cordingly, calcium rinkite may be termed a rare earth- and niobium-bearing strontian götzenite.

The unit cell dimensions of götzenite separate it from the minerals of the mosandrite-rinkite group. Based on some differences in powder pattern between mosandrite (johnstrupite) on the one hand and rinkite on the other, Sahama and Hytönen (1957 *b*) considered rinkite to represent a species separate from mosandrite (johnstrupite). As very truly was remarked by Flesicher (1958 *b*), the differences may be caused by the less pronounced metamict alteration of rinkite. Both Slepnev and Fleischer agree in considering mosandrite (johnstrupite) and rinkite one single species. As mentioned by Fleischer, the name mosandrite has the priority and, accordingly, names like rinkite, johnstrupite, rinkolite and lovchorrite should be dropped in mineralogical nomenclature. If this is accepted, then also the name calcium rinkite should be dropped in favor of götzenite.

References

FERSMAN, A. E. (1937), Minerals of the Khibina and Lovozero Tundras; Lomonossov Inst. Acad. Sci. USSR.

FLEISCHER, MICHAEL (1958 *a*), Abstract in *Am. Mineral.*, **43**, p. 790.

——— (1958 *b*), Abstract in *Am. Mineral.*, **43**, 795–796.

SAHAMA, TH. G. AND HYTÖNEN, KAI (1957 *a*), Götzenite and combeite, two new silicates from the Belgian Congo; *Min. Mag.*, **31**, 503–510.

——— (1957 *b*), Unit cell of mosandrite, johnstrupite and rinkite; *Geol. För. Stockholm Förh.*, **79**, 791–796.

SLEPNEV, YU. S. (1957), The minerals of the rinkite group: *Izvestiya Akad. Nauk. USSR, Ser. Geol.*, No. 3, 63–75.

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A PLASTIC UNIVERSAL STAGE FOR STUDENT USE

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For many optical techniques a clear understanding of the indicatrix is essential. This concept is fundamental in the use of convergent light figures, in refractive index measurements, in the relation of vibration axes to crystallographic directions, and in similar techniques.

Geology students frequently encounter difficulty in fully understanding the indicatrix. The "three-dimensional thinking" involved is aided by use of the universal stage before the student is introduced to con-

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vergent light, but unfortunately, it is generally impracticable to provide junior students with expensive multi-axis stages.

The authors have overcome this difficulty by designing a low cost, 3 axis universal stage, of simplified construction. It may be produced in a small workshop with the minimum of equipment, and can be made in sufficient quantity to be used with large classes. Being small, it can be fitted to most microscopes with little difficulty. Special objectives are not necessary, a standard low power (e.g., Swift 32 mm., ×4) is quite satisfactory.

The perspex stage is not intended for precise measurement, but it has been found possible to make reasonably accurate measurements of 2V.

Material

The stage described was made from perspex, but any similar reasonably durable, non brittle and easily machined plastic (Leucite; Plexiglas) would be suitable.

Construction

The component parts are shown in the "exploded" diagram (Fig. 1), and an assembled stage, mounted on a Swift Model P polarizing microscope, appears in Fig. 2.

Quarter inch sheet perspex was used for all parts except the inner rotating stage (D, Fig. 1) which was cut from $\frac{1}{16}$ inch perspex, and the upper segment holder (E), of $\frac{1}{8}$ inch perspex. The rings were cut with a trepanning bit; few other tools are necessary.

Considerable variation in dimensions and detail is possible. Measurements indicated below are those used in construction of the stage illustrated in Fig. 2. The basal ring (A, Fig. 1) and main ring (B) have an outside diameter of $3\frac{5}{16}$ inch and $3\frac{3}{16}$ inch respectively, each ring being $\frac{13}{32}$ inch wide. Supports F and G are cemented to the basal ring and the main ring mounted between them, with a vertical gap of $\frac{3}{4}$ inch between the rings.

