

BOOK REVIEWS

FLEMING (R. F. S.), Editor. *Proceedings of the First Industrial Minerals International Congress, London, 1974*. London (Metal Bulletin Ltd.), 288 pp., 116 figs., 1975. Price £20 (Distributors: Oyez I.B.C. Ltd., London, W.C.1).

The first Industrial Minerals International Congress was a commercial venture. The Proceedings contain the texts of twenty-eight papers, together with the transcripts of discussions, mainly presented by consultants, representatives of companies working in the industrial minerals field, and various government research institutes.

The various papers are concerned with four general aspects of industrial minerals. (1) The geological framework of occurrence including the industrial mineral production and potential of the United Kingdom, Turkey, Finland, etc. Specific examples of industrial mineral prospects, e.g. feldspar at Durness, Scotland, and evaporites in New Brunswick, Canada. (2) Economic constraints influential in the exploitation of industrial minerals, together with important factors in the evaluation and laboratory assessment of industrial mineral deposits are described by several authors. Several papers discuss the place in world markets of specific commodities including nepheline syenite, perlite, mineral sands, phosphate rock, and fluorspar. (3) The nature, properties, and potential uses of various minerals including phlogopite, 'hermitic clays' (attapulgitite, sepiolite, etc.), olivine, baryte, dolomite, magnesite, and ilmenite (for TiO_2 manufacture) are documented. A number of papers deal with the uses of industrial mineral commodities for particular purposes including fillers, catalytic and adsorbent materials, granular pesticide carriers, chemical manufacture, and drilling muds. (4) The technology of industrial minerals processing, including beneficiation by electric separators, processing of kaolin by centrifugal force, and critical factors in pilot plant testing.

The tonnage and value of industrial minerals and bulk commodities production far exceed those of the metallic ores and coal, but industrial minerals have received considerably less attention in the scientific and technical press than metallic ore deposits. A technical conference on industrial minerals is a welcome addition to the existing sources of information. The resulting proceedings in this case, however, reflect the rather piecemeal nature of the conference. A more coherent conference might have been achieved had papers concerned with geological/mineralogical evaluation, economic uses, and marketing been grouped into separate sections.

J. MCM. MOORE

TAYLOR (S. R.). *Lunar science: a post-Apollo view*. New York and Oxford (Pergamon), 1975. xix+372 pp., 131 figs., 63 tables. Price £6.90.

This is the first wide-ranging account of the scientific discoveries stemming from research conducted on the Moon rocks and Moon environment, throughout the *whole* period of the Apollo missions. It is a truly splendid book, not only because of the

exhaustive coverage but also because it is scholarly, accurate, convincing on fact and hypothesis, concise, and fascinating to read. It is difficult, even in these early days of lunar science, to see what book could supersede this one as a timely record of the prodigious scientific programme that supported and, surely, justified the hazardous manned missions.

The introduction includes, as well as a brief history of lunar exploration, several little-known statistics on the research programme. From 382 kg of Apollo rock collected (35 600 samples), only 1.6 kg were consumed by analysis (the Soviet Luna missions collected 0.13 kg). Yet the international research literature output has required the author to summarize in the ratio of 1:100 pages, and to condense a total bibliography of about 100 printed pages. So much for the question 'What has come out of the Moon programme?'

The other chapters deal with the scientific discoveries in depth, are abundantly illustrated, and refer to all the main literature sources. First the surface morphology and stratigraphy are made more interesting by reference to data from absolute chronology, laser altimetry, orbiting gamma-ray and X-ray fluorescence analysis, earth-based radar reflectivity, and other Apollo-age methods. Next, the surface regolith is treated as a single topic in order to concentrate on the dynamic effects of meteorite impacts and on their material contributions, as well as on the solar and galactic cosmic ray studies and the search for organic components.

The maria and the highlands are then described in two large, 'core' chapters that provide a wealth of information, extensively tabulated, on the petrology, mineralogy, and chemistry of the materials indigenous to the Moon. Here the author's expertise is evident in the use of geochemical correlation diagrams to illustrate the evolutionary links between the feldspathic crust and the ultramafic mantle from which the mare basalts were derived. The two final chapters deal with the interior (seismic, thermal, and magnetic properties) and the origin and evolution. The Taylor-Jakeš evolutionary model is understandably a favourite with the author but despite some problems in accepting it, the alternatives to a hypothesis of two-stage melting of the outer 300–1000 km seem at present less convincing. The hypotheses on origin are discussed in the light of Apollo and Luna data, but the author is unable to choose between the precipitation and the capture hypotheses. It is as well that the book ends on that cautious note because we are still in need of satisfactory hypotheses on both source and thermal history of the Moon, and hence major questions still remain half-answered.

Mineralogists should be well satisfied with the specific lunar data (especially by cross-reference to *Lunar Mineralogy* by J. W. Frondel, J. Wiley and Sons Ltd., 1975). Some geologists may forever be perplexed that the evolutionary history of a vast planetary body could be near-unravelling in a purely laboratory exercise with minimal fieldwork. Geochemists will discover new dimensions in their consideration of elemental and isotopic relationships, and geophysicists and astronomers should welcome this means of coming to grips with much unfamiliar nomenclature in the petrological, mineralogical, and geochemical context. Advanced-class undergraduates and post-graduates in the geological sciences would benefit from reading it during their studies of the Earth. Perhaps even the 'public media', who for six years have appeared to deprive

the general public of real news about the progress and discoveries of lunar science, will recognize in this book the hallmarks of a true classic to be shared by every person who followed the prologue and is curious about the epilogue. G. M. BROWN

SHUEY (R. T.). *Semiconducting ore minerals* (Developments in Economic Geology, Vol. 4). Amsterdam and New York (Elsevier Sci. Publ. Co.), 1975. 415 pp., 55 figs. Price Dfl. 55.00 (\$22.95).

The book is basically divided into two parts: the first deals with the principles of semi-conduction of materials and the second gives a progressive series of ore mineral information; this latter section deals with the ore minerals in the logical sequence: Elements, Sulphides, and Oxides.

This book is excellent in bringing together for the first time information on the semiconducting properties of ore minerals from sources not normally seen by the economic mineralogist, many of a recent Russian origin.

A major failing of the book is in the lack of a serious attempt to relate this information to the atomic structure of the minerals being considered. Minor criticisms are in the type-face used and the lack of line justification. A minor irritation is in the lack of a complete author index, the authors being indexed by chapter so causing in some instances triplication of one reference. There is a complete lack of reference to many basic publications on atomic structures of minerals.

This book is obviously aimed at those mineralogists engaged in research into the properties of ore minerals, and for those people represents a necessary addition to their library. J. W. OLDHAM

CARMICHAEL (I. S. E.), TURNER (F. J.), and VERHOOGEN (J.). *Igneous Petrology*. New York and London (McGraw-Hill), 1974. xvi+739 pp., 175 figs. Price £11.25.

To Professors Ian S. E. Carmichael, Francis J. Turner, John Verhoogen
Dear Ian and Frank and John,

The appearance this year of your *Igneous Petrology* has by its synoptic view, lucidity, and sense of direction as applied to igneous petrology, made the roles of the advanced student and his teacher much easier.

The original 'T. and V.' is, however, still needed for its references and for aspects of regional petrology. That in this new work certain topics, for example pegmatites, magmatism in relation to ore deposition, are still lacking and that the treatment of the lamprophyres and of the alkali rocks is rather cursory may be taken as a challenge to the reader to amplify these sections to his own requirements using the rest of the book as an excellent model.

I hope that you will accept this 'Consumers' Report', the joint creation of three of