

REVIEWS

ALAN MOOREHEAD, 1969. Darwin and the Beagle. London: Hamish Hamilton.
280 pp, many illustrations. 75s.

Books on Darwin and Darwinism are legion and, when yet another appears, one might well ask if there be any justification for it. Following the publication of the "Origin of Species", Darwin (so he tells us in his "Autobiography") made an attempt to collect all that appeared on the book, "excluding newspaper reviews", but the volume grew so great that he "gave up the attempt in despair".

The author of "Darwin and the Beagle" is not known for his scientific work; however, he is the highly accomplished - and successful - author of several interesting non-fiction works and has the ability to make what could be a rather boring subject very readable. Editions of Darwin's own account of the voyage of the "Beagle" are not uncommon; however, to many would-be readers they have a somewhat Victorian appearance which does not lend itself to easy reading. What Moorehead does, in effect, is to rewrite Darwin and pad the account with information culled from other works. The whole process produces a highly interesting and very readable account of an important voyage.

Not unnaturally the methods utilised by Moorehead cannot escape criticism, particularly regarding what he manages to leave out. Darwin stressed the importance of geological observation, but Moorehead pays scant attention to this aspect of the voyage and even refers to the giant ground sloth Mylodon as "an extinct elephant", while indexing another ground sloth, Megatherium, as appearing on page 81 when it does not. Nevertheless such defects are of minor importance; a palaeontologist would note them, but most general readers will not. A more debatable procedure is to present certain of Darwin's later formulated opinions as dating from the period of the voyage; however, once again it will be the specialist to whom this is jarring, not the general reader for whom the book seems primarily to cater.

The last chapter concerns the historic meeting of the British Association at Oxford in 1860. It was here that Bishop Samuel Wilberforce sought to "slay the evolutionary infidels", but was himself "slain" by the redoubtable T.H. Huxley. This was also a public condemnation of his scientific "advisor", the anatomist Richard Owen, who seems to have been more peeved at the publicity Darwin was receiving than the bitter opponent of evolution as which history has branded him. Huxley and Owen had crossed swords before; and while "Soapy Sam" Wilberforce took the public drumming, in reality it was Owen who went off to sulk.

It had not been Huxley's intention to attend the British Association meeting but, as Moorehead notes, a chance meeting in the street with an old friend had brought about the change of heart. The old friend, who Moorehead does not name, was in fact Robert Chambers, author of an earlier and equally controversial evolutionary work, "Vestiges of the Natural History of Creation" (Leicester University Centre for Victorian Studies have, through the University Press, recently republished this once famous book). The fact that it was a bishop who led the attack on Darwin's theories illustrates the bitterness to which they gave rise in religious circles, though it should be noted that hostility was not unanimous (as witness the Reverend Charles Kingsley's welcome of the theory). Darwin seems to have been rather puzzled by it all and noted in his "Autobiography" that "considering how fiercely I have been attacked by the orthodox it seems ludicrous that I once intended to be a clergyman". When the invitation to join the "Beagle" as naturalist reached Darwin, one of the objections to his accepting which his father raised was that it would be "disreputable to (his) character as a clergyman". As it turned out, Darwin's intention

to take Holy Orders died a natural death on his joining the ship. Another objection made by Dr. Robert Darwin to his son taking on the job was that the voyage "would be a useless undertaking". How wrong he turned out to be.

"Darwin and the Beagle" is a book which makes the famous voyage come alive; for those who know little about it in detail but want to fill this gap in their knowledge, this book will be welcome. It is well printed and contains a wonderful range of illustrations, many in full colour. The price is high, which is a pity as I feel there are many people who would like to own this book but who may think twice before paying 75/-.

ROBERT W. MORRELL

Geology: Journal of the Association of Teachers of Geology, vol. 1, 1969, Ashstead, Surrey: Association of Teachers of Geology. 68 pp. (obtainable from Dr. J.R. Harpum, Secretary of the A.T.G., St. Paul's College, Cheltenham, Glos.: Price not stated).

The teaching of geology in Britain has had a varied history. At the university level, it may be said to have begun in Scotland, where John Walker, Professor of Natural History in the University of Edinburgh, was already giving a remarkably sound course in geology between 1779 and 1803 (as is indicated by his "Lectures", published for the first time in 1966 by the University of Chicago Press). His successors included the arch-Wernerian Robert Jameson, an influential teacher (although Charles Darwin found him "distressingly dull") and Edward Forbes, a versatile naturalist who was arguably the founder of palaeoecology. Not until 1871, however, was a specific Chair of Geology founded (its first holder was Archibald Geikie, succeeded by his brother James in 1882). In England, the commencement was almost as early: John Kidd, primarily a chemist, introduced geological courses at Oxford during the years 1805-10 and William Buckland, who succeeded him as Reader of Mineralogy in 1813, greatly expanded this aspect of his teaching, becoming the first Professor of Geology in 1819. Although the Woodwardian Chair of Geology at Cambridge had existed since 1731, none of its incumbents did anything in the way of teaching (indeed, only two of them, John Michell and John Hailstone, can even have been said to have done any geology!) until 1818, when Adam Sedgwick was elected and poured his considerable energies into the task of learning to be a geologist, since he had done no geology beforehand! The year 1838, when Charles Lyell commenced lecturing at King's College, London, marks the beginning of a greater expansion: geology had become sufficiently "respectable" to be included in the curricula of all subsequent University foundations of Victorian times, and its progress as an academic discipline has since been steady.