The inner ring (C) has an outside diameter of $2\frac{5}{16}$ inch, is $\frac{5}{16}$ inch wide, and is recessed to carry the inner rotating stage with a cut $\frac{1}{16}$ inch wide and $\frac{1}{16}$ inch deep. The inner rotating stage (D), with a diameter of $1\frac{13}{16}$ inch, fits snugly into the recess in C, and yet is free to rotate.

The quadrants, H and I, were cut from a ring of the same outside diameter as B, but to permit clearance of C when rotated about the horizontal N—S axis, only $\frac{11}{32}$ inch in width. A maximum quadrant height of $1\frac{1}{4}$ inches above the thin section is sufficient to clear the revolving nosepiece of a Swift microscope when a $1\frac{1}{2}$ inch objective is used.

Any type of bearing may be used. In the original prototype $\frac{3}{32}$ inch

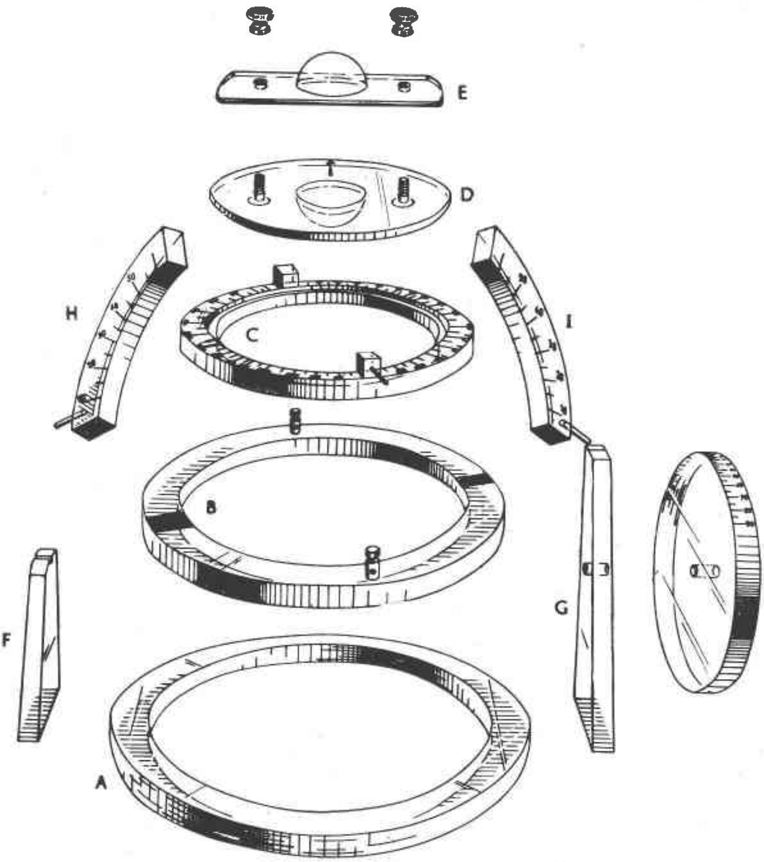

FIG. 1. The perspex stage, "exploded" to show details of components.

steel rod and small brass electrical terminals were used (Fig. 1). Those in Fig. 2 are threaded brass, and have proved particularly satisfactory as they permit the amount of friction between the moving parts to be adjusted.

Perspex cement was used in assembly. Especial care is necessary to align both sets of horizontal bearings so that the axes of rotation are level with the rock slice in an average thin section above the inner rotating stage D.

Glass hemispheres

Small hemispheres (diameter about $\frac{3}{4}$ inch) were made by heating soda glass rod free from air bubbles in a glassworking lathe. Alternatively they

