features, in which the forms are distinctive, I find no trenchant differences among them.

**Tribe Campephilini**

**Genus Dryocopus Boie**

There are six species occurring throughout the Americas, Europe, and Asia. All are black or brown and white, generally with a white wing patch and a strong (usually) to weak (*martius*) crest. The bill varies greatly, from somewhat curved along the culmen, narrow, and pointed, with bare nostrils (galeatus) to broad and straight with feathered nostrils and a chisel-tip. The tail is long and relatively specialized, concave below, and the central pair have
Dryocopus galeatus

elongated tips. The fourth toe is as long as the anterior toes, and the hallux is half the length of the fourth toe. Bark scaling is a major feeding mode. Sexual dimorphism involves both the crown (males with red or more red, females with less or no red) and the malar (red in males, black in females).

HELMETED WOODPECKER

Dryocopus galeatus

Color Plate 72

Range Summary. Eastern South America.

Diagnostic Features. Medium to Large, wing length 161 to 174 millimeters. A black and white woodpecker with a large red crest, buff and black barring on the face, a cinnamon throat patch, a white stripe along the sides of the neck, unbarred black wings with a cinnamon wing patch, and black and white barred underparts. The rump and long uppertail coverts are buffy white. Most of bill ivory colored. Male with red malar area. Possibly endangered.

Description. Bill moderately long, curved (more so than other congeners) along culmen, slightly chisel-tipped, moderately broad across nostrils, which are not covered by feathering of nasal tufts. Black or brownish black on upper back, giving way on midback, usually with a few cinnamon- and black-barred feathers at the border, to buff or cinnamon-tinged, creamy lower back, rump, and uppertail coverts; few black bars at times on rump; uppertail coverts unusually long, over half the length of the tail. Wings mainly brownish black, bearing large cinnamon or rufous-cinnamon patch formed at inner bases of flight feathers; below, dusky brown with large pale cinnamon patch on coverts and inner wing, coverts with sparse to moderate black bars. Shafts brown to black dorsally, duller below, paling to brown at base of tail and becoming yellowish cinnamon in bases of wings where cinnamon patch occurs. Tail fully black, duller below. Tail/wing ratio 0.65 to 0.73. Unmarked cinnamon or rufous-cinnamon on gular area and forethroat, giving way on hindthroat to black, with few cinnamon- and black-barred feathers where shift in pattern occurs. Nasal tuft area to lores rufous-cinnamon, sometimes extending partway under eyes; most of area under eyes (see Sexual features) and central and lower ear coverts are cinnamon or rufous-cinnamon with fine black bars. Moderately broad bare area around eyes, skin color unknown. Forehead cinnamon-rufous anteriorly, grading into red posteriorly; top of head red from forehead to long nuchal crest, extending onto dorsal and posterior ear coverts and to lower sides of neck. Crown feathers with buffy cinnamon bases and black shafts basally; these show through in some birds. White or cinnamon-tinged white stripe from lower rear of ear coverts along neck to sides of breast (in males, may be obscured by red anteriorly). Anterior breast to rear of throat black, but showing some cinnamon spots or bar-spots anteriorly (on throat portion of black) and spot-bars posteriorly that grade into fully barred midbreast; breast to undertail coverts, including flanks and sides, barred black on cinnamon-buffy white background; black bars deepest on breast, narrower posteriorly.

Sexual features: Sexes similar in size. Females average slightly longer wings and tail; males with slightly longer, wider bill and slightly longer tarsi. Males have red malar area underlain with fine cinnamon and black bars at feather bases, the red extending from the malar to encroach upon the region under the eyes (sometimes red reaches lores); the lower anterior ear coverts; the sides of the throat (red occasionally extends across throat in region
where cinnamon anterior throat borders black rear of throat); and, around rear of ear
covers, connecting with red of crest along sides of neck. The females lack red in the malar
and adjacent regions, the entire side of the head, including the malar, being barred cinnamon
and black. Immatures are more brown, with less extensive red on the crown; other features
remain to be determined. The eyes are brown; the legs are grayish black; and the bill is ivory
tipped, becoming gray or blue-gray at its base.

**Distribution and Habitat.** Found from Parana, and São Paulo south through Santa Catarina
to (at least formerly) Rio Grande do Sul; inland to the upper Parana River of eastern
Paraguay and northern Misiones, Argentina. Rare, possibly endangered, no specimens or
reports since 1958. Its habitat has not been discussed or reported but seems to occur in
primary forests of southeastern Brazil; it is known from elevations up to at least 2500 feet.

**Behavior.** Unknown. This is certainly the least known of all true woodpeckers. Apparently,
it is so rare that it should be sought, and information obtained about it so that it might be
saved from extinction, if indeed it is not already extinct. I know of no more than 25 extant
specimens of this woodpecker. The molt is in April to July, suggesting a breeding season
perhaps from November through February.

**Taxonomy.** Beautifully intermediate between *Celeus* and *Dryocopus*, thus connecting the
two genera. Its very black and ventral barred pattern, whitish neck stripe, unbarred wings
and fully red crown and crest resemble those traits of *Dryocopus*; its curved weaker bill
tends toward *Celeus*; and its cinnamon wing linings and very long, white uppertail coverts,
throat-breast pattern, barred face, expanded malar red area in the male, and exposed nostrils
tend toward *Celeus*, or are features of *Celeus* (*C. spectabilis* especially resembles *D. galeatus*).
It would appear to be most closely related to *D. lineatus* and *D. schulzi*. Monotypic.

**BLACK-BODIED WOODPECKER**

*Dryocopus [pileatus] schulzi*

**Color Plate 77**

**Range Summary.** South-central South America.

**Diagnostic Features.** Medium to Large, wing length 167 to 186 millimeters. A red-crested,
black woodpecker, rarely showing some white barring below. Malar stripe red in males, black
in females, bordered by white line under eye and grayish white throat. Yellow patch on
lores, blackish gray ear coverts. White line on sides of neck; white scapular line present or
absent. Bill pale, eyes dark.

**Description.** Bill long, broad across nostrils, straight along culmen, with small chisel-tip.
Polymorphic, showing white line on scapular area that connects with white of sides of neck
(most northern birds), or lacking white scapular line (most southern, one quarter of northern
birds), or white partially marking the scapular feathers (5 to 10 percent of all birds). Black
upperparts, wings, tail and underparts, except for (1) white of scapular line, when present;
(2) white patch on bases of wing flight feathers; (3) underwing coverts and axillar feathers
white to creamy or yellowish white, marked on bend of wing by an irregular, usually large
(variable, sometimes nearly lacking) black blotch; and (4) white tips of tail in some wood-
peckers in fresh plumage. (5) In addition, 40 percent of specimens show some indication
(from traces to moderate bars) of pale yellowish white barring ventrally, usually as narrow
bars on flanks and abdomen; but, less commonly, there is narrow barring on sides (the most
ventrally barred specimen has barring across the abdomen, flanks, and lower sides, but those
regions mainly are black, the pale bars being on the tips of the feathers). Shafts black, duller below, but white at bases of primaries and secondaries (where white patch is located). Tail with central two feathers elongated, narrow, especially rigid; tail/wing ratio 0.62 to 0.70. Crown to long crest, red, with white basally, sometimes showing through. Nasal tufts usually long, covering nostrils, colored yellowish or yellow-white, but sometimes inner feathers are blackish; long line from nasal tufts through lower lores, under eye, expanding onto sides of neck (and to scapular line, when present), the line white except for yellow anterior portion (lores, nasal tufts). Black line above yellow of lores, to eye skin; narrow white line behind eye, between red crown and dark ear coverts; and, the ear coverts are blackish gray, often showing white flecks. The rear of the malar is black and connects with black of breast and across lower throat, setting off grayish white anterior throat-gular patch; this patch varies from immaculate, nearly pure white to dirty gray with or, usually, without fine black streaks that probably are not visible in the field.

Sexual features: Males barely if at all longer winged and longer tailed than females, with slightly longer (2 to 3 percent) tarsi and a 6 to 8 percent longer bill; males have red of crown extending over forehead to base of bill and nasal tufts, as well as red malar (anterior and central malar only; rear is black). Females lack red on malar and forehead, having black malar and black forehead (forehead may show fine white spots at junction of crown red). The black of the plumage tends to fade to brownish black with wear. Immatures browner, less black overall, more often showing barring on flanks and sides, and often with fine white spots on the forecrown. Sexes nearly as adults: males with moderate to strong malar red and with red to forehead, and females without red in those areas. Eyes brown or reddish brown according to specimen labels and the colored plate in Dabbene (1915, plate I), thus differing from *D. lineatus*. Legs and feet deep gray. Bill pale ivory with gray along culmen, edges, and at base, overall considerably paler than that of *lineatus*.

**Distribution and Habitat.** Dry woodlands from the chaco of western Paraguay and immediately adjacent southeastern Bolivia south through the western chaco of Salta, Santiago del Estero, and Chaco (unreported for Formosa), to Córdoba and Tucumán. It frequents dry portions of the western and central chaco (Short, 1975a, p. 251), extending into the lower dry subtropical forest in the fringe of Bolivia (Chuquisaca, Tarija), Salta, and Tucumán, reaching an elevation of about 1000 feet. It may contact *D. lineatus* in the eastern chaco (eastern Paraguayan chaco, eastern Chaco Province) and in the southwestern chaco (Tarija).

**Behavior.** Essentially unknown. I know of no information about its nesting or foraging or anything of its displays. Breeding occurs in October and November, with molt following nesting, in February to April.

**Taxonomy.** Forms a superspecies with Nearctic *D. pileatus*, which it resembles in its black plumage, and with *D. lineatus*. Differences from *lineatus*, other than its generally unmarked black underparts are: It has grayer ear coverts; it has long, yellowish white nasal tufts; its bill is paler; its underwings usually have a strong black mark (this usually is lacking in *pileatus* and *lineatus*); and there is a white line over its eye. Also, *schulzi* is shorter winged by 10 percent than *D. lineatus* erythropus, but is only 5 percent shorter winged than adjacent (Bolivian, Mato Grosso) *D. l. lineatus*; the tail, bill, and tarsus are shorter in *schulzi* as well. Extreme birds of the two species overlap in wing length (between 180 and 186 millimeters); and overlap is considerable in tail, bill, and tarsal length. Unusual are the facts that *D. Schulzi* is polychromic, birds lacking the white scapular stripe and those having it occurring in the same populations, immediately adjacent geographically to *D. l. erythropus*, the southernmost subspecies of *lineatus*, and that form also shows the identical polychromism. Some authors
have considered that *D. schulzi* itself may be a color phase of *D. lineatus*, but its discrete geographic range; small size (adjacent to large *D. l. erythrops*); pale bill; black underwing mark; pale, long nasal tufts; and other characters indicate that it is a distinct taxon. Whether or not it is specifically distinct from *lineatus* is a moot point, for *schulzi* seems to be rare, or rather rare, and studies have not been undertaken in areas of potential contact with *D. lineatus*. It appears to meet *lineatus* (1) in the lush (compared with farther west) eastern chaco woodlands just west of the Paraguay River in Paraguay, and in the same woodlands west of the Parana River in eastern Chaco Province, Argentina; and (2) in the subtropical dry forests at the western edge of the chaco in Tarija, Chuquisaca, and possibly Santa Cruz, Bolivia. Definite hybrids are known from Las Palmas and Rio de Oro, Chaco, Argentina (females in Museum of Comparative Zoology and Stockholm Museum, respectively); Lapachio, 110 kilometers west of Concepción, chaco of Paraguay (male, Stockholm); and Villa Montes, Bolivia (male, Academy of Natural Sciences of Philadelphia). Furthermore, *Dryocopus* “erythrops” *fulcitus* of eastern Chaco Province and *D. schulzi major* of the same area seem to refer to hybrids of *schulzi* and *D. l. erythrops* or to *erythrops* introgressed toward *schulzi*. These birds, and the hybrids just noted, are intermediate between *D. lineatus* and *D. schulzi* in measurements; all show some to strong black under the wings; the bills are either intermediate or resemble *schulzi*; the underparts are variously intermediate (from essentially all black with a few bars on sides to mainly barred, but with black extending toward the abdomen from the breast more than in *lineatus* and with the black bars considerably broader than in *lineatus*); the nasal tufts resemble those of *schulzi* or are intermediate; the ear coverts are gray-black; and the throat is either obsolesently marked as in *schulzi* or the marks are very fine (intermediate). The Villa Montes hybrid (discussed as a “puzzling” *D. l. lineatus* by Bond and Meyer de Schauensee, 1943, p. 218) lacks white in the scapulars in an area where the black morph (*erythrops*) of *D. l. lineatus* does not occur, and it seems black on the scapulars as a result of *schulzi* genetic influence. The Lapachio hybrid is white on the scapulars – both white and black morphs of *D. l. erythrops* occur in Paraguay adjacent to where it was taken (and, of course, *schulzi* has a white morph anyway, so this trait could come from either or both parents). The Chaco, Argentina, hybrids and “fulcitus” and “major” from that Province are of the black morph. The extent of hybridization is uncertain but appears not to be so pervasive as to involve massive introgression, so tentatively I maintain *D. schulzi* as a species apart from *lineatus*. Its resemblance to allied, northern *D. pileatus* is remarkable and parallels the situation in *Campephilus*, in which “ivorybills” have evolved in both temperate extremes (*magellanicus* in southern South America, the *principalis* superspecies in North America) from tropical ancestors. I regard *D. schulzi* as monotypic, since black and white (scapular region) morphs occur together in all populations. Southern birds (“shiptont”) are smaller than those from the northern chaco, but the difference (about 5 to 7 percent in wing, tail, and bill length and virtually no difference in tarsal length) seems trivial and variation is clinal. As noted, *D. s. major* represents *schulzi* × *erythrops* hybrids, and so cannot stand nomenclaturally.

**LINEATED WOODPECKER**

*Dryocopus [pileatus] lineatus*

**Color Plate 77**

**Range Summary.** Middle and South America.

**Diagnostic Features.** Medium to Large, 136 to 264 grams (136 to 181 grams in *similis*,...
186 to 228 grams in lineatus, 164 to 190 grams in fuscipennis, and 216 to 264 grams in erythrops), wing length 159 to 210 millimeters. A red-crested, black woodpecker with a pale and black barred abdomen, a white patch in the wings, a pale, black-streaked throat, and a white stripe along the side of the neck (usually leading to the bill, under the eye). Black ear coverts; malar patch red in males, black in females. Differs from Campephilus species by distinct malar patch and discrete red (never partly black) crown and crest, the red not extending onto sides of head or throat.

Description. Bill long, slightly curved along culmen, broad across nostrils, and chisel-tipped. Entirely black or brownish black above from hindneck to tail; wings also brown to black (tips of primaries often white in fresh plumage), with yellowish white, white, or buffy white on bend of wing, and a patch of that color formed at the inner bases of the flight feathers; a scapular white line is present in all but a few lineatus, and is absent in erythrops. Underwings grayish black to brown with large white to buffy white patch formed by coverts and bases of flight feathers; occasionally with small- or, rarely, with moderate-sized black mark inside bend of wing (approaching condition of D. schulzi). Shafts above from black, paling to brown at the bases, to brown in part of tail, and whitish to dusky at bases of tail and throughout wings (in fuscipennis); below, white at bases, dusky to brown at tips, almost all white in fuscipennis, with some trace of yellowish. Tail black; browner below, often with pale yellow-brown sheen (especially fuscipennis) on outer rectrices. Tail/wing ratio 0.59 to 0.72. Ear coverts slaty gray to blackish, sometimes bordered above by very fine white mark behind eyes (often lacking) and bordered below by a white line from sides of neck under eye to lores, becoming yellow on lores and edge of nasal tufts (scapularis has white line much reduced, or obscured). Crown to long crest red, often showing gray bases; hindnape black; sides of neck with white stripe connecting to subocular line and with scapular white stripe (in all but a few lineatus and in erythrops). Nasal tufts black centrally, yellowish laterally, usually not obscuring all of nostrils; rear of malar gray-black in line to breast; throat variably white with fine streaks (rarely obscure), to mainly black with streaks on buffy white gular. Breast sooty black (fuscipennis) to black, variably extending to belly in a few, scattered lineatus and erythrops (and in hybrids of these and D. schulzi, see p. 410); flanks and abdomen white to buffy (especially buffy in similis, but also in others to some extent) with very variable black to brown bars (narrow to broad, tending to be irregular and wavy in some birds, especially northern lineatus and fuscipennis). Undertail black with white to buffy bars.

Sexual features: Males 8 to 10 percent heavier than females, wings and tail similar or to 5 percent longer, and bill 5 to 10 percent longer. Males have red forecrown to bill, and anterior malar area is red mixed with some gray-black; whereas females have a black forehead and lack red in the (black) malar area. Immatures duller than adults, browner above, with less contrast (bars paler, grading into background color, more irregular, sometimes obsolescent) on abdomen, more white tipping on wing flight feathers, and black of breast often more extensive. Sexes resemble adults, except males have very little red in the mainly black malar (perhaps red is lacking at first in nestlings). Rarely, yellow replaces red in the crown in juveniles. Eyes vary from white to pale yellowish orange; the young may have brown eyes at first; and skin around eyes is brown. Legs and feet are various shades of gray or slaty, with greenish, yellowish, or bluish cast, but also may be olive or ashy blue. Bill pale in similis and scapularis, mainly dull white or bluish white; and variable in other races, but upper bill always gray to blackish, lower bill from white to gray, often dark tipped.

Distribution and Habitat. This woodpecker is resident from Tamaulipas and southern Sonora, Mexico, south through Middle America to Trinidad and South America as far south
as northwestern Peru, and, east of the Andes, Paraguay, southeastern Bolivia, northeastern Argentina (Chaco, Corrientes, Misiones), and southern Brazil (Rio Grande do Sul). It frequents xeric scrub, dry woodlands, and wet forests, but favors edges, clearings, second-growth, pastures, areas about burned forest, plantations, and streamside woods, often nesting in an isolated tree or stub. Occurring from sea level into the middle levels of mountains, it reaches an elevation of 5000 feet in Mexico, 4500 feet in Guatemala, 3500 feet elsewhere in Middle America, 2000 feet in Trinidad, 6800 feet in Colombia (Cauca), and 5000 feet in Bolivia.

**Foraging Habits.** Feeds individually or in pairs (at times both members of a pair forage in the same tree) on the trunks, branches, and branchlets of diverse trees in forests and in cleared areas near forests. Mitchell (1957) noted foraging in branchlets too small for the woodpecker, which had to use its wings to hold its position as it gleaned. It may use wild cane (*Gynerium*) stems, from which it extracts insect larvae (Skutch, 1969). The guarumo tree (*Cecropia*) is a favorite feeding tree; it is fast-growing in cut-over or burned areas, the wood is soft, the bark is thin, and the tree is inhabited usually by *Azteca* ants that form part of the Lineated Woodpecker’s diet. This species excavates, taps, pecks, probes, and gleans for insects, often spending long periods of time at one feeding site. The debarking of dead trees is a preferred foraging technique, involving probing, prying, and probe-tapping to loosen flakes of bark. Pieces even are pulled off with the bill. The long tongue extracts insects from their tunnels, exposed by the woodpecker. Ants comprise a vast majority of the food consumed; but beetles, orthopterans, and other insects are taken, as well as seeds, such as those of *Heliconia*, and fruits, such as *Clusia rosea* (Skutch, 1969). The tongue is very long and flexible in *lineatus*, and the salivary glands are large, as in many ant-foraging woodpeckers.

**Voice.** Both sexes drum in a long roll, very much like that of *D. pileatus* (Wetmore, 1968) and rendering the species distinct from the drum-tapping species of *Campephilus*. One common vocalization is the Sputter Call, variously rendered “squeak-errrrr” or “oook-churrurr” or “chiurr” (Slud, 1964, p. 190); “kay rar-r-r-r-r” or “kroo” (Skutch, 1969, p. 431); “keeer” (Short, 1970a, p. 24); and “put-air” (Kilham, 1972a, pp. 41, 42). An injured bird gave a form of this, a loud “pee,” as a distress call (Short, 1970a). This vocalization is used in situations of disturbance, when a bird is surprised by an intruder or a conspecific bird, and in interactions; Skutch (1969) noted the “kay rar-r-r-r-r” version as typifying interactions of older nesting or fledgling birds with adults. Slud (1964) likened this call to the usual call of the Squirrel Cuckoo (*Piaya cayana*). Another common call is the Wik or Long Call, a series of notes variably rendered as a “flicker-like *wic wic wic*,” becoming at “high intensity a *wuk wuk wuk* of about 17 notes, falling off at the end, that one recognizes at once as being similar to the high call of the Pileated Woodpecker,” and at low intensity, “a *wer wer wer*” (Kilham, 1972a, pp. 40-42). Slud (1964) also likened this call to that of *D. pileatus*, and Skutch (1969, p. 431) stated it was a loud, mellow, “far-carrying” vocalization. It is uttered as a territorial and aggressive call, and even may be heard from the young before they leave the nest. Short (1970a, p. 24) heard another call, a “kee-ka-ka-ka-kowk” given by an adult male as it foraged high in a tree in Misiones, Argentina.

**Display.** Other than Crest Raising by members of a pair when close together, I know of no descriptions of its displays.

**Interspecific Interactions.** There is a strong competition for nest sites with aracari toucans (*Pteroglossus torquatus*), especially when the nest has been completed and during egg laying
and incubation. One of the woodpeckers remains about the nest during most of this period; when in the nest, the woodpecker easily defends it against aracaris, which may make repeated visits to the site. Skutch (1969) noted that aracaris took over nests within a few days after the Lineated Woodpecker young had fledged. Kilham (1972a) observed Lineated Woodpeckers usurp, enlarge, and use a hole excavated by Melanerpes pucherani. Most interest has been shown in interactions of *D. lineatus* with the similarly colored *Campephilus guatemalensis* (north from Panama) and with *C. melanoleucos* (south from Panama). Slud (1964) observed that *lineatus* is less abundant than *guatemalensis* in Costa Rica. Kilham (1972a) compared *melanoleucos* and *lineatus* in Panama and found that, although the former is dominant over the latter, they usually do not interact; and when *melanoleucos* supplants *lineatus* at a feeding site, there is no apparent hostility or display. There may indeed be an association of the two species, as Kilham saw *lineatus* forage over areas of trees that had just been worked by *melanoleucos*. The two species held overlapping territories, and often “fed in the same location and occasionally in the same trees — without signs of hostility or indeed special reactions of any kind” (Kilham, 1972a, p. 40). Kilham made a point of the difference in breeding period of *lineatus* and *melanoleucos*, although their breeding seasons actually seem to overlap. Mr. C. B. Schaugency kindly sent me notes of observations made by him and his wife, and by Mr. and Mrs. J. Lawrence, on 9 and 10 March 1972 north of La Penita, Nayarit, Mexico. There they found, in a dead palm stub back from the Pacific Ocean, adults feeding young at a nest of *Campephilus guatemalensis*, 29 feet up the stub facing east, and at a nest of *Dryocopus lineatus*, 18 feet up the stub facing west. The adults in each case fed the young several times, with no interactions between the species, although the nests were but 11 feet apart.

**Breeding.** Nesting occurs in the southern spring in Paraguay and Argentina (September to November), in July to October in Bolivia, probably in September to November in Peru and at the same time in eastern Ecuador, from August through September along the Amazon and its eastern tributaries, in March to July in the Guianas, from January to April on Trinidad, in January and February in Venezuela, during August in Colombia, at the end of the dry season (March to May) in Panama, in December to March (young leave nest February to May) in Costa Rica, and during February to July in Guatemala and Mexico. Territories are large, larger than in *Campephilus melanoleucos* (Kilham, 1972a), and drumming and Long Calls are used in establishing them. The nest is excavated in the top of a stub or in a stub of a live tree; the stub often is of small size (Kilham, 1972a) and may be so thin as to break easily (possibly the small stubs are selected to avoid competition from aracaris). The cavity may be excavated from 6 to 100 feet up in a tree, usually at a fair height (30 feet or more), but in Guatemala two nests were but 6 and 10 feet above ground (one was in a railroad trestle piling [Skutch, 1969]). Both sexes excavate the nest, which is about 18 inches deep, 5 by 7 inches wide, and has an entrance 3 1/2 inches in diameter. Once well along, the nest is guarded almost continuously against nest-site competitors. The Long Call is uttered as a contact note and prelude to copulating. The eggs number two to four (two to three on Trinidad), and the male incubates at night and shares duties with its mate at 2- or 3-hour intervals during the day. The incubation period is not known. The young are fed by regurgitation at a rate of once an hour, and fecal material is carried away from the nest by adults. The male guards the nest much of the time, feeding the young less than does the female. A “peculiar rolling kay rar-rar-r-r” punctuated at intervals by a sharp note like a sneeze” (Skutch, 1969, p. 435) marks interactions of adults with older nestling and fledgling young. The young leave the nest (nestling period undetermined) and follow the adults about for an unknown amount of
time. The annual molt occurs after the breeding season, from December to February in Argentina and southern Brazil, in November to February in Mato Grosso, in March and April in northern Bolivia, in November to July in eastern Peru, during November to January in western Ecuador (fuscipennis), in October to April in Amazonia, from June to October in Venezuela, in April and May in Colombia, from January to March or later in Panama, and in June to September in Costa Rica and Guatemala.

Roosting. The adults roost separately, each having two or more cavities from which to select a roosting site.

Taxonomy. Related closely to parapatric allospecies D. schulzi, with which it has hybridized (see D. schulzi, p. 412) and to allospecies D. pileatus. For differences from schulzi, see under that species; lineatus differs from pileatus in its strong abdominal barring and its smaller size (erythrops, the largest form, barely attains the minimum size of some Florida pileatus). Among the races of D. lineatus, the northernmost are scapularis (including “obsoletus”) of southern Sonora to Guerrero, western Mexico, and similis (including “petersi”) of eastern and southern Mexico (Tamaulipas south through Oaxaca and Yucatan) and all of Middle America to Costa Rica. The western scapularis is distinctive among races of lineatus by virtue of its very reduced, broken, often obsolete subocular white streak; it differs from similis in its whiter, less buff ventral markings and from eastern Mexico similis by its 9 to 13 percent smaller measurements in various mensural characters. There is a slight clinal increase in size northward in scapularis, but there is no justification for subdividing this race on that basis. The subspecies similis, like scapularis, is pale billed, a feature of these two northern forms; it is larger than scapularis and buffier below, with a definite white subocular stripe. Northern populations of similis average larger, but “petersi” of northeastern Mexico shows but 3 to 7 percent greater measurements, there is much overlap, and no other differences exist, so I merge this form in similis. Likewise, I find no trenchant differences among the dark-billed South American and southern Middle American populations assigned to “mesorhynchus” (Costa Rica to Panama), “nuperus” (Panama to western Colombia), “improcerus” (northeastern Brazil), and populations ascribed to lineatus, which thus occupies the area from Costa Rica south to Bolivia, northern Paraguay, and São Paulo in the southeast, to eastern Peru further west, and to Colombia west of the Andes. Costa Rican birds variously tend toward similis in bill color and buffiness; from Costa Rica southward the populations grade in size toward Venezuelan and Colombian populations, being but 5 percent smaller in Panama and Costa Rica. Thus, “mesorhynchus” does not merit subspecific treatment, and I find no basis at all for “nuperus,” whatever one may care to do with “mesorhynchus.” These are best treated as clinally smaller (grading toward similis) northern populations of D. l. lineatus. Eastern “improcerus” is barely smaller (wings 4 to 9 percent shorter, tail 0 to 6 percent shorter, bill 2 to 5 percent shorter) than adjacent Amazonian lineatus and is approached closely by Mato Grosso and Bolivian populations; “improcerus” is not whiter below than lineatus, and I find no color features of this putative subspecies. I prefer to disregard the weak mensural tendencies nomenclaturally, rather recognizing them by stating that lineatus tends to diminish in size in eastern Brazil and toward Mato Grosso and Bolivia. Another subspecies of D. lineatus is erythrops of São Paulo, and Espírito Santo south through eastern Paraguay to Rio Grande do Sul and Misiones, Corrientes, and eastern Chaco, Argentina. This interesting form (see Short, 1975a, pp. 251-252) differs from other races of lineatus in lacking the white scapular marks, although D. lineatus lineatus rarely shows such variants (three birds from Trinidad and Amazonia); however, in the northern part of its range, from São Paulo to eastern Paraguay and Misiones, erythrops occurs in two
"morphs," with and without the white scapular mark. Individuals having this mark increase in number toward the range of D. l. lineatus; they resemble the black morph ("true" erythrops) in size — the race erythrops is larger by about 8 percent than adjacent (Bolivia, Mato Grosso) lineatus. There are a few cases of intermediacy in the scapular mark, but generally it is present fully or is absent. There being no other differences between birds with and without the mark, it is appropriate to consider them as "morphs" of the same taxon. Because of its size difference from D. l. lineatus, and because the southeastern (Santa Catarina, Rio Grande do Sul) populations are composed entirely of birds lacking the scapular mark, it is appropriate to use erythrops as a racial designation for populations of unmarked birds and for those populations containing individuals of both morphs. The form erythrops previously was treated as a separate species, but Pergolani de Costa (1962) and others have recognized that polymorphism of D. lineatus is responsible for "erythrops." It is noteworthy that D. schulzi, geographically adjacent to D. l. erythrops in the west, shows exactly the same polymorphism. As noted in the discussion of D. schulzi, D. lineatus “fulcitus” of eastern Chaco Province, Argentina, represents hybrids of D. schulzi and D. l. erythrops. Finally, the arid zone of western Ecuador and northwestern Peru is occupied by D. l. fuscipennis, a form smaller than D. l. lineatus and showing a browning of the plumage coloration — it is browner, less black above, the ventral pattern is brown and white with the markings irregular and somewhat obscure, and the shafts of the wings and tail are conspicuously pale (dusky brown to white).

Reference

PILEATED WOODPECKER

Dryocopus [pileatus] pileatus

Color Plate 77


Diagnostic Features. Large to Very Large, 240 to 341 grams, wing length 211 to 249 millimeters. Black with black and white facial stripes, red crest and mainly black body, wings, and tail; a few pale grayish white bars may occur on the flanks and sides; large white wing patch, barely visible when bird is perched, and, in flight, appears on front of wings, the patch having a black posterior border (see Campephilus principalis). Male has red malar stripe and forehead; female is black in those areas. Bill dark, at least on upper portion. Flight less undulating, straighter than in most other woodpeckers.

Description. Bill long, somewhat curved along culmen, broad across nostrils and very broad generally, with chisel-tip. Entirely black above, from gray-black to slaty black (Florida pileatus are blackest, but there is much individual variation); wings black with white patch at base of flight feathers, forming large white patch along front of wing in flight when viewed from below, the underwing coverts also being white (often with small black mark); and bend of wing white, usually barred black. Tips of wings and tail show a little white in fresh plumage. Shafts black above, but striped white in wing patch area dorsally; below, black at tail tips, horn-brown at tail base and in much of wings, white at base of wing flight feathers. Tail black, central pair elongate and narrowed at tip; paler below. Tail/wing ratio 0.64 to 0.73. Most of crown, and long crest, red; nasal tufts long, black on inside, whitish outwardly,
the white connecting with white stripe from lower lores along sides of head below eyes, expanding posteriorly into a white stripe along sides of neck, meeting white underwing area and leading to sides of breast. Black line from inner nasal tufts to lores and continuing barely under eye to ear coverts, then narrowly connecting with black of hindneck to back. Narrow white stripe behind eye, over ear coverts, occasionally connecting through rear of ear coverts to side of neck; black border above this white stripe, along sides of red crown. Rear of malar forming broad black stripe, connecting with breast. Gular area and anterior throat variable, pure white, or faintly streaked grayish or strongly streaked gray down center or, in some far western *abieticola*, entire throat and gular area grayish; rear of throat black, continuous with breast. Underparts variably black (especially Florida *pileatus*, but some birds from all areas are blackish) to very dark gray from rear of throat to undertail coverts; markings may be sparse or rarely lacking in *pileatus* and western *abieticola*, but usually variably, although narrowly barred with grayish white on sides, occasionally across lower breast and upper abdomen. Rare melanic birds may lack white markings on the head, neck, wings, and underparts (Short, 1965d).

Sexual features: Males 5 to 10 percent heavier than females, wings and tail nearly equal or slightly longer in males, and bill 7 to 10 percent longer in males; anterior malar area and forehead and forecrown red in males (feather bases buffy, gray or brown on crown, showing through in worn birds). Females have malar entirely black and anterior crown and forehead variably black, black with brown tips, or the pale brown to buff tips may be expanded, forming a black-marked, buffy area in this region (females frequently show several red-tipped feathers in the forecrown and forehead). Immatures grayer and browner, duller than adults, tending to have more streaking or gray on throat and with red of crown and crest paler, more orange-red; sexes as adults except males show less red in malar (red mixed with black). Eyes creamy white to pale yellow, usually yellowish in adults and bluish gray or slaty blue in nestling birds; orbital skin grayish olive. Legs and feet flesh colored in very young nestlings, becoming bluish gray to gray-black in late nestling, fledgling, and adult birds. Bill slate colored above with black tip; lower bill bluish white at base, darkening to gray at tip.

**Distribution and Habitat.** Forests of North America from northern British Columbia and southern Mackenzie across southern Canada to central Quebec and Nova Scotia, ranging south to northern California, Oregon, Idaho, Montana (rarely a vagrant to Arizona, New Mexico, Utah), southern Manitoba, and southward east of the Great Plains to eastern North Dakota, eastern Kansas, eastern Oklahoma, and eastern Texas, thence eastward to the Atlantic Coast and south to the Gulf Coast and Florida. It frequents mixed deciduous-coniferous forests, deciduous forests of several types, and secondgrowth woods wherever some large trees can be found. It became rare in the United States following land clearing of the early eras, but began a comeback in the 1920's and 1930's, seeming to adapt to secondgrowth woodland and park areas in suburbs — it nested in 1974 on the New Jersey Palisades within sight of Manhattan's skyscrapers! It occurs from sea level to at least 5000 feet in the Appalachian Mountains and reaches 7500 feet in western mountains (California).

**Foraging Habits.** This woodpecker forages in diverse ways, including some gleaning, stripping of bark by probing, prying and tapping, and excavating, mainly in somewhat rotten wood. During much of the year deep excavating for ants is the mainstay of its feeding, and it digs great holes in ant-infested trees and stumps. Long slivers of wood may be pried and tapped loose or pulled off with the bill, gouging holes 4, 6, or even more inches deep and up to a foot or more in length, thus exposing tunnels and chambers of carpenter ants. The long sticky tongue is employed to catch and extract ants throughout the partly exposed
tunnel system. Well-rotted logs on the ground may be literally torn apart in a search for beetle and other larvae therein. Occasionally this woodpecker may dig into ant hills on the ground (Bent, 1939, p. 183), the usual feeding source for flickers (Colaptes). Gleaning is accomplished sporadically, in the course of other feeding. I have seen Pileated Woodpeckers working nimbly in tiny branches of cherry trees to secure cherries. The food consists principally of carpenter ants (Camponotus herculaneus) secured at all heights in diverse trees—these may compose up to 60 percent of the diet, 2600 ants being found in a single stomach (Bent, 1939). Some beetles, termites, and caterpillars also are eaten, and 27 percent or so of the diet is comprised of various fruits, berries, and nuts. Among the vegetable foods are wild grapes; wild cherries; chokecherries; dogwood berries; sour gum and tupelo fruits; berries of Virginia creeper, holly, poison ivy, sumac, and hackberry; some acorns, pecans, and other nuts; and persimmons. Occasionally this woodpecker visits bird feeding stations to eat suet (Hoyt, 1957; personal observ.).

Voice. Drumming is used extensively, there being several forms of sound made with the bill. Birds are prone to tap audibly once when disturbed or excited (Hoyt, 1957). Demonstration tapping of two types occurs. One is described as "a rapid roll which lasts for about a second" (Kilham, 1959d, p. 377), often repeated, at a prospective nest site when both birds have "agreed" upon a site. Kilham did not report the sexes of drumming individuals. It remains to compare this demonstration tapping with drumming. Another form of demonstration tapping is a series of several taps, often given by a member of a pair within a nest when its mate has approached to take over incubating or brooding (Bent, 1939, p. 166; Hoyt, 1957, p. 252). This form may occur as a double tap, akin to the drum taps that are characteristic of various species of Campephilus; such a double tap may be associated with copulation or may occur at a prospective nest site (Kilham, 1959d, p. 381). Such demonstration tapping is known in D. javensis and D. martius. Drumming takes place all year, but especially marks the prebreeding period, for example, in December and January in Maryland (Kilham, 1959d). Bent (1939, p. 175) cites Sutton as indicating that a drumming burst may be followed by three distinct blows, thus resembling drum taps of Campephilus, but Hoyt (1957) did not think these are typical, nor do I. Drumming may be repeated at 40- to 60-second intervals for an hour or even up to 3 hours (Bent, 1939; Kilham, 1959d). It seems to proclaim a territory and occurs often at particular drumming trees. Birds about to roost for the night may drum before roosting. Females drum much less than do males (Kilham, 1959d). Bursts are 0.68 to 3.0 seconds, usually 1 to 2 seconds in duration. There may be 11 to more than 30 beats per burst, given at 14.5 to 16.8 beats per second, with a definite speedup of about 18 percent from 13 to 17, up to 17 to 19 beats per second at the beginning and end of a burst. The speedup is found also in javensis and martius; the drumming of pileatus is intermediate in tempo between that of javensis and of martius, its moderate speedup is more like that of martius, and its duration resembles that of javensis. Calls of pileatus have been discussed by Bent (1939), Hoyt (1957), and Kilham (1959d); I differ in terminology from these authors, placing calls of pileatus in a framework relating to apparently homologous calls of D. javensis (Short, 1973d) and D. martius (various authors, especially Blume, 1961). Kilham noted that the voice of females is pitched higher than that of males. The calls resemble those of D. javensis more than those of D. martius, which has a flight call not found in the other two species. Essentially there are three basic calls, the Waa Call, the Wok Call (a form of Wicka Call), and the Wuk or Long Call; there also is a Mewing Call. The Waa Call is sonographically a horizontal, long sound, variable in length (0.2 to 0.5 second) but sounding like "waaa" or "waaaaa." The notes, often irregularly
PILEATED WOODPECKER

repeated, show several overtones, with a fundamental tone at 0.5 kilohertz and emphasis on the tone at 3.0 kilohertz. Possibly this is the “soft, nasal ‘chuck-chuck-chuck’ call... entirely different from other calls” reported by Hoyt (1957, p. 249) and the “hn, hn” or “hn-waan” call of begging young and adults in close contact (as preceding copulation) noted by Kilham (1959d, pp. 378, 380). Occasionally heard in nest relief, it marks close interactions of members of a pair. The Waa Call grades into the Wok Call in the form of a 0.1 to 0.2 second “waak.” The Wok Call begins like the Waa Call, but rises to a peak terminally; it is shorter and has strong emphasis at 1.2 and 2.4 kilohertz (fundamental tone 0.6 kilohertz) and is uttered in series of up to eight notes at about three notes per second. An intense form was rendered “woick, woick” by Kilham (1959d, p. 378); Bent (1939, p. 175) gave the call as a “woick, woick, woick.” It occurs during interactions between individuals, accompanying Wing Spreading and Head Swinging displays. Still shorter wok notes grade into the Wuk Call notes. The Wuk Call includes single call notes and a series of “wuk” or “wik” notes (rendered also “cuk” or “kuk” by Hoyt, 1957, and Kilham, 1959d). This call is very variable, with several forms, and is used in territorial proclamation, in interactions at a distance, and by birds flying to a mate to copulate; it may be given in duets by paired birds. Loose, irregular series of wuk notes may be uttered by a disturbed Pileated Woodpecker for several minutes at a time. The basic note is 0.04 to 0.05 second in duration, sonographically inverted, U-shaped, peaking at 1.1 (fundamental tone) and 2.1 kilohertz. I found that Georgia birds show less or no emphasis on the fundamental tone, whereas Adirondack Mountain woodpeckers emphasized a definite, though subordinate (to first harmonic tone), fundamental tone — the pitch of the notes is identical, but sounds higher, clearer in southern birds. A slow regular Wuk Series Call contains similar notes uttered at five or five and a half notes per second for 20, 30, or even 50 seconds. There may be shifts in tempo and loudness in such calls. A moderate Wuk Series Call is similar, but notes are uttered at about seven and a half per second. Long series may commence with moderate and end with slow Wuk notes. The fast Wuk Series Call is distinctive and more regular, usually rendered at eight to 10 notes per second in 1.2 to 2.2 seconds, containing 10 to 20 notes. The first harmonic tone at 2.3 to 2.6 kilohertz is dominant in these, as in other Wuk Calls. Longer calls of the fast type show a slight speedup in tempo during the call, and the fastest calls sonographically show notes almost connected by sound at their peaks. The Mewing Call was reported by Bent (1939, p. 167, from G. M. Sutton) as somewhat whining notes reminiscent of a mewing sapsucker (Sphyrapicus varius) or scream of a hawk, given five or six times in a series. Hoyt (1957, p. 250) stated that in courtship a female responds to displays of a male with “a loud nasal mewing call audible for a hundred feet or more,” often answered by her mate. Another courtship call has been described by Hoyt (1957, p. 249) as a “descending nasal kyow-kyow-kyow,” often repeated up to six or even 10 times. As reported for D. javensis, that species has a Kew Call that has both “kyow” and “wuk” or “wik” (or “kuk” or “kik”) versions and is given both as a call note and in series, as a Long Call, thus showing resemblance to the Wuk Call of D. pileatus and to this “kyow” call described for pileatus by Hoyt. Young Pileated Woodpeckers give peeping notes and “soft churr churr notes” (Kilham, 1959d, p. 378).

Displays. Displays have not been studied in detail. Wing Spreading Displays are frequent in conflict between birds of the same sex or between members of a pair. The wings are raised and spread, showing off the white patch (see Kilham, 1959d, p. 384, fig. 4). Swinging or Head Swinging also frequently occurs, called the “bill-waving dance” by Kilham (1959d, p. 379), and is accompanied by the Wicka or Wok Call. Often the bill is held very high,
reflecting escape or submissive tendencies, but I have seen the display rendered almost horizontally. Crest Raising is a common display, occurring during interactions and in concert with other displays (Kilham, 1959d). Bent (1939, p. 175) noted Crest Raising with Wing Spreading and Wok Calls as two birds touched bills in their conflict. Head Bobbing may be a separate display, as various observers have noticed a bobbing or bowing component of Head Swinging (see citations and comments in Hoyt, 1957, p. 250). A Flight Display is evident during pair formation; Hoyt (1959, p. 250) described this as follows: "The male bird usually flies in circles through the tree tops, calling a soft 'cuk-cuk-cuk', at times flashing the white of his wings more than in normal flight." Bent (1939, p. 180) also mentioned gliding flight displays at times during changeover at the nest, the departing bird leaving in a glide on "wide-spread wings."

**Interspecific Interactions.** There is nest-site competition with other hole nesters, but the Pileated is successful in retaining its hole when actually nesting. Kilham (1959d, p. 385) noted interaction of a Wood Duck (*Aix sponsa*) with a Pileated Woodpecker over a roosting hole; the woodpecker roosted elsewhere. Of course, many species, including various squirrels, Starlings (*Sturnus vulgaris*), and bluebirds (*Sialia*) utilize abandoned holes of this woodpecker. Bent (1939, p. 169) mentioned an incident from Bachman, related by Audubon, of bluebirds nesting in a hole that was appropriated, or reappropriated, by a pair of Pileateds: The woodpeckers removed the nest and young of the bluebirds, enlarged the cavity, and used it for nesting. In another case a Starling managed to lay an egg in a Pileated Woodpecker nest as the woodpeckers began to lay eggs. The woodpeckers hatched the young Starling, which died and was removed from the nest (Hoyt, 1957). Some interactions, including conflicts between Pileated Woodpeckers and Northern Flickers (*Colaptes auratus*) were reported by Hoyt (1957, p. 249), but the two species also may nest in the same stub with no interactions.

**Breeding.** Nesting commences in March, generally, with courtship and territorial activity beginning in December or January and eggs being laid in April and May (Bent, 1939). Drumming and Wuk Long Calls mark establishment of territories, which in favorable areas may be as small as 60 or 70 acres (see Kilham, 1959d). Both sexes drum at established sites, especially in the morning and evening. Pair formation is facilitated when the members of a prospective pair roost near each other in the nonbreeding period. Courtship activities are centered on the roosting and nesting area. Wing Spreading, Crest Raising, Head Swinging, Wok and Wuk calls, demonstration tapping, and drumming are associated with pairing activities. Copulation occurs on a horizontal branch, the female perching crosswise, and has been discussed by Kilham (1959d, p. 380). Wicka Calls and Head Swinging Displays may precede copulation. The nest is at 15 to 80 feet up a live or dead tree, more usually in a dead tree or in a dead stub of a live tree. Diverse pines, cypress, hemlock, ash, sycamore, hackberry, sweetgum, elm, oak, cottonwood, birch, beech, hickory, basswood, tulip, as well as other trees have been used. In parts of the South, utility poles often are used for nesting, particularly when the surrounding forest is well managed and lacks suitable nesting trees (utility companies have tried various devices to prevent woodpeckers from using the poles). The nest is 10 to 28 inches deep, 7 or 8 inches across, and its opening is 3 1/2 to 4 1/2 inches in diameter. Excavation is by both sexes, with variation in which bird is most active, and may take 25 days or more. Usually a new hole is excavated, but old holes occasionally are modified and used. Often the nest is placed in a stub used for several or many years, with several old holes evident. Three to five eggs weighing 10 to 12 grams form the clutch (Bent, 1939; Hoyt, 1957). Incubation is by both parents and averages 18 days. Nest relief occurs.
every 2 hours or so during the day, the male occupying the nest at night. Incubating and brooding adults may tap (demonstration tapping) inside the nest, especially when the other adult is nearby; Wicka Calls mark changeover in incubating. The hatchling young usually are well protected, as one or the other adult remains about the nest during the early nestling stage. The young are fed hourly by regurgitation; much of the food is obtained in the vicinity of the nesting tree. The nest is maintained clean; adults probably eat the feces at first, but carry fecal sacs from the nest after the young are about 5 days old. The eyes open on the eighth day, the ears are fully developed by the tenth day of age, at which date the feathering begins to break from the feather sheaths (see Hoyt, 1944), and the birds reach the entrance of the nest for feeding on the twelfth day. Older nestlings are fed less often, about every 2 hours. Fledging occurs at 26 to 28 days of age (Hoyt, 1957). Near the time of fledging, the adults become especially aggressive, even against human observers. Fledged birds leave the area about the nest rather slowly, flying about from one treetop to another, calling and being fed, still by regurgitation. Adults may work at excavating holes near the young, which become interested in the holes and forage in them. The family groups may remain together through the summer, to September. In July I have seen an entire family of five feeding on wild cherries, all clambering about tiny branches in the top of the tree. Dispersal occurs during the fall. The annual molt takes place from July through October, mainly in August and September.

Roosting. Roosting cavities are excavated chiefly in the fall. Members of a pair may occupy roosting holes in proximity, which may facilitate re-pairing during the winter.

Taxonomy. Forms a superspecies with allopatric D. lineatus and D. schulzi, especially resembling the latter in its all-black body (but size is much greater). Also, pileatus is related to the Eurasian D. martius and especially D. javensis, being vocally very similar to the latter. Variation in pileatus largely is clinal, and designation of subspecies is difficult because of this variation. I recognize two subspecies: northern abieticola and southern pileatus. Northern birds are somewhat larger than southern Pileated Woodpeckers but are only 3 to 9 percent longer winged and longer tailed than Florida birds; they are, however, separable by virtue of their 15 to 21 percent longer bill. Florida pileatus average slightly blacker than birds from other southern states, but there is much overlap due to variation; Florida males barely are smaller than those of other southern states and females differ not at all, so “floridanus” does not merit nomenclatural recognition. Birds of the far West (“picinus,” California to British Columbia) tend to have a grayer throat than do abieticola from farther east (Alberta to Maine, south to Maryland) and show a tendency for less barring, but over half the western birds are identical in color with eastern birds, and there is no consistent difference in size; hence I see no reason for recognizing “picinus.” Indeed, the species varies rather little; recognition of as many as four subspecies overemphasizes this variation, and differentiation simply has not progressed sufficiently to allow such treatment.

References
WHITE-BELLIED WOODPECKER

Dryocopus javensis

Color Plate 78

Range Summary. Southern and eastern Asia.

Diagnostic Features. Large to Very Large, 156 grams (hodgsei), and 197 to 347 grams (other races). Wing length 169 to 266 millimeters (169 to 181 mm. in parvus, 178 to 203 mm. in hodgsei and suluensis, 187 to 217 mm. in most races, 210 to 225 mm. in hodgsonii, 215 to 235 mm. in javensis, and 240 to 266 mm. in forresti and richardsi). A mainly black woodpecker with a white belly, white patch in the wings, and usually some white on throat and face (Andaman Islands hodgsei is entirely black except for sexual markings). Rump white in some races, black in others. Males have red malar mark and all-red top of head; females have red restricted to hindcrown and nape or lack red entirely. Eyes white to yellow. Where sympatric with D. martius, distinguished by white belly, white rump, dark bill, red malar mark of male, lack of red on female, and brighter, more orange-red on male's head.

Description. Bill long, curved along culmen, broad across nostrils, and chisel-tipped. Varies considerably geographically. Black or sooty black above, with rump or uppertail coverts white or partly white in hargitti, mindorensis, philippensis, hodgsonii, feddeni, forresti, richardsi, and a few confusus, suluensis, and pectoralis, but white lacking in all others. Uppertail coverts black. Wings black with white tips of primaries in richardsi, forresti, and in most feddeni, multilunatus, and mindorensis, as well as in most birds in fresh plumage of other races except hodgsei; also creamy white patch at inner bases of flight feathers and on underwing coverts, except for black “wrist” mark (hodgsei lacks white in wings; white wing patch most expanded in richardsi and feddeni). Shafts black to brownish black above, brown to horn colored below; shafts white at bases of wing flight feathers in white patch area, especially in richardsi and feddeni. Tail black, paler below. Tail/wing ratio 0.66 to 0.83, least in forresti and richardsi. Hindcrown and nape red, forming crest. Lores and nasal tufts black, also black over eyes and below eyes. Ear coverts and sides of neck black with white traces at rear of ear coverts in richardsi, forresti, hodgsonii, and philippensis; white lacking in hodgsei (in which color is gray-black), and white flecks widespread in black of other races, especially in multilunatus (forming streaks) and pectoralis (rear of ear coverts streaked, more white than black). Throat sooty (hodgsei), black with sparse flecks of white (richardsi, forresti, hodgsonii, some philippensis and confusus), white flecking more general (most races), streaked white or black (multilunatus) or white with black streaks (pectoralis). Underparts all sooty black in hodgsei. Breast black in most races, occasionally irregular in few narrow bars at rear, but barred buffy in part in multilunatus and creamy or buffy white with black blotches, streaks, or chordate marks in pectoralis. Abdomen creamy white in all but hodgsei; undertail coverts black; the posterior abdomen, thighs, and flanks usually barred black and white (barring weak, area just mentioned mainly black except pale thighs in hargitti, mindorensis, and confusus); and some pectoralis have spots scattered over abdomen.

Sexual features: Males 9 percent heavier than females, about the same wing and tail length, and with bill 1 to 8 percent longer; males have red malar mark on anterior malar and black-based red forehead, crown, and nape. Females lack red in the malar area, which is black, and have the forehead and forecrown black — in richardsi the female lacks red, having entire head black. There is variation in color of the crown, and male’s malar mark, which are orange-red in richardsi, forresti, feddeni, and all the races of the Philippine Islands (some confusus are darker), but which are dark red in hodgsonii, javensis, parvus, and
**WHITE-BELLIED WOODPECKER**

*hodgei*. The malar red mark of males is somewhat narrow in *richardi*; it is notably broad in all the Philippine region races, and it is expanded beyond the malar area in some *hargitti*, *confusus*, and *multilunatus* (onto subocular area, ear coverts), and reaches onto the throat and throughout the ear coverts in some (male) *philippensis* and *pectoralis*. Immatures paler, duller (browner) than adults, with whiter, less creamy abdomen, paler especially on throat, and, in black-rumped forms, sometimes showing white on rump. Sexes differ as in adults (crown color), except that males show much less red, sometimes only traces, in the malar area; the forehead and crown of males also tend to be speckled white or black and red because of broad basal dark or dark and whitish areas of feathers. Eyes usually yellow, varying from pale yellow or yellowish white or greenish yellow to red (several Philippine birds); gray in immature birds. Skin around eyes grayish. Legs and feet dark gray or slaty; nails brownish. Bill uniform blackish (*hodgei, mindorensis, hodgsonii*, most *confusus*), black or gray-black above with a paler gray lower bill (*javensis, parvus, feddeni, forresti*, and *richardi*) and blackish above with a dark tip of the lower bill and a pale horn color or greenish yellow center and base of the lower bill (*hargitti, suhuenensis, multilunatus*, and *pectoralis* and some individuals of *confusus, feddeni*, and *javensis*).

**Distribution and Habitat.** Ranges from Sikang and northwestern Yunnan, China, south through Burma, Thailand, and the rest of southeastern Asia, to Sumatra, Borneo, Java and associated islands, Simalur Island, Palawan, and the Philippine Islands, including the Sulu Islands; isolates occur in western India from Bombay to Travancore, in central and southern Korea and Tsushima Island (rare), and on the Andaman Islands. This species frequents primary forests, secondary forests bearing large trees, forest edges, isolated trees in pastures or clearings near forests, and swampy forests, usually of evergreen tropical forest, also in tropical and subtropical forests, and in temperate deciduous and mixed forests in the northern part of its range. It forages singly, less commonly in pairs, and is very noisy. The altitudinal range is from sea level to 3500 feet in India, Southeast Asia, and parts of the Philippines, and in Korea; in Burma and western China it ranges up mountain slopes to 12,000, or even 14,000 feet (Tung-Ha Mountains, Yunnan).

**Foraging Habits.** Uses dead trees, dead stumps of live trees, large fallen logs, rotten stumps, and various living trees 12 centimeters or more in diameter for foraging. A period of up to an hour or more may be devoted to excavating and tongueing ants and other insects at a single site. Tapping, excavating, probing, and prying are the modes of foraging used at all heights in the trees or stumps utilized. Sporadic light tapping with much tongueing is satisfactory in well-rotted sites, large holes being made easily with the bill. Less rotten wood is hacked open in often large gashes and pits up to 20 centimeters long and 8 centimeters deep, very like those left by *D. pileatus* and *D. martius*. Lateral blows serve to free bark pieces that fall to the ground, exposing insects beneath it, this being very much like bark stripping of *D. pileatus* and *D. lineatus*. Females may visit the sites of excavation of males, working further on them. The food consists of ants, ant pupae, beetles and their larvae, termites, and honey bees and perhaps honey (Ali and Ripley, 1970).

**Voice.** Demonstration drumming takes place in and about the nesting cavity, the bird holding its head very low, not raising it at each swing of the bill. A male may employ this form of tapping at the approach of a female, or vice versa. The low, fast tapping may last 90 seconds (Short, 1973d). Drumming occurs in short to long bursts, showing a marked speedup in tempo of 45 to 72 percent (11 or 12 to 16 to 19 beats per second) during a burst. These average 12.8 to 15.8 beats per second, in 0.8 to 2.0 or more seconds; there are four to 28 beats per burst. Drumming appears to be used in territorial establishment and
maintenance. Members of a pair may drum in establishing contact or as a location sound, or for reproductive stimulation, with up to three bursts, and responses, per minute. Late afternoon and early morning are the main periods of drumming. These bursts generally are shorter and slower than those of *D. martius*. Short (1973d, p. 289) illustrated movements of the body and head of a White-bellied Woodpecker during drumming; essentially, as it lowers its head to tap its bill against the tree, the drumming bird pulls its wings into the body, arches its back, expands its chest, appresses its tail, and straightens and tightly clasps its feet. A “playing” White-bellied Woodpecker in Malaya used a dead tree for a drumming site and concentrated its drumming beside a cavity being excavated by a Crimson-winged Woodpecker (*Picus puniceus*); between episodes of drumming it worked on the edges of the entrance to the cavity, and in three mornings of this had so enlarged the hole that the Crimson-wing no longer could use it, although the branch was too narrow to afford any opportunity for the White-belly to use the cavity. A Wicka Call was rendered as “ch-wi, ch-wi” and “a-wi, a-wi” by Short (1973d, p. 291) from a pair of birds perched close together with no obvious displays. A “soft quok note” reported by Smythies (1953, p. 307) possibly represents a Wicka Call. Ali (1953) mentioned a laughing call uttered by flying birds, but I have no knowledge of a flight call such as the Kyrr Call of *D. martius* (see discussion following). The call note complex is very variable note forming a graded series from a short, sharp “kik” or “kuk” (see Abdulali, 1964, p. 546), through longer “kyuk” notes and “kew” notes, to a still longer “kyow,” and finally a long, double-noted “kee-yow” or “pee-aw” reminiscent of some calls of species of *Campephilus*. These calls were discussed by Short (1973d, pp. 290–291), the complex being designated as the Kew Call Complex. Sonographically these notes are inverted, U-shaped (in simplest [kik] form essentially that) with longer forms of the call gradually extending the duration of the dropping leg, and adding a lower pitched horizontal sound. Notes vary from 1.2 to 1.4 kilohertz in the peak of the fundamental tone and 2.5 to 2.8 kilohertz in the dominant harmonic tone; their duration ranges from 0.02 to 0.03 second for fast (kik) notes to an extreme 0.25 second for long, double-noted (kee-yow) notes. There is some resemblance of the longer versions of this call to the Kijak Call of *D. martius* and of the shorter versions to wik notes of *D. pileatus*. Functionally, Kew Calls are low to moderate intensity alarm-agonistic notes, perhaps having a location function as well. A bird interrupted by me gave a few “kew” calls; as its alarm lessened, it watched me, shifting to a “kuk” or “kyuk” — if it became more alarmed, it climbed upward in the tree, switching to “kew,” “kyow,” or “kee-yow.” Thus, longer forms of the call express greater alarm and perhaps greater aggression than shorter calls. There is an association of one or another version with immediately adjacent calls in the spectrum of Kew Calls. The White-bellied Woodpecker lacks the flight call of the Black Woodpecker, instead using its Long Call both in flight and when perched. This vocalization is an often irregular series of “kik” or “kuk” notes, many of them double or triple connected notes in series at 11.5 to 13.3 notes per second for 0.47 to 5.0 seconds or longer. Each single note is 0.03 to 0.045 second in duration, with emphasis on the harmonic tone peak at 2.2 to 2.8 kilohertz (fundamental tone peaks at 1.1 to 1.5 kilohertz). The call has been described as “a loud chattering kuk, kuk, kuk” (Abdulali, 1964, p. 546). Long calls are uttered sporadically by feeding birds, by members of a pair in response to one another, and by birds in flight, perhaps stimulated by my presence. This call more closely resembles that of *pileatus* than that of *martius* (Short, 1973d).

Display. Crest Raising is the only display known, occurring when members of a pair are in proximity.
**Interspecific Interactions.** Interactions of this species with *Picus puniceus* have been described earlier and with *Mulleripicus pulverulentus* under that species account.

Correspondence with Dr. Pyong-Oh Won of Korea (personal comm.) provides recent information concerning *D. javensis richardi* and *D. martius martius* from that region, in which they are sympatric. The former is very rare, mention being made of four pairs at two sites; the latter is rare but widespread in Korea. The following information is from Dr. Won, to whom I am grateful. He reports that the “call” is very different in the two species there, that *javensis* flies directly and *martius* in a more undulating flight, and that *javensis* tends to remain in pairs throughout the year whereas *martius* is mostly solitary when not breeding. Foraging habits of the two differ there to a degree. He reported that *martius* is noisy in its tapping and excavating and that it frequently strips bark from trees. On the other hand, *javensis* (which has a narrower bill) is quieter, taps more, and less often strips bark from trees, an activity he feels is especially prevalent in the breeding season. According to Dr. Won, *javensis* occupies smaller territories throughout the year, and *martius* shifts to a larger winter home range. These apparent differences and interactions remain to be investigated in detail, particularly actual interactions, which appear likely to occur, although Dr. Won found them to be allopatric when breeding, but sympatric in winter (implying some movement of *martius*). It must be borne in mind that, with both species rare and *javensis* so restricted, results may be in part an “artifact” reflecting this restriction more than actual differences.

