

lic iron, usually angular in shape, and ranging from a fraction of an ounce to $52\frac{1}{2}$ lb. in weight. In one arc of 6 by 6 feet over a hundred fragments were collected. Only two masses (one of 13 lb.) were found within the crater walls; and in one of the smaller craters a bore-hole to a depth of 8 feet through fine silt down to coarse rock fragments yielded no mass of iron. Fragments of iron rust are also abundant; and some glassy material, suggesting fusion of the country-rock, was found. These craters, which are very similar, were evidently formed by the impact of a shower of meteoric irons at some remote period.

ANNIVERSARY MEETING, *November 3rd.*, 1931. The following were elected officers and members of the Council: President, Sir John S. Flett; vice-presidents, Dr. G. F. Herbert Smith, Prof. C. Gilbert Cullis; treasurer, Mr. F. N. Ashcroft; general secretary, Mr. W. Campbell Smith; foreign secretary, Prof. A. Hutchinson; editor of the journal, Dr. L. J. Spencer; Ordinary members of council, Dr. A. Brammal, Mr. G. McDonald Davies, Prof. W. C. Fearnside, Miss M. W. Porter, Mr. A. F. Hallimond, Dr. F. H. Hatch, Sir Albert E. Kitson, Prof. W. L. Bragg, Mr. F. A. Bannister, Prof. H. H. Read, Mr. Arthur Russell, and Prof. C. E. Tilley.

BOOK REVIEWS

THE EXAMINATION OF FRAGMENTAL ROCKS, FREDERICK G. TICKELL. Stanford University Press, 1931. 122pp., 35 figs. and 2 pls. Price, \$5.00.

The examination of mineral fragments has proven to be a valuable procedure in petroleum geology, mining geology, hydrology, ceramics, metallurgy and in chemical engineering. Contributions to the science of mineralogy are being derived from each of these subjects. Prof. Tickell has endeavored to assemble some of the best methods from published contributions of each of these technologies. This material is presented in an unusually brief, compact form thus the errors of omission exceed those of commission. If, as the author states, the treatment is not one for elementary students, certain omissions become even more serious.

"Electric wind" effects are not mentioned under dielectric separation although such effects are vitally important. The maximum dielectric constants given in table 10 are meaningless without at least reference to temperatures at which they were obtained. More surprising is the omission of all methods for feldspar determination except those of Tsuboi and Schmidt. Surely advanced students are entitled to more than one page and one diagram on the fundamental conception of the triaxial ellipsoid. Mineralogists will be surprised to find the mixtures, leucoxene and limonite accorded full rank along with apatite and microcline as mineral species.

The chapters on size analysis and porosity and permeability are an excellent summary of the literature.

The book offers an elementary presentation to students of petrography even though it may be, as the author states, of advanced character to other students. Its chief value lies in the inclusion between two covers of material not otherwise to be found except by reference to many publications.

ERNEST E. FAIRBANKS

THE STUDY OF ROCKS. S. J. SHAND. xi+224 pages. Thomas Murby and Co., London, 1931. Price, 6 shillings. D. Van Nostrand Co. *New York.*

The author, who is professor of geology and mineralogy at the University of Stellenbosch, South Africa, quotes J. J. H. Teall upon the confusion in petrographic

nomenclature and the great number of names "used in different senses by different authors." He also repeats I. C. Russell's advice to use "plain English names" rather than Latin and Greek translations. Dr. Shand feels very strongly on these points which were first emphasized in his "Eruptive Rocks" published in 1927.

In the present volume, 129 pages are devoted to igneous (eruptive) rocks. We liked especially his brief summary of the various systems of classification of igneous rocks beginning with that of Zirkel, Rosenbusch, Harker, Hatch, Iddings, the Quantitative System by Cross, Iddings, Pirsson, and Washington, Osann, Niggli, Johannsen, and ending with his own which is a simplification using a combination of mineralogical and chemical characteristics in a system containing only 56 rock names. After his own classification, Dr. Shand evidently prefers that of Zirkel, but he is very fair to Rosenbusch whose adherents probably predominate in the United States and Canada.

From the perusal of the book we received the impression that the author is both a skilled petrographer and an efficient petrologist, and that he knows his literature exceedingly well. We also are aware that he knows the alkaline rocks of South Africa better than any other person. We will never forget our trips with him as guide during the Geological Congress of 1929, to the alkaline rocks of Pilandsberg, Franspoort, and Sekukuniland.

The book also devotes 48 pages to sedimentary, and 35 pages to metamorphic rocks. Instead of a long bibliography at the end of each chapter he gives "Suggestions for Reading" which are very pertinent. The reviewer has been very glad to read a book in English which has a different viewpoint, and also contains many expressions and words which differ from our usage in the United States.

FRANK R. VAN HORN

A DESCRIPTIVE PETROGRAPHY OF THE IGNEOUS ROCKS, VOLUME I, INTRODUCTION, FEATURES, CLASSIFICATION AND GLOSSARY. ALBERT JOHANNSEN. xxii+267 pages; with 146 illustrations. The University of Chicago Press, Chicago, 1931. Price \$4.50.

Petrographers will welcome this volume on the textures and classification of igneous rocks by Professor Johannsen, who is our leading scholar in this field. The chapters on the constitution, structures, and textures of igneous rocks are brief but with the Glossary of textural terms at the end they cover their fields adequately. One might question the explanation for the origin of spherulites and lithophysae, and the description of the large spodumene crystals at the Etta mine as crystallizations from a melt.

The main part of the volume is devoted to the classification of the igneous rocks. The subject is presented with a historical setting. The megascopic or field classification is hardly adequate or satisfactory for the purposes of a petrologist in the field. An unusual amount of space is devoted to chemical classifications and those of Osann, Hommel, Niggli and von Wolff, as well as the C.I.P.W. system, are described. It is refreshing to have these European classifications given equal weight with the C.I.P.W. classification in an American textbook.

An historical development of the mineralogical classification of igneous rocks is presented and the quantitative mineralogical classifications of Lincoln, Shand, Hodge, and in particular that of Johannsen are described. The classification of Johannsen has much to commend it. It follows very closely the commonly used system

of classification but is more systematic and more quantitative. It does this by using prefixes and other modifiers to the old terms so that one can readily understand the new rock names if he knows the names used in the prevailing classification. I believe that the double tetrahedron is over emphasized and that the scheme of classification is more easily understood from the tables than from the double tetrahedrons. It is to be hoped that petrographers will soon agree on a quantitative classification and I know of none that so well meets the needs of a working petrologist as that of Johannsen.

Nearly a third of the book is devoted to miscellaneous definitions and to textural terms. Chemical tables for the calculation of the norms and other purposes are given at the end. The values given for the specific gravities of minerals are misleading for while most minerals have a variable specific gravity it is incorrect to give the values for quartz as ranging from 2.649 to 2.697.

The book has real literary merit. The chapters are headed with apt quotations from many languages and one chapter is headed by the music of a song. A remarkable amount of information is presented in a clear, logical way in a small space. Very many references to the literature are given. The illustrations are numerous and excellent and include pictures of many of the leaders in petrography, illustrations of most of the important textures, numerous diagrams, etc. The printing paper and binding are of a high quality.

ESPER S. LARSEN