

REVIEWS

L. F. Laporte 1968. Ancient environments. Foundations of Earth Science Series. Englewood Cliffs, N.J.; Prentice-Hall. 116 pp., many illustrations. 21s.

This work represents one of a series of comparatively inexpensive original works on aspects of the life sciences, geology, geomorphology and astronomy (two others are also reviewed in this number of the "Mercian Geologist"). They are printed on good-quality paper, lavishly illustrated and enrobed in stout paper bindings (though the standard colour of these bindings - white - is about the least serviceable that could have been chosen.) In concept, they are intended as introductory texts for students: but their format and style render them suitable reading for the amateur geologist.

The scope of the present work is best indicated by listing the titles of its six chapters:-
Geologic environments: sediments and environments: organisms and environments: geochemical environmental evidence: environmental analysis; ancient environments and historical geology. This is a large amount of ground to cover in such a restricted compass, especially when page space is further reduced by the abundant illustrations. It would be easy indeed to list omissions and to point to superficialities in treatment, but many of these can be attributed to restricted space and, in general terms, the coverage of the topics is adequate. The least satisfactory chapter is unquestionably that on "Environmental analysis": its title suggests that it will contain advice on techniques but, in fact, it contains merely a discussion of the published results of some environmental analyses, without explanation as to how these were carried out.

The illustrations are largely borrowed from other text-books and papers. Reproduction of diagrams is excellent; reproduction of photographs is of much more variable quality, with some (e.g. 3-6, p.44) extremely clear, others (e.g. 2-6, p.18) blurred and unsatisfactory. Figure 2-4 E (p.14), representing graded bedding, has been printed upside-down, so that the grading appears to be from fine to coarse instead of vice versa!

The text is well written and the author merits high marks for readability. Some statements are, however, wholly misleading. For example, on p.17; "Only the calcareous - and siliceous - secreting protistans and the calcareous algae and invertebrates ... have any real quantitative significance in the geological record". This is nonsense; spores, pollen and planktonic organisms, with walls composed of organic compounds, occur fossil in numbers quite comparable with, and often much greater than, the groups listed. A second statement on the same page, about non-preservation of non-mineral-secreting organisms, is equally misleading.

On p.44 occur the following sentences: "Coarser-grained sediments are more difficult to burrow into because the grains are usually well sorted, permitting closer packing, and the water content is less. Consequently, such sediments usually have fewer burrowing organisms than do muddier, finer-grained sediments". This is erroneous in several ways. First of all, because it is untrue to state that coarse sediments are usually well-sorted - such a generalisation scarcely applies to breccias, greywackes and boulder clays; secondly, because good sorting does not produce close packing, but the exact opposite - the worse the sorting, the better the packing, in general; thirdly, because, although it is true that coarse sediments contain less water than muddy sediments, this is simply because water generally passes through coarser-grained sediments more rapidly - those of our English Midlands sandstones that are sealed below by impervious sediments are important aquifers - whereas water is retained by argillaceous sediments: and finally, because the denser population of organisms in muddy sediments is more a reflection of greater detrital food supply in such sediments than of any other cause.

On p.55, it is stated that, whereas the diversity of species is greatest in the Equatorial regions, the number of individuals of a particular species increases towards the Poles, as diversity of species decreases. It is noted that: "This gradient may merely reflect an increase in food resources and living space with the decline in number of species". This, again, is profoundly misleading. The number of individuals, of all species considered together, is probably at its greatest in the Equatorial regions - a fact that is not mentioned. The Pole-ward increase in numbers of individuals within a species applies, perhaps, to vertebrates and higher plants: it does not apply to insects or to microscopic animals and plants generally. The cause is surely evolutionary: fewer species can survive in the harsher environments (reptiles, for example, do not inhabit the frigid zones) and the pressure of interspecific competition is less. Most certainly, it cannot justly be claimed that food supply increases towards the poles, as the author - surely unintentionally - suggests.

On p.74, the tabulate corals are listed as important reef-forming organisms of Ordovician to Carboniferous seas, the "hydrozoan corals" from Silurian to Carboniferous. Now, neither of the two major Palaeozoic coral groups (tabulates and rugose corals) are reef-formers in any real sense: they are simply inhabitants of reefs that are dominantly algal in origin. "Hydrozoan corals" perhaps means alcyonarians - a group whose fossil record is sparse and which do not seem to have been major reef-builders in the Palaeozoic.

