

Evolution. The Story of Life

Douglas Palmer, illustrated by Peter Barrett

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Have you ever wondered how the Cambrian predator *Anomalocaris* lived 520 million years ago? What about the surviving fauna in the Karoo Basin, South Africa during the Carboniferous Ice Age 299 million years ago? Aquatic reptiles in Germany's seas 182 million years ago? Lakeside biota during the early Cretaceous in Brazil? If you are interested in these or any one of 100 reconstructed scenes of life from the Precambrian to recent times, then this is a book for you.

While Palmer and Barrett's book *Evolution: The Story of Life* (2009) is probably not meant to be a textbook in an academic sense, it presents an incredible amount of information about the entire evolutionary history of this planet in a very accessible and visual format. It begins with several brief sections (following the book's general format of a two-page spread) including introductory topics such as evolution, classification, Charles Darwin and *The Origin*, the pattern of life, fossils, reconstructing the past, and recent molecular techniques. These sections are engagingly written, combining the historical development of evolutionary thought with current views and research. At the very least, these sections provide a captivating and informative introduction, and demonstrate the significance of Darwin's theory in unifying our biological and paleontological understanding of Life, as well as the refinements resulting from more recent scientific research. Importantly, there is also a brief guide explaining how to use the book, providing some basic practical tips on the navigating its innovative but unconventional structure, and the intended use of each section of the book.

The bulk of the book is taken up by the 100 reconstructed scenes of life in Earth history (and a couple of extra gatefold spreads called 'The Explosion of Life' on Cambrian diversity, and 'Extinction Events' covering the end of the Cretaceous). These provide the 'backbone' (heh heh) of the book, and each presents a reconstruction of an important fossil site somewhere around the world. Barrett's illustrative artwork is both reminiscent of the old historical museum reconstructions and up-to-date based on the latest research. Each two-page layout includes additional contextual information, such as a site location map and a reconstruction of its ancient geographical relationships. A species list of the biota portrayed and a couple of 'snapshot' windows to include photos of actual fossils or detailed reconstructions of important anatomical structures complete the picture. These reconstructions alone make for several

hours of engaged and enjoyable browsing, and the information presented is balanced and objective and avoids sensationalism. I did not even find anything to object to among the dozen or so early hominid reconstructions.

The book concludes with a number of useful sections to provide additional context for the species and sites presented in the reconstructions. The first of these is titled *The Trees of Life*, which explains and visually represents the interrelationships between different species in a series of over 20 somewhat stylised cladograms. These cladograms depict the relationships among species of all forms of life from metazoans to mammals, at different taxonomic levels, and including both extinct and extant groups. The last time I studied such a broad range of taxa, van Halen was still at the top of the charts, so this section provided an excellent update incorporating new fossil discoveries, as well as the results of molecular phylogenetics. It also demonstrated quite starkly how much has changed in the world of systematics. While I recognized many of the 'old' taxonomic groups that remain in use, such as the Osteichthyes, Theropoda, and the good ol' Primates, both molecular phylogenetics and recent paleontological research has resulted in many new ones, such as the Euarchontoglires and the Laurasiatheria (well, new to me, anyway; like I said, it has been awhile!). It also was initially confusing to attempt to relate these cladograms to anything like a Linnaean hierarchy (Kingdom-to-species), simply because all of the clades portrayed are referred to simply as 'groups' without reference to any such named hierarchy. It is possible to follow certain taxonomic units through several different cladograms, and thus to understand at least something about such relationships, but it requires a bit of effort. On the other hand, the accompanying text for each cladogram does provide a clear description using common terms for animals and plants, and occasionally including statements indicating that the current groups 'cut across traditional Linnaean classification and [that recent research] has had a particularly severe impact on the old order-level grouping...' (p. 280). Thus, the book clearly emphasizes the impact that molecular phylogenetics and cladistics have had in revising our understanding of biological relationships among organisms. It would have been useful to provide some of that historical context, especially for the old-timers who may be out of date on current taxonomy and especially, on molecular phylogenetics for anything other than Primates. The information is there, but does not appear concisely summarized

in one place.

The next section is a site gazetteer summarizing all of the fossil sites used for the reconstruction scenes and including additional reading and relevant websites, and this is followed by a complete species listing and index directing readers to the relevant two-page reconstruction. To my mind, these features are very useful in helping to cross-reference between the book's sections. But the site gazetteer and species listing also provide a great deal of additional information that is useful as context for the 100 reconstructions. The final sections include a general glossary and index, and a four-page foldout presenting a complete timeline of earth history and a reduced but complete panorama-view of all the fossil site reconstructions.

This book is fairly clearly aimed at a general readership, but one with a fairly serious interest in evolution, paleontology, and related topics. The book covers an enormous scope and requires some knowledge of geology, biological classification, paleontology, ecology, and other topics. Because of the two-page layout format utilized by most sections in the book, and the largely visual format, the text is not very extensive in most sections and is thus unable to provide more than introductory information and brief (and usually very interesting) anecdotal accounts of particular fossils, sites, and other relevant facts. The only section that provides additional reading is the site gazetteer, and

it would be useful to include additional readings for other topics, ranging from evolution itself to molecular techniques and even a selection of the fossil finds mentioned. However, given the scope of the book, the production of a manageable reading list to cover just enough of the relevant material would be a complex challenge.

Despite the more general target audience, I do think that this book could be quite useful as a supplementary text for some undergraduate courses in evolution, paleontology, or similar topics. While the two-page spread format requires each section to be concisely presented, essentially all of the topical sections introduce a variety of issues to stimulate discussion or provide a starting point for student research on new finds, methods and controversies. With regard to primate and human evolution alone these would include the complete skeleton of *Darwinius masillae* from the Eocene Messel shales, the *Sahelanthropus* cranium from Chad, the Atapuerca hominids from Spain, and the diminutive hominid fossils from the Indonesian island of Flores—and more! The book's coverage is extremely impressive, and I am pretty sure that just about anyone reading it will learn an incredible range of new information, and be reminded to refocus our specialized narrow interests now and then to indulge in the complete and fascinating history of life on our planet.