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Gaining Ground – The Origin and Evolution of Tetrapods

by Michael D. Gottfried

by Jennifer A. Clack
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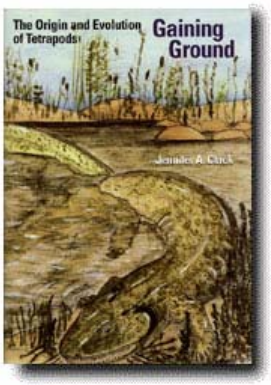
Jennifer Clack's new book **Gaining Ground – The Origin and Evolution of Tetrapods,** a recent addition to the growing list of paleontological titles from Indiana University Press, comes along at an opportune moment for students of vertebrate evolution, in particular those with a serious academic interest in the early fossil record of tetrapods and their piscine relatives. Clack has been at the forefront during the recent dynamic period of research on this topic, contributing in areas ranging from how many toes the earliest tetrapods had, to basal tetrapod interrelationships and lifestyles. **Gaining Ground** is a timely, well-written, and comprehensive synthesis, and it is nice to read a single-authored work for a change, rather than yet another multi-authored symposium volume. The emphasis is on major morphological transitions in the early fossil record of tetrapods, which is Clack's specialty, but the book also incorporates new data from genetics and developmental biology that bear on the group's history. The strong treatment of Devonian tetrapods is particularly noteworthy, and especially appropriate in that the number of Devonian tetrapod genera has risen from two or three to eight over the last couple of decades, and the story has expanded geographically from East Greenland, for many years the only 'home' for Devonian tetrapods, to include recent finds from North America, the Baltic region, and Australia.



Clack's book is offered in hardcover at $49.95, a fair price that will make it affordable for many readers. This comes at a time when examples at the other extreme (e.g., the 2001 reissue of Colbert's **Evolution of the Vertebrates,** which contains little that is new and is listed at the ridiculous price of $141.95) are more the norm. Even cash-strapped vertebrate paleontology grad students should consider scraping together fifty bucks for this one.

Illustrations are of particular importance in a book of this type, and **Gaining Ground** contains a large number of both line-art and photographic figures. The line drawings are generally straightforward and clearly printed, but not of uniformly high aesthetic quality; many are taken from recent publications by the author, and by other researchers. A few of the line

drawings are so simple as to verge on cartoonish (e.g., 9.25), but the majority are useful in illustrating morphological details of early tetrapods and sarcopterygian fishes. It would have been helpful to see characters more consistently mapped onto the trees or listed in the captions – many of the cladograms (e.g. Figures 6.1, 6.7, 9.36, 9.38, 9.39) are not accompanied, either on the figure directly, or in the caption, by supporting shared derived features. This may have been a deliberate editorial decision, but it is an unfortunate omission, forcing readers to either search through the text, or look up the original papers, rather than having the features provided with the figures (and for an example of how helpful that is, see Benton's [2000] **Vertebrate Palaeontology,** a good model in this regard). It is also a missed opportunity, given how useful cladograms are for summarizing and synthesizing key information. In addition, many of the figures (e.g., 6.8, 6.11, 7.8, 9.10, 9.17, 9.22) have bones and other anatomical structures identified by abbreviations, but no key is given for this morphological shorthand. Specialists will know what, for example, the "v cran fiss" and "par for" are (the latter may also strike a chord with golfers who can't spell), but general readers will be mystified by this cryptic labeling, and it suggests some degree of carelessness, and disregard for non-specialists, in putting the book together.

In contrast to the clearly printed line drawings, a number of the halftones (e.g., 3.17, 4.3, 5.17, 7.10, 9.4) look murky and washed-out, mainly due to low contrast levels. This may result from producing black-and-white images from color slides of specimens and localities; whatever the cause, crisper photos in these instances would have made for a more appealing presentation.

A primary issue affecting the book's readability is the small font used throughout the text. While it is admirable to have fit so much content into the book, it is hard to read, and this is compounded by the two-inch-plus margin along the outer edge of each page. The figure captions are placed in these margins, but they still account for one-third of the width of each page, resulting in a great deal of blank space on many pages, and giving the text an unappealingly squeezed appearance. This format, which is used in other books by Indiana University Press, should be reconsidered.

Turning back to the scientific content of this book, it strives, as is true of a number of other recent titles in vertebrate paleontology, to be relevant to both general-interest readers and academic specialists. I believe it succeeds better in serving the specialists. The book begins in a very general voice – the first line (p. 1) reads "About 370 million years ago, something strange and significant happened on Earth." Much of the introductory chapter consists of concise, non-technical accounts of geologic time, fossilization, and phylogenetic methodology. Further on, however, the book becomes more densely technical, as for example this typical sentence (on p. 158): "The scapulocoracoid itself had a substantial platelike form equivalent to the coracoid portion of later tetrapods, but there was no endochondral component further dorsally equivalent to the scapular blade." This level of detail is relevant for researchers, and it is suitable for advanced and graduate-level college classes. However, 'lay' readers with an interest in the subject, but less specialized knowledge, and less time to wade through dense material, will want to turn to Carl Zimmer's 1999 book **At the Water's Edge,** which recounts the fish-to-

tetrapod transition in a very engaging manner.

One additional note – it is particularly appropriate that Clack very graciously highlights the important contributions of preparator Sarah Finney, whose meticulous efforts have made it possible for Clack and others to see and describe many of the morphological details featured in **Gaining Ground.** More paleontologists should follow Clack's lead in prominently recognizing the vital role that preparators, and other technicians, play in paleontological research.

In summary, **Gaining Ground** is a richly detailed, state-of-the-art summary of basal fossil tetrapods, emphasizing key morphological transitions. The core scientific content and Clack's writing are generally at a higher standard than the book's editorial design and production values, but this criticism is somewhat mitigated by its reasonable price. Many paleontologists and grad students will want to have a copy, and it should serve as a standard and frequently consulted reference work for many years to come.

REFERENCES

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