**Breeding.** Nesting takes place in February to June in Malaya and Burma, during May to July in China and Korea, from December to March in India, from February to May in the Andaman Islands, and during February to July on various islands (Luzon, Mindoro, Mindanao, Sulu Islands, Masbate) of the Philippines. The nest is excavated in the stub of a live tree or in a dead tree, either within the forest or in a lone tree or stub standing near forest, at heights of 8 to 20 meters. The male seems to perform much of the excavating (Short, 1973d). The nest may be 2 feet deep or more, with an entrance hole 5 inches in diameter. Demonstration tapping is associated with the nest and is performed by both sexes. The clutch is two to four eggs (two regularly in Andaman Islands), and they are incubated by both adults. The incubation period and details of nesting and fledgling periods are unknown. Young birds are eaten as a delicacy in parts of India (Ali and Ripley, 1970). Apparently the young spend some time with their parents, as parties of three or four birds frequently are mentioned in the literature. The annual molt occurs in August and September in China and Korea, during March to July in India, from September to November in Malaya and Burma, from June to September on the Andaman Islands, in March on Nias, and from May to November in the Philippines (Palawan, Masbate, Panay, Leyte, Luzon, Mindoro, Mindanao).

**Roosting.** See Great Slaty Woodpecker (*Mulleripicus pulverulentus*).

**Taxonomy.** Related to *D. martius*, with which it marginally is sympatric in Korea and southwestern China, but resembling also *D. pileatus*; probably *martius* has differentiated more from the ancestral Old World *Dryocopus* than has *javensis*, accounting for the latter’s greater similarity to New World congers. There is an array of races, one of which, *hodgensi* of the Andaman Islands, is very distinct in being melanic, having no white below or on the face or wings; its sexual color patterns and what is known of its voice and habits indicate its conspecificity with *D. javensis*. Palawan *hargitti* resembles *D. j. javensis* but is fully white rumped, the red on the head is more orange-red, and the malar area of males is broader.
Mindoro mindorensis resembles hargitti but is distinctly smaller (no overlap in wing length), the bill is blackish throughout, and the white patch on the lower back is narrow. The Sulu group of islands is occupied by suluensis, another small race having orange-red on the head; the lower back and rump either are entirely black or bear a very narrow white patch, and the lower bill is pale. Luzon confusus is the size of mindorensis and is dark-billed, but the lower back generally lacks white (or, if present, the white is very restricted), and its bill is longer. Northern Luzon birds have been separated ("esthloterus") on the bases of a supposedly thinner bill and less white on the head than southern confusus. I find overlap in both features, and these seem to represent tendencies that best are expressed verbally without nomenclatural recognition, especially in view of the lack of geographic isolation of the supposed form and the weakness of these traits compared with those of other insular Philippine subspecies. The islands of Panay, Negros, Masbate, and Guimaras are occupied by philippensis, which is characterized by a narrow, white lower back area, a pale lower bill, splaying of red out from the male's malar onto the face and throat, and slightly larger size than mindorensis, confusus, and suluensis. A fully black-backed form, multilunatus, with a pale lower bill, some buffy on the breast and throat, and an expanded malar patch (males), is found on Basilan and Mindanao and is similar in size to philippensis. The islands of Leyte, Samar, Panaon, Calicoan, and Bohol form the range of well-marked pectoralis, resembling multilunatus but with pale bars and streaks throughout the breast, more barring on the flanks, and a white throat with black streaks; the lower bill is pale and the rump area is black, occasionally with traces of white; and red commonly extends onto the face and throat in males. Simalur Island is the home of the smallest of all races, parvus, which is much smaller (javensis has 24 to 41 percent greater bill, tail, and wing measurements) than javensis but resembles that form in its black rump and deeply colored red of the head; parvus shows buffy traces of barring on the throat, breast, and ear coverts. The nominate race occurs in southern Thailand, Malaya, Sumatra, and Borneo; it is larger than the subspecies mentioned so far, it is very deep red on the head, the rump is black, and the white in the wings is restricted. The Nias Island population ("büttikoferi") differs from nominate javensis only in having somewhat less barring on the thighs, and this tendency is not sufficient to warrant its recognition apart from javensis. Isolated western Indian hodgsonii has the deep red on the head, as in javensis, and its white wing patches are restricted as in that form; it is distinguished from javensis by its white rump, shorter wings and tail, but considerably longer bill. Most of Thailand and Burma form the range of feddeni, somewhat smaller than javensis and hodgsonii with a white rump, considerable white in the wings, and orange-red color in the head. Adjacent forresti of montane northern Burma and adjacent southwestern China resembles feddeni in head color and its white rump, but it is much larger (11 to 21 percent longer wings, tail, and bill), has less white in the wings, and has a proportionately shorter tail. Isolated, endangered richardsi of Korea and Tsushima is even larger, especially longer billed than forresti; its wings show more white (as feddeni) and, unlike all other subspecies, the female lacks red on the head.

References
BLACK WOODPECKER

Dryocopus martius

Color Plate 78

Range Summary. Northern Eurasia.

Diagnostic Features. Very Large, 285 to 378 grams, wing length 226 to 259 millimeters. All black or sooty black with red on forehead to nape (males) or nape (females). Eyes yellowish, base of lower bill and lower part of upper bill pale, yellowish to horn colored.

Description. Bill long, slightly curved along culmen, broad across nostrils, very broad across base, and chisel-tipped. Entirely black (except top of head; see Sexual features), darker on head and upper back, sooty black elsewhere; khamensis is blacker overall, glossier than martius. Shafts black above, blackish below except brown in wings. Tail/wing ratio 0.65 to 0.75.

Sexual features: Males average 6 percent heavier, their wings are about as long, the tail is shorter (by 1 to 3 percent), but the bill is 4 to 5 percent longer than in females. Males have dark red from forehead to small nuchal crest; females have red restricted to hindercrown and nape, rest of head being black. Immatures sootier, less black, usually with throat especially pale and set off from darker head; shafts especially paler below, often whitish in wings. Sexes as adults, distinctive even in early nestling stage. Eyes lemon yellow to creamy gray or milky white. Legs and feet grayish black; claws black. Bill blackish to blue-gray, paling to horn color or yellowish at base, along tomia, and on middle and base of lower bill; paler, all horn color or yellowish in nestling birds.

Distribution and Habitat. Ranges from Scandinavia, the Pyrenees, and France across Europe, to Asia Minor, and through forested Russia to eastern Siberia, south to the Caucasus, northern Iran, northern Mongolia, northern China, Sakhalin, Hokkaido, and northern Honshu (rare), with an isolate in Tibet, Yunnan, and western Szechwan. It frequents diverse coniferous and mixed forests, as well as some parks having very large trees, and it occurs from sea level to an elevation of 3000 feet in most regions, although found as high as 14,000 feet in Tibetan mountains.

Foraging Habits. The Black Woodpecker mainly eats ants obtained from within infested trees and stumps, but it also forages on insects obtained from rotten logs and in debris on the ground at some times. Most of its feeding is in large trees, but it visits rotten small trees as well. The bill strikes directly, not from the side, and apparently little or no flaking of the bark occurs.* Rather, deep holes are excavated or ripped out of rotten wood by slow, powerful pecking of the bill (Pynnonen, 1939). Deeply gouged holes, identical to those left by D. pileatus, are characteristic of trees worked in the areas inhabited by this woodpecker. The tongue is employed to snare ants and other insects deep in chambers within rotten wood and indeed may be used as a sensor to detect the presence of ants and other insects (Callegari, 1955). From 75 to 99 percent of the diet (Cuisin, 1972) is composed of larvae, pupae, and adult formicid hymenopterous insects, namely ants of the genera Camponotus (especially C. vagus), Formica (especially F. rufa), and Lasius (especially L. niger and L. ligniperda). Another staple is cerambycid beetle larvae, varying from few to as much as 20 or 25 percent of the diet. A few beetles of the Scolytidae, Curculionidae, and Elateridae are

*In Korea, Dr. Won (personal comm.) reports it strips bark from dead trees, more so than does javensis.
Dryocopus martius

429

eaten occasionally, as are some lepidopterous larvae, tipulid flies, and Gastropods. Rarely, Black Woodpeckers eat eggs of other birds, as reported by Hasse (1961; eggs of Goldeneye, Bucephala clangula).

Voice. Vocalizations and drumming have been discussed by Blume (1961 and earlier) and by Cuisin (1967), as well as by Short (1973d, pp. 288–292). Demonstration tapping occurs associated with the nest (Blume, 1961); these are rather slow tapping beats against the nest wall, perhaps differing in resonant quality from taps against a more solid substrate. There are three to 12 beats in demonstration tapping, which occurs in the late pair-formation period, and during some nest-relief ceremonies. Drumming is in bouts lasting 1.8 to 2.7 seconds, involving 32 to 44 beats given at 16 or 17 beats per second, but usually showing a speedup in tempo from about 16 to 18.5 beats per second from the initial to the terminal half second of a burst (Blume, 1961; see also Sielmann, 1959). The speedup is of the order of 20 percent, nearly as in D. pileatus. Drumming occurs in establishment and maintenance of territories, occurring in fall, winter, and spring. Vocalizations remain to be clarified, particularly their functional interrelations. The Keeyah Call (the Kijah or Kjäh Call of Blume, 1961, and the Klieu Call of Cuisin, 1967) is a kyeh or kliah note uttered as a call note the year round and resembling the Kew Call of D. javensis. It appears to represent a low-intensity aggressive-alarm note, given from a perch or in flight. It is a long double note, with an introductory fast peaked element, followed by a long “yah” at a constant pitch. The call is 0.6 to 1.0 second in duration, with the initial 0.05 second including the sharp element peaking at 1.7 kilohertz (fundamental tone) and the remainder, a plateau of sound at 1.3 to 1.5 kilohertz. The harmonic tone at 3.4 kilohertz for the peak, and 2.8 kilohertz for the plateau is dominant, the fundamental tone is strong, and there is a weak second harmonic tone. Allied to the Keeyah Call, apparently, is the Klikeya or Klik-je Call (Blume, 1961), a short (“kk” or “koick”) or longer (“kliaeck” or “kilchye”) note employed in conflicts and against models of Black Woodpeckers. I was unable to analyze this call. The Teyak Call (Tiax or Cuisin, 1967; Kijak of Blume, 1961) is a nasal, Jackdawlike (Corvus monedula) note uttered in flight or while a bird is perched, given throughout the year but especially in April and May (Blume, 1961). That author feels that the call serves in species recognition and in intimate contact between members of a pair. It is heard about an active nest and in the fall when members of a pair meet at the roosting area. Possibly the equivalent of a Wicka Call, the Teyak has two parts, a slightly rising initial portion 0.08 to 0.13 second or more in duration and a noisy, dropping terminal part 0.12 to 0.2 second in duration. The rising part is pitched at 1.0 or 1.1 kilohertz (codominant harmonic at 2.2 kilohertz), and the dropping part falls from 1.3 or 1.4 to 1.0 or less kilohertz (codominant harmonic tone drops from 2.5 to 1.8 or 2.8 to 1.6 kilohertz in several European examples supplied by Blume). Blume (1961) mentions the Ryrr Call (Rürr Call), an aggressive call given during conflicts and at meetings of members of a pair, as sometimes during nest relief. Sielmann (1959, p. 17) cites such a call as “rürr-rürr-rürr.” I have no data for analysis. Characteristic of Black Woodpeckers throughout the year is the Kyr Flight Call, a loud kür series (Blume, 1961), a “krrii-krrii-krrii-krrii” (Sielmann, 1959, p. 89), or a “kru kru kru kru kru...” (Cuisin, 1967, p. 294). This is uttered as a localization call to a partner, during territorial establishment, by one bird to another when in flight, and by the incoming adult at nest relief. The call includes four to eight or more connected notes, each note of which has six to 10 connected “r” elements. A call may be 1 to 3 seconds in duration. Elements of the notes vary in pitch, even within a note, but the pitch is maintained between 1.5 and 2.0 kilohertz with harmonics weak or lacking. The variable pitch bestows a wavering quality to the call. I suspect that this
call is derived from the Long Call (notes pitched about as in Kyrr Call and not dissimilar to Long Call of *D. javensis*). The Long Call, or Ouic Call of Cuisin (1967) or Kwik Call of Blume (1961), is a series of notes typical of the pair-formation period, mainly heard from late February to early May in Europe (Blume, 1961) but uttered between January and October overall. In some years (or areas) this call is rarely heard, perhaps reflecting relative permanence of territories and pair bonds among old birds. The call variously may be rendered as a series of 17 to 34 kwik, ouic, kwi, quack, or kwoi (Blume, 1961; Cuisin, 1967) notes, uttered at about five (3.7 to 6.4) per second, lasting 3 to 5 seconds or more. There is a slight speedup in tempo of the notes, which are pitched at 2.0 to 2.5 kilohertz (harmonics are weak) and are 0.06 to 0.16 second in duration. The notes either rise slightly to a peak or are simple, inverted U-shaped. Nestling birds have at least various calls based on an inverted U-shaped or V-shaped note, short versions of which are rendered “kik”; longer, more inverted U-shaped notes, “kuk”; and short series of sharp notes, “ki-ki-di-dit.” The shortest notes are 0.03 second, the kuk notes are up to 0.08 second, and series are up to 0.2 second in duration. The notes peak between 1.5 and 2.0 kilohertz and have strong overtones; most emphasis is on the fundamental tone and initial harmonic tone.

Displays. Various displays were described by various authors, especially Blume (1956, 1961). Complex Head Swinging Displays (for example, Blume, 1956, p. 146, fig. 6b), Head Bobbing Displays (Blume, 1956, p. 146, fig. 6c), and Head Circling Displays (Blume, 1961, p. 99, fig. 18) mark agonistic interactions. Head Swinging, the Kopfschwenken of Blume, involves the side-to-side movement of the head, with the bill pointing at the antagonist or raised above the horizontal (bill in the air). Head Bobbing involves the raising and lowering of the outstretched head and bill toward an antagonist or to one side. The Head Circling Display contains elements of both Swinging and Bobbing, but the head and bill are moved in a tight circle, apparently when two interacting birds are very close together. The Teyak Call is associated with these aggressive displays. Crest Raising also occurs aggressively, as in conflict between an adult male and immature birds during midsummer. A Flight Display occurs about the prospective mate, the wings being held outstretched (Blume, 1961). Bill Directing and other displays are likely to occur but remain to be demonstrated.

Interspecific Interactions. Jackdaws have been known to usurp holes of Black Woodpeckers (Sielmann, 1959). See *D. javensis* for interactions.

Breeding. Nesting takes place in late February to June, with egg laying mainly in April in Europe. Pair formation commences with offering of the roosting hole to a prospective mate, demonstration tapping, Long Calls, drumming, and Flight Displays (Blume, 1961), leading to copulation, which may begin as early as January. The territory is established through drumming and Long Calls and may be 300 to 500 hectares per pair in France (Cuisin, 1972) or 250 to 600 hectares in Germany (Blume, 1961). The nest is placed in diverse large trees (pines, birches, beeches) at a height of 4 to 18 meters, mainly between 6 and 12 meters (Schmidt, 1970). Both sexes excavate, changing every 30 to 50 minutes or more often (Sielmann, 1959, noted 12 changes in 1 hour); one bird may excavate with its mate perched nearby. Sometimes the male performs most of the labor. About 21 to 23 days may be used in construction of the nesting cavity, which may face in any direction. In many cases old nests may be reused, often after enlargement or other modification. Dimensions of the nest are as follows: entrance oval, 11 by 7.5 to 17.5 by 9.5 centimeters; depth, 31 to 55 centimeters; and diameter, 17 to 27 centimeters (Cuisin, 1972). The female crouches with head lowered and stretched and wings drooping for copulation (Blume, 1961, p. 98, fig. 15).
The two to six eggs (Schmidt, 1970) are incubated by both parents for the 12 days required to hatch them. According to Sielmann (1959), changeover occurs every 70 to 90 minutes but every 90 to 150 minutes according to Blume (1961). The incoming bird often gives the Kyrr Flight Call as it flies to relieve its mate; demonstration tapping, Ryrr Calls, and Teyak Calls may mark some changeovers. After the young are hatched, the parents feed them by regurgitation—a total of 12 or 13 times a day at 20- to 90-minute intervals; two or three young may be fed at one feeding. The adult touches the pad or swelling on the side of the naked, blind nestling's bill before it opens the bill; the adult then pumps food into the open bill. By the time they are 10 days old, the nestlings climb about readily and are fed at the entrance of the nest. Fecal sacs are carried from the nest by both parents. The young fledge in about 28 days (Blume, 1961). They follow the adults about, usually one or two birds per adult, and remain with the parent for a considerable time (into September). The annual molt is from late July to early October in Europe and from August to October in eastern Asia.

**Roosting.** In favorable areas a number of birds may roost relatively near one another. These roosting groups of up to seven birds seem to include more than a single family. The flight pattern of an individual to the roost, and often to the nest, is relatively invariable, the bird coming from the same direction each day.

**Migration.** Subject to irruptive migrations at times in Scandinavia (Roos, 1974). Blume (1961) noted dispersal of up to 500 kilometers, suggesting considerable movement of (presumably) subadult birds, if not migration.

**Taxonomy.** Closely related to *Dryocopus javensis* and perhaps more distantly to the *pileatus* group of the Americas (see Short, 1965d). Its range closely approaches that of *D. javensis* in southwestern China, where it seems to occur at higher elevations; in Korea it is sympatric with *D. j. richardsi*, from which it differs in its broader, paler bill; black underparts; black back and rump; lack of a malar mark in males; lack of a white wing patch; presence of red on the head in females; and the darker, deeper red of the head in males and females compared with males of *javensis*. Interactions of these two forms in sympathy would be interesting to document. Both are rare in Korea, but they are very similar in size and proportions, differing in bill shape (thinner bill in *javensis*, broader bill in *martius*); hence perhaps they feed differently. Their color differences in sympathy, particularly the differences in head markings, suggest that these species interact behaviorally, for *D. j. richardsi* differs from all other forms of *javensis* in head pattern. There is clinal variation in size within northern *D. martius*, birds from southern Europe and Caucasus being smaller than Scandinavian and northern Siberian birds and those from eastern Asia averaging larger than European Black Woodpeckers, thus confirming the findings of Voous (1961) and Vaurie (1959a). The differences range up to 8 percent (bill length, Scandinavian versus southern European woodpeckers) in one case, but are clinal and overlap is too great to permit racial treatment of southern (European “pinetorum”; Japanese “*silvifragus*”) or eastern Asian (“*reichenowi*”) populations apart from nominate *martius*. The isolated western Chinese-Tibetan population, *khamensis*, reluctantly is recognized, chiefly on the basis of its distinctly blacker plumage than *D. m. martius* and its geographic isolation from the nominate race. There is a difference in bill length, *khamensis* being 10 percent shorter billed than the large, eastern Asian populations of *martius*, but there is no other mensural difference, and southern European and other southern populations of *D. m. martius* have the bill barely averaging longer than in *khamensis*. 
References

Genus Campephilus G. R. Gray

The 11 members of this neotropical genus of large woodpeckers are marked by black and white (or cream or cinnamon) plumage, a strong crest, a pale wing patch, and specialized bill and tail. The bill is long, broad, straight, and chisel-tipped, and it varies from black to ivory colored; the nostrils are in lateral slits, covered by feathering. The tail is dark, and the central two pairs are very concave below and hardened throughout with long, stiff tips. The fourth toe is elongated, much longer than the anterior toes, and the hallux also is long. Males tend to have much red on the head, even an all-red head. Sexual dimorphism involves the head, or crown, and crest, which are red in males; females show less or no red on the crown (but in some cases their black crest is longer than the red one of males).

POWERFUL WOODPECKER

Campephilus pollens

Color Plate 79

Range Summary. Northwestern South America.

Diagnostic Features. Large, wing length 164 to 190 millimeters. Black bill, face black with white stripe, crown red or black with slight crest; back white or cinnamon; underparts cinnamon with black barring and black patch on breast.

Description. Long, chisel-tipped bill, slightly curved along culmen, broad across nostrils. Above, black scapular regions and uppermost back black, forming a patch bordered by a narrow, white (often with a few black-barred cinnamon feathers) stripe on each side continuous with neck stripes; middle to lower back white with some cinnamon feathers (often bearing black bars) at sides and rear (pollens), or generally cinnamon to cinnamon-white with scattered, sometimes moderate black bars (peruviana). Uppertail coverts black (pollens) or black with a few fine cinnamon bars (peruviana). Wings black with broad to narrow white bars on inner vane of flight feathers and moderate white tips to those feathers; underwings dull black with white bars, coverts form large white patch. Shafts black above, blackish brown below, and dull white at bases of tail feathers. Tail with only 10 feathers, black, rarely with a white mark or two near tips of outer feathers; shafts strong, central four feathers especially sturdy and narrowed toward tips. Tail/wing ratio 0.64 to 0.72. Head black, at least from edges of crown through ear coverts and lores, and to forehead; white stripe from feathers of nostril and base of lower bill back along upper malar region, below eye and along sides of neck, where each divides in two, one band continuing onto back and the other bordering the black breast patch. Chin, lower malar, and throat black. Below, breast black, bordered on sides by white band coming from sides of neck; lower breast to abdomen bright cinnamon, barred with chordate to straight black bars, pronounced on lower breast and moderate on sides and flanks, but usually weak on center of abdomen. Undertail black with fine cinnamon bars.
**Campephilus haematogaster**

Sexual features: Male with red from rear of forehead over crown to small crest and nape and hindneck (red feathers have black bases and narrow white bar or streak before giving way to red, and the white and black may show through). Female lacks red, having entire forehead to hindneck black. Immatures very like adults but have longer, more lax feathers of the crest; browner and duller black on the wings; buffier; more extensive back barring; grayer and less bright cinnamon background in underparts; and broader ventral bars. The sexes are as in adults. Eyes white to pinkish, legs and feet gray, bill black.

**Distribution and Habitat.** Slopes of the Andes Mountains from westernmost Venezuela and Colombia south to Ecuador and Peru, chiefly at elevations of 4000 to 12,000 feet. Favors wet montane forest and “cloud” forest, often on steep slopes.

**Behavior.** Very little is known of this woodpecker. Birds usually are in pairs, and they work over the trunks of forest trees. Apparently, Powerful Woodpeckers use the double drum tap found in other species of the genus (drum taps heard in areas where this was the only large woodpecker). A “pee-yáw, pee-yáw” call is closely similar to that of *Campephilus magellanicus* and resembles the comparable call of other *Campephilus*, including *leucopogon*. Breeding activities are unreported. Immature birds are known from various localities in Colombia between dates of 10 June and 23 September and from August in Ecuador. Molting birds from Ecuador were taken between June and August, indicating a breeding season in March to August. Colombian specimens in molt bear dates in September and October.

**Taxonomy.** Related rather closely to *Campephilus haematogaster*, which also occurs along the Andes in the same region, but at lower elevations. Both species share various features of plumage pattern and have relatively less massive bills than other species of *Campephilus*. *Campephilus pollens* is distinctive by virtue of its 10 rather than 12 tail feathers and its lack of red color in the female. Two subspecies, weakly defined, are recognized. Peruvian birds (*C. pollens peruviana*) have strong cinnamon to cinnamon-white rump and middle back regions, usually with considerable barring; the black uppertail coverts often show some cinnamon bars. *Campephilus pollens pollens* is the northern form, ranging from Ecuador to Colombia and Venezuela. It has the midback to rump white with little or no cinnamon and usually weak barring; the uppertail coverts show no cinnamon bars.

**Reference**

**CRIMSON-BELLIED WOODPECKER**

*Campephilus haematogaster*

**Color Plate 79**

**Range Summary.** Northern South America.

**Diagnostic Features.** Large, wing length 166 to 195 millimeters. Black bill, black and white face, red crown and short crest, red rump, and bright to dull red underparts distinguish this species.

**Description.** Bill long, chisel-tipped, almost straight along the culmen, and broad across the nostrils. Above, black to brown-black on broad scapular areas along sides of back, but cinnamon-white with (splendens) or without (haematogaster) black bars on upper back; lower back to rump with broadly red-tipped feathers obscuring their whitish to cinnamon- and-black-barred bases; uppertail coverts black. Wings black or brown-black with large white
to buffy white spot-bars on inner vanes of flight feathers and at their tips; black and white barred below, with white coverts. Shafts black above to brownish horn colored below. Tail black, the middle four feathers being very sturdy and narrowed toward their tips. Tail/wing ratio 0.50 to 0.62. Crown red (bases black) to weak crest, hindneck, and sides of neck; black line over eye to rear and in front of eye around edge of forehead to bill; ear coverts with black line in lower portion surrounded by a short cinnamon-white line above and a long, cinnamon-white line from the nostrils and lores, under the eye, and along the sides of the neck. Lower malar region, throat, and chin black. Below, sooty black feathers moderately tipped red, but with weak to very strong buff and black bars between the black bases and red tips (which are longer in fresh plumage, hence birds redder). Undertail coverts black.

Sexual features: Females with red of head and neck as just described. Males more extensively red on sides of neck, the red covering the pale stripes on the sides of the neck (haematogaster) and even extending beyond to pervade the entire rear of the throat (splendens). Immature birds are blacker (sooty), less barred, and less red below; the dorsal black is browner in tone; and the anterior crown is blacker with less red than in adults. Sexes as in adults (red sometimes restricted anteriorly). Eyes red-brown, skin around eyes black, legs and feet brownish black, and bill black.

**Distribution and Habitat.** Panama and Colombia southward along the lower Andean slopes to eastern Peru and western Ecuador. It occurs in lowland forest, but only near the base of mountains, and on forest slopes as high as 4600 feet in elevation.

**Behavior.** Very little known. Wetmore (1968) noted that it ranges through the undergrowth and lower levels of tall trees in dense forest and higher up in trees where the forest is more open. The birds often perch quietly, without moving or calling. Stomach contents noted by Wetmore include weevils, beetles, larval beetles of boring species, including longicorn larvae up to 150 millimeters long. The Crimson-belly drum taps with a double rap, as in others of this genus. Calls (Wetmore, 1968, p. 582) include “low, chattering calls” as the birds forage, a low rattling call “similar to that of” Campephilus melanoleucos malherbii, and loud squealing (birds captured in nets). Nesting takes place during March to May in Panama, in December in Colombia (Cauca Valley), and in September to April in Ecuador. Molting Panamanian and Colombian birds are known from February (molt commencing) to September (end of molt). Ecuador specimens in molt represent diverse months (December, January, April, July, October).

**Taxonomy.** Related rather closely to *C. pollens*, which occurs at higher altitudes in the same region. Two subspecies of *C. haematogaster* are *splendens* of Panama, northwestern and western Colombia, and western Ecuador; and *haematogaster* of eastern Colombia to Peru. The northwestern *splendens* is more barred below (less red tipped) and above, and the crown is more black and less red. Males have red tips on the black throat feathers, whereas *haematogaster* males have an all-black throat. The tail also is proportionately (to the wings) shorter in *splendens*.

**Reference**

RED-NECKED WOODPECKER

Campephilus rubricollis

Color Plate 80

Range Summary. Northern South America.

Diagnostic Features. Large, weight 178 to 236 grams (Surinam, Brazil), wing length 169 to 206 millimeters. Black above with a mainly red head and crest and unbarred rufous underparts. Wings have cinnamon-rufous patch; bill largely pale.

Description. Bill long, chisel-tipped, broad across nostrils, almost straight along culmen. Above, black to brownish black, neck to uppertail coverts. Wings black, the flight feathers with a large cinnamon-rufous area on at least the inner vanes of flight feathers (rubricollis), but extending to the outer vanes and thus showing up as a patch on the closed wing in trachelopyrus; rarely the flight feathers bear small cinnamon-white tips; underwings largely rufous-cinnamon, darker on coverts, with black tips of flight feathers. Shafts black above, except chestnut in wing areas having rufous patch; below, blackish brown, becoming pale horn colored at base of tail and cinnamon in wing areas having rufous patch. Tail black, four middle feathers narrowed, all feathers with strong shafts; below, browner. Tail/wing ratio 0.56 to 0.65. Head mainly red; see discussion of sexual features that follows. Underparts entirely rufous-cinnamon (rubricollis) to rufous-chestnut or even chestnut (trachelopyrus), without barring; anterior breast feathers tipped red, the red extending farther onto lower breast or even to abdomen in some birds, especially in trachelopyrus.

Sexual features: Head, crest, and neck of male red except for small white and black spot at lower rear ear coverts. Female red in the same areas, except for a large, tapering white patch from the nostrils and bill to the lower rear ear coverts, and also a black line above the white patch from the forehead, under the eye to the rear of the ear coverts, and another black line along the lower malar region under the white patch, connecting across the chin along the edge of the bill. The red feathers of the neck, throat, and ear coverts (both sexes) have a bar, which is colored cinnamon, and a black base — the barring often shows through, especially in worn-plumaged birds. Immatures resemble adults but are duller, the black being browner and the red more orangish. Immature females are like adult females but have more black in the black facial markings, the black crossing the forehead and even being visible on the anterior crown; immature males differ from adults in having a white facial patch (as adult females, but lacking the black borders), although there usually are some red feathers among the white ones. Males also have mixed black and red on the throat. Eyes yellow, legs and feet blackish gray, bill grayish white to ivory.

Distribution and Habitat. From Venezuela and Colombia through eastern South America, south to eastern Peru, northern Bolivia, Mato Grosso and Maranhão. Favors lowland dense forests, avoiding open or cut-over areas, rarely up to 4000 feet in elevation (Mt. Roraima, Venezuela).

Behavior. Virtually unknown. Feeds on larvae of beetles and moths in trees. Breeds in February to July in the Guianas (rubricollis), during November in Ecuador (intergrades of rubricollis and trachelopyrus), and during September along the Urubamba Valley of Peru (trachelopyrus), excavating an oval hole in a tree. The annual molt takes place at various times, indicated by these data: rubricollis, July to October in the Guianas, June to December or even February in Venezuela, September in Colombia, and July to December in northern Brazil; trachelopyrus, July to February in Peru; and olallae, September to February in
Bolivia, June and July on the Tapajoz River, August and September on the Xingu River, November and December on the Tocantins River, and September to February along the Lower Amazon River.

**Taxonomy.** No very close relatives. Polytypic, with three subspecies. Nominate *C. r. rubricollis* of the Guianas, Colombia, and Venezuela to Ecuador and the north bank of the Amazon River is the smallest form, tends to be a pale rufous below, and has a more restricted rufous wing patch that does not reach the outer vanes of the outer several primaries. In the west from northeastern Peru to La Paz, Bolivia, occurs the large, dark (more chestnut) *trachelopyrus*, with a large rufous wing patch that includes the outer vanes of the outer primaries. These two races intergrade in Ecuador, northern Peru, and northwestern Brazil. The area south of the Amazon from Para west to the Madeira River and to Cochabamba, Bolivia, is occupied by populations very like *trachelopyrus*, but somewhat smaller (intermediate between *trachelopyrus* and *rubricollis*) and brighter in red and rufous colors; these form the subspecies *olallae*, rather weakly defined.

**ROBUST WOODPECKER**

*Campephilus robustus*

**Color Plate 80**

**Range Summary.** Central eastern South America.

**Diagnostic Features.** Large, weight 230 to 263 grams, wing length 175 to 204 millimeters. Fully barred below with black wings and tail, a cinnamon-tinted white back, and a moderate red crest; head, including neck and throat, is red in males and red with a black-bordered white stripe in females. Bill dark based, but “ivory” at tip.

**Description.** Bill chisel-tipped, virtually straight along the culmen, and broad across the nostrils. Above, white, tinged cinnamon to fully cinnamon from neck to uppertail coverts; black bars tend to encroach on sides of back and where cinnamon-white meets red of neck. Wings black with windowlike cinnamon spots on inner vanes of flight feathers; below, cinnamon on coverts and spots of flight feathers, otherwise blackish brown. Shafts black above, brown below. Tail black, middle four feathers narrowed, especially at tips, and all feathers with strong shafts. Tail/wing ratio 0.60 to 0.69. For head colors, see discussion of sexual features that follows. Underparts from red of neck to undertail coverts barred black on buff to buffy white, the black bars broad (equal to or broader than pale bars) on breast and narrower to the rear, especially on the abdomen. In some birds the abdominal barring approaches obsolescence; hence there is great contrast with the strongly barred breast and flanks.

Sexual features: The male has the entire head, crest, and neck red, except for an oval spot, black below and white above, at the lower rear of the ear coverts; in females the head is mainly red, but there is a white stripe, V-shaped tapering to the rear, from the nostrils and lower bill along the upper malar region to the rear of the ear coverts—except at its lower rear edge and at the bill, the white is bordered narrowly with black (front of chin and partway along sides of throat and across front of forehead to lores and under eyes). In both sexes the red feathers have buffy white and black basal bars that often are visible on the surface, especially along the neck and at the ear coverts. Immatures similar to adults but duller and browner on wings, more white on back, less darkly barred below, and undertail not barred. Both sexes are similar to adult females in pattern, but males show some red-tipped feathers
Campephilus [melanoleucus] guatemalensis

coming into white-and-black-patterned areas of the face. Eyes ivory white to yellow; legs and feet gray; bill dusky horn above and at base, becoming ivory below and at the tip.

**Distribution and Habitat.** East-central South America from Goias, southern Bahia, and Espírito Santo south in Brazil to Rio Grande do Sul, and west to western Parana and to Misiones, Argentina, and eastern Paraguay. Found in subtropical forests of lowlands and hills, usually below 3500 feet but up to 7200 feet in Minas Gerais. Found in cut-over forest only where large trees have been left standing.

**Behavior.** Not well known. The woodpeckers forage high in large trees, excavating, tapping, pecking, and probing at the bark. Birds often fly to dead or dying trees in the open where the forest is being cut. Their feeding is noisy because of the loud whacking sounds of the bill. The climbing stance of _robustus_ while feeding is with the head held far out from the trunk and the legs held laterally. A double drum tap is characteristic of this species and is given from any site, whether on a horizontal limb, a live tree, or a dead tree. One to three drum taps may be given per minute. The only known vocalization is a single kee or kew note given while foraging or in flight. Displays include Wing Spreading, as two males chased about the trunk of a tree with wings out, apparently not calling. Breeding takes place during September and October in Misiones, Argentina; and young birds are known as late as December. Molting occurs from February to April in the south and, earlier, from November to February farther north.

**Taxonomy.** I am not certain of the relationships of _C. robustus_, which appears to be essentially allopatric or parapatric with the possibly somewhat closely related _C. melanoleucus_. Comparison of a large series of Misiones specimens with birds from elsewhere in the range of the species demonstrates that there is a cline in size, with larger birds occurring in Paraguay, along the Parana River of Parana, in Misiones, and in Rio Grande do Sul. Northern birds are smaller (Goias, Bahia, Minas Gerais), and “intergradient” populations occur in Parana and São Paulo. However, the difference is only of the order of 5 to 6 percent in wing length, and there is considerable overlap, so I prefer to treat _C. robustus_ as monotypic.

**Reference**

**PALE-BILLED WOODPECKER**

_Campephilus [melanoleucus] guatemalensis_

**Color Plate 81**

**Range Summary.** Middle America.

**Diagnostic Features.** Large, weight 205 to 244 grams in _guatemalensis_ and 263 to 282 grams in _regius_; wing length 172 to 208 millimeters. Bill pale, head and crest mainly or entirely red (black throat in female); the feathering at the lateral and ventral base of the bill is red. Black above with white stripes from neck to upper back; black breast, barred lower breast and abdomen. Lacks distinct black and white patch on sides of head.

**Description.** Bill long, straight, chisel-tipped, broad across nostrils. Above, black, sooty, or blackish brown, occasionally with some barring (whitish) on lower back and rump, and with converging buffy white to white stripes coming from neck to a point on the midback, which sometimes shows a few spots or bars; uppertail coverts pale tipped, sometimes slightly white barred. Wings blackish brown to black, flight feathers tipped white; bases of flight
PALE-BILLED WOODPECKER

feathers with area of white, yellowish white, or buffy white, forming with underwing coverts a large whitish patch beneath the wings. Tail black, except bases of feathers, which are white; central four feathers narrowed, especially toward tips, and shafts strong; below, paler, brown, even yellow-brown. Feather shafts brown above, except whitish at bases in wings; below, white, becoming brown at tips of tail. Tail/wing ratio 0.52 to 0.62. Neck black with white stripes on sides, commencing at rear of malar area on head and continuing onto back. Underparts barred from lower breast to undertail coverts, the dark bars varying greatly in depth and in color (black to brown), but generally much deeper anteriorly; throat to upper breast black to blackish brown, varying in extent rearward on breast.

Sexual features: Crest and entire head of male red, showing white at rear of malar where neck stripe begins and a dusky red area at the rear of the ear coverts; often some black and white barring shows at the surface (bars at bases of red feathers). Female has black forehead (to bill) and center crown rear to the center of the crest and has a black throat; red is found on the chin (base of bill only), about the nostrils and base of the bill (upper and lower) on the sides, around the eyes, along the malar area, over the ear coverts (dusky at lower rear), and from the sides of the crown to the sides and rear of the crest and hindneck (some barring often visible in the red areas). Immatures browner than adults; red of head is more orangish; the border between the breast patch and barred area is indistinct, and the bars are less regular and somewhat vague on a browner background; the bill is darker (gray-black) than in adults. Sexes initially differ very little, males having the brown-black crown, forehead, throat, and lores of females. Male specimens soon show some red feathering in the throat and on the crown (but nestling birds probably cannot be distinguished sexually, as the throat red may appear later). Eyes creamy buff to yellow; grayish to brown in immature birds. Bare skin around eye grayish. Legs and feet greenish gray to gray, with yellowish underside of toes. Bill horn colored to yellow with grayish or bluish base (darker gray in immature birds).

Distribution and Habitat. Middle America from Tamaulipas and southern Sonora, Mexico, south to westernmost Panama. Found in lowland forest, but favors edges and riverside forest, woods in savannas, and even dry tropical woodland, where it tends to occur in moister sections. Occurs up to 5000 feet in southern Middle America, but reaches 6500 feet in Guatemala and up to 8000 feet in Jalisco, Mexico, in subtropical and even montane forests (usually in upper canyons that contain plants typical of lower elevations). In some areas it frequents coffee plantations and mixed woods and pastures.

Foraging Habits. Insect food is obtained at all heights in trees, mainly on larger branches and trunks, but it is versatile and able to feed on small branches. Feeding is by excavating and by the scaling away of loose bark on dying branches. Low stumps and logs sometimes are visited, the woodpeckers cutting holes in the bark. Members of a pair apparently forage rather close to each other throughout the year. Sutton (1951) mentioned its scattering about of bark as it foraged. Larval beetles, especially of the Cerambycidae and Scarabeidae, comprise a large part of the diet and are fed to the young. Otvos (1967) mentioned extensive feeding on a species of the genus Croton, which contains pain-killing alkaloid substances; no insects or signs of insects were found in fresh or old work attributed to this woodpecker, raising the intriguing question of what it was seeking. Captive birds have been maintained for up to two years on mealworms, with an occasional grape or raisin (Throp, 1957). Berries form part of the diet of wild birds (Skutch, 1969).

Voice. A double drum tap is the characteristic drumming of this and many species of Campephilus. It is the only species in its range to make such a sound. Skutch (1969, p. 441)
described a soft, longer series of drums, perhaps associated with the nest site or a potential nest site. Several vocalizations have been described. Begging young birds out of the nest give a “high, bleating note” (Skutch, 1969), apparently similar to that he mentioned as the common call of adults. This call was compared by Skutch to that of *Campephilus principalis*. Other calls described by Skutch are low, whining notes of a pair at the nest; a low, moaning or whining call of a male apparently seeking a nesting site; and a peculiar call of a male replacing its mate during incubation — a low “keen keen keen keen keen.” Slud (1964, p. 195) cited two calls; the first is a rattlelike call noted as “a reedy rattle that sounds as though the reed were not only loose but about to fall out”; and the second, a rapid “heh-heh-heh.” Slud also mentioned its whirring wings, possibly serving a signal function, as the birds varied their flight from a silent flight to the noisy whirring movements.

**Displays.** Visual displays are unknown, except for Crest Raising (see later discussion).

**Interspecific Interactions.** No information is available about its possible contact with the almost extinct *Campephilus imperialis*, and with *C. melanoleucos*, although indications are that they meet or once met in Panama. No interactions have been observed with the rather similar *Dryocopus lineatus*, which feeds somewhat differently and has different calls, drumming, and behavior. Wetmore (1968) mentioned their feeding in the same areas without apparent competition. *Campephilus guatemalensis* in some places, as in Costa Rica, nests in the wet season, raising young earlier than *Dryocopus lineatus* (Skutch, 1969). However, see *Dryocopus lineatus* for a case in which both nested in the same tree at the same time in Nayarit, Mexico.

**Breeding.** The breeding season varies from region to region. Dates of eggs are few, and most breeding is determined from juvenal birds, giving later dates than from eggs. Young are out of the nest from late March (Tamaulipas) to late July (Jalisco) in Mexico, involving all subspecies. The same period covers breeding in birds of Guatemala. One young bird from Honduras was taken in February. March to May covers the dates of Nicaraguan birds. Skutch indicates nesting from August to December, with young out of the nest as late as January and February in Costa Rica, and Panama birds breed generally at the same time (see following). Both sexes excavate the nesting cavity, which is situated in a large, live tree or a dead stub of various trees, including palms, at various heights to 40 feet. Only two eggs are known to be produced, or at least no more than two young or eggs have been reported. Both sexes incubate the eggs. A low, whining note (Skutch, 1969), accompanied by Crest Raising of both adults, marks the changeover of adults. Incubation periods are of great duration. Skutch found that one male incubated from quarter after noon until early the next morning, almost 19 hours at a stretch, and the female of the pair incubated for a 4 1/2-hour period during the day. Hatchling birds have an “egg tooth,” a projection on the longer, lower bill, used in breaking the egg shell, and have enlarged white knobs at the corners of the mouth, perhaps an aid in directing the feeding movements of adults. Young birds also have large tarsal pads full of projections, on which they rest. Food is fed directly, not by regurgitation. Little is known of the time spent by the young with adults, but it probably is a very long period. Molting follows the breeding season, in April to October in Tamaulipas (race *regius*), May to August elsewhere in Mexico, June and July in Guatemala, as late as October in Honduras, March to October in Nicaragua, July to October in Costa Rica, May to September on the Panamanian mainland, and in January and February on Panamanian islands (Cebaco, Sevilla).

**Roosting.** Adults roost separately, excavating their own roosting cavity that resembles the cavity excavated for nesting.
**Taxonomy.** The three allopatric woodpeckers *Campephilus guatemalensis*, *C. melanoleucos*, and *C. gayaquilensis* form a superspecies. Of these, *guatemalensis* shows a reduction of face patterning and increased red color of the head. Their distributions virtually are parapatric, suggesting that they meet and interact. I admit no more than three subspecies, although several more have been treated by others. Occupying northeastern Mexico south to Veracruz, *regius* is large, with a bill length frequently over 50 millimeters (culmen) and wings from 190 (187 in females) to 208 millimeters. Somewhat smaller, but mensurally overlapping with *regius*, is *guatemalensis*, which occurs from Veracruz to western Panama, except in western Mexico. I find this form too variable to permit separation of subpopulations ("buxans"). Northwestern Mexico from Sonora to Oaxaca forms the range of *nelsoni*, slightly smaller on the average than *guatemalensis*, with a somewhat browner (partly due to fading in generally xeric environments) plumage, whiter coloration (less buffy tone) under the wings and on the back, and a tendency, pronounced northwardly, for moderate barring (brown and black) on the lower back and rump. The last trait appears in some birds of all races. Northwesternmost Mexican birds have been separated ("dorsofasciatus") on the basis of their lower back and rump barring, but this represents a strong tendency that does not in itself warrant their racial separation from *nelsoni*.

**Reference**


---

**CRIMSON-CRESTED WOODPECKER**

*Campephilus [melanoleucos] melanoleucos*

**Color Plate 81**

**Range Summary.** South America.

**Diagnostic Features.** Large; weight 193 to 284 grams; wing length 161 to 181 millimeters in *cearae*, 176 to 204 millimeters in other races. Crested red or red and black head with white around base of bill and (female) rearward along face; throat and chin black. Barred below except black on upper breast. Black above with white neck stripes reaching back. Bill blackish to ivory.

**Description.** Bill slightly curved along culmen, broad across nostrils, chisel-tipped. Above, black with two white stripes converging from sides of neck to midback; where they meet there often are some black spots or bars on buff or buffy white. Wings black, flight feathers tipped white, and bases of flight feathers with white inner vane, ventrally forming with underwing coverts a large white patch. Feather shafts blackish brown above, paling to gray-white at base of covert; below, white, becoming horn colored at tips of wings and black toward tip of tail. Tail black, middle four feathers much narrowed, especially toward tips, and with sturdy shafts. Tail/wing ratio 0.56 to 0.62 in *cearae*, 0.57 to 0.67 in others. Throat black; feathers about nostrils and sides of upper and lower bill white or cream colored (see discussion of sexual differences that follows). White stripe from malar area along side of neck to back. Below, upper breast black adjoining throat, becoming barred on midbreast to undertail coverts, blackish brown bars deeper anteriorly; background buffy white to cinnamon-buff (*malherbit*).

Sexual features: Male with red crown, crest, hindneck, and sides of head; narrowly black at front of forehead; red on middle and rear of malar area, except an oval black and white
patch formed from white at upper rear of malar and black lower edge of ear coverts. Female has red restricted to sides and rear of crest and hindneck, posterior sides of crown, and upper ear coverts, the red extending around the eyes, almost encircling them in *malherbii*; forehead to crest black, the black center of crest longer than red crest of male; lower ear coverts black; and white stripe from nostrils and lower bill along malar area to sides of neck (and to upper back). Immatures as adults but variable, usually with darker buff to cinnamon background below, barring often heavier, black color is browner, crest shorter and red more pinkish, less bright; usually show black stripe along ear coverts, bordered by white below (malar stripe) and with a white stripe above, between ear coverts and crown. Sexes very similar at first, both having more black and less red on head and black central crown-crest feathers; males show more red than females on sides of head and soon show red feathers in the anterior crown, in the ear covert region (obscuring white line over black ear coverts), and in the malar region. Eyes white to yellow; legs and feet gray to greenish gray; bill ivory, usually with a grayish cast and a blackish base in most races, but dull gray-black to brownish gray in *malherbii*.

**Habitat and Distribution.** From western Panama through South America to west-central Colombia, and in lowlands east of the Andes south to Bolivia, northwestern Argentina, central Paraguay (but not the chaco), Corrientes, Argentina, and Parana and Bahia, Brazil. It favors forest edges and clearings and especially gallery forests in savanna country. In most of its range it is essentially a lowland species, but in western Colombia it occurs up to 8000 feet. It is allopatric and probably parapatric with its relatives *Campephilus leucopogon* (around the borders of the chaco), *C. robustus* (in Parana and Misiones), *C. gayaquilenis* (in southwestern Colombia), and *C. guatemalensis* (in western Panama). Interactions between these species probably affect their distributions.

**Foraging Habits.** Silent and inconspicuous, with a heavy, undulating flight, this woodpecker forages chiefly by excavating for larvae of beetles and moths and for termites, ants, and other insects. According to Haverschmidt (1968), berries also are eaten. Tapping and probing also are employed to a moderate extent, and lateral blows (tapping) are used in scaling bark from dead limbs (Kilham, 1972a). Feeding sites are diverse, including well-rotted stubs, dead and dying branches of live trees of all sizes, epiphytes along tree trunks and branches, and smaller branches and branchlets. In fact, the Crimson-crest is a versatile forager, probably competing to some extent with all small to very large sympatric woodpeckers that are not primarily ant-eating species. Agile, *melanoleucos* is able to work under limbs, delivering powerful blows, as well as pecking atop branches and on trunks. It appresses the legs to the bark somewhat out from the body, although less so than *C. leucopogon* and *C. robustus*.

**Voice.** The drumming of this species is the drum tap, including an initial loud blow followed by one or several softer blows, typical of at least several woodpeckers of this genus. Drum taps may be given at a rate of two to three per minute. Both sexes drum tap (Haverschmidt, 1968). A longer form of drumming, seemingly demonstration drumming, takes place at or within the nesting cavity, as a signal to the male. Kilham (1972a, pp. 29-30) described this rapid drumming, which he called “drum-tapping.” The common call note according to Wetmore (1968, p. 580) is a “chis seeh chis seeh.” I heard a “wink-at-chew,” repeated four times by a male accompanying a young female in Argentina. Kilham (1972a, p. 31) summarized vocalizations of Panamanian birds. The localization call is a “ka” note. Alarm and excitement result in Ka-warr and Kwirr-ah notes resembling the Kwee-yar, Pee-yaw, and Kee-argh calls of other species of *Campephilus*. So-called intimate notes
(Kilham, 1972a) are double-noted "wuk wuk" or "uh uh" calls uttered when birds are interacting at close range, as in the changeover of mated birds during incubation. Begging notes of a young female were rendered "K-da k-da" by Kilham (1972a, p. 35). That author also noted heavy wing noises of *melanoleucos* as signals associated with conflicts.

Displays. Actual displays have been incompletely described. Crest Raising appears to be an important display, serving during interactions between mated birds and agonistic encounters. The crest indicates clearly the sex of the bird (black center in female), and probably its aggressive intentions. Kilham (1972a, p. 30 and fig. 2) noted the curling over or forward erection of the crest, but this seems likely to be more prevalent in females, which have a longer crest than do males. Wetmore (1968, p. 580) noted paired birds frequently displaying to each other "with rapid movements of the head, accompanied by repetitions of their usual note *chis seek chis seek.*" The head movements are not described, but may be swinging or waving movements. Bill Touching Displays are frequent in mated birds and accompany Crest Raising as one bird bends to touch the bill of its mate (Kilham, 1972a, p. 32). The Bill Touching Display often precedes copulation, and during coition the male sometimes reaches down to touch the female’s bill. A female invites copulation by perching crosswise on a more or less horizontal limb and crouching. Conflicts between individuals of the same sex have not been described in detail but appear to involve few or no vocalizations. Kilham (1972a, p. 36) mentioned a Wing Spreading Display used by a male to prevent supplanting by an attacking male. Distinct sounds of wing beating often accompany aggressive interactions as the birds move about.

Interspecific Interactions. Kilham discussed (1972a, p. 37) usurpation of the nesting cavity of a pair of Crimson-crested Woodpeckers by a pair of Collared Aracaris (*Pteroglossus torquatus*), involving no overt aggression. In the same publication Kilham treated interactions of *Campephilus melanoleucos* and *Dryocopus lineatus*. In Panama these similarly sized picids seem to nest at different times of the year and show other differences that suggest they compete and hence have evolved behavioral differences that minimize interactions. Their territories overlap. Interactions noted by Kilham involved no displays, although an instance of supplanting of a Lineated Woodpecker by a Crimson-crest was noted.

Breeding. Excavation of nesting cavities is by both sexes (Kilham, 1972a). The site usually is a large stub of a live tree, but living tree branches and trunks probably also are used. Many cavities excavated by the woodpeckers probably are lost to toucans and to various mammals. Nesting takes place from November to April in Panama and in Colombia (*malherbii*), but I have seen August juveniles from Chocó, Colombia. Breeding in *C. m. melanoleucos* takes place as follows: in the Guianas, December to March (Haverschmidt, 1968); Venezuela, April to August; Ecuador, April; Peru, August to October; Bolivia, May to August; northwestern Brazil, July; northern Brazil, July; Amazon River area, August to December; Madeira River, May; Mato Grosso, November; and Argentina, September to November. East Brazilian *cearae* nests in November and December. The eggs number from two to three and possibly four, but usually only two young survive to fledge. Adults are quiet about the nest and incubate for periods up to 4 hours or more at a sitting. Males incubate at night. Both sexes brood and care for the young, but it is not known what they feed the young. Kilham (1972a) observed no food carried to nestlings in the bills of adults. Fledged young move about with the adults and may associate with their parents for nearly a year. Adults have been observed feeding large grubs, probably coleopterous, to young out of the nest. Pairs are territorial,
probably throughout the year. Molting follows the breeding season, that is, in April and May in Panama, March to July in Colombia, August on Trinidad, April to June in Guyana and Surinam, October to December in French Guiana, January to June in parts of Venezuela, April to September in Ecuador, July to November in Peru, December and January in the Rio Negro area, August to November in the Amazon region, February to June along the Madeira River, November to March in Mato Grosso, December to February in Goias, January to May in Maranhão, October in Bolivia, and November onward in Argentina.

**Taxonomy.** Forms a superspecies with *C. gayaquilensis* and *C. guatemalensis*, with which it appears not to overlap in range. These species differ in color markings of the sexes (see gayaquilensis). From *guatemalensis*, which possibly may meet it in western Panama, *melanoleucos* differs in having a dark bill (subspecies *malherbii*), a white area around the base of the bill, less red on the head, a shorter tail relative to wing length, and (in males) a black and white "ear patch" that is muted (dusky) in *guatemalensis*. *C. melanoleucos* overlaps broadly with *C. rubricollis* in the only instance of extensive sympatry within this genus. Otherwise, *melanoleucos* seems allopatric or overlaps marginally with its congeners, as for example *C. leucopogon*, *C. robustus*, and *C. haematogaster*, as well as its allspecies *gayaquilensis* and *guatemalensis*. Where it approaches *leucopogon* at the borders of the chaco, *melanoleucos* favors richer, usually riverine forest, or, as near Puerto Casado, occurs on densely forested hills, whereas *leucopogon* is in the drier, flatter chaco woodlands. Several races of *melanoleucos* are recognized, of which three may merit such treatment. Distinctive is *C. melanoleucos malherbii*, of western and northern Colombia and Panama. This subspecies differs from the others in its dark rather than pale bill, possibly an effect related to its probable contact in Panama with pale-billed, closely related *C. guatemalensis*. The race *malherbii* also is characterized by more extensive red around the eyes and more cinnamon-buff color of the underparts. Intergrade specimens of *malherbii* and *melanoleucos* are known from Villavicencio at the eastern base of the Andes Mountains and at Barrigán along the upper Meta River, both in eastern Colombia; and a possible intergrade specimen also was seen from Caqueta, Colombia. The nominate race ranges through northern South America east of the Andes Mountains southward to Bolivia and Brazil. A small form, *cearae*, with a proportionately shorter tail and measurements (wing length) about 11 percent less than in *melanoleucos*, occurs in Ceará, Piauí, Maranhão, and Bahia, Brazil. A vast area, including Goias, Mato Grosso, Bolivia, Paraguay, and northern Argentina, is occupied by Crimson-crested Woodpeckers generally intermediate in size between *melanoleucos* of the Amazonian region and *cearae* of eastern Brazil, although within these intermediate populations there may be a clinal increase in size southward (specimens from Corrientes, Argentina, match *C. m. melanoleucos* in size). The intermediate populations might be treated as a separate subspecies, for which *albirostris* is an available name, but I see no point in formally recognizing these intermediate populations, which bear no distinctive features and are highly variable.

**References**
GUAYAQUIL WOODPECKER

*Campephilus* [melanoleucos] *gayaquilensis*

Color Plate 81

**Range Summary.** Western South America.

**Diagnostic Features.** Large, weight 230 to 253 grams, wing length 175 to 190 millimeters. Head and crest red with black throat and (female) white face stripe; below, barred brownish black on a buffy to cinnamon-white background. No barring in blackish wings. White stripe from neck onto back. Bill blackish.

**Description.** Bill long, broad between nostrils, slightly curved along culmen, and chisel-tipped. Upper back with shield-shaped black mark bordered by white stripes that lead forward to the sides of the neck; lower back varies from black in center, barred buff and black on sides, to nearly fully black and buff barred; uppertail coverts blackish brown with buffy tips. Wings nearly black on coverts to blackish brown or brown on flight feathers, the inner vanes of which have a vaguely bordered cinnamon-white area; below, coverts white grading into dull cinnamon-white patch at base of flight feathers, which otherwise are brown. Shafts horn-brown above and dull brownish white below, whiter on flight feathers, browner at tips of tail feathers. Tail brownish black to brown, paler below, the central four feathers narrowed and strong shafted. Tail/wing ratio 0.59 to 0.66. See Sexual features, following, for head colors. Below, black on anterior breast (to throat), becoming buff to whitish buff or cinnamon buff with brown bars that are variable in depth but always narrower posteriorly; undertail coverts buff with several bars.

Sexual features: Male with red crest and top and sides of head to sides of neck and throat border with malar region (throat black, occasionally with red intrusion from sides); small black and white oval spot on lower ear coverts. Female red from forehead to crest, lores, around eyes, and most of ear coverts; small black patch at lower rear of ear coverts; broad white stripe, rarely with a trace of red, from nostrils (barely) and lower bill along malar area to sides of neck (and backward to back); throat black from chin to breast. Red feathers on head with narrow buff bars and black bases that sometimes show on the surface. Immatures tend to be less barred on the lower back and underparts and on feather shafts. Immature males resemble adult males but have the white face patch (usually with some red feathering) typical of adult females. Immature females are distinctive; the white face stripe and black throat are as in adult females, but there is a white spot on the rear of the head at the sides, black around the eyes and in a line back to the hindneck, and black from the bill across the forehead and crown to the center of the crest, forming a bicolored crest (see, for example, *C. leucopogon* and *C. melanoleucos*), the remainder of which is red. Eyes yellow; legs and feet greenish gray to gray-brown; bill blackish above, grading to gray below.

**Distribution and Habitat.** Western South America along the lower Andean slopes and Pacific lowlands from Nariño, Colombia, through western Ecuador to northwestern Peru. It occurs in dry forest wherever there are suitably large trees, ranging from the coast up to at least 5000 feet (in Peru).

**Behavior.** Unknown. I have seen immature birds from Ecuador in September, and an immature nearly in adult plumage from Ecuador was taken 19 December. The annual molt occurs from December to May (Ecuador).

**Taxonomy.** Similar to its close relative *C. melanoleucos* and forming a superspecies with it and *C. guatemalensis*. Differs in several features from *melanoleucos*, including browner over-
all coloration and, most importantly, in head color of the sexes. Females of *gayaquilensis* have red almost like that of males of *melanoleucos*, lacking the black crown and black crest of *melanoleucos* (and *guatemalensis*) females. Males of *gayaquilensis* lack white about the nostrils and front of the malar region. These sexual differences between the two forms probably would pose a serious problem for interbreeding of *gayaquilensis* and *melanoleucos*, and this is my basis for maintaining *gayaquilensis* as a separate species.

**CREAM-BACKED WOODPECKER**

*Campephilus leucopogon*

**Color Plate 82**

**Range Summary.** Central South America.

**Diagnostic Features.** Large, weight 203 to 219 grams, wing length 170 to 190 millimeters. All black below and on lower back, with cinnamon-white patch on upper back; head and crest mainly red in male and black, white, and red in female. There is a pale cinnamon wing patch, and the bill is ivory colored.

**Description.** Bill long, essentially straight along culmen, chisel-tipped, and very broad across nostrils. Above, white tipped with pale cinnamon-white on upper back, becoming all black (sometimes showing black bars in the area of changeover) on midback to uppertail coverts. Wings black with pale cinnamon patch, visible in flight, formed by large marks in that color on inner vanes of flight feathers near their bases; underwings black with pale cinnamon patch in flight feathers and a cinnamon to white, narrow, often somewhat finely barred patch at the bend of the wing. Shafts black above, except pale horn-brown at bases of tail feathers; below, brown to horn colored (base of tail), except pale cinnamon adjacent to wing markings. Tail rather short, black, central four feathers narrowed, especially toward tip, with strong shafts. Tail/wing ratio 0.50 to 0.58. For head colors, see discussion of sexual features following. Underparts entirely black.

