

history from pre-European times. The longest chapter describes the geology and mineral resources of the Republic of South Africa and the adjacent protectorates. Gold, not unnaturally, gets the greatest coverage in this chapter, as it does in the rest of the book. This reflects the author's own long connexion with New Consolidated Gold Fields. Rhodesia, Zambia, and Malawi follow, with adequate descriptions of gold and copper mineralization. There are then chapters on the Congo Republic (Leopoldville), Portuguese possessions, and East Africa. In this latter part of the book there is decreasing detail of descriptions. Perhaps this is justified in that the mineral resources are of lesser importance than those in the countries of the south, but one does feel that Tanzania diamonds are worth more than one page, and that carbonatites could have been treated in greater geological detail. There is a final chapter on mineral exploration and the author stresses the importance of adequate geological maps on which to base prospecting programmes of all sizes, and also the dependence of modern prospecting on geologists.

This reviewer found the book most interesting and it should appeal to a wide readership. It should not be regarded as a specialized book on the economic geology of Africa and students, in particular, could obtain much from it.

J. W. BARNES

SINKASKAS (John). *Mineralogy for Amateurs*. Princeton, New Jersey (D. van Nostrand Company, Inc.), 1964. 608 pp., 327 figs. Price: 97s.

An excellent introduction for anyone interested in mineralogy; the text is easily understandable and well written. The line drawings are well drawn, abundant, and always clearly instructive. All the plates are very well selected and clear.

A brief outline of the atomic structure of minerals is given as a foundation to the study; atoms and molecules are described in their relationship to crystal formation and the important silicate structures are described and well illustrated. The structure and meaning of chemical formulae are expressed in simple terms and the classification of minerals by ions on the Berzelian System is expounded.

The growth of crystals from melts, solution, and vapour precedes the discussion of growth rates, the development of crystal faces, the development of imperfections of form, and the formation of crystal aggregates and twin crystals. Crystallography is treated simply from the morphological standpoint. The explanations of crystal axes, axial ratios, and crystal symmetry are clearly expressed. The essential forms of the

crystal systems are dealt with excellently in both line drawing and text. No unessential matter is included.

The physical properties are very well described and illustrated. The description of a home-made beam balance and Jolly Balance is just the type of information required by an amateur. The optical properties are only briefly considered as is right in such a text as this. The discussion of some properties such as triboluminescence is a little beyond most who describe themselves as amateurs. Refractive index and double refraction are well done, but the apparatus described would be beyond the reach of most amateurs. The study of optical figures is not really adequately covered.

More could have been made of the formation and association of minerals, particularly in respect of their genesis, but the brief consideration offers inspiration for further study.

The identification methods are mercifully shorn of many of the more obscure methods. The descriptive mineralogy is good, particularly the paragraphs dealing with mineral occurrence. The identification tables are very useful.

The outstanding feature of the book is the high quality of its illustrations, which, no doubt, accounts for its high price.

BRIAN SIMPSON

JONES (M. P.) and FLEMING (M. G.). *Identification of Mineral grains*. Amsterdam (Elsevier), 1965. 102 pp. Price: 30s.

A useful and well set out laboratory and field compendium for the identification of minerals in grains—mainly the opaque minerals often associated with ore deposits but not exclusively so. A concise summary of the Determinative Scheme is set out in the opening pages and is followed by a list of equipment and reagents necessary to implement the scheme: these are reduced to a safe minimum and are sufficient for the needs of the scheme.

The procedure is outlined in ten sections in each of which the descriptions of operations are reduced to a minimum, but are clear and easily understood. The first eight groups of tests, including specific gravity, refractive index, hardness, streak, magnetic permeability, and solubility, can all be carried out easily in the field and call for no highly specialized apparatus. More information for identification is obtained from spot tests, which call for more chemical reagents, but still quantities that could be used in rough field conditions. The tenth section, which is labelled 'Additional Tests', includes closed tube tests, fusibility, flame