Outside the Universities, the development of geology presents a much less coherent picture. During the later nineteenth century, the subject had become so popular that audiences for the major figures were sufficient to fill large lecture halls: through the efforts of such educationalists as Thomas Henry Huxley, evening courses in geology were being given widely in Mechanics' Institutes and People's Colleges in major towns throughout Britain; and the geological collections featured in most local museums, were arranged and labelled for serious students willing to spend days in their study. In the twentieth century, however, the position has altered markedly and the present position presents many unexpected paradoxes. Thus, for example, no geological lecturer would expect to be able to pack a hall; yet the attendances at classes run by the W.E.A. and University extramural departments has never been higher. Geological societies relying on amateur support had a hard time to survive in the '30's, '40's and '50's; yet now they are doing well again, as is witnessed by the success of the East Midlands Geological Society and the impressive exhibits at the Geologists' Association's annual reunions. Television programmes on geology obtain good viewing ratings; plastic dinosaurs pop out of corn-flake packets: and there are more (and better

illustrated) books on geology for children than ever before.

Yet, paradoxically, popular knowledge of the subject is surprisingly poor. A national newspaper recently was astonished that the findings of ammonites in a Midlands motorway excavation "proved that this part of the country was once under the sea"; a Sunday "intellectual" paper published a map of fossil localities which was a horrifying hotchpotch of errors; and an illustrated paper produced a feature section likening young pelicans to the pterodactyl, "the first bird". Often, indeed, the subject is confused with archaeology. (The writer recollects being asked whether he spent his time "digging up pyramids!").

Museum collections of rocks and fossils have all too often come to be sadly neglected: most provincial museums nowadays are staffed by biologists or archaeologists, unwilling or incompetent to revise geological displays in such fashion as to attract the museum visitors of these more hasty times. In some instances, indeed, geological collections have actually been thrown out: the collection of a London borough museum was only narrowly saved from the refuse heap by Reading University, and the collection of a museum in the northeast was actually used as road-building material!

More serious is the flagrant disregard of geology by architects and planners, with consequent wastage of public and private money and the erection of unsatisfactory, uncomfortable and, even dangerous structures. Politically, geology has made scant progress to date. Legislation enforcing adequate surveys before civil engineering works is still lacking; a recent bill enforcing the geological surveying of tips has been formulated only after the need had been so horrifyingly underlined by the Aberfan disaster. The laws governing prospecting are a creaking wilderness of antiquated regulations and injustice - a serious deterrent to investment in the exploitation of British raw materials. The geologist in Britain is not a recognised professional figure: there is no organisation to protect the interests of the consultant geologist. Science in schools has for long come to mean "physics + chemistry", with biology taught as a rather apologetic addition: geology only rarely figures in curricula as a special subject, despite an encouraging growth in recent years in the number of schools teaching it, and its inclusion in general science courses is generally only perfunctory.

In an attempt to remedy an unsatisfactory situation, Section C of the British Association for the Advancement of Science set up a sub-committee to enquire into the teaching of geology in schools. The almost total lack of liaison between schools and Universities was speedily recognised and Professor L.R. Moore (University of Sheffield) suggested that a national association of teachers of geology be formed to provide common meeting ground. This matter was further explored during the Nottingham British Association meeting in 1966: a questionnaire was prepared and circulated to ascertain the probable support for such an organisation. Sufficient favourable replies were received to encourage further action; and, at a meeting at Keele, Staffs. in 1967, the Association of Teachers of Geology came into being, with the avowed object of advancing teaching in Universities, schools and colleges throughout the United Kingdom. In the following year, a further Conference was organised: and now the Association has published its first journal, under the simple but comprehensive title "Geology".

The journal presents an agreeably mixed bag of contents. A brief account of the formation of the Association is given by D. Emlyn Evans; and articles by Rex. L. Birch and Victor R. Paling discuss the teaching of geology in primary and secondary schools respectively. A.C. Higgins and E.C. Spinner give a clear description of techniques for the extraction of microfossils, though the hazardous character of some of the chemicals employed necessitate laboratory facilities unlikely to be available to most of their readers. (The figures accompanying this article contain two errors: Micrhystridium is mis-spelled "Micrhrystidium" and the form figured as "Tasmanites"

is in fact a Dictyotidium.) Finally, two topical articles are included: an account of the search for natural gas in the North Sea by Rex L. Birch and a fascinating anthology of writings about William Smith, the "Father of English Geology" born just two centuries ago, presented by Douglass A. Bassett.