**Sexual features:** Male with almost entire head, crest, and foreneck red, the extent of red on neck varying, and with an oval "cheek" patch, black above and white below. Female has black forehead, lores, crown, hindneck, and center of crest; the crest itself is longer than that of male; also black below eyes to lower ear coverts; white patch from nostrils and base of bill (laterally) rearward, tapering to a point below the rear of the ear coverts; narrow black band on lower malar and edge of throat connecting across at chin; red on sides of head from rear of eyes to nape, forming the rear edge of the crest and connecting around rear of white patch along malar area to throat, which is red from rear of chin to hindthroat, its posterior extent varying. Immatures resemble adults, the black being barely if any browner; the extent of red on the head is less than in adults, sex-for-sex, and the red is usually paler and often more orange. Males show black on the forehead and under the eyes to the lower ear coverts and have considerable black on the chin, throat, and neck; there is an adult femalelike white patch from the nostrils and bill to the lower rear of the ear coverts, but this area shows some red feathering intermixed with white. Immature females at an early age show red only at the rear sides of the crown and under the crest (this red is less extensive than in the adults); the white facial stripe is entirely bordered by black, and the throat is all black or shows only a few traces of red. Eyes pale yellow, legs and feet gray, and bill the color of ivory.
Distribution and Habitat. South-central South America from north-central Bolivia (Cochabamba) south through western and central Paraguay to La Rioja, Córdoba, and Entre Ríos, Argentina, and to westernmost Rio Grande do Sul, Brazil. Its range includes all of the chaco (xeric) woodlands, including its extension toward Rio Grande do Sul and Uruguay, subtropical forests of Tucumán and La Rioja, and dry valleys of Bolivia to an elevation of at least 5600 feet (Chilon, Santa Cruz, near Cochabamba border).

Behavior. This powerful woodpecker forages by excavating and tapping in trees, its blows resounding through the dry woods. Sites from the tops of trees in woods to isolated pasture trees and fallen logs are utilized. Movements on trees are by hops, with the feet held predominantly out to the sides. Its foods include predominantly larval beetles. A drum tap, two loud consecutive taps, is delivered against a vertical tree trunk. When drum tapping, the woodpecker perches quietly with its head far out from the trunk, and it reverts to the watchful pose after tapping. The only known vocalization is a Pee-yaw Call, the double note often being repeated and frequently in conjunction with drum tapping. The nesting has not been described. Nest holes are oval and frequently are excavated in palm trees. Breeding takes place in September, with young out of the nest as early as 30 September (Corrientes, Argentina), but more often in October to December. The annual molt follows the breeding season, lasting from February to May.

Taxonomy. This species has no very close relatives and probably is related to the C. melanoleucos group and to C. magellanicus. It is allopatric with its congeners, except perhaps very marginally (I know of no proven sympathy) with C. melanoleucos, which closely approaches the range of leucopogon in northern Corrientes, Argentina; in northern Paraguay; and along the base of the Andes in Bolivia. A southwestern race, C. l. major, has been described from the Tucumán region (Salta to La Rioja) on the basis of its larger size. I find that Tucumán and Salta birds average about 5 to 8 percent larger than specimens from the northern and eastern parts of the range of C. leucopogon, but individual variation is great and overlap in wing length, tail length, and bill length almost is complete (the longest winged birds I have seen are from northern Paraguay). I see no purpose in maintaining two subspecies and consider the species monotypic.

Reference

MAGELLANIC WOODPECKER
Campephilus magellanicus

Color Plate 82

Range Summary. Southern South America.

Diagnostic Features. Very Large, largest South American woodpecker; weight 276 to 363 grams; wing length 205 to 228 millimeters. The only very large woodpecker in its range, and the only black one; black with white wing patches and red head and crest (male) or red around bill (female).

Description. Bill long, culmen slightly curved, broad across nostrils, chisel-tipped. Entire neck, body, wings, and tail brown-black to black, except as follows: Uppertail coverts usually, and rump rarely, show white, the white in streaks along the shaft or at the base, feathers rarely almost all white. White patch in wings formed by white inner vanes of outer
flight feathers, the white broader on inner secondaries and showing as a white line when bird is perched; the white sometimes shows black barring. Shafts blackish brown above; below, white or yellow-white, especially at base of tail, becoming horn-brown at tips of flight feathers. Tail/wing ratio 0.68 to 0.77. Underparts generally browner, less glossy than back, and often showing narrow, faint white bars on abdomen. Most body feathers are white at their bases; the white sometimes is extensive, especially on sides and flanks.

**Sexual features**: Entire head of male is red, including a curled crest, but red feathers have narrow white and broad black bars at bases that sometimes show at the surface, especially at the ear openings, on the throat, and on the crown. Female has red restricted to area around front of eyes, lores, nostril feathers, front of forehead, front of malar area and chin, thus forming a red ring around base of bill; rest of head glossy black (rarely with a scattered few red feathers), including very long curled crest, feathers of which are narrowed; also, bill about 12 percent shorter than in male, and weight 16 percent less. Immatures similar to adult female but browner, less glossy, crest less pronounced; males have few to many pale red feathers scattered about the head, especially in the malar area. Eyes golden yellow, usually ranging from yellow near the pupil to gold and finally orangish at the outer rim. Legs and feet blackish gray; bill grayish black.

**Distribution and Habitat.** Found in temperate forests of southern South America from central eastern Chile and central western Argentina southward along the Andes Mountains and the Chilean lowlands to Tierra del Fuego. Habitat mature southern beech and southern beech-cypress forests from timberline to the coast wherever suitable habitat exists.

**Foraging Habits.** Living in forests inhabited by only two other woodpeckers: the ground-foraging *Colaptes pitius* and the tree-foraging *Picoides lignarius*, very much smaller than *Campephilus magellanicus*. The last species forages very diversely, feeding along trunks and main branches of the large beech (*Nothofagus*) and cypress (*Cupressus*) trees and also clinging like a small pied woodpecker (species of *Picoides*) to twigs seemingly too small to support its weight. Occasionally, Magellanic Woodpeckers hop on the ground about fallen, rotted logs, also used for foraging. There may be a sexual difference in foraging habits, for several birds clinging to tiny branchlets were all females, and this sex has a considerably shorter bill than do males. Foraging birds on large branches and trunks appress the tail closely to the bark and move by hopping, with legs spread far apart, very much as in *C. robustus*. The four toes tend to be directed forward and laterally, often well spread apart. Pecking was deliberate and not sustained; rather, birds used light taps, some probing, and heavier whacks with the bill. One to three or four strong blows often sufficed to dislodge a piece of bark from a live tree. Workings of this woodpecker varied from scarcely visible holes in the bark to deeply chiseled gouges resembling those made by *Dryocopus pileatus*. Movements of the birds when feeding ordinarily are rapid, with frequent, often noisy (wings flap audibly) flights from tree to tree.

**Voice.** Flight of these birds can be quiet, or noisy, and flapping sounds of the wings may serve as signals to a mate or nearby bird. Drumming is in the form of a drum tap, as in other congeneric species. Drum taps are usually double, sometimes single, loud, deliberate blows, serving to establish and maintain territories, and perhaps as a location sound. Three calls are known for this woodpecker (Short, 1970c). The Picaw Call is a double-noted call uttered usually in series and varying in loudness and harshness as follows: “pi-cád” (usual call), “wieeeer” (longer), “kee-ááh” (softer, less harsh), and “kee-árgh” (harder, drawn out). Probably functioning as an aggressive note, and possibly also an alarm note, this call was directed at me by some birds and was used whenever two or more birds were near one
another. A Toot Call resembles the Kent Call of *Campephilus principalis* but is a less nasal “toot” or “toot-toot.” These notes may serve generally as location notes. They were given sporadically by feeding birds and also frequently introduced series of Picaw Calls during encounters. A long “cray-cray-cray-cray-cray-cray,” possibly directed at me by a male near a nest, is the sole example I have of such a vocalization. Another call, a “peep,” given irregularly, probably was the note of a young Magellanic Woodpecker, uttered within the nest, as calling (Picaw Call) adults fed it.

**Display.** Other than an obvious raising of the crest by the woodpeckers (both sexes) when calling, and whenever two birds were in proximity, I have no information on displays. Crest Raising presumably is important in several ways, showing off the different color (red versus black) and shape (short and bushy versus long and tapered) of the crest in the sexes.

**Breeding.** The breeding season commences in late October, with eggs hatching in November to January and young birds out of the nest in December and January. Cavities for nesting (also roosting cavities) are excavated usually if not always in partly dead large trees. The openings are circular to oval or dropletlike in shape and are found at 5 to 15 meters above ground. One cavity at 5.5 meters up was in a nearly dead, small *Nothofagus* tree 32 centimeters wide at nest height; the hole was 12 by 9 centimeters, the cavity was 40 centimeters deep, and it was lined with wood chips and sawdust. Apparently one to four eggs are laid. I found one nestling alone in one nest, and a laying adult female that we collected showed signs of having laid but one egg. As many as three young have been seen out of the nest. Most adults in forests of Neuquén and Río Negro, Argentina, seemed not yet to be nesting during the last week of November, and their gonads indicated that eggs would be laid mainly from mid-December onward. The sole young bird, a nestling about 3 days old, was obtained on 29 November. No information is available on incubation and care of the young. It may be assumed that family groups remain together for a long time, perhaps until the following breeding season. The molt occurs following the breeding season, from January to May.

**Taxonomy.** The relationships of *C. magellanicus* within *Campephilus* are unclear, but it is extremely unlikely that it is related directly to the large North American “ivorybills.” Rather, *magellanicus* probably evolved *in situ* from an ancestor reaching the region from the northeast. A common ancestor of *Campephilus leucopogon* (which approaches *magellanicus* most closely in its range — the chaco and scrub of western Argentina) and of the *C. melano-leucos* group probably gave rise to *magellanicus* (Short, 1970c), which is monotypic.

**Reference**


**IVORY-BILLED WOODPECKER**

*Campephilus [principalis] principalis*

**Color Plate 83**

**Range Summary.** Southeastern North America.

**Diagnostic Features.** Very large, weight 1 pound (448 grams, one male), wing length 237 to 264 millimeters. Black with white patches in rear of wings; white stripe up neck not completely to bill; red or black crest. Ivory-white bill.

**Description.** Bill long, chisel-tipped, broad across nostrils, slightly curved along culmen. Above, glossy blue-black; white stripes begin at rear of ear coverts and broaden along neck
and sides of back, converging and ending on the midback. Wings black; outer primary very narrow; very large white patch formed on inner primaries and secondaries, commencing at tips of primaries but involving all but black bases of secondaries; underwing coverts and edge of wing also form a white patch, often with few black spots or bars. Shafts black above except white where white patch occurs on wings; below, brownish black, paling to white at bases and white in area of wing patch. Tail black, but some birds have white spots in outer or next to outer pair. Tail/wing ratio 0.58 to 0.66. Head mainly black (see Sexual features), with white feathering of nostrils and along base of upper bill; white stripe variably commences between malar area and ear covert region, at the level of the eye (especially Cuban specimens) or behind the eye (most continental birds). Underparts black, less glossy than back and head, and often brownish on abdomen; between a third and half the specimens show traces of white, rarely moderate white barring in some areas, especially the flanks, sides, and/or abdomen.

Sexual features: Male has red crest and hindneck, the red extending forward on sides of crown to level of eyes, but center of crown and crest is black (red feathers longer, however). Female lacks red and has black crest longer than male's, tending to show a slight upward curve. Bent (1939) claimed that females were larger than males, but seasonally comparable samples (several seasons) indicate that, as usual in woodpeckers, females are slightly smaller than males. Immatures very like adults, less glossy black (browner), with crest shorter, less white underwing, and larger white tips on the wing flight feathers; sexes alike, resembling adult female, but crest not so elongate; red feathering develops in young males between 1 and 3 months after leaving the nest. Eyes cream colored to white, darker in juveniles. Legs and feet light gray. Bill creamy white, or “ivory” in color, even in juvelinal birds.

Distribution and Habitat. Endangered. At present no positive records of this Ivorybill are known in the United States; and, regardless of the existence of any birds there, the chance of a viable population occurring in this country is virtually nil. A small population, perhaps numbering a dozen birds, exists in hilly pine forest of northeasternmost Cuba, and protection measures appear to be permitting the maintenance of this last remnant population. Formerly, the species ranged across Cuba and the southeastern United States from eastern Texas, eastern Missouri, southern Illinois, * Alabama, and southern North Carolina to the Gulf Coast and southern Florida. The habitat in the United States is usually cited as being deep, tall swamp forest. However, it is my view that the species originally inhabited the virgin pine forests of southeastern North America. These pines were cut over rather early, because of their accessibility, probably restricting the Ivorybill to less optimal swamp hardwood forests before the earliest observers rendered reports. It is clear that the Cuban population occupies pine forests; and the Imperial Woodpecker (C. imperialis), very closely related to principalis, is, or was, an upland pine forest inhabitant of Mexico.

Foraging Habits. This large woodpecker feeds on diverse trees by several methods. Much feeding is accomplished on recently dead or dying trees or branches, by delivering hard blows in scaling off the bark of the tree, then extricating exposed insects, mainly beetle larvae. Lateral blows of the bill, flicking of the bill, and prying serve to loosen flakes of bark very rapidly; large areas of suitable trees are divested of their bark. The birds quickly picked up larvae exposed as they scaled the bark, even sweeping the bill to catch the insects when they fall out. In addition to bark scaling, the Ivorybill excavates conical holes or deep (up to 5 inches into a tree) gouges in living or dead trees, apparently also in obtaining beetle larvae.

*There are prehistoric records as far north as central Ohio, J. L. Murphy, in litt.
Fire-killed trees may be scaled, or otherwise used for feeding, and it is possible that chance fires originally provided concentrations of food for this species (fires now largely have been eliminated, or otherwise are strictly controlled). Some feeding occurs in smaller branches, and rarely the birds even descend to the ground, usually to work on the base of a tree. Diverse hardwoods and evergreens are used for feeding. When berries, fruits, and nuts are available, usually in summer and fall, these are utilized heavily for food. Poison ivy berries; hickory and pecan nuts; acorns; black gum, magnolia, and tupelo fruits; cherries; hackberries; grapes; and persimmons are among the foods utilized. Insect foods include engraver beetles (Tomicus); long-horned beetles (Cerambycidae); buprestid beetles (Buprestidae); the cerambycids Stenodontes dasystemmus, probably Neoclytus capraea, and others; probably the scarabeid beetle Dynastes tityrus; and others (Tanner, 1942). Possibly ants also are used on occasion.

Voice. The Ivory-billed Woodpecker drums using the double drum tap typical of its genus, although sometimes only one tap is given. These drum taps may function as a location signal and may also have aggressive functions, as they are given when the birds are disturbed and in response to drum-taplike sounds in the forest. Apparently only a single call, with variations, has been described. The Kent Call is a single or repetitive note, typically a nasal "kent," sounding "between the note of a clarinet or saxophone mouthpiece and a tinny trumpet" (Tanner, 1942, p. 61). One version is a loud "kient-kient-kient," similar in quality to the "kent" note, but slurring upward. This possibly is a contact call. A low, soft "yent-yent-yent" is uttered by mated birds when they are near each other, as during incubation when they change over. Young birds give a buzzing note and a "chirp-chirp-chirp" (Tanner, 1942, p. 62) that probably is the forerunner of the adult Kent Call. A loud noise produced by the wings at times during flight may serve a signal function.

Displays. Very little known. No aggressive displays have been described, although presumably the Ivorybill is territorial. Bill Touching, or even clapping of the bill, seems to be one feature of courtship, one bird bending to touch or grasp in its bill the bill of its mate. Crest Raising surely is a display, as in related species. A photograph (Tanner, 1942, pl. 16) shows an interacting pair at the nest, crests erect and heads held high, perhaps in a Bill Raised Posture or even Head Swinging (these are likely to be aggressive displays). Obviously, much remains to be learned about the Ivorybill.

Interspecific Interactions. Observed interactions with other woodpeckers are few and sparsely documented. Tanner's study (1942) of feeding Ivorybills and Pileated Woodpeckers (Dryocopus pileatus) showed that these species overlap considerably in their feeding modes, but Ivorybills perform much more bark scaling than does the Pileated. I feel that competitive interaction between these species played a role in the reduction of Ivorybill populations. The Pileated is very common in the southeastern United States. Once the original forest habitat, in which these species evolved together, had been modified severely by man, the Ivorybill was forced into secondary habitats and became widely scattered as a result. Stands of trees suitable for bark scaling were no longer available, and this fact probably forced Ivorybills more directly into competition with the Pileated. Individuals of this powerful species can exist in diverse woodlands, but breeding and raising young birds is another matter. A dense population of Pileated Woodpeckers, given that habitat no longer is very favorable for Ivorybills, may act as a deterrent to successful nesting of the latter. It is noteworthy that in parts of temperate Asia, and in Europe, where no ivorybills (Campephilus) are present, the species of Dryocopus (martius and javensis) approach or exceed the size of
Campephilus [principalis] principalis

the North American Ivorybill, and their bills are more massive than that of the Pileated, approaching the bill of an Ivorybill — these species probably fill the niche of both the Ivorybill and the Pileated woodpeckers. Thus, I am pessimistic about chances for establishing a viable Ivorybill population in the presence of Pileated Woodpeckers; and I consider Cuba, where no Dryocopus is found, the main hope for preservation of the Ivorybill.

Breeding. Roosting holes and nesting holes are excavated similarly, except that both adults probably work on the nesting cavity. Birds seemingly mate for life. Excavations are from 15 to 70 feet above the ground. Nesting occurs between January and April, with young leaving the nest from April to June. Entrances to the cavity vary from round to oval and measure up to \(6\frac{3}{4}\) inches (an oval nest, long dimension) across. The nest is 14 to 25 inches deep and up to \(10\frac{1}{2}\) inches wide. One to four white eggs form the clutch. Both sexes incubate, the male doing so at night, with about eight exchanges per day. The incubation period was estimated at 20 days by Tanner (1942). Up to four young have been seen out of the nest with adults, but one or two is the usual number. Both adults feed the young, directly, by carrying one to three or more insects in the bill at one time. A nest with one nestling bird was visited 13 times by the male and 17 times by the female in one day, all visits for feeding purposes. The number of feedings diminishes as the young bird grows older. The male broods the young at night, and he also removes most or all of the fecal material. The young leave the nest at about 35 days of age. Adults feed the young for 3\(\frac{1}{2}\) months or more, and young birds may remain with adults for as long as 8 months. The annual molt takes place between May and September.

Roosting. Old nests are not used for roosting, generally (but in Cuba, at least, nests may be used 2 consecutive years [Lamb, 1957]). Roosting cavities are similar in structure to nesting cavities but are excavated by one bird. Two adult birds appear not to roost together at any time. Young birds do not return to the nest to roost after leaving it, but they may use an old roosting hole of one of the adults.

Taxonomy. Related closely to Campephilus imperialis and forming a superspecies with it. Conceivably the two could prove conspecific. Campephilus principalis is smaller than imperialis, with more white (neck stripes present) and a shorter, less curled crest sex-for-sex, but their plumage pattern is otherwise similar. Both are related to the neotropical members of the genus, and their common ancestor probably evolved from an ancestor in common with that of the melanoleucos-guatemalensis group. Two races of C. principalis usually are recognized, the Cuban bairdi being distinguished from mainland North American principalis by its supposed smaller size and white extending farther forward along the sides of its head. The seven Cuban specimens that I examined are not smaller than C. p. principalis but fall near, at, and above the average for that form in wing length, tail length, and tarsal length. Cuban birds do have a slightly shorter, narrower bill; and only about 20 percent of mainland birds approach them in the extent of white along the sides of the head. The small bill and extended white lines on the face then are the only traits marking the weakly defined bairdi.

References
IMPERIAL WOODPECKER

Campephilus \textit{[principalis]} \textit{imperialis}

Color Plate 84

Range Summary. Mexico.

Diagnostic Features. Largest woodpecker in the world, wing length 292 to 313 millimeters. Very Large size; black body with white patch in rear of wings and white stripes on upper back; head all black with curled crest, or black with red crest. Bill ivory colored.

Description. Bill very long and broad across nostrils, chisel-tipped, and slightly curved along culmen. Entirely black, usually glossed blue, sometimes blackish brown, except as follows: Back with lateral white stripes along base of wings, the feathers of the upper back having white bases. Inner primaries of wings with white tips, becoming all white (bases black) on secondaries to form very large white patch on both upper wing and lower wing. Also, white patch on underwing coverts, mixed with some black (spots). Shafts brownish black, but lighter at base of tail above; brown below except at white bases of wings and bases of tail feathers, which are yellowish white. Tail/wing ratio 0.62 to 0.68.

Sexual features: Male has red crest, the red feathers white at bases, with black crest feathers overlying the red in the center of the crest. Female lacks red and has longer black crest that is curled upward and anteriorly. Immatures as adults but browner with less gloss; white more extensive on wing tips, but less so on secondary feathers, forming the large wing patch; sexes alike at first, some red then appears in young males at rear under the long, black, adult femalalike crest. Eyes yellow, grayish yellow in immature birds. Legs and feet grayish. Bill ivory-white.

Distribution and Habitat. Endangered, on brink of extinction if not extinct. Formerly found in pine forests of northwestern Mexico above an elevation of 7000 feet, from Michoacán north to northwestern Chihuahua. Not known away from mountain pine forests and apparently restricted to uncut forest, which virtually is gone.

Behavior. Almost unknown. Their foraging seems to be like that of \textit{C. principalis}, namely, the scaling of bark from dead trees and excavating of deep, pitlike holes in quest of insects. On larger branches they sometimes cling upside down, working with ease on the underside of the branch. Apparently it drums by drum tapping, as reference is made to the slowness of its loud drumming by Nelson (1898). Its call, described by Nelson (1898, p. 219) as consisting of “queer, nasal, penny-trumpet-like notes,” clearly resembles the Kent Call of \textit{C. principalis}. Nests are excavated in pine stubs usually at considerable heights in January and February, and eggs are laid from February onward. Immature birds out of the nest are known from April to September in Jalisco and Chihuahua. Molting begins in July and is completed in December.

Taxonomy. Forms a superspecies with \textit{Campephilus principalis}. \textit{Campephilus guatemalen-sis}, probably related rather closely to \textit{principalis-imperialis}, occurs at lower elevations in Mexico and probably sporadically meets, or met, \textit{C. imperialis}. The Imperial Woodpecker is monotypic.

Reference
Tribe Picini

Genus Picus Linné

The 13 species of Picus usually are partly or mainly green in color, mostly barred below, and occupy Eurasia. Many of them feed to some extent on the ground. The bill is moderate to long, with feathering covering the nostrils; the culmen is curved to nearly straight; the tip is pointed to somewhat chisel-like and is relatively round in section. The tail is hardened and concave below, and the barbs are somewhat specialized. The fourth toe is equal to or a bit shorter than the anterior toes, and the hallux is about half the length of the fourth toe. Sexual dimorphism affects the color of the crown and malar areas or crown alone or malar alone. Males have red or yellow or black in the malar, such colors lacking in the female, or males have red or more red on the crown than females. One species, miniaceus, shows almost no sexual dimorphism; this species tends toward Celeus in structure and pattern and, to some extent, behaviorally.

Banded Red Woodpecker

Picus miniaceus

Color Plate 85

Range Summary. Southeast Asia.

Diagnostic Features. Small, 79 to 98 grams, wing length 113 to 140 millimeters. Red on wings and crown with long, yellow crest feathers; face brown; pattern below barred brown and buffy white. Throat and breast usually cinnamon-brown. Rump greenish yellow.

Description. Bill rather short, very broad across base, moderately broad across nostrils, curved along culmen, and bearing only a slight chisel-tip. Above, olive on back with buffy or cinnamon-buff bars evident; tips greenish yellow, redder in miniaceus, and mainly red with little barring in niasensis; yellower on lower back, becoming vaguely barred to unbarred on a yellow background on rump. Uppertail coverts olive-brown with a few dull buffy bars. Wings brown on flight feathers with buffy to cinnamon bars on outer vane of primaries and inner vane at base of primaries and in secondaries; coverts, outer vane of secondaries, and outer vane of primaries (basally), red, often with hint of olive. Underwings brown with dull buffy bars. Shafts brown to black above; below, brown in tail with pale shafts and pale brown, sometimes yellowish brown, in wings. Tail with broad feathers, brown or blackish brown, unmarked, and paler below with buffy cast. Tail/wing ratio 0.55 to 0.66. Nape, sides of neck and crown red; rearmost nape feathers are yellow and modified (thin, elongate) and usually bear some brown bars (see Sexual features for rest of head). Upper breast cinnamon-brown, usually unmarked or barred weakly, except in miniaceus, in which it is partly or fully barred and marked with fine pale spots; red tips evident in niasensis; rest of breast and abdomen barred, dark bars brown, often V-shaped, and more or less equal in depth to pale buffy white bars (pale bars deeper in perlatus, although varying individually in depth); sides and flanks more broadly barred. Undertail coverts barred buff and brown.

Sexual features: Male slightly larger with proportionately shorter tail than female; males with brown of face, malar area, and sometimes throat suffused with red. Females lack red on lower ear coverts, under eyes, lores, nasal tuft area, malar, throat, and chin, these areas
varying in (brown) color but bearing fine buffy white spots (brown is dark anteriorly, paler and more cinnamon on throat and rear of ear coverts). Immatures like adults; duller above and below; forehead unmarked brown; ventral pattern less contrasting with large pale spots and irregular brown bars (hence, pale areas deeper than adults’ pale bars); throat and upper breast duller brown, less cinnamon. Males appear to have red crown and nape; females, only hindcrown and nape red. Eyes chestnut to red; legs and feet greenish gray, grayish green, or dull green; bill black above, bluish white to gray below.

**Distribution and Habitat.** Southeastern Asia from peninsular Thailand and Tenasserim, Burma, south through Malaya, to Sumatra, Nias Island, Borneo, and Java. Rarely reaches 2500 or 3000 feet on mainland (Burma) and 2700 feet on Sumatra but occurs as high as 5000 feet on Java and 5500 feet on Borneo (specimen data). Mainly occurs in lowland and foothill dipterocarp forest, but it ranges in low numbers into mangroves, coastal scrub around plantations, and dense secondgrowth forest.

**Foraging Habits.** A rather quiet, inconspicuous woodpecker that forages alone or in pairs (both birds side by side at times) at all levels in vines, fallen logs, stubs, trunks, epiphytes, and branches of forest trees. Utilizing rather few sites, a bird or pair concentrates attention in rotten areas, or in epiphytes, tapping sporadically or probing, with frequent pauses. Gleaning is perhaps the major feeding mode. Most foraging sites are in dense vegetation where their deliberate movements assist in concealment. The bulk of the diet, and in fact the only food cited in the literature, is ants. It sometimes feeds in interspecific foraging flocks, moving for some time through the forest with the flock.

**Voice.** Drumming unknown. The Keek Call is delivered alone or in loose series of several notes. Each note is 0.15 to 0.20 second in duration, with emphasis at 2.0 and 3.5 or 4.0 kilohertz; the note is horizontal or downward tending on a sonagram. Some calls have two peaks. The call is uttered during interactions between birds, but its function is unclear. The Kwee Call is a commonly heard call of one to six or seven notes. Each note is a long (0.35 to 0.42 second), inverted, U-shaped note, with a rapid initial peak followed by a gradual drop. Emphasis is on the first harmonic tone (3.1 to 3.2 kilohertz) and, to a lesser extent, on the fundamental tone. The call may be uttered by a lone bird pointing its head toward the sky, in the manner of *P. puniceus* and *P. chlorolophus*. This may be a territorial call. Faint Wicka Calls or Wickalike calls were given, at least sometimes, during encounters (for example, between two males) as “Kwi-wi-ta-wi-kwi,” “pwi, pwi, pwi, pwi,” and “pe-wew, pe-wew, pe-wew” (Short, 1973d). These seem to be aggressive-submissive notes.

**Displays.** Little known. Crest Raising Displays occur during encounters, with Swinging Displays and Wicka Calls. The more aggressive bird raises the crest more fully. Crest Raising also is employed against other species, as Crimson-winged Woodpeckers (*Picus puniceus*). Swinging is a side-to-side, slow motion of the head and body. A Gliding Flight Display was given by a male exiting from its nest, with wood chips in its bill, and gliding on set wings (few weak fluttering movements) in a curve about the female (Short, 1973d).

**Interspecific Interactions.** Aggression noted between *Picus miniaceus* and *P. puniceus*. A male of the latter supplanted a male of the former, with both birds Crest Raising.

**Breeding.** The breeding season begins in February or March and lasts at least through June in Malaya; young birds from Sumatra date from June and from Borneo, August. The nest is constructed in dead stubs from 15 to 65 feet up. Both sexes excavate, at times side by side simultaneously, but more often the male excavates with the female perched nearby. Occasionally the male flies from the nest, wood chips in its bill, displaying in the female’s
presence, as just described. The male roosts in the nest cavity, giving Kwee Calls at its entrance before emerging from it in the morning. Many nesting attempts fail. Two or three eggs form the clutch. Nothing is known of feeding or care of the young. The annual molt takes place between September and November in Malaya (also Sumatra and Borneo, October molt), from October to March on Nias, and up to January in Thailand and in Java.

**Taxonomy.** Related rather closely to *P. puniceus* and *P. chlorolophus*. There are several subspecies. The mainland birds show a size cline, Thai and Burmese birds (*perlitus*) being 8 percent longer winged than those from Malaya; that subspecies is recognized not on size alone, but because it also shows less barring in the nape patch and more shallow ventral barring (hence paler below). The Malayan, Sumatran, and Bornean populations comprise a single race, *malaccensis*. Bornean birds have been segregated into a smaller form, "*dayak*," and larger *malaccensis*; but I am unable to ascribe a range to supposed *dayak*, and the difference in size (wing length) appears trivial. It seems that highland birds generally are larger than lowland Bornean birds, and this sort of clinal situation is best described, not treated nomenclaturaly. I tentatively maintain the Nias Island form, *niasensis*, apart from *malaccensis*, although these are very similar. Nias specimens show brighter red on the crown and crest, as Ripley (1944) showed; there also is more red across the mantle and on the throat, the rump is brighter, there is more yellowish in the green coloration, and *niasensis* is slightly smaller. Javan *miniaceus* differs from other races in its more barred breast that also bears pale spots; it tends to be longer billed and brighter red dorsally (tending toward *niasensis*) than *malaccensis*.

**Reference**

**CRIMSON-WINGED WOODPECKER**

*Picus [chlorolophus] puniceus*

**Color Plate 85**

**Range Summary.** Southeast Asia.

**Diagnostic Features.** Small, 77 to 96 grams (*observandus* and *soligae*), wing length 117 to 137 millimeters. Red crown and nape with (usually) yellow feathers extending beyond red at rear of nape. Crimson wings, greenish body, few spots on underparts, usually brighter yellowish rump. Male has red malar stripe.

**Description.** Bill moderately long, nearly straight along culmen, with definite chisel-tip, broad across nostrils. Above, yellowish green, tips of feathers more yellow in fresh plumage, becoming brighter yellow (sometimes with trace of red) on rump, except in dark-rumped *puniceus*; uppertail coverts green. Wings appear mainly crimson, but there is green on scapulars (sometimes bearing pale spots) and greenish on inner vanes of inner secondaries; the inner vanes of the coverts and secondaries and all of the primaries (except red edges basally) are blackish brown; there are well-separated yellowish white spot-bars on the inner vanes of the flight feathers and narrow spots on the outer vanes of all but the outermost primaries. Underwing brown with pale yellowish white bars on coverts and bases of flight feathers. Shafts blackish brown, paler at bases; lower surface of shafts paler, even dull whitish brown in wings. Tail brownish black, paler below with olive cast. Tail/wing ratio 0.61 to 0.74.
Forehead to midnape dark red, but bases of feathers olive-gray or blackish, often showing through (mottled), especially at sides and on forehead; rear of nape with elongate, modified feathers forming crest; these usually yellow, but partly red, obscuring the yellow in soligae. Ear coverts olive or brownish olive; throat olive-brown, brownish olive (puniceus), or buffy. Underparts variably green, from deep olive-green to brownish olive (partly discoloration effects?), paling toward throat; flanks variably barred or spotted with buffy white, sometimes nearly obscure; in others extending onto sides. Undertail coverts grayish olive, sometimes with pale bars.

Sexual features: Sexes similar in size. Male tends to have longer, deeper-tipped bill; male with red malar patch, which in females is colored as throat. Immatures resemble adults, but duller, more olive or even grayish and less yellow above and more grayish olive below; ventral markings usually more pronounced and more spotlike, often extending across abdomen and lower breast; and crown generally olive, red somewhat restricted to nape and tips of some lateral and posterior crown feathers. Sexes as adults, although very young males may lack red on the malar or have but traces. Eyes red to reddish brown, with narrow bluish orbital skin. Legs and feet greenish or yellow-green. Bill brownish above, with yellowish margin, below olive-yellow or greenish yellow.

**Distribution and Habitat.** Peninsular Thailand and southern Tenasserim southward through Malaya, Sumatra, Borneo, Bangka Island, and Nias Island to Java. Found in lowland forests, ranging out of them into secondgrowth wherever sufficient tall trees are left. Ranges into foothills, but rarely exceeding 1800 feet, hence not meeting its allospecies, chlorolophus, which occurs in mountains of Tenasserim, central Malaya, and Sumatra. Reaches 5000 feet on Borneo, where chlorolophus is absent (Harrison, *in litt.*).

**Foraging Habits.** Forages singly, or loosely in pairs, predominantly or entirely eating ants obtained by tapping, probing, excavating, gleaning, and prying on the trunk and larger branches of trees. Usually the woodpecker starts foraging on the trunk in the middle of the tree and moves upward to the top, where it may pause to call for awhile before moving onward to another tree. Movement is rather rapid, the bird circling the tree, foraging especially at rough places such as those where lichens grow, and halting for an extended period only occasionally, as at a broken branch. One female fed within a 20-square centimeter area for an hour and a half, tapping, excavating, and mainly “tonguing” up insects (ants, presumably) from the exposed wood. Among sympatric relatives, P. mentalis moves more rapidly and consistently; and P. miniaceus is more stolid, spending much time feeding at a single site or perched inactively (Short, 1973d).

**Voice.** Drums weakly about the nesting cavity and during displays. One tape-recorded burst was 0.9 second in duration and contained 14 beats given at 15.6 beats per second. Individual beats may vary in intensity, with weaker and stronger beats in a single burst. Territorial proclamation, location of mates, and other functions may be served by diverse drumming. A Week-eek Call was uttered during displays between a male and a female and possibly was a Wicka Call. Peew Calls are uncommon, low-pitched, symmetrical notes, 0.25 second in duration, closely resembling the Peew Call of P. chlorolophus and to a lesser extent the Kwee Call of P. miniaceus. Its function is uncertain. The Pee-bee Call is the commonest vocalization, containing two to four or rarely one or five notes, rendered “pee-bee” or “see-boo” or “pee-dee-dee;” etc., uttered from treetops repetitively, throughout the day, but especially in the evening. The calling bird raises its head and bill almost vertically, with head stretched upward, as does P. chlorolophus in giving the Peew Call. The Peew and Pee-bee calls of puniceus seem structurally and functionally related, serving localization and
territorial functions. Individual Pee-bee Call notes are 0.1 to 0.2 second in duration; the first note of a call is longer than the others, as well as usually substantially higher in pitch. Similar structurally to Pee-bee Call notes are the notes of the Long Call, a series of three to 22 simple, inverted U-shaped notes sonographically. Calls last from 1.5 to 11 seconds with a tempo of 1.1 to 2.4 notes per second. The Long Calls are given during interactions and seem more aggressive in connotation and less a localization or contact call than is the Pee-bee Call.

Displays. Few have been reported. Crest Raising Displays are common and are associated to some extent with the Pee-bee Call. A pair perched together, the male drummed, then both called ("week-eek") as they faced each other. Bill Raising (above the horizontal) and a Swinging Display (head side to side) accompanied the calls of these birds. Further details and functional information are lacking.

Interspecific Interactions. I have reported (Short, 1973d) the loss of a roosting hole of a male Crimson-wing to a male Dryocopus javensis that enlarged the cavity to beyond the size usable by the Crimson-wing. An encounter with P. miniaceus is discussed in the treatment of that species.

Breeding. Nesting and roosting sites appear to be in rather small, dead limbs high (20 meters or more) in large trees. A nest with three eggs was reported but not described from Borneo by Smythies (1960); this probably refers to a report by Harrison (in litt.) of a female taken from a nest containing three eggs at Pamada in mid-June. There is a suggestion that the nesting cavity may be developed from the roosting cavity of the male (Short, 1973d). Immature birds are known from two areas of Borneo representing widely different times of the year, that is, June and December birds from Sarawak and July and December birds from Brunei. Other dates are in late November and late April in Sumatra, April to October in Malaya, March to August in peninsular Thailand and Tenasserim, and early July on Nias Island. Molting birds represent Sumatra (April to December, fresh plumage from November onward), Java (November to March), Nias (July), and Malaya (September to March).

Taxonomy. Forms a superspecies with P. chlorolophus, which is a mountain-inhabiting species within the area occupied by puniceus—the two conceivably may meet at an elevation of about 3000 feet, but puniceus rarely if ever reaches that elevation. There is no indication of hybridization between them. I recognize three subspecies: Larger, nominate puniceus of Java is dark in color with the rump barely, if any, paler than the back. The Sumatran, Borneo, and Malay Peninsula observandus is paler green with a distinctly yellowish rump. Borneo birds average smaller, but overlap greatly in size with specimens from Sumatra and Malaya (see Mayr, 1938); hence, they are not recognizable. The Nias Island soligae is still paler, is yellower on the back, the yellow of the crest is greatly reduced and is overlain by red, and the ventral color is grayer (less green).

Reference
LESSER YELLOW-NAPE

*Picus* [chlorolophus] chlorolophus

Color Plate 85

Range Summary. Southern Asia.

Diagnostic Features. Small, 57 to 83 grams (*simlae, chlorolophus, chlorigaster, wellsi*, and *vanheysti*); wing length 111 to 146 millimeters (*wellsi* [111 to 122 millimeters] to *simlae* [137 to 146 millimeters]). Mainly green, varying in shade, with a dark breast, yellow or gold crest, red patch in the wings, and bars or spots on the abdomen. Often white marks on face. Males with red “moustaches” or, if not, with red at least over eyes and on crown, forehead, and front of nape; females with red on hindcrown. Very similar and related *P. punicus* rarely if ever meets *chlorolophus*; it shows much more red in wings, even on coverts, conspicuous when bird is at rest (red of *chlorolophus* is on primaries, usually inconspicuous, barely showing when bird is perched).

Description. Bill nearly straight along culmen, broad across nostrils, and chisel-tipped. Above, green, varying from deep green with slight yellow tinge (*citrinocristatus* group, *chlorigaster* group, and *rodgeri* group) to golden yellow tone on green (*chlorolophus* group); rump usually brighter, with slightly more yellow evident; uppertail coverts as back or brighter, feathers often with black shaft streak. Wings green, brown, and red with white barring on inner vanes of flight feathers; green on inner secondaries, on outer vane of outer secondaries, as fine edge on inner primaries, and on coverts; red dull (maroon) to bright, varying in extent, especially with wearing of green edges (showing more in worn, breeding birds), and located on outer vane of outer secondaries (near shaft only) and basal portion of outer vane of primaries (virtually lacking in outermost primaries); and, primaries and inner vane of secondaries brown to brownish black, with white bars or bar-spots at margin. Underwings brown, barred white basally, coverts olive with white spot-bars. Shafts dark brown or blackish above, paler at base of tail and paler below, especially in wings that show dull whitish or yellowish on shafts. Tail black or brownish black, duller below, often with greenish or dull yellow cast on outer feathers. Tail/-wing ratio 0.65 to 0.83. Long crest, varying from yellow (most races) to golden or even orangish (*chlorolophus*; tendency in *rodgeri*), the yellow nearly hidden by anterior red feathering in *chlorigaster* group; red on hindcrown of both sexes, grading into nape yellow. Ear coverts olive or grayish, with fine shaft streaks sometimes evident. Upper lores to bill and nasal tufts, black. There tends to be a vague white patch behind the eye, white borders the lower part of the eye, and a white stripe occurs from the bill across the lower lores and under the eye. All this white is lacking in the *chlorigaster* group; in the *chlorolophus* group it varies, but the stripe usually is narrow or mottled and incomplete; the *citrinocristatus* group shows only the subocular stripe and it is interrupted; whereas the *rodgeri* group has a well-marked stripe below the eye, but little or no white above and to its rear. Throat very variable, from whitish with brown or olive bars (many of *chlorolophus* group) to mainly olive, gray, or brownish gray with white bars, white streaks, or no white at all (last in few *chlorolophus* and some birds of all other groups). Breast deep green (*chlorigaster* group, *vanheysti*, and some of *chlorolophus* group), grayish green (some of *chlorolophus* group, *longipennis*, and *rodgeri*), or greenish gray (*citrinocristatus* and few *rodgeri*), but middle to lower breast partly barred in *annamensis*. Lower breast and abdomen, as well as flanks and rear of sides, variably barred olive or brownish (or grayish olive) on a dull white background in *chlorolophus* group (bars partly vague, whiter in *annamensis* of that group); all others have abdomen mainly dark in center with
markings (barlike in most, spotlike in chlorigaster group) prominent on flanks and sides, the background color less dark than on the breast, but similar (that is, nearly gray in citrinocristatus, gray-green in rodferi and longipennis, green in chlorigaster group). Undertail coverts barred olive and white, darker in dark-bellied races, paler in chlorolophus group.

Sexual features: Males slightly larger, bill not disparately longer in male; males with malar stripe red except for anterior end (olive, gray), or malar area green with few or no traces of red (citrinocristatus group); males with forehead and sides of (green) crown red, variably extending toward center of crown, except in chlorigaster group, in which entire crown is red (the red feathers are blackish or grayish at bases, often showing through in “mottling” effect). Females lack red on malar patch (malar solidly colored green or, in more barred-throated forms, barred as throat, although appearing darker because of broader dark bars); red on crown restricted variably to sides of the hindcrown at edge of crest or across crest in front of yellow patch, except in chlorigaster group in which entire hindcrown and anterior crest forms a large red patch. Immatures resemble adults, but show more barring on breast, are duller green above, and show less red on the crown than adults, sex for sex. Eyes reddish brown to deep red; bare skin around eyes, slaty. Legs and feet gray-green. Bill generally dull black or slaty, paling to greenish yellow or green at base, especially base of lower bill.

**Distribution and Habitat.** From northwestern India through northern India and Nepal east to Bangladesh (hilly areas), Bihar, Sikkim, Assam, and through most of Burma, northern Thailand, Laos, both Vietnams, and Cambodia; also Fukien, China, island of Hainan, mountains of Malaya and Sumatra, and central and southern India and Sri Lanka. Northern populations especially are associated with foothills, occurring down to an elevation of 700 feet (Burma) and locally reaching up to an elevation of 6500 feet (Ali and Ripley, 1970). In Malaya and Sumatra, restricted to highlands above 3500 feet, there replacing lowland, related *Picus punicus.* Southern Indian and Ceylonese populations occur in lowlands more frequently, but the birds seem more numerous in hilly situations, reaching 6000 feet locally (Whistler and Kinneir, 1934). Frequent diverses forests and plantations. Found in bamboo, secondgrowth scrub, cardamon forests (Sri Lanka), tea forests, rubber and coffee plantations, and terai and bhabar forests (Himalayan hills [Ali and Ripley, 1970]). In some areas it favors heavily wooded ravines with fallen, rotting trees on which it forages, but open secondgrowth, open plantation areas, and even dry forests (Sri Lanka) also are occupied.

**Foraging Habits.** Feeds at diverse heights in trees, down to fallen rotting logs and occasionally even to dung heaps on the ground (Jerdon, 1862, p. 190; W. W. A. Phillips, 1953, indicated frequent ground foraging in Ceylonese birds). Most foraging occurs on the trunk and major branches of trees, but it does not ignore understorey trees and shrubs, and it visits twigs and branchlets on occasion. Foraging is moderately rapid, but some time may be spent working at one site, as a rotten, exposed place on the bark. Generally, coverage is spotty, a bird intensively covering a small area of tree trunk, then flying to a branch that it follows for a short distance, then dropping to another site. These rapid movements well fit the species for foraging in mixed-species flocks. Foraging modes mainly are gleaning, soft tapping, and probing, with some prying and excavating, but rarely is there much noise produced by its foraging. Single birds, especially females, often are found moving with flocks of babblers (for example, Malayan Garrulax, Stachyris, Alcippe, and Heterophasia), drongos (Dicrurus), minivets (Pericrocotus), flycatchers, and other flocking species. Individuals usually forage alone; occasionally the members of a pair forage in rather close approximation. Food is primarily ants, their eggs, larvae and pupae (for example, of formicid Crematogaster
and pyralid *Hapalia* [Ali and Ripley, 1970]), but also termites, as well as beetles occurring in bark and in dung heaps.

**Voice.** Drums early in the breeding season, at least sporadically (Proud, 1958). A distinctive call note has been ascribed to the Lesser Yellow-nape by many authors, rendered variously “a single, loud, sharp ‘chak’” (Betts, 1951, p. 230), “a nasal, rather mournful note cheeuk,” about one second long, from the top twigs of a leafless tree” (Ali, 1954, p. 450), and a “nasal single note cheeuk,” lasting c. $\frac{1}{2}$ to 1 second—reminiscent of call of Black Bulbul (*Hypsipetes madagascariensis*)—repeated monotonously every 15 to 30 seconds, often for 10 minutes or more at a stretch, while the bird is clinging motionless to a bare branch at the top of a forest tree” (Ali and Ripley, 1970, p. 193). The last authors note that this call is given by both sexes, and “at each call the bill is raised to an angle of c. 45°, and the head turned from side to side as if expecting a response, and yellow nape fluffed out into prominence” (this delivery is virtually identical to that used by *P. puniceus* in giving the Pee-bee Call). I render this the Peew Call, a wailing “pee-a” or “pee-ew” (Malaya, West Bengal, India). Those recorded on tape last 0.32 to 0.55 second and vary from sonographically sharply peaked notes with a tapering downward ending to a down-tending, nearly horizontal note. The peak is at 3.5 to 3.8 kilohertz. This call is functionally like the Pee-bee Call of *P. puniceus*, acting as a localization note, and is delivered in the same manner as that call, but structurally it instead resembles the Peew Call of *puniceus*. A possible Wicka Call of *chlorolophus* was described by Stuart Baker (1927, p. 18) as a “low chuckling sound, rapidly repeated” between a male and female; he reported, “I once watched a pair in the dusk alternate pursuing one another and uttering this (‘chuckling’) note until coition took place.” A Long Call, rendered “kwee-kwee—” was heard from Malayan birds, but I did not succeed in recording it on tape. The several examples contained eight to 10 slowly delivered, loud kwee notes. Presumably this is a territorial call.

**Display.** The only display known is Crest Raising, in which the crest is erected. This occurs whenever two Lesser Yellow-napes are close to each other, when uttering the Peew Call, and at times when flying from one to another foraging site. Apparently it is a mild threat display.

**Breeding.** Nesting takes place during April and May in northern India, from January to May (mainly March and April) in southern India, about that same time (February to July, mainly March and April) in Sri Lanka, June and July in Burma, and April and May in Thailand. The nest is excavated in a dead tree or branch, usually within 5 meters of the ground, but occasionally to 10 or 12 meters. In Sri Lanka nests were found in Grevillia trees (*Grevillia robusta*) and Albizia trees (*Albizia moluccana*) in tea plantations near woods. Often, small dead branches are used, and the opening frequently is placed beneath a bracket fungus. The opening is especially small, just under 2 inches in diameter, barely allowing the birds to enter. The cavity measures about 9 inches deep and 3 by 3 inches in diameter. Both sexes excavate the cavity, and share in incubating the three to five, or (in southern India and Sri Lanka) usually one or two, occasionally three, oval eggs. There is no information about feeding of the young or the time spent in the nest. Family parties break up soon after the young are able to forage effectively (see, for example, Betts, 1934), and such groups are rarely encountered by observers. Molting occurs following the breeding season, during September and October in India, August to December in Sri Lanka, September to November in Thailand, July to November in the Vietnams, in March in Sumatra, and in April in Malay.

**Taxonomy.** Forms a superspecies with allopatric *P. puniceus* and is altitudinally separated from the latter in Malaya and Sumatra. A possible instance of interbreeding with *P. xanthopygaeus* was reported by W. W. A. Phillips (1953, p. 127) in Sri Lanka. I recognize four sub-
species groups in this variable species. The *chlorolophus* group includes *simlae* of the western Himalayan foothills of India; *chlorolophus* of eastern Nepal, northeastern India, Burma, Thailand, Laos, and North Vietnam; and *annamensis* of South Vietnam, Cambodia, and southeastern Thailand. Birds of this group are strongly barred below with a full golden yellow nape, a full white facial stripe, and bright golden green plumage. The largest race, *simlae*, is 8 to 10 percent winged and longer tailed than *chlorolophus*, with a more lemon-yellow nape and a greener, less yellow back. The widespread *chlorolophus* has orange or gold in the nape patch and a more golden green back. I merge “*chlorolophoides*” and “*burmae*” in *chlorolophus*, as well as Laotian “*laotianus*” (the last represents a population clinally intergradient toward *citrinocristatus* and *annamensis*). Eastern *annamensis* (including “*krempfi*”) shows more red on the crown, is darker green, and is smaller than *chlorolophus*. The *chlorigaster* group includes central and southern Indian *chlorigaster* and Ceylonese *wellsii*. These are smaller than birds of the *chlorolophus* group; they are much darker green, show more pale spotting than barring below, have a reduced pale face stripe, and have more red on the crown, restricting the yellow nape. The insular *wellsii* lacks a white face stripe, is still darker than *chlorigaster*, has more red in the wings, has reduced pale spotting below, and has red obscuring most of the yellow nape patch. The *citrinocristatus* group also includes two races: *citrinocristatus* of Fukien and the Tonkin area of North Vietnam and *longipennis* of Hainan. These have reduced barring ventrally and are sooty gray below with little green; the male’s malar patch is reduced to a trace of red, or is absent, and the nape is lemon yellow, not golden. The form *longipennis* is separated from *citrinocristatus* by its slightly smaller size; greener, less gray breast; and more evenly barred flanks and sides (its isolation makes it worthy of recognition despite these rather minor differences). Finally, the *rodgeri* group includes Malayan highland *rodgeri* and *vanheysti* of Sumatran mountains. These are dark, resembling the *chlorigaster* group, but showing less red on the head, a strong white facial mark, and more barring and less spotting below; from the *citrinocristatus* group it differs in greener coloration and the presence of a well-developed malar patch in males, as well as a golden tinge in the nape patch. Sumatran *vanheysti* resembles *rodgeri* but is yellower, is less dark green above, and is brighter green and less sooty gray on the breast and abdomen.

References

CHECKER-THROATED WOODPECKER

*Picus [mentalis] mentalis*

Color Plate 86

**Range Summary.** Southeast Asia.

**Diagnostic Features.** Small to Medium, 88 to 113 grams (*humii*), wing length 118 to 147 millimeters. A green woodpecker with red wings and a yellow nape. The throat usually is streaked or spotted (“checkered”); the breast is chestnut or rufous. No bars or streaks except for throat and rufous-barred wings.

**Description.** Bill moderately long, curved along the culmen, somewhat broad across nostrils, and chisel-tipped. Above, yellowish green, less yellow in *P. m. mentalis*; rump slightly brighter (more yellow); uppertail coverts sooty olive basally, tipped with bronzey green or
yellow-green. Wings with green on scapulars and inner secondaries, also on covert feathers near bend of wing; rest of coverts and outer vanes of most secondaries and inner primaries, red, brighter in *mentalis*, the red masking a pattern of bar-spots near the shafts of the flight feathers; inner vanes of most secondaries and entire outer primaries blackish brown with rufous-chestnut bars or bar-spots. Underwings barred brown and cinnamon, with greenish in coverts. Shafts black above, paler below with rufous tinge at base of tail feathers and on wing shafts (which pale to whitish at tips). Tail black or brownish black. Tail/wing ratio 0.66 to 0.78. Crown green, olive-green, or sooty olive, often with rusty edges (sides of crown and forehead rufous in *mentalis*); nape with long yellow feathers, but anteriorly rusty tinged or (*mentalis*) extensively rufous-chestnut, covering most of restricted yellow feathers. Ear coverts and lores are mixed green and rusty. Breast rufous-chestnut, extending onto sides of neck; rest of underparts variably yellowish green, with bronzy or sooty tinge (less yellow and bronze evident in *mentalis*).

Sexual features: Sexes similar in size, but males slightly larger, with proportionately longer bill (9 percent longer); males with malar area olive or blackish bearing buffy white or white spots, grading into a similarly white-spotted black throat in *mentalis* or a black-and-white-streaked throat in *humii*. Females chestnut-rufous on malar area and with chestnut extending from malar area to sides of neck and onto throat, and especially the chin (in *mentalis*, chestnut covers most of throat, leaving only small streaked patch at rear; hence, breast, throat, neck, malar, and sides of crown are all rufous-chestnut). Immatures resemble adults but have rufous suffused over entire underparts, more green in wings. Sexes probably alike in earliest juvenal plumage, resembling adult female; then males assume spotted malar feathers. Some red often is evident on the nape. Eyes reddish brown to brown; olive bare skin around eye; legs and feet blue-gray to olive; bill black above, gray below.

**Distribution and Habitat.** Lowlands of southeastern Asia from southern Thailand and Tenasserim through Malaya to Sumatra, Borneo, and Java. Occurs in primary forest especially where moist conditions or other factors favor dense undergrowth; occasionally it occupies dense secondgrowth. A lowland species, it ranges into foothills and has been recorded up to 3600 feet in Malaya, although rarely reaching that elevation. In the absence of its close relative, montane *P. flavinuch*a, in Borneo and Java it occurs up to 5500 feet or more.

**Foraging Habits.** Prefers the upper understory and low canopy level, although sometimes foraging higher or lower than the 3 to 15 meters at which it normally is found. Trunks of smaller trees, low branches of large trees, saplings, and vines are favored by this very active, agile woodpecker. Its foraging is seemingly erratic, with only a short time spent at one site before the woodpecker flies to another site. It often crisscrosses back and forth across its earlier path. Participation in mixed-species foraging flocks is an expected outcome of its rapid foraging, and it frequently joins such flocks of warblers (Sylviinae), babblers (Timaliinae), and flycatchers (Muscicapinae). Paired birds usually forage alone; or, if near each other, they feed several trees apart. Foraging modes include gleaning and probing, chiefly, with some tapping, prying, and rarely excavating. The woodpeckers may flutter or hang upside down in gleaning for insects. Concentration is on small areas, and the birds bound away from these, move upwards or sideways, drop back, flutter off to another tree, or move tangentially. Rarely do they tap or excavate for some time at one site, as a rotten stub. In Malaya and Indonesia, where related *P. puniceus* and *P. miniaceus* are sympatric, *P. mentalis* forages more rapidly and at lower levels than the former and much more actively moves about than does *miniaceus*. Harrisson (*in litt.*) reports crickets, roaches, beetles, ants, earwigs, grasshoppers, and green berries in its diet.
Voice. Drumming is in bursts of 0.75 to 1.5 seconds, sometimes put together into two bursts separated by a very brief pause. There are 19 to 23 beats per second, thus more rapid than in *P. puniceus*. I was uncertain of the precise functioning of the sporadic drumming heard in Malaya during my visit there. A Pook Call is a single note, inverted U-shaped sonographically, with concentration of sound at 2.5 to 3.1 kilohertz. The note is 0.07 to 0.2 second in duration and varies somewhat, sounding like "pook," "kyick," or "kwik." It appears to be an aggressive and localization note of low intensity, given when a bird is disturbed or when its mate calls. The Keek Call is a single note or series call uttered when two birds approach each other. An alarm function may be served by the single note. The single notes are longer, lasting 0.37 second, whereas series keek notes are 0.19 to 0.31 second in duration. The peaked note drops and is extended terminally. Sound is concentrated at 2.7 to 3.1 kilohertz in series keek notes, with weak overtones; single Keek Call notes have at least one strong harmonic tone additional to the fundamental tone. Series Keek Calls last 1.05 to 3.5 seconds, with notes uttered at 2.25 to 2.81 notes per second. Some series calls are preceded by a Pook Call; and when this occurs, the initial keek note following it is intermediate between a Pook and Keek note, showing the similarity of these calls functionally as well as structurally. The Long Call of this species, heard but several times, resembles that of *P. flavinucha*, but notes are lower pitched and more rapid; they are faster and higher pitched than notes of the Long Call of *P. vittatus*, which also is similar. The only tape-recorded call is represented by 23 of the 49 notes counted in the call, the 23 notes being given in 2.35 seconds (9.8 notes per second). No function can be ascribed definitely to this call as yet.

Display. Crest Raising is the only known display; it is conspicuous whenever these woodpeckers fly from site to site, as well as when members of a pair are near each other.

Interspecific Interactions. Three cases of active association of Ferruginous Babblers (*T. chastastoma bicolor*) with a Checker-throated Woodpecker suggest that this may be a common association. Two, two, and three babblers were involved, the birds perching quietly near the woodpecker when it paused, but fluttering beside it to grasp insects startled by the woodpecker as it moved about. The incidents lasted from 10 to 30 minutes, with the babblers maintaining close contact with the actively moving woodpecker. No other birds were nearby, and the cases did not involve mixed-species foraging flocks. Such associations may afford some additional protection to the woodpecker, as well as foraging opportunities for the babblers, which might glimpse potential predators that the busy woodpecker may not see soon enough.

Breeding. March and April is the breeding season in Malaya, February to June covers that period in Borneo, and nesting occurs perhaps as early as January through August in Java. Little is known of nesting. Up to three eggs are laid in a tree cavity in Malaya. There is no information about care of the young. Molt follows breeding, in May to October in Borneo, in June in Malaya, and during March in Java.

Taxonomy. Forms a superspecies with allopatric *P. flavinucha*, which occurs only in highlands in the area adjacent to that occupied by *P. mentalis*. I recognize two races: (1) Larger (longer wings and tail), but proportionately shorter billed, *mentalis* of Java, which has males with white-spotted black throat and females with chestnut expanded over the throat, restricting streaks of throat to a small area. Also, this race has a paler yellow nape that is nearly hidden by red-tipped and cinnamon anterior nape feathers; the back is duller green, but the red of the wings is brighter. (2) Smaller *humii* of Malaya, peninsular Thailand, Sumatra, and Borneo has the throat fully streaked black and white and differs from *mentalis*.
in the other ways just suggested. I synomize “saba” of southern Borneo with humii because of the trivial size difference (at most 5 percent) and my failure to find valid color distinctions; all but a few extremely small southern Borneo birds are indistinguishable from those of northern Borneo.

Reference

GREATER YELLOW-NAPE

*Picus [mentalis] flavinucha*

**Color Plate 86**

**Range Summary.** Southern Asia.

**Diagnostic Features.** Medium to Large, 153 to 198 grams (*flavinucha*), wing length 132 to 185 millimeters. Green with a yellow or gold crest, an all-dark or checkered hindthroat, unmarked greenish gray underparts, and barred black and rusty wings that may show red. Male with yellow or yellowish “moustache,” sometimes throat as well; female with chestnut on moustache and sometimes throat.

**Description.** Bill moderately long, curved along culmen, slightly chisel-tipped, and wide at base, although only moderately wide across nostrils. Above, green, varying from bright yellowish in *flavinucha* to deeper green in *mystacalis* group; rump as back, or barely paler; uppertail coverts as back. Wing coverts mainly green, darker than back (bases of feathers may be barred rufous and black); innermost secondaries similar, with rusty bars on inner vanes; rest of secondaries and inner primaries barred with rufous, the large bars reaching the outer vanes, where reddening, even reddish in *mystacalis* group and some *flavinucha*, but outer margin usually green (reduced in eastern *flavinucha*). Outer primaries blackish brown barred broadly with chestnut-rufous, reddening to form reddish patch on outer vanes (obscuring bars) in *mystacalis* group; bars extend to tips in *ricketti* and most *styani*, are reduced in *mystacalis*, and are very narrow in *korinchi* (which has more brownish, less rufous barring). Underwings paler, brown and rufous-cinnamon; coverts cinnamon or whitish with brown bars. Shafts blackish brown with chestnut cast at tail base and in wings where bars occur; brown below with pale shaft streak, even whitish at wing tips, and cinnamon on sides where wing bars occur. Tail blackish above, browner below tinged with greenish cast on outer feathers. Tail/wing ratio 0.67 to 0.84. Ear coverts deep olive-gray, or blackish; sides of neck darker. Crown variable, olive to green, with rusty tipping (the rust showing reddish cast) that may extend over the entire crown (hence olive-rusty in most birds) or that mainly occurs on forehead and forecrown (some eastern *flavinucha* and *korinchi*). Hinderown feathers are elongated and partly obscure orange-gold to yellow nape (there is much individual variation, only general geographic tendencies, *wrayi*, *mystacalis*, *styani*, and *ricketti* having a yellower crest than others). Rear of throat usually deep olive, even blackish olive with narrow white (or white and rufous) streaks at the feather margins, these streaks terminating before the tip such that the dark center of the feather expands at the tip (hence “checkered” pattern), but pale streaks reduced in *mystacalis* group and only traces are found in *mystacalis* and *korinchi*. Upper breast olive or blackish olive, paling posteriorly to gray in *flavinucha* and *pierreii* but remaining olive-gray in others or even becoming green in *mystacalis* and *korinchi*. Abdomen paler than breast, usually pale to dark gray and tinged tan or rusty at feather tips, but
bears olive traces in most birds of mystacalis group. Underparts much subjected to effects of wear and staining. Undertail coverts as abdomen.

