

- MAKATSCH, W. 1974. Die Eier der Vogel Europas. Vol. 1. Neumann Verlag, Berlin.
- MILLS, J. A. 1973. The influence of age and pair-bond on the breeding biology of the Red-billed Gull (*Larus novaehollandiae scopulinus*). *J. Anim. Ecol.* 42:147–162.
- PATTERSON, I. J. 1965. Timing and spacing of broods in the Black-headed Gull (*Larus ridibundus*). *Ibis* 107:433–460.
- RYDER, J. P. 1975. Egg-laying, egg size and success in relation to immature-mature plumage of Ring-billed Gulls. *Wilson Bull.* 87:534–542.
- SIEGMANN, O. 1983. Kompendium der Geflügel Krankheiten. Verlag M. & H. Schaper, Hannover.
- SUTHERLAND, A. 1980. Erythristic Herring Gull eggs in Caithness. *Scottish Birds* 11:84.
- WINKLER, D. W. AND J. R. WALTERS. 1983. The determination of clutch size in precocial birds. Pp. 33–67 in *Current ornithology*, vol. 1 (R. F. Johnston, ed.). Plenum Press Corporation, New York.

DARIUSZ BUKACIŃSKI AND MONIKA BUKACIŃSKA, *Dept. of General Ecology, Institute of Ecology, Polish Academy of Sciences, Dziekanów Leśny, 05-092 Łomianki, Poland. Received 13 Oct. 1995, accepted 20 Sept. 1996.*

Wilson Bull., 109(1), 1997, pp. 182–184

Variable plumage ontogeny in the Black (*Turdus infuscatus*) and Glossy-black robins (*T. serranus*).—Ontogenetic sequences and their relative timing are a major issue of interest in ornithology (Lawton and Lawton 1985, Thompson and Leu 1994) and biology in general (Gould 1977). Attention has focused on relative timing, social implications, and evolutionary transformations in the ontogeny of plumage and soft-part color characters. A detailed understanding of causes and trajectories of these changes may allow inferences regarding a variety of evolutionary processes (e.g., Peterson 1991a, b).

Recently, during efforts to inventory the vertebrate fauna of Cerro Piedra Larga, a remote, isolated 2850 m massif in eastern Oaxaca, Mexico, we had the opportunity to study and sample abundant populations of the local Black Robin (*Turdus infuscatus*). During a two-week study period (31 March–13 April 1993), we observed about 15 individuals daily, and collected 16 specimens for detailed plumage comparisons. This material, together with specimens examined in the collections of the Field Museum (FMNH), Natural History Museum of Univ. of Kansas (KUMNH), and the Museo de Zoología, Facultad de Ciencias, Univ. Nacional Autónoma de México (catalogued temporarily as OMVP), permitted us to document further a poorly known male plumage (Baepler 1962, Howell and Webb 1995) in certain populations of this species. Additional information on specimens was kindly provided by the Louisiana State Univ. Museum of Natural Science (LSUMNS).

The majority of the specimens collected on Cerro Piedra Larga were males in an all-black plumage with a yellow bill (8), or females in a uniform brown plumage with a dusky brown bill (5). However, three males (OMVP 279, 282, and 439) had female-like plumage, pneumatized crania (100%, 80%, and 100%, respectively), and gonads that were not minute (testes 3×5 mm, 3×5 mm, and 7×10 mm, respectively); only one (OMVP 279) showed any sign of molt, and that described as “some under tail,” and hence not illustrative in direct determination of plumage sequences. These males were dusky-brown plumaged with occasional black feathers scattered over the body, and tended to have dusker colored bills than the yellow-billed adult males. On several occasions, we observed brown-plumaged

individuals actively singing and apparently defending territories, with songs indistinguishable from those of the black-plumaged males. Therefore, the Cerro Piedra Larga Black Robins appeared to have a subadult (predefinitive) female-like brown plumage before attaining the black definitive male plumage.

The subadult brown-male plumage is apparently present in many populations of the species. Specimens from San Luis Potosí (LSUMNS 12030, 12040), Oaxaca (KUNHM 45900, LSUMNS 3316), Chiapas (LSUMNS 41565), Guatemala (Baepler 1962), and El Salvador (FMNH 109817) all clearly indicated the existence of a brown plumage. Two specimens from Oaxaca (LSUMZ 33316) and Veracruz (FMNH 187377), Mexico, were apparently molting from the subadult brown plumage to the definitive black plumage. We found no molting specimens demonstrating the attainment of the subadult plumage from the juvenal plumage; however, several such specimens are in the collection of the Carnegie Museum of Natural History (K. C. Parkes, pers. comm.), documenting that this plumage is indeed the first prebasic plumage. No Middle American specimen indicated direct change from the juvenal plumage to a black plumage.

