hemispheres is known, the angle 2V can be computed. This device can easily be made and can be used in class for giving a vivid demonstration to clarify the relation of the optic axis figure to the Bx_a.

Since most beginning students have difficulty in distinguishing the Bx_a from the Bx_o for large optic axis angles, a fourth special slide is provided, with two holes in the paper mask. In one hole a plate of andalusite 84° Bx_a is mounted, while the other hole has a plate of the same mineral cut for Bx_o. With this slide the student can observe quickly the difference in appearance between the two figures.

It is believed that a set of these mineral slides in connection with the monomineralic grain-thin section will eliminate much waste of time in the laboratory and give the student a vivid and complete conception of the optical properties of the different minerals. The same set could be used to advantage as a reference set in further studies in petrography.†

Grain-thin sections have been used for the following purposes other than teaching aids: (1) in sedimentary problems for the identification of mineral grains in fractions coarser than 100 mesh; (2) for control of nonmetallic coarse concentrates in the concentrating process; (3) for examination of churn drill sludge.

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NOTES ON LAKESIDE NO. 70 TRANSPARENT CEMENT

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Since Lakeside No. 70 cement is rapidly taking the place of Canada balsam as a mounting cement for preparation of thin sections, a few

† Sets of 40 mineral grain-thin sections and the four special slides are obtainable through Ward's Natural Science Establishment, Rochester, N. Y., or through the author.

words in regard to its properties and use seem appropriate. Meyer* mentions the following properties: index 1.54, insoluble in petroleum, melting temperature 140°, easy to apply and grind, more viscous than Canada balsam and therefore prevents spreading of the section in covering. The index of refraction of a cement used for the preparation of thin sections is of utmost importance, and since any cement which is not reasonably stable in this respect would be useless, a study of the ageing quality of this cement was undertaken before it was used for ordinary thin sections. The first batch of this cement was obtained by the author in January, 1944, and was used only for sections which had to be ground in oil. It was widely recommended by the author for this purpose for its superior strength, insolubility in mineral oils, and good grinding properties. The index was not measured at this time, but slides were prepared in which the index of the cement could be compared with that of orthoclase and quartz. By April, 1947, no ill effects of ageing could be observed in the slides and prisms were prepared from the 1944 batch of cement, and a new batch just received. The index of both prisms was measured as 1.5369 for sodium light. After this it was felt that the cement was sufficiently uniform and stable for general use, and has been used since for mounting all slides. The cement is somewhat liable to cause bubbles at temperatures above 150° and is too viscous below 140°, and therefore requires somewhat closer control of the hot-plate temperature than does Canada balsam. Its superior holding power and resistance to bruising make it an ideal mounting medium. At first it seemed unsuitable for impregnation due to surface tension, but later it was found that when the surface of the chips was moistened with kerosene before applying the cement, the surface tension was reduced and the cement flowed sufficiently deep into the rock to permit grinding of a flat surface. For covering, Canada balsam is still preferred, particularly for the reasons mentioned by Meyer. The 1944 prism was stored for one year at an elevated temperature over the hot plate and the measurement repeated, giving an index of 1.5366. The measurement was made on a Gaertner one-circle goniometer to within $\pm .0002$. Therefore the lower index after ageing does not necessarily indicate that the index has a tendency to get lower with time. At the same time two other batches of Lakeside No. 70 were measured; one of darker color than usual showed an index of 1.5371, and one of the usual color showed 1.5358 for sodium light. The dispersion of Lakeside No. 70, cooked Canada balsam, and the ordinary ray of quartz is shown in Fig. 1 and Table 1. The index of Lakeside No. 70 is lower than the ordinary ray of quartz over practically the entire visible spectrum. For the measure-

* Notes on cutting and polishing of thin sections: *Ec. Geology*, **41**, 166–172 (1946).

ments a helium tube as suggested by J. Glass† was used. The data for quartz were obtained from Hardy and Perrin "The Principles of Optics."

TABLE 1

Wave Length	Canada Balsam	Lakeside No. 70
4713	1.5573	1.5495
5016	1.5502	1.5432
5890	1.5417	1.5358
6678	1.5382	1.5319

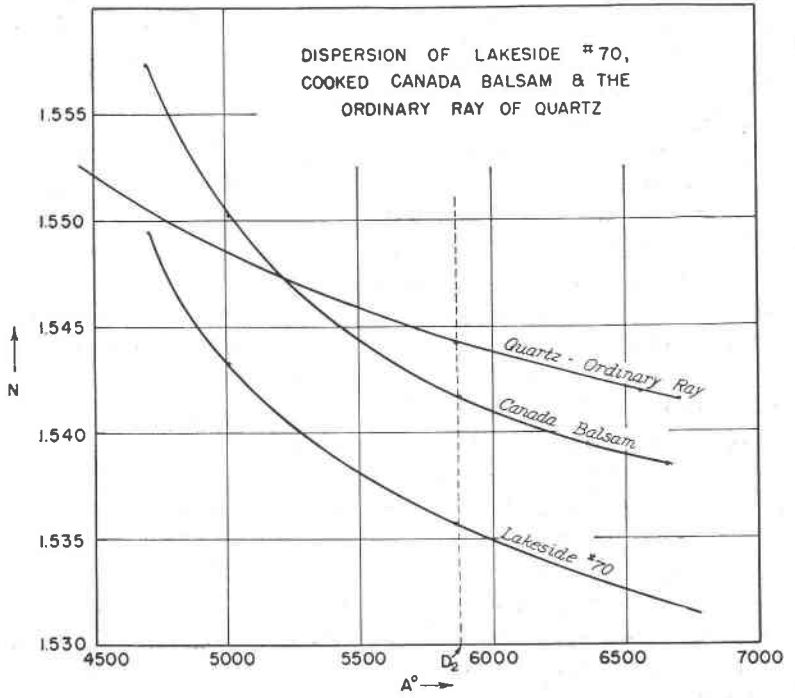

FIG. 1

The author expresses his thanks to Dr. George Tunell for encouraging the publication of these observations and for reading the paper.

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† Glass, J. J., Standardization of index liquids: *Am. Mineral.*, **19**, 459–465 (1934).