

Understanding such an odd and unexpected situation constitutes a serious challenge: preconceptions regarding what is likely to be the "truth" can easily carry an investigator far from that truth. Groth, however, developed this study in the form of a series of hypothesis tests, and this approach is key in making the study convincing. For each character set, he asked whether character variation is more pronounced among regions or among local call types. Only by this approach could such surprising results be made believable.

Groth's conclusion was that the "Red Crossbill" actually consists of eight sympatric, nomadic species. Referring to them as "types," Groth showed that four types (1, 2, 3, and 4) are widespread, with records from the Pacific Northwest east to the eastern United States; type 5 is to date known only from the Rocky Mountains west, type 6 from southeastern Arizona, type 7 from the Pacific Northwest, and type 8 from Newfoundland. Each type should probably best be accorded full species status, given the multiple data sets presented by Groth.

One question burns bright as a result of this study: How many additional species are there in the remainder of the genus? The genus *Loxia* is found throughout the Holarctic, with populations of three species presently recognized for Eurasia, two of which occur in North America; isolated populations are found in the Philippines, on the island of Dominica, and south to Nicaragua in the mountains of Central America. If Groth or some other systematic ornithologist were to study carefully those populations, how many species would make up the genus? I urge Groth to apply his understanding of this group to providing ornithology with a preliminary taxonomy as soon as is feasible, especially when peripheral populations can be included. These questions should be accorded high priority, because the nature of this genus so challenges the norm that they might lead ornithology to a new breadth of understanding of avian diversity.

More generally, Groth is to be congratulated warmly for his work. The monograph is well written and organized, and clearly illustrated with useful figures. I strongly recommend this monograph to all interested in bird systematics and diversity.—A. TOWNSEND PETERSON, *Natural History Museum, The University of Kansas, Lawrence, Kansas 66045, USA.*

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Evolutionary Differentiation in Morphology, Vocalizations, and Allozymes Among Nomadic Sibling Species in the North American Red Crossbill (*Loxia curvirostra*) Complex.—Jeffrey G. Groth. 1993. University of California Publications in Zoology No. 127, University of California. Berkeley, California. xii + 143 pp., 34 text figures. ISBN 0-520-09782-3. \$xx.xx (paper).—The long tradition of avian systematics has led ornithologists to expect certain phenomena. Complex patterns of geographic variation exist in some taxa in most regions, including contact zones, hybrid zones, distinctive isolated populations, ring species, and interrupted clines. These situations have challenged ornithologists for centuries, and have traditionally been the phenomena that have most complicated avian taxonomy and systematics.

The crossbills, however, seem to be a completely different matter. Older treatments attempted to make geographic patterns in the group fit into the usual avian model of geographic variation and differentiation, which resulted in an enormous confusion of names, synonymies, and uncertain geographic ranges. The first hint of the true nature of the situation came from a series of studies by A. R. Phillips (e.g. *Emu* 74:282, 1975), but its importance was lost in Phillips' confusion among geographic races and sympatric species. Now, with the publication of Groth's monograph, ornithology has for the first time some basis for understanding this group, which may be the most complicated of all North American bird species or species complexes.