

yield excellent figures. The numerous rotations of the universal stage make it possible to change from one figure to another very easily. These figures were obtained with both low and medium power objectives by removing the ocular.

7. In using the double variation procedure one is limited to certain definite embedding fluids only when the highest degree of accuracy is desired.

To my mind there are two features of the Scheumann-Lindley apparatus which highly commend it. First, the ability to mix liquids on the stage affords still another means of varying the index of the immersion medium. I am eager to test the convenience and especially the effect on the accuracy of this detail of their procedure. Second, Fisher states that Lindley is now working on a heating stage. For moderate temperatures this has already been accomplished, but Fisher expresses the hope that high index melts may be kept molten. If the attendant difficulties do not prove too great (i.e., the problem of gluing the grain, cleaning the lenses between melts, heat damage to the lenses, effect of higher temperatures on the optical and physical properties of minerals) this brilliant idea should lead to an interesting and useful technique which could be applied very widely.

## BOOK REVIEW

MICROSCOPIC DETERMINATION OF THE ORE MINERALS, M. N. SHORT, U. S. Geol. Survey, *Bulletin* 825, 1931, 204 pages, 11 plates, 16 figures.

This very comprehensive treatise on the microscopic characteristics of the ore minerals is based on surer foundations than any previous publication of the same kind. The genuineness of each mineral species is given a very critical review and, while the reviewer disagrees with some of the author's conclusions as in the cases of galenobismutite and kallilite, accurate and reliable data are for the first time available on a great majority of the ore minerals. Approximately one-fourth of the bulletin is devoted to a discussion of microscopic technique and physical properties. As earlier text-books have included a considerable proportion of this information, it would seem that this introductory part might have been considerably abbreviated without impairing its value.

A step in the right direction has been taken in eliminating the intermediate grade of hardness. Since there is sufficient range in the hardness of certain mineral species to cause overlapping in the three-class system of soft, intermediate, and hard, it seems inadvisable to attempt anything more than a simple classification into soft and hard minerals as outlined in this bulletin.

Part 3, which makes up the second quarter of the volume, is taken up with an admirably brief discussion of etch reactions followed by a set of determinative tables based on isotropic or anisotropic character, and on etch reactions with the four standard and two supplementary reagents of Davy-Farnham. The use of aqua regia in differentiating such groups as pyrite and sperrylite on the one hand and braunite, chromite, cobaltite, franklinite, hematite, and magnetite on the other, would seem of doubtful value since the first two can be differentiated quite easily from the remainder by other means. Apart from such minor details these tables seem to be well adapted to the use of microscopic investigators of this special class.

The remainder of the bulletin, part 4, gives by far the best résumé published up to date of microchemical methods and their adaptation to this class of microscopic investigation. The last section on specific tests for minerals, though useful for reference, might have been omitted as most of the information contained therein is to be found in other parts of the publication.

The minor nature of such criticisms as are here mentioned can be taken as an indication of the sterling character of this publication. It should find an extended use in all laboratories where microscopic work on ores is carried out.

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