Sexual features: Males slightly longer winged, but tail equally as long as in females; bill 5 to 10 percent longer in males; and, in flavinucha, males 10 percent heavier than females. Also, males have yellow malar patch, this yellow extending across chin and forethroat in flavinucha; the malar area is duller yellow in wrayi, and in the other races of the mystacalis group it is strongly tinged buffy or rusty; the chin and forethroat of the mystacalis group is blackish olive or there is a rusty chin patch or, in scattered birds of these races, there is a small area tinged yellow (except wrayi, all males of which have a dull rusty yellow to yellow chin patch, hence tending toward flavinucha). Females lack yellow on the throat and malars, instead having chestnut or rufous-cinnamon malar stripes, the cinnamon continuing onto the chin and sometimes (usually in flavinucha, styani, and wrayi) onto forethroat, but malar patch discrete in mystacalis and korinchii. Immatures are grayer below than adults, the outer primaries are less barred, and the wings show paler rufous coloring; males have a rustier malar with more buff than yellow in the throat than in adults, and the crown feathers often are tipped red. Immature females resemble adult females but have less rufous on the throat and chin. Eyes are brownish red to red in adults, brown in immature birds; orbital skin is grayish green. Legs and feet gray to greenish gray. Bill variable, light gray, darker at base and paling to white at tip of upper and lower bill in some forms such as flavinucha; all gray-black in styani, mystacalis, wrayi, and ricketti.

**Distribution and Habitat.** Occurs in lower slopes of the Himalayas from northwestern India through Nepal and Sikkim to northern Burma, and from central Burma to Thailand, Laos, Cambodia, the Vietnams, and southeastern China (Kwangsi), with isolated populations in Hainan, Fukien, Sumatra, and Malaya. Generally favors foothills and mountain slopes and is restricted to mountain areas of Sumatra and Malaya; reaches lowlands (near sea level) in Thailand. Reaches 9000 feet in Burma (Stanford and Ticehurst, 1939), mainly between 700 and 1500 meters but locally reaching 2400 meters in the Himalayas (Ali and Ripley, 1970), above 3500 feet in Malaya, and above 2500 feet in Sumatra. Frequent mountain oak forests, sal forest at the base of the Himalayas, mixed deciduous and evergreen forest, and clearings, especially where cultivation occurs, in various forests; in southwestern Thailand breeds in remnant monsoonal dry forest patches in largely cultivated country near sea level.

**Foraging Habits.** Forages at all levels from the ground (occasionally or rarely, but perhaps locally may do so commonly in some places [see Ali and Ripley, 1970, p. 191]), through the trunks and major branches, into the foliage. Pairs or family parties often are encountered, paired birds feeding in separate trees and maintaining vocal contact. Foraging modes are diverse, including gleaning, probing, and tapping, and very little excavating. Much of the feeding is by probe-gleaning into leaf masses or debris in crevices. The woodpeckers move frequently, hopping about, leaning, turning, recrossing their paths. Frequently the species joins mixed-species foraging flocks of babblers, bulbuls, and other birds, their rapid movements enabling them to keep pace with the flock. The diet is diverse, including ants, termites, beetle larvae, various other insects, centipedes, and even frogs (Inglis, 1964). I watched a female pull what appeared to be a small bird or mammal from an old woodpecker cavity, drop it, flutter down to the ground, and fly into the forest carrying the item in its bill. The female returned a few minutes later to investigate the cavity further, but it was supplanted by a male that entered the cavity, tossed out some sticks and debris, then left abruptly. This species is more active than is *P. chlorolophus*, with which it often is sympatric. Ali and Ripley (1970, p. 190) reported apparent sapsucking in this species.
Voice. Drums sporadically during the breeding season, in weak bursts of rapidly delivered beats very like that of *P. mentalis*. Vocalizations are varied but, except for one call (Kyaa Call), seem to represent modifications of a single element, a sonographically inverted, U-shaped note varying in pitch and often compound. In unmodified form this is the Keep Call ("keep," "kup," "kip"), a note 0.05 to 0.07 second long, emphasizing mainly the peak at 2.6 to 4.7 kilohertz. Occasionally, double Keep Calls ("keep-EEP") were heard. This note resembles Keek, Pit, and Kjaeck calls of related species of *Picus* (vitatus and squamatus) and of *Celeus* (brachyurus). Often interspersed with the Keep Call, or following an initial Keep Call, is the Kyew Call. This latter call is repetitive, but not in series; rather, Keep Calls are interspersed. The Kyew consists of a prolonged, rapid, or slowly dropping keep note, heard only in Indian *flavinucha*, or a compound, double note with a higher first note and a lower, dropping, and strongly emphasized second note, heard in Thai birds ("lylei"). A few Indian Kyew Calls showed closer resemblance to Thai calls than did the others. Kyew Calls are 0.09 to 0.21 second in duration. The Indian Kyew Calls closely resemble the Pook Call of *P. mentalis*; and it is noteworthy that the Kyew Call of Thai and Malayan birds, geographically near *mentalis*, differs more from the Pook Call of *mentalis* than does the Kyew Call of geographically distant Indian *flavinucha*. The Kyaa Call, heard only several times from Indian birds, sonographically is a wavering, horizontal note at 2.4 to 2.8 kilohertz, lasting 0.18 to 0.22 second, and somewhat like the Kjaeck Call of *P. canus*. A Kweep Call is a series call, sometimes uttered as a single note; its notes are double Keep Call notes emphasizing the second peak. The Long Call, another series call, is similar to the Kweep Call; but its notes are short, and they lack (or have inconspicuously) a horizontal element prominent in the Kweep Call (see Short, 1973d). Intermediate Kweep-Long Call series have been noted. Kweep Call notes are uttered at 2.6 to 3.0 notes per second in rather short series (to six notes). The Long Call is longer and faster, at a rate of 4.6 to 6.1 notes per second and containing 10 to 29 notes. Rendered "Kwee-kwee-kwee-kwee-kwee-kwee-kwee-kwi-kwi-kwi-wi-wi-wik" (16-note call), the notes are variable and speed up toward the end. These two series calls were noted only in Thailand, the Kweep Calls by adult and immature birds of a family group and the Long Calls only by adults. An alarm-agitation or localization function is surmised for the Kweep Call, and a territorial-aggressive function seems likely for the Long Call (which I elicited several times from an adult male that I approached). The Kweep Call resembles calls of *Celeus brachyurus* and *Picus puniceus*; the Long Call notes resemble notes of the Kjaeck Call of *P. viridis*.

Display. Crest Raising is the only display noted. The adult male regularly raises his crest in the presence of its mate, as when supplanting her. The female, too, raises the crest, as when approaching a young Greater Yellow-nape. Elsewhere (Short, 1973d, p. 303), I have quoted Stuart Baker's (1927, p. 24) description of "courtship," involving an expanded crest and the head of the male thrown backward over the rump before copulation.

Breeding. Nesting occurs from March to June in India, in January and February in southwestern Thailand and Malaya, in March to May in Burma, and in April and May in Sumatra. The nest is excavated in a rotten tree or stump from 2 to 6 meters above ground, with an entrance 6 to 8 centimeters in diameter, 8 inches deep, 3½ to 4½ inches wide, and extending somewhat above the entrance tunnel (Ali and Ripley, 1970; Cramer, 1941). Both adults excavate the cavity, incubate, and feed the young. Three or four eggs are laid. Feeding may be partly by regurgitation (see photographs in Cramer, 1941). The fledged young remain with the parents for some time and are very noisy when hungry or when isolated from the family party, calling (Kweep Calls) frequently. Molt follows the breeding season, in late
August to as late as early December in northern India and Nepal and in Burma, during September to November in Thailand, and in November in Hainan.

**Taxonomy.** Forms a superspecies with smaller, lowland *P. mentalis*, which appears to be fully allopatric, although approaching the range of *flavinucha* closely in Malaya and southern Thailand. Both are similar in pattern and in aspects of behavior (foraging habits, vocally). There are several racial groups of *P. flavinucha*. There is a large northern form, variable and showing some clinal variation from east to west and north to south; I recognize one race, *flavinucha*, including as synonyms *kumaonensis*, *marianae*, *lylei*, and *archon*, from northwestern India east to North Vietnam. There is a tendency toward greener coloration and large size (up to 8 percent longer wings) in the northwestern part of this range ("kumaonensis"), but this seems slight. I find a size cline from smaller southern birds ("lylei") to northeastern "marianae" and Burmese *flavinucha* and no differences separating "marianae" from "lylei"—these latter supposed races are slightly smaller and more golden naped than more western flavinucha, but individual variation is great and I prefer not to treat complex clinal and rather trivial geographical variation formally (which would result in recognition of what would be unsatisfactorily separable subspecies). The Hainan (and perhaps immediately adjacent mainland Chinese) birds are recognizably distinct as *styani*, a dark form with a dark bill and very little yellow on the throat of males. The Fukien form, *ricketti*, also is dark with an even blacker bill and is about 10 percent longer winged than *styani*. It extends south to northern North Vietnam (Tonkin) and intergrades through southern North Vietnam with *pierrei*. Central and southeastern Thailand, Cambodia, and southern South Vietnam form the range of *pierrei*, another dark form but paler gray below with yellower, less deep green on the back and with unbarred wingtips compared with *styani* and *ricketti*. The Sumatran forms include northern *mystacalis* and southwestern *korinchi*. The latter has browner, less rusty and paler, as well as smaller wing markings; has grayer underparts; and is darker green above than *mystacalis*—both these races lack yellow or have but traces on the chin of males, and females show less chestnut on the chin with throat markings virtually lacking compared with Malayan birds. All of these races other than *flavinucha* form the *mystacalis* group of darker forms with reduced (or no) yellow in the throat of males. In Malayan mountains is found *wrayi*, a race resembling *pierrei*, but smaller and darker, with the dark bill and redder wings of the *mystacalis* group; but males have a yellow chin patch and brighter yellow in the malar, thus tending toward *flavinucha*.

References

**LACED WOODPECKER**

*Picus vittatus*

**Color Plate 87**

**Range Summary.** Southeast Asia.

**Diagnostic Features.** Medium, 94 to 132 grams (*vittatus, viridanus*), wing length 120 to 144 millimeters. A green woodpecker with a black tail, white-barred wings, and streaks on the lower breast and abdomen (or forward to the throat). Whitish on sides of head and dis-
distinct black or black and white streaked malar patch (see *P. xanthopygaeus*). Crown and crest red in males, black in females. Bill yellow below, dark above. Eyes dark.

**Description.** Bill curved along culmen, moderately broad across nostrils and at base, somewhat chisel-tipped. Above, green with yellow to bronzey cast (more bronzey in *viridanus* and in southern and eastern *vittatus*); rump distinctly more yellow or orangish (in eastern *vittatus*); uppertail coverts as back. Wings deeper green than back, often more bronze on coverts and inner secondaries and on outer vanes of outer secondaries (feathers in these areas show pale bars basally); rest blackish brown with narrow buffy white to white bars (including outer vanes of primaries and bases of inner vanes); wing edge (“wrist”) whitish; below, brown with dull white bars, coverts yellowish white with brown bars. Shafts brown to black, paling to brown below and to horn color at wing tips. Tail brownish black, unbarred or with faint bars suggested on central and outer pairs of feathers in *vittatus*, those feathers usually with definite but weak brownish bars in *viridanus* (sometimes bars on bases of all feathers); below, paler, with dull yellow cast on outer feathers in many *vittatus*. Tail/wing ratio 0.71 to 0.84. Ear coverts grayish white to buff with faint dark streaks, bordered above and below by distinct, narrow white line, extending over and under eye; lores buff or white; a black line extends around sides of crown, over white line, cutting off white line in front of and above eye and continuing to nasal area (across base of bill). Malar area black or black with white streaks in *vittatus*, streaked black and white in *viridanus*, always forming a distinct patch. Throat varies from unmarked buffy white or yellow-greenish buff in *vittatus* to tan or buffy brown with faint to strong white streaks in *viridanus* (throat more greenish posteriorly in both). Sides of neck yellowish to yellow-green. Upper breast clear buffy yellow to olive-buff in *vittatus*; entire breast and underparts of *viridanus*, and lower breast posteriorly in *vittatus*, streaked buffy or whitish and olive-green, the dark streaks very broad in *viridanus*, the background paling posteriorly; undertail whitish and olive streaked (dark streaks on underparts usually are near feather edges, converging toward tip, sometimes forming a “V”; the shaft also may have a dark streak).

Sexual features: Sexes similar in weight, males slightly longer winged than females and with bill 5 to 8 percent longer. Male has red crest and crown; female has entire crown and nape black. Immatures resemble adults but are greener, less yellow above. The streaking below is less distinct (less contrasting, suffused greenish all over) but is as extensive and usually more so (onto throat in *vittatus* group); and the tail more often shows barring. Sexes as adults; red of male’s crown paler, more orange, and feathers less modified (tips not attenuated). Eyes reddish brown to red; legs and feet grayish green; bill yellow below and mainly dusky yellow above, with blackish along culmen and the area near the tip. At least occasionally, wild birds may live for more than 10 years (McClure, 1974, p. 190).

**Distribution and Habitat.** Burma, Thailand, Laos, and South Vietnam through Cambodia and southern Thailand to Malaya, Sumatra, and Java east to Bali and the Kangean Islands. Frequents diverse forests, especially mangroves and coastal scrub (*vittatus* group), bamboo brakes, dry forest, and montane wet forest (*viridanus*), and also deciduous forests and gardens in towns. Partial to bamboo and to mangroves, in which it reaches its greatest abundance. Occurs up to 5000 feet in mountains of Burma.

**Foraging Habits.** Most foraging takes place near or on the ground in dense vegetation, with probing into the dirt or (mangroves) mud or into debris at the bases of trees. Some arboreal feeding occurs, although this may be minimal seasonally. The *viridanus* group favors more moist forest habitat; its foraging habits are little known, but it may be mainly arboreal. In trees it moves rapidly over the bark, tapping, probing, gleaning, and scanning for insects.
Attention is given to broken places in the bark, in the nodes of bamboo shoots, and at the bases of palm fronds. Its tapping is audible and serves to break away pieces of bark or debris or to form a hole into which the tongue is placed to secure subsurface insects. Ground feeding is by probing, scanning, swiping at debris, and tapping on fallen wood or tree bases. The birds hop clumsily about on the ground. Tapping often is at an angle to one side rather than directly vertically. Members of a pair feed together or nearby, usually the latter (for example, in adjacent trees).

**Voice.** Drums seasonally in a steady, even, roll of rather low intensity, slightly faster (23 beats per second) than the usually longer bursts of *Picus canus*. The few bursts heard in Malaya and Thailand lasted 0.06 to 0.87 second and were virtually like the drumming of *P. mentalis*. Vocally complex, the Laced Woodpecker gives five or more distinct calls. The functionally and structurally related Keep and Kip calls are single notes, inverted U-shaped sonographically, and with strong harmonic tones. Keep Calls are 0.07 to 0.1 second in duration with emphasis usually on the initial harmonic tone at 3.2 to 3.5 kilohertz. Double-noted Keep Calls also occur and especially resemble such vocalizations of *P. flavinucha*. Kip Calls essentially are short, low-pitched Keep Call notes and vary from short to long; short Kip Calls show structural differences from moderately long to long Kip Calls and may be distinct functionally (a single bird may utter all three forms of the call). In duration, long Kip Calls are 0.04 to 0.06 second, moderately long calls are 0.035 to 0.04 second, and short Kip Calls are 0.025 to 0.035 second. The rapid calls are more vertical in effect sonographically. Kip Calls mainly were rendered by birds judged to be immature, and age difference thus may influence the particular call (Keep or form of Kip) given. Keep-Kip calls are heard from disturbed woodpeckers in stress situations, as when an intruder interrupts a foraging bird, or from adults near their nest. Possibly serving a location function, these calls primarily seem to be low-intensity agonistic notes. Kip Calls of the long version particularly resemble KjaecK Calls of *P. squamatus*. A Kip-calling young bird gave a Trill Call a number of times. This call is a series of eight to 20, inverted, V-shaped notes uttered at 0.28 to 0.73 note per second. A wavering frequency of these calls was noteworthy. Possibly the Trill Call is a left-over begging call of newly independent juvenal individuals. Wicka Calls were heard from immature and adult woodpeckers whenever there were interacting individuals close to each other. This call was described by Lewin (1954, p. 17) as a "Tiku-tiku," repeated, in members of a pair upon their meeting at the nest. Three types of notes, given in mixed sequence or uniformly in one call, are designated A, B, and C Wicka Call notes (Short, 1973d). These notes have equivalents in the Wicka Call of *Celeus brachyurus* and of *Picus canus*. Basically the Wicka Call seems to be an agonistic vocalization uttered during conflicts between individuals, at lower or higher intensities. A complex call is the KjaecK Call, resembling somewhat the Kjacket-KjaecK calls of *Picus canus* and *P. viridus* in certain details. From one to 24 notes or more comprise a series, each note of which has four major components. At 0.15 to 0.25 second for a single note, the parts of each note vary somewhat in pitch. Longer calls last up to 4 seconds. Employed by flying woodpeckers, the KjaecK Call may serve as an aggressive note toward an intruder, causing the bird to fly; as an alarm and contact note (uttered by both birds of a pair) as birds are compelled to fly; or as a location note when two flying birds depart in different directions. Finally, a Long Call or Pee Call is a series of simple, inverted U-shaped notes emphasized at the peak of the fundamental tone (1.2 kilohertz). The notes, of 0.03 to 0.05 second duration, are spaced about 0.07 to 0.12 second apart, with somewhat greater spacing (hence a slowdown) at the end of a call. Five recorded calls had eight to 21 notes, lasting 1.18 to 3.20 seconds, and a rate of 6.56 to 7.32 notes per second. The Long
Calls of other species of Picus, especially of P. canus, are similar, as generally are such calls of species of Celeus and Colaptes. A territorial proclamation or "song" function, possibly combined with that of localization is likely for this Long Call.

Displays. Little known. I saw weak Swinging Displays (body and head moved from side to side) accompanied at times by Wicka Calls in interactions between adults and between adults and young woodpeckers. No other displays have been reported.

Breeding. Very little is known of nesting in this woodpecker (see Lewin, 1954). Juveniles from Java date from 30 September to 13 April, and five Sumatra juveniles represent late June. Breeding in Malaya occurs at least from April until June, and Thai birds ("eisenhoferi," viridanus) nest between February and June or July. Malayan pairs utilize chiefly palm trees, either dead stubs or living (but possibly decayed) trees, between 0.4 and 5 meters above ground. Both adults incubate at the nest, but it is uncertain whether both excavate the chamber. Often the nest is in cultivated areas, even beside homes, and the birds readily adapt to human disturbance. At the cavity the entry is made after backing down the tree from above. A nest 3 meters up a palm stub near Petburi, Thailand, contained young birds on 28 March, but I was unable to ascertain how many birds were within the cavity, or their age. Excavation often occurs well before nesting commences. A male excavated within a chamber 3 meters up a 5-meter tall, dead palm stub 13 centimeters thick beside a chicken coop and outbuilding near Klang, Malaya, in early March (nest begun earlier); and by early April the pair either was incubating or had newly hatched young. By 24 April the adults were feeding two fledgling young nearby, the young being perhaps 3 to 6 days out of the nest. These birds were fed in palm trees and on the ground, but were mainly out of view, such that details of feeding were not observed closely. Molting occurs following the breeding period: in August to December or even early January in Burma, Thailand ("eurous," "eisenhoferi," viridanus), and Malaya; from May to August in the Kangean Islands; in March on Bali; and from June to November in Java.

Taxonomy. Related rather closely to P. xanthopygaicus, to P. squamatus, and not very distantly to P. canus. The obscure malar streak, small size, and pale upper bill serve to distinguish xanthopygaicus from vittatus where the two are sympatric, as at Tamnang, Thailand. Two species generally are recognized within the vittatus complex, although Deignan (1955) clearly showed there to be no basis for sympatric occurrence of two species. In fact, the two racial groups, viridanus and the vittatus group, are very closely similar in all respects and show no features that suggest they could not interbreed. In the area of potential contact, now highly modified by cultivation and clearing, viridanus is a lower montane forest bird, whereas the vittatus group occupies coastal mangroves and scrub, including suburban Bangkok. Historical and biotic factors other than competitive exclusion, rather than full speciation, seem responsible for their proximity without interbreeding. Generally, viridanus has a streaked throat, merging into the more boldly streaked breast, whereas the vittatus group is unstreaked, usually bright yellowish green on the throat, sharply contrasting with the streaked breast. However, scattered birds well within the range of viridanus (for example, Arakan, northern Tenasserim) approach vittatus or indeed are indistinguishable from vittatus (eisenhoferi). Immatures of both groups show streaking on the throat, another indication of the rather trivial nature of the throat-color difference; soft part colors of both forms are identical. I find no trenchant differences within the vittatus group of populations, especially in view of the rather minor difference between vittatus and viridanus. There is clinal variation in size, with a decrease from the north (Laos, central Thailand) to the south and south-east. Also, a concordant cline of increasing bronzy tone on the upperparts occurs to the
SQUARETAILED WOODPECKER

*Picus xanthopygaeus*

**Color Plate 87**

**Range Summary.** Southern Asia.

**Diagnostic Features.** Small, 83 to 105 grams, wing length 121 to 138 millimeters. Mainly green with V-shaped markings below, an orange-yellow or yellow rump, and gray and white face. Males have red crown and crest; females with gray-streaked black crown. Differs from very similar, slightly larger *Picus vittatus viridanus*, which it contacts, by its paler throat and breast, less distinct (inconspicuous) malar stripe, and conspicuous yellowish rump patch, as well as the streaked crown of females and the pinkish or white eyes (bill of *xanthopygaeus* also straighter, narrower). Larger, pale-billed, sympatric *P. squamatus* has no throat or upper breast markings, and its abdominal marks are heavier, blacker.

**Description.** Culmen slightly curved, bill tip chisel-like, bill rather long and broad across nostrils. Above, yellowish green; rump and tips of uppertail coverts lemon-yellow to mixed orange and yellow. Wings darker green on coverts and outer vanes of secondaries; inner vanes of secondaries, primaries, and bases of covert feathers black to brownish black with white bars; underwings brown with whitish bars, coverts white with olive bars, “wrists” white. Shafts blackish above, brown below in tail, pale horn-brown below in wings, becoming white at wing tips. Tail blackish, edges of middle several pairs green, with distinct but faint brownish bars on inner and outer pairs, at least, and sometimes on all feathers; undertail brownish black, suffused with dull yellowish, especially about pale bars. Tail/wing ratio 0.66 to 0.76. Ear coverts gray, with fine streaks, bordered above (from neck to over eye) and below (to lores) with distinct white line; edge of crown is black, over white line, meeting the eye over the front. Malar area dirty white with fine black streaks, barely differing from throat (by virtue of streaks being black), which is whitish with brown to olive streaks. Rear of nape black, variable in extent, often seen posterior to red crest of male. Lores partly white, with black above; black from sides of crown continues over lores and around base of bill. Below, yellowish or olive-white, paler (whiter) posteriorly, definitely greener on breast, with narrow to broad, pale olive to deep olive, V-shaped marks, less commonly also having fine shaft streaks of same color; markings narrower on abdomen, sometimes vague. Undertail coverts whitish with black or deep olive V-bars.

**Sexual features:** Sexes virtually alike in measurements, including bill length. Male with red from forehead to crest. Female usually lacks red (one bird shows traces), having top of head black with gray streaks, the latter showing from feather bases along sides of feathers.

**References**


**STREAK-THROATED WOODPECKER**

*Picus xanthopygaeus*

**Color Plate 87**

**Range Summary.** Southern Asia.

**Diagnostic Features.** Small, 83 to 105 grams, wing length 121 to 138 millimeters. Mainly green with V-shaped markings below, an orange-yellow or yellow rump, and gray and white face. Males have red crown and crest; females with gray-streaked black crown. Differs from very similar, slightly larger *Picus vittatus viridanus*, which it contacts, by its paler throat and breast, less distinct (inconspicuous) malar stripe, and conspicuous yellowish rump patch, as well as the streaked crown of females and the pinkish or white eyes (bill of *xanthopygaeus* also straighter, narrower). Larger, pale-billed, sympatric *P. squamatus* has no throat or upper breast markings, and its abdominal marks are heavier, blacker.

**Description.** Culmen slightly curved, bill tip chisel-like, bill rather long and broad across nostrils. Above, yellowish green; rump and tips of uppertail coverts lemon-yellow to mixed orange and yellow. Wings darker green on coverts and outer vanes of secondaries; inner vanes of secondaries, primaries, and bases of covert feathers black to brownish black with white bars; underwings brown with whitish bars, coverts white with olive bars, “wrists” white. Shafts blackish above, brown below in tail, pale horn-brown below in wings, becoming white at wing tips. Tail blackish, edges of middle several pairs green, with distinct but faint brownish bars on inner and outer pairs, at least, and sometimes on all feathers; undertail brownish black, suffused with dull yellowish, especially about pale bars. Tail/wing ratio 0.66 to 0.76. Ear coverts gray, with fine streaks, bordered above (from neck to over eye) and below (to lores) with distinct white line; edge of crown is black, over white line, meeting the eye over the front. Malar area dirty white with fine black streaks, barely differing from throat (by virtue of streaks being black), which is whitish with brown to olive streaks. Rear of nape black, variable in extent, often seen posterior to red crest of male. Lores partly white, with black above; black from sides of crown continues over lores and around base of bill. Below, yellowish or olive-white, paler (whiter) posteriorly, definitely greener on breast, with narrow to broad, pale olive to deep olive, V-shaped marks, less commonly also having fine shaft streaks of same color; markings narrower on abdomen, sometimes vague. Undertail coverts whitish with black or deep olive V-bars.

**Sexual features:** Sexes virtually alike in measurements, including bill length. Male with red from forehead to crest. Female usually lacks red (one bird shows traces), having top of head black with gray streaks, the latter showing from feather bases along sides of feathers.

**References**


Immatures have broader V-bars below, the barring shows less contrast, they are greener and less yellow above with gray feather bases giving a blotched appearance, and the sexes are as in adults (however, males have less red than do adults). Eyes white or pinkish white, darkening to reddish outwardly. Legs and feet gray-green. Bill brownish slate colored above and at tip of lower bill; dull horn-yellow on sides of lower bill.

**Distribution and Habitat.** Ranges from northwestern India, the lower Himalayan slopes of Nepal, Sikkim, Assam, and Burma and adjacent China south to southern India and Sri Lanka and east to southwestern Thailand; also in Cambodia, southern Laos, and South Vietnam. Frequents open woodlands and edges, as well as tea, teak, and rubber plantations, parks, sal forest, and bamboo groves mixed with deciduous forest. Usually a bird of low hills, reaching sea level in India and extending upward rarely to 1700 meters there (Ali and Ripley, 1970); in Sri Lanka, chiefly found in hills between 1000 and 4500 feet in elevation.

**Foraging Habits.** Feeds, usually alone, rarely in pairs, on the trunks of trees, on fallen logs, and on the ground, where it seeks its principal food, ants. Termites also are taken, as well as beetle larvae and other insects about dung piles. Date palm juice and flower nectar were cited as foods by Ali and Ripley (1970). I have not seen this bird, but accounts indicate that it forages rapidly, moving about a good deal.

**Voice.** Drums (Ali and Santapau, 1957) sporadically during the breeding season. Utters a single note as a call, a "loud, singular whistling 'queemp,' which carries long distances" (W. W. A. Phillips, 1953, p. 126). Long Calls ought to occur but have not been documented.

**Displays.** Unknown.

**Intraspecific Interaction.** An instance possibly involving hybridization with *Picus chlorolophus* was noted by W. W. A. Phillips (1953, p. 127; see *P. chlorolophus*).

**Breeding.** April to June marks the breeding period along the Himalayas and as early as January in the Indian Peninsula. Eggs are laid between late April and September in Sri Lanka (W. W. A. Phillips, 1953). The nest often is constructed in a dead tree, sometimes an isolated tree in an open situation. Both sexes assist in excavating the cavity, which usually is not very high (but to 50 feet, or more, occasionally). The clutch numbers three eggs in Sri Lanka and three to five elsewhere. Both adults incubate the eggs and tend the young, although W. W. A. Phillips (1953, p. 126) found that males usually expend the most effort in nesting activities. The incubation period is not known. The annual molt follows nesting, from late May to September in most areas. Ceylonese nests have been found in *Albizia moluccana*, dadaps (*Erythrina lithosperma*), Grevillia (*Grevillia robusta*), rubber (*Hevea brasiliensis*), and Patana-Oak trees (*Careya arborea*).

**Taxonomy.** Closely related to the very similar and broadly sympatric *Picus vittatus*. No races are known of *xanthopygaeus*.

**References**


SCALY-BELLIED WOODPECKER

*Picus squamatus*

Color Plate 88


Diagnostic Features. Medium to Large, 156 to 194 grams, wing length 157 to 172 millimeters. Mainly green, with a long, pale bill; barred wings and tail; unmarked olive upper breast; and weak to strong dark V-marks on the lower breast and abdomen. Streaked malar patch, white line over and under eye. Male with red crown and crest; female crown black and gray.

Description. Bill long, slightly curved along culmen, moderately broad across nostrils, and slightly chisel-tipped. Above, green, but variable, much paler in *flavirostris*; and grayer, often with blotches, in worn birds. Rump much yellower, but not so bright as in *P. xanthopygaeus*. Uppertail coverts mixed yellow-green and green. Wings with green coverts and blackish brown and white barred flight feathers and greater covert feathers; however, outer vane of secondaries (part of inner vane also), basal edges of inner primaries, and edges of greater coverts are green, obscuring underlying barred pattern. “Wrist” barred white and brown; underwings barred, pale brown and white on flight feathers, yellowish white and brown on coverts. Shafts brown above, paling to horn color on bases of tail feathers; below, dusky, with yellowish white at tips and elsewhere on shafts. Tail mainly brown, fully barred with buffy white, but bars obscured near feather bases by suffusion of green; paler below with dull yellow suffusion over pale areas. Tail/wing ratio 0.68 to 0.78. Sides of crown black, the black reaching the eye at its anterior dorsal margin, and black continuing around upper base of bill to nasal tufts. White line below black of crown edge, from eye to rear. Ear coverts mainly olive-gray, but a black line is formed by a black area behind eye that seems to “connect” with black before eye to form an eye line; lower lores and line back from there under eye, white. Malar area black with fine white streaks. Throat whitish (*flavirostris*) to pale whitish gray or olive-gray, darkening to rear. Breast olive-gray to grayish olive, except in *flavirostris*, in which it is pale buffy olive. Rest of underparts white (*flavirostris*) to yellowish white (gray tinge), with rather broad black (*squamatus*) to narrow brown (*flavirostris*) V-shaped marks, and frequently in *squamatus* also with a shaft streak of the same color. Undertail coverts chordeate barred, or barred on yellowish or whitish background.

Sexual features: Females slightly shorter billed and shorter winged than males, but tail proportionately longer. Males with red crown and crest, but the feathers are black and gray at their bases and these colors often show at the surface; the red shifts abruptly to orange-red or sometimes yellow-orange on crest. Females with black crest and mainly black crown, but gray bases and outer edges show through to cause a streaked effect. Immatures resemble adults but show barring (V-marks) on upper breast as well as the rest of the underparts, these bars being less contrasting than in adults. Breast grayer, less greenish; black on hindneck; tail bars less distinct, gray feather bases showing dorsally (hence blotched effect). Sexes as in adults, except red of male’s crown is mixed with black. Eyes reddish pink, darker toward pupil, paler (pink) outer rim; brown in immatures. Legs and feet olive-green or horn-green; bill horn-yellow or dull yellow, variably dark at tip or yellow at tip and base.

Distribution and Habitat. Southeastern Transcaspian Russia, eastern Iran, Afghanistan, northern Pakistan, and Kashmir southeast to Nepal, the Darjeeling area of West Bengal, and Sikkim. Frequents montane and hill clearings and forest edges, open mixed oaks and pines, juniper woods, poplars, streamside trees, orchards, and open areas with scattered large trees.
Found above 1000 meters along the Himalayan slopes, above 1300 meters in Pakistan, and ranging up to 3700 meters in Kashmir and elsewhere in the Himalayas. Wanders to lower elevations sporadically in fall, occasionally (in severe winters) moving downslope in numbers.

**Foraging Habits.** Little known, but forages mainly on the ground, hopping about very much like *P. viridis*, eating ants and termites, as well as caterpillars, but also forages in trees for various insects, including wood-boring beetles (Ali and Ripley, 1970), and secures berries in trees and bushes during later summer, fall, and winter.

**Voice.** Drums during the spring and early summer, but drumming has not been described in detail. Two calls have been reported: a single-noted Keenk Call, resembling Keek and Keep calls of such species of *Picus* as *P. vittatus* (Short, 1973d); and a repetitive, loud, bisyllabic Kleewee Call. The former spectrographically is a simple, inverted U-shaped note emphasized at 2.8 or 2.9 kilohertz and of 0.06 to 0.07 second duration. This may be an aggressive call. More frequently cited (e.g., Ali and Ripley, 1970, p. 184: "A wild, ringing, rather melodious double-noted *klee-gu* or *pea-cock*) is the Kleewee Call, possibly a contact and territorial call that has not been analyzed spectrographically. A "chok, chok" note is reported on a label of a juvenile from Mussoorie, India.

**Displays.** Unknown.

**Breeding.** Nests in April and May, the nest being excavated usually within 3 or 4 meters (to 15 meters or more) of the ground in such trees as pistachio, chilghuza, wild apricot, mulberry, juniper, and tamarisk (Ali and Ripley, 1970) in the west (*flavirostris*). In Transcaspian Russia, pairs are widely scattered along riverbottom stands of Euphrates poplar (Dementiev and Gladkov, 1966 [1951]). No details of the nesting activities are known. Fledged young date from 15 May through 8 August (both races). Molting birds represent August and September.

**Migration.** Migrates irregularly, although preceding severe winters perhaps massively, downslope into protected valleys adjacent to areas where they breed.

**Taxonomy.** Closely related to and forming a link between the groups of *viridis, awokera*, and *canus* and the *vittatus-xanthopygaeus* group. Two subspecies are recognized: *flavirostris* of Transcaspian Russia, Afghanistan, Iran, and western Pakistan; and *squamatus* of easternmost Afghanistan (Nuristan), northeastern Pakistan, northern India, Nepal, and Sikkim. The latter is much darker than *flavirostris* on its upperparts and on the breast; and its ventral markings are broader, blacker, and more contrasting. Generally, *flavirostris* is more yellow in tone.

**References**

**WAVY-BELLIED WOODPECKER**

*Picus awokera*

**Color Plate** 88

**Range Summary.** Japan.

**Diagnostic Features.** Medium, 120 to 138 grams (*awokera*), wing length 133 to 149 millimeters. A green-backed, gray-breasted woodpecker with strong barring on the lower breast
Picus awokera

and abdomen, a red nape patch, a black-bordered red malar patch, and a yellow rump. Males have red crown and nape.

**Description.** Bill curved along culmen, moderately broad across nostrils, and virtually pointed at tip. Above, grayish green (awokera) to deep olive-green (horii); rump tipped with yellow to golden yellow; uppertail coverts green. Wing coverts green, scapular feathers as back, but covert tips and outer vanes of secondaries and inner primaries are bronzey green; rest of flight feathers blackish brown with white bars on inner vane and, in outer primaries, on margin of outer vane. “Wrist” whitish, underwings brown with whitish bars, coverts black and white barred. Shafts blackish brown, paler below with yellowish white extending up shafts from bases, reaching tips of primaries. Tail mainly brown, but edges and bases of more central feathers green; very faint barring evident on outer two pairs of feathers and often on central pair. Tail below paler, barring more evident, but still faint, and outer several pairs with suffused dull yellowish green. Tail/wing ratio 0.65 to 0.73. Ear coverts and line over eye gray to greenish gray; lores, nasal tufts, area around base of upper bill, and below eyes, black or brownish black. Often there is a small white mark at rear of eye, dorsally. Malar area black or grayish black at front and rear, as well as around margins, enclosing red area. Sides of crown behind eyes gray to greenish gray. Throat white with gray to tan cast, often with some gular black. Breast pearly gray to gray-green (horii), giving way rearward to wavy or chordate bars on a grayish white (awokera) to greenish (horii) background; bars black or brown, becoming olive on flanks; undertail coverts yellowish white or green with dark bars.

**Sexual features:** Males about 3 percent longer winged, tail almost equal (hence, proportionately longer in females), bill about 8 percent longer than in females; males have red crown patch, narrowing in center of crown, then expanding to meet nape patch, and also with more red in malar area than in that of females, which lack red on crown, having crown gray with variable black bars and streaks concentrated in midline of crown (sometimes there is a black midline patch, expanding to meet nape patch at rear). Immatures resemble adults, but are duller, with grayer upperparts and broader, less chordate barring on upper breast. Eyes red; legs and feet greenish gray; bill varies from mainly yellow to yellow at its base and especially the basal half of the lower bill, the rest of the bill being grayish black or dusky, but usually bill is mostly yellow with dusky along the culmen and at the tip for one quarter of its length.

**Distribution and Habitat.** Japanese islands, including the main islands of Honshu, Shikoku, and Kyushu, and also Awashima, Tobishima, Tanegashima, and Yakushima. Mainly a hill bird occurring between 1000 and 4500 feet (Austin and Kuroda, 1953), but sporadically occurs up to 6500 feet, and into the lowlands (the last especially during the winter). Frequent woodlands with large trees, especially mixed woods, and, to a lesser extent, coniferous forest and plantings of conifers.

**Behavior.** Details have not been published (or are in Japanese literature). Forages on the ground to some extent, perhaps less so than *P. canus*. It gleans and taps on tree trunks and branches and in the foliage as well, even on tiny twigs. Ants, beetles, and other insects are eaten, as well as fruits and berries of such plants as *Sambucus*, *Taxus*, *Akebia*, and *Sorbus* (Austin and Kuroda, 1953). Drums in the breeding season. Two vocalizations are known: a Ket, ket — probably a call note; and a loud pyo, a repetitive note of one syllable very like that of *Picus canus*. The latter seems to be the territorial proclamation call. Nesting commences in April, and young leave the nest in late May and June. The clutch is five to eight eggs, laid in a nest excavated usually 2 to 6 meters above ground in a large tree.
Migration. Moves in some numbers to lower elevations for the winter, the migration varying in numbers of birds affected from year to year, depending on severity of the weather.

Taxonomy. Related to P. canus and P. squamatus, but probably most closely related to P. viridis (possibly representing a derivative of an ancestral stock of viridis, another element of which is P. viridis vaillantii – viridis and awokera later being separated, then replaced by canus over much of Eurasia). Various races have been described, but variation simply is clinal, from north to south showing a darkening of (green) color and a slight decrease in size. Formal treatment of races, if indulged in at all, ought to be limited to separation of northern, pale, large birds of Honshu (also Awashima and Tobishima; P. a. awokera) from southern (Shikoku, Kyushu, Tanegashima, and Yakushima; horii), darker, slightly smaller woodpeckers.

GREEN WOODPECKER

*Picus viridis*

Color Plate 88

Range Summary. Western Eurasia.

Diagnostic Features. Medium to Large, 160 to 250 grams, wing length 152 to 177 millimeters. Black area around eyes and on lores, except gray in Spain and Portugal, and dark pattern there lacking in North Africa. Usually red from nape to forehead (except black in females from North Africa). Back green, rump yellow; pale greenish gray to whitish below, palest on throat, with no markings, or bars restricted to abdomen and flanks. Wings barred, tail less distinctly barred. Malar “moustache” present, mainly or entirely black or black with red center in most males. Distinguished from smaller, grayer, sympatric Gray-faced Woodpecker (*P. canus*) by its dark face and red on nape.

Description. Bill somewhat curved along culmen, almost pointed at tip, moderately broad across nostrils. Above, yellow-green to olive, paling to bright yellow (sometimes orangish) on rump; uppertail coverts olive with yellow tips. Wing coverts, inner secondaries, and outer vanes of most secondaries and inner primaries green with bronze cast; flight feathers otherwise blackish brown with white bars on inner vanes (except near tips) and white bars on outer vanes of primaries (except tips; white clear on outer feathers), gradually greener inwardly; underwings appear white with brown bars, except brownish tips. Shafts, blackish brown above, paling to horn color at bases; below, paler, becoming white at bases, especially in wings. Tail mainly brown, but edges are greenish, as are pale but definite bars (paling to whitish on outer feathers); paler below, with yellow cast. Tail/wing ratio 0.58 to 0.68. Nape red, often with orange or yellow at posterior margin; forehead to crown red, the feathers with gray bases and a black border below the red (showing gray streaking through red), except females of vaillantii (see Sexual features). Nasal tufts black or black and white. Lores black, extending around eye as solid black patch in viridis and innominatus, blackish gray not extending around eyes in sharpei, and dull white bordered above by a black line in vaillantii. Ear coverts dull yellowish gray-white (viridis), whitish (innominatus), olive-gray (sharpei), or grayish white (vaillantii); ear covert color continuous to eyes, increasingly gray, in sharpei, and graying at the eyes but extending as whitish line under eye to lores in vaillantii and some sharpei, but otherwise sharply contrasting with black at rear of eyes (viridis and innominatus). Sides of neck olive or grayish olive, in vaillantii with orange and yellow tinge continuous with sides of nape. Gray line over eye (black anteriorly in viridis
and *innominatus*). Throat almost white (*innominatus*), pearly white (*viridis* and *sharpei*), or white tinged grayish tan (*vaillantii*; tan sometimes evident in others). Breast pearly white with yellow tinge in *innominatus*, grayish olive-white to yellow-olive with gray tinge in others; lower breast paler; abdomen paler, but with stronger yellow tinge; flanks, and occasionally lower abdomen, with olive or gray-brown barring in some birds, variably vague to moderate (bars sometimes vaguely evident on lower breast), often chordate, usually strongly developed in *vaillantii*. Undertail coverts yellowish white or olive-white with faint to strong chordate bars.

Sexual features: Sexes alike in size. Males have black malar area with red patch in the rear portion (red surrounded by black) in *viridis* and *innominatus*, red more extensive anteriorly and to borders of malar area in *sharpei*, but lacking in *vaillantii* (malar area all black, but a few birds show red traces). Females of all races lack red in malar area. In *vaillantii*, females differ from males not in malar color but in restriction of the red on top of the head to the nape, the crown and forehead being black (gray bases show through), whereas the entire top of the head is red in males as it is in both sexes of other races. Immatures differ markedly, showing extensive or complete ventral barring (bars variably chordate to V-bars, always darkest on breast); throat usually streaked, as are ear coverts and sides of neck; facial area black in adults is streaked, not black; wings and tail more barred, back usually with moderate or (especially *innominatus*) strong green and pale bars, rump more lemon-yellow, and crown red reduced such that gray bases show through at surface. Sexes of immatures like adults: males show red in malar; females lack red there (or show few traces), but males have less red than in adult males, and malar of females is streaked or barred (in *vaillantii*, both sexes show red in crown, not malar, the red being restricted to the center of the forecrown in females and more extensive in males). Eyes grayish white to white with pinkish outer ring (in *vaillantii* as well), duller white or more grayish white in juveniles. Legs and feet gray or olive-gray. Bill grayish black with pale olive-yellow tinge at base of lower bill.

**Distribution and Habitat.** Occurs from southern Scandinavia and England through most of Europe; the mountains of Morocco, Algeria, and Tunisia; and Turkey, eastward to western Russia (Volga River, Caucasus, Transcaucasus) and western Iran. Frequents deciduous and mixed forest edges, secondgrowth, plantations, parks, and other situations in which trees are available for foraging and nesting, but there is also sufficient open country for ground foraging. From sea level to 4000 feet (Alps, Pyrenees, Spain) in Europe, between 2000 and 6500 feet in North Africa, up to 6500 feet in Iran, and to 9000 feet in Transcaucasia.

**Foraging Habits.** Feeds on the ground, securing ants and various grubs, as well as on the trunk, branches, and twigs of trees. On the ground it probes and twists its head from side to side, knocking away soil to extricate ants or other insects. Progress on the ground is by hopping, the movements being "heavy" compared with those of *Colaptes auratus*. In trees it taps and occasionally excavates in the bark of trees, securing larvae of beetles, moths and butterflies, flies, ants, and other insects. Perching in smaller branches of trees most commonly is crosswise to the branch. Bees are also eaten, and sometimes beehives are damaged as the woodpeckers feed on bees and probably honey. Worms also are taken. Witherby et al. (1938) reported an instance of birds' eggs being eaten by a Green Woodpecker. Various fruits (cherries, apples), berries (pyracantha), seeds (pines, oaks), and a little grain (oats) also have been noted in its diet, and probably these seasonally available foods are nutritionally important.

**Vocalizations.** Drumming occurs sporadically and probably is not a major display in most populations. However, drumming may be more prevalent in North African *vaillantii*. A
drumming episode of the latter in Tunisia (sonagram provided by H. Winkler) lasted 1.78 seconds and contained 37 beats (20.8 beats per second). Its vocalizations are quite varied; several begging calls, a Wicka Call, soft contact notes (possibly low Wicka Calls), a variable Kly, Pee or Long Call, a variable Kjaeck Call, and possibly a low Whurde-like (see *Colaptes auratus*) note make up the Green Woodpecker's repertory. Begging Calls of young birds include long (1 to 1.5 seconds), repetitive, noisy notes, mainly horizontal in form sonographically, with little emphasis on elements within the calls; and a series of more or less distinct notes at 1 to 5 kilohertz, uttered at about 10 notes per second. No functional difference has been reported for these two calls. The Wicka Call, variable in intensity and length (number of notes), as well as structurally, occurs during interactions between individuals of the same or opposite sex. Typically a “Kwit-up, kwit-up, kwit-up———” (or “cut-up,” etc.), softer versions that are low contact notes, probably low intensity Wicka Calls, include a “kyik-kyik-kyik———,” “Ki-yik, ki-yik———,” “py-a, py-a———,” a faint “yeek-yeek-yeek———,” and a “Kwi-kwi-kwi———” (last of male landing beside female, probably its mate). I have not analyzed these calls sonographically, but they seem to lack the inflected “week” or sharp “wik” aspect of Wicka Calls of such species as *Colaptes auratus*. The Wicka Call is a vocal display varying in intensity and structure with an aggressive (threat-submission behavior) function and probably other (perhaps facilitation of breeding in pairs) functions as well. Two major, structurally related “Long Calls” are the variable Kjaeck Call and the Kly or Pee Call. The Kjaeck Call is a series (rarely notes are given singly, perhaps as alarm calls) of two to 15 sonographically vertical notes with variation in pitch and usually with strong overtones. Notes are 0.07 to 0.11 second in duration with emphasis on a peak having a fundamental of 1.7 to 2.3 kilohertz. The peak often rises sharply and drops more slowly. Of 15 calls analyzed (from Austria, Germany), eight show a strong vertical element introducing some of the notes, this element peaking at about 1.0 kilohertz with strong overtones (up to 7 kilohertz). Other notes in these calls and some notes in the other seven calls show a gradually rising, distinct initial element at 2 to 3 kilohertz. Calls are 0.5 to 4 or even 5 seconds in duration, containing four to 30 notes (given at 4.2 to 7.7 notes per second). The last few notes often show a slowdown, but some calls show irregular tempo at the beginning or in the middle of a call. The Kjaeck Call often is uttered in flight, and it is given by adult and immature birds. The Kjaeck Call may be rendered variously as “Kjaeck-Kjaeck———,” “Kyowk-Kyowk———,” “Kjaeck-yike-yike-yike,” and “Yak-yak-yak———.” I view this call as an aggressive display having alarm and localization functions as well. It may be elicited by an intruder (e.g., a human) not an obvious predator, who causes a foraging woodpecker to fly. Interactions, particularly those at a distance, often include Kjaeck Calls. The Pee or Kly Call consists of slower, often longer, less peaked notes with little or (usually) no emphasis on harmonic tones; the notes tend to be simple and sonographically horizontal in form, almost whistled in effect, as “Pyew-pyew-pyew-pyew” or “Pyi-pyi-pyi-pyi.” Given in “pure” form at 1.7 to 5.2 notes per second, notes of this call sometimes are combined with Kjaeck notes in a compound call, or intermediate notes may comprise a call. Pee notes are 0.07 to 0.15 second in duration, with a frequency of 1.7 to 2.2 kilohertz. Some notes are slightly peaked, but the overall sonographic aspect is that of a horizontal note. From four to 20 or more notes are included in a call, which lasts 1.15 to 4 or more seconds. A single Pee Call of *P. viridis vaillantii* from Tunisia (courtesy of H. Winkler) is 1.64 seconds long, contains 11 notes (thus the tempo is 6.7 notes per second, but there is a slowdown from about 8 to 5.8 notes per second from the beginning to the end of the call), and the 0.07-second long notes are emphasized at 2.2 kilohertz. Except for its rather rapid rate of delivery, this call
matches Pee Calls of European viridis. Calls intermediate between Pee and Kjaeck calls, and those containing notes of both types, are faster than Pee Calls, resembling Kjaeck Calls in tempo; they tend to resemble the Pee Call in lacking overtones. The Pee Call is a territorial call, not uttered by young birds, and it may serve as a localization call as well. Finally, a low whirring note was heard several times from birds flying (see also Cohen, 1946) in to meet another Green Woodpecker. The note resembles the Whurdle Call of Colaptes auratus and is not simply a sound made by the wings. It remains to be investigated, however.

Displays. I have observed several displays, and these have been described by Blume (1955, 1962), Blume, et al. (1957), Fish (1943), Cowdy (1955), Sovago (1954), and others. Crest Raising, Head Swinging, Head Bobbing, Wing Flicking, Tail Spreading, Gaping displays, and a Bill Directing Posture are ascribed to the Green Woodpecker. The Bill Directing Posture is a simple pointing of the bill (see Blume, 1955, fig. 4e), head inclined forward, at an antagonist. I saw this posture in presumably mated pairs and in fledged Green Woodpeckers engaged in interactions. Crest Raising Displays occur (see, e.g., Witherby, et al., 1938, p. 279), but I have seen only two obvious cases, both of a male in the presence of a large immature bird. The Head Swinging and Head Bobbing complex resembles that of Colaptes auratus and other woodpeckers, but Green Woodpeckers show a characteristic upward angle of the head and neck (regardless of the direction of the bill; see Blume, 1962, fig. 13a) that is less marked in other species. The Head Swinging is a side-to-side movement mainly of the head and bill, but including much of the body to some degree; it may be given with the head held low (Blume, 1955, fig. 5a) or high. Most commonly the swinging occurs without Head Bobbing. The latter display seems to be a ritualized form of movement occurring when the woodpecker raises its head to look about, presumably for potential predators (this simple movement was shown by Blume, 1955, fig. 6; and Snow and Manning, 1954, pp. 355-356, well characterized it). Head Bobbing often is incorporated into a Swinging-Bobbing complex much like that of Colaptes auratus (Short, 1972b, fig. 24), although comparisons are needed using motion picture photography. The Head Swinging-Head Bobbing complex is an aggressive display incorporating the Bill Directing Posture. Wing Flicking is a display emphasizing threat (see Blume, 1955, fig. 1) and simply involves the rapid spreading out and retracting of the wings, usually as the bird faces an antagonist. Tail Spreading has not been analyzed, but it seems to occur during intense conflicts, often in conjunction with the Head Swinging-Bobbing display. The tail is spread moderately and may be twisted to one side or the other during extremely wide Head Swinging. It is noteworthy that the tail is not colored brightly on its undersurface as in the flickers (Colaptes). Gaping is an extreme threat, usually preceding or accompanying movement toward (attack upon) an antagonist (Blume, 1955, fig. 1). The bill is held open and directed (Bill Directing) at the other bird. Courtship feeding may occur, the male feeding ants to the female, which assumes a begging posture (Hann, summarized by Blume, 1955, p. 194). Copulation has been illustrated from movie film by Blume (1962, p. 35). The female crouches on a branch, tail low, and head held rather high. The male mounts from the side and achieves cloacal contact from one side while atop the female; there is some bill contact during copulation, the male tapping the open or closed bill of the female.

Interspecific Interactions. Reacts of course to various hole-nesting species near its nesting and roosting sites. The Gray-faced Woodpecker (P. canus) is closely related and has hybridized (Salomonsen, 1947; Ruge, 1966) with P. viridis; diverse interactions between these species in their European zone of sympatry are likely. The Green Woodpecker utilizes more open country and feeds on the ground farther away from tree cover than does the Gray-faced. I noted several interactions, one involving a male viridis and a female canus in Austria.
In this case both birds were on the trunk of a large tree during August; the male viridis moved toward the female canus, directed its bill forward at her, and supplanted her. Several times I saw and heard Green Woodpeckers react to an overflying Gray-faced Woodpecker by uttering a Pee Call. Starlings (Sturnus vulgaris) frequently displace Green Woodpeckers from nesting cavities excavated by the latter, especially early in the breeding season.

**Breeding.** The breeding season is from March to June in most of Europe, and fully juvenal-plumaged birds represent the months of June through early September. Immature birds from Spain (sharpei) date from May to September. Iranian birds (innominatus) also nest in April to June, and Tunisian and Moroccan vaillantii, too, nest during April to June. The breeding territory usually includes woodland edge and open country and covers 480 to 1000 acres (Blume, 1961). Both sexes take part in excavating a nesting cavity, which may be started as early as the previous fall, although most work is done in the spring. The nest is situated at diverse heights from near ground level to 20 meters or more above ground. A dead stub often is used, or a rotted part of a living tree trunk or tree branch. Occasionally an old nest is used again, and very rarely the birds utilize a natural cavity in a tree. The excavated cavity is $2\frac{1}{2}$ by $2\frac{1}{2}$ inches in diameter of the entry, 5 to 7 inches wide, and 12 to 16 inches deep (Witherby, et al., 1938, p. 279). Four to seven eggs (rarely up to 11) are laid on wood chips at the bottom of the cavity. These are incubated for 18 or 19 days by both parents. The hatchling young are brooded sporadically for 3 to 5 days and are fed by regurgitation about hourly by both parents; they fledge in about 3 weeks. Nestlings are noisy, and their begging cries can be heard at some distance from the nest. Fledged birds are fed by the parents for some weeks, well into August in Europe, before becoming independent. Molt commences in late August and is completed by early to mid-November.

**Migration.** Not regularly migratory, except at the northern fringe of its Scandinavian and Russian range. Tends to wander after breeding, even south of its range in Russia and to very open regions in which it does not nest. Altitudinal migration occurs in Russian mountains.

**Taxonomy.** Related rather closely to P. canus (they have hybridized [Salomonsen, 1947; Ruge, 1966]) but more so to P. awokera (awokera and viridis appear to show a relict distribution, with more recently evolved canus having invaded the northern Eurasian region between awokera and viridis). Facial markings and the strong ventral barring of viridis (especially in juvenile plumage) reflect traits of awokera and their common ancestor. P. viridis vaillantii particularly resembles P. awokera. The North African vaillantii often is considered specifically distinct from P. viridis, from which it differs mainly in its sexually dimorphic color characters (see Sexual features described earlier). It also tends to be more barred below in adult plumage, its face lacks the black about the lores found in viridis, and it is proportionately shorter billed than other races of P. viridis. Zoogeographic considerations (evolution of vaillantii as an African offshoot of European viridis), the strongly barred plumage of vaillantii, resemblance of Iberian P. viridis sharpei to vaillantii, and the similarity of its Pee Call to that of viridis prompt me to concur with Vaurie (1959a) and others that vaillantii is conspecific with P. viridis and is not directly related to P. canus. Iberian sharpei tends toward vaillantii in its bright yellow pigmentation, loss of black on the face, and reduction of red on the crown of females. There also is usually an indication of a white line over the malar stripe in sharpei, a trait seen in vaillantii and also in P. awokera and P. squamatus, near relatives of P. viridis. Picus viridis sharpei is smaller than other races of viridis (shorter wings and tail; bill as short as that of long-winged vaillantii). Its range includes Spain, Portugal, and the Pyrenees Mountains (birds from Bourg-Madame Plateau of the French Pyrenees are nearer sharpei than viridis). In the mountains of western Iran is found P. v. innominatus,
distinguished from *viridis* by its very pale coloration (grayer, much less green above, nearly pearly white below). I agree with Vaurie (1959a) that all other described races of *P. viridis* should be synonymized with *P. v. viridis*, with the possible exception of *bampurensis* (Baluchistan, southeastern Iran), which neither he nor I were able to study. There is a cline of decreasing size in Europe and Russia, but extreme populations do not differ by more than 5 percent in wing length and tail length; since the populations intergrade and are connected by variable intergradient populations and they exhibit no trenchant characters (compared with those of *sharpei* or *vaillantii* or even *innominatus*), I see no purpose served in treating them nomenclaturally.

References

RED-COLLARED WOODPECKER

*Picus rabieri*

**Color Plate 89**

**Range Summary.** Southeast Asia.

**Diagnostic Features.** Medium, wing length 125 to 136 millimeters. A green woodpecker with red forming a band around the neck (pink on lower neck, red on nape). Fine pale bars evident on abdomen, white bars in wings. Males have red crown and reddish in malar area.

**Description.** Bill moderately long, curved along culmen, slightly chisel-tipped and moderately broad across nostrils. Above, bright green, paling slightly on rump; uppertail coverts green with black shafts and blackish feather bases. Wings blackish brown in flight feathers, the coverts and inner secondaries, as well as the outer edges of all secondaries, being bronzy green (the bronze tone varies, some birds being greener and others showing a distinctly red tinge); narrow white bars on outer vanes of primaries, broader white bars on inner vanes of primaries and on secondaries; underwings yellowish white or white with gray-brown bars, becoming gray-brown at tips of flight feathers. Shafts blackish brown to black above, similar below but paling at base of tail and toward tips of wings, the shafts at the extreme tips being yellowish white or white. Tail black above with green edges of inner feathers (not at tips); below, black with distinct greenish yellow cast, outer feathers often yellowish, and all feathers frequently discolored; variably unbarred or with fine dusky white bars on central feathers (first and second pair). Tail/wing ratio 0.73 to 0.78. Forehead buffy green; ear coverts green; short, fine white line just over and behind eye; throat buffy green, often showing whitish streaks (white bases of feathers show through). Underparts green, slightly paler than back; unmarked on breast and often on center of abdomen, but sides, flanks, and most of abdomen are tricolored green, yellowish white, and olive, the olive occurring in chevron bars (as in *vittatus*, *squamatus*) that are sufficiently indistinct to present a blotched or streaky pale and dark green pattern. Undertail coverts olive-gray with green edges and tips.

Sexual features: Sexes similar in size (wing, tail length); bill of male trifle (4 percent)
longer. Male has red over entire crown and red extending forward from sides of the neck into the middle or anterior part of the malar area; the red often suffuses into the loral area, under the eyes, and onto the forehead; and it may encroach upon the throat and ear coverts as well. Females lack red on the center and anterior parts of the crown, and the facial suffusion of red just mentioned in males. Both sexes show a vague streaking of the crown, in males a blackish olive spot-streaking amid the red and in females a blackish streaking on a green background. Immatures resemble adults but are much grayer below and have orange or even yellow evident in the red around the neck. Young males show the same head pattern as adults; immature females not seen. Eyes red-brown; legs and feet yellowish green or grayish green; bill black except at base, where tinged greenish or yellow-green.

**Distribution and Habitat.** A generally rare forest species confined to eastern Laos, North Vietnam, and South Vietnam. Its altitudinal range is not known.

**Behavior.** One of the two or three least known woodpeckers. There is no information on its vocalizations, displays, or nesting. According to Wildash (1968, p. 143), it “lives in the forest, usually on the ground or not far from it. Feeds mainly on ants.” One specimen label bears a note that it “generally feeds on the ground.” Apparently rare in much of its range, but found to be abundant at Phuqui, North Vietnam, by Delacour and Jabouille (1931). An immature male dates from March at Phuqui; January to March adults are in worn plumage with no sign of molt, and thus this period is indicated as the breeding season.

