



Biology of the Reptilia. Volume 5, Physiology A.

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The Quarterly Review of Biology, Vol. 52, No. 3 (Sep., 1977), 313.

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three "High Andean Species" with those of twelve "Other Species." She concludes that: "Both tarsus and hallux are significantly longer . . . in *O. estella* than in the other non-Andean species," and that: "The other two species of high Andean hummingbirds . . . have foot measurements similar to those of *O. estella*" (p. 13). But five of the twelve "other species" are montane Andean! Furthermore, three of these five species have a relatively long tarsus and one (*Aglaeactis cupripennis*) has a tarsus length right within the range of Carpenter's "high Andean species."

Contrary to Carpenter, I would only conclude from her data that some montane Andean hummingbirds have large feet, whether they live below or above timberline. Since *A. cupripennis* perches on vegetation at or below timberline, one might consider this species to be "preadapted" for life in the open puna, thus giving us an idea of what proto-*Oreotrochilus* could have been like ecologically. This example was given in detail to show the difficulty of speculating about "adaptations" in *O. estella* without a sound and broad comparative study of many hummingbirds, and a careful consideration of their present distributional ecology.

The merit of Carpenter's work lies in her laboratory studies on the energetics of *O. estella* (pp. 43-61). This research breaks new ground and opens the way for further, truly comparative investigations on Andean and other hummingbirds. It would be rewarding to study similar problems, first in other taxa of *Oreotrochilus*, such as *O. chimborazo* of the Ecuadorian páramos (an environment which is neither so seasonless nor so moderate as Carpenter says), and *O. leucopleurus* of the temperate and lower Andes of southern Chile and Argentina. Next it would be necessary to study other montane Andean species that have large feet and live at lower altitudes than does *Oreotrochilus* (such as *Aglaeactis cupripennis*). And finally, it would be interesting to study hummingbirds living in other kinds of harsh environments (for instance in the Peruvian coastal deserts). Only after such comparisons have been made will we know enough to make statements about the unusual adaptations of *O. estella*.

This monograph is carelessly written and full of imprecisions or inaccuracies, some small, others less so, all irritating. Since so few Andean hummingbirds have been studied at such length many ecologists and evolutionists might turn to this book for information. They must be warned of pitfalls. Students of Andean evolution and ecology must read Carpenter's work with a very critical mind, and hummingbird students will want to re-read Dorst's and Langner's papers for I do not think that Carpenter has done these workers full justice.

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BIOLOGY OF THE REPTILIA. Volume 5, Physiology A.

Edited by Carl Gans; Coeditor for this volume, William R. Dawson. Academic Press, London and New York. £16.80. xv + 556 p.; ill.; index and author index. 1976.

The fifth volume in this authoritative series continues the tradition of detailed, current reviews of topics in reptilian biology. A special feature of this volume, the first devoted to reptilian physiology, is a short overview chapter by Gans and Dawson in which stress is placed on reptilian physiological capacities. McDonald has written a long, very informative, and useful summary of methodology in the study of the physiology of reptiles. The remaining chapters are high-quality reviews of topics of either general interest (such as the chapter on metabolism by Bennett and Dawson) or of special topics that have relevance far beyond the limits of reptilian biology (salt glands, by Dunson). Respiration is reviewed by Wood and Lenfant, circulation by White, regulation of acid-base balance by Howell and Rahn, osmoregulation by Bentley, and nitrogen excretion via kidneys by Dantzler.

A theme in chapter after chapter is the value of studying reptiles for the insights they provide for the understanding of general problems, rather than as some sort of preview of mammalian conditions. Most authors stress the folly of finding "primitive" physiology in these highly diverse, specialized lineages.

Reptilian physiology is far from a unified discipline, for reptiles have little in common physiologically that they do not also share with some nonreptilian ectotherms. Nevertheless, these somewhat encyclopedic chapters provide evidence of the value of focus on even such a disparate group as reptiles. Such chapters as those by Bennett & Dawson and Wood & Lenfant, include many original formulations and summarizing graphs. Some unpublished data are presented. These and other chapters are more than simple literature abstracts, and they will be important references for years to come. Occasional syntheses are achieved, as in the case of the interweaving of information on anaerobic and aerobic metabolism.

While the chapters all provide good summaries, they vary in the degree to which they will appeal to general readers. All authors have attempted to be current, but reference to papers in press in 1973 suggests that this volume was in production for a long time. Nevertheless, it is one of the most impressive in this generally fine series.

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