

# BOOK REVIEWS

## Buoyancy

*Buoyancy Effects in Fluids.* By J. S. Turner. Pp. xv+24 plates. (Cambridge University: London, February 1973.) £9; \$29.50.

ONE needs to know about buoyancy effects in fluids to understand convection in a star or to dispose of sewage. They are important for many applications in science and engineering, because gravity may profoundly modify the motion of a fluid of variable density. They may be unexpected or spectacular: for example the angle of reflexion of an internal gravity wave by a plane rigid wall is independent of the angle of the wall. The range of these effects is vividly illustrated by the plates, which seem to be a pageant of the rapid progress of research in the last twenty years or so.

Dr Turner looks at research in his subject from the point of view of a fluid dynamicist rather than a specialist in one of the fields to which the subject is applied. However, he draws many examples from these fields, notably meteorology and oceanography. He quotes theoretical results, without dwelling upon the details of their derivations, and relates them to experiments and observations. He openly follows his own research interests, which spread widely over the subject. This promotes a reliable up-to-date treatment of most topics in the book. But I feel that it also promotes some imbalance of the selection of topics. Heat transfer in real gases is largely ignored, incompressibility being used as an approximation almost everywhere. Also about half the book is devoted to turbulent convection and diffusion of one sort or another, and this necessitates inclusion of a lot of speculative ideas because of the imperfection of our understanding of turbulence. In consequence parts of the book may be ephemeral. But a reader with a practical problem to solve will be unable to wait until the last word on the subject is written, and meanwhile should find this book an invaluable guide to known buoyancy effects in fluids.

The editing is not up to the usual standard of the Cambridge University Press; but, in all, this book is welcome for its absolute merits. It is also welcome for its relative merits, because it has no competitor. Some recent books

have each covered one or more of Dr Turner's topics, but none is a rival as a comprehensive study of buoyancy effects in fluid dynamics, and few rival the quality of his treatment.

P. G. DRAZIN

## Mineral Crystals

*Crystal Chemical Classification of Minerals.* By A. S. Povarennykh. Volume 1. Pp. xiv+1-458. Volume 2. Pp. 459-766. (Plenum: New York and London, 1972.) \$46 two volumes.

THE need for a comprehensive and up-to-date reference book in which the crystal structures of all minerals are described has been acute for many years. This work seeks to fill the gap. The task is formidable, and it is perhaps not surprising that the author has only partly succeeded. The work is a translation of a Russian one published in 1966, revised and updated by the author for the English edition. The most recent references are to papers published in 1971, but the coverage is distinctly incomplete for several years before this. About a quarter of the total number of pages deal with the principles of crystal chemistry and the classification and nomenclature of mineral species, and the rest with individual minerals, including for each, insofar as they are known, composition, morphology, crystal data (but not optics), and a brief description of the crystal structure. There are many diagrams of structures; 1,916 species are described, and 1,411 references given. There are name and formula indexes.

The author's views on what constitutes a species and on nomenclature, expounded in volume 1, deviate markedly from accepted conventions. His definition of species eliminates separate names for minerals related by continuous solid solution or polytypism, and he prefers chemically based names. In the Russian edition, his new names were used extensively, but for the English edition there has been a substantial compromise with accepted nomenclature. Most minerals appear in both index and text under their accepted names, but sometimes the name index is difficult or impossible to use; for instance, if one looks up pyroaurite, one is directed to magferro-

hydrate-3R, but this does not appear, and the mineral is actually described under sjögrenite. Accepted mineralogical nomenclature may be imperfect, but it has proved highly flexible in assimilating new concepts and data, and it is unlikely that the author's system would be as successful. In any case, an idiosyncratic system should not be used in a reference book, as this could inject much confusion into the literature. The system of classification, too, is open to criticism. Although the author claims that it is based on crystal-chemical principles, he subdivides chain silicates in such a way that the amphiboles, for instance, are split between three separate groups, with little cross-referencing between them.

The treatment of individual minerals is not always reliable; for example, the 3R-polytypes of the manasseite group are wrongly stated to have *c*-axes triple those of the 2H-polytypes. The calcium silicate minerals seem especially poorly treated; for example, structures are described for the tobermorite group that were merely guessed from cell parameters, while the contrary result obtained experimentally is not mentioned. At least one well-established species, dellaite, is dismissed as inadequately characterized or doubtful. Minerals are sometimes classified irrationally, e.g., thaumasite and bultfonteinite are placed together in a group of hydrated chain silicates, though they have little in common and neither contains silicate chains. Despite the author's objection to polytype names, he has introduced some new ones, such as clinowollastonite.

The reference list is extensive, but frequently only volume and part but not page numbers are given, and references are sometimes to later Russian papers and not to those in which structures were originally described. Contents tables for groups of minerals do not include page numbers. There are many mis-spellings of mineral names, probably sometimes due to repeated transliteration. Despite its faults, the book should nevertheless prove very useful, especially to those interested in the less common groups of minerals, but it will sometimes be found difficult to use, and will always demand caution because of its unreliability.

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