**Taxonomy.** Relationships not clear, but seems to represent a relict species related to the canus-vittatus-xanthopygaeus group of *Picus*, perhaps evolved from an ancestor of that group near the line giving rise also to the flavinucha group. The faint but definite chevron bars on the underparts clearly point to a relationship with the vittatus complex. The species is monotypic.

**BLACK-HEADED WOODPECKER**

*Picus erythropygius*

**Color Plate 89**

**Range Summary.** Southeast Asia.

**Diagnostic Features.** Medium, 100 to 135 grams, wing length 144 to 160 millimeters. A green woodpecker with a red rump; yellow throat, breast, and neck; black face and crown; and vaguely barred, dull white abdomen. White bars in wings. Males have red crown patch. Yellow eyes.

**Description.** Bill rather short, curved along culmen, almost pointed at tip, moderately broad between nostrils. Above, yellowish green, paling to yellow on hindneck and along border with rump; rump orange-red to red; uppertail coverts olive-green (shafts black). Wings deeper green than back on coverts and inner secondaries, becoming blackish on coverts near bend of wing and primaries and inner secondary vanes. White bars narrow on outer vanes of primaries, broad on inner vanes of all flight feathers; underwings mainly white basally with black bars, blacker toward tip. Shafts blackish, paling to brown at tail base; below, brown, paling to white at base and tip of primaries and to pale brown at tail base. Tail blackish, some green at edges of central feathers, paler below; trace of pale bars toward base of central feathers. Tail/wing ratio 0.70 to 0.78. Entire top of head, crown, nape, ear coverts, lores, and malar area black; but polymorphic in that some birds have and others lack a fine white line over eye, extending posteriorly to yellow neck. Sides of neck yellow, the yellow
extending over the entire throat (duller and paler on chin) and uppermost breast (where often olive tinged). Lower breast whitish, bearing faint gray or brown chordate or V-bars; sides and flanks somewhat more strongly barred on white background, and abdomen heavily barred brown or blackish; undertail coverts barred brown and white.

Sexual features: Females barely average smaller than males in wing length and other measurements; red patch in center of crown in males, the patch lacking in black-crowned females. Immatures are greener, less yellow on the back than adults; the wings show more barring and are tipped with white; the breast is buffy and less yellow; the throat is paler yellow; ventral barring is less contrasting; and males have less red in the crown (red mixed with black). Sexes differ as in adults. Eyes lemon-yellow; orbital skin slaty. Legs and feet grayish green. Bill olive-yellow with darker tip in erythropygius, deep brown in nigrigenis.

Distribution and Habitat. From central and southern Burma across northern and central Thailand and through southern Laos and Cambodia to the Vietnam. Found chiefly in lowland monsoonal dry forest and scrub woods, reaching an elevation of 1500 feet or more in South Vietnam and up to 2700 feet in northern Thailand.

Behavior. Little known. “It keeps to the treetops and understorey and has not been seen feeding on the ground” and “it is shy, restless, and continually on the move” (Smythies, 1953, p. 295). According to Deignan (1945, p. 230), “its main food is termites, in pursuit of which it may often be observed on rott ing stumps, logs, or even on the ground” (contra Smythies). This woodpecker forages frequently with mixed species flocks of laughing-thrushes (Garrulax), jays (Garrulus), and treepies (Dendrocitta, Crypsirina). Its loud, ringing call is characteristic — “The ordinary call is a loud double note, a sort of garrulous quitch-quatch, quitch-quatch; sometimes a high-pitched staccato phrase cha-chacha, cha-chacha, rapidly repeated with the stress on the first note in each phrase” (Smythies, 1953, p. 295). Drumming has not been reported. Its nesting habits are essentially unknown. Fledgling young (nigrigenis) are known from June to August in Thailand and Burma, and a Burmese nest in a “pyinkado tree” was noted by Smythies (1953, p. 295) for 18 March. These data suggest February or March to June as the nesting period. Molting birds represent late June to November in the west (nigrigenis), although a bird taken in southwestern Thailand on 26 February is in full molt. June to September includes the molting period of the race erythropygius as indicated by the specimens I have seen.

Taxonomy. Relationships not clear, but probably with P. canus or with vittatus and xanthopygaeus, which are relatives of canus. Two subspecies are recognized: nigrigenis, the blackish billed, western race (Burma, western Thailand), and the pale-billed eastern subspecies, erythropygius. These intergrade in Central Thailand (Meklong, Kan Song).

GRAY-FACED WOODPECKER

**Picus canus**

Color Plate 90

Range Summary. Eurasia.

Diagnostic Features. Medium, 98 to 140 grams (canus, dedemi), 110 to 175 grams (jessoensis, hessii), 147 to 182 grams (sanguiniceps); wing length 127 (dedemi, tancolo) to 167 (sanguiniceps) millimeters. Mainly green (one race dull red) or bronzv green; paler below, with no barring or markings above or below (rarely faint abdominal bars). Rump distinctly
brighter (more yellow or else red). Black line on malar area. Throat paler than head, often whitish. Wings barred white. Males have red crown patch. Many races with black nape.

**Description.** Bill moderately long, curved along culmen, moderately broad across nostrils, and somewhat chisel-tipped. Very variable in color, somewhat so in size. Above, grayish green (*canus* group), yellowish green (most races), or dark red (*dedemi*), brightening to yellowish (most races) or red (*dedemi*) on rump. Uppertail coverts green or red, basally black. Wing scapular area as back, much of coverts and inner secondaries more bronzy green (or bronze-red in *dedemi*); small portion of coverts near bend of wing, inner vanes of secondaries, and primaries blackish or brownish black; primaries bear small white bar-spots along outer margin. Underwings grayish brown with white bars, except coverts black and white bared. Shafts black or brown above, except paler at base of tail; below, black in tail, brown in wings, paling to white at tips. Tail mainly brownish black, paler below with (sometimes) a greenish cast; some green edging of central feathers dorsally; weak, almost vague pale bars evident, especially on central feathers, of most races, but lacking in *dedemi*. Tail/wing ratio 0.63 to 0.81, greatest in southern Asian *ricketti*, *dedemi*, and *robinsoni*. Sides of head variably pale to dark (*dedemi*) gray, extending forward to the bill below the eye and over the eye to its anterior margin, the gray bordered by a black or black and gray malar mark below, by black lores, a black mark before and above the eye, and black sides of the crown. The upper lores often are marked by a whitish line bordering the black above the lores, sharply setting off that black. Nape is gray, continuous with sides of head and extending to midcrown and sides of crown in *canus* group, gray at the sides with black in the center of the nape in most races of the *guerini* group, and all black in *hessei*, *sanguiniceps*, *robinsoni*, and *dedemi*. Hindcrown often streaked black and gray in most of *guerini* group, and rarely in some birds of the *canus* group. Throat gray, often gray-white in all races except *robinsoni*, *tancolo*, and *dedemi*, but always paler than ear coverts and grading posteriorly into breast coloration. Breast varies from gray with barely a yellow-green tinge (*canus*, *jessoensis*), green-gray (*kogo*), gray-green (*guerini*, *sordidior*, *sorbinus*, *tancolo*, some *hessei*), green (*sanguiniceps*, some *hessei*), to olive-red (*dedemi*). The breast color pales somewhat rearward onto the abdomen, which shows more yellow and gray (most races) or some green and gray (*dedemi*). Some faint to moderate barring occurs on the flanks and abdomen in occasional individuals of all races; it is uncertain whether or not these represent birds only one year old or so. Undertail coverts gray, greenish, or (*dedemi*) blackish, rarely barred.

**Sexual features:** Males average very slightly larger than females, with bill proportionately longer (bill 5 percent longer). Males with red patch on midcrown to forehead, patch extending rearward more (hence larger) in *hessei* and *sanguiniceps*. Females usually lack red (scattered birds of all races may have a few red feathers present), that area of the head usually being mixed gray and black (most races), gray-green (*canus* group, some *kogo*), or black (*dedemi*). Immatures grayer, less green above than adults, often showing a gray “scaling” effect, or (*dedemi*) blacker, less red above; underparts virtually lack green tinge (in *dedemi*, blacker below, less reddish) and are barred vaguely to strongly, at least on abdomen, but often extending onto sides and even breast; black malar mark less prominent than in adults and stronger white marks over eye and under eye to lores. Sexes differ as in adults, but red on male’s crown more orange or even yellow tinged. Eyes brownish red, red, or possibly pale grayish yellow (reported in two *P. c. sordidior*), grayer, less red in immature birds. Legs and feet gray, brownish gray, or blackish, tinged greenish, olive, or bluish; claws grayish brown; toe pads grayish white. Bill varies from grayish green to slate or blackish, but the base, especially of the lower bill, is paler, gray to yellow, in most birds.
Distribution and Habitat. Ranges from the limit of trees in west-central Europe (Scandinavia, including Norway, and from central France eastward) across eastern Europe and Russia to the Pacific Coast of Russia, Korea, and Hokkaido, Japan; south to the Alps, the Balkan mountains, Rumania, the lower Volga region of Russia, the Altai Mountains, and extending southward through China (but not Japan) and beyond to the Vietnams, Laos, Thailand, and Burma; westward from Burma and southeastern Tibet along Himalaya Mountains of northern India, northern Bangladesh, and Nepal to Kashmir; isolated populations occur on Formosa, Hainan, and in the mountains of Malaya and Sumatra. Reaches sea level in Europe and eastern Asia, but generally associated with hill and montane forests, ranging up to 7000 feet in the Altai; to 8000 feet in Kashmir, Nepal, and India; to 11,600 feet in Tibet and Assam; from 4000 to 11,500 or even 12,000 feet in southwestern China; between 4000 and 6000 feet in Malaya; and from 4300 to 7600 feet on Sumatra. Habitat broad-leaved and mixed deciduous-coniferous forests of diverse types, especially open forests with some open ground, forest edges, dry woodlands, parks, cultivated areas with trees, and mixed bamboo and secondgrowth forest.

Foraging Habits. Forages on the ground, at some seasons and in some places mainly, but not exclusively so; also taps, probes, and gleans, occasionally excavating for food in trees, especially at rotten or broken places or in crevices on the tree surface. Ants and their larvae, pupae, and eggs are the major food items; but termites also are taken, and larvae of beetles and other insects are obtained from trees. Various fruits and berries are consumed seasonally, as to some degree is nectar from flowers (Ali and Ripley, 1970, p. 187). Those authors reported Tibetan specimens that had fed upon fruits of a shrub (Actinidia sp.) to the extent that their intestines were dyed indigo blue from the fruit. When on the ground, progress is by hopping (occasionally a step or two is taken when pivoting [Short, 1971g, fig. 9]), the movements being heavy, almost clumsy. The woodpeckers probe into anthills and into crevices in the soil, poking with the bill, then “tonguing” up ants. Although they can be noisy at times when tapping in trees, they usually forage slowly and quietly, and their deportment and color render them inconspicuous. Much tongue probing takes place at crevices and other irregularities in the bark. The woodpecker may perch quietly for a long time, “tonguing” insects from such crevices. There are frequent pauses during foraging. Various types of trees are utilized, and trees of all sizes, the birds foraging from ground level to the tops of trees. Ground foraging occurs along paths, near bases of bushes, and in other open places adjacent to bushes or trees; when the woodpeckers are somewhat alarmed, they move toward the base of a tree, and they ascend the tree if the situation continues to disturb them. Members of a pair frequently forage close together on the ground or in the same or adjacent trees. Occasionally Gray-faced Woodpeckers join mixed species foraging flocks, moving about on the ground and in trees with the flock (for example, with tree-pies, Crypsirina temia, and babblers, Garrulax sp., in Thailand).

Voice. The vocalizations of the Gray-faced Woodpecker have been discussed by Blume and Jung (1959), by Conrads and Herrmann (1963), by Conrads (1964), and by Short (1973d, pp. 314–316). Drumming is in bursts of 1 to 2.2 seconds, with a rate of 18 to 20 beats per second (European P. canus canus). These bursts are longer and slightly slower than those of related, sympatric P. vittatus; and they are considerably slower than those of P. viridis (22 to 27 beats per second), which rarely drums. The bursts are delivered at about two or three per minute, much less than the Lesser Spotted Woodpecker (Picoides minor), which drums similarly (same tempo of beats). Territorial proclamation and localization seem to be served by drumming. Mild threat or alarm is expressed by a short, single note,
the Kik (or Kük) Call. Sonographically this is an inverted, U-shaped note emphasized at a peak of 2.0 to 2.2 kilohertz in the fundamental tone, but with some emphasis on harmonic tones at 4.2 and 6.3 kilohertz. The notes are 0.03 to 0.05 second in duration. I have not heard this form of vocalization in *P. viridis*, but the Kip Call of *P. vittatus* is very much like the Kik Call of *P. canus*. The complex Wicka Call was reported accompanying Head Swinging Displays, by Conrads (1964, p. 182: "wi-{te} wi-{te}——"). I recorded this call ("chew, t-chew, t-chew," [Short, 1973d, see fig. 21m]) in Austria; it was uttered by one of a male and an unsexed bird, both adults, perched close to each other. The call contains two forms of note: a short, higher-pitched, inverted V-shaped element, and a longer, lower-pitched, inverted U-shaped element, usually uttered alternately. The longer element is virtually identical to the banded type-B element in the Wicka Call of *P. vittatus* and is 0.03 second in duration, peaking at 1.1 to 1.2 kilohertz and at five or six higher tones. The shorter element somewhat resembles the type-A element of the Wicka Call of *P. vittatus*, being 0.015 to 0.02 second in duration and peaking at 2.0 to 2.5 kilohertz. Functionally, the Wicka Call seems to be a vocal threat display. The Kjack Call (Short, 1973d, fig. 27s) is somewhat similar to, but does not closely resemble, the Kjaack Call of *P. viridis* or of *P. vittatus*. It functions similarly, however, as a location call in flight; and it may occur also when the birds are perched. Austrian calls contain four to nine notes given in 1.1 to 2.3 seconds (at 3.3 to 4.5 notes per second). Notes are 0.1 to 0.21 second in duration, and they tend to shorten and to drop in pitch toward the end of the call. Almost horizontal, forming a very broad, inverted-U, the notes waver in pitch, with emphasis on the fundamental tone (1.7 to 2.2 kilohertz) and the harmonic tone at 4.8 to 6.4 kilohertz. Each note is marked by a faint, initial vertical element. Compared with the Kjaack Call of *P. viridis*, the Kjack Call is higher pitched, emphasizes but one overtone, and has weak vertical components. The Kee (or Kű) Call, or Long Call, is a series of four to 10 notes with territorial proclamation and localization functions. Two Austrian calls are 0.67 and 1.03 seconds in duration (tempo of notes, 5.8 to 6.0 notes per second), with emphasis only on the fundamental tone (1.3 to 1.8 kilohertz). Some calls heard in the field were 2 seconds in duration. The inverted, U-shaped notes are 0.06 to 0.13 second in duration, thus being longer, higher pitched, and delivered more slowly than in the Long Call of *P. vittatus*. Compared with *P. viridis*, the Long Call of *canus* is a piping, hollow “pee-pee-pee-pee-pee——,” rather than a deeper “wee-kwee-kwee-kwee——.” I have not heard the so-called pairing call, the Djök Call of Conrads and Herrmann (1963), nor their anger-alarm vocalization, the Quaquä Call. Although I have not been able to analyze fully the begging calls of juvenal birds, there seem to be at least three types of call: a short-noted, rapid call; a longer-noted, slower call; and a continuous shriek-like call. These seem to include only one or two of the three calls ("schätt," "tsack," and "tjück" calls) of Conrads and Herrmann (1963), but studies are required to elucidate this matter. The calls of which I have sonagrams are very much like those of *P. viridis*.

Displays. Various stretching movements (one wing, both wings) were figured by Blume (1965, fig. 2). Wing Flicking is either a simple intention movement or a display. Blume (1962), Blume and Jung (1959), and Conrads (1964) described other displays. Head Swinging with an accompanying Wicka Call during interactions was the subject of a brief report by Conrads (1964), and in weak form may have been expressed in Blume and Jung’s (1959, p. 68) report. I have seen Crest Raising by a male in the presence of a female. Tail Spreading seems not to have been described.

Interspecific Interactions. Sometimes interacts with Green Woodpecker, with which it rarely hybridizes (Salomonsen, 1947; Ruge, 1966). I have seen two instances of “ducking”
by Gray-faced Woodpeckers when Green Woodpeckers flew over, emitting Kjaeck Calls. The “ducking” involved movement under a branch and into foliage. See also Green Woodpecker.

Breeding. Bussmann (1944) and Conrads and Herrmann (1963) discussed the breeding of Gray-faced Woodpeckers in Europe. Breeding occurs in May and June in most areas throughout its vast range, with enlarged gonads noted as early as March, and juvenile birds dating into September. These dates include European, Russian, Chinese, Nepalese, Japanese, and Burmese birds; northern Indian woodpeckers may commence laying in April or as early as March, and young Sumatran birds (dedemi) out of the nest represent 15 April, 16 July, and 8 August. The nest is excavated in diverse trees, usually in the rotted trunk of a live tree at heights from near (or below, if nest entrance is very low) ground level to 8, 10, or even 15 meters. Indian birds are reported frequently nesting very low, within a meter of the ground (Inglis, 1964; Ali and Ripley, 1970). Both sexes excavate the nesting cavity. The entry is about 6 centimeters in diameter and 15 centimeters in depth, and three to seven or even nine eggs are laid on wood chips in the bottom. Incubation is shared, the male incubating during the night. About 18 days are required for incubation. The nesting period lasts 24 or 25 days (Bussmann, 1944). The young are brooded at night by the male and at times during the day by either sex, but especially the female. The food consists mainly or entirely of ants, adults feeding the young at 22- to 50-minute intervals (Ehrenroth, 1973). Bussmann (1944) documented the development of nestling Gray-faced Woodpeckers. Adults feed the fledglings for several weeks after they leave the nest. The young achieve adult plumage by late September. The molt takes place from July through October to mid-November (all areas except North Vietnam [September to January] and Sumatra [May to October]).

Migration. Some birds of northern populations migrate or wander south after breeding, and it is likely that the birds of the uppermost altitudinal limits of the species in mountainous central Asia move downslope in fall.

Taxonomy. Related on the one hand to the Green Woodpecker group (P. viridis, P. awokera, and P. squamatus) and to the vittatus group of species (P. vittatus, P. xanthopygaeus, P. rabieri, and P. erythropygius). Probably represents a second invasion of northern Asia and Europe by Picus, the first invasion resulting in the evolution of P. viridis and P. awokera. Hybrids occur rarely with the Green Woodpecker (see p. 479). There are many races, but some of those currently recognized are in my opinion not worthy of nomenclatural recognition. Essentially I agree with Vaurie’s (1959a, 1965; see also Greenway, 1940) concept of variation in P. canus, except that I recognize two fewer subspecies (11 rather than 13), the two synonymized being griseoviridis with jessoensis and biedermannii with canus. There are two major racial groups: the northern, gray-crowned (females), grayish canus group and the eastern and southern guerini group, which has black on the nape and crown and a strongly green tone, plus two isolates, robinsoni in Malayan mountains and dedemi of the highlands of Sumatra. Of the last two races, robinsoni is very dark green throughout (except for pale throat and yellow rump), the male has a red forecrown, and the crown and nape in both sexes are black (few gray streaks in female). The subspecies dedemi is even more distinctive, being mainly reddish instead of green above; red, green, and gray below, with a fully black crown and nape (red forecrown in male). Both these races are small (wings 134 to 141 millimeters in robinsoni, 129 to 141 millimeters in dedemi). The canus group includes canus of Europe and Russia, east to western Siberia, and jessoensis of eastern Siberia, northeastern China, Manchuria, Korea, and the northern Japanese islands, including Sakhalin. Vaurie (1959a, p. 11) adequately covered the synonymy of P. c. canus, and he indicated clearly
that biedermanni of the Altai region should be synonymized with canus, as it represents an intermediate population between canus and jessoensis. The last-named race is grayer, less green than canus; and it varies greatly, many individuals being indistinguishable from canus, especially those in fresh plumage. I treat Chinese “perpallidus” and “zimmermanni” and Korean “griseoviridis” as synonyms of jessoensis, these representing tendencies that, in view of the variation of jessoensis, are too trivial to merit racial recognition. Even “griseoviridis,” recognized by Vaurie by virtue of its greenish upperparts and grayish underparts, is matched by too many other jessoensis specimens to be treated nomenclaturally. Southward in China jessoensis intergrades with kogo in the west and guerini in the east. In eastern China there is an array of populations containing dark-colored birds of relatively small size. Picus canus guerini of the eastern Yangtse River region west to central Szechwan (where intergrading with sordidior through “jacobi”) has a black nape patch and streaked crown (females) and is greenish above and below. Next, to the south, in Fukien, Kwangtung, Kwangsi, and easternmost North Vietnam, is P. c. sobrinus, similar in size to guerini and jessoensis but more golden green above and greener, less gray below. On Formosa and Hainan islands occur very similar populations treated under the name tancolo, with “hainanus” a synonym. This subspecies is characterized by its even more deep green upperparts, its greener underparts, a grayer face, and smaller size compared with sobrinus. Hainan birds average slightly smaller than those from Formosa, but there is great overlap. Far inland in northern China (Shansi west to Tsinghai and south to Szechwan) is kogo, larger than guerini and greenish but paler green than guerini; the female’s crown is streaked and the nape is black. South of kogo in western Szechwan, Sikang, Yunnan, and adjacent northeastern Burma is an equally large form, sordidior, dark in color like eastern guerini but less dark than hessei, which occurs south of it. The remaining two races show more red on the crown of males and a blacker nape and crown in females, and they are more deeply green than others of the guerini group. From Nepal and northern India, northern Bangladesh, eastward through Burma and most of Thailand to the Vietnamese occurs a variable golden green form, hessei, that is deeper green below and less gray than other races of the guerini group; its tail also is less barred and darker. This race shows a cline of diminishing size from north to south and especially from northeast to southwest. Western populations have been treated as racially distinct (“gyldenstolpei”) on the basis of coloration and shorter bill, but I concur with Vaurie and others that no purpose is served in formal recognition of what are at best slight tendencies. Finally, sanguineiceps of westernmost Nepal and northwestern India is the largest of all races of P. canus; it is greener with less yellow and gold tints than hessei, and males have even more red on the head.

References

Genus Dinopium Rafinesque

The four southern Asian species are patterned in green, red, black, and white and are crested. The face and throat are striped black or black and red and white, with the position
of the lines different from *Chrysocolaptes*. The bill is short to moderate, curved along the culmen; its base is narrow with nostrils partly covered by feathering and situated close to the culmen. The tip of the bill is pointed or slightly chisel-tipped. The tail is long and slightly concave below, but rather soft. The fourth toe is short, barely as long as the anterior toes; the hallux is short in *benghalense*, vestigial or absent in *shorii*, and absent in the other two species. Sexual dimorphism affects the crown and, to some extent, the malar area; males have a red crown and crest and sometimes red in the malar, whereas females lack red in the malar, have no or less red on the (rear of the) crown, and may have pale spots on the anterior crown.

**OLIVE-BACKED WOODPECKER**

*Dinopium rafflesii*

Color Plate 91

**Range Summary.** Southeastern Asia.

**Diagnostic Features.** Small to Medium, weight 76 to 84 grams (*dulitense*) and 87 to 119 grams (*rafflesi*, Malaya), wing length 119 to 139 millimeters (*dulitense*) and 137 to 149 millimeters (*rafflesi*). Side of head with two black and two white stripes; yellow-green above; underparts green-olive to gray-olive, often stained rusty, without markings or with a few white spots. Crown black or red with long crest.

**Description.** Bill moderately long, somewhat curved along culmen, chisel-tipped, and narrow across nostrils. Nostrils covered over by feathering. Back green to olive-green with strong yellowish to bronzey cast (feather tips); rump tipped yellow-green or, less commonly, dull orangish, rarely red; upper tail coverts olive-black, sometimes barely edged with orange or red. Wings with brownish black flight feathers, paler or with white spots at tips; coverts yellow-green, also outer vanes of secondaries; inner vanes of flight feathers have row of white spots; below, brown to blackish with white spots on coverts and flight feathers. Shafts black above, brown below, becoming whitish at bases of flight feathers. Tail black, long; below tinged olive. Tail/wing ratio 0.70 to 0.79. Hindneck black, usually connecting with broad black line through ear coverts to eye. White line from over eye rearward, and another from lores to rear, under ear coverts, broadening to large stripe on side of neck. Black line from upper edge of malar area posteriorly, below white stripe, also broadening on neck. Rest of malar area, anterior lores, nasal tufts, and throat cinnamon-buff to yellowish white, often strongly tainted buff to rusty all around base of bill. Underparts, from rear of throat to undertail coverts, olive-gray to olive, often stained rusty; some birds are unmarked; others have whitish spots on sides or on flanks or have spot-bars in those areas.

Sexual features: Male has red crown and very long crest, narrowly bordered black at sides, and with buff bases of red feathers, these becoming prominent (red tips narrower) on forehead; some males show red traces to moderate red tips of the malar feathers. Females lack red on crown (and malar areas); crown black with small crest, becoming olive toned at extreme sides (over eyes), and buffy cinnamon on forehead. Immatures resemble adults but are grayer, less bright green, and duller generally; males have red restricted to the crest or occurring on anterior crown and forehead only as sporadic spots, these areas being mainly olive or blackish olive; females are like adults, but crown more olive, less black. Eyes reddish brown ("blue" in one Borneo bird), legs and feet gray or blue-gray, bill gray-black.

**Distribution and Habitat.** Southeastern Asia from Tenasserim, Burma, and peninsular
Thailand to Malaya, Sumatra, and Borneo. Prefers dense, swampy parts of lowland primary forest; in hills to elevations of 3000 feet on the mainland, but reaching at least 5200 feet on Borneo.

**Foraging Habits.** Taps, gleans, and probes for food in forest trees and saplings up to 8 meters above ground, that is, within the forest understory. Sometimes it descends to fallen logs. Birds feed loosely in pairs or, more commonly, alone. Movements of the Olive-back are slow but continuous, with infrequent pauses. Much of its food consists of ants.

**Voice.** Drumming is not known, except for demonstration tapping at the nest site. This tapping, a series of 10 to 12 soft beats, seems to be a signal between mated birds and is produced mainly by the female of a pair within a nest, during incubation. A low "ch-wee," repeated, forms the Ch-wee Call, a vocalization heard from paired birds at the nest as a male supplanted its mate. The Slow Long Call is a series of six to 34 notes, averaging 18.7 notes delivered at 8.79 notes per second for 0.68 to 4.10 seconds. The notes are simple and low pitched, although variable. Calls often terminate in a loose, irregular series of several separate notes. A Fast Long Call averages 13.11 notes per second and contains 11 to 46 notes lasting 0.93 to 3.0 seconds. The tempo and form of the notes are more regular than in the Slow Long Call, and the emphasis is on a harmonic tone at a higher pitch than in the other call. Notes shorten in duration during the Fast Long Call, and there are no delayed notes at its end. The Slow Long Call is used by members of a pair near the nest and may be a signal indicating presence of one of the birds at the nest. The Fast Long Call seems to be the territorial proclamation call.

**Displays.** Crest Raising Displays occur between birds in encounters, and are especially noticeable in males. A male facing its mate near the nest usually has its crest raised during any other displays. Head Swinging from side to side also occurs in encounters between paired birds and probably takes place in aggressive interactions too. Bowing Displays also accompany Crest Raising Displays — the head and bill are raised and lowered slowly. All of these are deemed to be aggressive displays based on their occurrence in other woodpeckers, but of course they require investigation in this species. Courtship Feeding (Short, 1973d, fig. 31) takes place between mated birds at the nest. A male supplanted its mate, Crest Raising at her, Bowed to her, engaged in Head Swinging Displays, then gleaned ants from a formation of them passing near the nest. With crest partly raised, the male then inserted its bill into the female's bill and presumably fed her. This happened during the period of nest excavation.

**Breeding.** Very little known. A pair excavated, taking turns, in a tree 25 centimeters in diameter at 4.5 meters above standing water in a Malayan forest on 11 March (fig. 29 in Short, 1973d). As they excavated, both male and female stopped occasionally to glean passing ants. In early April incubation was occurring, with the female in the nest most frequently during the day and the male remaining within the nest at night. I do not know the fate of their nesting endeavors. Immature birds are known from Malaya during May. The molt follows the nesting period, in August to November, generally, except that a March specimen from Sumatra is in molt.

**Taxonomy.** Rather distinct within its genus, the Olive-backed Woodpecker probably does not meet *D. javanense*, the only other member of its genus within its range, for the Olive-back is a forest bird and *javane*nse frequents scrub, mangroves, and open woods. Racial variation is minimal; I find Borneo birds to be distinctly smaller (shorter wings, tail, and tarsus) than mainland and Sumatra birds, and these can be treated as *D. r. dulitense*. Malayan,
Dinopium [javanense] shorii

Thai, and southern Burmese birds have been separated (peninsulare) from Sumatran Olive-backed Woodpeckers (rafflesi) on the basis of red edges of the rump and tail covert feathers, but many of the continental birds lack red there and Sumatran birds show traces of red. Individual variation is great, and the single character would not be sufficient to justify racial separation of these birds even if there is an average difference. It is clear that Bornean birds have differentiated to a greater extent from Sumatran and mainland birds than Olive-backs from Sumatra have from mainland birds. Thus, I recognize dulitense (Borneo) and rafflesii (remainder of species’ range) as the only subspecies of D. rafflesii.

Reference

HIMALAYAN GOLD-BACKED WOODPECKER

Dinopium [javanense] shorii

Color Plate 92

Range Summary. Southern Asia.

Diagnostic Features. Medium, weight 101 grams, wing length 147 to 166 millimeters. Very like somewhat smaller D. javanense, which it meets in Burma, but shows dusky tan on sides of breast forward, forming tan line up center of throat, bordered by line of black spots on each side; entire breast browner and dusker, less clearly black and white. Otherwise the two are nearly identical.

Description. Bill moderately long, curved along culmen, nearly pointed at tip, narrow across nostrils. Essentially like D. javanense intermedius except as follows: Primaries browner, less black. Tail/wing ratio 0.61 to 0.67. Malar area more dusky tan anteriorly, less black. Throat, instead of central line of black extending to rear, has buffy tan midline beginning narrowly at bill and broadening onto breast, bordered by line of black spots on each side. Breast buffy tan with central area of black-bordered white feathers and black band at sides of breast; entire breast more tan than black or white. Rest of underparts with chainlike bands of white, bordered by black; the tips of the feathers have narrow black edge, so effect is of more continuous white stripes and black bands than in the more barred, hence reticulate-marked javanense. Black of underparts browner, hence pattern less contrasting (black and white) than in javanense.

Sexual features: As in javanense. Immatures more dusky and tan below, markings obscure on abdomen, sometimes also breast; crown streaks dusker, less white. Male with red crest; forehead to crown buffy brown with broad white shaft streaks. Female lacks red, has broadly streaked brown crown. Eyes red-orange, red-brown, gold, or crimson. Legs and feet greenish gray to greenish brown; toes three or four — about 20 percent of specimens have three toes, most of the others have only a stub of the fourth toe, and some have a tiny but fully formed fourth toe and claw. Bill blackish.

Distribution and Habitat. Lowlands and foothills along south base of Himalayan Mountains from United Provinces, India, east through southern Nepal, Sikkim. Bhutan, and adjacent northern India to central Burma. Habitat is valley and hill forests up to an elevation of 700 meters (Ali and Ripley, 1970); teak forests in Burma. Apparently favors primary forest, but little known.

Behavior. Virtually unknown, presumably similar in many respects to D. javanense. Breed-
ing occurs in March and April, with young out of the nest in late April (northern India, Sikkim) and early May (Burma). Two to three eggs laid in a cavity excavated in a tree. Nothing is known of its nesting habits. Molt takes place in July and August.

**Taxonomy.** Very similar to *D. javanense* and forming a superspecies with it. Their main difference is in the pattern of the throat. They have been reported to overlap (Stanford and Ticehurst, 1939) near Bhamo in central Burma and about the Arakan Range in southwestern Burma. Sympatry is documented by specimens of both *shorii* and *javanense* taken about Thayetmyo, Burma, and a possible hybrid exists in the British Museum collection from Boulay, Thayetmyo. Ecological separation may obtain if *shorii* indeed is a forest species, since *javanense* is a woodpecker of edges, clearings, and dry forest. Two very weakly defined races tentatively are recognized. The Burmese (adjacent Assam, India, perhaps) *D. s. anguste* supposedly differs from *shorii* of Gharwal to Assam in males having less red on the back and females having finer crown streaks. I find no difference, or the barest tendency of a difference, in the amount of red on the back of males from the two areas. There is a distinct difference in streaking of the crown, the finer streaked *anguste* females having the rear of the crown strongly black, with almost no streaking, whereas *shorii* has broad streaks and a white and black hindcrown. There also is a slight difference in size (bill length, wing length, tail length) between comparably plumaged specimens from the two areas, although samples are small; *anguste* is the smaller form.

**COMMON GOLD-BACKED WOODPECKER**

* Dinopium [javanense] javanense

**Color Plate 92**

**Range Summary.** Southern Asia.

**Diagnostic Features.** Small, approaching Medium; weight 67 to 90 grams (*javanense*), 85 to 98 grams (*everetti*), and 79 to 100 grams (*intermedium*); wing length 116 to 155 millimeters, varying racially. Yellow-green above with red rump; two black and two white face stripes. Barred or chainlike marks below. Resembles *D. shorii*, the range of which it barely meets, but center of throat with narrow to broad line of black spots. Resembles larger *Chrysocolaptes lucidus*, but bill shorter, malar area black or speckled and not white with narrow black lines bordering it (as in *lucidus*), hindneck black rather than white, and eyes dark, never yellow or white. Flight darting; tail often twists as woodpecker flies; less heavy flight than in *C. lucidus*.

**Description.** Bill short to moderate, curved along culmen, pointed at tip, and narrow across nostrils. Above, yellowish olive-green, the tips yellower, and often showing orange or red (races vary somewhat in color, but never are red backed); uppermost back black; rump and lower back red; uppertail coverts blackish brown with olive tinge at times. Wings with coverts as back; outer vanes of secondaries yellowish, but more olive in tone than coverts; flight feathers blackish brown with windowlike white spots on inner vanes; below, brown with white spots, coverts white and brown. Shafts brown above, paler below (approaching horn color in some), especially at wing tips and at base of tail. Tail black, browner below with tinge of yellow-olive to yellowish on vanes, especially of outer feathers. Tail/wing ratio 0.59 to 0.70. Moderate crest; narrow to broad white line from above eye to neck; black line through eye, usually connecting to black of hindneck; white line under eye from bill to throat. Malar area usually (see Sexual features) black above, broadening to rear (forming
black line), and white below anteriorly with black spots or streaks. Throat buffy to white with central narrow to broad line of black spots, broadening to rear of throat, forming an ill-defined whitish band to either side of throat (throat more generally spotted in everetti). Below, variable; breast usually with feathers having broad white centers bordered by wavy black edges, forming open, broad, but wavy white and narrower black streaks; in everetti the upper breast is brownish buff without markings. Abdomen whiter, the black areas tending to form bars, giving more barred effect (in exsul the underparts are generally, but irregularly, barred; and in everetti the lower breast is bar streaked and the abdomen is barred). Face, throat, and underparts often discolored or stained brown to rusty.

Sexual features: Male with red crown and crest, at forehead becoming mixed with brown; in everetti there also is red, sometimes strongly so, in malar area, and red tends to occur in spots (tips of feathers) in ear coverts and line under and over eye. Female generally lacks red on head, having a black crown and crest with broad, white shaft streaks. In exsul the female has a narrow red or orange-red band across the nape; and in everetti the female has a broad red nape patch and streaking of the crown obscure, or present as very fine, tiny streaks, mainly anteriorly. Immatures resemble adults closely, but are blacker (or browner) on the breast (white marks more spotlike), with a less clearly barred abdomen; females have crown bearing more spotlike marks, or droplet-shaped spots; males are like adults in head pattern, but show strong black on forehead and crown. Eyes brown to red-brown or red with black orbital ring; eyes grayish brown in immatures. Legs and feet grayish, greenish gray, or greenish brown; toes three. Bill gray-brown to black, usually paler below and at base.

Distribution and Habitat. Southern Asia from western India disjunctly east to Burma, Thailand, Vietnam, Malaya, Sumatra, Java, Borneo, Bali, and Palawan. Frequent woods, especially open woods, parks, golf courses, palm plantations, mangroves, and, in India, moist forest. It ranges up to 5000 feet in western India, and possibly approaches that altitude in Burma, but elsewhere is rather strictly a lowland species. In Malaya it is uncommon to rare away from the coast, and it occurs mainly about the coast in Borneo.

Foraging Habits. Feeds mostly low in trees and saplings, often down to their bases. In palm trees, to which it seems attracted, it concentrates on the frond scars of the trunk and among the fronds at the top of the tree. Birds forage usually in pairs on adjacent or nearby trees. Feeding sites appear scattered, and the birds often fly some distance from one site to another. Movement on a trunk is rapid, the woodpecker quickly gleaning, probing, and lightly pecking at the surface and in crevices as it progresses. Active periods of rapid movement alternate with sometimes long periods of quiescence and immobility. Sporadic pecks cause no noise — I never heard its blows, although others (e.g., Smythies, 1960) allude to their tapping or “hammering,” as in shredding bark of young trees. Occasionally, and more so on some days than others, the Goldbacks dropped off a tree trunk to snatch a flying insect. Most of the diet seems to consist of ants, and the darting, gleaning movements of the birds as they twist and move irregularly about the trunk of a tree seem related to ant foraging. Beetles and other insects and their larvae also are taken.

Voice. The only drumming activity known is a soft, fast drumming at the nest, heard from a male in Malaya either as a signal to its mate or as an aggressive action toward me. Six calls are known: A high-pitched Pee Call, a series of “pee” notes from a male, is of uncertain function. A Wicka Call given in interactions between members of a pair is complex and contains three types of notes, two of which are like Wicka Call notes of species of Picus, Celes, and other woodpeckers. It is rendered “ta-wi-ka” or “week-a-week”; one of the notes occasionally is double. The call may last 4 seconds or more. The Kow, Kowp, and Rattle calls are
related structurally. The single or double Kow Call is 0.27 to 0.32 (single) or 0.43 to 0.47 (double) second in duration, with a fundamental tone peak at 1.4 kilohertz and strong, multiple harmonic tones. Apparently it is the Goldback's call note. Kowp Calls are repetitive, loud, variable Kow Call-like notes given in flight or as a bird lands or takes off. Some variation in calls may reflect functional differences, as between alarm and serving as a contact note between members of a pair. There is variation in vertical aspects of the calls, sonographically, and in the tones emphasized, some calls sounding like "kow-kow-kow" or "kowp-kowp-kowp," and others "ka-da-da-dit" (tending toward Rattle Call). Calls contain up to nine notes delivered at nine to 18 notes per second. The Rattle Call is a long, fast series of Kow Call-like notes, lasting 0.72 to 2.56 or more seconds and delivered at 17.5 to 23.6 notes per second. It is rendered in my notes as "ka-di-di-di-di" (slower) or "dddddt" (faster). The Rattle Call probably serves aggressively as a territorial call, as well as a contact call. A Long Call of uncertain function was heard infrequently and contained four to 14 notes (two examples, 0.23 and 0.97 second in duration). The longer call was uttered by a male Goldback apparently in response to the Long Call of a Celeus brachyurus in an adjacent tree.

Displays. Goldbacks were observed by Harrison (1958) to rub their neck and breast in the green bark they had exposed of the Malayan white champaka (Michelia alba) trees, an action termed "barking" by that author. Its function is unknown. Displays are poorly known. Crest Raising is a common display, often seen when members of a pair happen to forage on the same tree (which they usually do not) and peek around at each other. It was also evident in wary adults that I saw at a nest. Swinging of the head and body, accompanied by a Wicka Call, occurred in an encounter between two females, ending in a chase. A Crest Raising male approached a silent female perched crosswise on a large branch and copulated with her (4 April, Malaya).

Breeding. Nests may be excavated in stubs or trees so rotten that one may poke into them with a finger, as noted by Betts (1934) and seen by me in Malaya. Ali and Ripley (1970) report Indian nests at 2 to 10 meters, usually below 5 meters in trees. Several Malayan nests or roosting holes in rotten palm stubs were 2 to 4 meters above ground. One Malayan nest, possibly an old woodpecker hole, had been excavated prior to late February. This hole was 4 meters up an 8-meter-tall palm stub, mainly devoid of bark, and 18 centimeters in diameter. A Goldback entered the nest several times in late February. Visits in March showed no activity at the site, but on 4 April both a male and a female (that had copulated [see earlier discussion]) entered the hole briefly, and the male tossed out wood chips. Incubation was in progress by late April, but I do not know the fate of the nest. The female was much more disturbed than was the male by my presence near the nest. Nesting in India occurs mainly in February and March, but ranges from January to April. Farther east in eastern India and Burma, Goldbacks nest from March to June or August, and this seems to be the main breeding period in Malaya (January to July), Borneo, and Palawan. Two to three rather oval white eggs comprise the clutch. Nothing is known of care of the young. Molting takes place during September and October in Burma; April and May in Java; March on Bali; November and December in Sumatra; March in Borneo; and January, February, and May in Palawan.

Taxonomy. Related closely to D. shorti (see p. 491), with which it forms a superspecies. The western Indian isolate D. j. malabaricum overlaps extensively with D. benghalense, but occurs in wetter woodlands (Ali and Ripley, 1970). The subspecies of D. javanense are not strongly marked, except for D. j. everetti. Western Indian malabaricum is disjunct by 1500 kilometers or so from intermediate, which it closely resembles; malabaricum is slightly
smaller on the average (wing, tail) and has narrower yellow (or reddish) tips of the back feathers, hence shows more olive on the back. *D. j. intermedium* ranges from Bangladesh and Assam across Burma and Thailand to Vietnam and Cambodia; it varies clinically in size from large northern Burmese and Assam birds to smaller in the south and east. Malaya, Sumatra, and western Java form the range of *D. j. javanense*, which is smaller than *intermedium* and *malabaricum*. Borneo birds usually are separated from *javanense* (trifle more barred below, less orange-red on back), but I do not find "borneonense" worthy of recognition. *D. j. raveni* of Eran Island and adjacent northeastern Borneo is probably not recognizable: females tend to have very fine crown streaks; the central throat streak is splayed out, approaching *everetti*; and the underparts are slightly more buff and less black. Eastern Java and Bali *exsus* differs from *javanense* in its strongly barred underparts and in females having a weak red nape patch. The distinctive *everetti* of Palawan is larger than nearby races, approaching *malabaricum* and *intermedium* in size; the tail of *everetti* is proportionately (to wings) shorter than in other races of the species. The upper breast of *everetti* is buffy brown without markings; there is a broadly spotted throat streak, not a narrow center line. The underparts are barred rather than chain streaked in *everetti*, and the ear covert mark is broad. Males of *everetti* have red of the crown and crest extending to the ear coverts or even the line under the eye; they also show red on the front of the malar region, sometimes only as vague tipping (rarely lacking). Females of *everetti* have a red nape patch and very reduced white streaking on the black crown.

Reference

**LESSEER FLAME-BACKED WOODPECKER**

*Dinopium benghalense*

**Color Plate 91**

**Range Summary.** Southern Asia.

**Diagnostic Features.** Small to medium sized, weight 86 to 133 grams, wing length 128 to 156 millimeters. Yellow, gold, or red on back with black patch on upper back and with black rump. Red crest; white stripes enclosing black stripe on face. Streaked, chainlike, or barred black and white pattern below.

**Description.** Bill moderately long, curved, rather narrow across nostrils, and almost pointed at tip. Above, black on upper back; yellow (*dilutum*), golden yellow ("jaffnense"), yellow-gold or orange-gold (most races), or red (*psarodes*) on center of back; lower back to uppertail coverts black (most races) or mainly black with olive tips of feathers (*tehminae, "jaffnense"*). Central back feathers have olive bases which may show on worn birds; sometimes they show pale bars or spots. Wing coverts and outer vanes of secondaries colored as midback, but duller and more olive; also, the area of the coverts around the outer bend of wings black (most races) or black obscured by olive (*tehminae, "jaffnense"*) or red (*psarodes*), and bearing angular white to yellowish white or reddish white spots; primaries and inner vanes of secondaries brownish black with well-separated white, windowlike spots; underwing coverts mainly white due to large white spots with narrow black edges or broad white and narrow black bars. Shafts brown to blackish above, paler below, especially at wing tips, where sometimes nearly white. Tail black (darker than wing tips), browner below. Tail/wing ratio 0.58 to
0.72. Broad red crest; white line from over the eye to hindneck; black line, usually streaked white, from eye through ear coverts to hindneck, which is black; white line from corner of bill rearward under eye and ear coverts, continuing along side of neck. Malar area black, streaked, or spotted with white. Throat varies from white and black streaked (dilutum, benghalense) to black and white barred or black with white spots or white with black checks (other races), but usually becomes blacker (white markings reduced) rearward. Below, variable; breast usually blacker, abdomen whiter, black markings being bolder anteriorly and reduced, even occasionally obscure on abdomen; markings wavy, giving chainlike streaking, or in broad streaks, the white streaks broadening and black ones narrowing posteriorly; abdomen and flanks more barred, sometimes strongly barred; undertail coverts broadly barred. The white of the underparts varies (individual variation) from white to creamy white or even buffy white (often with stains).

Sexual features: Males have crown and forehead feathers tipped red, on black bases; the black usually shows at the surface, and worn birds may show very little red, the tips having been worn off. Females lack red on crown and forehead, which are black with small, white, checklike spots. Immatures resemble adults, but spotting of crown reduced or lacking in females; males with more finely red tipped crown feathers and often showing small, white shaft spots; browner where adults are black; grayer below with dark markings tending to be less bold and distinct. Eyes brown to red; skin around eye greenish. Legs and feet gray-green; toes four in number. Bill dull gray-black, paler below.

**Distribution and Habitat.** Southern Asia from Pakistan, Punjab, Nepal, West Bengal, Bangladesh, and Assam south through India to Ceylon. Occurs in dry woodland, scrub, cultivated tree plantations, parks, roadside trees, villages, and gardens of lowlands, but attains elevations as great as 1700 meters in places on the mainland and on Ceylon (Ali and Ripley, 1970).

**Foraging Habits.** Foraging birds move about in pairs or in family parties, feeding on the trunks and branches of various trees, on stumps and stubs, on hanging fruits and flowers, and occasionally on the ground. Most of its food consists of ants obtained by gleaning; W. W. A. Phillips (1953, p. 124) stated that "it will also readily take almost any insect or gecko that it discovers upon or under the bark it is searching, as well as grubs from decayed wood." Inglis (1944) noted that it sometimes attempted to catch butterflies, presumably in flight. Nectar is taken from flowers of various trees (listed in Ali and Ripley, 1970). Ants eaten include *Camponotus compressus, Oecophylla smaragdina*, and species of *Crematogaster, Pheidole, Meranophis*, and *Myrmecocystus* (Ali and Ripley, 1970, p. 198). Various beetles, weevils, geometrid moth caterpillars, centipedes, and spiders also are mentioned by these last authors. Fruits also are consumed, including berries, mangoes, and figs. Apparently the Lesser Flameback moves about rapidly, but jerkily, circling upward along a tree trunk, occasionally stopping and backing downward to secure food. Some tapping is employed to obtain subsurface insects. This woodpecker clings awkwardly to blossoms when feeding on nectar (Betts, 1934). When not breeding it is prone to join mixed species foraging flocks.

**Voice.** Drumming is known to occur (Vijayaraghavan, 1957; Neelakantan, 1962), but is weak and not audible for more than 20 yards. The bursts last 2 to 3 seconds. Ali and Ripley (1970) considered the drumming an advertisement signal. Vocalizations are variously described, but probably are similar to those of *D. javanense*. A screaming call is mentioned by several authors, rendered "ki-ki-ki-ki-ki" by Dharmakumarsinhji (1956, p. 275) and uttered in flight as well as when the bird is perched. A trill or Rattle Call also is mentioned, separately from the screaming call, as are low squeaking or whistling calls during the nesting
season. Nestlings give a “screechy hissing” (Ali and Ripley, 1970, p. 198) when they are disturbed.

Displays. Little known. Considered highly aggressive by several authors. Legge (1878, p. 203) mentioned its “extraordinary pugnacity”; quoting a Mr. Parker, he states “the Red Woodpecker [Dinopium benghalense psarodes of Ceylon] is one of the most fearless (amongst his fellows) of any bird I have seen. One day...I heard a tremendous screaming in a large tree, and I found there two Red Woodpeckers fixed vertically on opposite sides of a small horizontal branch hammering away at each other as they would do at a dead tree” and, continuing, “after watching them 10 minutes or a quarter of an hour I left them still screaming and fighting.” Neelakantan (1962, p. 289) discussed interactions of several of these woodpeckers, involving drumming episodes. A drumming bird was approached by another, which sidled up to it, and mounted; “The copulatory action was brief and not very lively.” No calls were given; the upper bird stepped off and perched, touching the bird with which it had copulated — the latter bird squatted crosswise on the branch with its body out, wings partly open, and wing tips drooped. Reverse mounting then occurred, the second bird jumping onto the first — “and quite vigorously copulated. The tail was sharply bent down and thrust almost under the belly of No. 1” — (Neelakantan, 1962). The two birds were of the same sex, apparently males (“Both had black foreheads without any prominent white spots” [Neelakantan, 1962, p. 290]). Legge (1878, p. 204) described “courtship” as follows: “they jerk to and fro, round and up a bare cocoanut trunk, hammering and alternately cocking their heads on one side to listen, then feeding each other, and playing hide and seek round the bare stem, uttering the whole time a low love-chattering.” This indicates that Courtship Feeding occurs, as found in D. rafflesii.

Interspecific Interactions. Legge (1878, p. 204) has described interactions of Ceylonese D. benghalense psarodes with Chrysocolaptes festivus in terms of the aggression of the former, saying of benghalense, “it is addicted to fighting with the Black-backed Woodpecker (C. festivus), disputing with it the right of entrance into the holes which the latter has perhaps excavated for its nest.” He then added that benghalense “is, however, not less amiable towards its own kin.” The interaction of similarly colored woodpeckers of Dinopium and Chrysocolaptes is interesting and might lend support to those who would claim “convergence” (rather than relationship of these genera) for their similarities. However, the interaction described by Legge involves not the Ceylonese forms that resemble each other closely, but those that are dissimilar. Thus, it is not the yellow-backed D. b. “jaffinense” interacting with yellow-winged Chrysocolaptes festivus or red-backed D. b. psarodes interacting with red-backed Chrysocolaptes lucidus stricklandi that Legge discussed, but red-backed D. b. psarodes interacting with the quite different yellow-winged C. festivus.

Breeding. Most races nest in March and April, although the season may start in December (Betts, 1951) and last until August; Ceylonese psarodes reportedly has two seasons, March to May and August to September; but W. W. A. Phillips (1953) found nests in the dry zone both in June and December (I have seen recently fledged young dating in June, July, and November), and he concluded that the breeding season is extended with two peaks. Two broods may be raised in one season (Ali and Ripley, 1970), but I have not seen convincing evidence that this occurs. The nest is located from 2 to 10 meters (usually 3 to 7 meters) above ground in a live or dead tree; live trees used are softwoods such as Erythrina. Dead, rotted stubs, especially of palms, also are used. Inglis (1944) reported that natural cavities are used, but it seems clear that most nesting cavities are excavated by the woodpeckers. Both sexes excavate (W. W. A. Phillips, 1953), forming a nearly rounded entrance. Two to
five eggs form the clutch, but the usual number of eggs is three. Incubation is by both sexes, perhaps with the male's contribution greater. Fecal material is carried from the nest, but several authors indicated that the nest smells badly, despite the sanitation. The young appear to be fed by regurgitation (Lewis in Inglis, 1944, p. 112, also plate II). Snakes such as the rat snake (Ptyas mucosus [W. W. A. Phillips, 1953, p. 125]) may prey upon the eggs or young (and adults) in the nest. The care of the young has not been described fully. Apparently, fledged young remain with their parents until the following breeding season. When not breeding, they often join foraging flocks of other birds. Molting follows the breeding season, lasting from August until December or even January.

**Taxonomy.** Related to the *Dinopium javanense* superspecies rather closely; sympatric with *javanense*. Racial variation is slight to moderate, and problems have been encountered by various authors in defining subspecies (e.g., “there is a good deal of individual variation” [Whistler and Kinnear, 1934, p. 292] and “subspecific differences in this woodpecker follow a continuous cline,” “the birds are subject to considerable individual variation,” and “boundaries are difficult to assign” [all from Ali and Ripley, 1970, p. 196]). There are three recognizable major races, and some may prefer to treat only these: (1) the northern, streak-throated, golden-backed *benghalense* group; (2) the central to southern and western Indian and northwestern Ceylon spot-throated, golden-backed *puncticolle* group; and (3) red-backed *psarodes* of much of Ceylon. Of the northern group, *D. b. dilutum* of Pakistan and Punjab lacks red and gold above, being lemon-yellow on the back and whiter below than *benghalense* of northern India, Bangladesh, and Nepal. The central India to Ceylon group is represented by *puncticolle* (yellower on back and spot throated compared with *benghalense*) in central and eastern peninsular India and *tehminae* (characterized only by an olive wash on the rump and upperwing coverts) of western peninsular India from Bombay to Kerala and northwestern (arid) Ceylon. There is a cline in size of *tehminae* from large (longer wings, tail, bill) in the north to small in Kerala and Ceylon, and it seems senseless to subdivide this form (into northern “woodi,” central *tehminae*, and Ceylonese “jaffinense”). The Ceylon race *psarodes* is distinctive with its red back, blacker crown of males, and variably marked throat and underparts; its tail is proportionately longer than in other races. Interbreeding has been reported between *psarodes* and *tehminae* in west-central Ceylon (Phillips, 1953, p. 123), and I have seen intermediates from Kalawwa.

**References**


**Genus Chrysocolaptes Blyth**

The two species of this genus occur in southern Asia and closely resemble *Dinopium* in their green, gold, red, black, and white plumage and crest; but the face pattern differs (malar area pale, bordered by black stripes). The bill is long (longer than in *Dinopium*), straight, and sturdy, broad across the nostrils, which are covered by feathers and are slitlike, laterally. The tip of the bill is chisel-like. The central two pairs of tail feathers are strongly concave below, are much stiffened throughout, and have long tips. The fourth toe is very long and anteriorly directed, and the long hallux is half the length of the fourth toe. Sexual dimorphism involves only the color of the crest and crown, these areas being red in males and variously gold, gold streaked, or white spotted or white streaked in females.
GREATER FLAME-BACKED WOODPECKER

Chrysocolaptes lucidus

Color Plates 93 and 94

Range Summary. Southern Asia.

Diagnostic Features. Medium to Large, weight 92 to 134 grams (haematribon, xanthocephalus, lucidus, chersonesus), 125 to 164 grams (socialis, Rufopunctatus), and 150 to 233 grams (guttacristatus); wing length 128 to 188 millimeters. Most variable of all woodpeckers in color pattern, also great size variation. Eyes red or ivory; rump red; face yellow or red or boldly patterned with pale malar area bordered above and below by thin black lines (see Common Gold-backed Woodpecker, Dinopium javanense). Back red or gold. Upper breast (often entire underparts) black with broad whitish streak-spots. Male has red crown and crest. Female usually has spotted crown (may be unspotted gold or yellow). Drums loudly at certain seasons, in contrast to Common Goldback that it resembles in color pattern.

Description. Bill pale to dark, somewhat curved along culmen, long and chisel-tipped, and broad across nostrils. Great size variation, as indicated by weights. The color condition in several forms will be described, and others will be compared with these. The guttacristatus group (including guttacristatus, chersonesus, socialis, and andrewsi) and strictus, kangeanensis, and erythrocephalus are colored yellow greenish gold to bronzny gold above and on wing coverts and most of secondary feathers. In montanus there is some red mixed with the gold; lucidus is mainly red but shows gold traces on the back and golden edges in the wings. Entirely dark red above are stricklandi, xanthocephalus, Rufopunctatus, and haematribon. The rump and lowermost back are red in all forms of the species, but the extent of the red varies anteriorly; some birds, especially strictus and kangeanensis, show white spot-barring in the rump. The uppertail coverts are black in this species, but are red tipped in xanthocephalus. The inner vanes of the secondaries, the primaries, and often the outer coverts of the wings (wing “edge”) are brown to black in all subspecies, occasionally with a gold (or red) tinge; the inner vanes of the flight feathers bear large white spots or spot bars; underwings, including coverts, brown and white spotted and barred. Shafts black to brown above, paling to horn at base of tail, and brown below, fading to horn colored, then white outwardly in wings. Tail rather short, central two pairs narrowed and rigid; color black above, brown to black below. Tail/wing ratio generally 0.50 to 0.60, averaging greater (to 0.64) in socialis, lucidus, montanus, and haematribon. Hindneck brown or black, spotted with white. Most races have a thin black line down the center of the throat, two other black lines along the edges of the pale malar area, a broad black eye stripe through the ear coverts, and a narrow black line along the sides of the crown, contrasting with a white line over the eye, another under the eye, a white malar stripe, and white throat stripes either side of the midline. This face pattern is obscured in erythrocephalus, which has the pattern overlain by red (entire head and crest reddish in male), though some white and black lines show along the throat and there is a conspicuous black spot (“ear” spot) in the ear coverts; xanthocephalus, which lacks the black except narrowly on the throat and lower malars, the sides of the head being orange-yellow; and kangeanensis, in which the eye stripe is reduced and spotted and the other black facial lines are either interrupted or obsolete (face yellow-white). Some races, as Rufopunctatus, that show the face pattern, have spotted, grayish, or brownish ear coverts instead of a full stripe. The facial white is tinged in the following, but the pattern is not obscured: Rufopunctatus — reddish buff, especially malar area; haematribon and lucidus — buffy white; and montanus — yellowish buff. The eye stripe is very broad in
GREATER FLAME-BACKED WOODPECKER

Stricklandi, almost obscuring the white stripe over the eye; and in Rufopunctatus and Haematribon, which show spots in the ear coverts, the stripe over the eye also is broken (a streaked or spotted line is formed). The basic pattern of the underparts is that of blackish feathers, each bearing a central spot or spot-streak, forming lines of pale streaks bordered by dark edges; the black is darkest and most extensive anteriorly, so that the lower throat and breast are mainly black with white spots (this pattern found in all subspecies), and, posteriorly, the black fades to brown and is dominated by broader white streaks, the abdomen being mainly white. There is considerable variation in the extent of brown or black markings posteriorly in races exhibiting this basic pattern; for example, the abdomen is weakly marked in Chersonesus and Stricklandi, more strongly marked in Rufopunctatus and Guttacristatus. There are four main departures from this basic pattern. In Andrewi, the ventral pattern is maintained, but adults show an “immature” condition of brown and gray, rather than black edges, and these obscure the streak pattern somewhat, especially in the center of the lower breast and abdomen. The subspecies Haematribon has a typical upper breast pattern, but the lower breast and abdomen are buffy with vague brown bars that contrast strongly with the black and white marked upper breast. The races Lucidus and Montanus tend to be more spotted throughout the underparts, and the edges and dark markings are grayer and browner, except on the lower throat, where they are blackish. Finally, in Xanthocephalus only the lower throat and uppermost breast are patterned with black and white, the lower breast and abdomen being immaculate yellow-buff. The undertail coverts of all forms are like the abdomen, but tend to be more strongly marked, especially barred, except in Xanthocephalus.

