NOTES AND NEWS

OCCURRENCE OF BOROSILICATES IN DIABASE AT LAMBERTVILLE, NEW JERSEY

W. Harold Tomlinson, Springfield, Pennsylvania.

In describing the solidification of the triassic diabases of the eastern states, petrographers usually arrange the minerals which crystallize from the magma in three groups according to the stage of solidification: (1) olivine and a few phenocrysts which crystallize from the quickly chilled magma and which are usually not found in the magma that has cooled more slowly; (2) labradorite and augite which crystallize more or less simultaneously at an early stage and are the principal constituents of the rock; (3) alkali feldspars, quartz, micro-pegmatite, apatite, sphene, etc., which crystallize at a later stage from magma left in the interstices of the labradorite-augite crystallization.

In small dikes the amount of the interstitial material (group 3) usually covers about 6% of the area of a section. In larger masses of diabase, however, the minerals of group 3 are often concentrated in pockets in blocks of solidifying magma. Crystallization within these blocks proceeds from the walls inward. As volatile constituents are concentrated the labradorite-augite crystallization becomes much coarser in grain size. This phase has been called diabase pegmatite. As magnesia and lime are depleted and alumina reduced the remaining magma crystallizes to form minerals of group 3.

The core magma of these blocks, fluid with concentration of volatile constituents, often works upward into a vein or chimney and may reach the surface of the diabase. Such pockets and veins can be seen in exposures of all the large masses of the diabase and they are well known to geologists familiar with the formation.

The volatile constituents usually present in this residual magma are water and carbon dioxide. This is inferred from the reactions found along the vein walls. In some pockets other volatile materials were present in considerable amount. Veins of scapolite in the diabase at Falls of French Creek, Pa., contain 2.45% chlorine. It would seem a reasonable inference that these veins were fed from one of these pockets formed at lower depth in which chlorine had been concentrated, the residual liquors having escaped through fractures in the already solidified mass above.

On the north wall of the quarry at Lambertville, N. J., a pocket is exposed in which boron had been concentrated. Borosilicates have been found in this diabase at many localities and their presence is not unusual, but their occurrence here is of interest because of the abundance of axinite, the variety of boron minerals formed, and their associations. The pocket is surrounded by diabase pegmatite which grades outward into diabase of finer grain. The pegmatite has a large percentage of interstitial minerals which increases rapidly toward the core. Approaching the core a brownish green hornblende takes the place of augite, then fibrous actinolite replaces hornblende. As carbon dioxide is concentrated albite and calcite take the place of labradorite. Axinite is very abundant at the core. Specimens were found up to a pound in weight in which axinite formed 30% of the rock (Fig. 1). The axinite occurs in sheaves of crystals showing the usual wedge termination, is of purple color (strong at the center but fading toward the edges), has the usual pleochroism and other optical properties. A little datolite in small, poorly formed crystals is associated with it.

Specimens taken from the quarry rubble below the pocket show an association of prehnite, tourmaline, actinolite, epidote and axinite. The upper part of the pocket was quarried out a long time ago but it would seem reasonable to suppose that these specimens collected from rubble below the pocket represent an upward extension in the form of a vein. These specimens are full of vugs which are lined with crystals of the various minerals. Prehnite crystals, white in color, are bounded by pinacoids forming single crystals that are optically uniform. They are quite different from the fan-shaped aggregates found in the zeolite veins. One specimen shows a replacement of tourmaline by prehnite accompanying the axinite. Apparently the axinite is stable under the alkaline conditions imposed but the tourmaline is not.

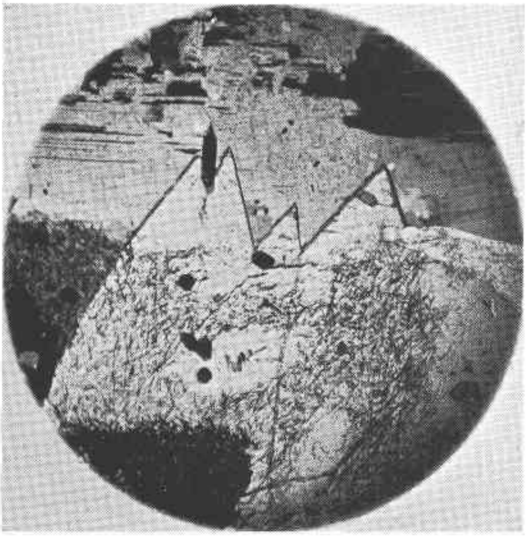

FIG. 1. Axinite wedges in albite. Black crystals, apatite; fibrous material, actinolite. × about 16 dia. Crossed nicols.

Corrections

I am indebted to Dr. H. J. Mel of the Geological Survey, Pretoria, for having called my attention to two incorrect figures of dispersion for liquids listed on pages 62 and 63 of *Memoir* **8**, *Geological Society of America*. The correct figures for $N_F - N_C$ for liquid #13, ethyl salicylate, is .0210 and for liquid #14, ethyl benzoate, is .0168.

R. C. EMMONS

Refractive Index of Western Australian Helvite

Since the publication of the paper on "Helvite and Danalite from New Mexico and the Helvite Group" by J. J. Glass, R. H. Johns and R. E. Stevens in the June number (**29**, 163–191) I have had the refractive index of the original sample of helvite from Mt. Francisco, Western Australia, checked by the immersion method using a mixture of pure methylene iodide ($n=1.739$) and an impure sample of methylene iodide ($n=1.759$). The refractive index of the liquid was measured in a hollow prism on a goniometer. The refractive index of the helvite was found to be 1.747. At the time when the original determination was made the hollow prism method was not available in this Laboratory. Helvite recently examined from the same or a nearby locality has the same refractive index, viz. 1.747.

H. BOWLEY, *Government Mineralogist*
Perth, Western Australia