It is hoped that the Association may succeed in a wider sense than its objects embrace; we, as a nation, are in urgent need of geological education, for it is vital that our restricted land area should be used intelligently and our resources exploited to the fullest extent.

WILLIAM A.S. SARJEANT

G.M. BENNISON & A.E. WRIGHT, 1969. The geological history of the British Isles. London; Edward Arnold. Boards £5.0.0.: paper £2.10.0. (£2.50).

Geologists this century have not been well served by texts on the stratigraphy of the British Isles. In the fifty years following the publication of Horace B. Woodward's classic "Geology of England and Wales" (1887), no authors had the courage to attempt works on a similar scale: the "Handbook of the geology of England and Wales" (1929) was a compilative work, with chapters of very variable quality, and its companion volume, "The handbook of the geology of Ireland" (1924) is a slight work of small value. In 1937 A.K. Wells' "Outline of historical geology" appeared; this work, misleadingly titled since its scope is wholly British, was revised by its author, in collaboration with J.F. Kirkaldy, in 1948 and again in 1959: it was to be a standard text for University geologists for some 35 years and has the assets of clarity and digestibility, but did not attempt to be as comprehensive as Woodward or the "Handbooks" and was of slight value at postgraduate level. By the 1950's, then, publication of a new comprehensive work on the stratigraphy of Britain was long overdue.

In the last and the present decade, the picture has been entirely transformed. Ireland has been especially well served, with three texts: H.E. Nevill's "Geology and Ireland" (1963), and two works by A.K. Charlesworth: "The geology of Ireland; an introduction" (1953) and "The historical geology of Ireland" (1963). G.Y. Craig has edited an excellent compilative work, "The geology of Scotland" (1965) and P.C. Sylvester-Bradley and T.D. Ford, a comprehensive "Geology of the East Midlands" of England (1968). A new, revised and greatly enlarged edition of Wells & Kirkaldy appeared in 1966, with additional chapters and earlier sections rewritten: and in 1967, Dorothy H. Rayner's "The stratigraphy of the British Isles" appeared (see review in Mercian Geologist" Vol. 3, no. 1, pp. 104-5). Hard on its heels comes the work here reviewed. The paper covered edition, received for review, has a pleasingly designed cover of a bronze hue: unfortunately, it shows signs of wear after only a single reading. It is not typographically attractive; the type-fount employed is too small and the lines too closely spaced for ready reading. Illustration is by text-figures, mostly culled from earlier books and papers by other authors, though a few are original: these show correlations of strata, reconstructions of past palaeogeographies, structural reconstructions and isopachyte maps. No illustrations of fossils are included.

The plan of the contents is straightforward. The book is divided into six sections: the first is on "General Principles" and the succeeding five sections each treat with a major division of geological time (Pre-Cambrian, Lower Palaeozoic, Upper Palaeozoic, Mesozoic, Cainozoic). After a single chapter on the Pre-Cambrian, the chapters are devoted to a particular system or major orogeny. The division of the Cainozoic into "The Tertiary" and "The Pleistocene", however, is surprising - the immense amount of data on the Pleistocene fully justifies a separate chapter but, since the Pliocene is also dealt with, it would have been better entitled "The Quaternary":

and surely the effects of the Alpine orogeny merited more extended treatment?

The text attempts to summarise the whole, complex stratigraphic story of the British Isles; it is thus, inevitably, packed with bed and locality names and with other detailed information. It is a hard task indeed to attempt to incorporate such a vast mass of data and yet to keep the text readable. The authors have, unfortunately, achieved only intermittent success; though particular sections are quite lucid (notably some of those on structural geology), the work as a whole does not make for ready digestion.

The authors append a section of fossils to each stratigraphical chapter. Their approach is strictly "classical": their attention is confined to invertebrates, vertebrates and macroscopic plants. Microfossils, in contrast, receive very scant treatment; foraminifera and ostracods are each mentioned only twice, conodonts once and spores not at all, though Quaternary pollen spectra gain brief mention. This blinkered view of palaeontology has produced at least one unfortunate mis-statement: that in Caithness and Orkney "the absence of fossils makes it impossible to determine when Old Red Sandstone sedimentation ceased" (p.180). In fact, the work of J.B. Richardson has demonstrated that it is possible to make both local and long-distance correlation of these strata by means of fossil spores (e.g. Palaeontology, vol. 7, pt. 4, 1965). The importance of Chitinozoa, acritarchs, dinoflagellates and diatoms in correlation at different stratigraphic levels is not mentioned; and foraminifera and ostracoda are only mentioned as being useful in the lower Tertiary and the Purbeck Beds respectively, whereas they have been a major tool, in subsurface correlation especially, throughout the geological column from mid-Palaeozoic onward. The mis-statement that radiolaria, an exclusively marine group, occur in lakes (p.29) should be noted: and the authors were unaware of work by Downie and Ford (Proc. Yorks. Geol. Soc. Vol. 75, pt.3, 1966), who have used acritarchs to demonstrate that the Manx Slates are, in part at least, of Ordovician age.

