dues. The grains are angular to sub-angular, with uneven fracture and some re-entrant angles. They are colorless, and exhibit no pleochroism. Some grains were oriented so as to give a good interference figure. The figure is uniaxial negative, though in some grains which do not show complete extinction a slight separation of the arms of the cross upon rotation was observed.

Garnet. In several of the mounts of the silt material there are a few sub-angular grains of a red to reddish-brown isotropic mineral which has high refringence and which is intricately fractured. There is little doubt but that this mineral is garnet, but the statement should be made that it may possibly be red spinel. However, the rarity of this latter mineral as compared to garnet is taken as an additional point in favor of the questionable minerals being garnet.

Topaz. In the mounts of the heavy fractions of the silty portions of two residues several grains of topaz were observed. These grains are sub-angular, colorless and "fresh" without pleochroism, have high index of refraction and low birefringence, and give a bluish positive interference figure.

Fluorite. Occasional grains of a substance which appears to be fluorite are found in the silt grade. These grains are isotropic, and have a peculiar bluish-gray pearly luster by reflected light. They are sub-angular in shape, and sometimes show clear cleavage (pair) in two directions.

Although this work has not been advanced far enough to permit definite conclusions being formed, certain inferences as to the kind of rocks from which the detrital grains were derived can be drawn. As a possible source of an assemblage of minerals such as is found in these residues, we have to consider: (1) acid or intermediate igneous rocks, (2) acid or intermediate metamorphic rocks, and (3) pre-existing sediments.

The writer does not believe that any one of these types of rocks alone has been the source of the detrital minerals of the Allentown limestone. The occurrence of well-rounded zircon and fairly well-rounded tourmaline with more angular grains of the same and other minerals, especially tourmaline, topaz, garnet, and corundum, seems best explained on the basis of different source-rocks—that is, by considering the well-rounded grains to have been derived from pre-existing sediments. On the other hand, it would be very unusual, if it is not impossible, for plagioclase feldspar to undergo two cycles of erosion, and accordingly an igneous or igneous-metamorphic rock origin must be supposed for that mineral. And, lastly, the cyanite must have been derived from rocks which had suffered at least local metamorphism.

Hills in his microscopic study\(^8\) of the limestones of the Lehigh Valley describes dolocasts which occur in the Allentown and other limestones of the region.

Dolocasts. Dolocast is a term introduced by McQueen to denote the silicified impressions of dolomite crystals. These impressions show very clearly the rhombohedral outline of the dolomite crystals. They are formed largely of white chert, although some are black to gray, and in some cases they are composed of crystalline quartz. The writer's opinion is that these impressions are probably diagenetic phenomena, and the light-colored chert which forms these impressions took its rise very soon after the deposition of the limestone, and is, for all practical purposes, primary. The dark chert seems to be somewhat later, although no conclusive evidence as to the relative ages of the two kinds of chert has been discovered.

Dolocasts are almost omnipresent in the shaly residues of all these limestones. However, in most cases these dolocasts are very small and can hardly be distinguished under the low power of a binocular microscope. At some horizons large and unmistakable cherty dolocasts appear, which are fairly characteristic of those levels. Unfortunately they are not very persistent, and tend to scatter through a considerable vertical range.

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