

## BOOK REVIEWS

KRISTALLOMETRISCHE DETERMINEERINGS-METHODEN. JAN HENDRIK HAAN. Proefschrift Univ. Groningen. J. B. Wolters, *Groningen*, 1932, 178 pp. Illustrated, 18×25.5 cm.

In this book Haan has tabulated and classified the geometric constants of 950 chemical compounds according to the method proposed by Barker. The tabulated values were recalculated from the data in Groth's *Chemische Krystallographie*. Haan has accomplished a substantial fraction of the work required to prepare determinative tables of geometric properties of all measured compounds, now numbering about 8000, and the present descriptions are intended as the beginning of a complete systematic catalogue of all measured crystals.

In 45 pages of text Haan discusses the proposals that have been made for the erection of systems of classification of the geometric properties of crystals to be used for the purpose of identification of an unknown compound. The systems explained and discussed are the ones proposed by Frankenheim, V. Goldschmidt, V. Goldschmidt and S. G. Gordon, Fedorov, Boldyrev, Barker. He concludes that the method proposed and tried out on a limited scale by Barker is the best and that it is, moreover, very satisfactory. With this method, as shown by Haan, Barker, and others, different observers will orient the same crystal in the same way and will obtain the same axial ratio from it. Haan points out at the same time that different crystals of the same compound grown under different circumstances (differences in habit) may lead to more than one orientation or axial ratio and that more than one entry in the table may be required for the same compound in some cases. Haan does not believe that such occurrences will be of sufficient frequency to seriously diminish the value of the determinative method, however.

The question has recently been discussed privately by several American crystallographers whether the axial ratio of a compound recorded in a set of determinative tables for use with the reflection goniometer should necessarily be exactly the same as that obtained from the unit cell dimensions established by  $x$ -ray analysis, or whether the axial ratio recorded in the tables might in some cases differ from the latter as some whole multiple. Barker himself states that it is not necessary for the axial ratio determined by his method to agree exactly in all cases with the unit cell dimensions determined by  $x$ -ray analysis. The present writers also believe that it is not desirable to stretch the results of the two methods of inquiry, with the reflection goniometer and the  $x$ -ray goniometer, into exact correspondence, although there should be a simple relation between them in all cases and an exact correspondence in many.

We think also that some day it may be possible to assemble a determinative table of unit cell dimensions determined by  $x$ -ray analysis in which only one entry will be required for each chemical compound. When that time arrives, however, it will still be true, in most cases, that a determinative investigation can be made more quickly with the reflection goniometer than with the  $x$ -ray goniometer. Therefore, we see no reason why two such tables, the one of geometrical constants and the other of unit cell dimensions, should be made to correspond exactly in all cases. It seems likely that an attempt to achieve a complete correspondence might lead to the frustration of both determinative methods.

GEORGE TUNELL  
TOM. F. W. BARTH

A DESCRIPTIVE PETROGRAPHY OF THE IGNEOUS ROCKS, VOL. II. THE QUARTZ-BEARING ROCKS. ALBERT JOHANNSEN. Pp. 428. The University of Chicago Press, *Chicago*, 1932,. Price \$5.50.

The second volume of Johannsen's scholarly work describes the quartz-bearing rocks from silicite to quartz-calcicase-gabbro. One is pleasantly impressed at the ease with which Johannsen's quantitative classification fits the Rosenbusch classification, how few new names are introduced and how obvious are the meanings of nearly all the names to one reasonably familiar with the Rosenbusch classification.

The descriptions are excellent—brief but adequate—and they are usually preceded by an interesting discussion of the historical development of the name and numerous references to the literature. Quaint quotations in the footnotes and interesting human touches add spice to the pages.

The quantitative mineral composition and the chemical analysis are given of all the rocks for which the former data are available. This should prove of great value to all petrographers and should encourage the publication of more such data.

In addition to the purely descriptive sections there are occasional discussions of the origin of some features such as rapakivi structure. Orbicular structures are treated at length under several rock types. There is a good discussion of the weathering of the various rocks.

Criticism of such a book as Johannsen's is likely to be largely a matter of the reviewer's personal preferences. The present reviewer objects to the term kali-as a prefix for a rock in which there is more soda than potash. The average kali-granite (page 56) has more soda and less potash than the average sodacase-granite (page 112). In general, it would be well to give more consideration to the chemical composition of minerals and mineral aggregates, even though it cannot be determined under the microscope. When the hand specimen study is not sufficient, we use the microscope, and when the microscope is not sufficient we must use a chemical analysis or any other means available for the complete analysis of the rock. Thus, the soda and potash in microcline, sanadine, perthite and ground masses are not distinguished. In general, the groundmass of a rock must be understood as well as the other constituents, even though it is a glass. This can commonly be done with a microscope by one familiar with rocks; if not, chemical means must be used and they must be taken into account in the rock classification. In that case, the effusive rocks would have the same chemical composition as the corresponding plutonites.

Johannsen gives the hypabyssal rocks a position of equal importance with the extrusive rocks. Is it not better to divide the rocks on the basis of texture rather than on geological occurrence? The emphasis on aschistic and diaschistic dike rocks is of doubtful significance.

In parts of the book the author has not distinguished carefully between truly igneous rocks and a rock formed by hydrothermal alterations of an older rock, such as tourmalite and greisen. The quotations in many foreign languages will be a disadvantage to many. Would it not be better to quote these in English translations?

The book is well prepared by the publisher except that the photomicrographs are not well reproduced. When completed, Johannsen's four volumes should be the world's standard on the subject of descriptive petrography. However, the price of the four volumes is so high that few students and not many teachers or investigators can afford to own the set. Can we not find a way to keep the price of such books within the resources of those who would naturally use them? ESPER S. LARSEN