BOOK REVIEWS

A Public Scientist

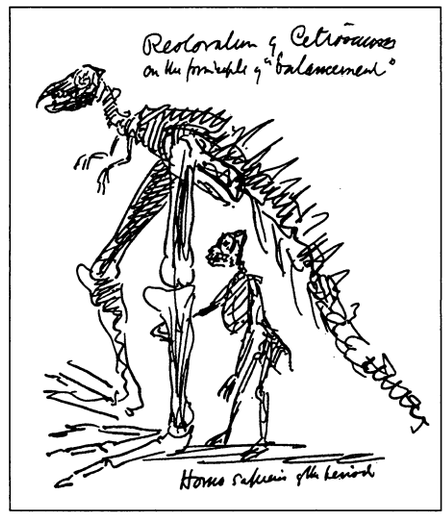
Huxley. From Devil's Disciple to Evolution's High Priest. ADRIAN DESMOND. Addison-Wesley, Reading, MA, 1997. xxii, 820 pp., illus., + plates. $37.50. ISBN 0-201-95987-9. Published in the U.K. in two volumes by Joseph, 1994 and 1997.

Thomas Henry Huxley is now best known as "Darwin's bulldog," the aggressive and loyal disciple who preached the new gospel of evolution by natural selection and defended his brilliant but retiring master from the outraged assaults of religious and intellectual conservatives. This characterization of Huxley and his work is accurate enough as far as it goes, but, like many catchy metaphors, it obscures at least as much as it reveals. Huxley's association with Darwin was only a part of a busy, varied, and influential scientific career. His strenuous advocacy of Darwinian ideas derived from complex motives, including institutional politics as well as scientific conviction; he often couched his arguments in terms that Darwin would not have chosen himself. Indeed, Huxley's understanding of evolution did not coincide with that of his principal in every particular, a discrepancy that probably worried Darwin more than it did Huxley. In this authoritative biography, Adrian Desmond provides a balanced and comprehensive account of Huxley's achievement, along with an illuminating explanation of his Victorian eminence and the subsequent decline of his reputation.

"The Scientist as Public servant. With a radical Home Secretary discriminating to get scientists jobs, Huxley added the Inspectorship of Fisheries in 1881 to his teaching load and Royal Commissions. *Punch* cynically appended '£.s.d' to his name, but the extra work drained his energy and drove him towards another breakdown." [From *Huxley*; courtesy of Angela Darwin]

Although Darwin and Huxley ended up fighting on the same side and from roughly the same position at the top of the liberal scientific establishment of Great Britain, they arrived there by very different routes. With one grandfather (Josiah Wedgwood) among the preeminent industrialists of the 18th century and the other (Erasmus Darwin) a precocious evolutionary theorist, Darwin inherited his entrée, if not his preeminence. Huxley, whose family was shabby genteel at best, had to fight not only for recognition and position but for the very time in which to do scientific research. A superficial parallelism in their formative experiences makes the difference clear. Both men began their careers with years-long voyages aboard naval ships engaged in mapping remote coastlines. But whereas Darwin held no commission on the *Beagle* and was under no obligation to do anything but amuse himself and keep the captain company, Huxley was assistant surgeon on the *Rattlesnake*, and his medical duties took clear precedence over his scientific pursuits.

After returning, whereas Darwin had only to decide where to settle, whether to marry, and which of his many research interests to pursue, Huxley had to make a living. The financial pressures on him were severe. Besides keeping his own body and soul together, he contributed to the support of various feckless members of his extended family. Perhaps reacting against their bad example, he exemplified extreme Victorian prudence in his personal arrangements, enduring an eight-year engagement before he felt able to marry the young woman he had fallen in love with when the *Rattlesnake* visited Australia. The need to support Nettie and their growing family in middle-class



