

# Evolution's evolution

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**Life's Splendid Drama: Evolutionary Biology and the Reconstruction of Life's Ancestry.** By Peter J. Bowler. *University of Chicago Press: 1996. Pp. 525. \$37.95, £30.25.*

IN 1887, the palaeontologist H. G. Seeley divided Richard Owen's Dinosauria, named in 1842, into two disparate groups, Ornithischia and Saurischia, based on the structure of the pelvis, vertebrae, braincase and armour. Maintaining that "the Dinosauria has no existence as a natural group", Seeley said that birds, crocodiles, anomodonts (mammal relatives) and pterosaurs would have to be included in the same group, because the characters that united dinosaurs merely "show their descent from a common ancestor rather than their close affinity".

That last curious statement has two implications and, although Peter J. Bowler does not treat this specific case in his excellent new book, it exemplifies much of the post-Darwinian, pre-'modern synthesis' thinking that is his subject. Yes, there are differences between these two subgroups, which were soon accepted as valid. But other similarities noted by Owen indicate a closer relationship between them than to any other animals. 'Different' need not mean 'unrelated'; but what, in the mid-nineteenth century, did 'related' mean, and how could a group have common ancestry but not 'close affinity'? Moreover, if Ornithischia and Saurischia are not most closely related to each other, what other group is?

The answer, as Bowler astutely shows, lies in the transition to true evolutionary thinking — accepting the tree of life in its full ramifications — that was a central problem for disciplines from taxonomy to embryology after the publication of the *Origin of Species*. It was difficult in early post-Darwinian days for scientists to craft a unified approach to what we would now call historical biology. In pre-Darwinian thinking, comparative anatomy and embryology vied for supremacy in explaining the patterns of life, but neither could win: one could not establish homology without the other. Darwin gave homology a new meaning by tying it to common descent, but he learned from Huxley and Owen to mistrust the fossil record as an arbiter of evolutionary history. Palaeontology's ascendancy would come later, with the great discoveries from the American West and elsewhere during the heady decades surrounding the turn of the century. Meanwhile, comparative anatomists and embryologists such as Bateson and T. H. Morgan turned in disappointment to the new science of genetics, and palaeon-

tological theory, in the hands of the Osborns and Schindewolf's, languished in the mire of orthogenesis and increasingly implausible land bridges to explain evolutionary and biogeographical trends.

In the study of the history of biology, Bowler's book is greatly needed. It moves the post-*Origin* emphasis away from microevolution (population genetics and so on) and on to macroevolution (the history of life and its environment), which dominated thought in most disciplines until well into the 1900s. Bowler shows that the Darwinian revolution was gradual, not punctuated, and that some disciplines raised its flag well before others did. His first chapter alone, which deals with what Darwin's great book really did and did not do, will set many evolutionary biologists by their ears, and we would all

benefit from taking its perspective to heart. Bowler explored this theme masterfully in some of his earlier books. Here he chooses extended examples of questions from the history of life and examines the forces that shaped the terms of their debate, from pre-Darwinian days to the dawn of the modern synthesis of genetics.

The heart of the book involves that central issue of evolution, the origin and relationships of major groups. Weaving together the three disciplines of comparative anatomy, embryology and palaeontology, Bowler shows how new information became integrated with new ways of thinking about these problems, while the hidebound disciplinary traditions remained. Are the arthropods monophyletic or did they arise from separate stocks? Where did the vertebrates come from? How did they make the transition to land? And what changes were involved in the origins of birds and mammals? Even the reader experienced in one or more of these questions will find new references, forgotten points of view and insights, and earlier expressions of the same arguments advanced today.

This is not, however, a typical effort in



THE buprestids, commonly known as metallic wood-boring or jewel beetles, are popular with collectors because of their metallic streamlined bodies. This plate is taken from *An Inordinate Fondness for Beetles* by Arthur V. Evans and Charles L. Bellamy, an authoritative reference volume resplendently illustrated with line drawings and colour photographs. Holt, \$40.