

Owen put it in the 1850s. Buckland himself is made out to be more conservative than he really was: the view that cave fossils had been washed there by Noah's Flood, attributed to him on p. 57, was in fact decisively challenged by him in the book cited (*Reliquiae Diluvianae*) in order to stage his sensational (and implicitly progressionist) reconstruction of an antediluvian ecosystem, as Martin Rudwick's *Bursting the Limits of Time* (2005) makes clear. Lastly, while Dawson rightly corrects the common understanding of Huxley as a universally successful popularizer, his argument seems unfairly weighted against Huxley in one or two particulars. For example, he suggests that Huxley's working-class audiences in the 1880s would have been unable to understand his allusions to Voltaire's *Zadig* (widely available since the 1790s in cheap reprints of Francis Ashmore's translation) or to read thirty-page scientific articles with no pictures. The work of Jonathan Rose and Anne Secord on working-class reading and artisan science casts serious doubt on these assumptions. For Huxley, then, to publish the same workingmen's lecture in a middlebrow journal was no admission of failure to meet the artisans' needs, but a sign that he was now targeting a different primary audience with the same argument, considering it suitable for both. In any case, access to middlebrow periodicals was not restricted to those who could afford to buy a copy.

But these are incidental quibbles in an otherwise thoroughly convincing, refreshing and rigorously researched monograph. Despite its length and its apparently abstruse subject, it is a pleasure to read, thanks to Dawson's lively style and his tight grip over his argument as it leads us between Paris, London, New Zealand, New England, the Crimea and elsewhere. This book deserves to be read well beyond the domain of 'earth science history'. In its distinctive blend of methodologies, its integration of remarkably diverse source materials, its bridging of the gap between histories of scientific controversy and histories of 'popular science', and its combination of fine-grained local analysis with a transnational and *longue durée* narrative, *Show Me the Bone* merits the close attention of anyone interested in the making of science in the age of industrial print culture.

RALPH O'CONNOR
University of Aberdeen

ROBERT J. RICHARDS and MICHAEL RUSE, *Debating Darwin*. Chicago: The University of Chicago Press, 2016. Pp. xvi + 299. ISBN 978-0-226-38442-9. £21.00/\$30.00 (cloth).
doi:10.1017/S0007087417000188

Robert Richards and Michael Ruse have been arguing about the intellectual origins of Darwin's theory of evolution by natural selection for many years now. This book formalizes their debate, giving the reader a clearly defined vision of their positions and allowing them to respond directly to each others' arguments. For Ruse, Darwin was a quintessentially British thinker of the middle class, imbued with the ideology of free-enterprise individualism and utilitarianism, and (originally, at least) an adherent of William Paley's argument from design based on the adaptation of organisms to their environment. Richards, by contrast, highlights his links to the Romantic philosophy that was flourishing on the Continent, operating through his reading of Alexander von Humboldt but also reflecting a more general awareness of the more holistic world view of German nature philosophy.

The debate is crucial for our understanding not only of Darwin's own thinking, but also of his theory's implications today. If Ruse is correct, natural selection is a ruthless mechanism based on individual benefit, with no means of promoting wider moral values and offering no evidence for Paley's benevolent Creator. Richards's Darwin offers a more humane vision of nature, alive to its beauty, with a true moral depth, and more compatible with the belief that it has some sort of divine origin. In this book each of the two authors gives a detailed statement of their positions, each then responds to the other, and an epilogue explores some of the implications for later developments in evolutionary thinking.

Before going any further I need to declare an interest. When asked to review the book I pointed out that I could hardly be regarded as impartial, having already made my position clear in response to earlier manifestations of the debate. On this issue, if on no other, I am on Ruse's side. It was suggested that I could still provide a useful account of the book by outlining both sides of the argument as clearly as possible, even though I will have to admit which side I personally find more convincing.

At a superficial level, both the British and the Continental influences on Darwin's thinking must be acknowledged. Ruse gives an account of his engagement with the classic elements of British utilitarian thinking, making the case for Darwin's origins in the wealthier element of the middle class and its way of thinking very clear. Richards leads with the equally obvious impact of Humboldt's writing on the young Darwin, but then develops this point to explore deeper links with the Continental way of thinking about nature as a harmonious and beautiful unity. For Richards, underlying the individualism and utilitarianism of Darwin's origins there is an imported vision of development as something purposeful, morally significant and even goal-directed, giving a spine to his thinking that is so deeply embedded that historians such as Ruse all too often miss its implications. Originating with Humboldt, this vision was sustained by occasional contacts with other aspects of Continental thought percolating into Britain at the time. Ruse sees the influence of Humboldt as trivial and transitory, inspiring the young Darwin to explore the tropics and experience the beauty of nature, but gradually fading into the background as his theory of natural selection developed along increasingly utilitarian and individualistic lines. He points out that by 1845 Darwin was complaining about the flowery nature of Humboldt's language, and notes that any respect for the beauty of nature could equally be sustained by reading British poets.

To sustain his interpretation of Darwin, Richards argues that the 'Being' who is introduced in his 1844 essay to help describe the action of selection is more than a metaphor derived from the analogy with the human breeder. It is a genuine reflection of a belief that there is a supernatural power underlying nature – and while less obvious in later writings, its influence never dies. Embryology is a key science, sustaining the image of development as a purposeful process. And to give a moral dimension to the picture, selection is always capable of operating for the good of the group as well as the individual. Ruse will have none of this. Embryology plays a role, but not in the teleological manner depicted by Richards. The 'Being' fades because Darwin becomes increasingly convinced that selection acts only for the benefit of the individual – group selection is a rare aberration. Curiously, I didn't notice Ruse appealing to Darwin's remarks about the cruelty of parasites, which offer strong evidence that he was increasingly aware of the lack of any moral foundation in nature.

Inevitably, they disagree about progress. Richards argues that Darwin continued to see nature as striving to reach a morally significant goal represented by humanity. Ruse acknowledges Darwin as a progressionist but promotes the more widely accepted view that his vision of the evolutionary tree allows many branches to advance in different ways. The disagreement extends to a comparison with Ernst Haeckel's Darwinism, which Ruse sees as significantly more teleological than Darwin's own vision – a point upon which I again have taken his side in previous writings.

As a whole this book gives an airing to an important debate that has simmered for years and is now displayed so that a wider audience can appreciate its significance. Read it, and make your own mind up. If I have one complaint, it is that I found the epilogue rather weak. It spends a lot of time worrying about the nature of consciousness and not enough on the modern debates about group selection and related topics that keep the moral issues alive.

PETER J. BOWLER
Queen's University, Belfast