

GILLULY (JAMES), WATERS (AARON C.), and WOODFORD (A. O.). *Principles of Geology*. (Third edition.) San Francisco and London (W. H. Freeman & Co.), 1968. vii+687 pp., 520 figs., 1 pl. Price 65s.

In this new edition more than half of the book has been completely rewritten and the other chapters have been revised and brought up to date. As in the earlier editions the authors have aimed to give an understanding of geological processes, concepts, and principles rather than a catalogue of technical terms, thus avoiding an authoritarian approach and providing an insight into the underlying uncertainty of much geological evidence. There are chapters on minerals and on igneous activity and metamorphism, and fairly extended appendices on the identification of minerals and of rocks. Perhaps one of the greatest attractions of this book for students is the multitude of clearly printed, well-chosen photographs and equally clear line-drawings, most of the latter having the added benefit of colour.

R. A. H.

STENO (NICOLAUS) [1638–86]. *Prodromus*. Reprint of the English translation of 1916. New York and London (Hafner Publishing Company), 1968. 283 pp., 8 pls. Price: \$12.50.

The full title is *The Prodromus of Nicolaus Steno's Dissertation concerning a Solid Body enclosed by Process of Nature within a Solid*. This translation (by John Garrett Winter) of a classic work was originally published in the Contributions to the History of Science, University of Michigan Studies (Humanistic Series). It is now reprinted, with an introduction and additional bibliography by George W. White, as No. 4 of the series 'Contributions to the History of Geology' of which he is editor.

N. F. M. H.

BISHOP (A. C.). *An Outline of Crystal Morphology*. London (Hutchinson), 1967. 314 pp., 227 figs. Price 30s. (paper).

The nature and aims of the book are well described by the following excerpts from the Preface: 'Crystal morphology has long been taught as part of elementary courses in geology. . . . The study has added point, however, for the manipulation of crystals and their projections helps develop facility in thinking three-dimensionally; . . . This book is written for those who are starting to study crystal morphology. It has been born of teaching experience which has revealed the need of a text at this level and of an essentially practical character.' The following excerpted definition of a crystal also helps to illustrate the point of view employed: '. . . a homogeneous solid with a definite chemical composition and ordered arrangement, bounded by naturally-formed plane faces.' As far as this book is concerned, students are bound to think that euohedral crystals are the only crystals.

The treatment is divided into two parts: 'The Principles of Crystallography' (80 pp.) and 'Systematic Crystallography' (207 pp.). The essence of the book can be conveyed by saying that it presents, in simplified and considerably rearranged form, much the same sort of material as in Phillips's *Introduction to Crystallography*. The principal

addition is an early chapter on simple crystal chemistry and some scattered atomistic rationalizations. The core of the book consists of Chapters 5–10 (150 pp.) in which all thirty-two symmetry classes are described in some detail. Each of these chapters is devoted to a crystal system: first each class is described, then the stereographic projection, indexing, and calculation and graphical determination of the axial constants of crystals in the system are treated. The verbal descriptions are more extensive than in Phillips. The figures are abundant, clear, and helpful.

One's estimation of the value and place of *An Outline of Crystal Morphology* will depend on one's views on education in general and on the function of crystallographic study in geological education. Although the author has, by and large, attained his stated goals I, for one, am not satisfied with such limited goals. In my opinion the book does not provide a satisfactory approach to the introductory study of crystallography for present-day university students for at least two important reasons. First of all, the approach is too old-fashioned and limited to provide the sort of understanding and appreciation of the crystalline state that students need today. Like the author, I think the study of morphological crystallography has a place early in courses (British sense) in geology but a much smaller place. Morphological crystallography should be used mainly as a natural point of departure for a more general study of the nature and behaviour of the solid phases with which geologists deal. Early over-emphasis on crystal faces alone leads almost inevitably to a certain amount of distortion of the way one thinks about crystals. Equally important, the type of treatment is too dogmatic and cookbook-like. One is mostly told that such and so is the case without enough development and explanation of how we know or why we should know. Crystallography is a marvellous subject in which to display the development and application of mental strategy and tactics, but little of this comes through.

On a more detailed level, there are numerous undesirable and some wrong statements and usages. Of these, two types of statements which recur throughout the book should be mentioned. One involves confusion of the concepts of *pattern* (scheme of arrangement) and *structure* (the arrangement itself). Thus, the word lattice commonly is used when structure is meant. The second type involves emphasis almost wholly on the metrical (size and shape relationships) rather than the symmetrical features of lattices, cells, and crystallographic axes.

For those who are interested in a large dose of morphological crystallography at the beginning level, this book offers an excellent simple coverage of all thirty-two classes. The diagrams and stereograms at the end of each chapter on a system should be especially helpful for beginners.

D. M. HENDERSON

LIPSON (H.) and COCHRAN (W.). *The Determination of Crystal Structures*, 3rd edn. Vol. 3, *The Crystalline State*. London (Bell), 1966. viii+414 pp., 393 figs., 13 plates. Price 90s.

This third edition is the first revision of the popular and durable *Determination of Crystal Structures*. When first published in 1953 [M.A. 12–295], it presented an essentially complete coverage of the state of the art of crystal structure determination