growth relations would likely have resulted. Furthermore, the silica content of the original diabasic or basaltic material likely was too low to result in the present mineral assemblage plus the frequent areas of quartz.

The structures shown under the microscope include a trachytoial arrangement of labradorite laths in a fine-grained groundmass of augite, magnetite, and andesine-labradorite, flow-structure due to the parallel arrangement of andesine-labradorite laths and the more common diabasic and ophitic structures.

**Age relations.**—Little is known about the age relations of this basic material to other rocks in Northampton County. In the area to the southwest in Lehigh and Berks Counties, however, the occurrence of similar material in areas of pre-Cambrian rocks and Hardyston quartzite would indicate its association with both Paleozoic and pre-Cambrian formations. The following seven paragraphs from a paper describing this material will give the reasons for considering it to be of probable Ordovician or post-Ordovician age.

Rocks of this type have long been recognized in the pre-Cambrian belt of eastern Pennsylvania. In Berks County in the area north of Boyertown and extending into the southern part of Lehigh County, altered diabasic rocks were recognized and described in 1917, when they were considered to be pre-Cambrian in age. More recently one dike of this material has been indicated as Triassic in age. In the absence of any conclusive evidence regarding the age of these rocks, it seems desirable to sum up the similarities and differences existing between them and the pre-Cambrian Pochuck gneiss and the Triassic diabase. With this thought in mind, the relations of this greenstone to the other basic rocks are discussed below.

**Comparison with the Pochuck gneiss.**—The greenstone, which may be called a meta-diabase or meta-andesite, is commonly associated with the Pochuck gneiss in the field and was at first thought to represent a facies of this formation. From the thin-section studies, however, it was found that the greenstone contains augite and andesine or andesine-labradorite while the Pochuck typically carries hornblende in addition to augite and andesine. Furthermore, the greenstone is altered by hydrothermal processes to epidote, chlorite, sericite, and saussurite, whereas alteration of the Pochuck produces uralite and sericite, and, except locally, only small amounts of epidote and chlorite.

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