To the uninformed reader, the authors' use of stages and stage-names will be a source of recurrent confusion. The definition of a stage on p.24 ("divisions of strata corresponding to a longer division of time than a zone") is not very specific: and the follow-up note that "The stage has been evolved to augment or to define more precisely in terms of time the divisions of the stratigraphical column called series" is not helpful. Indeed, the authors' usage of stages in subsequent chapters is inconsistent, suggesting some confusion in their own minds. Thus, in the Ordovician chapter, only series names are listed and it is not made clear that the British series names are the basis for the international stage names: in contrast, Devonian stages are clearly tabulated (p.161). On p.99, the so-called "stage" names employed (Costonian, Marshbrookian, etc.) are purely local names formulated for Shropshire and without wider application: this also is not made clear. In successive tables on pp. 122, 124 and 125, "Wenlock Series", "Wenlock" and "Wenlockian" are used (the latter also appears as a subheading); since a table on p.117 introduces the local name: "Eltonian", Whiteliffian", etc., as zone names, the author might legitimately be confused as to the significance of "Wenlockian". On p.161 and elsewhere, the word "Gedinian" appears; this Devonian stage-name is more usually spelled "Gedinnian". The retention of the old stage-name "Purbeckian", which overlaps the Jurassic-Cretaceous boundary, is indefensible after its formal abandonment at international level: "Purbeck" should be used as a series or facies name only. The names "Argovian", "Rauracian" and "Sequanian", shown as used in Western Europe, never achieved currency outside France and have likewise been abandoned by formal international agreement: the two latter were viewed as substages of the Oxfordian, rather than as successor stages to a reduced Oxfordian. "Palaeocene" (p.352) is correctly spelled "Paleocene": most Tertiary workers would nowadays consider that the Montian and Danian are synonyms and many would place the Landenian, or at least the Thanetian, into the Paleocene, so that the lower part of the British Tertiary succession would include that "system". The table on p.335 is inadvertently misleading, in that it suggests that all Oligocene "stages" are present in Britain: in fact the highest, the Chattian, is absent. The status of the divisions of the

Neogene quoted on p.351 is not made clear and the implication that the Pliocene consists of one "stage" only must be presumed to be inadvertent.

A number of other specific points merit mention. The divisions of the Precambrian quoted on p.12 are not the product of international agreement and are oddly chosen; the Eocambrian is usually considered part of the Proterozoic, itself part of a threefold division including Azoic and Archaeozoic. (They form a sequence of diminishing duration, with Archaean immensely longer than Proterozoic and Eocambrian very brief.) On p.14, Corallian is cited as a synonym of Oxfordian, whereas it is merely Upper Oxfordian. On p.24 the duration of the Lower Jurassic is quoted as "less than 10 million years": Howarth (in the symposium volume "The Phanerozoic Time Scale", Geol.Soc.Lond.1964) quotes a duration for the Jurassic of 55-60 million years and for the Lower Jurassic of about 24 million years. On p.32 the origin of deep-sea red clays is discussed; it is highly probable that meteoritic dust is a major constituent, in view of the daily rain of debris from space onto the earth - a point not mentioned. The statement on p.67 that the Uriconian volcanic rocks are "mostly acid" is an oversimplification; certainly in the Stretton Hills, andesitic and basic materials figure largely. The Orusia Shales of the Shropshire Cambrian (p.82) escape mention. On p.302 the archaic name "Estuarine Series" is used without comment in the Yorkshire Middle Jurassic sequences: the name "Deltaic Series" is more general in modern literature. The diachronous nature of the London Clay, considered by the authors to be speculative, is strongly supported by recent, still unpublished studies of microplankton assemblages.

This work is a compact compendium of stratigraphical data. It is, in part, the geological history that the title leads one to expect, in that an account is given of the movement of shorelines of structural events and of sedimentological conditions. However, the living landscape of the past - its animals, its plants and their environment - is not dealt with. The beginner will find this book heavy going: its dense packing of detailed facts will be hard for him to digest and the frequent use of technical geological terms that have not been defined will bemuse him. A geologist with a good background in his subject, however, will find it a worthwhile purchase; he will recognise its faults but he will find them to be outweighed by its merits as a convenient sourcebook for stratigraphical information.

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