

In the 80 years following Sorby's work, there was little interest in sedimentary structures on account of the overwhelming need to solve purely stratigraphical problems, in which features indicative of sedimentary environment were widely thought to be irrelevant.

The wheel has turned once more, and geologists now realize the importance of a knowledge of sedimentary structures to an appreciation of both stratigraphy and sedimentary environments. But first, one must find the structures and then develop them to reveal as much as possible about themselves. Dr Bouma's important book is concerned with the techniques available to reveal sedimentary structures in the greatest possible detail according to circumstances. In studies of modern sediments, the field worker is faced with two problems which must be solved together: how to consolidate the sedimentary material and how to pick out with clarity the structures present in the deposit. The worker on consolidated sediments, on the other hand, is often faced with rocks showing structures only obscurely or not at all, and techniques are therefore needed to reveal any structures which, by reason of diagenetic processes, have become obscured or hidden in the rock.

Solutions to these and many related problems are to be found in Bouma's thorough and detailed account. The making of sedimentary peels is described together with the impregnation of sediments, either dried out or in a wet or moist state. Radiography, with application to unconsolidated as well as to lithified sediments, is discussed in detail and many useful practical hints on this relatively troublesome and expensive technique are given. Bouma also describes a variety of minor techniques such as staining, sand-blasting (also useful in fossil preparation), and moulding. The book has an exhaustive list of references, helpful appendices containing conversion tables and receipts, and a particularly useful list of manufacturers and suppliers of materials and apparatus.

This book will be an essential reference for all whose work involves sedimentary structures. It is unfortunate that its length and therefore price could not have been kept smaller by the rigorous exclusion of unnecessary detail and illustration for its own sake. For example, there are twenty-three full pages of costly half-tone illustrations that do little more than show that radiography will reveal the (not always unobvious) fabrics and structures present in rocks of different kinds. It is a pity that readers should be burdened in this way.

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## ENGINEER'S VIEW OF GEOLOGY

### Engineering Geology and Rock Mechanics

By Neil Duncan. Vol. 1: Pp. xxii + 252 with 37 plates. Vol. 2: Pp. xxiv + 270 with 68 plates. (Leonard Hill: London, 1969.) Vol. 1, 55s; Vol. 2, 60s.

THE recent appearance of several new books on engineering geology suggests that new ideas and techniques have made it an opportune time for a re-statement of the subject for students. This two-volume work is related to the author's own experience of the ground covered in the first and second years of a civil engineering degree course. The approach is a creditable one because it is a new attempt to look at geology for engineers from the viewpoint of the engineer. Yet it does seem to fall short in the amount of real geology that it contains.

Volume one deals with the properties of "rock materials" and begins with the properties of minerals. (A short introductory chapter giving the nature and scope of engineering geology in relation to pure geology and engineering would perhaps have been appropriate here.) The structure of the Earth is briefly described and then there is a discussion of igneous, metamorphic and sedimentary rocks. The content of this discussion, however,

is perfunctory, and the use of the now obsolete silica-percentage classification for igneous rocks is unfortunate. The nature and occurrence, structure and texture of each rock group are described together with a brief classification. The author then goes on to erect an engineering classification of rocks based on texture, structure, composition, colour and grain size, in which rocks fall into six groups. Such an approach may be of value to an engineer but might also tend to absolve him from making any geological identification at all, besides involving him in descriptions of texture, and the like, not catered for in earlier chapters. Presumably this is where a thorough course of practical work is essential—as indeed the author implies in his preface.

There is then a very detailed and lengthy consideration of the physical, mechanical and dynamic properties of rocks and the ways in which these properties may be measured. The volume ends with a description of soils (in the engineering and not the geological sense)—in what is a particularly comprehensive introduction to soil mechanics.

The second volume is concerned with rock masses and the application of geology to engineering problems. Because the reading lists in this and the first volume are quite adequate, it might have been better to omit the structural and stratigraphical chapter of this volume altogether rather than give it so brusque a treatment. The greater part of the section, however, is concerned with the methods by which joints may be studied in rock masses, the effects of groundwater, and the overall description of forces acting on the masses and their significance. The second part of this volume describes all types of engineering problems and practice, and provides a good practical demonstration of what has gone before. It also stresses by implication that field-work is an integral part of the course.

The text is very well illustrated with diagrams and graphs, but the choice and reproduction of some of the photographic plates make their interpretation almost meaningless (for example, plate 6, vol. 1, and plate 62, vol. 2). Any understanding of the graphs is also marred by the absence of any mention of the number of samples, and frequency and geographical location of the samples taken.

The approach of this work is very interesting and it can be recommended to teachers in the subject because it is different. Those that find sympathy with the approach will no doubt recommend the book to their students. It can also be recommended to geologists, particularly those who are reluctant to quantify, for whom the chapters relating to rock-soil mechanics might prove particularly useful. But because it was written with students in mind, it would doubtless be better received if the volumes were combined in a paperback—perhaps without so many plates—at a reduced price.

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## SOLID STATE TUNNELLING

### Tunneling in Solids

By C. B. Duke. (Solid State Physics: Advances in Research and Applications, Supplement 10.) Pp. x + 353. (Academic Press: London and New York, September 1969.) 149s.

TUNNELLING has enjoyed a golden age for the past decade, when it developed from a "good example in wave mechanics" to a major study and tool in solid state research. The publication of the first book on the subject probably indicates that this era is over and that both theoretical and experimental techniques will have to be refined to discover small deviations from the behaviour that can now be understood.

Duke has undertaken to tell the whole story of tunnelling. He considers electrons tunnelling through barriers.