

to make a sedimentary structure. This classification provides a valuable basis for the analysis and description of structures in the field or in the specimen. The genetic classification used is essentially a substantial expansion of that proposed by R. E. Elliott. Structures are grouped according to origin into the four categories: hydrodynamic, rheotropic, biogenic and diagenetic. Each of these groups is further classified.

The authors set themselves the task of providing "an aid, for use in the field and laboratory, in the identification and description of sedimentary structures in both outcrop and core, and their application to the problem of reconstructing ancient depositional environments". Curiously, having set themselves this imaginative brief, Conybeare and Crook then narrow down their task in a manner which will puzzle most sedimentologists used to thinking about sedimentary rocks and modern sediments as parts of a single continuum. Attention is to be confined to structures on what is called the mesoscopic scale, that is, visible in anything between hand specimen and outcrop. Moreover, sedimentary environments are to be thought of primarily as geographical places, rather than as portions of space in which unique assemblages of intrinsically quantifiable processes are located. The consequences of these self-imposed limitations, for example, the absence of discussion of the larger bed forms and a certain naivety in the treatment of the physical and environmental significance of structures, underlie the only reservations I have about an otherwise useful and attractive work. It is, I believe, essential to try to comprehend the whole continuum of sedimentary structures, from the surface texture of sand grains to the largest of desert dunes or linear sandstone bodies. Furthermore, I think it is more important to know first and in detail the immediate causes of a structure than where that structure is to be found. There are grave dangers in the purely empirical approach to the interpretation of sediments, if only because modern sediments on the Earth's surface have as yet been most inadequately sampled, and more than a study of sedimentary structure is needed for success in environmental reconstruction.

The book includes a long list of references followed by 108 illustrative plates. The text is a clearly written and balanced survey of the sedimentary structures which the authors regard as falling within their compass. Schemes for description are given and key papers and reviews are cited. The plates, which mostly represent new material (chiefly from Australia), are, generally speaking, satisfactory, though a number have suffered during publication. It is sometimes difficult to ascertain their scale properly, and inexperienced students will certainly be mystified by these instances.

With the reservations mentioned above, I shall certainly be glad to recommend this book to my students for use in the field (at base) and in the laboratory. At its price (to educational institutions) it is an excellent buy.

J. R. L. ALLEN

LANDSCAPE STUDY

Principles of Geomorphology

By William D. Thornbury. Second edition. Pp. xi + 594. (Wiley: London and New York, April 1969.) 130s.

WHEN this book was first published in 1954 it was very much ahead of its time and was probably one of the first to contain references to the then new quantitative methods in geomorphology, as well as being a sound university textbook. It is disappointing therefore that this second edition does not seem to have kept pace with the developments in the ensuing fifteen years. Some new material has naturally been included, but the preface to the second edition is more an apology for what has been left out than an explanation of what recent advances have been

included. And it is a very great pity that the author "did not feel competent to do justice" to a treatment of "Quantitative Geomorphology" especially as the chapter on "Tools of the Geomorphologist" of the first edition has not been included. His justification for the omission is that "several books have appeared on this subject in recent years". But then, so have many other geomorphology textbooks!

All the branches of geomorphology are otherwise dealt with well in the book. With one exception, the organization is the same as that in the first edition. If individual chapters are compared it is true to say that much of it is unchanged but additions and amendments have been made to most of them. Obviously it would be too lengthy to itemize all the changes, but perhaps the most significant additions are those on the concept of equilibrium and the expansion of Penck's ideas, and more especially the new chapter on palaeogeomorphology. This chapter—the only new one—divides these previously formed and now visible landscapes into relict, buried and exhumed types, the main criterion for their identification being that the landscape in question should have been formed by processes now no longer operative on it. The use to which the knowledge of these ancient landscapes may be put is discussed with special reference to petroleum exploration.

The book retains almost all of the diagrams and photographs of the previous edition—new ones are hard to find. More has happened in geomorphology during the past fifteen years than is apparent here, however, and this amount of new material hardly seems to have justified another edition, and because the book is manifestly intended for students, its price—twice that of the previous edition—seems a little excessive.

JOHN R. V. BROOKS

EXTINCT PLANTS

The Yorkshire Jurassic Flora

Vol. 3: Bennettitales. By Thomas Maxwell Harris. Pp. vi + 186 + 8 plates. (Trustees of the British Museum (Natural History): London, February 1969.) 140s.

The Yorkshire Jurassic flora is now probably the most thoroughly known of all Mesozoic floras in the world. This is certainly due more to the work of Professor Harris than to any one of the many other palaeobotanists who have studied it during the past 150 years. The present volume is the third in a projected series of four which, when completed, will be a comprehensive account of the whole flora. This volume deals with a single order of extinct plants, the Bennettitales. It contains systematic descriptions and line drawings of all the Yorkshire Jurassic species, supported by eight collotype plates of photographs. There is a key to the genera of leaves, and a field key (based on macroscopic characters) for the species within each genus.

Harris's style is unique; the descriptions are forthright, and the author draws the reader's attention to the weaknesses of his interpretations as vigorously as he hammers home his convictions. Among the more important of these is the final demolition of the "Cycadophyta" concept—that of a group comprising the extant cycads proper plus the Bennettitales, which resemble them principally in a parallel range of leaf form. Harris concludes that "any phyletic connexion between them must be remote. The term 'Cycadophyte' which was intended as a major phyletic group means no more than 'Gymnosperm with a pinnate leaf'". The old division of the Bennettitales into two families, based respectively on the Jurassic williamsonias and the Cretaceous cycadeoids, is abandoned; this is the outcome of increased knowledge of the whole group, and particularly of the work of Delevoryas at Yale, on the American cycadeoids, which