

Romer renewed in the 1980s

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Vertebrate Paleontology and Evolution.
By Robert L. Carroll. W.H. Freeman:
1987. Pp.698. \$52.95, £47.50.

A LITTLE OVER two decades ago there appeared the third and last edition of Alfred Sherwood Romer's *Vertebrate Paleontology*. This was taken to be the textbook on the subject by all students in the English-speaking world.

It is inevitable that Carroll's new text will not only be compared with Romer's, but will be regarded by many as the fourth edition. Although produced by different publishers, the physical resemblance between the two books is such that it is difficult to see it as coincidence. Both are handsomely produced quarto volumes printed in double columns and profusely illustrated with line drawings of reconstructed fossils but with very few pictures of specimens. Both incorporate an appendix consisting of an attempt to list all genera of fossil vertebrates in a traditional classification of the group.

More important, however, is the similarity of approach. It was widely accepted until the late 1960s that the tasks of a vertebrate palaeontologist were to describe and restore the anatomy of fossil vertebrates from collected specimens, to attempt some reconstruction of their mode of life with a particular emphasis on functional morphology, and to use details of the fossil record to demonstrate, not just the truth of evolution, but fragments of its pattern. Finally, but often as an afterthought, the working palaeontologist felt called upon to fit his specimens into a received pattern of classification. Few, however, questioned the largely intuitive nature of their classificatory method.

Carroll has had a distinguished career working within this traditional pattern and his book reflects this. Like Romer's it is almost entirely concerned with a systematic treatment of fossil vertebrates. After an introductory chapter and some account of theories of the origin of vertebrates, most of the text is taken up with a group-by-group review of vertebrate fossils, beginning with the most primitive fish-like forms and finishing with mammals. The account of each group includes anatomical descriptions, along with something on functional morphology, relationships and reconstructed evolution. Unlike Romer, Carroll notes controversies in the text with citations of the literature. References cited in each chapter are listed at its end, probably the most convenient method in a textbook.

I endorse the carefully chosen words of

a colleague, quoted on the dust jacket: "I am greatly impressed by the data presented. . . . Useful not only for students but for colleagues in the field as a resource"; and yet I know that many other people will not just be dissatisfied, but actually annoyed with Carroll's book. This is not simply because they will find errors in their own field of expertise. These are inevitable in a large text of such wide coverage, and the present work is by no means free of them. It is the whole approach to the subject that many will object to. The critics will, I suggest, be divided into two, not mutually exclusive, categories.

The first group will point to Carroll's lack of rigour in matters of classification. The publication of the last edition of Romer coincided almost exactly with that of Hennig's *Phylogenetic Systematics*. Hennig advocated a rigorous method of classification in which species and higher taxa were grouped exclusively by the use of uniquely shared characters. The results of such grouping are expressed in branching diagrams known as cladograms before being turned into orthodox classifications or interpreted as phylogeny, the pattern of evolution. Most vertebrate palaeontologists now agree that cladistics represents a methodology of classification which fills what was almost a vacuum amongst the techniques of their subject. Carroll gives quite a lengthy account of classification in general and cladistics in particular in his first chapter, but his heart appears not to be in it, so that in the body of the book there is a glorious jumble of approaches to classification and phylogeny and an amazing assortment of diagrams.

The second category of objectors would demand an entirely different sort of text, guided by the question, "What is vertebrate palaeontology for?". Carroll does

consider the general interpretation of the fossil record in his final chapter on evolution, and also has a chapter in the body of the book on the biology and extinction of dinosaurs. His views on evolution and extinction are orthodox 'neo-Darwinian'. Critics would argue, however, that a text on vertebrate palaeontology should be organized to demonstrate the use that can be made of the fossil record and the practical and theoretical problems tackled by palaeontologists from the discovery and interpretation of fossils to their use in evolutionary and other hypotheses — a topic- rather than a taxon-based book.

Such a topic-based book, Olson's *Vertebrate Paleozoology*, was published soon after Romer's last edition, but is now out of print. Jarvik's scholarly but idiosyncratic *Basic Structure and Evolution of Vertebrates* (1980) in a sense combines both approaches but deals almost entirely with fish-like forms and is limited to comparative anatomy. The ideal topic approach, though not specifically vertebrate, was Raup and Stanley's *Principles of Paleontology* (2nd Edn, 1978) which cries out for a third edition. Perhaps one needs both a taxon-based text, such as Carroll's, and a topic-based one, but it is unlikely that any but the most devoted student would buy both.

I do not want to end this review on a negative note. Carroll has to his credit an immense amount of useful labour in writing the book and will probably corner the market for a vertebrate palaeontology text for the rest of this century. I am glad to have the book and anticipate using it frequently. I suspect that will also be the case for many of his critics. □

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Mammoth weapon — part of a weighted spear thrower, broken through the shaft below the carving of a mammoth which forms the weight of the thrower. The tail of the animal originally formed the hook, and the line of its back follows the line of the shaft. The picture is taken from A Catalogue of Palaeolithic Art in the British Museum by Ann Sieveking. The collection comes mainly from France, and while the greater part was acquired before 1890, it has not previously been described in detail. The book is published by the British Museum and costs £70.