Sexual features: In all races the male has a red crown and crest; in largely red-headed Erythrocephalus the male tends to have more red in the malar area than does the female. Females of most races have a blackish crown and crest bearing generally rounded spots (in contrast to Dinopium Javanense, the females of which have smaller streak-spots). Exceptions are (1) strictus, Kangeanensis, and Xanthocephalus, the females of which have the crown and crest golden yellow, sometimes with dark barring evident (strictus), or with a tinge of orange or red, especially on the crest; (2) Erythrocephalus, in which females have red on the crest and sides of the crown (also some sprinkled elsewhere on crown), but crown mainly golden olive with golden white spots; (3) crown and crest olive with dull golden or yellowish spots in Lucidus and Montanus (red traces in crest); and (4) crown and crest brown with reddish buff or rusty tinged spots in Rufopunctatus. Immatures have dark eyes, are duller in color above (more orange-red in red-backed forms and more olive, less gold, but more reddish tint in gold-backed forms), and are duller below (markings, especially on abdomen, browner or grayer, more vague and obscure, less contrasting). Often, immatures show more pale barring or spotting on the back. Subspecies with spot-crowned adult females generally have immature males with less red on the head than adults and with the forehead and forecrown (sometimes most of crown) spotted; even in Xanthocephalus, males tend to show “spots” (pale-based feathers give spotted appearance). In Erythrocephalus both sexes have red on the head but the red is more restricted, sex for sex, than in adults, immature males being like adult females and immature females having still less red. Females resemble adult females but tend to have smaller, duller, often buffy crown spots. Eyes white or creamy white in Chersonesus and Stricklandi; gold, yellow, or buffy golden red (yellower inner ring and redder outer ring) in Guttacristatus and Socialis; and red in other subspecies (red-brown in Strictus?). Immatures have brown or reddish brown eyes. Legs and feet are brown or greenish brown to black, except pale (yellowish) in Xanthocephalus; nails are dusky. Bill variable, black, blackish, or brown in some races, brown with a pale (yellowish
or yellow-green) area on the lower bill in *rufopunctatus, strictus, kangeanensis, xanthocephalus, montanus*, and *lucidus*, and distinctly yellowish in *erythrocephalus* and *stricklandi* (base dark in *erythrocephalus* [whereas Ali and Ripley, 1970, p. 246, give “Bill horny brown or plumbeous brown at base, paling towards tip where it is almost white and tinged green in the centre” for *stricklandi*]).

**Distribution and Habitat.** Ranges (*guttacristatus*) from northwestern India and Nepal along the lower slopes of the Himalayas eastward, and in Indian lowlands from eastern Madhya Pradesh and eastern Andhra Pradesh east through Bangladesh and Assam, along the Chinese border of Burma and through Burma to Thailand (south to Langkawi Island and peninsular Thailand) and in North and South Vietnam. Isolated mainland *socialis* occupies west coastal India along the Western Ghats from Bombay south to Kerala. Also isolated geographically from *guttacristatus* is *chersonesus* of Malaya, Singapore, Sumatra and associated islands, and central and western Java. The northeastern part of Borneo (including Sebattick Island) is occupied by *andrewsi*. Eastern Java forms the range of *strictus* that grades into *kangeanensis* (coastal eastern Java), a form found mainly in adjacent Kangean Islands and Bali. *Chrysocolaptes lucidus stricklandi* is found on Sri Lanka. The remaining subspecies occupy the Philippine Islands, namely, *erythrocephalus* on Palawan, Balabac, and Calamianes; *haematribon* on Luzon, Polillo, and Marinduque; *xanthocephalus* on Masbate, Guimaras, Ticao, Panay, and Negros; *rufopunctatus* on Leyte, Samar, Panaon, and Bohol; *lucidus* on Basilan and the Zamboanga Peninsula of western Mindanao; and *montanus* on the remainder of Mindanao. On the continent it mainly occurs below an elevation of 2000 feet, but occasionally reaches 4500 or even 5000 feet. It is coastal in Borneo and generally so in Malaya. On the various islands it ranges as high as 7000 or even 8000 feet. The habitat varies from dense forests in parts of India, in Sri Lanka, and in some areas of the Philippines to dry open woodland (Thailand, parts of India), riverside timber in open or cultivated country, large parks in cities, tea and other tree-adorned cultivated areas, and mangroves. It avoids forests in lowland Malaya, being found in cutover areas still bearing large trees and in coastal mangroves. It often wanders across open country to visit isolated large trees. Throughout its range it prefers big trees, although to some extent it does utilize saplings and small trees for foraging.

**Foraging Habits.** Usually found in pairs or in family parties, the paired birds feeding in adjacent trees or occasionally in the same tree. Family parties remain together for a long period, and the birds forage apart or in proximity, but maintain vocal contact and congregate to roost close together at night. Foraging occurs on trunks and branches of large trees and on the trunks and major branches of small trees. Dead trees or dead stubs are favorite feeding locations, and the birds may fly far from one to another such site. Most foraging is high in large trees, but the birds forage down to the bases of tree trunks; Inglis (1965, p. 184) even reported them feeding “on the ground” on termites. Such ground feeding is sporadic, and rare, for in over a hundred hours of observation in India, Thailand, and Malaya I never saw this woodpecker on the ground. Ali and Ripley (1970, p. 244) reported a pair “hawkwing winged termites in company with drongos, launching out in the air, hovering like a Pied Kingfisher clumsily, making half a dozen captures in the bill and returning to the tree” (thus, even highly woodpecking-specialized woodpeckers such as this one may forage in ways usually thought to be the habit only of generalized woodpeckers). Nevertheless, the Greater Flameback primarily feeds by tapping and excavating. A bird usually moves rapidly up a trunk or along a limb, tapping hard at regular intervals and pausing to excavate for longer periods wherever a suitable feeding site is found. At well-rotted trees, this flameback
pecks laterally at the bark, flaking it off, then probes or gleans insects that had been hidden there. Recently dead branches receive much attention, the birds excavating deeply and strongly, putting big holes into the limb for periods up to 35 minutes at one such excavation site. Epiphytes encountered in trees are examined, and tapping and probing are employed to obtain insects therein. Its tapping is loud and frequent and is a characteristic sound of the forests and woodlands it inhabits. Much of the Greater Flameback's food consists of larvae of beetles extracted from within live or dead wood or beneath the bark; but some ants, termites, and other insects are taken. Fruit probably is eaten sporadically, and Ali and Ripley (1970, p. 244) reported nectar from flowers of *Salmania* and *Erythrina* as a secondary item in its diet.

**Voice.** Drums loudly and frequently, at least prior to and during the nesting season. The bursts of drumming are rapid and speed up from an initial rate of 20 to a terminal rate of 30 beats per second. As the tempo increases, there is a corresponding decrease in loudness through the burst. As few as 12 to as many as 49 or more beats are given per burst (usually 30 or more), and bursts last from about 0.35 to more than 2.2 seconds. Occasionally the beats fade away or cease briefly toward the end of a burst. The generally long, loud, rapid bursts with progressive weakening are distinctive. Vocalizations of the Greater Flameback resemble those of the Black-rumped Woodpecker (*C. festivus*) and also are closely similar to those of the Common Goldback (*Dinopium javanense* [Deignan, 1945; Ali and Ripley, 1970; Short, 1973d]) and of the Lesser Flameback (*Dinopium benghalense* [Ali, 1953; Lister, 1954]). A Keek Call Note is uttered at times and is pitched at about 2.5 kilohertz and lasts about 0.3 second. Mildly disturbed woodpeckers give this call sporadically or in very irregular, loose series. A Chit Call, heard but once, may be another form of call note. The Wicka Call is heard from interacting birds at close range, as for instance a pair or an adult and a juvenile during feeding by the adult. Lister (1954, p. 60) elicited an apparent Wicka Call by mimicking a calling bird. The call contains two distinct notes: a rapid note and a longer, sharper note, uttered in series and varying greatly in the arrangement of the two forms of note. The Wicka Call resembles that of *Dinopium javanense*. Kow Calls and Kowk Calls form a single, variable Kow-Kowk Call complex, similar to that occurring in the Kow-Kowp complex of *Dinopium javanense* and also resembling Kjæeck Calls of *Picus vittatus* and *P. viridis*. There seems to be some geographic, in addition to individual, variation in this call complex, but one burst of a five-then a seven-note call from a Thai bird exhibits forms of notes heard from various Malayan, Thai, and Indian birds. Kow Calls are single to triple noted vocalizations, loud and rapid, the notes having strong overtones. Notes have one or two peaks, the single peaked notes being identical to Kow notes of *D. javanense* and to some Kip Calls of *P. vittatus*. The call lasts up to 0.36 second with three notes included. Kowk Calls contain four to 12 notes, varying from 0.33 to 1.63 seconds in duration and averaging 10.2 notes per second. Initial notes are longer, terminal notes tending to be shorter, sometimes much shorter. The short Kow Call sounds like "kow-kow-kow," and the longer Kowk Call, like "kow-kow-kow-kow-kowk." The Kow Call is uttered by a bird perched or in flight, whereas Kowk Calls usually or entirely are given in flight, paralleling the cases of the Kow-Kowp Call of *Dinopium javanense* and the series Kjaeck Call of *Picus vittatus* and *P. viridis* (similar or equivalent flight calls are lacking in possibly related genera such as *Gecinus*, *Blythipicus*, *Reinwardtipicus*, and *Meiglyptes*, except perhaps for the Kwa Call of *G. grantia*). These appear to be contact calls, probably with some aggressive connotation, as birds often greet an intruder with such a call as they fly off. The Kow-Kowk Call is the screaming or laughing call, commonly given, referred to by many authors. A rapid series
of simple notes marks the Rattle Call of *C. lucidus*. This call varies geographically, having strong overtones in Malayan birds (*chersonesus*) and weak overtones in Thai and northern Indian birds (*guttacicristatus*). Malayan Rattle Calls contain five variant notes (one of these is most common, and up to three or rarely five occur in a single call) in series of six to 51 notes, averaging 21.7 notes per call, uttered in 0.45 to 3.55 seconds. There are distinctive shifts in tempo in most calls, giving a pulsating effect; the average tempo is 14.1 notes per second, but parts of a call may be uttered at a rate of 20 or more notes per second. The Malayan Rattle Calls closely resemble the Fast Long Call of *Dinopium rafflesii*, but are much less regular, and the slower Rattle Call of *Blythipicus rubiginosus*. Thai Rattle Calls predominantly contain one type of note that is infrequent in Malayan calls. They are somewhat slower, have weak overtones, and their notes tend to be longer. These Thai calls resemble those of northern Indian birds, the one type of note of Malayan birds, and some calls of *Dryocopus javensis*; but they show few resemblances to calls of other species. Given in flight, or from a perch, Rattle Calls indicate aggressive motivation (toward an intruder, including myself; other Greater Flamebacks; and, once, a *Celeus brachyurus*).

**Displays.** Crest Raising was the most frequently observed display, mainly in males when near a female or young bird. Paired birds remain near each other; and when on the same tree trunk, they move to opposite sides, with crests erect. When very close together, the birds exhibit weak Head Swinging Displays, the bill up at a 45-degree angle, crest semierect, and head and bill swung to each side several times.

**Breeding.** Nesting takes place at diverse times, varying geographically. Malayan *chersonesus* nests in December to February. Burmese *guttacicristatus* breeds in late December to May, Thai birds in March, and Indian birds in March to May. South Indian *socialis* nests in December to March. Ceylonese *stricklandi* mainly breeds in December and January, but there are records from October to April (molts August to December). On Java, *strictus* nests in October and November. Palawan *erythrocephalus* have young out of the nest in April and May. Negros Island *xanthecephalus* breeds in March and April. Among other Philippine subspecies, *montanus*, *lucidus* (Mindanao), *rufopunctatus* (Leyte, Samar), and *haematribon* (Luzon, Polillo), all nest between February and August, mainly from April to July. Up to one month is taken to excavate the nesting cavity, which is constructed in a living tree (often rotted inside), especially one with soft wood, or in a stub, and usually the tree chosen is very large. Both adults excavate the nest (W. W. A. Phillips, 1953 [*stricklandi*]), incubate the eggs, and feed the young. The nest entrance usually is oval or droplet shaped and is beveled at the lower edge. It measures about 3 by 4 inches; and, according to Phillips, the chamber is 12 inches deep. Often several holes may be seen in proximity to the nest hole, and certain trees are used year after year. However, some or most such clusters of holes are due to the activities of adults and fledged young following nesting season. The adult pair and one to four young birds roost near one another, each bird in a separate hole that it has constructed (Short, 1973d), all the openings of which may be within a 1- to 2-meter section of the tree. I observed construction of cavities simultaneously by two females with a male just above them, watching from the entrance to his presumed roosting hole. The clutch varies considerably, from one to five white eggs. According to Phillips, the incubation period is about 15 days, and fledging occurs at about 25 days of age (also Ali and Ripley, 1970, for *guttacicristatus*). The young are fed mainly on large larvae (coleopterous?) that are carried directly in the bill of the adult, not regurgitated. Family parties remain together for a long time, roosting near one another at night and often traveling about within vocal contact during the day. Possibly the families do not break up for a full year, until the next nesting season. Roosting has been
noted earlier, but may also take place in the open (young bird, perhaps [Ali and Ripley, 1970]).

**Taxonomy.** Related rather closely to sympatric *C. festivus*. A great number of subspecies have been described. Most subspecies are isolated geographically. The main continental subspecies *guttacristatus* occupies a larger area than all other forms combined. This race is large, typically chain marked below, and occurs as noted earlier. I treat *sultaneus* of western Nepal and adjacent northwestern India as a synonym of *guttacristatus*, representing the end of a cline of increasing size, similarly large birds occurring all along the northern fringe of the species’ range east to North Vietnam. The isolated western Indian race is slightly smaller in size, is more olive and less gold on the back, and has red extending farther up the back from the rump. This form has been treated as consubspecific with *chersonesus* of Malaya, Sumatra, and Java, but I find it separable. Its appropriate name is *socialis* Koelz, for Whistler and Kinnear (1934) showed that the earlier name *dellesterti* Malherbe actually referred to *guttacristatus*, of which it is a synonym. The Malayan area’s *chersonesus* differs from *socialis* in its still smaller size, its more restricted white spotting below (hence much blacker underparts), and its broader white line over the eye. Like *socialis*, it is more olive backed and smaller than *guttacristatus*. All three of these subspecies are very similar, and I believe *chersonesus* (which shows vocal differences from *guttacristatus*) and *socialis* to have been evolved independently from the ancestor of *guttacristatus*. East Bornean *andrewsi* resembles the *guttacristatus* group, and is black billed also; but it is perhaps neotenic in the browner, rather than black, color of the underparts. It is more barred on its flanks and is larger than adjacent *chersonesus*. The Ceylon subspecies *stricklandi* is highly distinctive, with its fully red back and wing coverts, a whitish yellow bill, and restricted white over the eye (hence, blackish face). East Javan *strictus* is of small size, and it has a blackish bill (pale at the top and below), buffy tone on the throat and face, weak red on the rump, and a bright yellow-green back; females have a gold or orange-gold crown and nape, with brown bases of the feathers and sometimes blackish bars or spots. Easternmost coastal Java, Bali, and Kangean *kangeanensis* closely resembles *strictus*, but its rump is redder; the black facial marks are narrower (eyestripe), broken (malar and throat stripes), or obscure (lower malar and throat stripes); the dark marks below are narrower and browner (hence, less black); and its size is smaller (all measurements). The Philippine Island region harbors four distinctive groups of populations. Of these, the *lucidus* group, containing also the subspecies *montanus*, most closely resembles the *guttacristatus* group. Strangely, it is the eastern form *montanus* of most of Mindanao that bears the yellow upperpart color of mainland forms; *montanus* shows some reddish above, but much less so than *lucidus*. It is slightly smaller, and its underparts are browner (less black). Both *lucidus* and *montanus* have an extensive red rump, their females show a brownish olive crown, often showing some reddish wash and with golden tips (spots), and their underparts show a more spotlike, less streaked pattern than other Philippine subspecies (they also have buffy ear coverts and a generally dark but ventrally pale bill). *Chrysocolaptes lucidus lucidus* is larger than *montanus*, its back is red or mixed red and gold (more red than in *montanus*), and the dark ventral color is blacker. It is found on Basilan Island ("maculiceps" described from there is identical to Mindanao *lucidus*) and the Zamboanga Peninsula of western Mindanao. Highly distinctive *erythrocephalus* of Palawan forms its own group, having a pale bill (dark at very base), golden green upperparts (with red traces; other than *montanus* this is the only golden backed Philippine form), an extensive red rump patch bearing black barring, very broad pale ventral streaks (hence, narrow black streaks), and, mainly, a red wash over the head and neck (both sexes; more extensive ventrally in males than in
females), and a black "ear" spot. Also forming a distinctive group of its own is xanthocephalus of Negros and nearby islands (see earlier discussion), which has a dark bill but, unlike all other subspecies of C. lucidus, has pale legs. It also shows restriction of the streaked underpart pattern to the breast, the remainder of the underparts being a contrasting, immaculate buffy gold; golden ear coverts with obscuring of malar lines (sometimes showing red there - the obscuring resembles that found in kangeanensis); a red back and rump (golden traces on wings); and, in females, an unsptotted gold crown, crest, and sides of the head. The final Philippine group, the haematribon group, contains the similarly red-backed, dark-billed, and spot-crowned (females) haematribon of Luzon, Marinduque, and Polillo (includes "montium," "ramosi," and "grandis") and rufopunctatus of Samar, Leyte, Panaon, and Bohol. These races differ as follows: haematribon has brown rather than blackish streaking below (black restricted to throat area), obscure grayish barring on the abdomen, no red wash over the malar and adjacent throat region, white rather than red-tinted or reddish buff crown spotting in females, and a proportionately longer tail. I find that there is a clinal decrease in size of haematribon southwardly on Luzon, but only of the order of 3 to 4 percent (the series upon which "ramosi" of southern Luzon was based is composed of immature and some molting birds), and there is no trenchant color difference in this variable form. Also, Polillo birds ("grandis") are but 4 to 5 percent larger than Luzon birds, their supposedly smaller crown spots (females) are not so (immature specimens of haematribon have small spots), and comparatively fresh-plumaged specimens from Polillo and Luzon are similarly colored (equally brown). Variation in haematribon is considerable, and I see no point, in this variable species with so many distinct forms, in overly splitting on the basis of weak tendencies.

References

BLACK-RUMPED WOODPECKER
Chrysocolaptes festivus

Color Plate 93


Diagnostic Features. Medium, weight 213 grams (festivus), wing length 142 to 160 millimeters. Eyes red or orange; rump, back, and "shoulders" black; uppermost back and hindneck white, forming a patch. Black and white striped face and throat, and streaked underparts. Red-crowned male, golden-crowned female.

Description. Bill very long, chisel-tipped, very slightly curved along the culmen, and broad across nostrils. Rump, uppertail coverts, middle and lower back, scapular region, inner wing coverts, and inner secondaries are black, sometimes edged yellow on rump. Upper back white, forming patch with white hindneck. Wings black on inner coverts (and scapular area), on inner vanes of secondaries, on all primaries, and on edge of wing (alular area); middle coverts to outer vanes of secondaries (and innermost primaries) forming a golden yellow patch, the patch brightest yellow or gold (sometimes with red tinge) on coverts, becoming olive on flight feathers; flight feathers bear large white spots. Underwings blackish to grayish
with large white spots. Shafts blackish above, horn-brown below with white center and paling to white at tips of wings. Tail relatively short, tips narrow, central four feathers very narrowed, rigid, and black. Tail/wing ratio 0.50 to 0.56. Head striped, with large white patch on hindneck to back usually connecting with broad white line above and to rear of eye; narrow black band around sides of crown-crest, meeting eyestripe over eye; broad black eyestripe from eye along ear coverts and sides of neck (connecting to “shoulder” black area); white lores and line under eye more or less continuing and broadening along side of throat to sides. Malar area white, bordered above and below by black lines that converge posteriorly. Throat with black center stripe (narrow in festivus, broad in tantus) that breaks into streaks onto breast, and broad lateral white stripes that usually connect with undereye and neck stripe at rear of malar area. Forehead white or speckled brown on white in festivus, blackish in tantus. Below, brownish black to black and white, the white predominating, forming a streaked pattern (feather edges blackish, broad center stripes white); dark streaks narrow to rear, hence abdomen whiter. Undertail coverts mainly black.

Sexual features: Male has red crown and short crest; female has golden yellow crown and crest, usually with some brown or brown and white spotting on the anterior crown. Immatures similar to adults. Black muted on back and underparts to blackish brown or brown; wing spotting more extensive; wing gold more yellowish; forehead less white and browner, spots vague or absent. Female is very like adult female on crown, but with some orange-red in nape and on crown; male crown is yellow or gold with orange-red tips of crest feathers and lateral crown feathers. Immatures may show red in rump. Eyes creamy orangish to red; brown in immatures. Legs and feet greenish gray. Bill blackish, perhaps paler (brown) in immatures.

Distribution and Habitat. Endemic to the Indian subcontinent, from northern Bombay, the Himalayan fringes of southwestern Nepal and adjacent northern India, and Bihar, south to the tip of India, and also Sri Lanka, where it is local in parts of the northern and southern sections. It is found in lowlands and foothills to an elevation of 3000 feet, frequenting open woods and scattered trees in cultivated areas, as coconut plantations.

Foraging Habits. Excavates in live and dead trees, feeding on beetle larvae and ants obtained beneath the bark. Ali and Ripley (1970, p. 240) stated that it feeds on the ground at times, which is doubtful except for casual stepping about while working on fallen logs and the bases of trees.

Voice. Drums, presumably like C. lucidus (Ceylon Bird Club notes for April 1974, p. 13). According to that source, its call is like that of lucidus “but did not carry far and had some wavering (or undulating) effect in it.” Neelakantan (1958, p. 559) rendered the “call note” as “a rapidly uttered, thoroughly unmetallic Kwirri-rr-rr-rr-rr repeated 6 or 7 times running every few minutes.” Ali and Abdulali (1938, p. 162) said of it vocally, “Pairs keep in touch with each other by means of a ch-chrr-chrr call. The usual chattering call is something like that of the Golden-backed Woodpecker (= Dinopium javanense), but louder and more ‘nasal.’” Finally, Ali and Ripley (1970, p. 240) render its call as “a loud, chattering ‘laugh’ similar to the Goldenback’s (= Dinopium javanense), particularly to that of the larger, C. lucidus . . . , but different in timbre; the two confusable if heard independently and at different times.” Thus, vocally similar to Chrysocolaptes lucidus and Dinopium javanense, and presumably with a similar array of calls.

Displays. Not known, presumed similar to those of C. lucidus.

Breeding. The nesting season seems mainly to be early in the year (January, or even
December, to March) in all areas, but a “summer” nest in Orissa was noted by Kirkpatrick (1960, p. 662), and Ceylonese birds may raise two broods or, at any rate, have been reported with young from January to September. The nest is excavated by both adults in a live or dead tree, often a coconut tree stub in Ceylon. Ali and Ripley (1970) and others report apartmentlike series of holes they ascribe to breeding in the same site yearly, with a new excavation each year, but these may result in one season from each member of a family excavating his own roosting hole as in _C. lucidus_. The nest is located at 2 to 10 meters above the ground, and its entrance is distinctively oval or pear shaped (Ali and Ripley, 1970, p. 241). One or two eggs (rarely three) form the clutch. Both adults incubate, the male more so (according to Phillips [1953]). When arriving in the nesting area, the adult lands high in the nest tree or an adjacent tree and backs downward to the level of the nest before entering it. Phillips noted a male carrying one of its eggs from its nest, then flying about with the egg in its bill, but does not describe the fate of the egg. Feeding has not been described, but insects apparently are carried in the bill (Ceylon Bird Club notes, April 1974, p. 13). Fledged birds are attended by the parents and remain a long time with them, roosting in the cluster of holes, often set close together, just mentioned. Molting follows the breeding period, mainly in April to August.

**Taxonomy.** Related rather closely to sympatric _C. lucidus_. There are two weakly defined races: continental _festivus_ and Ceylonese _tantus_. The latter is about 7 percent smaller, and the black feather borders are broader below, making it somewhat blacker than is _festivus_.

**References**

**Genus Gecinulus Blyth**

A single species constitutes this Southeast Asian genus. It is characterized by greenish or reddish plumage with diffuse markings, relatively unpatterned, three toes, a moderately strong bill, and a relatively unspecialized tail. The bill is short to moderate, slightly curved along the culmen, chisel-tipped, with a rather broad base and feathered nostrils. The tail is soft and the feathers broad, with only modest stiffening of the shafts. The hallux is lacking, and the fourth toe is as long as the anterior two toes. This woodpecker occurs mainly or entirely in bamboo. Sexual dimorphism affects crown coloration (red or pinkish in males and lacking such color in females).

**BAMBOO WOODPECKER**

_Gecinulus grantia_

**Color Plate 95**

**Range Summary.** Southern Asia.

**Diagnostic Features.** Small, weight 68 to 85 grams (_viridis, grantia_), wing length 122 to 137 millimeters. Almost always associated with bamboo groves; largely greenish or dull reddish in color, palest on the head. Yellow, buffy, or red crest; pale bill; no spots or bars other than tail barring (some forms) and white spots in the wings.
**Description.** Bill moderately long, somewhat chisel-tipped, straight, and broad across the nostrils. Above, yellow-green with a bronzy tone (*viridis*), dull red with an olive tone (*viridifanus*), dull red (*indechinensis*), or brighter red (*grantia*). Rump tipped with red in all races; uppertail coverts olive or red. Wings mainly as back, green to red; flight feathers brown, outer edges green to red with vague pale bars, inner webs with white bars or spot-bars; underwing coverts spotted gray and white. Shafts cinnamon to yellowish, becoming brown at tip of tail, paler (horn-color, whitish) below. Tail with broad vanes, not highly modified, relatively long, brown to blackish, and edged with red to green; broad pale (buffy) bars are well developed (*viridifanus, indechinensis*), variably moderate to obscure (*grantia*), or obsolete (*viridis*); undertail with dull green or yellow tinge. Tail/wing ratio 0.58 to 0.68 in *grantia*, 0.66 to 0.73 in *viridis* and *indechinensis*, and 0.70 to 0.75 in *viridifanus*. Forehead and lores yellowish to buffy; ear coverts greenish yellow (*viridis, grantia*) or olive-gray (*viridifanus, indechinensis*). Throat buffy, grading into underpart color. Below, deep olive or sooty brown (*viridis*), more olive (*grantia*), or brownish gray (other races), paling on throat and lower abdomen; undertail coverts usually brownish.

Sexual features: Males tend to have proportionately shorter tail; crown to crest (nape) red bordered by greenish yellow (*viridis*) or hindcrown patch dull red extending partly to nape and bordered with greenish yellow (*grantia*) or hindcrown patch pinkish with yellow-green crest and nape (*indechinensis*) or very restricted pink crown patch (*viridifanus*). Females lack red or pink, the greenish crown and crest being most yellow (especially *viridis* and *grantia*) on nape. Immatures much like adults, but sexes alike (as adult female); darker than adults generally, browner, and especially more gray below. Eyes reddish brown to red; legs and feet olive-green or gray-green; bill varying from yellowish white to pale bluish horn, paler at the tip and gray or gray-green at the base.

**Distribution and Habitat.** Ranges along the Himalaya Mountains from eastern Nepal, northeastern India, and hills of Bangladesh east through Assam, Burma, Thailand, Laos, probably Cambodia, the Vietnamese, to southeastern China (Fukien, Kwangtung); a possibly disjunct population inhabits southern Thailand and Malaya. Although it utilizes other arbor-eal vegetation, it is restricted to areas in which bamboo grows commonly, and it can be found most often in bamboo clumps. It is found wherever extensive bamboo groves occur at elevations up to 3000 or even (Burma) 4000 feet.

**Foraging Habits.** Forages mainly alone, occasionally in pairs, and most often on bamboo stems. It does glean and tap on trunks of sapling trees at times. Usually it does not forage above a level of 5 or 6 meters. In bamboos it employs a clapping hold, appressing feet and legs inward to maintain its position on the smooth surface between nodes; when it reaches a node, it often pauses and assumes a more typical woodpecker stance (legs below body, toes directed forward). Foraging birds move slowly, pausing to tap or to look behind them, or to one side, then usually moving on. The birds glean (ants, presumably) from the surface and also tap frequently, but usually in short bursts, up to 10 taps sufficing to break into the bamboo stalk. Such drilling resulted in little pitlike holes readily seen in bamboos where the species is common, as in parts of Thailand. About broken places, and in crevices in broken or dead bamboo, much gleaning and sporadic tapping occur. Ali and Ripley (1970) reported Bamboo Woodpeckers feeding on fallen rotting logs. The woodpeckers forage alone, or uncommonly a pair may forage in a single clump of bamboo. The food of this woodpecker consists mainly or entirely of ants.

**Voice.** Drums weakly, usually in bamboos, in bursts of about 1 second (0.38 to more than 1.12 seconds) in duration, the drumming averaging 19 to 21 beats per second but slowing
about 20 percent in tempo through the burst (the slowdown is less marked than in *Celeus brachyurus*, a similarly shaped woodpecker frequently found with *G. grantia*). No fewer than six calls were heard from Malayan and Thai birds (*viridis*). A Pit Call given by birds apparently disturbed by my intrusion is a fast (0.04 second) vertical note, peculiar in form, with emphasis between 1.6 and 3.8 kilohertz. Calls heard during male-female interactions include a long (0.11 second) single-noted Kwa Call, dropping somewhat and emphasized at 1.4 and 2.1 kilohertz, and a “wee-a-wee-a-wee” (Short, 1973d, p. 335) burst, both perhaps forms of a Wicka Call. The most common call that I heard is a Rattle Call very like that of the Bay Woodpecker (*Blythipicus pyrrhotis*), but slower, and resembling those of the Bay Woodpecker and the Greater Flame-backed Woodpecker (*Chrysocolaptes lucidus*) in its wavering quality. Six recorded calls contained seven to 18 notes rendered at 13.5 to 14.6 notes per second and lasting 0.48 to 1.34 second. The pulsing of the call is an effect of varied loudness and varied pitch, the pitch being higher for louder segments. The notes of the call are emphasized mainly between 2.2 and 3.4 kilohertz, and they resemble in form those of the Rattle Call of *Blythipicus pyrrhotis*. Aggressive in connotation, this call is directed at other conspecific woodpeckers or at intruders. An agitated Kweek Call (“kweek-week-week” to “kwi-kwi-week-Kweek-Kweek” [Short, 1973d, p. 335]) contains several notes closely resembling those of the Kweek Call of *Celeus brachyurus* and is given in conflict situations. The notes are somewhat more vertical than those of *Celeus brachyurus*, and there are other, minor differences. Some calls of *Picus* species (for example, *P. mentalis*) also are somewhat similar. A Long Call, “kek-kek-kek—,” emphasizing the initial note, was given several times by a male Bamboo Woodpecker and may be the chief territorial call. Clear and loud, it sounded most like the Long (Pee) Calls of *Picus vittatus* and *P. canus*, but no sonagrams are available for analysis.

**Displays.** No displays are known, but agitated birds frequently show partial ejection of the short, bristly crest, probably in display.

**Breeding.** Nests are excavated low in rotten stubs or stumps (Ali and Ripley, 1970, p. 205), as well as in bamboos. Bamboo nests seen in Thailand are ascribed to this species because of its abundance in bamboo, its size in relation to the size of entrances, and a process of elimination (Short, 1973d, p. 333). Cavities in bamboo were excavated usually above a node in the stem, at a distance appropriate for the size of *Gecinulus grantia* perched at, and clinging to the node, and extending through that node into the internode below, giving a cavity up to 25 centimeters in depth. Three white eggs are laid in late February through May. Nothing is known of parental care or incubation. Molt occurs between July and September in most areas, extending to November in Malaya.

**Taxonomy.** No very close relatives, genus monotypic. Two groups of populations usually have been treated as species, namely, the *grantia* group of India, Nepal, northern Burma, Laos, the Vietnams, and southeastern China, and the *viridis* group of most of Burma, Thailand, and Malaya. The *viridis* group differs from the *grantia* group in its green back (lacking red), the unbarred tail, a longer tarsus, and, in males, a more extensive red crown and crest. I do not view these differences as sufficient to prevent interbreeding, and, lacking indications of sympathy of these allopatric forms, I treat them as conspecific. I treat four subspecies, three in the *grantia* group, plus *viridis*. The traits of *viridis* were noted earlier. Apparently, eastern populations of the *grantia* group are isolated geographically from *grantia* and perhaps from each other. These eastern populations differ from *grantia* of Nepal, Sikkim, India, and northern Burma in having the back less red and more olive; the ear coverts sooty instead of yellowish; sooty, less olive underparts; and, in males, a pinker, less red crown. Tail barring
also is more strongly developed in these populations than in *grantia*. The eastern populations are treated as representing two subspecies, although these are less distinct than are *viridis* and *grantia*. The Chinese population (Fukien, Kwangtung), *viridanus*, is proportionately longer tailed and shorter billed than the Vietnamese-Laotian *indochinensis*; it is more olive and less red above; the forehead and nape of the female are more buffy cream and less yellow; and the crown of the male is less extensive and a trifle more pink. In view of the fact that these differences barely make *viridanus* worthy of separation from *indochinensis*, I consider “poilanei” (of South Vietnam) a synonym of *indochinensis*, “aristus” (of northeastern India) a synonym of *grantia*, and “robinsoni” (of Malaya) a synonym of *viridis*. Of these last three putative subspecies, only *robinsoni* shows distinctive tendencies (away from *viridis*; that is, smaller wing spots, darker color generally, nape and crown concolored), but there is overlap with *viridis* and, lacking other traits to distinguish it, I see no reason to treat Malayan populations racially apart from *viridis*.

Reference

Genus *Sapheopipo* Hargitt

This monotypic genus, found only on Okinawa Island, is colored dark reddish, with a pale bill. It is characterized by a strong bill and feet and rather soft tail. The bill is very slightly curved along the culmen, long, chisel-tipped, and broad at the base, with covered nostrils in lateral slits. The tail is long and soft, the feathers are broad, it is only slightly concave below, and only somewhat stiffened. The fourth toe is very long and reversible; the hallux is less than half the length of the fourth toe, and the claws are strongly curved. Its habits somewhat resemble those of *Blythipicus*. Sexual dimorphism involves crown color.

**OKINAWAN WOODPECKER**

*Sapheopipo noguchii*

**Color Plate 96**

**Range Summary.** Okinawa, Ryukyu Islands.

**Diagnostic Features.** Medium, wing length 148 to 158 millimeters. Dark plumage showing red below and on lower back, paler brown throat and face, and conspicuous yellowish bill are diagnostic. Much larger than brown, black, and white *Picoides kizuki*, the only other woodpecker of Okinawa.

**Description.** Bill long, broad across nostrils, slightly curved along culmen, with distinct chisel-tip. Above, deep brown, the feathers tipped red, brightest on lower rump and upper-tail coverts (in dark, misty undergrowth the red is inconspicuous); brownest on upper back. Wings dark brown, the edges of remiges being tinged red; white spot-bars occur on primaries and inner vanes of secondaries, being very narrow and barely visible in the closed wing; underwings brown with white spot-bars. Shafts brownish black above, brown below. Tail long, feathers broad and not highly modified (narrowed) at the tips; blackish brown, paler below, with outer rectrices especially pale below. Tail/wing ratio 0.67 to 0.76. Nasal tufts, lores, malar area, and ear coverts tan-brown, deepening in color posteriorly onto neck; throat
Sapheopipo noguchii

paler brown, nearly tan with a trace of white. Below, breast rather well demarked from paler throat, feathers deep brown with red tipping; redder posteriorly on abdomen and laterally onto sides (abdomen has long red tips, but some gray-brown still is visible). Undertail coverts mainly red.

Sexual features: Males slightly longer winged, with tail as short as or shorter than that of female, and bill 6 percent longer; forehead to nape of male dull blackish with broad red tips, red greatest in extent at sides of nape, and showing mixed black and red over most of the crown. Female lacks red on head, having black crown and nape, often with brown or gray bases of feathers evident. Immatures grayer, duller, less red than adults; sexes as adults except that males show less red than in adults. Eyes brown or reddish brown, legs and feet slaty gray, bill yellowish at tip and along base of lower bill, but darkening to brown along culmen at base and to grayish or greenish gray about base of bill.

Distribution and Habitat. Restricted to the northern half of Okinawa Island in the Ryukyus, where found above 500 feet elevation in damp, dense hilly forests. Endangered (Short, 1973a; Nakajima, 1973), numbers unknown but certainly fewer than 100 pairs and perhaps as few as 20 pairs (see Ikehara, et al., 1976, who estimate the population at fewer than 100 birds). Woodcutting and woodgathering for firewood and elimination of forests for logging (often followed by planting of exotic trees that cannot support Okinawan Woodpeckers) are the causes of its small and lessening numbers. The species requires dense undergrowth and a debris-strewn forest floor with large old trees (Castanopsis sieboldii, especially) in which to nest. Thus, it requires primary forest, or dense secondary forest in which there are some old trees (Ikehara, et al., 1976). These circumstances are found in eight or so hilly areas of northern Okinawa. The pressure is heavy on these areas, but the Japanese government is aware of the situation and appears to be attempting to save the species.

Foraging Habits. Feeds on rotting tree trunks, limbs, and fallen logs and branches that quickly rot in the wet surroundings. Foraging is often by excavating, tapping, pecking, and tearing apart rotting wood to get at the insects inside. The birds also probe somewhat, and they hop on the ground, moving from log to log, or tap into tree bases or roots. The food primarily consists of insects, mainly cerambycid and other beetles and their larvae, and spiders, but many seeds (of Rubus and Rhus) also are eaten in season (Chiba, 1969), and berries are taken as well (W. Criswell, personal comm.). Centipedes, moths and some nuts (Pasania, Machilus) may be dietary items as well (G. R. Beringer, in litt.). Its workings in wood are large, to 3 or 4 centimeters long and 4 centimeters wide, mainly below 5 meters above ground (Short, 1973a). Their activities are muted by the wet conditions and rotted wood on which they work. Not only wood, but clumps of moss and other debris in trees or on the ground also are investigated and the bill used to tear them asunder.

Voice. Drums during at least late winter and spring in bouts of about three bursts per minute for 5 minutes, with long intervals (10 to 30 minutes) between Drumming periods. Bursts were either short (seven to 14 beats) or longer (15 to 21 beats). In the short Drumming bursts the beats are rendered at 14.5 to 18 per second, for 0.4 to 0.9 second. Long bursts were more regular, lasting 1.0 to 1.22 seconds with 17.6 beats on the average, delivered at 15.5 to 17.2 beats per second. There is a slow start, then a speedup. Short bursts tend to commence or terminate a bout. Presumably, Drumming serves an announcing, territorial function. There are two call notes: a sharp Whit Call when disturbed and a variable Kup Call (Kyu-kyu; Kup, kup, kup; or Kyu-kyu-kup [Short, 1973a]). The Whit is a peaked note 0.15 to 0.2 second in duration, with most sound at 2 to 4 kilohertz, closely resembling calls of Blythipicus rubiginosus and Picus canus. The Kup is given singly or in series and is like the
Whit but faster. These may function as alarm (Whit) and localization (Kup) calls. Nestlings have a Pip Call when agitated, a series of Whitlike or Kuplike notes that probably develops into the Kup Call of adults. The Kyaa Call is a variable series of longer, double notes, 0.35 second in duration (versus 0.07 second for Pip notes). This vocalization is given during feeding or otherwise when adults are near the young. The Long Call is a series of clear “pee” notes, irregular in delivery at five to 12 notes per second, for up to 3 or 4 seconds or longer. Its functional relation with Drumming was not established, but in late winter it is less frequent than Drumming. This call resembles that of Picus woodpeckers and Blythipicus rubiginosus.

Display. A Wing Flicking Display occurs, sometimes with Kup Calls, when birds are disturbed. The flicking seems to emphasize the white marks on the dark wing.

Breeding. Breeding occurs in April and May, with pair formation in late winter and young out of the nest from May onward. Nests are excavated in large trees over 25 centimeters in diameter, usually Castanopsis sieboldii, but occasionally Persea thunbergii or Quercus miyagii (Ikehara, et al., 1976), from 1.7 to 12 meters (usually 3 to 9 meters) up, and usually on an inclined (inward) side of the trunk or stub. Most trees containing nests are on steep slopes, and the section of tree used invariably is dead or dying. Measurements of a nest entrance are 58 millimeters wide by 76 millimeters deep, with a chamber 24 by 38 centimeters forming the nest. Nothing is known of incubation, but the nestlings are fed larvae and centipedes, and probably other insects. Fecal sacs are carried from the nest by adults. Fledgling and postfledgling behavior are unknown. The annual molt lasts from July to October.

Taxonomy. Monotypic genus and species, with no very close relatives, but its feeding behavior, ease of movement on the ground, plumage patterns, vocalizations, and tail and bill structure suggest relationship with the Picini, including the Picus canus group and the Gecinulid-Blythipicus line.

Reference

Genus Blythipicus Bonaparte

The two Southeast Asian species are brown, rusty, or reddish with barring on the body and little head patterning. The bill is long, straight, chisel-tipped, with feathered nostrils set wide apart. The tail is rather short, concave below, with stiffened and pointed central (one pair only) rectrices. The fourth toe is slightly longer than the anterior toes. The hallux is short, about one quarter of the length of the fourth toe. Both species inhabit the dense forest understory. Sexual dimorphism affects the sides of the nape (red in males, brown or but weakly red in females).

MAROON WOODPECKER

Blythipicus rubiginosus

Color Plate 97

Range Summary. Southeast Asia.

Diagnostic Features. Small, weight 64 to 91.5 grams (25 Malayan and five Burmese birds),
Blythipicus rubiginosus

Wing length 110 to 132 millimeters. Uniformly dark with an unpatterned head and a long, bright yellow bill; dully red dorsally; vague or no barring or markings except on wings. Found low in forest trees.

**Description.** Bill long and broad. Above, brown-based feathers suffused with dull red; vague bars, one or two toward feather bases, but obscured; rump as back, but more barred. Bases of flight feathers brown with dull red edges and wing coverts; dark brown and buff barring on flight feathers; dull brown under wing. Shafts dark brown above, very pale buffy brown or dull brown below on wings, little paling below in tail. Latter fully barred brown with rather dark paler bars, hence barring inconspicuous; central two feathers narrow tipped, shafts strong. Tail/wing ratio 0.47 to 0.58. Entire head dull brown, paler on forehead and darker on ear coverts and crown. Below, deep sooty brown to dull black, paling noticeably to dull brown on throat; vague red tips on breast feathers.

**Sexual features:** Male has longer bill, bright crimson tips (narrowed, specialized) on hindcrown and especially sides of nape (occasionally there is slight red concentration in malar region of males). Female has smaller bill, with dull brown hindcrown and nape often tipped dull red (not crimson, and feathers unspecialized) as back, and little or no red on malar region. Immatures colored like adults but red more variably dull orange to dull crimson above; both sexes have more red tipping on crown than in adults, the red brighter and more intense on nape of males, which do not have narrowed red tips of adult feathers. Eyes deep red in adults, brown in immature birds. Legs and feet grayish brown to black. Bill pale yellow to lemon-yellow, dusky greenish at base.

**Distribution and Habitat.** Occurs from southern Burma and southern (peninsular) Thailand through Malaya and south to Sumatra and Borneo. An inhabitant of dense lowland forest, usually primary forest but also dense secondary forest, ranging up to 2500 or 3000 feet regularly and rarely up to 5000 feet except on Borneo, where it is found in the highlands (in the absence of its highland relative, *B. pyrrhotis*, which does not reach southern Malaya, Borneo, and Sumatra).

**Foraging Habits.** Like the Okinawan Woodpecker and the Bay Woodpecker, both relatives of the Maroon Woodpecker, this last species excavates in live trees and, mainly, hacks apart rotten moist stumps and fallen logs and trees. In live trees, mosses and other debris are tossed aside, and the bird rapidly excavates a rather deep pit. Well-rotted wood is rendered into a pile of wood chips as the bird seeks insects within the wood. Pairs feed loosely together, maintaining vocal contact but using different trees for foraging. Most feeding is accomplished within a meter or 2 of the ground, and rarely above 6 or 7 meters up in a tree. The usual routine is for the bird to begin feeding nearly at ground level, work rapidly upward a meter or 2, then drop to a fallen log or a nearby tree to repeat its performance. Beetle and other unidentified insect larvae comprise most of its food.

**Voice.** The Maroon Woodpecker characteristically calls "pit" or "kyik-ik" in concert with Wing-flicking as a reaction to an intruder. Single-noted Pit Calls last about one-third second, and double or triple calls up to one-half second in duration. A higher pitched series of pitlike notes forms the Rattle Call of the Maroon Woodpecker. Up to about 15 notes, lasting 0.5 to 1.25 seconds, make up the Rattle Call. Most examples waver somewhat in pitch. This call seems to be an aggressive vocalization, more intense than a single Pit Call note. Long pitlike notes form an uncommonly heard Keek Call ("keek-ee-k-ee-ee-ik"). There are two other related long calls: the Pew Call and the Pee or Long Call, which sometimes are combined into a Pew-Pee Call. The Pew Call consists of about 15 notes uttered in about 2.25 seconds; the notes are sharply peaked, and overtones are weak. The Pee Call is a series of seven to 11
or so rather clear notes, lasting about 2 seconds. The notes are given roughly at three to four per second compared with 6.25 per second for Pew Call notes. The notes characteristically drop in pitch throughout the call. Combined Pew-Pee calls last about 4.5 seconds. The Pee Call is thought to represent a territorial proclamation call and location call, carrying farther than the apparently more aggressive Pew Call issued at closer range. Neither species of the genus Blythipicus is known to communicate by drumming.

Displays. These are little known. Crest-raising occurs in aggressive encounters, and Wing-flicking is perhaps an alarm signal given with Pit Calls when the bird is disturbed. Nothing is known of pair-formation activity.

Breeding. Nesting occurs from December to May in Malaya; and Borneo juveniles are known from January, April, June, September, and November. Well-developed immature birds accompanying adults were seen in Malaya into March. Molting birds are known from February through October, but at higher elevations (3700 feet and above) molting is known in December and January, suggesting breeding prior to that time. Details concerning nesting activities have not been reported.

Taxonomy. Closely related to larger B. pyrrhotis, a more northern species which strictly occupies highland areas in parts of the Malay Peninsula where its range meets (the two species have not been taken together) that of rubiginosus. The Maroon Woodpecker is considered monotypic, for B. r. "parvus" of Sumatra and Borneo averages barely smaller than more northern birds, with great overlap; the longest-winged bird I have measured is from Borneo. No color features serve to distinguish this supposed subspecies, and it serves no purpose to retain it nomenclaturally.

Reference

BAY WOODPECKER

Blythipicus pyrrhotis

Color Plate 97

Range Summary. Southern Asia.

Diagnostic Features. Medium, weight 126 to 160 grams (pyrrhotis), and 100 to 102 grams (cameroni), wing length 130 to 156 millimeters. A yellow-billed, rusty, chocolate, or blackish woodpecker with rufous and black barred back, wings, and tail and with a streaked crown. Throat pale buff. Often shows reddish in wings, on back, on breast. The pale bill and throat are conspicuous in the dark undergrowth frequented by this bird.

Description. Bill long, chisel-tipped, straight, very broad across nostrils. Back black to brown with narrow cinnamon to rufous bars and fine, pale shaft streaks, sometimes obscured by red to brown tips of feathers (in pyrrhotis, mainly), which wear gradually, showing more barring in worn specimens. Rump as back, sometimes with barring obscure (hainanus); uppertail coverts with broader rufous bars equal in depth to black bars. Wings entirely barred black and rufous to cinnamon, the dark bars broadest on coverts, the pale bars broadest on flight feathers; a red tinge is evident on the flight feathers of pyrrhotis; paler below, but pattern same. Shafts rusty to chestnut, tending to blacken at crossing of black bars and at tip of tail; paler, approaching yellowish, below. Tail rather short, central pair of feathers narrowed, next pair partly so; rufous with narrower black bars that occasionally are obso-
Blythipicus pyrrhotis

lescent; paler below. Tail/wing ratio 0.54 to 0.66, greatest in sinensis. Malar area, lores, forehead, and throat Buffy brown, palest on throat; ear coverts darker, brown to sooty, usually with pale shaft streaks. Crown and short crest brown to blackish with vague (tendency in pyrrhotis) to strong Buffy and rusty streaks along the shaft, these pale streaks fine to broad. Underparts mainly unmarked rusty gray (pyrrhotis), brownish sooty (most races), or blackish (cameroni, annamensis), showing red tone in pyrrhotis; variably shows pale Buffy shaft streaks on breast (especially sinensis); lower abdomen and flanks dark with narrow rusty or cinnamon bars, these obsolete in some birds, and especially annamensis and hainanus. Undertail coverts dull rufous with black bars.

Sexual features: Males longer billed, bearing crimson on nape and sides of neck, strongest on sides and tending to break on the nape in most races (forming two separate spots of red); females lack red on nape and neck. Immatures resemble adults but are distinctly blacker below, often with more bars; dorsally they are strongly barred. The head is more broadly pale streaked, showing broad dark and light streaks. Males show dull, broad, red nape; females little or no red on nape. Eyes reddish brown, legs and feet grayish black with a yellow tinge, and bill pale yellow with dull green at its base.

Distribution and Habitat. Himalayan foothills and adjacent lowlands and hills from central Nepal and Bangladesh through Sikkim, Assam, Burma, northern Thailand, Laos, North Vietnam, and southeastern China north to Fukien and Kwangtung. Isolated populations occur in the mountains of Malaya, in South Vietnam, on Hainan, and in southwestern China. Vaurie (1965) and Peters (1948) have questioned its occurrence in southwestern China, but it seems to occupy western Szechwan. In addition to the record they cite from Tatsienlu (Kangting), Szechwan, there is a male in the Chicago Field Museum of Natural History from Hsiao Yang Chi, Szechwan, about 100 miles from Tatsienlu (see M. A. Traylor, Jr., 1967, p. 25; this specimen is large and may represent an undescribed subspecies; the nearest pyrrhotis population is on the Burmese border of China, more than 300 miles southwest of the Szechwanese localities). Occurs in lowland forests only sporadically, in India and Burma, in the vicinity of foothills, but mainly occupies dense understory of mountain forests up to an elevation of 7000 feet. In Malayan mountains its lower altitudinal limit is 3400 feet, above the level reached there by closely related B. rubiginosus.

Foraging Habits. Most foraging takes place below a height of 4 meters on tree trunks, stumps, rotten logs, and occasionally on the ground (usually when working from the ground on rotten logs or bases of trees) and on bamboos and saplings. Thus, it favors dense forest undergrowth. At times it forages higher in trees; but, when doing so, it utilizes dense trees and keeps on the trunk or is well hidden by the foliage. It is vocal and defies close approach, hiding from view though calling frequently; hence, close observation is very difficult. Members of a pair often forage apart, maintaining contact through occasional calling bouts and converging several times a day, particularly in the evening. When feeding near each other they do not occupy the same tree. Foraging is diverse, with much excavating and tearing apart of rotten stubs or logs, some tapping, probing, and gleaning. When not excavating, Bay Woodpeckers move frequently and often perch crosswise on saplings or vines. They may bound off a log or trunk to snatch insects flushed by their actions. Ants, termites, and beetle larvae, as well as fruits and unidentified flying insects, are known dietary items.

Voice. Not known to drum (nor is the Maroon Woodpecker, B. rubiginosus), but is among the most vocal of woodpeckers. Single-note calls are less often delivered than in the Maroon Woodpecker and include the Peew Call and Pit Call. The Peew Call is 0.10 to 0.35 second in duration and effectively is a drawn out Pit Call. The latter is a shorter, more peaked note,
most frequently heard initiating the Rattle or, rather, Pit-Rattle Call. The Pee and Pit calls are the equivalent of rubiginosus’ Pit Call and are used in alarm and aggressive situations. The common call of the Bay Woodpecker is the wavering Pit-Rattle Call, usually introduced by a “pit” note and lasting 0.13 to 1.71 seconds. The three to 26 notes are uttered at a tempo of 15 to 23 notes per second, the notes having many (up to 10) overtones. The tempo and pitch of the individual notes vary in groups, giving a pulsating effect, as “dit-d-d-di-di—, di-dit-d-d-di-di—,” the call bearing considerable resemblance to that of Reinwardtius validus. Sharp pit or dit notes occur at intervals of four to eight notes, and each such note introduces a faster series and follows a slower series of notes. Rattle or Pit-Rattle Calls are given by disturbed birds and individuals engaged in encounters; they seem to occur in more intense situations than do Pit or Pee calls. As in the Maroon Woodpecker, separate Pew and Pee calls are employed that are often combined in that order, into a Pew-Pee Call. Pew Calls are 2.12 to 2.97 seconds in duration, contain 10 to 14 or more notes, and show a tempo of 4.1 to 4.7 notes per second (40 percent slower than in B. rubiginosus). Pee Calls (also termed Pee Long Calls) contain nine to 13 notes delivered at 2.63 to 4.89 notes per second. There seems to be geographic variation in this call, as Indian birds (B. p. pyrrhotis) call more slowly and Malayan birds (B. p. cameroni) call more rapidly. Usually the tempo increases but the intensity, duration, and pitch decrease somewhat during the call. Serving as a contact call and probably as a territorial call, the ringing Pee Call can be heard over a distance of 1 kilometer or more. The Pee Call is similar to that of the Maroon Woodpecker and to various Long Calls and other calls of species of Picus and Celeus (Short, 1973d). Combined Pew-Pee Calls last 5 or more seconds and show some tendency for intermediacy of notes at the point of the shift, although generally the call sections are distinct. As in the case of the Maroon Woodpecker, the Pew Call probably is more aggressive in function than the Pee Call, which seems to function as a location call and distant territorial proclamation call.

Displays. One calling male responded to a nearby calling female with erection of its crest (Crest Raising Display). Wing Flicking Displays occur when Bay Woodpeckers utter Pit-Rattle Calls (see also Ali and Ripley, 1970, p. 239). Other displays are unknown.

Breeding. The nest is excavated low in a tree or stump, and two to four eggs, usually three, form the clutch. According to Ali and Ripley (1970, p. 239), “Both sexes take part in drilling the nest-hole, incubation, and feeding the young.” Usually the nests are widely scattered about, but occasionally several pairs may be found nesting in proximity. Nesting is stated by Ali and Ripley to be mainly in May and June in India, but may be considerably earlier (Sikkim, small young on 23 February; Assam, well-developed young on 17 February; the Vietnamese, fully developed young from early March to late April) or later, as in Malaya. The molt follows the breeding season (mainly in August to November, but up to January in some cases).

Taxonomy. Related closely to allopatic Blythipicus rubiginosus, but differing sufficiently morphologically and behaviorally so that it cannot be treated as forming a superspecies (if Reinwardtius validus were to be considered congeneric with the present two species of Blythipicus, then rubiginosus and pyrrhotis would form a species group). A number of subspecies have been described, of which I recognize five. The variable nominate race pyrrhotis (including “porphyreus” and “pyrrhopipra”); I note that Koelz’s subspecies often are described as pale, but his specimens are saturated with tali or other whitish powder, having a paling effect) occupies northern and northeastern India, Bangladesh, Nepal, Sikkim, Burma, Thailand, and Laos. Birds from Szechwan, China, appear to be very large and may prove racially separable, but tentatively they are placed in pyrrhotis (the single specimen seen is
near pyrrhotis in color, and pyrrhotis geographically is closest to Szechwan). The Fokien-Kiangsi region of China is inhabited by a pale population, sinensis. The highlands of South Vietnam harbor an apparently geographically isolated population, annamensis, birds of which are very dark below and more rufous, less cinnamon above compared with sinensis. North Vietnamese birds ("intermedius") resemble sinensis but are darker, tending toward annamensis and pyrrhotis. They perhaps best are treated as intergradient toward these other races, within pyrrhotis. The mountains of Hainan form the range of hainanus, a small, short-billed, dark subspecies (but browner, less sooty than annamensis). Malayan highland birds of the race cameroni closely resemble annamensis, being very dark, tending to be smaller. They show even more restriction of red in the nape of males (and in wings of both sexes) than annamensis (pyrrhotis shows more red than other races, generally). It is interesting and perhaps is zoogeographically significant that Malayan Bay Woodpeckers should resemble not the nearby pyrrhotis of Thailand and Burma, but the South Vietnamese population.

Reference

Genus Reinwardtipicus Bonaparte

This monotypic genus inhabits southeastern Asia and is characterized by a short crest; specialized bill and tail; dull red, orange, white, and gray plumage; and an entirely white to orange back and rump. The bill is broad, straight, and chisel-tipped; and the nostrils are in slits laterally. The tail is short, but the feathers are concave and hardened, with elongated, stiffened tips of the central two pairs. The fourth toe and hallux are elongated and sturdy, as in Campephilus. Most of the head is reddish in males, and females lack red on their largely grayish head. Occasional individuals show a few dorsal black and cinnamon barred feathering, resembling Blythipicus, which behaviorally resembles Reinwardtipicus.

ORANGE-BACKED WOODPECKER

Reinwardtipicus validus

Color Plate 98

Range Summary. Sundaland.

Diagnostic Features. Medium size, 155 to 185 grams, wing length 146 to 160 millimeters. A largely brown woodpecker with rufous-barred wings and a white patch from the neck to the back; males are tinged red on the underparts and have a yellow to red rump; females are gray below and have a white rump. Noisy, tapping loudly and calling frequently.

Description. Bill long with a slightly curved culmen and broad between the nostrils. White or white-based feathers from hindneck to rump, with dark barring evident in some xanthopygius and especially validus; uppertail coverts brown. Brown wings, including scapulars (rarely edged red or yellow), and flight feathers, which bear three to five broad rufous bars; upper coverts or vanes sometimes spotted rufous; below, barred fully with cinnamon and brown or (coverts) buffy white and brown. Shafts brown to rufous (where barred). Tail brown, paler below, with very strong shafts; central two feathers narrow near tips, second pair moderately narrow, third pair slightly narrow at tips. Tail/wing ratio 0.52 to 0.58. Head
mainly brown (except males; see later discussion), darker on crown, dull on ear coverts; crest short; indistinct pattern of buffy white stripes from lower malar and chin to sides of neck, separated by a dark brown stripe, broadening posteriorly, from the center of the chin rearward. Underparts dull brown (except males) with obscure abdominal barring; dark brown undertail coverts.

Sexual features: Males strikingly different from females, with slightly longer bill. Males have the entire crown red, showing brown feather bases anteriorly, and bordered with dull orange-yellow on the sides; brown malar area overlain with dull gold, which extends to the chin and sides of the throat; lower back and rump tipped broadly with yellow to orange or red; and brown of underparts overlain with red from throat to abdomen, especially concentrated on the breast, and with narrow yellow or gold edges on lower breast and abdominal feathers. Females entirely lack red, yellow, or gold, having the head generally brown (malar area, chin, and throat patterned as just described); the lower back and rump white; and the underparts brown. Immatures generally colored like females (feather texture lax), but immature males show some red on the crown and yellow edges of white rump feathers. Eyes orange or red to red-brown. Legs and feet gray to gray-brown. Bill pale brown above and yellowish below, including the dull yellow tip.

Distribution and Habitat. Southeastern Asia from southern Tenasserim, Burma, and southern Thailand south through Malaya to Borneo, Sumatra, and Java. Mainly restricted to lowland primary forest, occasionally foraging into adjacent dense second-growth and partly cleared areas bearing large trees. Usually becomes uncommon in hilly country, and rarely reaches 3000 feet on the mainland, but extends upward to over 6000 feet in Borneo.

Foraging Habits. Orange-backed Woodpeckers forage from within a few inches of the ground to the canopy of the forest, but mainly at middle and upper levels of the trees. Foraging sites include fallen trees, dead stubs, vines, and trunks and major branches of trees. Most birds forage in pairs or family groups, although individuals used separate trees generally. Modes of foraging principally include excavating and tapping, by which large pits or deeper holes are formed; bark scaling also occurs occasionally. The diet is composed largely of subsurface larvae of beetles and other boring insects, but ants are taken at times.

