

**COLBERT'S EVOLUTION OF THE VERTEBRATES (fifth edition), by E.H. Colbert, M. Morales, and E.C. Minkoff, 2001. New York: Wiley-Liss, 560 p., hardcover \$145.**

I knew and liked Ned Colbert, and loved the early editions of this once-classic book. He passed away on November 15, 2001, shortly after this edition appeared, which makes it difficult to be honest and frank. But this is necessary, because this is a clear case of a publisher trying to push an outdated, badly conceived project on the market, and few but professional vertebrate paleontologists will realize how problematic this book has become.

In its first edition (written in 1955), Colbert's *Evolution of the Vertebrates* was an excellent, non-technical review of vertebrate evolution as it was known, almost 50 years ago. The second (1969) edition and third (1980) edition began to become more and more outdated, since Colbert retired in the 1960s, and became less and less connected to the latest developments (both in discoveries and in philosophy) that had occurred in vertebrate paleontology. By the time of the fourth edition (published in 1991), the publisher brought in Mike Morales as a younger co-author, but it made no difference—the book was badly out of date in both its approach and its facts. Most of us hoped that this would be its last edition, because there was little that could be done to salvage it. But in this edition, they have added a third author, Eli Minkoff, a biologist who is not a vertebrate paleontologist and who clearly has not kept up with the important developments that have occurred in the past decades. Consequently, the book is full of errors of both omission and commission in every chapter, and should not have been published, let alone used by anyone to teach a modern course in fossil vertebrates.

The problems are so numerous that I cannot list them all in a brief review, but I will mention a few of the more important ones here. It starts with the authors' ambivalence toward the cladistic revolution, which in the past 20 years has completely transformed the way we think about fossil vertebrates. In places, they attempt to be current by paying lip service to cladograms, but their fundamentally old-fashioned philosophy is unchanged everywhere else. On page 16, they mention (but never explain) cladistics in one brief paragraph, and throughout the book they place Colbert's 50-year-old diagrams (with no resolution of phylogenetic relationships) side-by-side with a cladogram of some of the same taxa—or use one of the outdated diagrams with no attempt to show more re-

cent hypotheses at all. Again and again, they make anachronistic statements suggesting that we can't know anything about phylogeny because of a lack of a suitable ancestor, or statements like "no clear indication of relationships among gnathostomous fishes can be determined from their stratigraphic order of occurrence in the rocks" (p. 48)—as if it ever could in a group with such a poor fossil record!

Certainly, they have a right to disagree with the prevailing philosophy in their profession if they so choose, although they end up painting a very unrepresentative and inaccurate picture of what we have learned as a consequence. Even more disturbing is the clear evidence that none of the authors kept up with the new discoveries made in past 20 years. Certainly, I haven't seen any of them at the meetings of the Society of Vertebrate Paleontology during that time, and apparently they don't read the journals, either. It is jarring to read, page after page, statements, ideas, or taxonomic concepts that have become grossly outdated, and should have disappeared long ago. Among the numerous examples are: the discredited notion that jaws are derived from gill arches (p. 38); Romer's idea that tetrapods left the water to escape drying pools, or chase prey, when all the recent discoveries of *Acanthostega* show that the tetrapod limb appeared in fully aquatic animals long before there was any need to crawl out on land (p. 85); the idea that anthracosaurs like *Seymouria* had anything to do with amniote origins, when recent discoveries like *Westlothiana* (not even mentioned in this book) have shifted the focus elsewhere (p. 105); the failure to note (p. 154) that the latest fossils show that snakes are descended from mosasaurs; a grossly antiquated approach to Mesozoic mammals and their relationships in Chapter 19, with almost no mention of the last decade of amazing discoveries; a carnivore "phylogeny" (p. 379) that treats "Fissipedia" as a natural group, and fails to show that pinnipeds are clearly descended from bears, not from the carnivoran stem; no mention (p. 394) of *Ambulocetus* and all the other recent spectacular transitional whale discoveries (all published long before this book went to press); the outdated notion (p. 428) that protoceratids are related to tragulids, rather than camels; the idea that perissodactyls have anything to do with phenacodonts (p. 452), instead of the recent discoveries of Chinese taxa like *Radinskya*, which point in a whole new direction; the outdated idea (p. 467) that brontotheres survived the Eocene (thanks to revisions of the time scale completed a decade ago), or that chalicotheres dug up roots (p. 469) with their peculiar claws (debunked by Coombs 20 years ago); the complete failure to mention (p. 480) all the new primitive elephants like *Numidotherium* and *Phosphatherium*, which push proboscideans back to the Paleocene of North Africa. The list could go on and on, but these are among the more glaring examples of a failure to recognize or incorporate any of the past 20 years of discoveries.

Equally jarring is the repeated use of taxa that were manifestly unnatural even in 1955, and have not been used by vertebrate paleontologists in many years. The examples are too numerous to mention, but it feels like going through a time warp to read about "chondrostearns," "holosteans," "labyrinthodonts," "thecodonts," "Prototheria," "eupantotheres," "condylarths," "palaodonts," as if anyone still practicing vertebrate paleontology took those taxa seriously.

Symptomatic of this problem is the use of the archaic term “mammal-like reptiles,” a misnomer that reflects several serious misconceptions. Synapsids (the “mammal-like reptiles”) and the true reptiles are two distinct lineages that originated separately and simultaneously in the mid-Carboniferous, so synapsids have never been members of, or descended from reptiles (in even the broadest sense of the word). Call them “protomammals” if you will—but they are not, and have never been, reptiles!

These problems might not matter if this were just a trade book intended for the popular audience, who might not care if it is accurate or up-to-date in every detail. But I know of several institutions where paleontologists (not vertebrate paleontologists) still use this book to teach classes in vertebrate evolution, completely unaware of how grossly outdated this book had become. Nor is it the only choice on the market written at this level. Michael Benton’s *Vertebrate Paleontology* (2<sup>nd</sup> edition, 2000, Blackwell) is fully up-to-date and much more affordable (especially since Wiley is charging \$145 for this book!). Clearly, the editors at Wiley-Liss are trying to extend their franchise long beyond its useful life, and instead of consulting with qualified vertebrate paleontologists who could have made the book up-to-date, they foisted this sad shadow of a former classic on the unsuspecting profession.

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