



Biology of the Reptilia. Volume 1: Morphology A.

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Little gill-arch evidence is brought forward for new changes in the placement of taxa in the classification of fishes. However, he gives support to recent suggestions that the Gonorhynchiformes are related to the Ostariophysi. New evidence is adduced for the monophyly of the teleosts and the neoteleosts, and for the distinctness of *Polypterus* from the actinopterygians. Unhappily, relationships are deduced mainly from the gill arches with support from few other structures. Some new changes are made in the status of fish taxa; for example, Holostei and Teleostei are made subordinate to the Chondrostei. He re-opens the case for apthetohyoidy in the acanthodians, although the evidence is not unambiguous.

It is in the final section on the classification of vertebrates that the most startling views are expressed. These and some earlier opinions in the text are explained by two of Nelson's statements. "In contrast, here it is assumed that the main purpose of a phyletic classification is to express such relationships. Matters such as the size of 'gaps' separating different groups, different 'rates' of evolution, and divergence, size and diversity of 'taxa' are not considered, for in the opinion of the writer they are irrelevant to the purpose at hand" (p. 531), and again: "Fossils here are not given primary consideration (nor even formal sister-group recognition), for the writer can see no reasonable way that such can be done and is unaware of any non-arbitrary attempt ever to do so" (p. 532-3). These rather Hennigian views run directly counter to those of some classical and many numerical taxonomists who consider divergence as an important index of relationship. The result is that Nelson reduces mammals and birds from the level of classes, not to subclasses, infraclasses or divisions, but to the approximate level of superorders in the normally piscine class Teleostomi. If the same philosophy was consistently applied to the whole animal kingdom, instead of just the vertebrates, birds might be reduced to the status of a family. A similar arrangement to Nelson's was presented by Sæve-Söderbergh in 1934. Nelson brings forward no new evidence in this regard. Although some zoologists have been aware of the imbalance between the traditional vertebrate classes probably few would go so far as Nelson.

In summary, Nelson makes an important contribution to gill arch structure. But whether ornithologists will accept his view that pigeons are actually teleostome fishes is doubtful.

D. E. McALLISTER

A REVISION OF THE CATFISH GENUS *Noturos* RAFINESQUE WITH AN ANALYSIS OF HIGHER GROUPS IN THE ICTALURIDAE. *United States National Museum Bulletin* 282.

By William Ralph Taylor. *Smithsonian Institution Press, Washington, D. C.* \$2.00 (paper). iv + 315 p. + 21 p. pl.; ill.; subject index. 1969.

INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION. *Bulletin Number* 26.

Published by the International North Pacific Fisheries Commission. No charge. iv + 192 p.; ill.; no index. 1969.

BIOLOGY OF THE REPTILIA. *Volume 1: Morphology A.*

Edited by Carl Gans; co-editors: Angus d'A. Belairs and Thomas S. Parsons. *Academic Press, London and New York.* \$11.50. xv + 373 p.; ill.; author and subject indexes. 1969.

The need for a comprehensive, encyclopedic treatment of living vertebrates has long been recognized, and the present volume is the first of a projected multi-volume treatise. If the first volume is any indication, this series will be a standard reference for years to come.

A concise, informative preface by Gans outlines the general aims and objectives of the series. This is followed by a series of six high-quality accounts ranging in length from about 30 to over 100 pages each.

Carroll sets a high standard in the initial articles on the origin of reptiles. The ancestry of the modern reptiles is briefly reviewed in a nonjudgmental manner, and the presentation of historical shifts in interpretation accompanying new discoveries is particularly lucid. The bulk of the article deals with the origins of the class as a whole. Among the possible reptilian ancestors, microsaurians are dismissed, and difficulties in deriving reptiles from seymouriamorphs or other anhracosaurian amphibians are discussed. Attention is directed to the solenodonts, a group too late to be reptile ancestors, but sufficiently generalized to serve as good structural models of ancestors. Carroll develops further his earlier arguments that reptiles evolved in terrestrial environments.

Reptilian bone is considered by Enlow. A discussion of classification systems of bone is technical but lucid. Turtles and crocodylians resemble mammals in broad outlines of bone histology. Lizards and snakes are distinctive in several features, and *Sphenodon* is more similar to lizards than to other reptilian groups. Aging studies based on evaluation of growth rings are critically reviewed. Studies of fossil bone reveal no single change in bone structure

that is associated either with the amphibian-reptilian or reptilian-mammalian transition. Certain evolutionary trends are discussed, but no major phylogenetic interpretations are made.