Voice. Despite its large bill, this woodpecker is not known to drum. Adults employ at least four calls, all comprised of a basic, fast, metallic-sounding note, used singly in the Pit Call. These notes are 0.03 to 0.045 second in duration, with emphasis at peaks at about 1.3 kilohertz (fundamental tone) and 2.5 to 3.7 kilohertz (initial harmonic tone). Sometimes these pit notes are given as double “pit-it” calls. Pit Calls seem to have a low-intensity aggressive and alarm connotation. A Pit Series Call, the common call uttered by birds disturbed by an intruder, is simply a slow series of pit notes terminated by a sharp, double note, the second element of which rises in pitch. Most calls last 1 to 2 seconds and contain about nine notes. A related but less frequent call is the shorter Pit Flurry Call, a series of pit notes pitched like the terminal note of the Pit Series Call and preceded by a low (typical) pit note. Thus, a Pit Series Call is rendered “di, di, di, di, di, di-dit” and a Pit Flurry Call, “di, di, dit, dit, dit, dit.” The latter call may indicate greater alarm and less aggression than the former. The Rattle Call is a much faster (16 notes per second) series of shorter, lower pitched notes that basically resemble the pit notes of the preceding three calls. Rattle Calls occur during conflicts and apparently are an aggressive vocalization. Short, metallic notes with diffuse sound over a wide range of frequencies (especially between 1 and 3 kilohertz) form the Di Call, uttered by juvenile birds as single notes, in variable, loose series, and in a long trill call. These notes
Reinwardtipicus validus

519

seem the equivalent of the adult Pit Call. Juvenile birds also employ a "begging" call, the equivalent of the similar Rattle Call of adults, from which it differs in being more variable and often slower and higher pitched. It is given by fledged young birds in the presence of adults and is suppressed by an adult calling (Pit Series Call) at the immature woodpeckers.

Displays. Crest Raising, Wing Spreading, Wing Flicking, and Bill Directing displays were observed. Adults, especially males, raise the crest when they are close to one another, and Crest Raising occurs in adults feeding young birds that have left the nest. Wing Spreading is another aggressive display, seen only in an attack on a Dollarbird (Eurystomus orientalis) by a male Orange-backed Woodpecker. The wings are stretched out and held spread in the display. Wing Flicking, the rapid partial raising and lowering of the wings, occurs infrequently, possibly as an alarm or alarm-aggressive reaction to an intruder, used with Pit, Pit Series, and Pit Flurry calls. Bill Directing is the pointing of the head and bill, with the head lowered, and it usually occurs in conjunction with Crest Raising. It is an aggressive display.

Breeding. Very few breeding data are available. Nesting occurs between January and June in Perak, Malaya; and family groups containing recently fledged young were prevalent in Pahang and Negeri Sembilan, Malaya, in February and March, indicating nesting between December and February. Specimens indicate February to August as the breeding period on Java. An immature bird from Sarawak was taken in November, whereas a southern Bornean juvenile was obtained in June. Nests are reported to be excavated in dead trees (one 18 feet up in Perak), with one to two eggs forming the clutch. In Malaya, young birds out of the nest numbered only one or two. These young followed the adults about and frequently were fed single large larvae directly (no regurgitation). One young bird followed an adult male to a large fallen tree, where the adult excavated several times. The immature bird was not fed, but followed the adult bird, going in turn to each newly excavated pit as the adult moved on. There the young bird probed, tapped, and poked, obtaining food. Such assistance rendered to young woodpeckers is known in other species, such as the Gray-capped Woodpecker. Molting occurs at diverse times, even in a local area. In northeastern Sumatra, for example, molting birds represent April, October, and December. Other molting Sumatran birds represent May and December. Molting woodpeckers from Borneo represent April, June, and July; and one Javan specimen in molt was secured in October.

Taxonomy. This species differs strikingly in color pattern and in behavior, including vocalizations, from species of Chrysocolaptes, in which it has been merged. Reinwardtipicus validus resembles Blythipicus rubiginosus and B. pyrrhotis in vocalizations, in pattern (brown color generally, head color, rufous wing bars, rufous and black barred feathers in the back of several specimens, unmarked brown or red and brown underparts), and in morphology. It is maintained in a monotypic genus pending further comparisons with Blythipicus and its relatives. R. v. validus is restricted to Java and differs from weakly differentiated xanthopygius in its usually more red lower back and rump (males; but much overlap), in the occurrence of vague to definite barring on the upper back, and in having the lower back and rump obscurely barred and suffused with brown (females) or brown and yellow-olive (males).

Reference
Tribe Meiglyptini

Genus *Meiglyptes* Swainson

The three Southeast Asian *Meiglyptes* are brown or black and white with a relatively small head, a long neck, a crest, and a weak bill. The bill is rather short, strongly curved along the culmen, and pointed, with nostrils partly covered by feathers and placed close to the culmen. The tail is short and little stiffened or otherwise modified. The fourth toe is the length of the anterior toes or shorter, and the hallux is less than half the length of the fourth toe. Sexual dimorphism affects only the malar patch, which is red in males and without red in females.

**BUFF-RUMPED WOODPECKER**

*Meiglyptes tristis*

**Color Plate 99**

**Range Summary.** Southeast Asia.

**Diagnostic Features.** Small, weight 43 to 50 grams, wing length 84 to 100 millimeters. Buffy to white and black barred, bars narrow on head and breast, more broadly barred on back, wings, and abdomen. Often shows distinct pale, unmarked area (buff to white) on lores, about eyes, and around base of bill, rendering dark eye conspicuous. Crest barred. Often with gray-black patch on lower breast. White or buffy white rump.

**Description.** Bill moderately long, rather narrow across nostrils, curved along culmen, and almost pointed at tip. Upper and middle back broadly barred black and buffy white to white, dark bars equal to or (usually) broader than pale bars; rump unmarked buffy white to white; uppertail coverts barred buffy white and black. Wings generally black with buffy white bars that are broadest on the inner vanes of flight feathers; underwings mainly buffy white, becoming blackish brown on flight feathers. Shafts black above; horn-brown to whitish below, especially on wings. Tail black above, browner below, with buffy white narrow bars that usually do not cross the feather shafts. Tail/wing ratio 0.39 to 0.55. Head and crest white to buff with fine black vermiculations that are broader posteriorly and become obscure in the gular region, on the lores, at the rear of the nostrils, and sometimes around eyes (thus forming a pale, unmarked area ringing the bill at its base). Underparts barred black and buff to white, the bars fine in front, broad to rear (especially on flanks, but not tibial area, which is finely barred); a brownish, grayish, or blackish patch usually is evident due to obscure bars on rear of breast to anterior abdomen — in *tristis* the greater part of the breast and abdomen is brownish black.

Sexual features: Male has red malar patch; female lacks red, malar finely barred as most of head. Immatures browner, less black, with variable barring, but usually dark bars broader (especially on crest); pale bars often vague on underparts, especially posteriorly; sexes as in adults. Eyes dark brown, legs and feet grayish, bill black.

**Distribution and Habitat.** Southeastern Burma in Tenasserim, and southern Thailand (Prachuap southward) south through Malaya, and on Sumatra, Borneo, Java, and some smaller islands nearby. Occurs through lowland primary forest, but common only at forest edges, clearings, and in secondgrowth. Ranges only to about 2000 feet on the mainland, but probably somewhat higher in Borneo.
Meiglyptes tristis

Foraging Habits. Moves rapidly, gleaning insects and occasionally probing for them in leaflets and at tips of small branches, often high in the canopy. Frequently several trees are passed as the birds move from one tree to another. Feeding birds hop about, perching crosswise, and often they hang upside down. Rarely they tap on the surface of trees, but not audibly. Birds forage in pairs or, more often, singly.

Voice. Regular drumming sites up to 20 meters above ground were used, especially mornings during March and April in Malaya, by Buff-rumped Woodpeckers. Members of a pair engaged in drumming bouts that were less prolonged than in M. tukki. Drumming is in short or long bursts. Short drumming bursts last a fraction of a second and are delivered at 15 to 17 beats per second. Long bursts of 1.4 to 3.0 seconds contain about 18 to 44 beats delivered at a tempo that is rapid at first (15 to 17 beats per second), then slows down (to 12 to 14 beats per second). The call note, a Pit Call, is a soft, simple, single or double note 0.03 to 0.05 second in duration, closely resembling the Pit Call of Hemicircus concretus. Sometimes it is uttered in loose series, as “pit—pit-pit—pit.” A long, variant “seep” version of the Pit Call occurs, as in H. concretus, but was not recorded on tape. Wicka Calls heard from a pair at a nest were rendered “wicka, wicka, wicka” (very like that of species of Colaptes) and “wick-a, wick-a, wick-a.” This call probably functions as an aggressive call with a role too in pair maintenance. Several low, weak series of “pee” notes were heard from birds at the nest, tentatively considered a Pee Call of unknown function. The Trill Call is a fast series of simple, pitlike notes with emphasis between 4.0 and 5.5 kilohertz, lasting 1 to 3 seconds. The tempo is about 18 notes per second. This call, rendered “drrrrr,” probably is an agonistic call functioning too in maintaining contact between members of a pair. It is the loudest and most distant-carrying call of this woodpecker. It is pitched higher and delivered more rapidly than that of M. tukki, and it closely resembles the Trill Call of Hemicircus concretus.

Display. A slight Head Swinging Display that accompanied Wicka Calls between members of a pair at a nest was the only display observed.

Breeding. Little known. I observed construction of a nest by a pair of Buff-rumped Woodpeckers during early April in Malaya. The excavation was 8 meters up a 17-centimeter-wide tree that had broken off at 12 meters above ground. Excavating sessions ranged from 15 to 70 minutes, and the sexes shared the duties about equally. Wicka Calls and, rarely, Head Swinging Displays occurred when the two birds met during changeovers in excavation. The cavity had been excavated beyond the point at which the adults could be seen within the entrance. A peculiar feature of excavation was that wood chips picked up in the bill of the birds often were not simply tossed out the entrance, as in most woodpeckers, but the birds actually backed fully out of the cavity, then tossed away the chips. My presence may have influenced this behavior, as the woodpeckers occasionally tossed out the chips in the usual manner. I was unable to follow this nesting endeavor to completion. Chasen (1939) described a nest bearing two eggs in a stump 7 feet tall in Malaya during late March and a clutch of two eggs from Borneo. I have seen juvenile specimens from southern Borneo taken during July, from northern Borneo during August, and from Java in March. July to September is the molting period in Malaya, and Sumatran birds are in molt during November, as are specimens from Borneo.

Taxonomy. Related rather closely to parapatric M. jugularis (see p. 522). I recognize two subspecies: M. t. tristis of Java and M. t. grammithorax of Burma, Thailand, Malaya, Sumatra, and Borneo and adjacent islands. The Javan form has considerable black on the underparts, and extreme birds show white along the sides, thus approaching M. jugularis in pattern. Also, M. t. tristis is less buffy, thus whiter above than is grammithorax, although the white bars
are narrow. Sumatran specimens of *grammithorax* are about 5 percent smaller (shorter wings and tail) than Malayan birds, and Borneo birds are 10 percent smaller than those from Malaya. However, there are no other differences; hence I consider the differences in measurements too small and individual variation too great to warrant subspecific recognition for the Sumatra or Borneo population. Ripley (1944) showed that Nias Island birds do not differ from those of nearby Sumatra.

**Reference**


---

**BLACK AND BUFF WOODPECKER**

*Meiglyptes jugularis*

**Color Plate 99**

**Range Summary.** Southeast Asia.

**Diagnostic Features.** Small, 50 to 57 grams, wing length 95 to 107 millimeters. Mainly black; white patch on rear of neck, on wings, and on rump. Long black crest. Throat checked black and white; head black with fine pale bars, especially anteriorly. Superficially resembles *Hemicircus canente*, but latter has a whitish throat, gray rather than black underparts, no barring on the head, and (females) a white crown patch.

**Description.** Bill moderately long, strongly curved along culmen, rather narrow across nostrils, slightly chisel-tipped. Above, black on upper to middle back, occasionally with a few white bars; rump buffy white, white, or creamy white; uppertail coverts black. Wings black with narrow white bars on outer vanes of flight feathers, broader white bars on inner vanes, and a white (often creamy or buffy) patch from front edge along scapular region to inner secondaries, which have large black bars near their tip; underwing coverts creamy white, grading into white bars of flight feathers, and tip of wing black below. Shafts black above, pale whitish or creamy horn color to brown below. Tail black, feathers broad and shafts not very rigid; browner below. Tail/wing ratio 0.45 to 0.52. Crest moderately long, black, overlying creamy white area along sides and back of neck; crown black with fine whitish buff bars, narrower to rear (obsolete on crest), slightly broader to front. Rear of malar area, ear coverts, and lores barred black and buff or whitish buff, the pale bars broader than on crown, sometimes mainly buff or buffy white at base of nostrils. Throat black with narrow to broad buffy or whitish spot-bars; when spot-bars are broad, they present a checked or even streaked pattern. Below, brownish black, grading to buffy white or white on the sides anteriorly; usually there are a few whitish bars on the flanks and sides and rarely on the abdomen.

Sexual features: Anterior malar area of male with red-tipped, buff and black based feathers. Female lacks red, malar black with buffy bars. Immatures similar to adults, duller, broader pale bars on crown (no very young birds examined). Eyes brown, legs and feet dull grayish green or blue, bill black, lower bill paling at its base.

**Distribution and Habitat.** Central and southern Burma across Thailand to Laos and North Vietnam, south to central Tenasserim, Burma, to Kanchanaburi in southwestern Thailand, Cambodia, and South Vietnam. Lowland forests to perhaps 3000 feet elevation. At least in some parts of Burma (Smythies, 1953) and Thailand (Deignan, 1963) it avoids dense forest, being confined to clearings in forests, forest edges, trailsides, secondgrowth, and bamboo. Seemingly rare in much of its range.
Meiglyptes tukki

Behavior. A very little known woodpecker. Feeds on ants and other insects, probably mainly by gleaning. According to Smythies (1953, after Davison), jugularis resembles tristis in its habits and calls. Nesting has not been described, but nests have been found during March in Tenasserim. Molting Thai specimens are known from June to November, suggesting March to June as the breeding season.

Taxonomy. Related rather closely to Meiglyptes tristis, which it resembles in pattern (head barring, blackish underparts, pale rump) and structure (long crest, short tail, bill shape). These species are parapatric; there is a gap of over 100 miles between them in northern peninsular Thailand, and they meet about Mwallayboo in Tenasserim (specimens of both, 5 to 8 April 1878). Despite their parapatry, I do not consider jugularis and tristis sufficiently closely related to comprise a superspecies. The Black and Buff Woodpecker is monotypic.

BUFF-NECKED WOODPECKER

Meiglyptes tukki

Color Plate 99

Range Summary. Southeast Asia.

Diagnostic Features. Small, weight 43 to 64 grams, wing length 86 to 110 millimeters. Mainly brown with fine bars, including rump (no rump patch); often a black or brown unbarred area on lower throat and breast. Buffy white mark on sides of neck. Top and sides of head brown, without markings; crest small.

Description. Bill strongly curved along culmen, nearly pointed at tip, rather narrow across nostrils. Above, dull brown with narrow buff bars, these sometimes vague or even lacking (especially in infuscatus). Wings brown, barred narrowly with buff throughout, except on inner vanes of flight feathers where bars are white, and broad; upperwing coverts rarely show trace of red edging; underwing coverts whitish, grading into patch formed along inner vanes of flight feathers, rest brown. Shafts whitish below (horn-brown near tips in tail), brown above. Tail brown with narrow buff bars. Tail/wing ratio 0.58 to 0.71. Crown variable, gray-brown to dull rusty brown, sometimes blackish brown, with short crest; forehead paler brown than crown. Ear coverts and lores as crown. Buffy white stripe on sides of neck to bend of wing; hindneck brown. Throat finely barred, pale bars buffy white to cinnamon, broadest on chin, dark bars brown to black; bars become obsolete on rear of throat, giving way to black or brown, unmarked area continuing to upper breast. Upperparts subject to strong fading through the year. Underparts variable, darker anteriorly. Upper breast with black to brown patch, sometimes almost obscured by barring; in other birds (especially batu) sharply defined. Lower breast to undertail coverts brown (darker anteriorly) with buff bars usually narrow anteriorly and broad on flanks. Center of abdomen often with barring obscure, sometimes bars very vague throughout, even lacking (especially azaleus and infuscatus), and rarely showing reddish edging of feathers.

Sexual features: Male has red malar area and rarely shows red on forehead. Female lacks red, malar brown as ear coverts. Immatures more broadly barred with buff on back, broader pale bars on throat (throat paler); breast patch less well marked. Sexes as in adults, except males sometimes have feathers of crown and especially forehead tipped red. Eyes brown, reddish brown, or red (crimson), perhaps more red in adults, browner in young and subadult birds. Legs and feet grayish olive to greenish gray. Bill black above; grayish or greenish horn-brown or even whitish below, grayer near base.
Distribution and Habitat. Southeast Asia from Tenasserim and peninsular Thailand south through Malaya to Borneo, Sumatra, and some adjacent islands (not Java). A lowland forest bird, frequenting primary forest and dense secondgrowth. It prefers areas with a dense understory, avoiding clearings and edges that are favored by its congeners. It rarely is found in upland forests above 2000 feet, but sporadically it reaches 4000 feet or even more in mountains of Malaya.

Foraging Habits. Feeds mainly by gleaning, with some probing and prying and a little tapping. At least some feeding is accomplished in very rotten stumps and logs, the birds pecking or poke-pecking into the soft, crumbling wood without noise. Birds often feed in pairs at such sites; whereas when gleaning high in forest trees, they seem to forage alone. One bird in the forest canopy probed and gleaned in leaf and bud masses in a very restricted area of one tree, then flew several trees away to feed similarly. At times a Buff-necked Woodpecker spent 15 minutes or so within a 1-foot volume of leaflets and twigs. Crevices in the bark of tree trunks and branches also are investigated. Some foraging also took place in saplings and vines. Thus, the species seems to forage at diverse heights, but its preference for a dense understory suggests that low feeding is very important. The often rapid movements of this woodpecker serve it well in keeping pace with moving interspecific foraging flocks with which it often feeds. Most of its diet consists of ants and termites (Smythies, 1960).

Voice. Drumming occurs especially during early morning in the breeding season and often is given by pairs. As soon as it was fully daylight, one of a pair commenced drumming and the other responded. The bouts lasted up to one-half hour or more, with bursts at an average of one to three per minute. Thus, synchronization of breeding, location, and territoriality may be served by drumming of this woodpecker. Drums are in long bursts of up to 3 or more seconds, or short bursts of 1 second or less. Long bursts often have weak subsections and usually commence at a rapid rate (16 to 22 beats per second) and then slow down (to 11 to 17 beats per second). Short bursts are rapid with few shifts within a burst. Infrequently heard call notes sound like “dwit” or “twit” and may be uttered as double notes or in irregular series. They were employed by two males in a conflict. Several “pee” notes were heard from a foraging female, the notes resembling those of the Pee Call of M. tristis. A male chasing another male used a Long Call, sounding like “wik-wik-wik-wik—,” at a tempo of seven to 10 notes per second. The notes of this call are simple, inverted U-shaped notes. The notes and call are similar to the Long Calls of flickers (Colaptes). The Trill Call resembles that of M. tristis in form, but is longer, slower, and lower in pitch. Lasting 2 to 3 seconds, it contains 28 to 43 or so notes. There is a slowdown in tempo from about 17 to 14 or 16 notes per second during the call, but this slowdown is less pronounced than in the Trill Call of M. tristis. The sound is below 3.8 kilohertz, whereas that of tristis has notes pitched at 4.0 kilohertz and higher. This is a location and agonistic call.

Displays. Head Swinging Displays are employed agonistically, the head and bill being swung rather slowly from side to side two or three times in an encounter between two males; call notes, a Long Call and a Trill Call accompanied or were interspersed with the displays. Bill touching, “caressingly” (Ogilvie, 1954, p. 53), was observed between mated birds together at a nest entrance.

Breeding. Nesting occurs from March to June, apparently throughout its wide range. Immature birds date from June to September (all areas, including Natuna Island). Nests are excavated in stubs of live trees or more often in well-rotted old stubs between 5 and 15 feet above the ground. One possible nest, excavated in late February in Malaya, was abandoned
Meiglyptes tukki

when the entrance was “enlarged” by some unknown animal — the wood was very rotten and the cavity abutted against the outer bark, and consequently one could poke a finger through the bark into the cavity. Ogilvie (1954) studied two nests in Malaya. One nest entrance was situated beneath an overhanging fungus. Two young birds were in one nest; the contents of the other were not determined. Both adults attend the young, feeding them apparently by regurgitation (see Ogilvie, 1954, p. 54) and carrying away fecal sacs. The feeding rate is once or twice per hour. Other details largely are lacking. The annual molt takes place from July to November, except that Nias Island birds taken in February and March are in full molt (as is a July bird — young are known from Nias in June and July).

Taxonomy. Less closely related to *M. tristis* and *jugularis* than are those species to each other (*tukki* has a distinctly longer tail than the others, its ecology differs somewhat, it is larger, and its pattern differs in details from theirs). *Meiglyptes tukki* is somewhat polypytic, but none of the subspecies is strongly marked. Size variation is not great; the largest birds are from the mainland and northern Borneo (*tukki*), southern Borneo (*percnerpes*), Batu Island (*batu*), Natuna Islands (*tukki*), Banjak Islands (*tukki*), and Banguey Island (*pulonis*). Specimens from Nias Islands (*infuscatus*) and Sumatra (*tukki*) are somewhat smaller (shorter winged). The Nias Islands’ population (*infuscatus*) is composed of weakly barred birds, the pale bars tending to be obscure on the upperparts and on the breast and abdomen; the crown also is dark. The Batu Island form (*batu*) also has a blackish crown and a strong, blackish, contrasting breast patch; it is larger than Sumatran *tukki*. *Meiglyptes tukki* “azaleus” of Natuna Islands does not differ sufficiently from *tukki* to be recognizable, nor does “calceaticus” of the Banjak Islands. The Banguey Island *pulonis* is distinctly longer billed than other races, is browner (less olive), and is paler on the throat. Southern Borneo birds (*percnerpes*) are strongly barred and brown, with little olive tone, and they often show a rusty or reddish tone, compared with *M. t. tukki*.

References

Genus Hemicircus Swainson

Two small, largely black and white woodpeckers with a short tail, long neck, and small head, but with a specialized bill, comprise this Southeast Asian genus. The bill is moderately long, nearly straight, chisel-tipped, and with the nostrils far apart. The tail is short and shows slight stiffening, with only weak concavity below. The fourth toe is longer than the anterior toes, and the hallux is long, about half the length of the fourth toe. Sexual dimorphism is unique, males having either a red crown and crest (*concretus*) or a white-spotted crown (*canente*) and females having a red crest but cinnamon crown (*concretus*) or a white crown and forehead (*canente*).
GRAY AND BUFF WOODPECKER

_Hemicircus concretus_

**Color Plate 100**

**Range Summary.** Southeast Asia.

**Diagnostic Features.** Little, weight 27 to 32 grams, wing length 78 to 90 millimeters. Gray body with strong gray or gray and red crest and buffy white rump patch; very thin neck accentuates large head and crest; back, wing coverts, and secondaries are black and white feathers with large, round, black central bars surrounded by white. Tail very short.

**Description.** Bill long, straight, narrow and chisel-tipped, rather broad between nostrils. Long crest and entire head (see Sexual features) gray, rarely with fine pale edges of feathers, gray continuing over underparts and neck; breast and abdomen gray, gray tinged with buffy or olive, or (concretus) blackish gray. Flanks and undertail coverts with broad black bars, narrowly edged white or buffy; abdomen sometimes has faint buffy or whitish bars. Back, wing coverts, and sometimes inner secondaries have broad, rounded black bars or chordate spots, edged in white or buffy white. Flight feathers black, showing some pale bars on outer and sometimes middle tail feathers, and larger pale bars on the secondaries; inner edges of primaries are buffy white, forming on the underwings a large buffy, cinnamon-white, or white patch; underwing coverts white, buffy white, or black and white. Rump white, stained buffy by secretions in area of special back gland; uppertail coverts black with white bar at tips. Tail/wing ratio 0.31 to 0.38.

Sexual features: Male is longer billed, with orange-red to red forehead, crown, and crest (in concretus the entire crest is red; in sordidus the posterior portion of the crest, bearing the longest feathers, is gray). Females lack red on the head, but rarely may retain a juvenal red and rufous crown. Immatures show cinnamon on the crown and forehead, much stronger pale (usually buff or cinnamon) barring below, and broader pale markings above; the dorsal pale areas grade from nearly white at the rear (rump and secondaries) to cinnamon-buff in front (upper back and wing coverts). The forehead, crown, and crest are mainly cinnamon, but show some fine black bars. Males have moderate to strong red in the center of the crest, or the entire hindcrown and crest may be red (concretus). Females generally show some trace of red in the crest region, but usually less than in males. Some juveniles have a long white stripe along the head from the malar area to the neck; these tend to show strong rufous barring below, and these patterns recall those of Meiglyptes as well as of H. canente. Eyes reddish brown, legs and feet blackish, bill gray-black.

**Distribution and Habitat.** From southern Thailand (there also is a single juvenal specimen in the British Museum supposedly from Banksan, Tenasserim, Burma), through Malaya, Borneo, Sumatra, Bangka Island, and western to central Java. It essentially is parapatric with its northern relative, _H. canente_, occurring northward at least to northern Trang (Khao Bhanum Bencha) in the west and to Nakhon Sri Thammarat in the east. Its ally, *canente*, occurs south to Phangnga in the west and to western Nakhon Sri Thammarat (Khoa Luang) in the east. This suggests a close approach of the two in Nakhon Sri Thammarat. The single Tenasserim record is 300 kilometers, and several Thai states north of other recorded localities, and is suspect; the broad sympatry of *concretus* and *canente* in Ranong, Phangnga, and southern Tenasserim implied by this Tenasserim record is doubtful indeed. The Gray and Buff Woodpecker frequents primary forests and tall secondgrowth in lowlands, rarely extending into hills to an elevation of 2800 feet. Occasionally it uses scattered trees outside the forest, but never far from it.
Foraging Habits. Frequent the foliage of forest trees, especially emergent trees and tall trees in secondary forest. It moves rapidly through the branches and branchlets, pausing occasionally, often hanging upside down, to glean insects or probe into leaf clusters. Sometimes it works over the trunk or branches high in the trees. Before long it zips to another tree, sometimes a considerable distance away, there to vanish into the foliage. The birds forage individually or in pairs. When feeding together, a male and female may forage differently, the female confining her activities to the outer twigs and leaf masses and the male alternating between those sites and major branches or the trunk. Among their varied movements, often including titlike clinging and peering, are frontal movements tangentially and sometimes nearly vertically down a tree trunk (more nearly so than any other woodpecker I have observed). Feeding is by gleaning, tapping, probing, and prying. They glean more than they tap, but tapping is frequent, enabling them to secure beetle larvae and other subsurface insects.

Voice. Frequent though irregular calls mark the movements of this woodpecker. The Pit Call is a high-pitched, somewhat variable note ("pit," "tsip," "tsEEP"), usually about 0.03 second in duration and closely resembling the lower-pitched Pit Call of Meiglyptes tristis. The long, "tsEEP" version is uttered in flight, especially during aggressive pursuits. A longer, more complex Peew Call is 0.33 to 0.48 second in duration, with a rising initial peaked ("pit") element followed by a slow, dropping "eew" element. It is employed during encounters, such as Crest Raising Displays, and sometimes is rendered in longer form ("kee-yew"). I heard several calls about 1.5 seconds in duration, written "ti-ti-tee-tee——ti," with up to 13 or so notes. A final call is the Trill Call, closely resembling that of Meiglyptes tristis and about 1.32 seconds in duration. The only trill recorded on tape contained 25 notes with sound concentrated at 4.5 to 6.0 kilohertz. Essentially a fast series of Pit Call notes, the Trill Call is used in aggressive encounters. Drumming had not been reported before I saw a male drum three times at the entrance to a cavity that he was excavating. Drumming is weak, hence not very audible and passes unnoticed by the observer.

Displays. Crest Raising Displays, in which the long crest is erected, were observed in encounters between the sexes. Males were dominant in these encounters, and their crests were more erect than were those of females. A Bill Directing Posture by a male at a female preceded a supplanting attack, the male driving the female away. Once, a male uttering a Peew Call attracted a female that flew toward him giving a Trill Call. Crest Raising at her, the male switched to a higher-pitched Peew Call ("Kyow"), then Bill Directed at her, leaning forward, before giving a rattling Trill Call ("ki-di-di-dit"), flying at and supplanting her, then chasing her uttering an excited "kit-kit-kit."

Breeding. Behavior very poorly known. Possibly nesting birds frequent tall stubs that bear several holes, and pairs or even three or four birds may roost separately in these holes. I saw a male and two apparent females at a stub 90 feet up a dead tree in mid-April in Malaya. Four small holes were seen there, in one of which the male was excavating; the females perched nearby. The male left its cavity, drummed weakly three times, then a female worked on the entrance opening after the male drummed. Nesting occurs late in the year in Java (January juveniles) and in July and August in Malaya. Molting takes place from March to August in Java, in July and August in Malaya, and in January in Sumatra. Juveniles take nearly a year to acquire adult plumage.

Taxonomy. Closely related to parapatric H. canente, possibly forming a superspecies with it and doubtless interacting with it where they meet (if they do), but the head patterns of these species differ strikingly, as do the juvemal plumages; hence I do not consider them
sufficiently closely related to form a superspecies. Three races of *H. concretus* usually are recognized, but only two subspecies seem to me to merit formal recognition. Javan *H. c. concretus* is larger (longer winged) and darker gray and even blackish below; males have the entire top of the head red. The rest of the species' range is occupied by shorter-winged, paler (pearly gray to yellowish or buff-gray below) *sordidus* that has the hindcrown and crest of the male gray, or partly gray, such that long, gray crest feathers stand behind red crown feathers when the crest is erected. Birds from Borneo and Sumatra usually are separated from Malaya populations as "cocometopus." However, these seem identical in size, and their supposed difference in color of underparts is trivial, if real; for many Borneo specimens are fully as yellowish or buff below as Malayan specimens. Any fine differences are bridged by variation. Hence, I see no reason to treat more subspecies than the well-differentiated *concretus* and *sordidus*, and I merge *cocometopus* with the latter.

Reference

HEART-SPOTTED WOODPECKER

*Hemicircus canente*

**Color Plate 100**

**Range Summary**. Southern Asia.

**Diagnostic Features**. Little, weight 37 to 50 grams, wing length 86 to 102 millimeters. Long black crest and very short tail; thin neck accentuates large head and crest; generally black above and gray below with whitish throat, buffy white rump, and wing coverts and secondaries white with large chordate (“heart-shaped”) black spots. Female has whitish crown patch.

**Description**. Bill long, thin, chisel-tipped, but broad across nostrils. Above, black, back sometimes with a few white bars; rump white, but discolored by glandular secretion (Bock and Short, 1971); uppertail coverts black or black and white barred. Wing flight feathers black with very narrow white inner edges; scapular feathers and inner secondaries buffy white to white with chordate black spots (hence, “Heart-spotted” Woodpecker); black wing coverts usually edged finely in white. Underwing with white patch on coverts and base of flight feathers. Shafts black above but dull white below. Tail very short, rounded, entirely black. Tail/wing ratio 0.33 to 0.38. Crest, hindneck, sides of head, around eyes, and lores are black. Throat and malar area white, usually with a distinct buffy tinge, grading into gray of underparts at rear of throat, but continuing along sides of neck, forming a patch connecting with white of scapulars. Underparts gray anteriorly, variable in tone, but often with a buffy olive tinge, darkening rearward onto abdomen, where becoming black; undertail coverts black (black abdominal and covert feathers sometimes tipped with a fine white bar, showing resemblance to juvenile *H. concretus*). A color phase or morph occurs uncommonly, having entirely black underparts.

Sexual features: Male is longer billed (almost no overlap with female), with forehead and crown black, bearing fine white or buffy white spots (varies from all black to black with distinct white bars) and thus entire top of head and crest are blackish. Female is shorter billed, forehead and crown buffy white to white, forming a white cap in front of the black crest. Immatures resemble the adult female, but the white cap is more buffy, even cinnamon,
and it frequently shows some black barring; white of scapulars and wings is more buffy; and underparts usually darker, often entirely black or brownish black, even on throat, thus forming a white line down sides of neck. Eyes brown to dull reddish, legs and feet brownish or greenish black, bill brownish black, mouth lining pink.

**Distribution and Habitat.** Occurs from coastal western India south from Gujarat and Khandesh to southern India and eastward across India to Bangladesh, the base of the Himalaya Mountains in West Bengal and Assam, Burma south to Tenasserim, western Thailand, eastern Thailand, probably Cambodia, and South Vietnam. For its geographical approach to *H. concretus*, see the latter. The Heart-spotted Woodpecker frequents lowlands and foothills, rarely extending beyond 3000 feet in elevation (occasionally to 4500 feet in southern India [Betts, 1934]). Its habitat includes various forests bearing tall trees, both primary forest and secondary forest, as well as tree plantations (for example, coffee plantations); in India it frequents bamboo groves.

**Foraging Habits.** Feeds singly or in pairs, sometimes in association with interspecies foraging flocks, frequenting the foliage and small branches of tall trees or the stems of tall bamboos. It moves almost continuously in the branchlets and leaf clusters, bobbing its head, gleaning, probing, and tapping frequently and "occasionally digging into rotten wood with energy and determination" (Ali and Ripley, 1970, p. 236). At times it forages on tree trunks, but soon disappears into the foliage. The tail is very short and often seems not to be appressed to the bark as the bird moves. Flying some distance from tree to tree, it perches crosswise very frequently. The diet is composed of various insects and their larvae, including ants and termites (Ali and Ripley, 1970).

**Voice.** Ali and Ripley (1970, p. 237) report this species as drumming in the breeding season, and it must do so uncommonly or weakly or both, as other authors have failed to note its drumming. Its calls have been summarized by those authors. In northern India I heard a Ch-yew Call very like the Peew Call of *H. concretus*; this seems to represent the frequently heard screaming call, or "chur-i" (Ali and Ripley, 1970, p. 237). Those authors report a "thin, plaintive su-sie uttered with the head stiffly lowered and repeated 10 or 12 times, each su-sie accompanied by a bow or bob," which call seems similar to the "twee, twee, twee" sometimes "extended into a trill of seven or eight notes" described by Betts (1934, p. 202). This may be the equivalent of the aggressive Trill Call of *H. concretus*. Ali and Ripley (1970, p. 237) also cited a "sharp double tchlik-tchlik given in flight." This last seems similar to the Pit Call of *H. concretus*.

**Displays.** Crest Raising Displays doubtless occur, and Ali and Ripley (1970) reported a head movement (Head Bobbing, Swinging) mentioned earlier. No other displays are known.

**Breeding.** Nesting occurs chiefly in November to March in India, but records as late as July are known from Burma and India. The nest is excavated in a small stub or fence post, usually in a situation in which the stub is isolated from other trees (for example, fence post in open, tree isolated in clearing, or stub over bamboo or low growth) and at heights of 3 to 45 feet above ground. The entrance is very small and oval. Two or three white eggs are laid in the bottom of the nesting chamber. No other data are available concerning breeding of this interesting woodpecker. The molt takes place in July and August, following the nesting season.

**Taxonomy.** Related closely to parapatric *H. concretus*, but not so closely as to form a superspecies (see *H. concretus*). Two subspecies are generally recognized; but, like Ali and Ripley (1970, p. 237), I do not consider southern Indian "cordatus" worthy of recognition.
The clinal variation noted by those authors is slight indeed, probably of the order of 2 or 3 percent, with great overlapping variation. Indeed, one is struck by individual variation and the rather uniform size of the species from Thailand to southern India. This woodpecker hence is considered monotypic.

Reference

Genus Mulleripicus Bonaparte

Three Southeast Asian species of Mulleripicus resemble much smaller Meiglyptes and Hemicircus in having a very long neck; they are grayish or black with fine white spotting on the crown. The bill is long, curved along the culmen, pointed or weakly chiseled at the tip, with covered nostrils moderately far apart. The tail is moderately specialized, somewhat to very concave below, with projections of the central feathers that are stiff but not hard. The fourth toe is shorter than or equal in length to the anterior toes. The hallux is half the length of the fourth toe. Sexual dimorphism involves the malar area, basically; males have a red malar, expanded onto the sides or over the entire head in the several species, whereas females lack red on the head.

FULVOUS WOODPECKER

*Mulleripicus fulvus*

Color Plate 101

Range Summary. Celebes (Sulawesi), Indonesia.

Diagnostic Features. Large, wing length 167 to 188 millimeters. The only large woodpecker on Celebes. Blackish gray above, tan below, with a finely white-spotted, dark head, partly red in males.

Description. Bill long, curved moderately along culmen, somewhat chisel-tipped, and narrow across nostrils. Slate above, sometimes brownish gray-black, occasionally with vague whitish shaft streaks and spots; uppertail coverts paler, browner, often with whitish shaft streaks. Wings blackish gray, paler below. Shafts black above, except pale yellowish at base of tail; below, dull brownish white, tinged yellow in tail. Tail long, brownish to blackish gray, central feathers narrowed; below, much paler and showing a very dull yellowish cast. Tail/wing ratio 0.77 to 0.92. Throat fawn-brown to gray, darker at sides, and leading to darker gray neck; gray hindneck and sides of neck, and the throat with very fine white to buff spots, one at the tip of each feather. Below, varying, but mainly tan, usually with a pearly cast at sides and rear and grayer on breast; usually stained yellow-brown or red-brown, possibly from soil or from bark of trees.

Sexual features: Males have red on head, in *wallacei* covering entire top of head to nape, upper ear coverts, under eyes, and malar area, but in *fulvus* restricted to center crown to bill, under eyes, malar area (not fully around eyes in many birds and not reaching hindcrown or ear coverts). Females lack red, having dark gray head; crown bearing fine white spots that become larger on nape. Immatures very like adults, duller in color, with broader spotting more widespread; sexes differ little: male has less red on head than adult; female
Mulleripicus funebris

has red on head, but less than male (Meyer and Wigglesworth, 1898). Eyes pale yellow, legs and feet greenish or bluish gray, bill black.

Distribution and Habitat. Throughout the island of Celebes (Sulawesi), Indonesia, in forests at elevations up to at least 800 meters in the north and 2000 meters in parts of the southeastern region.

Behavior. Essentially unknown. Many individuals show a heavy crust of dirt on the bill. This suggests ground foraging but more probably reflects foraging in dead, rotted stumps and stubs. Various insects, white ants, and caterpillars are listed as food by Meyer and Wigglesworth (1898). Stomach contents of one specimen include many termites of a species of the genus Odontotermes (family Termitidae); these are ground-dwelling, mound-building termites according to K. Krishna, who kindly identified them for me. The Fulvous Woodpecker is the only species of its genus that does not occur sympatrically with Dryocopus javensis, and in fact M. fulvus is the only large woodpecker on Celebes, which supports tiny Picoides temminckii as its only other woodpecker. Thus, habits of fulvus are likely to differ somewhat from those of its relatives, funebris and pulverulentus. Two, or occasionally three, eggs are laid in a cavity in a dead tree (Meyer and Wigglesworth, 1898, p. 176). Nesting probably occurs in the period of April to August. Molting is known to take place between July and December, suggesting the earlier occurrence of breeding activity. The following statement by Meyer and Wigglesworth (1898, p. 177) suggests drumming by Fulvous Woodpeckers: “If the male and female lose each other, the male knocks and the female follows the sound.”

Taxonomy. Probably most closely related to Philippine M. funebris, but it is questionable whether these form a superspecies. The color of its underparts suggests that fulvus might be closer to pulverulentus, but its head pattern is that of funebris; fulvus is larger and stronger billed than funebris and is more patterned with pale underparts. There are two subspecies of M. fulvus: the northern fulvus has slightly shorter wings and tail and has proportionately longer bill and tarsi than does southern wallacei. Also, the red of the male’s head is more restricted in fulvus, not reaching to the nape and rear of the ear coverts as it does in males of wallacei.

SOOTY WOODPECKER

Mulleripicus funebris

Color Plate 101

Range Summary. Philippine Islands.

Diagnostic Features. Medium, weight 139 to 183 grams, wing length 147 to 167 millimeters. All dark, either black or gray, below and above. Head gray or black, with or without red on malar area and sides of head; fine white spots on throat and neck, and sometimes on top of head.

Description. Bill moderately long, strongly curved along culmen, and narrow between nostrils; tip rather pointed, but some “chisel-tipping” visible. Body, wings, and tail black, glossed with blue above and less glossy, paler, or sooty in tone below (most races), or else slate-gray above and on wings and tail and paler gray below (fuliginosus); markings absent or rarely with fine white spots at tips of breast feathers. Shafts black, except horn colored below in wings and at bases of tail in fuliginosus. Tail/wing ratio 0.68 to 0.88. Throat gray-black to black, paler than breast, and bearing very fine to moderate white spots at the tips of the feathers; sides of neck and hindneck as throat but ground color darker.
Sexual features: Males have red on head; females lack red. In most races males have dark red around eyes and malar region, affecting the anterior ear coverts, to the lores and nostrils, and across the forehead and forecrown; the remainder of the crown, nape, and ear coverts is black, with small to obsolescent white spots at feather tips. Males from Polillo Island have red of the top of the head restricted to forehead (not on forecrown), but some birds of subspecies funebris and mayri approach this condition. Males of fuliginosus have red on the malar region and immediately adjacent area below, but not reaching the eyes, and lack red or show but traces elsewhere. Females have a black head with variable white spotting (fine or obsolete) or (in fuliginosus) a gray head also with variable spotting. Immature duller than adults, with more diffuse, larger spotting of the head region; sexes as adults. Eyes pale yellow. Legs and feet grayish with brown tinge. Bill varies from dull blackish with a pale (horn-colored) center of the lower bill in funebris and parkesi to mainly pale yellowish ivory with a grayish base in mayri and fuliginosus.

Distribution and Habitat. Philippine Islands, including Luzon, Catanduanes, Marinduque, Polillo, Leyte, Samar, and Mindanao. Rather uncommon in original forest and its edges and nearby clearings with standing dead trees. It reaches elevations up to 3000 feet or more, at least on Mindanao.

Behavior. Mainly unknown. Reported by Gilliard (1950, p. 490) as "always in pairs which constantly call back and forth as they move about, never far apart." Breeding occurs at least during April and May in some parts of Luzon, and on Polillo Island, and from April to August on Samar and Leyte. The annual molt takes place from October to January or February in south-central Luzon and from August onward on Leyte and Mindanao.

Taxonomy. Related rather closely to M. pulverulentus and M. fulvus, but not forming a superspecies with either. The head pattern of the funebris group closely resembles M. fulvus, but fuliginosus in its gray color and malar stripe of the males very closely resembles M. pulverulentus. Interestingly, in tail/wing ratios fuliginosus also tends toward the proportionately shorter tailed M. pulverulentus, and the funebris group tends toward the longer tailed M. fulvus. Three weakly characterized subspecies form the funebris group of races, which differ from fuliginosus in their generally black coloration (versus gray), their proportionately longer tail, and the extent of red over the head of the male rather than only on the malar stripe as in fuliginosus (which is found on Samar, Leyte, and Mindanao islands). Of the three races in the funebris group, parkesi occurs on Polillo Island, mayri on northern Luzon, and funebris in central and southern Luzon and on Catanduanes and Marinduque islands. The northern form mayri is supposed to have a longer tail and bill than funebris, and there is such a tendency (the describer of mayri compared birds in different stages of plumage wear, and some birds were in molt), but it is minor, and there is considerable overlap. However, mayri has a mainly pale bill (except the base) like that of fuliginosus, and funebris has a blackish bill, pale only on the center of the lower bill. These races intergrade in central Luzon (Bataan, Vieja EciJa). The Polillo Island form parkesi resembles funebris in bill color and in all other features (possibly it averages a trifle larger) except that males have the red of the head restricted on top, the red covering only the forehead and not the crown.
GREAT SLATY WOODPECKER

*Mulleripicus pulverulentus*

Color Plate 101

Range Summary. Southern Asia.

Diagnostic Features. Very Large, weight 360 to 563 grams (*pulverulentus*), wing length 215 to 247 millimeters. Gray or black body, long neck and bill. Pale patch on throat, showing red tinge in some males, which have small red “moustaches.” Head gray to blackish with faint pale spots.

Description. Bill very long, moderately curved along culmen, chisel-tipped, and narrow across nostrils. Body, wings, and tail mainly gray, darker above, to blackish slate (*pulverulentus*), blacker above. Feather bases pale gray, sometimes showing through. Upper back and breast and sometimes entire underparts show pale spots at tips of feathers, the spots more streaklike in front, more barlike at rear. Abdomen very pale gray, or whitish, rarely mostly white. Shafts black to brown, palest at tail base (underside). Tail/wing ratio 0.61 to 0.73. Nostrils to hindneck gray to black with dull grayish white spots smaller anteriorly. Lores, ear coverts, and anterior malar area gray to black, paler anteriorly, but showing few distinct spots except at rear of ear coverts. Throat and chin cream colored to yellow-tan.

Sexual features: Males have small red patch at rear of malar area, and usually show red tips on feathers of rear of throat. Females lack all red, having fully gray to black malar area. Immatures white throated and browner, especially above. Males have red over larger malar area than in adults, and also some red on crown; females lack the red. Eyes brown; skin around orbit, gray. Legs and feet bluish or greenish gray. Bill grayish white, becoming blackish along the culmen and at the tip.

Distribution and Habitat. Occurs from north-central India and Nepal eastward to southwestern China, Thailand, Vietnam, Malaya, and throughout western Indonesia to Borneo, and Java, and eastward to Palawan. Frequents lowland forest to an elevation of 3000 feet, or somewhat higher along the foothills of the Himalayan Mountains. It occurs in scattered tall trees left in cutover areas, but only near primary forest.

Foraging Habits. Feeds in pairs or family groups, which move about together. Feeding sites seem widely scattered, and Great Slaty Woodpeckers seem to fly great distances over the forest from site to site. When moving up a tree trunk, they seem to jerk clumsily, and they often perch crosswise on small branches and bound about as if much smaller than they actually are. They pause at and explore crevices and breaks in the bark, gleaning, probing, tapping, prying, and occasionally excavating. When they tap or excavate, the blows of the long bill are powerful, but birds do not often tap for an extended period. They usually feed high in the trees, but I have seen a pair engaged in foraging among low saplings in the forest understory, hopping and bounding about, half flying as they grabbed insects, perhaps ants. A pair often feed close together, and usually the male precedes the female, frequently on the opposite side of the tree. The head, the long bill, and the long neck give this woodpecker a comical, ungainly appearance; and it is capable of twisting its head 180 degrees or perhaps more. The main food of this species seems to be ants, although termites also are taken; and Ali and Ripley (1970, p. 207) reported wood-boring beetle larvae and pupae as items in the diet of Indian birds.

Voice. I heard no drumming by this woodpecker, and the literature is not clear about tapping sounds made (drumming as a signal versus foraging noise; also literature mention of
drumming may have been that of *Dryocopus javensis*. Fluttering of the wings produces a rather loud sound, possibly serving a signal function. Uncommon calls are the Dit Call (“dit” or “dit-dit”) and a rare Rattle Call composed of rapid dit notes (“didididididi”), heard twice. The common call note, usually given singly or in loose series, is the Dwot Call, 0.10 to 0.15 second in duration with a terminal peak, rendered “dwot.” A low-peaked variant is the Low Dwot Call, which tends to be somewhat longer. Another variant is the higher pitched introductory flight note, which introduces the Flight Dwot Call, a series of several “dwot” notes, each shorter than a typical Dwot Call and with an extra element. These calls serve a location and alarm function, but mainly help to keep a pair or family party together. Mewing Calls are longer, up to 0.5 second in duration, with no peak, given as “conversational” notes between members of a pair, and rendered “mew”; there are several versions (Short, 1973d). A double-noted, repetitive “dew-it, dew-it” is considered a Wicka Call and is uttered in conjunction with visual agonistic displays. The Whinny Call is the loudest and most distinctive call of this woodpecker. Carrying far through the forest, the usually four-noted call lasts 0.4 second and sounds like a bray or whinny. The notes are given at a rate of 11 to 15 per second. The variant Short Whinny Call contains two or three notes that are not separate, but connected. The Dropping Whinny Call is another version, marked by faster (15.4 notes per second) delivery, a distinct drop in pitch from note to note, and emphasis on the first overtone rather than the fundamental tone. The Whinny Call seems to be an aggressive, perhaps territorial call that may replace drumming of other woodpeckers. It is often uttered in flight, seemingly as if challenging or proclaiming its presence. Playback of the Whinny Call attracted a pair to me, and they then displayed to each other.

 Displays. Much remains to be learned, but several apparent displays occur. A group of displays resulted from the playback of a recorded Whinny Call, mentioned earlier. The pair chased each other about, usually the male after the female, giving a Whinny Call (male) and bounding about the branches with wings spread half out (Wing Spreading Display) and tails spread (Tail Spreading). They frequently also swung the long neck and head from side to side, maintaining the Wing and Tail spreading. The male’s red malar stripes and red-tinged neck were evident during these displays. Movements of the birds were clumsy, and they seemed most ungainly. Preening took place for 20 minutes following these efforts.

 Interspecific Interactions. A male Great Slate Woodpecker displaced a male White-bellied Woodpecker (*Dryocopus javensis*) at a roosting tree, although there were no displays and separate roosting holes were involved. The White-bellied Woodpecker investigated the area about the Great Slate Woodpecker’s cavity, with the latter inside; and, although the White-belly had been using another hole in the tree nightly, it then flew off and ceased using the tree for roosting. An unidentified, orange-pelaged mammal usurped a freshly excavated nesting cavity in Malaya in March. A Black Hornbill (*Anthracoceros malayanus*) supplanted a male Great Slate Woodpecker at a partly excavated cavity on 8 April in Malaya, and the woodpecker pair ceased work on the cavity, at least for several days thereafter.

 Breeding. Poorly known. Nesting has been reported in Malaya during July and August, but my observations suggest that nesting is attempted as early as March. Nesting occurs in April in Burma and from March to May in India. Behavior of a pair at the time of nesting, when exposed to playback of their voices, was described earlier. These large birds probably have great difficulty in maintaining a nest after excavating it, as the large holes they excavate are suitable for many mammals and some birds, which apparently take them over rather frequently. Thus, each pair may attempt several nestings before they are successful. Reports in the literature suggest that pairs resort to old holes when they are unsuccessful at maintaining
a newly excavated nest. Excavating birds deliver blows very slowly, but with power, and pause frequently to scan the sky, twisting the head remarkably in so doing. Both sexes excavate, although the male makes a more sustained effort. The nest usually is placed high in the trunk or main branch of a large tree; two Malayan sites were 25 and 45 meters up. One site was just above a swollen, broken area, indicating rotten or otherwise abnormal wood (see fig. 43 in Short, 1973d). The second, higher site was beneath and at the base of a stub in an emergent, huge tree. Two to four eggs are laid on the floor of the cavity. The incubation period has not been determined, but both sexes incubate (Ali and Ripley, 1970). Nothing is known of the care of the young, although, according to Ali and Ripley (1970), both sexes feed the young. After leaving the nest, the young accompany the adults and probably remain with them until the commencement of the following breeding season. Thus, family groups may number three to six birds, and it is conceivable, with the great range of a territorial pair, that some foraging at favored feeding trees near the territorial borders may involve more than one family group. Molting birds are from the months of August to February, generally (Nepal, Burma, Thailand, Malaya), but a June specimen from Borneo is in molt.

Roosting. Roosting holes are used by single birds, even in cases in which sufficient space seemed available to enable two birds to roost together. A male, early in the breeding season, used the partly open top of a large dead stub, entering through the old (woodpecker-excavated) entrance. From here he watched a White-bellied Woodpecker (Dryocopus javensis) male pass close to the entrance — this latter bird had roosted nightly in another hole below, but ceased abruptly to utilize the tree after encountering the Great Slaty Woodpecker. The Great Slaty Woodpecker flew to the vicinity of the roosting tree, accompanied each night by its mate, from 10 minutes to as much as an hour before dark. The female stayed nearby for awhile, even flying to near the roosting hole, but she left the area and did not roost in the immediate vicinity. The male left the hole immediately after daybreak and either called nearby and was joined by the female or flew in the direction in which the female had departed the night before.

Taxonomy. Related rather closely to its congeners (see M. funebris, p. 531, and M. fulvus, p. 530). A number of races of the Great Slaty Woodpecker have been recognized, but in view of the great size and variation within the species, I consider only two of them worthy of formal recognition; even these are not especially distinctive. I find no appreciable size difference in populations throughout the range of the species (although Palawan Island birds consistently are rather short winged). The specimens from southern peninsular Thailand southward (Malaya, Borneo, Natuna Island, and Palawan Island) are gray-black and represent the nominate subspecies. More northern birds from India and Nepal to Tenasserim, Burma, Thailand, and Vietnam are paler gray and are treated as M. p. harterti. Occasional birds in the range of each approach the other in color. I find the western populations (India, Nepal) barely if at all darker than more eastern harterti, and no consistent difference in the malar stripe from eastern harterti is apparent (type of M. p. mohun Ripley is matched by Thai and Burmese specimens, and so are other western birds). Populations intermediate between harterti and pulverulentus in peninsular Thailand have been named ("celadinus"), but should not be treated subspecifically. Variation in this woodpecker simply is too slight to admit more than two subspecies.