"The concept of bipedal dinosaurs was novel in 1868. When John Phillips unearthed a five-foot *Cetiosaurus* thigh bone, Huxley dashed off this caricature. The arms were unknown; in the sketch Huxley shrank them by a corresponding amount as a tease. Note the ape-faced 'Homo sapiens of the period'; Huxley had long believed that humans lived alongside dinosaurs." [From *Huxley*; Oxford University Museum]

comfort, as well as the continuing demands of his siblings and in-laws, meant that Huxley did not feel financially secure until well into middle age. One reason Huxley has been remembered for his services to Darwin rather than for his own research was his constant need for money, which led him to accept most of the numerous lectureships, consultancies, and literary assignments that were offered him. Huxley was a man of unusual energy as well as ability, but these responsibilities inevitably ate up his time. In the end, overwork spoiled his health and shortened his career and his life.

Of course, Huxley's crammed calendar was not exclusively the result of his economic circumstances or class background. One of Desmond's many strengths as a biographer is his careful interweaving of social and personal factors. Desmond is deeply familiar with the Victorian scientific community—no one more so. He is the acclaimed author of *The Politics of Evolution*, a contextual analysis of the radical medical community in which the young Huxley received his professional education, and (with James Moore) of the magisterial biography

With this issue Katherine Livingston, Book Review Editor of *Science* since 1974, steps down. She plans to remain in Washington.

Darwin. Throughout *Huxley* Desmond shows that his subject's goals were much broader than simply the advance of scientific knowledge. He used his many public lectures, committee memberships, and society presidencies to forward his crusade for the institutionalization of science, so that young men of modest means, such as he had been, could routinely aspire to scientific careers. His many popular and semi-popular writings served to attract recruits, as well as to spread the gospel of science more generally. As part of the same campaign Huxley repeatedly stressed the power and authority of scientific expertise, simultaneously minimizing the influence of merely social prestige within the scientific community while maximizing the prestige of science within the Victorian culture as a whole.

Huxley's was thus one of the earliest exemplars of a recognizably modern career as a scientist or a public academic. The final sections of Desmond's sympathetic and lively biography, which chronicle an incessant round of deadlines and meetings, may sound uncomfortably familiar to many late-20th-century readers. If Huxley's accomplishments are little known at present, they were richly acknowledged in his own time. His 1895 funeral, in Desmond's words, was attended by "the greatest constellation of Victorian scientists ever to gather on one spot." And perhaps we still acknowledge his influence, albeit unconsciously, by living our lives within the institutions and according to the patterns that he struggled to establish.

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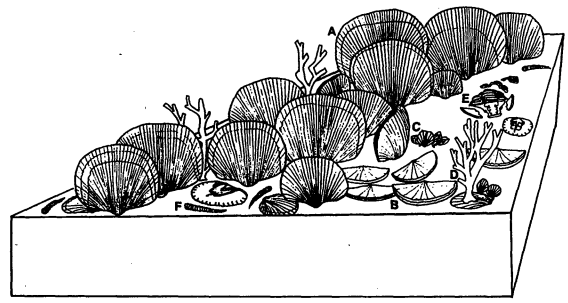
Paleoecology: A Redirection

Paleontological Events. Stratigraphic, Ecological, and Evolutionary Implications. CARLTON E. BRETT and GORDON C. BAIRD, Eds. Columbia University Press, New York, 1997. xviii, 604 pp., illus. $75 or £52. ISBN 0-231-08250-9.