Haines treats epiphyses and sesamoids, adding some new information. Epiphyseal centers are cartilaginous in crocodylians and turtles, and in some respects resemble those of birds. Lizards and *Sphenodon* bear a general resemblance to mammals, in the nature of epiphyseal and apophyseal centers, but snakes, surprisingly, are more like crocodylians and turtles. In contrast to some recent views, Haines suggests that epiphyseal and apophyseal centers, and sesamoids all have independent evolutionary origins.

A detailed, comparative account of reptilian dentition is presented by Edmunds. A brief account of dental morphology is followed by a well-illustrated treatment of tooth development, with emphasis on replacement. Most of the paper is a rather variable presentation of general information concerning teeth of living families and some fossil groups. The paper contains much original information, but no new conclusions of broad significance are reached.

In the longest paper, Hoffstetter and Gasc treat the reptilian vertebral column and ribs, emphasizing structural patterns. This encyclopedic paper is well illustrated and contains much useful information, but development is considered only in passing, and functional and evolutionary considerations are not stressed.

The turtle shell is analyzed by Zangerl in a paper which is a rather curious mixture of details and generalizations. A significant feature is a new major classification of turtles, based on "levels of shell organization" that, according to Zangerl "probably do not represent important adaptive advances." All turtles are placed in four suborders, three of which have living representatives. An interesting departure from convention is the placement of the family Testudinidae in its own suborder.

DAVID B. WAKE

ECHIDNAS. "International Series of Monographs in Pure and Applied Biology," Zoology Division, Volume 38.

By M. Griffiths. Pergamon Press, Oxford, London, Edinburgh, New York, Toronto, Sydney, Paris, and Braunschweig. \$12.00. ix + 282 p.; ill.; author and subject indexes. 1968.

This work is a comprehensive treatment of echidnas, one of the two major groups of egg-laying mammals (monotremes), covering the various aspects of their biology. Chapters are devoted to external features and taxonomy, the skeleton, digestive system, central nervous system, special senses, endocrine system, reproductive system, embryology, mammary glands, circulatory system, kidney function, affinities of the

Monotremata, and a comparison of the convergent features of the echidna and other anteaters, the Australian marsupial *Myrmecobius*, the South American edentate anteaters, and the African *Orycteropus*, *Manis*, and *Proteles*. The work includes a comprehensive bibliography and review of the findings of earlier workers. A nice feature of the book is its readability: it provides a maximum of information for a minimum of effort.

Of the two genera of echidnas, *Tachyglossus* and *Zaglossus*, the former has a very wide range in Australia (mountains to desert) and the latter is confined to the New Guinea mountains. The method of temperature regulation of *Tachyglossus* is trustworthy only up to 35° C; it dies of heat apoplexy at 38° C. In the central desert, accordingly, it must spend the hotter part of the day in caves. In southern Australia it hibernates in winter for periods of from a few days to about 117 days. *Tachyglossus* lives mainly on termites and ants; most attacks on ant mounds take place between August and October prior to the insects' nuptial flight, and when the queens are loaded with fat. Echidnas tend to be local but one moved 11 miles over a period of 2½ years. Although the anatomy includes reptilian features (pectoral girdle, reproductive system), studies show many of the features to be typically mammalian. Thus, for example, the blood supply and drainage of the kidney is entirely mammalian. The brain is for the most part mammalian in character but it does exhibit certain structures and arrangements that are also found in the brains of Sauropsida. The ear is every bit as efficient as that in the Eutheria, and so on.

This work can be recommended as an authoritative treatment of a most fascinating group of primitive mammals.

ALLEN KEAST

BIOLOGY OF *Peromyscus* (RODENTIA).

Edited by John A. King. Special Publication No. 2, The American Society of Mammalogists. \$15.00. xiii + 593 p.; ill.; author and subject indexes, and index to technical names. 1968.

This book brings together and evaluates the large amount of research on North American deer mice that has accumulated over the past 60 years under the stimulus of pioneering work by Osgood, Sumner, and Dice. The material is admirably introduced by W. F. Blair and is organized under 14 topics, each of which is presented by a specialist in the field (Paleontology, by C. W. Hibbard; Classification, by E. T. Hooper; Speciation, by L. R. Dice; Habitats and Distribution, by R. H. Baker; Anatomy, by D. Klingener; Ontogeny, by J. N. Layne; Parasites, by J. O. Whitaker, Jr.; Endocrinology, by B. E. Eleftheriou; Genetics, by D. I. Rasmussen;