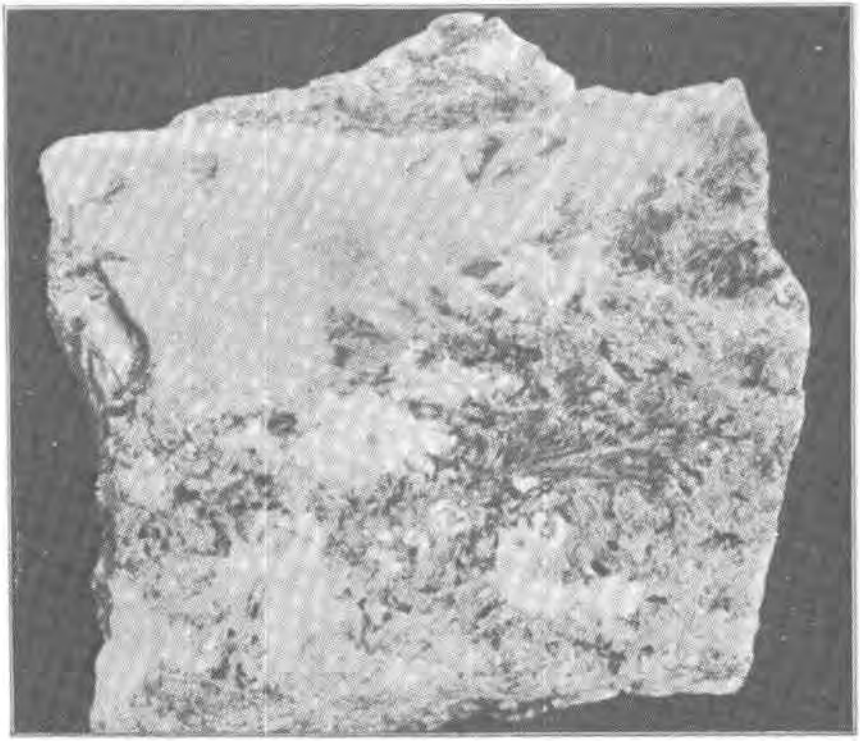

Photograph by Samuel G. Gordon

LAMELLAR CALCITE (ARGENTINE) WITH MESOLITE (WHITE RADIATIONS) AND STILBITE (DARK RADIATIONS), WARD'S QUARRY, DELAWARE CO., PA. NATURAL SIZE.

PLATE IV.

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AN OCCURRENCE OF LAMELLAR CALCITE (ARGENTINE) IN PENNSYLVANIA

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WITHIN the past three years a new locality for argentine has become well known to Philadelphia collectors, both for the fine specimens of this mineral, and for the accompanying stilbite, laumontite, and heulandite. The occurrence is mineralogically and geologically quite different from those in Rhode Island and in Massachusetts, as described by Hawkins,[1] Hitchcock,[2] and Nash.[3]

The locality is Ward's quarry, on the east side of Crum Creek, about a half mile southeast of Crum Lynne Station, Delaware county.

The rocks of the quarry consist of a granite gneiss, a biotite gneiss, possibly a more basic facies of the former, and pegmatite. The granite gneiss is a light-colored, medium-grained, quartz-feldspar-mica rock, forming the bulk of the material quarried. Closely associated with this is the biotite-gneiss, a coarse-grained, more or less porphyritic rock, of a dark color, composed essentially of biotite, oligoclase, and quartz. Numerous pegmatite dikes cut these rocks, having a general N. W. to S. E. direction, and varying in width from a few inches to 16 feet. The following minerals have been noted in the pegmatites: quartz, microcline (in large pink cleavages), albite (greenish crystals up to one and a half inches), muscovite, biotite, garnet, and tourmaline.

The lamellar calcite (argentine) and the zeolites occur as vein fillings in a series of closely spaced sheeted zones (due to shearing

[1]Alfred C. Hawkins, "The Occurrence of Lamellar Calcite in Rhode Island," *This Journal* **1**, 3, 1916.

[2]Edward Hitchcock, Final Report, Geology of Massachusetts, 562, 1841.

[3]Alanson Nash, "Notices of the Lead Mines and Veins of Hampshire County Massachusetts," *Am. J. Sci.* [1], **12**, 255–258, 1827.

or faulting movements), striking E.-W. and N. 60° W., and traversing all three types of rock. The argentine is milky-white in color and has a characteristic pearly luster (often termed silvery, whence the name argentine) due to the wavy lamellar structure (see Plate IV); occasionally it grades into normal calcite. Stilbite and laumontite are the most abundant zeolite minerals, the former occurring in yellow radiations up to two inches, and the latter in small white and yellowish radiating crystals. Heulandite crystals up to an inch in diameter have been found in the laumontite. Mesolite in mealy white radiations up to one inch in diameter has also been noted. The minerals were deposited in the following sequence: stilbite and laumontite; heulandite; calcite. No alteration of the wall rock is observable, beyond slight secondary enlargement of the quartz grains into small crystals, and occasional thin films of chlorite and epidote.

Zeolites are by no means rare in such acidic gneisses, and in fact, the frequency of this mode of occurrence leads to the belief that they were produced by meteoric waters, the efficacy of which in extracting calcium, sodium, aluminium, etc., from rocks can not be doubted. Probably the process suggested by Fenner,[4] selective solution of the anorthite molecule of the oligoclase of the acidic gneiss, has been effective here. The cause of the unusual habit of the calcite can not have been high temperature, for the zeolites which preceded it would have been decomposed had this greatly exceeded 100°, but no conclusive evidence of other possible causes can be obtained at this locality. It may be suggested, however, that the lamellar habit may have been due to the presence of traces of silicates, in this case zeolite material, in the solution. In the occurrence described by Mr. Hawkins perhaps the chlorite played the same rôle. It must be remembered, however, that free silica appears to produce an opposite effect, Mr. Whitlock[5] having shown that several lines of evidence appear "to connect beyond question the pyramidal habit of calcite with a crystallizing solution saturated or nearly saturated with silica." Additional data upon such questions are greatly needed.

[4] Clarence N. Fenner, The Watchung basalt and the paragenesis of its zeolites and other secondary minerals, *Ann. N. Y. Acad. Sci.*, **20**, 121, 1910.

[5] N. Y. State Mus. *Memoir* **13**, 134—135, 1910.