

Professor P. von Groth, for many years professor of Mineralogy at the University of Munich, Germany, died Dec. 2, 1927, in his eighty-fifth year. A biographical sketch of his life and contributions to mineralogical science will appear in a later number of the JOURNAL.

REVIEWS

REVIEW OF AN INVESTIGATION OF THE RATE OF GROWTH OF CRYSTALS IN DIFFERENT DIRECTIONS

An excellent piece of research on the growth of crystals, by Dr. Marie Bentioglio, working under the direction of Dr. Barker and Professor Bowman at Oxford University, has just been published in the *Proceedings of the Royal Society*,¹ and as this journal is probably not accessible to many of the readers of the *American Mineralogist*, this review has been prepared to call the attention of crystallographers to the significant results obtained.

While the experimental methods employed were similar to those of Wulff, many important improvements were introduced. The crystal under study was held at the center of a horizontally-placed flask filled with 500 cc. of solution, the zone of faces to be measured being horizontal, and the flask being slowly rotated on the axis of this zone. To hold the crystal a hole was drilled into it, and a long fine pin fixed into this with wax, the pin being then clamped to a rod attached to the stopper of the flask. To measure the amount of growth, the rod was detached and mounted on a tripod so that it could be slid along on a glass plate, under a microscope with magnification of 75 diameters, readings being obtained by means of a milled head, graduated in 0.01 mm.

Crystal growth was effected by slow cooling of the solution, the best initial temperatures being found by trial to be: sodium chlorate, 35–37°; K-alum and double sulfates of Mg or Fe⁺⁺ with K or (NH₄), 30–34°; K and (NH₄) tartrates, 40°C. A fall in temperature of 10–12° in 4–5 hours was attained by wrapping the flask in cotton, and proved adequate. The results are tabulated in detail and illustrated by crystal drawings, and lead to the following conclusions: (a) On crystals bounded by a single form, all the faces grow at the same rate, irrespective of their original sizes. Hence a distorted crystal may tend toward, but never quite attain, ideal development with the faces all equal in size. (b) On crystals bounded by a combination of forms, unlike faces grow at different rates, but like faces grow at the same rate. An exception to the latter relation may occur when the faces lie adjacent to a larger face of another, fast-growing form, for the latter may impoverish the solution in its neighborhood, and slow up the growth of faces surrounding it. (c) On crystals lacking a center of symmetry, the growth-rates of parallel faces may be widely different. (d) In an isomorphous series, the order of increasing rates of growth of different forms is not the same for different members.

While these results are interesting in throwing light on the manner of development of crystal habit, their greatest value lies in their bearing on the theory of the relation between crystal structure and form. The frequently accepted view, favored by Wulff and carried to an extreme by Fedorov, is that the rate of growth of a given form is directly related to its reticular density, *i.e.*, the packing of

¹ *Proc. Royal Soc. (London)* A, 115, No. A 870, 59–87, June 1, 1927.

leptons (atoms, ions, or molecules) in the layers parallel to the faces of this form. The closer the packing, it is supposed, the slower the growth-rate of a form; then, since slow-growing faces are the ones which persist the longest and become the largest as the crystal grows, the dominant faces on a given crystal are taken to be those of greatest reticular density.

The fallacy of this view is clearly shown by the results reported here: (a) In the isomorphous series of double salts, the reticular densities of different forms must be relatively the same from one member to another. Yet it is found that the relative growth-rates of different forms vary widely among the different salts, the form r (201) being actually the fastest-growing form on one substance and the slowest-growing on another in the same series. (b) Even more significant is the finding that the forms situated at opposite ends of a polar axis, which must necessarily possess the same reticular density, nevertheless grow at markedly dissimilar rates. Crystal growth and crystal habit are, accordingly, not merely a matter of the geometrical relations involved in the packing of leptons; they express the result of oriented attractions on the part of the leptons lying at the surface of the crystal.

E.T.W.

PROCEEDINGS OF SOCIETIES

PHILADELPHIA MINERALOGICAL SOCIETY

Academy of Natural Sciences of Philadelphia, November 3, 1927.

A stated meeting of the Philadelphia Mineralogical Society was held on the above date with the Vice-president, Mr. Clay, presiding. Twenty-five members and seven visitors were present.

Mr. Charles R. Toothaker of the Commercial Museum was elected to membership.

Mr. Clay spoke of the recent death of the Society's President, George Vaux, Jr., and the loss to the Society of his friendship and leadership. A resolution expressing the sympathy of the Society to his family was unanimously adopted.

The Society then heard a very interesting address by Mr. Charles R. Toothaker who spoke on: "RAMBLES THROUGH BRAZIL: DIAMONDS, GEMS, IRON AND MANGANESE." The speaker described his visits to the gem regions of Brazil, the manganese mines at Lafayette and the iron deposits at Burnier. Of special interest was his account of the diamond diggings along the Jequitinhonha river in Minas Geraes, the topaz at Ouro Preto, the quartz from Goyaz and the agate localities along the Uruguay border. The address was profusely illustrated with colored lantern slides and by means of specimens of Brazilian gems and other minerals.

Mr. Biernbaum described a trip to Paterson, N. J., Mr. Oldach spoke of trips to Franklin, N. J. and French Creek, Pa. and Mr. Cienkowski of a trip to Moores and Stockton, N. J.

F. A. CAJORI, *Secretary*

NEW MINERAL NAMES

L. L. FERMOR: Composition of some Indian garnets. *Records Geol. Surv. India*, 59, 191-207 (1926).