

begun by members of the universities of Liverpool and Aberystwyth and with Survey collaboration a 1:25,000 map covering Central Snowdonia was published in 1972. It served the geosciences community well for more than a decade, though it had no accompanying explanation.

There was then some debate as to whether to incorporate this compilation in the regional 1:50,000 sheet coverage or to resurvey at the scale of 1:10,000. Resurvey involved high cost, for it was recognized that the area, with its rugged terrain and complex lithologies, was of such academic interest that the quality of mapping would have at least to match that of the great Tertiary Volcanic mapping by the Scottish Survey in the 1920s. My own doubts as head of the unit at that time were over-ruled, and mapping on a topographic base provided by customised aerial photographs was begun. Had any doubts remained they would have been resolved by the publication of this memoir which rounds off 30 years of intensive and productive activity by the Survey and its supporting academic researchers. It is entirely appropriate that the senior author of the memoir should be M. F. Howells who remained as the core member of the unit from the outset of mapping and has more than a score of joint papers on mainly Snowdonian volcanological topics credited to him in the extensive bibliography.

With much of the volcanic stratigraphy and nomenclature already covered by earlier publications, the memoir has had the space to give a full accounting of the biostratigraphy of the mainly sedimentary Cambrian and early Ordovician successions. Structure, metamorphism and geophysical investigations are also fully covered. The text throughout is succinct and is handsomely illustrated by 29 two-coloured line diagrams. This, together with the good quality of the coloured plates forming the frontispiece and soft cover, makes the memoir a desirable addition to any bookshelf. It might be hoped that the barely adequate quality of some of the 13 black and white plates together with the overprinting error which rendered p. 88 totally illegible are peculiar to this reviewer's copy. E. H. FRANCIS

From isotopic dating through to the sourcing of artefacts, geology and archaeology share many techniques and approaches. However, the two fields probably interface most closely in the study of the processes that shaped the ancient landscape and its relationship with human activity.

The people of the Archaic Period (roughly 8000–2000 BC) were hunter-gatherers who subsisted mainly on small game, fishing and gathering wild fruits and nuts. The Archaic saw increases in population and the development of regional identities, specialised tools and strategies for intensive food collection. These changes precursored the later development of tribal societies or chiefdoms, the use of pottery and eventually the development of agriculture, and are generally considered to have been fostered by environmental pressures caused by climatic and sea-level changes.

Each of the seven papers in this volume reviews the evidence for the Archaic environment in a particular region of North America, from the Rocky Mountains across to the Atlantic Continental shelf. They also focus upon the extent to which the archaeological record as we see it today has been modified by geological processes, covering, exposing or destroying the sites in the intervening period. Thus not only does the archaeological geology provide an understanding of the prehistoric environment and its effect on cultural development, but it also gives an indication of the integrity of the archaeological record: to what extent is the distribution of archaeological remains today an accurate reflection of the past?

The contributions are well written and well illustrated, the reviews are comprehensive and well referenced with bibliographies typically containing ~ 500 entries each. For the reader who wishes to obtain an insight into the multi-disciplined approaches adopted in archaeological geology, it is highly recommended. I. C. FREESTONE

Radhakrishna, B. P. and Vaidyanadhan, R. *Geology of Karnataka*. Geological Society of India, Bangalore, 1997. Paperback, xii + 353 pp. US\$25.00. ISBN 81-85867-08-9.

Bettis, E. A. III. *Archaeological Geology of the Archaic Period in North America*. Geological Society of America Special Paper 297, 1995. 154 pp. Price US\$45.00 (post paid). ISBN 0-8137-2297-7.

This book is the enlarged and revised second edition of a volume first printed in 1994. The structure of the volume, divided into two unequal parts dealing with the geology and then geomorphology, remains the same. The revisions

are largely to the geology section and reflect the quantity of research that has been carried out in Karnataka since the inception of the first edition. The text is specifically written without inclusion of references and, although there is a comprehensive selection at the end of each chapter, some might find this a little frustrating because at times it is difficult to follow through which opinions belong to which author. A decision that is slightly odd, particularly in today's commercially-oriented world, is to ignore mineral resources and economic aspects – they are to be presented in a second volume. However, that said, the aim of the book is to summarize the geology for non-specialists and there has to be a time when the 'new' interpretations become those that are accepted as the best current explanation. In this sense the new edition does succeed as a readable and convincing summary of some of India's most important geology.

Following two introductory chapters, one on the early pioneers which sets the context of the development of geological research in the State, and a brief introduction to the geology, the next seventeen chapters are essentially arranged in stratigraphic order dealing with the oldest rocks first. Karnataka is dominated by Precambrian geology and so discussion of Archaean and Proterozoic rocks dominates the volume. Individual chapters review the geology of the ancient supracrustal rocks, the main gneiss complex and the different younger schist belts. Chapter 8 deals with the development of granulites and the problems of arrested granulite 'charnockite'. Chapter 9 deals with the 'younger' granites, one of which forms a major feature through the State. Rocks from the Proterozoic are well represented in the State and the coverage they receive provides good examples of intracratonic sedimentary basins. There are also important exposures containing evidence of early life, often in the form of stromatolites, but also less obviously in the form of microscopic filaments and crude colonies. Such evidence from the Archaean and Proterozoic is reviewed in Chapter 13, before a brief discussion on the place of India within Gondwana. Three chapters then discuss the Deccan, various dyke rocks, and lastly, a summary of events during the Tertiary.

Two chapters deal with laterite and black soil development before the final chapter discusses the general geomorphology. A brief subject index is provided to assist in finding one's way through the volume.

The authors have done a fair job in presenting only those hypotheses that are reasonable (given our present geological knowledge) and so permit the beginner to form a sound understanding of the overall geology. There are many illustrations, some of variable quality, and a few of the many photographs have suffered in their reproduction. However, this need not be of great concern as the intentions are largely clear. The inclusion of a generalized coloured map of the State is welcome. As an up-to-date description of the geology of Karnataka the book has much to recommend it. The readership is likely to be students and those generally interested in Indian geology rather than the specialist who might be expected to go directly to the original papers. C. R. L. FRIEND

Hurlbut, C. S., Jr. and Sharp, W. E. *Dana's Minerals and How to Study Them* (Fourth Edition). Chichester and New York (John Wiley and Sons), 1998. vii + 328 pp. Price (paperback) £32.50. ISBN 0-471-15677-9.

This book is intended mainly for beginning students and amateur mineralogists. Although, in the interval of almost fifty years since the third edition, great strides have been made, thanks to new, elaborate and sophisticated instrumental techniques, the authors feel that while the students must indeed be informed of these new techniques and what they can accomplish, there remains a place for the old, simple, easy-to-make tests. Thus after chapters giving hints on how to study minerals, and an introduction to crystals and crystallography, the fundamental properties of minerals, mineral chemistry (including blowpipe and borax bead tests), and mineral genesis are described. Individual descriptions of some 150 mineral species (in 150 pages) are followed by determinative tables. There are numerous photographs and line-drawings as well as eight colour plates. R. A. HOWIE

Perkins, D. *Mineralogy*. Upper Saddle River, New Jersey 07458 (Prentice Hall, Inc.), 1998. x + 484 pp. Price £29.95. ISBN 0-02-394501-X.

The author claims that many otherwise excellent mineralogy texts are not appropriate for undergraduate use because they do not stimulate students or present information in ways that help students to learn. This student text thus aims to