To summarise, this work is well-written and copiously illustrated; but it should be read with care, in view of serious factual misstatements and misinterpretations. It is useful background reading on geological environments but is no way a practical handbook on palaeoecological techniques. For that, one must turn to Ager's more expensive work "Principles of paleoecology" (McGraw-Hill).

WILLIAM A.S. SARJEANT

D.L. EICHER 1968 Geologic time. Foundations of Earth Science Series. Englewood Cliffs, N.J.; PRENTICE-HALL 150 pp., many illustrations. 21s.

W.B.N. BERRY 1968. Growth of a prehistoric time scale based on organic evolution. San Francisco and London: Freeman, 158 pp., 16 figs. 52s. cloth, 22s. paper.

Geologists this century have been fortunate in that the subject of geologic time has attracted the attention of some of the most lucid geological writers, from W.J. Sollas ("The Age of the Earth", 1905), through Arthur Holmes ("The Age of the Earth", 1927), to Frederick Zeuner, primarily concerned with the Quaternary ("Dating the past", 1946) and Stephen Toulmin and June Goodfield, with their concern with the historical development of the subject ("The discovery of time", 1965). The two writers whose works are here reviewed are worthy additions to this distinguished company, for both books are distinguished by clarity of style and a high standard of factual accuracy.

Eicher's book is the more general in its scope, as is indicated by the titles of its six chapters. The first, "Growth of the concept", is a selective historical account of the principal phases of the development of our ideas on geologic time. Chapter 2, "The rock record", is a simple account of rock types and sedimentational structures; it may be skipped by readers with even a fair background of geological knowledge. In Chapter 3, the matter of "Stratigraphic units" is considered. This is reinforced by Chapter 4, which treats with "Physical correlation and palaeogeography". The section on Continental drift is especially praiseworthy for its balance and scientific detachment; its conclusion, "We must learn more before the theory of Continental drift can be considered firmly established", deserves to be borne in mind by many geologists who are over-ready to use it as a solution for their purely local problems. The two latter chapters

deal with the principal methodological approaches to geologic time, "Biostratigraphy" and "Radiometric dating".

One or two comments need to be made. On pp. 49-50, the pioneer stratigraphic studies of J.L. Girard-Soulavie, who was the first to distinguish and correlate strata by their fossil content (1780), ought surely to have been mentioned. The use of the term "Eogene" (p.56) is surely less general than that of its synonym "Palaeogene", which is not mentioned. On p.56, it is stated that the Paleocene (among other series) has its type section in France: this is not strictly true, for its two lower divisions, Montian and Danian, have their type sections in Belgium and Denmark respectively. It is not made clear that Pleistocene is used in two senses (some authorities, e.g. West 1968, use it to comprise the whole of post-Pliocene time) and the alternative name "Flandrian", for the period since the recession of the last glaciation, is not mentioned. Finally, Eicher comments quite validly on the reluctance of geologists to seek international agreement on stratigraphic divisions: but he does not mention the pioneer work done in this direction by the two International Colloquia on the Jurassic, held in Luxembourg in 1962 and 1967, which have achieved international agreement on stage subdivisions for the lower two thirds of this system and resolved the problems of its upper and lower boundaries. However, these are all minor criticisms: this is an excellent and readable book which can be highly recommended.

Berry's work, in contrast, explores a particular aspect of geologic time in depth, for it comprises an account of how stratigraphic divisions came to be established, on the basis of correlation by fossils. His account is especially of interest in that it details the work of less familiar figures, such as Lehmann, Flüchsel, Arduino and d'Omalius de Halloy, and thus puts into better perspective the contributions of such "giants" as Steno, Hutton, William Smith and Lyell. The development of the nomenclature of the geological periods is discussed in fuller detail than in any other text currently available. The only fault with this excellent work is that it does not give an adequate coverage of developments in stratigraphy during the last 50 years: although Arkell's stratigraphic studies on the Jurassic are mentioned, his profoundly important 1946 paper, with its attempt to codify rules for the establishment of an international stratigraphic nomenclature, is not; nor is there any reference to the controversial proposals of Hollis D. Hedberg. Perhaps Berry felt that we were too near to such events to get them in accurate perspective!

WILLIAM A.S. SARJEANT

T.D. FORD & J.H. RIEUWERTS (editors) 1968. Lead Mining in the Peak District. Bakewell, Derbyshire: Peak Park Planning Board. 124 pp., 15 pls., many text-figs. 5s.

