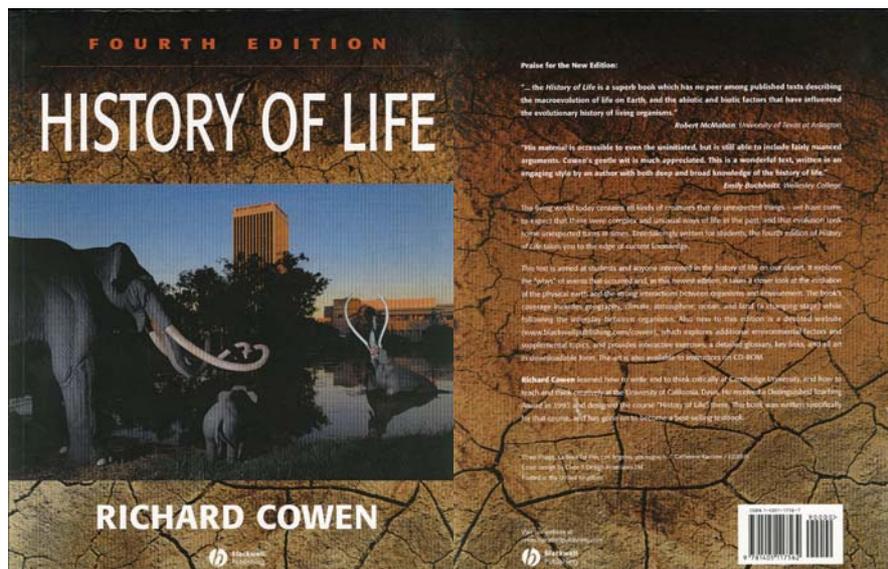


Cowen, R. 2005. *History of Life*. 4th Edition. – Oxford, Blackwell Publishing

Book review by J.W.F. Reumer



This is a magnificent book. It shows – not unjustified after the terribly deceptive book I reviewed elsewhere (Reumer, 2006) – that palaeontology is a wonderful science, that Cowen is a highly gifted teacher and writer, and that when these two get together we witness the emergence of a book that is really superb. The title is what the book is about. It describes the history of life on earth, from the earliest beginnings we know so little about up to the present-day ecosystems we seem to care so little about. So it starts with Stanley Miller's 1953 experiment simulating an early atmosphere consisting of methane, ammonia and hydrogen struck by lightning discharges. And it ends with the evolution of *Homo* and the recent human-induced threats to our planet.

This is one slight problem I have with this book – and most of its shelf mates too: ever since the Old Testament described creation, starting with the inanimate and ending with the creation of man, our species comes at the end. Understandable though this may be, it suggests a certain goal in it all, a teleological order decidedly moving towards the diamond in creation's crown: *Homo sapiens*. If the world would be looked upon from the viewpoint of – say – a cockroach, a bald eagle or a croaking toad, such a book would end describing the evolution of the Blattidae, *Haliaeetus* or *Bufo*. I rather prefer to see *Homo sapiens* depicted as one of the c. 4.000 species of mammals: a ridiculously successful one, but no better adapted to its environment than the prairie dog is to the prairies. This is a philosophical objection though, which by no means degrades the quality of Cowen's book. The concept of teleology, even without naming it, is properly dealt with in a small paragraph named 'Evolution by improvement' (pp. 250–251). Cowen writes: "Many people do not like the concept of improvement, or of evolutionary progress, which is another way of saying the same thing". He then continues with the example of horse evolution, in which he observes progress. That is: continuous evolution towards better adaptation, making animals perform better than their predecessors.

Cowen writes in a very personal style: witty and using the 'I' form where many such books only use a more technical style. The personal style greatly enhances readability and it also adds a certain subjectivity that makes the reader realize that scientists are human beings with their doubt and uncertainties and many unsolved disputes. When beginning his chapter on human evolution (chapter 20), Cowen writes: "Be warned that almost everything I have written in this chapter is being argued over by palaeoanthropologists. I have tried, as usual, to select what I think are the most likely hypotheses." (p. 278). This is what science is all about. Another personal contribution to the scientific discourse is Cowen's discussion of the Snowball Earth concept. He rejects the idea of all oceans being frozen over, and instead comes up with his Slushball Earth concept, leaving a substantial surface of open ocean and a situation highly benign for plankton. In this planktonic paradise, eukaryotic life radiated into early, planktonic metazoans that ultimately gave rise to the Ediacaran and Cambrian diversity (pp. 50–53).

In order not to turn this review into a hagiography, I have one real critique: Cowen appears to have missed the point in one of the most intriguing, yet difficult aspects of evolution: the origin of the mammalian middle ear and its tiny ossicles. He writes about mammals (on p. 213): "They have only one bone along their lower jaw, instead of the reptilian four bones, and the jaw hinges between this lower jaw, the dentary, and the squamosal, replacing the joint of earlier synapsids, which had been between the articular and the quadrate." No

problem, so far. But then: “The three bones that are ‘missing’ from the lower jaw evolved into the middle ear of mammals, giving mammals particularly acute hearing at high frequency (squeaks and insect buzzing).” This is simply wrong. In fact, only one of the bones from the reptilian mandible became involved in the middle ear ossicles: the articular, that became the malleus (ear ossicle # 1, counting from the tympanic membrane). Ear ossicle # 2, the incus, originates from the quadrate, a dermatocranial skull element. Ear ossicle # 3, the stapes, is an old reptilian device in hearing that just remained and continued doing what it always did: transferring sound vibrations. This also means that the ‘old’ reptilian jaw–joint (the articular–quadrate joint) is still functioning as the hinge between malleus and incus!

Really, this is the only major flaw in an otherwise great text. I loved Cowen’s description of the amniote egg and how he compared it with a spacecraft: a crew quarter (the amnion with the embryo), a food store (the yolk), a gas exchanger and waste disposal facility (the allantois), and a water supply (the albumin), all this surrounded by the spacecraft’s outer hull (the egg shell). The analogy immediately shows the enormous evolutionary advantage of the amniote egg: much like the spaceshuttle can escape from terrestrial constraints can the amniote egg develop outside a pool of water. It proved to be the decisive innovation for conquering land.

‘History of Life’, already in its fourth edition (1990, 1995, 2000, 2005: every five years Cowen publishes an update!), is a book that should be compulsory for everyone who wants to call him/herself a palaeontologist. And I already look forward to the year 2010.

Cowen, R. 2005. *History of Life*. 4th Edition. – Oxford, Blackwell Publishing. 324 pp. ISBN 1–4051–1756–7. Price € 33.99 (paperback).

Cited literature

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