

could have been achieved using the techniques available in Walcott's time, but a decade more passed before more detailed studies led to acceptance of these fossils' age and biotic origin.

Bill Schopf was in at the start of what he calls "the emergence phase" of this new science of Precambrian micropalaeontology in 1965. Fifteen years ago, he organized the Precambrian Palaeobiology Research Group (PPRG), the endeavours of which led to a monographic publication on Archaean and early Proterozoic palaeobiology in 1983 and which, now enlarged to 41 experts, has produced this 3.4-kg epic. It contains printed summaries of several (bio)geochemical and palaeontological databases from both published work and results from 1,800 new samples from sites worldwide. Thence arise numerous synthetic articles on most aspects of the Proterozoic biosphere with an update on the Archaean, and a hard look at the Early Cambrian. Palaeontology is set in the context of changing atmospheric and oceanic chemistry, evolving styles of preservation of sediments in basins, and reconstructed continental positions. Considerable attention is given to proxy indicators as pointers to Earth's evolution, such as taxa-specific organic molecules extracted from Proterozoic sediments, stable isotope records and sediment geochemistry, and to molecular phylogeny of extant organisms as indicators of their relative times of emergence in the past. The multidisciplinary approach is exemplified by the devotion of nearly 100 pages to studies of modern microbial mat communities, relevant insofar as they model the Proterozoic benthos.

This book is not the place for wholly new theories, but contains a painstaking testing and development of numerous hypotheses, with a willingness to discard old favourites. Thus G. Vidal and A. H. Knoll's theory of late Proterozoic decline in the diversity of eukaryotic plankton is confirmed in modified form. Conversely, cyanobacteria now seem *not* to have evolved (we can point to a third of Proterozoic prokaryotic taxa still living today): cue Schopf's eulogy on their indestructibility and immutability. The immense co-operative effort represented by this work makes for a coherent text, satisfying on one level, although perhaps a bit too comfortable on another. Only rarely do subtle differences of emphasis emerge. Was there measurable oxygen in the Archaean atmosphere? Did any of the late Proterozoic Ediacaran animals survive into the Cambrian?

Despite its encyclopaedic scope, the tome is cautious in outlook, for several reasons. One can cite the morphological simplicity of most Precambrian fossils, problems in determining which struc-

tures actually are fossils, and the decreasing preservation potential with age of unmetamorphosed sediments. The imprecision of age determinations is a major stumbling block, and no radiometric data are gathered in this work. Other gaps are in sedimentary facies and petrology, stromatolites, and chemo- and lithostratigraphy (note the scope for correlation afforded by the low-latitude glacial deposits); but these are covered by other international groups whose work is in progress. And as the book is largely three years out of date, one must ask why all those tables weren't

printed on microfiche. The future of the full databases and their accessibility is also unclear. But let's not quibble: the *Proterozoic Biosphere* is undoubtedly a benchmark, as was intended. □

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■ Of related interest is the newly published *Fossil Prokaryotes and Protists* edited by Jevé Lipps. The book aims to provide a "consistent and comprehensive" text for courses in micropalaeontology. Blackwell, £35 (pbk).

Remembrance of things past

Paul G. Bahn

Archaeology: The Science of Once and Future Things. By Brian Hayden. *W. H. Freeman*. 1992. Pp. 484. \$23.95, £18.95 (pbk).

IN the esoteric and competitive world of introductory archaeology textbooks there are three basic models: the thorough survey of methods and techniques, the global chronological gallop through past cultures and the volume that aims to do both. As a coauthor, with Colin Renfrew, of an example of the first model (*Archaeology: Theories, Methods and Practice*, Thames and Hudson, 1991 — see *Nature* 354, 198; 1991), I suspected that this review would have to begin with a declaration of interest. But this is a different kind of book altogether.

Although resembling other introductory texts in size and format, Brian Hayden's book is actually a long, personal statement of what archaeology is about, and what it can tell us about the human condition in the past, present and future. His stated aim is to give students what they want to know, to present them with an archaeological perspective on the world that will last beyond exams.

He begins by setting out a few basic concepts, some of which will certainly challenge the minds of beginning students: that archaeology has no established facts and can never be truly objective; the purpose of typology; and the simple theories that underpin archaeological interpretations and explanations of cultural change. In the second section, the nucleus of the book, he leads us through human cultural development, from hunter-gatherers to the rise of food production, complex societies and civilizations. In the brief third section, he takes the story through the industrial and nuclear ages into the future, and philosophizes about our destiny.

Hayden's aim of establishing an "appropriate framework of conceptual

tools" and giving a "panoramic view of past events" is accomplished admirably, but at some cost. In contrast to textbooks that try to set out the data together with a variety of possible interpretations, he has been forced to make only very occasional reference to hard archaeological evidence, and to devote most of the book to telling a story — albeit a sometimes convincing one — at the most general level. His chosen explanations of change are determinedly materialistic, highlighting competition, rivalry, violence, warfare and Big Men. Perhaps a career in academic archaeology exposes one to these phenomena among one's peers to such a degree that they may come to dominate one's view of the past as well as the present, overshadowing any possible evidence of cooperation and spirituality.

Hayden's examples are often drawn from the areas he knows best: Mesoamerica, Australia and America's northwest coast. His bibliography is extraordinarily eclectic, from a history of square dancing to Tom Robbins's *Jitterbug Perfume*. The data provided are sound on the whole, although there are occasional lapses: for example, using an Ice Age engraving of two women as evidence for copulation, attributing the burial of Pompeii to an eruption by Mount Etna, and apparently fusing Gerald Hawkins with Stephen Hawking. Moreover, it is puzzling that a text that seeks to spare students unnecessary jargon and technical detail should subject them repeatedly to obscure terms such as chthonic or scrying.

Nevertheless, this highly readable and stimulating text constitutes an invaluable source of topics for discussion and will make its readers think. There can be no higher praise than that. □

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