During the period 1966-7, when the reviewer was serving as Preservation Officer for the Peak District Mines Historical Society, he proposed to Mr. Foster, of the Peak Park Planning Board, that that organisation might sponsor a booklet which would serve as a general introduction to Peak mining and a guide for those who would like to examine its surviving surface relics. This was agreed. In consultation with the Council of the P.D.M.H.S., a provisional contents list was decided upon and the task of writing about particular mines or groups of buildings was assumed by various members of that Society. This was almost immediately beneficial, for it brought about the surveying, and research into the history, of some mines and smelts which were then little known: for example, Ronald N. Tune undertook a study of Snake Mine, Hopton Wood, and Lynn Willies, with collaboration from C.J. Williams, made a pioneer study of the isolated Stone Edge Smelt.

When the reviewer went to the U.S.A. in the summer of 1967, James H. Rieuwerts became Preservation Officer and, in collaboration with Dr. Trevor D. Ford, he undertook the final organisation of manuscripts and preparation of the booklet here reviewed. The Editors and the Society deserve every congratulation, for this is, beyond all question, the handiest and most readable

work on Peak District mining yet produced, as well as the least expensive. It is also the first guide to be produced for use in the field by the visitor to the Peak District who is interested in industrial archaeology.

There are five principal sections: an account of "The lead ores and veins" by Dr. T.D. Ford; a "History of Mining" by Mr. Rieuwerts; a series of 12 itineraries for field excursions written by various members of the P.D.M.H.S., each of which incorporates a historical account and a map or plan; a glossary of Peak mining terminology; and a list of suggestions for further reading. A series of plates form a central section to the booklet, all of them good and some of outstanding quality.

This fine booklet can certainly be cited as "BEST BUY" in the North Midlands literature for 1969.

WILLIAM A.S. SARJEANT

A.L. MCALESTER 1968. The History of Life. Foundations of Earth Science Series, Englewood Cliffs, New Jersey; Prentice-Hall. vii + 152 pp. with appendix and many illustrations. 25s.

"The history of life" considers the origin and development of life, its diversification and development in the seas, the move to land environments by plants, and the later evolution of reptiles, mammals and man.

The book covers an immense field and, as the length of the book is short, the author has chosen, in keeping with the general scope of the series, those aspects which have had most impact on the study of evolution during the last few years. Aspects of evolution have always interested the layman and a number of books have appeared lately on this subject: this book will certainly be compared with Beerbower's "Search for the past" (1960), Brouwer's "General palaeontology" (1967), or Bernal's "The origin of life" (1967), to mention only a few which are at present on the bookshelves.

The most difficult part of the history of life is undoubtedly the beginning. McAlester's book follows the now familiar routine of organic molecules, organic photosynthesis, bacteria and iron deposits, algae and stromatolites, coal and limestone deposits in ancient rocks and eventually to the 'true' fossils found in the Gunflint Chert deposits of Lake Superior and on to the Ediacara fauna of Australia. British readers will regret that there is no mention of Charnia: nor is there any clear distinction between living and non-living organic material. It would have been useful to find, in the first chapter, ideas on the kind of evidence one should look for in the earliest rocks to formulate a hypothesis on the origin of life and the time taken for this life to evolve.

Comments could be made in the same way about other chapters. What has been included is to the point, up-to-date and concise. Unfortunately, many readers will find that their pet group has not been included for survey and will thus be disappointed.

The book is well illustrated and printed in clear type in a modern treatment. It is one of a series intended for the educated beginner, wishing to get into a subject quickly and to obtain up-to-date facts and ideas: for such a public, the price in this country is a little high. This book is not intended for, and will not appeal to, the specialist, who would certainly prefer to consult original sources.

FRANK M. TAYLOR

J. E. METCALFE 1968. British Mining Fields. London: The Institution of Mining and Metallurgy, 91 pp., 25 pls. 50s.

Mr. Metcalfe was invited to write this book and was no doubt working to a brief and under pressure to finish it in time for the Ninth Commonwealth Congress of Mining and Metallurgy. Undoubtedly, as the President of the Institution of Mining and Metallurgy says in the forward, Mr. Metcalfe has produced "a guide that is sufficiently brief to give busy people time to read it"; one hopes that these same busy people will be willing to spend fifty shillings on such a slim volume.

The author is nevertheless to be congratulated on attempting to review the British Mining Industry in less than 30,000 words and in succeeding in conveying succinctly both an appreciation of historical aspects and of modern technology. That such a review is needed is illustrated by the fact that nothing has been attempted since Sir Robert Hunt's monumental British Mining was published in 1884.