The Black Robin of Mesoamerica (Mexico south to Honduras) is sometimes considered conspecific with the disjunct Glossy-black Thrush (*T. serranus*) of the Andes of South America (Ripley 1964); conspecific or not, the two are at least closely related (AOU 1983). Several specimens of the latter species, however, indicated that ontogenetic variation in this species may be more complicated than in the Black Robin. Specimens from Venezuela (Sucre, Mt. Turuniquire, FMNH 92278-9) showed a clear brown plumage, one of which (FMNH 92278) was molting into the black plumage. However, specimens from Colombia (Popayan, Cauca, FMNH 282238) and Peru (LSUMNS 982083) were molting from the spotted juvenal plumage to a black plumage, suggesting direct transition to the black plumage without a brown subadult plumage. These and other specimens (LSUMNS 106514 and uncat.) suggest that the first plumage to replace the juvenal plumage, although blackish, may be more suffused with brown than subsequent plumages. Hence, ontogenetic sequences in the Glossy-black Thrush are complicated, and remain unclear based on specimens available.

Published documentation of strikingly delayed plumage maturation is surprisingly scant in the subfamily Turdinae. Three additional species that do show delayed plumage maturation are *Turdus merula* (Snow 1958), *T. olivater* (K. C. Parkes, pers. comm.), and *T. rufitorques* (Skutch 1960). Together with *T. infuscatus*, these examples seem few, given the size of the subfamily (179 species) and its near-cosmopolitan distribution. However, perusal of general references such as Cramp (1988) and Keith et al. (1992) suggests that this phenomenon exists in other species, at least of the Old World; and hence, delayed plumage maturation may not be as uncommon among thrushes as the literature might suggest.

Acknowledgments.—We thank our field companions for their assistance and interest during the field work on Cerro Piedra Larga, and the curators and staff of the Field Museum; Museo de Zoología, Facultad de Ciencias, UNAM; and Louisiana State Univ. Museum of Natural Science for access to specimens and information under their care. Thanks are due to Mark B. Robbins, Kenneth C. Parkes, Peter Stettenheim, Peter Pyle, and especially Christopher Thompson for comments on the manuscript. Financial support was provided by the National Science Foundation (DEB 92000863).

LITERATURE CITED

- AMERICAN ORNITHOLOGISTS UNION 1983. Check-list of North American birds, 6th ed. American Ornithologists' Union, Washington, D.C.
- BAEPLER, D. H. 1962. The avifauna of the Soloma region in Huehuetenango, Guatemala. *Condor* 64:140–153.

- CRAMP, S., (Ed.) 1988. Handbook of the birds of Europe, the Middle East, and North Africa, Vol. V. Oxford Univ. Press, Oxford, England.
- GOULD, S. J. 1977. Ontogeny and phylogeny. Belknap Press, Cambridge, Mass.
- HOWELL, S. N. G. AND S. WEBB. 1995. A guide to the birds of Mexico and Northern Central America. Oxford Univ. Press, Oxford, England.
- KEITH, S., E. K. URBAN, AND C. H. FRY. 1992. The birds of Africa, Vol. IV. Academic Press, London, England.
- LAWTON, M. F. AND R. O. LAWTON. 1985. Heterochrony, deferred breeding, and avian sociality. *Curr. Ornithol.* 3:187–222.
- RIPLEY, S. D. 1964. Check list of the birds of the World, Vol. X. Museum of Comparative Zoology, Cambridge, Massachusetts.
- PETERSON, A. T. 1991a. Geographic variation in beak color maturation rates in Gray-breasted Jays. *Condor* 93:448–452.
- . 1991b. Sociality and ontogeny of coloration in the Blue-and-black Jays (*Cyanocorax*). *Wilson Bulletin* 103:59–67.
- SKUTCH, A. F. 1960. Life histories of Central American Birds, Vol. II. Pacific Coast Avifauna 34:1–593.
- SNOW, D. W. 1958. A study of blackbirds. George Allen and Unwin, Ltd., London, England.
- THOMPSON, C. W. AND M. LEU. 1994. Determining homology of molts and plumages to address evolutionary questions: A rejoinder regarding emberizid finches. *Condor* 96:769–782.

GRISELDA ESCALONA-SEGURA AND A. TOWNSEND PETERSON, *Natural History Museum, The University of Kansas, Lawrence, Kansas 66045. Received 6 March 1996, accepted 30 Sept. 1996.*