THE GNOMONIC PROJECTION AS A MEANS OF IDENTIFYING CUT GEMS

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The gnomonic projection developed mainly by Dr. Goldschmidt of Heidelberg has been found by many crystallographers to be the most satisfactory and entertaining method of investigating crystals. Graphic methods in the study of complex mathematical problems are being appreciated to a greater extent perhaps than formerly, and especially in the study of crystals have proved of inestimable value.

It occurred to the writers that a graph of the gnomonic projection of a cut gem would be a permanent and accurate record of the gem and might be used for the purpose of identification in cases of suspected falsification or substitution. A cut gem was therefore mounted on the two-circle goniometer and the values for *rho* and *phi* recorded in the usual manner. The gem used was a white sapphire with thirty-three facets and the measurements were made without removing the stone from its setting in the ring. The gem was adjusted on the instrument solely by means of the "base" or top facet. This facet was made to read zero for *rho* in all positions of *phi*. The gnomonic projection was then made on paper with the instrument designed by Goldschmidt for that purpose. The whole process required something like one and one-half hours. The most striking feature observed was that all of the facets are closer in towards the center than appears in a typical projection of a crystal. Natural pyramids are in general sharper than the facets cut on a gem. Probably the best method of comparing two or more graphs would be to superpose them using tracing paper. Owing to peculiarities mentioned above it would be well, also, to employ a radius of ten cm. instead of five as is customary in plotting. To facilitate the comparison radial lines are drawn from the centre to the face poles, the ordinary system of zone lines not being applicable to the artificially cut facets. Of course a further check is obtained by comparing values obtained for *phi* and *rho* for each facet after due consideration for a zero meridian has been made. It might be noted that undue prominence has been given the top facet but this is necessary since adjustment of the gem on the goniometer could not be made by means of the pyramid or prism method. The

top face could be recut for purposes of masking identification and a new projection would be so dissimilar that comparison would be difficult. A slight recutting of this facet would not change the values of *phi* to any extent and those values could still be used in identification.

It is not believed that this will become a practical method of recording cut gems but it was thought worthy of brief mention. Occasion might arise where a record of this sort of some especially valuable gem would be of importance.

PROCEEDINGS OF SOCIETIES

THE PHILADELPHIA MINERALOGICAL SOCIETY

Academy of Natural Sciences, December 14, 1922

A stated meeting of the Philadelphia Mineralogical Society was held on the above date with the Vice-president, Mr. Trudell, in the chair. Seventeen members and one visitor were present.

Upon favorable recommendation of the Council, Mr. Wilfred Broadbelt was elected an active member. Mr. Hoadley proposed Mr. Horace Hallowell for active membership. The chair announced the death of Mr. William R. Evans.

Dr. Edgar T. Wherry of the Bureau of Chemistry addressed the society on "Modern Views of Crystal Structure." The history of the study of crystal structure was reviewed, introductory to a description of the Laue, Bragg, and Hull methods of X-ray analysis, and some of the results achieved. A *domain* was defined as the space through which the attractive and repulsive forces of the atom are effective. The shape of the domains may be derived from the space lattices, which are determined by the equilibrium of these forces. The packing of domains was illustrated with a number of models and lantern slides. Crystal habit was regarded by the speaker as being principally influenced by impurities in the solution, but the faster the formation of the crystals, the less the influence of the impurities. Isomorphism is limited to atoms that approximate each other in size; thus, there is limited replacement of K for Na, while that of K for Ba is complete, as illustrated by the feldspars. The alkalies, Cs, Rb, and Li in the beryl group are considered to be due to an isomorphous *hexagonal* pollucite. In tourmaline Li replaces ferrous iron. Other cases of atomic isomorphism in the micas, pyroxenes, scapolites, and zeolites were cited. A vote of thanks was accorded the speaker for his interesting and instructive communication.

SAMUEL G. GORDON, *Secretary*

BOOK REVIEWS

THE MINERALOGY OF PENNSYLVANIA. SAMUEL G. GORDON. Special Publication No. 1, Acad. Nat. Sci. Phila., 1922. Price $3.75.

The frontispiece of this valuable work is an illustration of pyrite crystals from French Creek, which will preserve for all time the exact outlines and appearance of these remarkable crystals.