The literature on this subject is widely scattered throughout numerous journals and it is regrettable that Mr. Metcalfe has rejected this opportunity to provide a guide to this voluminous literature. The lack of a bibliography and the scanty nature of the references in the text mean that this otherwise admirable publication will be of little use to the senior student of either Mining or Mining Geology. The restriction of the subject matter to those materials obtained by underground mining methods gives a curiously unbalanced view of the present British economic geology scene. Bulk minerals such as sand and gravel, limestone, road metals, rock aggregates, clays and shales are not discussed since none are obtained by underground methods. On the other hand, since the East Midlands Ironstones are worked underground at Dragonby and Barton they are included and methods of opencast workings are discussed. The Monks' Park Bath stone is discussed since it is worked underground but other important building stones, such as Portland, Clipsham and Ancaster, are not mentioned. In the writer's view, a more balanced result would have been achieved if the author had limited himself to, say, British metalliferous deposits and discussed these irrespective of whether they were worked above or below the ground.

It is hoped that Mr. Metcalfe will now attempt the more comprehensive and well documented account of British Economic Geology which is badly needed by serious students of the subject.

RONALD J. FIRMAN

T. S. SANDS (editor) 1968. The natural history of the Sheffield district. Sheffield: The Sorby Natural History Society. 73 pp., 4 pls. 10s. (Available from Messrs. A. B. Ward's Bookshop, Chapel Walk, Sheffield).

This is the Jubilee publication by which one of the East Midlands' most eminent amateur societies commemorated its fiftieth year of existence. It was formed, from the fusion of the earlier Sheffield Microscopical Society and Sheffield Naturalists' Club, on the 14th December 1917. The name, initially the Sorby Scientific Society, was chosen to honour the Sheffield-born naturalist Henry Clifton Sorby (1826-1910). Sorby was one of those Victorian scientists of seemingly universal talents, a pioneer in the fields of metallurgy and marine biology, in the study of meteorites, in igneous petrology, in the study of sedimentological and metamorphic processes, and a host of other fields: his name was additionally appropriate for the new Society in that he had been President of both the constituent Societies at different times! The new Society flourished

immediately - and, indeed, has continued to do so ever since.

A Geological Section was formed in 1921 with Mr. A.C. Dalton, an amateur geologist well known for his glaciological researches in Derbyshire, as its first Secretary. In 1929, the Society published its first (and only) volume of "Proceedings" under the title, "The natural history of the Sheffield district" (the same title as this Jubilee volume): it contains an important paper on the geology of the Stoney Middleton region by T.O. Morris, which was the product of a joint mapping project by the Geological Section.

Three years later, because of a steadily declining concern with other aspects of science, the current name "Sorby Natural History Society" was adopted. A strong interest in geology has always characterised the Society; its Presidents have included Professor W.G. Fearnside, for long Sorby Professor of Geology in the University of Sheffield, and Dr. Jack Shirley, author of a series of fundamental works on Derbyshire geology; in the Jubilee year, another notable geologist, Mr. William H. Wilcockson, who had been President in 1929, was occupying this office for a second time. (Mr. Wilcockson led an East Midlands Geological Society excursion to Edale in 1966, reported in "Mercian Geologist" vol. 2, no. 1.)

Publication by the Society was not resumed until 1958, when a new journal, "The Sorby Record", appeared under the Editorship of the reviewer. This has since progressed from a duplicated format to the dignity of offset litho printing; it stimulated a renewal of research by the Society. Noteworthy early contents included an account of the geology of the City of Sheffield by Dr. L.G. Love, a description of the Ewden Valley lead-mining district by Mr. M.E. Smith, and an account of the Magpie lead mine by Miss Nellie Kirkham: however, in recent years the geological content has declined.

The content of the Jubilee Volume is as comprehensive as its title suggests. The account of the geology of the Sheffield District is given by Mr. Wilcockson: this treats with an area contained within a circle whose northern boundary is drawn south of Pontefract and which includes Worksop in the east, Matlock in the south and Kinder Scout in the west - a stratigraphic range from Carboniferous Limestone to Keuper Marl, with a covering of Pleistocene and Recent sediments. Because of limitations on space, this is inevitably very much a summary: no details of specific outcrops are included. However, it is lucid and up-to-date, serving as a useful background to the subsequent botanical and zoological chapters.

The format and binding are attractive and the photographs excellent, though their reproduction is, unfortunately, only adequate. The volume is, in general, a credit to the Society and an appropriate commemoration of its Jubilee: it is a worthwhile acquisition for E.M.G.S. members living in the Sheffield area.

WILLIAM A.S. SARJEANT