Reference
Part Three

Color Plates
Plate 1. Northern Wryneck (*Jynx t. torquilla*), above; Rufous-necked Wryneck (*J. r. ruficollis*), below.
Plate 2. Five male piculets: Speckled (*Picumnus i. innominatus*), upper left; Lafresnaye’s (*P. lafresnayi punctifrons*), upper right; Golden-spangled (*P. exilis buffoni*), center left; Bar-breasted (*P. aurifrons borbae*), center right; and White-bellied (*P. s. spilogaster*), bottom.
Plate 3. Six piculets: male Chestnut (*Picumnus c. cinnamomeus*), upper left; male Rufous-breasted (*P. rufiventris grandis*), upper right; female Tawny (*P. fulvescens*), center left; male Rusty-necked (*P. fuscus*), center right; male Mottled (*P. nebulosus*), lower center right; and male Olivaceous (*P. olivaceus flavotinctus*), bottom.
Plate 4. Six male piculets: Grayish (*Picumnus g. grenadensis*), upper left; Scaled (*P. s. squamulatus*), upper right; Plain-breasted (*P. castelnau*), center right; Guianan (*P. minutissimus*), center; Ochraceous (*P. l. limae*), center left; and Fine-barred (*P. subtilis*), bottom.
Plate 5. Six male piculets: Varzea (*Picumnus varzeae*), upper left; Spotted (*P. pygmaeus*), upper right; Speckle-chested (*P. steindachneri*), center left; White-barred (*P. c. cirratus*), center right; Ecuadorean (*P. s. sclateri*), lower left; and White-wedged (*P. albosquamatus guttifer*), lower right.
Plate 6. Three male piculets: African (Sasia africana), adult, upper right, and immature, upper left; White-browed (S. o. ochracea), lower left; and Rufous (S. a. abnormis), lower right.
Plate 7. Antillean Piculet (*Nesoctites m. micromegas*), female, above, and male, below.
Plate 8. Lewis' Woodpecker (*Melanerpes lewis*), left; male White Woodpecker (*M. candidus*), right.
Plate 9. Guadeloupe Woodpecker (*Melanerpes herminieri*), left; male Puerto Rican Woodpecker (*M. portoricensis*), right.
Plate 10. Red-headed Woodpeckers (*Melanerpes erythrocephalus*), adult, above, and immature, below.
Plate 11. Male Acorn Woodpeckers (*Melanerpes formicivorus*), subspecies *bairdi*, above, and *flavigula*, below.
Plate 12. Male Red-fronted Woodpeckers (*Melanerpes c. cruentatus*), typical form, above; *rubrifrons* "morph," lower left; and intermediate bird at right.
Plate 13. Male White-fronted Woodpecker (*Melanerpes cactorum*), above; male Yellow-fronted Woodpecker (*M. flavifrons*), below.
Plate 14. Males of Gold-naped Woodpecker (Melanerpes chrysauchen), subspecies chrysauchen, above, and pulcher, left center; male Black-cheeked Woodpecker (M. pucherani), below.
Plate 15. Males of Jamaican Woodpecker (*Melanerpes radiolatus*), right, and Hispaniolan Woodpecker (*M. striatus*), left.
Plate 17. Males of Red-crowned Woodpecker (*Melanerpes rubricapillus*), subspecies *rubricapillus*, above; *paraguanae*, left; and *rubricomus*, right.
Plate 18. Males of the Melanerpes carolinus superspecies: the Gila (Melanerpes u. uropygialis), upper right; Gold-fronted (M. aurifrons santacruzi), upper left; Hoffmann's (M. hoffmannii), center right; Great Red-bellied (M. superciliaris nyeanus), lower left; and Red-bellied (M. carolinus), lower right.
Plate 19. Males of Gold-fronted Woodpecker (*Melanerpes aurifrons*), subspecies *leei*, upper left, and *polygrammus*, upper right; males of Great Red-bellied Woodpecker (*M. superciliaris*), subspecies *caymanensis*, lower left, and *superciliaris*, lower right.
Plate 20. Yellow-bellied Sapsuckers (*Sphyrapicus varius*), immature, above, and adult male, below.
Plate 22. Williamson’s Sapsuckers (*Sphyrapicus t. thyroideus*), male, left, and female, right.
Plate 23. Male Cuban Green Woodpeckers (*Xiphidiopicus percussus*), subspecies *insulae-pinorum*, above, and *percussus*, below.
Plate 24. The *Campethera nubica* superspecies: male Nubian Woodpecker (*Campethera n. nubica*), upper right; female Bennett’s Woodpecker (*C. bennettii capricorni*), upper left; male Bennett’s Woodpecker, lower left; and male Fine-spotted Woodpecker (*C. p. punctuligera*), lower right.
Plate 25. Males of *Campethera notata* superspecies: Golden-tailed Woodpeckers at upper left (*Campethera abingoni anderssoni*), upper right (*C. a. mombassica*), and lower left (*C. a. suahelica*); and Knysna Woodpecker (*C. notata*), lower right.
Plate 26. Males of *Campethera maculosa* superspecies: Green-backed Woodpecker (*Campethera cailliautii*) at top (C. c. cailliautii) and left (C. c. permista); and Little Green Woodpecker (C. maculosa), below.
Plate 27. Male Tullberg’s Woodpeckers (*Campethera tullbergi*), subspecies *taeniolaema*, top, and *tullbergi*, below.
Plate 28. Males of Buff-spotted Woodpecker (Campethera nivosa herberti), above, and Brown-eared Woodpecker (C. c. caroli), below.
Plate 29. Males of Bearded Woodpecker (*Dendropicos namaquus*), subspecies *namaquus*, upper left, and *schoensis*, upper right; and African Ground Woodpecker (*Geocolaptes olivaceus prometheus*), below.
Plate 32. Male Cardinal Woodpeckers (*Dendropicos fusescens*), subspecies *fusescens*, left, and *lafresnayi*, right.
Plate 33. Male Gaboon Woodpeckers (*Dendropicos gabonensis*), subspecies *lugubris*, left, and *gabonensis*, right.
Plate 34. Males of *Dendropicos pyrrhogaster* superspecies: Fire-bellied Woodpecker (*Dendropicos pyrrhogaster*), left, and Yellow-crested Woodpecker (*D. xantholophus*), right.
Plate 35. Male Elliot's Woodpeckers (*Dendropicos elliotii*), subspecies *elliottii*, upper, and *johnstoni*, lower.
Plate 36. Males of *Dendropicos goertae* superspecies: Olive Woodpecker (*Dendropicos griseocephalus*), subspecies *ruwenzori*, left, and *kilimensis*, lower; and Gray Woodpecker (*D. goertae*), subspecies *koenigi*, upper right, and *rhodeogaster*, center right.
Plate 37. Males of Temminck's Pygmy Woodpecker (*Picoides temminckii*), left, and Brownbacked Woodpecker (*P. o. obsoletus*), right.
Plate 38. Males of Philippine Pygmy Woodpecker (*Picoides maculatus*), subspecies: *validirostris*, upper left; *maculatus*, upper right; *fulvifasciatus*, lower left; and *ramsayi*, lower right.
Plate 40. Three sympatric pied woodpeckers of eastern Siberia: males of Lesser Spotted Woodpecker (*Picoides minor amurensis*), left; Japanese Spotted Woodpecker (*P. kizuki ijimae*), upper right; and Gray-capped Woodpecker (*P. canicapillus doerriesi*), lower right.
Plate 41. Males of Lesser Spotted Woodpecker (*Picoides minor comminutus*), left, and Japanese Spotted Woodpecker (*P. kizuki amamii*), right.
Plate 42. Males of Gray-capped Woodpecker (*Picoides canicapillus*), subspecies *kaleensis*, upper; *canicapillus*, left; and *aurantiiventris*, right.
Plate 43. Males of *Picoides macei* superspecies: Streak-bellied Woodpeckers (*Picoides macei*), subspecies *analis*, upper left, and *westernani*, upper right; Brown-fronted Woodpecker (*P. auriceps*), lower left; and Stripe-breasted Woodpecker (*P. atratus*), lower right.
Plate 44. Males of Yellow-crowned Woodpecker (*Picoides m. mahrattensis*), upper, and Arabian Woodpecker (*P. dora*), lower.
Plate 45. Male Rufous-bellied Woodpeckers (*Picoides hyperythrus*), immature of subspecies *subrufinus*, upper, and adult of subspecies *hyperythrus*, lower left.
Plate 46. Males of Brown-throated Woodpecker (*Picoides darjellensis*), above; Middle Spotted Woodpecker (*P. medius caucasicus*), left; and Crimson-breasted Woodpecker (*P. cathpharius tenebrosus*), lower right.
Plate 47. Male White-backed Woodpeckers (*Picoides leucotos*), subspecies *owstoni*, left, and *leucotos*, right.
Plate 48. Four species of the superspecies Picoides major: Himalayan Woodpecker (Picoides h. himalayensis), upper left; Syrian Woodpecker (P. syriacus), upper right; White-winged Woodpecker (P. leucopterus), lower left; and Sind Woodpecker (P. assimilis), lower right, all males.
Plate 49. Male Great Spotted Woodpeckers (*Picoides major*), subspecies: *canariensis*, upper left; *numidus*, upper right; *major*, lower left; and *brevirostris*, lower right.
Plate 50. Males of the superspecies *Picoides mixtus*, Striped Woodpecker (*P. lignarius*), above; Checked Woodpecker (*P. m. mixtus*), below.
Plate 51. Males of Nuttall’s Woodpecker (*Picoides nuttallii*), lower right; hybrid Nuttall’s X Ladder-backed Woodpecker, lower left; and Ladder-backed Woodpeckers (*P. scalaris*), subspecies *scalaris*, upper left; *sinaloensis*, upper right; and *eremius*, center left.
Plate 52. Male Downy Woodpeckers (*Picoides pubescens* medianus, above; *P. p. gairdneri*, left center) and female hybrid Downy X Nuttall's Woodpecker (*P. pubescens* turati X *P. nuttallii*), lower right.
Plate 54. Male Strickland's Woodpeckers (*Picoides stricklandi*), subspecies *arizonae*, above, and *stricklandi*, below.
Plate 55. Males of Hairy Woodpecker (*Picoides villosus*), subspecies: *picoideus*, above; *sanc-torurn*, center left; *maynardi*, center right; and *septentrionalis*, below.
Plate 56. Males of Black-backed Woodpecker (*Picoides arcticus*), above, and Three-toed Woodpeckers (*Picoides tridactylus*), subspecies *crissoleucus*, right, and *funebris*, lower left.
Plate 57. Males of Smoky-brown Woodpecker (*Veniliornis* f. *fumigatus*), above, and Scarlet-backed Woodpecker (*V. callonotus major*), below.
Plate 58. Males of Yellow-vented Woodpecker (*Veniliornis dignus baezae*), above; and Barbellied Woodpeckers (*V. nigriceps*), subspecies *nigriceps*, center right, and *equifasciatus*, lower left.
Plate 59. Males of the superspecies Veniliornis passerinus: Little Woodpecker (Veniliornis passerinus), subspecies olivinus, above, and taenionotus, center; and Dot-fronted Woodpecker (V. frontalis), below.
Plate 60. Males of White-spotted Woodpecker (*Veniliornis spilogaster*), above, and Blood-colored Woodpecker (*V. sanguineus*), below.
Plate 61. Males of the superspecies *Veniliornis affinis*: Red-stained Woodpecker (*Veniliornis affinis*), subspecies orenocensis, above, and ruficeps, upper left; Yellow-eared Woodpecker (*V. maculifrons*), upper right; Red-rumped Woodpecker (*V. kirkii continentalis*), lower left; and Golden-collared Woodpecker (*V. cassini*), lower right.
Plate 62. Male White-throated Woodpeckers (*Piculus leucolaemus*), subspecies *leucolaemus*, left, and *simplex*, right.
Plate 63. Male Yellow-throated Woodpeckers (*Piculus flavigula*), subspecies *magnus*, above, and *erythropis*, below.
Plate 64. Males of *Piculus chrysochloros* superspecies: Golden-green Woodpecker (*Piculus chrysochloros*), subspecies *xanthochlorus*, upper left; *capistratus*, upper right; and *paraensis*, lower left; and White-browed Woodpecker (*P. aurulentus*).
Plate 65. Males of the superspecies *Piculus rubiginosus*: Golden-olive Woodpecker (*Piculus rubiginosus*), subspecies *rubripileus*, upper left; *tucumanus*, upper right; *chrysogaster*, center; and *aeruginosus*, lower left; and Gray-crowned Woodpecker (*P. auricularis*), lower right.
Plate 67. Male Black-necked Flickers (*Colaptes atricollis*), subspecies *peruvianus*, above, and *atricollis*, below.
Plate 68. Males of the superspecies *Colaptes punctigula*: Spot-breasted Flickers (*Colaptes punctigula*), subspecies *guttatus*, upper, in tree, and *ujhelyii*, upper of ground birds; and Green-barred Flickers (*C. melanochloros*), subspecies *nattereri*, left, in tree; *melanochloros*, right, in tree; and *leucofrenatus*, at bottom.
Plate 69. Males of Northern Flicker (Colaptes auratus), five subspecies and hybrid: luteus, upper left; collaris, upper right; luteus X collaris, center left; chrysocaulosus, center right; mexicanoides, lower left; and mearnsi, lower right.
Plate 70. Males of Fernandina's Flicker (Colaptes fernandinae), above, and Chilean Flicker (C. pirius), below.
Plate 71. Male Andean Flickers (Colaptes rupicola), subspecies rupicola, top, and cinereicapillus, upper center; and Campo Flickers (C. campestris), subspecies campestris, lower center, and campestroides, bottom right.
Plate 72. Males of Helmeted Woodpecker (*Dryocopus galeatus*), above, and Rufous Woodpecker (*Celeus brachyurus squamigularis*), below.
Plate 73. Males of Waved Woodpecker (Celeus undatus), subspecies undatus, upper right, and multifasciatus, lower left; Scaly-breasted Woodpecker (C. g. grammicus), lower right; and Cinnamon Woodpecker (C. l. loricatus), upper left; the first two species of which form a superspecies.
Plate 74. Males of the superspecies Celeus elegans. Chestnut Woodpecker (Celeus elegans), subspecies hellmayri, upper left, and citreopygius, top center; Chestnut-colored Woodpecker (C. castaneus), upper right; Pale-crested Woodpecker (C. l. lugubris), lower center; and Blond-crested Woodpecker (C. flavescens), subspecies flavescens, lower left, and ochraceus, lower right.
Plate 75. Males of Cream-colored Woodpecker (Celeus f. flavus), upper left, and Rufous-headed Woodpecker (C. s. spectabilis), lower right.
Plate 76. Male Ringed Woodpeckers (*Celeus torquatus*), subspecies *occidentalis*, above, and *torquatus*, below.
Plate 77. Males of the superspecies *Dryocopus pileatus*: Pileated Woodpecker (*Dryocopus p. pileatus*), upper left; Lineated Woodpecker (*D. lineatus*), subspecies *erythrops*, upper right, and *fuscipennis*, lower right; and Black-bodied Woodpecker (*D. schulzi*), lower left.
Plate 78. Males of Black Woodpecker (*Dryocopus m. martius*), left; and White-bellied Woodpecker (*D. javensis*), subspecies *richardsi*, upper right, and *hodgei*, lower right.
Plate 79. Males of Powerful Woodpecker \textit{(Campephilus p. pollens)}, left, and Crimson-bellied Woodpecker \textit{(C. h. haematogaster)}, right.
Plate 80. Males of Red-necked Woodpecker (Campephilus rubricollis trachelopyrus), upper right, and Robust Woodpecker (C. robustus), lower left.
Plate 81. The superspecies *Campephilus melanoleucus*: Crimson-crested Woodpeckers (*Campephilus melanoleucus*), male of subspecies *cearae*, upper left, and female of *malherbii*, upper right; male Pale-billed Woodpecker (*C. g. guatemalensis*), lower left; and male Guayaquil Woodpecker (*C. gayaquilensis*), lower right.
Plate 82. Females of Magellanic Woodpecker (*Campephilus magellanicus*), left, and Cream-backed Woodpecker (*C. leucopogon*), right.
Plate 83. Ivory-billed Woodpeckers (*Campephilus principalis*), male, above, and female, below.
Plate 84. Imperial Woodpeckers (*Campephilus imperialis*), male, left, and female, right.
Plate 85. Males of Banded Red Woodpecker (Picus miniaceus malaccensis), upper left; and the superspecies Picus chlorolophus — namely, Crimson-winged Woodpecker (P. puniceus observandus), upper right; and Lesser Yellow-napes (P. chlorolophus), subspecies wellsii, lower left, and chlorolophus, lower right.
Plate 86. The superspecies *Picus mentalis*: Checker-throated Woodpeckers, (*Picus mentalis*), female of subspecies *humii*, upper left, and male of subspecies *mentalis*, upper right; and Greater Yellow-napes (*P. flavinucha*), male of subspecies *flavinucha*, lower left, and female of subspecies *mystacalis*, lower right.
Plate 87. Males of Streak-throated Woodpecker (*Picus xanthopygæus*), upper left; and Laced Woodpecker (*P. vittatus*), subspecies *vittatus*, upper right, and *viridanus*, bottom.
Plate 88. Males of Wavy-bellied Woodpecker (*Picus a. awokera*), upper left; Scaly-bellied Woodpecker (*P. s. squamatus*), upper right; and Green Woodpecker (*P. viridis*), subspecies *viridis*, center right, and *vaillantii*, bottom.
Plate 89. Males of Black-headed Woodpecker (*Picus erythropygius nigrigenis*), left, and Red-collared Woodpecker (*P. rabieri*), right.
Plate 90. Males of Gray-faced Woodpecker (Picus canus), subspecies hessei, above; jessoensis, center; and dedemi, below.
Plate 91. Males of Olive-backed Woodpecker (*Dinopium r. rafflesii*), top; and Lesser Flame-backed Woodpecker (*D. benghalense*), subspecies *psarodes*, lower left, and *benghalense*, lower right.
Plate 92. Males of superspecies *Dinopium javanense*: Common Gold-backed Woodpeckers (*Dinopium javanense*), subspecies *intermedium*, top, and *everetti*, right; and Himalayan Gold-backed Woodpecker (*D. s. shorii*), lower left.
Plate 93. Males of Greater Flame-backed Woodpecker (Chrysocolaptes lucidus), subspecies sultaneus, upper left; stricklandi, upper right; and strictus, lower left; and Black-rumped Woodpecker (C. f. festivus), lower right.
Plate 94. Male Greater Flame-backed Woodpeckers (Chrysocolaptes lucidus), four subspecies: *xanthocephalus*, upper left; *montanus*, upper right; *erythrocephalus*, lower left; and *rufopunctatus*, lower right.
Plate 95. Male Bamboo Woodpeckers (*Gecinulus grantia*), subspecies *robinsoni*, above, and *grantia*, below.
Plate 96. Male Okinawan Woodpecker (Sapheopipo noguchii).
Plate 97. Males of Maroon Woodpecker (Blythipicus rubiginosus), above, and Bay Woodpecker (B. p. pyrrhotis), below.
Plate 98. Orange-backed Woodpeckers (*Reinwardtipicus validus xanthopygius*), male, above, and female, below.
Plate 99. Males of the three species of Meiglyptes: Buff-rumped Woodpecker (*M. tristis grammithorax*), above; Buff-necked Woodpecker (*M. t. tukki*), lower left; and Black and Buff Woodpecker (*M. jugularis*), lower right.
Plate 100. The two species of *Hemicircus*: Gray and Buff Woodpeckers (*H. concretus sordidus*), male at top; female, center left; and immature male, upper right; and Heart-spotted Woodpeckers (*H. canente*), male, bottom left, and female, bottom right.
Plate 101. Males of the three species of Mulleripicus: Sooty Woodpecker (*M. funebris*), subspecies *fuliginosus*, upper left, and *mayri*, upper right; Great Slaty Woodpecker (*M. p. pulverulentus*), lower left; and Fulvous Woodpecker (*M. fulvus wallacei*), lower right.
Part Four

References and Index
REFERENCES

Abdulali, H.
Abro, A.
1962. Vendehalsens Reir. Sterna, 5:146-147
Ali, S.
Ali, S., and H. Abdulali
Ali, S., and S. D. Ripley
Ali, S., and H. Santapau
Ali, S., and H. Whistler
Amadon, D.
Amadon, D., and L. L. Short
Antevs, A.
Arnhem, R.
1960. A propos d’une triple couvaison normale chez le Torcol, Jynx torquilla L. Geraut, 50:1-10
Attwell, G. D.
Austin, O. L., and N. Kuroda
Baker, W. W.
REFERENCES

Baldwin, P.

Bankovics, A.

Bannerman, D. A.

Baptista, L. F.

Bates, G. L.
1909. Field notes on the birds of southern Kamerun, West Africa. Ibis, 1909, pp. 1–74

Bauer, K.

Beal, F.

Beckett, T. A.

Benson, C. W.
1940. Further notes on Nyasaland birds. Ibis, 1940, pp. 387–433
1942. Additional notes on Nyasaland birds. Ibis, 1942, pp. 299–337

Benson, C. W., and C. R. S. Pitman

Bent, A. C.

Betts, F. N.
REFERENCES

Biswas, B.
Blake, E. R.
Blume, D.
1961. Über die Lebensweise einiger Spechtarten (Dendrocopos major, Picus viridis, Dryocopus martius). Journ. für Ornith., Vol. 102 (Sonderheft), pp. 1–115
1968. Die Buntspechte (Gattung Dendrocopos). Wittenberg, Lutherstadt, Germany, A. Ziemsen Verlag, pp. 1–112
Blume, D., and G. Jung
Blume, D., G. Jung, W. Keutzer, and K. H. Werner
Blume, D., K. Ruge, and W. Tilgner
1975. Die Sprache unserer Spechte. Mühlacker, Germany, A. Graul Co. (phonograph record)
Bock, C. E.
Bock, C. E., and J. H. Bock
Bock, W. J.
Bock, W. J., and W. deW. Miller
Bock, W. J., and L. L. Short
Bond, J.
Bond, J., and R. Meyer de Schauensee


Brackbill, H.

Brodkorb, P.

Brown, J. K.

Bull, J.

Bürkli, W., M. Juon, and K. Ruge

Burt, W. H.

Bussmann, J.
1944. Beiträge zur Kenntnis der Brutbiologie des Grauspechts (*Picus c. canus* Gm.). Archives Suisses d’Ornith., 2:105–136

Caldwell, H. R., and J. C. Caldwell

Callegari, E.

Carpentier, J.

Chapin, J. P.
1921. The abbreviated inner primaries of nestling woodpeckers. Auk, 38:531–552
1952. *Campethera cailliautii* and *permista* are conspecific. Ibis, 94:535–536

Chapman, F. M.

Chasen, F. N.

Cheng, Tso-hsin, Xian Yaohua, Zhang Yinsun, and Jiang Zhihua

Cherrie, G. K.
REFERENCES

Chiba, S.  

Clancey, P. A.  
1964b. The Birds of Natal and Zululand. Edinburgh, Oliver and Boyd, pp. xxxiv + 511

Cody, M. L.  

Cohen, E.  

Conrads, K.  

Cowdy, S.  

Cramer, E. O. H.  

Crockett, A. B., Jr.  

Crosby, G. T.  

Cruz, A.  
REFERENCES

Cuisin, M.

Dabbene, R.

Danforth, S. T.

Davis, J.

Deignan, H. G.

Delacour, J., and P. Jabouille

Dementiev, G. P., and N. A. Gladkov, eds.

Dennis, J. V.

De Zylva, T. S. U.

Dharmakumarsinhji, R. S.

Diesselhorst, G.

Dorst, J.
1956. Notes sur la Biologie des Colaptes, Colaptes rupicola, des Hauts Plateaux Peruvian. L’Oiseau, 26:118–125

Eates, K. R.

Ehrenroth, B.

Erskine, A. J.
REFERENCES

Farner, D. S.

Feindt, P.

Felix, J.

ffrench, R.

Fish, W. M.

Friedmann, H.
1948. Birds collected by the National Geographic Society’s expeditions to northern Brazil and southern Venezuela. Proc. U. S. National Mus., 97:373-569

Friedmann, H., and A. Loveridge

Friedmann, H., and J. G. Williams

Garrido, O. H.

Gatter, W.

George, W. G.

Gibbon, R. S.

Gilliard, E. T.

Glenister, A. G.
REFERENCES

Goodge, W. R.

Goodwin, D.

Gosse, P. H.

Greenway, J. C., Jr.
1943. Oriental forms of the pygmy woodpecker. Auk, 60:564–575

Griscom, L., and J. C. Greenway, Jr.

Gyldenstolpe, N.

Haffer, J.

Harrison, C. B.

Hartert, E.
1898. List of a collection of birds from the island of Lirung or Salibabu, the largest of the Talaut Group. Novitates Zoolog., 5:88–91

Harwin, R. M.

Hasse, H.
1961. Schwartzpecht (Dryocopus martius) zerstört Gelege de Schellente (Bucephala clangula). Jour. für Ornith., 102:368

Haverschmidt, F.

Hellmayr, C. E.

Hodgetts, J. W.

Hogstad, O.

Howell, T. R.

Hoyt, J. S. Y.
REFERENCES

Hoyt, S. F.
1957. The ecology of the Pileated Woodpecker. Ecology, 38:246-256

Ikehara, S., T. Abe, M. Shimojana, Y. Yonashiro, and S. Miyagi

Inglis, C. M.

Jackson, F. J.

Jackson, J. A.

James, F. C.

Jerdon, T. C.

Johnson, A. W., and J. D. Goodall

Kilham, L.
1958b. Pair formation, mutual tapping and nest hole selection of Red-bellied Woodpeckers. Auk, 75:318-329
Kirkpatrick, K. M.
Klaver, A.
LaFrance, F.
Lamb, G. R.
Land, H. C.
Lanz, H.
Lawrence, L. deK.
Lay, D. W., E. W. McDaniel, and D. N. Russell
Leach, F. A.
Legge, W. V.
Lewin, H. G. D.
Ligon, J. D.
Lister, M. D.
Löhr, H.
Lynes, H.
1925. On the birds of north and central Darfur, with notes on the west-central Kordofan and North Nuba provinces of British Sudan. Ibis, 1925, pp. 344-416
McAtee, W. L.
1940. An experiment in songbird management. Auk, 57:333-348
McClure, H. E.
Macklin, C. H.
1937. Breeding the White-headed Woodpecker, Melanerpes candidus. Avicult. Mag., 1937, pp. 244-246
Mackworth-Praed, C. W., and C. H. B. Grant
McLachlan, G. R., and R. Liversidge
1957. Roberts’ Birds of South Africa. Cape Town, Central News Agency Ltd., pp. xxxviii + 504
MacRoberts, B. R., and M. H. MacRoberts
Massey, C. L., and N. D. Wygant
1973. Woodpeckers: most important predators of the spruce beetle. Colorado Field Ornith., No. 16, pp. 4–8
Mayfield, H.
Mayr, E.
Meinertzhagen, R.
Mengel, R.

Meyer, A. B., and L. W. Wigglesworth

Meyer de Schauensee, R.

Miller, A. H.
1947. The tropical avifauna of the upper Magdalena Valley, Colombia. Auk, 64:351–381

Miller, A. H., and C. E. Bock

Miller, W. DeW.

Mitchell, M. H.

Monroe, B. L., Jr.

Moore, R. T.

Morse, D. H.

Moynihan, M.

Munteanu, D.

Murray, B. G., Jr.

Nackejima, C.

Neelakantan, K. K.

Nelson, E. W.


Nero, R. W.


Niethammer, G.


Noble, G. K.


Ogilvie, L. S.


Olrog, C. C.


Olson, S. L.


O’Neill, J. P.


O’Neill, J. P., and D. L. Pearson


Otvos, I. S.


Paludan, K.


Paynter, R. A., Jr.


Peale, R. E. F.


Pergolani de Costa, M. J.


Peters, J. L.

REFERENCES


Phillips, C. L.

Phillips, W. W. A.

Pinto, A. A. da Rosa

Pinto, O. M. de O., and E. A. de Comargo

Pomeroy, A. L.

Price, R. E., Jr.

Priest, C. D.

Proud, D.

Pynnonen, A.

Rand, A. L.


Recher, H. F., and J. T. Recher

Reller, A. W.

Remsen, J. V., Jr.
1977. Five bird species new to Colombia. Auk, 94:363

Ripley, S. D.

REFERENCES

Ritter, W. E.

Robinson, G.

Robinson, H. C.

Roos, G.

Ruge, K.

Ruge, K., and W. Weber

Russell, S. M.

Salomonsen, F.
1947. En hybrid mellem Grønspætte (Picus v. viridis L.) og Graasæte (Picus c. canus Gm.). Vår Fågelværld, 6:141-144
Schäfer, E., and W. H. Phelps

Scherzinger, W.

Schlegel, J., and S. Schlegel

Schmidt, R.

Schneider, W.

Schater, W. L., and R. E. Moreau
1932. Taxonomic and field notes on some birds of north-eastern Tanganyika Territory, Part II. Ibis, 1932, pp. 656–683

Selander, R. K.

Selander, R. K., and D. R. Giller

Serle, W.

Shelley, L. O.
1935. Flickers attacked by Starlings. Auk, 52:93

Short, L. L.
1971a. The affinity of African with neotropical woodpeckers. Ostrich, Supplement 8, 35–40
1974e. Nesting of southern Sonoran birds during the summer rainy season. Condor, 76:21–32
1975b. Interspecific competition in woodpeckers. Emu, 77 (supplement):301
1978. Sympathy in woodpeckers of lowland Malayan forest. Biotropica, 10:122–133
Short, L. L., and R. C. Banks
Short, L. L., and W. J. Bock
Short, L. L., and R. S. Crossin
Short, L. L., and J. F. M. Horne
Short, L. L., and J. J. Morony, Jr.
Sibley, C. G.
1957. The abbreviated inner primaries of nestling woodpeckers. Auk, 74:102–103
Sielmann, H.
Skutch, A. F.
Slud, P.
Smythies, B. E.
1960. The Birds of Borneo. London, Oliver and Boyd, pp. xvi + 562
Snow, D. W., and A. W. G. Manning
Snyder, D. E.
Southern, W. E.
REFERENCES

Sovago, M.

Stager, K. E.

Stahlbaum, G.

Stanford, J. K., and E. Mayr
1941. The Vernay-Cutting Expedition to northern Burma, Part V. Ibis, 83:479–518
1939. On the birds of northern Burma, Part V. Ibis, 81:1–45

Stearns, R. E. C.

Stefanović, A.

Stickel, D. W.


Stresemann, E., and V. Stresemann

Stuart Baker, E. C.

Sutter, E.

Sutton, G. M.


Szlivka, L.


Tanner, J. T.
REFERENCES

Tarboton, W.

Taylor, R. R.

Throp, J. L.

Todd, W. E. C.

Tooby, H. J.

Traylor, M. A., Jr.
1963. Check-list of Angolan birds. Publ. Cult., Comp. de Diamantes de Angola, No. 61, pp. 1-250

Troetschler, R. G.
1976. Acorn Woodpecker breeding strategy as affected by Starling nest-hole competition. Condor, 78:151-165

Turček, F.
1954. The ringing of trees by some European woodpeckers. Ornis Fennica, 31:33-41

Urban, E. K., and L. H. Brown

van Rossem, A. J.

van Someren, V. G. L.

van Someren, V. G. L., and G. R. C. van Someren

van Tyne, J., and A. J. Berger

Vaurie, C.
REFERENCES


Verheyen, R.

Vijayaraghavan, B.

Vincent, A. W.

Vincent, J.

Virkkunen, I.
1967. Ethological observations on wintering woodpeckers, with special reference on the interactions between different species. Ornis Fennica, 44:73–77

Voous, K. H.


Waldbauer, G. P., J. G. Sternburg, W. G. George, and A. G. Scarbrough

Walker, G. R.
1939. Notes on the birds of Sierra Leone. Ibis, 1939, pp. 401–450

Walkinshaw, L. H.

Wallace, R. A.

Wetmore, A.


Wetmore, A., and B. H. Swales

Whistler, H., and N. B. Kinnear

White, C. M. N.

Wildash, P.

Winkler, H.


Winkler, H., and W. J. Bock

Winkler, H., and L. L. Short


Zimmer, J. T.


Zimmer, J. T., and W. H. Phelps

Zimmerman, D. A.

Zusi, R. L., and J. T. Marshall
INDEX

Campethera (continued)
  bennettii, 19, 50, 186, 187, 188–192, 193, 195, 205, 207, 562
calliluati, 39, 40, 51, 55, 197–199, 200, 202, 564
caroli, 43, 47, 51, 202, 203, 204–205, 223, 566
maculosa, 40, 51, 197, 199, 200, 201, 564
nivosa, 47, 51, 202–204, 205, 223, 566
notata, 51, 194, 195, 196–197, 563
permista (calliluati), 51, 55, 197, 198, 199, 200, 564
punctuligera, 47, 50, 186–188, 191, 192, 193, 562
scriptoricauda (bennettii), 188, 189, 190, 191, 193, 197
teniolaema (tullbergi), 51, 55, 201, 202, 565
tullbergi, 47, 51, 55, 201–202, 565
Campetherini, 35, 36, 37, 38, 43, 44, 45, 50, 186
 candidius, Melanerpes, 21, 47, 50, 108–109, 133, 404, 546
canente, Hemicircus, 48, 54, 522, 525, 526, 527, 528–530, 638
canicapillus, Picoides, 12, 51, 55, 213, 232, 233, 236, 237, 238–242, 244, 245, 247, 248, 249, 578, 580
canus, Picus, 12, 19, 40, 48, 54, 284, 466, 469, 470, 474, 475, 476, 479, 480, 482, 483–488, 509, 511, 512, 628
caroli, Campethera, 43, 47, 51, 202, 203, 204–205, 223, 566
carolinus, Melanerpes, 21, 50, 117, 121, 137, 148, 152, 154, 157, 160, 162, 163, 164, 165–170, 171, 312, 556
cassini, Veniliornis, 53, 354, 355, 356, 357, 599
 castaneus, Celeus, 52, 394, 398–399, 400, 402, 403, 612
casteelhau, Picumnus, 46, 49, 93–94, 97, 542
cathpharius, Picoides, 51, 247, 258, 259–261, 262, 263, 584
caymanensis, Melanerpes superciliaris, 50, 55, 170, 171, 557
Celeus, 10, 11, 12, 13, 16, 17, 21, 23, 26, 35, 36, 39, 42, 44, 45, 46, 47, 48, 53, 55, 389, 406, 407, 410, 453, 470, 493
Celeus brachyurus, 10, 13, 28, 39, 44, 47, 53, 389, 390–393, 466, 469, 494, 503, 509, 610
 castaneus, 53, 394, 398–399, 400, 402, 403, 612
elegans, 40, 47, 53, 55, 398, 399–401, 402, 403, 405, 407, 612
 flavescens, 44, 53, 56, 399, 400, 402–404, 612
 flavus, 9, 44, 47, 53, 404–405, 613
grammicus, 53, 392, 394, 396–397, 611
 immaculatus (elegans), 53, 55
 jumana (elegans), 53, 55, 399, 400, 401
 loricatus, 47, 53, 392, 393–395, 398, 407, 611
 lugubris, 40, 53, 56, 399, 400–402, 403, 612
 spectabilis, 47, 49, 53, 389, 394, 405–407, 408, 410, 613
torquatus, 44, 47, 53, 389, 407–408, 614
 undatus, 44, 47, 53, 392, 394, 395–396, 397, 611
Centurus (Melanerpes), 47, 108, 127, 146, 164, 170
chlorogaster, Picus chlorolophus, 53, 55
Chloronterpes (Piculus), 44
chocoensis, Veniliornis affinis, 55, 354, 355, 356, 357
chrysacthen, Melanerpes, 47, 50, 115, 117, 130, 133, 136–139, 140, 141, 142, 153, 552
Chryserpes (Melanerpes), 146
chrysochloros, Picumnus, 26, 44, 52, 359, 361–362, 363, 602
Chrysocolapes, 9, 11, 13, 16, 36, 45, 46, 54, 55, 489, 497, 498, 519
Chrysocolapes festivus, 45, 54, 497, 502, 504, 505–507, 631
validus (see Reinwardtipicus)
 chrysogenys, Melanerpes, 47, 50, 134, 135, 141, 148–150, 151, 554
 chrysoidea, Colaptes auratus, 14, 52, 55, 375, 376, 379, 380, 381
 Chrysopitius (Colaptes), 52, 55
cinnamomeus, Picumnus, 46, 49, 90, 99–100, 541
cirratus, Picumnus, 9, 39, 40, 46, 49, 55, 71, 72, 75, 80, 81, 82, 83–86, 88, 89, 543
Colaptes, 10, 12, 21, 25, 28, 30, 36, 44, 46, 47, 52, 55, 145, 212, 364, 367, 368, 381, 382, 384, 387, 389, 419, 470, 479, 521, 524
Colaptes atricollis, 19, 44, 52, 369–370, 371, 380, 605
 auratus, 6, 11, 14, 15, 19, 21, 24, 26, 29, 40, 44, 52, 55, 112, 119, 121, 128, 159, 188, 317, 323, 340, 364, 368, 370, 373, 374–381, 382, 383, 386, 388, 421, 477, 478, 479, 607
eafer (auratus), 14, 52, 55, 375, 376, 380, 381
INDEX

campestris, 19, 40, 44, 52, 374, 383, 385, 387–389, 609
chrysoïdes (auratus), 14, 52, 55, 375, 376, 379, 380, 381
fendiniae, 12, 19, 44, 49, 52, 381–382, 608
melanochloros, 9, 19, 40, 52, 370, 371, 372–374, 382, 388, 606
melanolaimus (melanochloros), 52, 372, 373, 374
pitius, 12, 19, 52, 382–384, 385, 386, 388, 389, 447, 608
punctigula, 19, 44, 52, 370–372, 373, 374, 380, 384, 606
rupicola, 12, 19, 25, 40, 44, 52, 383, 384–387, 388, 389, 609
Colaptini, 35, 36, 38, 39, 42, 43, 44, 46, 52, 344
concretus, Hemicircus, 33, 45, 54, 521, 525, 526–528, 529, 638
darjellensis, Picoides, 51, 258, 260, 261–263, 264, 584
Dendrocopos (Picoides), 51, 55, 228, 258, 267, 272, 280, 287, 289, 432, 481
Dendropicus, 9, 10, 11, 12, 13, 36, 42, 43, 44, 45, 47, 51, 55, 207, 225, 228, 229, 235
Dendropicus abyssinicus, 51, 209–210, 211, 213, 569
elachus, 51, 207–208, 568
elliotii, 40, 47, 51, 55, 222–223, 257
gabonensis, 39, 51, 55, 213, 214–216, 571
goertae, 40, 47, 51, 223, 224–226, 228, 574
griseocephalus, 51, 223, 224, 225, 226–228, 574
johnstoni (elliotii), 51, 55, 222, 223, 573
lafrenayi (fuscescens), 51, 213, 214, 570
lugubris (gabonensis), 51, 55, 214, 215, 216, 571
namaquus, 33, 43, 47, 51, 216, 217–219, 220, 225, 567
poecilolaemus, 51, 208–209, 210, 213, 568
pyrrhogaster, 47, 51, 215, 219, 221–222, 572
stierlingi, 43, 47, 48, 51, 216–217, 219, 569
xantholophus, 47, 51, 219–221, 222, 572
dignus, Veniliornis, 10, 44, 52, 344, 345–346, 596
Dinopium, 9, 11, 12, 13, 16, 17, 36, 45, 46, 54, 101, 488, 497, 498
Dinopium benghalense, 33, 40, 54, 232, 489, 494, 495–498, 502, 629
ejavanense, 42, 54, 391, 490, 491, 492–495, 498, 499, 500, 502, 503, 506, 630
rafflesi, 30, 42, 45, 46, 54, 489–491, 497, 629
shorii, 45, 54, 489, 491–492, 494, 630
dorae, Picoides, 49, 51, 255–256, 582
dorbygnianus, Picumnus cirratus, 83–86
Dryocopus, 9, 21, 22, 26, 36, 39, 42, 44, 45, 46, 47, 48, 53, 408, 410, 451
Dryocopus erythropus (lineatus), 53, 55, 411, 412, 413, 416, 417, 615
galeatus, 35, 41, 44, 47, 48, 53, 408, 409–410, 610
lineatus, 33, 40, 53, 55, 137, 411, 412–417, 422, 439, 442, 447, 615
martius, 8, 39, 44, 47, 53, 284, 285, 408, 419, 422, 423, 424, 425, 426, 428–432, 450, 481, 616
schulzi, 40, 53, 410–412, 413, 416, 417, 422, 615
elachus, Dryocopus, 51, 207–208, 568
elegans, Celeus, 40, 47, 53, 55, 398, 399–401, 402, 403, 405, 612
elliotii, Dendropicus, 40, 47, 55, 222–223, 573
erythropus, Dryocopus lineatus, 53, 55, 411, 412, 413, 416, 417, 615
erythropygus, Picus, 48, 54, 482–483, 487, 627
exilis, Picumnus, 49, 55, 71, 72, 73–74, 85, 540
fernandinae, Coelaptes, 12, 19, 44, 49, 52, 381–382, 608
festivus, Chrysocolaptes, 45, 54, 497, 502, 504, 505–507, 631
flavescens, Celeus, 44, 53, 56, 399, 400, 402–404, 612
flavifrons, Melanerpes, 47, 50, 133, 134–136, 138, 139, 141, 142, 143, 551
flavigula, Piculus, 52, 358, 359, 360–361, 602
flavinucha, Picus, 21, 53, 462, 463, 464–467, 469, 624
flavus, Celeus, 9, 44, 47, 53, 404–405, 613
Flicker, Andean, 52, 384–387, 609
Black-necked, 52, 369–370, 605
Campo, 6, 33, 52, 374, 387–389, 609
Chilean, 52, 382–384, 608
Common (see Northern)
Fernandina’s, 52, 378, 381–382, 608
Gilded (Northern), 375
Green-barred, 33, 52, 372–374, 388, 606
Northern, 6, 25, 29, 32, 52, 317, 323, 340, 342, 364, 375–381, 382, 421, 607
Red-shafted (Northern), 375
Spot-breasted, 52, 370–372, 606
Yellow-shafted (Northern), 375
frontalis, Veniliornis, 40, 52, 350–351, 352, 597
fuliginosus, Mulleripicus funebris, 54, 55, 531, 532, 639
fulvescens, Picumnus, 49, 56, 90–91, 541
fulvus, Mulleripicus, 13, 54, 530–531, 532, 639
fumigatus, Veniliornis, 52, 347–348, 364, 595
funebris, Mulleripicus, 13, 54, 55, 531–532, 535, 639
fuscus, Picumnus, 46, 49, 85, 88–89, 541
gabonensis, Dendropicos, 39, 51, 213, 214–216, 571
galeatus, Dryocopus, 35, 41, 44, 47, 48, 53, 408, 409–410, 610
gayaquilensis, Campephilus, 14, 53, 56, 440, 441, 443, 444–445, 619
Gecinus, 17, 36, 45, 46, 54, 502, 507, 512
Gecinus grania, 54, 55, 502, 507–510, 633
viridis (grania), 55, 507, 508, 509, 510
Geocolaptes, 9, 36, 45, 51, 205
Geocolaptes olivaceus, 19, 25, 51, 205–207, 567
goertae, Dendropicos, 40, 47, 51, 223, 224–226, 228, 574
grammicus, Celeus, 53, 392, 394, 395, 396–397, 611
granadensis, Picumnus, 46, 49, 71, 97, 98–99, 542
grania, Gecinus, 54, 55, 502, 507–510, 633
griseocephalus, Dendropicos, 51, 223, 224, 225, 226–228, 574
guttifer, Picumnus albosquamatus, 49, 55, 76, 79, 80, 82, 84, 85, 86, 87–88, 92, 543
haematogaster, Campephilus, 48, 53, 433–434, 443, 617
Hemicircus, 9, 11, 36, 45, 46, 48, 54, 525, 530
Hemicircus canente, 48, 54, 522, 525, 526, 527, 528–530, 638
concretus, 33, 45, 54, 521, 525, 526–528, 529, 638
herminieri, Melanerpes, 13, 47, 49, 50, 111, 113–115, 117, 121, 133, 148, 547
himalayensis, Picoïdes, 51, 252, 263, 272–273, 275, 279, 281, 286, 586
hoffmannii, Melanerpes, 40, 50, 56, 152, 154, 155–157, 160, 162, 163, 169, 171, 556
hyperythrus, Picoïdes, 21, 47, 51, 252, 256–259, 272, 273, 583
hypopolius, Melanerpes, 47, 50, 56, 134, 150–151, 554
immaculatus, Celeus elegans, 53, 55
imperialis, Campephilus, 8, 44, 48, 53, 439, 449, 451, 452, 622
innominatus, Picumnus, 39, 41, 46, 49, 67–69, 540
Ipocrantor (Campephilus), 44
javanense, Dinopium, 42, 54, 391, 490, 491, 492–495, 498, 499, 500, 502, 503, 506, 630
jelskii, Picumnus cirratus, 82, 83–86
johnstoni, Dendropicos elliotii, 51, 55, 222, 223, 573
jugularis, Meiglyptes, 48, 54, 521, 522–523, 525, 637
jumana, Celeus elegans, 53, 55, 399, 400, 401
Jyninae, 7, 35, 36, 37, 42, 49, 59
Jynx, 10, 13, 36, 49, 59
Jynx ruficollis, 38, 49, 62, 63–66, 539
torquilla, 26, 38, 49, 59–62, 63, 64, 66, 539
kirkii, Veniliornis, 52, 348, 354, 355, 356, 357–358, 599
kizuki, Picicum, 51, 236–238, 239, 241, 245, 510, 578, 579
lafresnayi, Dendropicos fuscescens, 51, 213, 214, 570
lafresnayi, Picumnus, 49, 55, 70, 71–72, 74, 85, 540
leucogaster, Picumnus spilogaster, 55, 78
leucoalexus, Picoïdes, 52, 55, 358–360, 361, 362, 600
INDEX

Leuconerpes (Melanerpes), 50, 55, 108
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
leucopterus, Picoides, 40, 52, 273, 275,
miniaeus, 12, 35, 39, 42, 45, 48, 53, 56, 453–455, 456, 457, 462, 463, 623
miniatus (miniaeus), 53, 56
myrmecophoneus (xanthopygaeus), 53, 56
puniceus, 12, 32, 53, 425, 426, 454, 455–457, 458, 459, 460, 462, 463, 466, 623
rabieri, 12, 48, 49, 54, 481–482, 487, 627
squamatus, 19, 48, 53, 466, 470, 471, 473–474, 476, 480, 481, 487, 626
vaillantii (viridis), 12, 48, 53, 55, 476, 477, 478, 480, 481, 626
viridanus (vittatus), 53, 55, 467, 468, 470, 471, 625
viridis, 12, 19, 40, 48, 53, 55, 266, 432, 466, 469, 476–481, 485, 486, 487, 502, 626
vittatus, 48, 53, 55, 391, 463, 466, 467–471, 474, 481, 482, 483, 485, 486, 487, 502, 509, 625
xanthopygaeus, 48, 53, 56, 460, 468, 470, 471–472, 473, 474, 482, 483, 487, 625
pittius, Colaptes, 12, 19, 52, 382–384, 385, 386, 388, 389, 447, 608
poecilolaemus, Dendrocygna, 51, 208–209, 210, 213, 568
Polipicus (Dendrocygna), 51, 55, 207
polleni, Campophilus, 4, 48, 53, 432–433, 434, 617
portoricensis, Melanerpes, 50, 115–117, 120, 133, 148, 547
principalis, Campophilus, 8, 9, 44, 48, 53, 412, 417, 439, 448–451, 452, 621
pubescens, Picoides, 9, 14, 15, 22, 40, 52, 121, 240, 290, 293, 296, 298, 300, 301–308, 311, 312, 314, 318, 320, 321, 323, 324, 325, 326, 335, 336, 340, 359, 590
puckerani, Melanerpes, 47, 50, 133, 134, 135, 138, 139–141, 148, 150, 394, 415, 552
pulverulentus, Mulleripicus, 8, 45, 48, 54, 426, 531, 532, 533–535, 639
pumilus, Picumnus lafresnayi, 55
punctigula, Colaptes, 19, 44, 52, 370–372, 373, 380, 382, 606
punctuligera, Campethera, 47, 50, 186–188, 191, 192, 193, 562
puniceus, Picus, 12, 32, 53, 425, 426, 454, 455–457, 458, 459, 460, 462, 463, 623
pygmaeus, Picumnus, 49, 80–81, 85, 86, 88, 543
dorbygnianus (cirratus), 83–86
exilis, 49, 55, 71, 72, 73–74, 540
fulvescens, 49, 56, 90–91, 541
fusus, 46, 49, 85, 88–89, 541
granadensis, 46, 49, 71, 97, 98–99, 542
guttifer (albosquamatus), 49, 55, 76, 79, 80, 82, 84, 85, 86, 87–88, 92, 543
innominatus, 39, 41, 46, 49, 67–69, 540
jelskii (cirratus), 82, 83–86
lafresnayi, 49, 55, 70, 71–72, 74, 540
leucogaster (spilogaster), 49, 55, 78
limae, 49, 91–92, 542
minutissimus, 49, 56, 75, 76, 77, 78–80, 88, 542
nebulosus, 46, 49, 91, 92, 541
nigropunctatus (exilis), 49, 55, 74
olivaceus, 46, 49, 71, 92, 95–98, 99, 541
pallidus (spilogaster), 49, 55, 77–78, 79
pumilus (lafresnayi), 55, 71–72
pygmaeus, 49, 80–81, 83, 85, 86, 88, 543
rufiventris, 49, 89–90, 100, 541
sagittatus (albosquamatus), 88
scletieri, 46, 49, 71, 74–75, 543
spilogaster, 49, 55, 56, 72, 75, 77–78, 79, 540
squamatus, 8, 49, 75–77, 542
steindachneri, 49, 81–82, 85, 543
subtilis, 46, 49, 56, 71, 93, 94–95, 97, 542
temminekii (cirratus), 49, 55, 83–86, 89
thamnophiloides (cirratus), 83–86
varzeae, 40, 49, 81, 82–83, 85, 86, 88, 91, 543
Picus, 12, 13, 16, 19, 21, 36, 39, 42, 45, 46, 48, 53, 285, 391, 453, 470, 474, 482, 493, 509, 512
Picus awokera, 19, 48, 53, 474–476, 480, 487, 626
canus, 12, 19, 40, 48, 54, 284, 466, 469, 470, 474, 475, 476, 479, 480, 482, 483–488, 509, 511, 512, 628
chlorogaster (chlorophilus), 53, 55
erithropygius, 48, 54, 482–483, 487, 627
flavichnola, 21, 53, 462, 463, 464–467, 469, 482, 624
mentalis, 48, 53, 456, 461–464, 465, 466, 467, 469, 509, 624
mineaceus (miniaeus), 12, 53, 56, 453
pyrrhogaster, Dendropicos, 47, 51, 215, 219, 221-222, 572
pyrrholtis, Blythipicus, 31, 54, 509, 513, 514-517, 519, 635
rabieri, Picus, 12, 48, 49, 54, 481-482, 487, 627
radiolatus, Melanerpes, 10, 47, 50, 146-148, 553
rafflesii, Dinopium, 30, 42, 45, 46, 54, 489-491, 497, 629
Reinwardticipus, 16, 36, 45, 46, 54, 55, 502, 517
Reinwardticipus validus, 13, 45, 54, 55, 516, 517-519, 636
rivoli, Piculus, 44, 52, 345, 364, 367-368, 604
robustus, Campephilus, 48, 53, 436-437, 441, 443, 447, 618
ruber, Sphyrapicus, 13, 14, 40, 50, 56, 172, 176, 177, 178, 180, 559
rubiginosus, Blythipicus, 54, 503, 511, 512-514, 515, 516, 519, 635
rubiginosus, Piculus, 40, 44, 52, 55, 357, 359, 363-366, 367, 368, 603
rubricapillus, Melanerpes, 26, 47, 50, 137, 140, 151-155, 157, 162, 171, 555
rubricollis, Campephilus, 48, 53, 435-436, 618
rubrifrons, Melanerpes cruenatus, 40, 50, 55, 131, 132, 134, 550
ruficollis, Jynx, 38, 49, 62, 63-66, 539
rufiventris, Picumnus, 49, 89-90, 100, 541
rupicola, Capolops, 12, 19, 25, 40, 44, 52, 383, 384-387, 388, 389, 609
sagittatus, Picumnus albosquamatus, 88
sanguineus, Veniliornis, 52, 344, 350, 352-353, 598
Sapheoipipo, 36, 42, 45, 46, 54, 510
Sapheoipipo noguchii, 10, 48, 54, 510-512, 634
sapsucker, 16, 22, 118, 126, 175, 180, 300, 320, 323, 334, 342
Sapsucker, Red-breasted, 50, 178-179, 559
Red-naped, 50, 176-178, 184, 559
Williamson’s, 50, 176, 178, 179-184, 560
Yellow-bellied, 50, 143, 146, 173-176, 178, 179, 323, 342, 558
Sasia, 17, 36, 38, 39, 42, 43, 45, 50, 55, 89, 100, 101
Sasia abnormis, 4, 8, 43, 50, 100, 101, 102-103, 104, 105, 544
africana, 4, 10, 43, 50, 100-102, 544
ochracea, 4, 43, 50, 100, 101, 102, 103-105, 544
scalaris, Picoides, 12, 14, 40, 52, 244, 248, 278, 289, 291, 292-297, 299, 300, 301, 304, 307, 311, 314, 317, 320, 325, 326, 330, 589
schulzi, Dryocopus, 40, 53, 410-412, 413, 416, 417, 422, 615
sclateri, Picumnus, 46, 49, 71, 74-75, 85, 543
scriptoricauda, Campethera bennettii, 188, 189, 190, 191, 193, 197
shorti, Dinopium, 45, 54, 489, 491-492, 494, 630
simplex, Piculus leucoalaenus, 52, 55, 358, 359, 360, 362, 600
spectabilis, Celeus, 47, 49, 53, 394, 405-407, 408, 410, 613
Sphyrapicus, 15, 16, 28, 36, 43, 45, 47, 50, 108, 110, 126, 172, 185, 258, 283, 298, 308, 320, 334
Sphyrapicus nuchalis, 13, 14, 40, 50, 56, 176-178, 179, 181, 182, 184, 559
rubra, 13, 14, 40, 50, 56, 172, 176, 177-179, 180, 559
thyroideus, 40, 50, 111, 165, 172, 177, 179-184, 560
varius, 14, 40, 50, 56, 115, 118, 120, 142, 143, 146, 165, 166, 173-176, 177, 178, 179, 180, 181, 182, 184, 185, 300, 323, 558
spilogaster, Picumnus, 49, 55, 56, 72, 75, 77-78, 79, 85, 540
spilogaster, Veniliornis, 52, 350, 351-352, 353, 354, 598
squamatus, Picus, 19, 48, 53, 466, 469, 470, 471, 473-474, 476, 480, 481, 487, 626
squamulatus, Picumnus, 8, 49, 75-77, 85, 542
steindachneri, Picumnus, 49, 81-82, 85, 543
stierlingi, Dendropicos, 43, 47, 48, 51, 216-217, 219, 569
striatus, Melanerpes, 10, 25, 43, 47, 50, 105, 108, 117, 143-146, 148, 168, 185, 553
stricklandi, Picoides, 6, 52, 55, 293, 314-318, 321, 322, 323, 325, 326, 330, 331, 334, 335, 592
subtilis, Picumnus, 46, 49, 56, 71, 93, 94-95, 97, 542
superciliaris, Melanerpes, 50, 55, 144, 148, 157, 160, 163, 169, 170-172, 185, 556, 557
syriacus, Picoides, 40, 52, 273, 274, 275-280, 281, 282, 283, 284, 285, 286, 586
taeniolaema, Campethera tullbergi, 51, 55, 201, 202, 565
temminckii, Picoides, 42, 43, 51, 228-229, 230, 231, 233, 241, 531
temminckii, Picumnus cirratus, 49, 55, 83-86, 89
thamnophiloides, Picumnus cirratus, 83-86
Thripias (Dendropicos), 51, 55, 207, 220
thyroideus, Sphyrapicus, 40, 50, 111, 165, 172, 177, 179-184, 560
torquatus, Celeus, 44, 47, 53, 389, 614
torquilla, Jynx, 26, 38, 49, 59–62, 63, 64, 66, 539
Trichocerus (Melanerpes), 50, 55, 108
tridaeuma, Picoidea, 6, 22, 52, 283, 320, 322, 324, 325, 326, 327, 331–338, 340, 341, 342, 343, 349
Tripsurus (Melanerpes), 43, 47, 108, 127
tristis, Meiglyptes, 33, 48, 54, 520–522, 523, 524, 525, 527, 637
tukkt, Meiglyptes, 54, 391, 521, 523–525, 637
nullbergh, Campethera, 47, 51, 55, 201–202, 565
undatus, Celeus, 44, 47, 53, 392, 394, 395–396, 397, 611
uropygialis, Melanerpes, 21, 40, 50, 56, 150, 157–160, 162, 163, 169, 171, 556
vaillantii, Picus viridis, 12, 48, 53, 55, 476, 477, 478, 480, 481, 626
validus, Reinwardticipus, 13, 45, 54, 55, 516, 517–519, 636
varius, Sphyrapicus, 14, 40, 50, 56, 115, 118, 120, 142, 143, 146, 165, 166, 173–176, 177, 178, 179, 180, 181, 182, 184, 185, 300, 323, 558
varzea, Picamus, 40, 49, 51, 82–83, 85, 86, 88, 91, 543
Veniliornis, 10, 11, 13, 21, 36, 44, 46, 47, 344
Veniliornis affinis, 52, 55, 345, 350, 353, 354–355, 356, 357, 599
callonotus, 52, 344–345, 595
cassin, 52, 354, 355, 356, 357, 599
chocoensis (affinis), 52, 55, 345, 354, 356, 357
dignus, 10, 44, 52, 344, 345–346, 596
frontalis, 40, 52, 350–351, 352, 597
fumigatus, 52, 347–348, 364, 395
kirkii, 52, 348, 354, 355, 356, 357–358, 599
macullifrons, 52, 351, 352–354, 355, 356, 599
nigriceps, 44, 52, 345, 346, 596
passerinus, 40, 52, 345, 348–350, 351, 352, 354, 355, 597
sanguineus, 52, 344, 350, 352–353, 598
spilogaster, 52, 350, 351–352, 353, 354, 598
Verreauxia (Sasia), 42, 50, 55, 101
viridanus, Picus vittatus, 53, 55, 467, 468, 625
viridis, Gecinulus grantia, 55, 507, 508, 509, 510
viridis, Picus, 12, 19, 40, 48, 53, 55, 266, 432, 466, 469, 474, 476–481, 485, 486, 487, 502
vittatus, Picus, 53, 55, 391, 466, 467–471, 473, 474, 481, 482, 483, 485, 486, 487, 502, 509, 626
wattsi, Picoidea canicampillus, 51, 55
African Ground, 51, 205–207, 567
Arabian, 51, 255–256, 582
Arctic Three-toed (Black-backed)
Arizona (see Strickland's)
Bamboo, 54, 507–510, 633
Bamboo Green (see Laced)
Banded Red, 50, 53, 453–455, 623
Bar-bellied, 52, 346, 596
Bay, 54, 509, 513, 514–517, 635
Bearded, 51, 271–219, 567
Bennett's, 50, 188–192, 562
Black, 8, 53, 284, 425, 428–432, 616
Black and Buff, 54, 522–523, 637
Black-backed, 6, 26, 31, 32, 52, 338–343, 594
Black-bodied, 53, 615
Black-checked, 50, 139–141, 552
Black-headed, 54, 482–483, 627
Black-rumped, 54, 502, 505–507, 631
Blond-crested, 53, 402–404, 612
Blood-colored, 52, 352–353, 598
Brown-backed, 6, 51, 234–235, 575
Brown-capped, 51, 231–234, 577
Brown-eared, 51, 204–205, 566
Brown-fronted, 51, 251–252, 581
Brown-throated (Darjeeling), 51, 261–263, 584
Buff-necked, 54, 523–525, 637
Buff-rumped, 54, 520–522, 637
Buff-spotted, 51, 202–204, 566
Cardinal, 32, 51, 210–214, 570
Checked, 52, 289–291, 588
Checker-throated, 53, 461–464, 624
Chestnut, 53, 399–401, 612
Chestnut-colored, 53, 398–399, 612
Cinnamon, 53, 393–395, 611
Common Gold-backed, 54, 492–495, 499, 502, 630
Cream-backed, 53, 445–446, 620
Cream-colored, 53, 404–405, 613
Crimson-bellied, 53, 433–434, 617
Crimson-breasted, 51, 259–261, 584
Crimson-crested, 53, 440–443, 619
Crimson-mantled, 52, 367–368, 604
Crimson-winged, 31, 53, 425, 455–457, 623
Cuban Green, 50, 184–186, 561
Darjeeling (see Brown-throated)
Dot-fronted, 52, 350–351, 597
Downy, 9, 22, 31, 52, 121, 300, 301–308, 318, 323, 326, 359, 590
Elliot's, 51, 222–223, 573
Fine-spotted, 50, 186–188, 562
Fire-bellied, 51, 221–222, 572
Flame-backed, Greater, 54, 499–505, 509, 631, 632
Flame-backed, Lesser, 54, 495–498, 502, 629
Fulvous, 54, 530–531, 639
Gaboon, 51, 214–216, 571
Gila, 50, 157–160, 556
Gold-backed, Common, 54, 492–495, 499, 502, 630
Gold-backed, Himalayan, 54, 491–492, 630
Gold-cheeked, 50, 148–150, 554
Gold-fronted, 50, 160–164, 556, 557
Gold-mantled, 51, 209–210, 569
Gold-naped, 50, 136–139, 140, 153, 552
Golden-backed (see Gold-backed)
Golden-collared, 52, 356, 599
Golden-green, 52, 361–362, 374, 602
Golden-olive, 52, 363–366, 603
Golden-tailed, 51, 194–196, 563
Gray, 51, 224–226, 574
Gray, Little, 51, 207–208, 568
Gray and Buff, 54, 526–528, 638
Gray-breasted, 50, 150–151, 554
Gray-capped, 32, 51, 232, 238–242, 249, 578, 580
Gray-crowned, 52, 366–367, 603
Gray-faced (Gray-headed), 6, 54, 480, 483–488, 628
Great Red-bellied, 50, 170–172, 556, 557
Great Slaty, 8, 54, 533–535, 639
Great Spotted, 22, 25, 52, 61, 120, 244, 266, 281–289, 586
Greater Flame-backed, 54, 499–505, 509, 631, 632
Green, 53, 266, 476–481, 626
Green, Cuban, 50, 184–186, 561
Green, Little, 51, 200, 564
Green-backed, 51, 197–199, 564
Ground, African, 51, 205–207, 567
Guadeloupe, 50, 113–115, 547
Guayaquil, 53, 444–445, 619
Hairy, 9, 22, 24, 31, 32, 33, 52, 300, 304, 305, 318–328, 334, 340, 342, 364, 593
Heart-spotted, 54, 528–530, 638
Helmeted, 3, 48, 53, 409–410, 610
Himalayan, 51, 272–273, 630
Himalayan Gold-backed, 54, 491–492
Hispaniolan, 50, 105, 143–146, 553
Hoffmann’s, 50, 155–157, 556
Imperial, 3, 8, 48, 53, 449, 452, 622
Ivory-billed, 3, 8, 48, 53, 448–451, 452, 621
Jamaican, 50, 146–148, 553
Japanese Spotted, 51, 236–238, 578, 579
Knysna, 51, 196–197, 563
Laced, 53, 467–471, 625
Lesser Flame-backed, 54, 495–498, 502, 629
Lesser Spotted, 51, 242–246, 485, 578, 579
Lineated, 53, 137, 412–417, 442, 615
Little, 52, 348–350, 597
Little Gray, 51, 207–208, 568
Little Green, 51, 200, 564
Magellanic, 8, 53, 447–448, 620
Maroon, 54, 512–514, 515, 516, 635
Middle Spotted, 31, 51, 263–267, 584
Nubian, 32, 50, 192–194, 562
Northern Three-toed (see Three-toed)
Nuttall’s, 22, 29, 30, 32, 33, 52, 128, 297–301, 305, 307, 589, 590
Okinawan, 3, 48, 54, 510–512, 513, 634
Olive, 51, 226–228, 574
Olive-backed, 54, 489–491, 629
Orange-backed, 54, 517–519, 636
Pale-billed, 53, 437–440, 619
Pale-crested, 53, 401–402, 612
Philippine Pygmy, 51, 229–231, 576
Pileated, 8, 53, 311, 414, 417–422, 450, 615
Powerful, 53, 432–433, 617
Puerto Rican, 50, 115–118, 120, 547
Pygmy, Philippine, 51, 229–231, 576
Pygmy, Temminck’s, 51, 228–229, 575
Red (see Lesser Flame-backed)
Red, Banded, 53, 453–455, 623
Red-bellied, 22, 50, 121, 122, 124, 165–170, 556, 557
Red-bellied, Great, 50, 170–172, 556, 557
Red-cockaded, 26, 48, 52, 308–314, 591
Red-collared, 54, 481–482, 627
Red-crowned, 50, 151–155, 555
Red-fronted, 50, 131–134, 550
Red-headed, 50, 118–124, 168, 170, 179, 304, 311, 378, 548
Red-necked, 53, 435–436, 618
Red-rumped, 52, 357–358, 599
Red-stained, 52, 354–355, 599
Ringed, 53, 407–408, 614
Robust, 53, 436–437, 618
Rufous, 53, 390–393, 610
Rufous-bellied, 51, 256–259, 583
Rufous-headed, 53, 405–407, 613
Scaly-bellied, 53, 473–474, 626
Scaly-breasted, 53, 396–397, 611
Woodpecker (continued)
Scarlet-backed, 52, 344–345, 595
Sind, 51, 273–275, 586
Slaty, Great, 8, 54, 533–535, 639
Smoky-brown, 52, 347–348, 595
Sooty, 54, 531–532, 639
Speckle-breasted, 51, 208–209, 568
Sterling’s, 48, 51, 216–217, 569
Streak-bellied, 32, 51, 246–250, 581
Streak-throated, 53, 471–472, 625
Strickland’s, 6, 52, 314–318, 592
Stripe-breasted, 51, 250–251, 581
Striped, 52, 291–292, 588
Syrian, 52, 275–280, 586
Temminck’s Pygmy, 51, 228–229, 575
Three-toed, 6, 32, 52, 324, 325, 331–338, 340, 343, 594
Tullberg’s, 51, 201–202, 565
Waved, 53, 395–396, 611
Wavy-bellied, 53, 474–476, 626
White, 50, 108–109, 546
White-backed, 51, 267–272, 585
White-bellied, 8, 53, 423–427, 534, 535, 616
White-browed, 52, 361, 362–363, 602
White-fronted, 50, 141–143, 551
White-headed, 52, 328–331, 591
White-spotted, 52, 351–352, 598
White-throated, 52, 358–360, 600
White-winged, 52, 280–281, 586
Yellow-crested, 51, 219–221, 572
Yellow-crowned, 51, 253–255, 582
Yellow-eared, 52, 353–354, 599
Yellow-fronted, 50, 134–136, 551
Yellow-throated, 52, 360–361, 601
Yellow-vented, 52, 345–346, 596
Wryneck, 10, 15, 17, 18, 25, 26, 27, 38, 42, 43, 59, 65
Wryneck, Northern, 6, 30, 49, 59–62, 539
Rufous-necked, 30, 49, 62, 63–66, 539
xantholophus, Dendropicos, 47, 51, 219–221, 222, 572
xanthopygaeus, Picus, 48, 53, 56, 460, 468, 470, 471–472, 473, 474, 482, 483, 487, 625
Xiphidiopicus, 36, 43, 45, 47, 50, 108, 146, 184
Xiphidiopicus percussus, 3, 10, 50, 184–186, 561
Yellow-nape, Greater, 53, 464–467, 624
Lesser, 31, 53, 458–461, 623