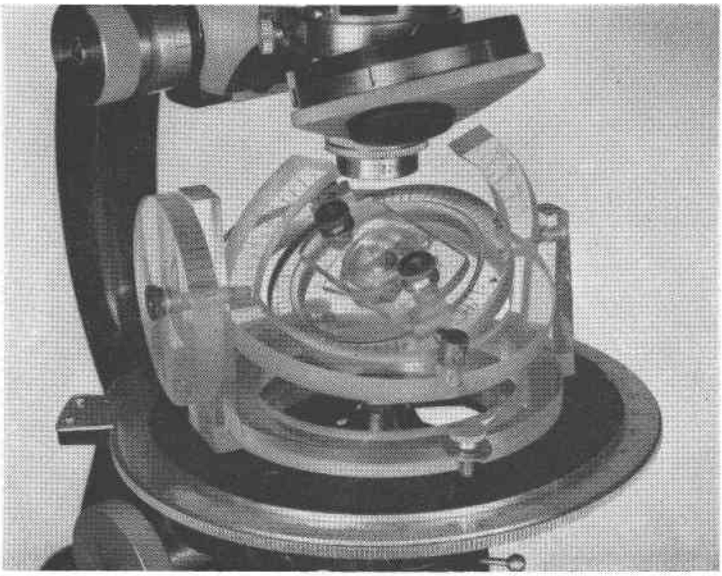

FIG. 2. The perspex stage, mounted on a Swift Model P microscope.

can be ground fairly cheaply, as precision is not essential, and all that is required is moderately clear vision through the upper segment.

Cost

Perspex stages, quite suitable for student use, were produced for the Victoria University of Wellington at a cost, including labor and glass segments, of approximately $25 per stage.

Use of Perspex Stages

Any suitable mineral may be measured in thin section on the perspex stage. Augite has been found to be convenient for introducing students to biaxial minerals. Grains giving under the conoscope a slightly off center acute bisectrix figure may be previously selected. Use of these grains ensures that both optic axes, Y, and the obtuse bisectrix are accessible without excessive tilt.

Students with some previous experience of the stereographic projection can rapidly acquire the necessary technique to enable them to find and plot the X and Y vibration axes of such suitably oriented augite crystals. They can then locate the optic axes and measure 2V directly.

This leads to a comprehension of the indicatrix which enables students to proceed to the study of convergent light interference figures with understanding.

Acknowledgments

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VERMICULAR GIBBSITE IN THE PENSAUKEN OF NEW JERSEY

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Vermiforms found near South River, New Jersey and in at least five other localities in the Pensauken formation of the New Jersey coastal plain were definitely identified as mainly composed of gibbsite by differential thermal analysis, *x*-ray diffraction, and chemical analysis. They occur in coarse sand, average 0.5 to 2.0 mm. in length, but a few specimens were as long as 6 mm. (Fig. 1). Gibbsite is also found there as whitish aggregates cementing coarse quartz grains. The veriforms are very similar in aspect to those found in South Carolina, California, and other localities and identified as kaolinite (1). A hand picked sample from South River showed the following mineral composition:

gibbsite	87%
kaolinite	6%
goethite	5%
other	2%

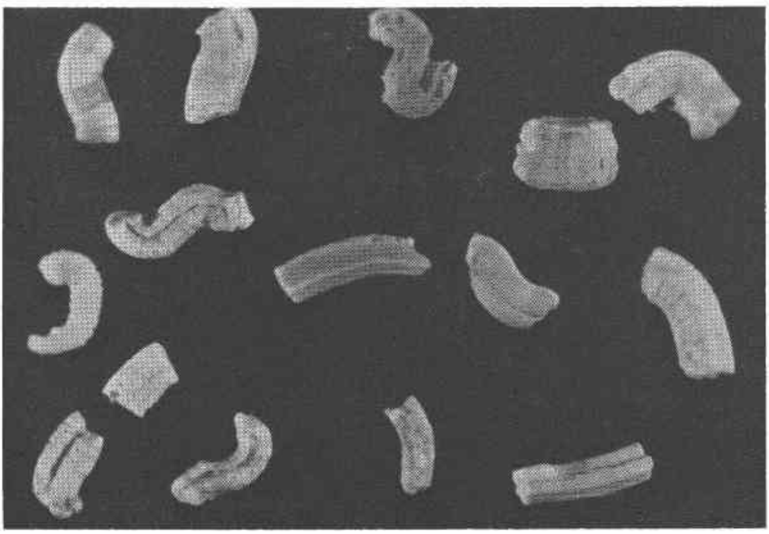

Fig. 1. Microphotograph of vermicular gibbsite, South River, New Jersey. ×14