

# Journal of Sedimentary Research

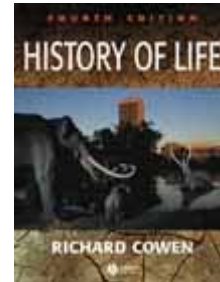
## An International Journal of SEPM

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*History of Life (4th ed.)*, by Richard Cowen, 2004. Blackwell Publishing, 350 Main Street, Malden, MA 02148-5020, U.S.A. Paperback, 324 pages. Price GBP 32.50; USD 79.95. ISBN 1-4051-1756-7.



As the author of the book openly declares in its *Preface*, his aim is ambitious. He promises to show “how life has evolved on Earth, and how we have constructed the history of that evolution from the record of rocks and fossils.” This has been achieved to some degree and the range of fundamental issues of evolutionary paleontology addressed in the volume is truly impressive. Unfortunately, in the middle of reading, the first—good—impression becomes gradually replaced by a feeling of somewhat uneven treatment of various parts of the subject. Several important and hotly debated topics of present-day science are omitted or only cursorily commented upon. This avoidance of more sophisticated problems may partially be a result of the author’s belief that “paleontology (= paleobiology) is accessible to the average person without deep scientific training.”

Admittedly, many readers and writers of popular stories on dinosaurs and mass extinctions believe that it is not necessary to learn taphonomy or ecology while speculating about disastrous results of impacts of extraterrestrial bodies in the ancient Earth’s past. Perhaps to meet their expectations, the book treats mostly the succession and extinctions of vertebrate faunas, giving much care to the largest Permian and Mesozoic reptiles and Cenozoic mammals. This is acutely expressed in the proportion of number of pages devoted to tetrapods (220) to those dedicated to fishes (10), invertebrates (21), and plants (18). Almost nothing is said about fossil unicellular organisms and algae, despite tremendous progress in this area of research during the last decades. No mention of conodonts, graptolites or belemnites. Ammonites are referred to only once as “essentially squids with shells” (p. 197) but a curious reader has little chance to be equipped with knowledge of fossil squids (however good the record of their evolution is now). If the title of the book and the contents of the *Preface* are to be taken literally, such presentation of data appears rather distorted.

Anyway, if one needs a vertebrate paleontology textbook for biologists containing a brief overview of related subjects, the volume may be of some use. The text is written in a vivid language, generally avoiding technical jargon. The author adorned the text margin with limericks and did not hesitate to expose his political preferences. One may perhaps complain that reviews of the vertebrate systematics seem in parts a little like excerpts from other textbooks, long series of taxonomic names being difficult to memorize even for professional paleontologists. It is not easy either to guess on what basis the presented taxa were chosen. The lists of literature sources added to each of the

21 chapters are quite useful and generally up-to-date (most recent items date from 2003), at least in the chapters on vertebrates and the origin of life. Other chapters may be found, in this respect, a little out of date. For instance, there is no mention of the seminal works on the Ediacaran fossils by Adolf Seilacher or James Gehling, although a separate chapter is devoted to this subject. Its content is thus misleading rather than instructive. Chapters on the evolution of plants deserve similar critical comments. The presentation of invertebrates and unicellular organisms is rudimentary, so there is actually not much to criticize; their literature sources are also fairly randomly selected.

Still, there are surprisingly few errors in facts, unavoidable in a book by a single author covering such a wide range of topics. Among the most apparent is the bizarre interpretation of the long scales of the Triassic reptile *Longisquama* (believed to be homologous to birds' feathers by some authors). They are proposed to be ribs supporting an airfoil (p. 181), although the true ribs (quite short) are well preserved in the original specimen. The arboreal hypothesis of the origin of bird's flight, according to the author, "must be abandoned in the face of the new theropods from China" (p. 187), but one may find the recent discovery of the four-winged bird *Microraptor gui* a spectacular confirmation of the old Beebe's idea of a hypothetical arboreal "Tetrapteryx." The author apparently missed noticing that in any gliding or actively flying object the center of gravity has to be located in proximity of the center of the wings area, which means that in cursorial theropods (if they were truly ancestral to birds) wings should have developed on hind legs, as it actually happened in the evolution of *Sharovipteryx*. Another misunderstanding of the basic principles of aerodynamics is his wrong expectation that in *Archaeopteryx* the tail had to provide lift, and the associated claim that it greatly increased drag. Actually, aerodynamic drag depends mostly on the frontal area of a flying object, and the cross-section of the two rows of feathers in the tail of the Jurassic bird was obviously very small. Generally, the chapter on the origin of flight does not look particularly competent. The claim in another chapter that "after the P-T extinction, fishes become mid-sized predators of the ocean" (p. 197) replacing cephalopods in this role, is very distant from reality. What about the giant *Sarcoprion* and other Late Permian to earliest Triassic edestids? No comparably large predatory fishes are known from the Triassic. The greatest surprise to me was to read that monotremes "nourish their hatchlings by suckling" (p. 219; same about the first mammals on p. 210), though it is well known that they lack nipples. It does not seem correct either to consider plesiadapids related directly to primates (p. 268) instead of dermopterans.

Probably the most peculiar aspect of the book is that none of the numerous diagrams of phylogenetic relationships of fossil and Recent taxa is calibrated with the geological time scale. The author declares that "the book uses a mild form of cladistics" (p. 37) and apparently accepts the cladists' claim that stratigraphic data should not be mixed with the only "scientific" morphologic evidence. The cladists' fashion to add a cross symbol to names of extinct taxa is also followed (p. 89). This is an interesting idea because of its philosophical implications. Those who believe that taxa from the geological past are fundamentally different from those with at least one survivor to recent times, in a sense question the Copernican view of the universe. They implicitly insist that the time we are living in is privileged in comparison to any earlier (or later) geological epoch. If true, there would be no reason to question the special position of our location in the cosmic space and we would owe an apology to Ptolemy and the present-day

fundamentalists. Anyway, if one wants to defend the anthropic principle on the grounds of paleontology (I would find such attitude weird), this should be done openly with all the consequences presented.

Although the geological time scale is missing in the phylogenetic trees (“phylograms”), the narration in the book is arranged chronologically whenever succession of faunas and their extinctions are discussed. Does it mean that the faunal evolution is a process with a time dimension, but that biological (phyletic) evolution is not? This would patently be nonsense. The time dimension of the process of evolution is of no less importance than its geographic and morphological dimensions. We have to appreciate that there is nothing special in the oscillatoriacean cyanobacteria of the Precambrian Bitter Springs flora except their geological age. It is also the Jurassic age that made *Archaeopteryx* the real connecting link between vertebrate classes. The time and space co-ordinates characterizing each particular finding, objective and directly accessible (not just inferred from morphology on the basis of questionable assumptions), are inseparable from the fossil record of evolution.

Ironically, diagrams of relationships among taxa neglecting geochronology can be published these days with ease even if they violate common sense. But such attitude to the fossil evidence is simply wrong. To ignore the geological time scale in a textbook on the history of life written by a professional paleontologist I find truly suicidal. This effectively deprives his (and mine) subject of research of its greatest value.

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