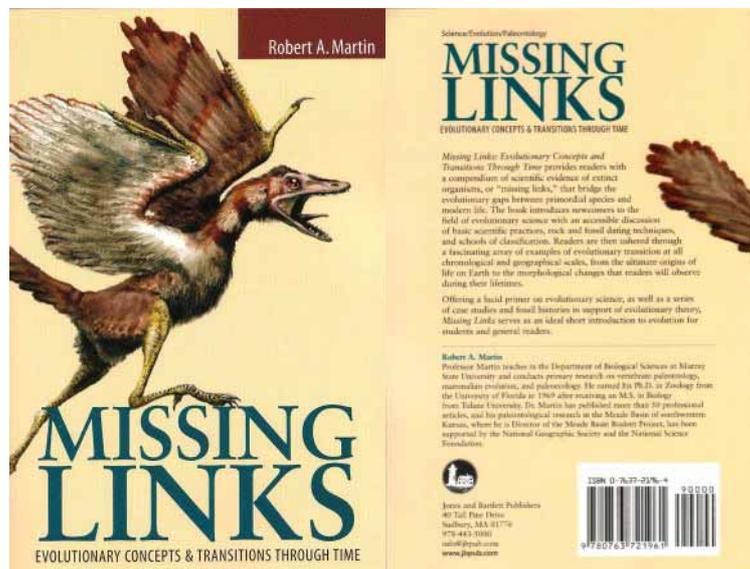


**Martin, R.A. 2003. Missing links. Evolutionary concepts & transitions through time. – Sudbury, Jones and Bartlett Publishers**

Book review by P.H. Lambers



According to its writer, ‘Missing links’ has been written to satisfy two needs. First “... it can be read as a compilation of fossil histories in support of evolutionary theory” and second it can be used as “... a primer on evolutionary science, particularly as it applies to fossil materials”. Robert Martin hopes that his book will be used when information on evolution and the fossil record is needed, “in student classrooms” or in “intellectual religious discussion”. Especially in the USA the influence of creationist thinking on society is big. About 50% of US-citizens think God created the earth, life on earth and man. ‘Creationist science’ resulting in books and websites against evolutionary theory is mostly an American phenomenon. Moreover, in certain states Christian fundamentalists are trying to ban evolution from the school-curriculum (Kansas, Georgia, Alabama). In Europe this is much less of an issue, although certainly not absent, as witnessed by the discussion in the Netherlands a couple of years ago how, if at all, evolution should be part of the biology-curriculum at secondary school. Throughout the book the debate between evolutionists and creationists is apparent and therefore it seems to be mainly written for the American market. Furthermore, in many cases the writer only uses the English common name of a certain animal or taxon, whereas the scientific name should be used as well. Martin wrote the book in a rather popular style, quite easy to read, aiming at a general public, for ‘newcomers’ as is written on the back cover.

The first section of the book consists of three introductory chapters; chapter 1 on the practice of science, the following two including the most recent views on the history and age of the universe and the earth, evolutionary theory and the origin of species, extinctions, classification methods and principles, and the interrelationships of ecology and evolution. Martin clearly explains among others dating techniques, continental drift, the species concept, evolution in all its aspects and all its driving forces, micro- and macroevolution, speciation, punctuated equilibrium, cladistics and fossilization. These chapters are well illustrated with drawings and diagrams from different sources but the survivorship plots showing the rate of extinction in vertebrate groups, as published by Van Valen in 1973, could have been explained better in the text.