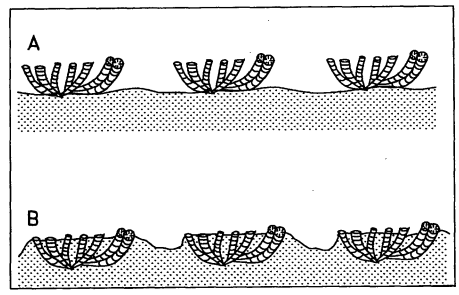
The Marble Hill bed, south of Carrollton, Kentucky, surely ranks as one of the minor wonders of fossil preservation. This meter-thick bed is composed entirely of the shells of *Lophospira*, an Ordovician gastropod. How did hundreds of thousands of these shells come to form this single bed? And how extensive was the original shell bank? Paleontologists have long celebrated the extraordinary preservation of the sudden avalanches that entombed the soft-bodied fossils of the Cambrian Burgess Shale and similar deposits, but the past decade has brought recognition that event beds like Marble Hill make up a remarkable fraction of the fossil record. As such deposits open opportunities for high-resolution biostratigraphy, they also raise interesting questions about their genesis and broader implications. This volume, ably edited by Carlton Brett and Gordon Baird, argues that hidden within these striking patterns of fossil preservation is a hierarchical structure, analogous to the hierarchical structure of sedimentary packages, the study of which has revolutionized stratigraphy through the development of sequence stratigraphy.



A reconstruction of a community dominated by the brachiopod *Onniella meeki* that colonized muddy bottom environments across the Cincinnati Shelf area in the Late Ordovician (early Richmondian). "Episodic storm events repeatedly disrupted these populations, dislodging, smothering, and burying these shells. . . . Less intense storms periodically reworked the upper layers of these shell beds, washing away muds and leaving the subsequent shell pavements exposed on the bottom for brief periods of time. The formation of shell beds probably inhibited the activities of burrowing infauna, mobile deposit-feeders, and semi-infaunal filter feeders . . . thereby contributing to the low numbers of these types of organisms occurring with *O. meeki* in these strata." [From R. C. Frey's paper in *Paleontological Events*]

This work also marks a milestone in the history of evolutionary paleoecology. During the 1970s paleoecologists, failing to appreciate that many fossil deposits represent a census of populations over tens to hundreds of years, attempted to study population dynamics or life-history strategies. By the 1980s a new research paradigm of "evolutionary paleoecology" was in full flower, focusing on changes over longer periods of time and spurred by advances in understanding the resolution of the fossil record (and, in part, by a desire by paleontologists to stand on their own two feet rather than slavishly mimicking the work of ecologists). But painstaking analysis of fossil beds has demonstrated that major storms, sea-level fluctuations, environmental shifts, and biogeographic incursions suggest a hierarchical structure to fossil deposits, enabling paleoecologists to address a host of different questions at different scales of temporal resolution. Moreover, the demonstration that some event beds extend over hundreds of kilometers, as documented by numerous chapters in this volume, is a testament to the progressive refinement of stratigraphic resolution. Far from being a random assortment of durable skeletal material that was lucky enough to be preserved, fossil deposits may follow an inherent logic, with important implications for ecological, biostratigraphic, biogeographic, and evolutionary studies. For example, Holland's integration of Upper Ordovician sequence stratigraphy with an understanding of the formation of fossil deposits demonstrates that invasion of certain brachiopods into the Cincinnati region is far more rapid than indicated by more classical approaches.

Paleontological event horizons are the focus of this volume—fossil deposits of local to intercontinental extent representing brief, distinctive biological events, particularly epiboles, which Brett and Baird redefine as pervasive, regional to occasionally global, thin (centimeter to meter) scale beds with an unusually high abundance of fossils that are normally rare or absent. Critically, epiboles may have a variety of causes and do not represent ecological disturbances but environmental disturbances over a longer, but still geologically brief, interval. This paleoecological usage differs from the more traditional biostratigraphic meaning of "epibole" and is not universally accepted by other authors in the volume. West and colleagues suggest that stratigraphic acuity is generally insufficient to demon-



"Two possible models for colonial rugosan thickets during growth. (A) Most of colony exists well above the sediment water interface, as is commonly observed in modern reef settings. (B) Most of intercorallite spaces are filled with sediment because of the baffling effect of phaceloid colonial morphology." [From T. H. Wolosz's paper in *Paleontological Events*]