In chapter 4 to 12 Martin presents some ‘Case Histories’, to illustrate how studying the fossil record has revealed macro- and micro-evolutionary developments. He chose some very appealing cases: the fossil record of early life, horse evolution, whale evolution, evolution of birds, evolution of hearing in mammals, evolution in voles and muskrats (his own area of expertise), transition from fish to amphibian, evolution of man and evolution as can be observed in certain recent animal groups. Martin discusses the most recent scientific developments and views on these topics, but he doesn’t really succeed in explaining them in an easy way to the non-specialist public this book is written for. For instance, in his chapter on the evolution of whales he doesn’t explain how only fragmentary skull and jaw remains can be used in reconstructing the evolution of these large animals. In the same paragraph he discusses the ‘whale involucrum’ of *Ambulocetus*, without explaining what it is. These are just a few examples, but in general the text in ‘Case Histories’ is sometimes difficult to follow. More figures illustrating the descriptions, the anatomical details and comparisons could have been very useful. In the chapters on bird-evolution and evolution of hearing in mammals the term ‘reptile’ is used (‘evolutionary tie between birds

and reptiles', 'reptile-mammal transition'), without however explaining what is meant by reptiles. In cladistic taxonomy a taxon of reptiles doesn't exist like in daily speech. Sometimes the chronology in chapters is a bit confusing, e.g. in the chapter on voles and muskrats 'chronomorphs' are discussed before the paragraph in which the concept of 'chronomorphs' is explained.

Unfortunately, the book contains quite a few mistakes and inaccuracies. For instance, the *Archaeopteryx* is put forward as a possible ancestor in the line of bird-evolution (that is not the general opinion), actinistian fishes (*Latimeria* and related forms) are called lungfishes (they are related to lungfishes but don't belong to them), Actinistia (coelacanth) and dipnoans are said to be early experiments among vertebrates that invaded land (Actinistia never did), man is supposed to be hairless (which he is clearly not), the naked mole rat is supposed to be the only naked mammal (whales are hairless; rhino's, elephants, hippo's, sea-cows are almost hairless), and the German word *Lagerstätte* is misspelled three times differently.

An original thought is Martin's hypothesis on the evolution of hands and feet in early tetrapods, called 'The Sexy Tetrapod Hypothesis'. Usually the evolution of hand and feet with digits is interpreted as an adaptation to facilitate movement in the shallow, densely vegetated waters where the primitive tetrapods evolved. According to Martin hands and feet might have been evolved to facilitate reproduction. Most amphibians perform a specific reproductive behaviour, which is called amplexus. The male grasps the female tightly, which causes the female to lay eggs and even might trigger the final development of the eggs. According to Martin's hypothesis hand and feet of early tetrapods were used in a similar way and thus mainly evolved as reproductive aids. But, up to now it is still unknown how early tetrapods reproduced. Did they reproduce like most fish, in which females lay eggs without physical contact between males and females, or already like (recent) amphibians? Fins and legs with hands and feet are in all vertebrates primarily used for locomotion. Once they had been evolved they could be used and adapted for other purposes, such as burrowing, amplexus or evolve even further into wings of birds and bats.

In general, the book offers a lot of information, is very up-to-date and is written in a pleasant style. To explain and discuss evolution by means of elucidating evolutionary transitions that have been discovered in the fossil record is a good choice. The topics that Martin presents are well chosen and he succeeds in showing how palaeontology contributes to the understanding of the evolution of life. In the 'Suggested Readings' at the end of each chapter many text-books have been listed, which is useful for the interested reader, for whom publications in scientific journals might be more difficult to access. The glossary is very useful but could have been more complete. I think that for the general public the book might sometimes be a bit difficult, but for biologists, palaeontologists or readers with already some knowledge on these matters it is a nice introduction to evolution and the role of palaeontology in evolutionary research.

Martin, R.A. 2003. Missing links. Evolutionary concepts & transitions through time. – Sudbury, Jones and Bartlett Publishers. 303 pp. ISBN 0-7637-2196-4. Price € 30.79, £ 21.99. Paperback. Copies can be purchased through Plymbridge distributors ([cservs@plymbridge.com](mailto:cservs@plymbridge.com)).

### Cited literature

**Valen, van, L. 1973.** A new evolutionary law. - Evolutionary Theory 1: 1-30.