

SPODUMENE AND AUTUNITE FROM ALSTEAD, NEW HAMPSHIRE

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During an investigation in August and September, 1927, of the pegmatites of the Gilsum area, Cheshire County, New Hampshire, two minerals, spodumene and autunite, were found which are not known to have been reported before from this district. It seems worthwhile, therefore, to put this occurrence on record.

The pegmatites of this region are intruded into a mica schist with which they have rather sharp contacts, although there is some lit-par-lit injection on a small scale as well as tourmalinization of the wall rock. The essential minerals, aside from quartz, are feldspar and muscovite, both of which are extensively quarried in the area. The accessory minerals include biotite, black tourmaline, beryl, garnet, apatite, spodumene, autunite, and zircon. The spodumene and autunite came from the quarry of the New Hampshire Mica and Mining Company in the town of Alstead, about one and four-fifths miles north northwest of Gilsum village.

The spodumene crystals occur on an inaccessible wall near the top of the west face of the quarry. They were much concealed by material washed down from the surface, but the crystals exposed appeared to be of the order of several feet in length. From blocks which had fallen from the wall a few crystals were obtained, the largest of which was six inches long, four inches wide, and one and one-half inches thick, but it did not represent the entire crystal. The spodumene occurs associated with tourmaline, garnet, apatite, feldspar, quartz, and sericite. The material shows a fairly good crystal form although it is much altered by weathering to a soft powdery substance of a light pink color, probably cymatolite, a mixture of albite and muscovite. The crystals show the characteristic spodumene etching and are colorless to white, pink, or light green. One specimen showed both a pink and a green color in the same crystal. The pink spodumene suggests kunzite, which in New England has been reported from Branchville, Connecticut.¹ Green spodumene or hiddenite is

¹ Brush, G. J., and Dana, E. S., On the mineral locality at Branchville, Connecticut. Spodumene and the results of its alterations, *Am. Jour. Sci.*, 3rd ser., 20, 257-285 (1880).

found in North Carolina.² Spodumene is also reported from a number of localities in New England,³ and in New Hampshire occurs at Winchester in white, well-formed crystals.⁴

At the same quarry autunite, the hydrous phosphate of uranium and calcium, is found in small micaceous flakes or scales of a light greenish-yellow color lying between plates of albite of the variety cleavelandite. A similar occurrence in the pegmatites of Maine was reported by Bastin.⁵ The mineral also occurs at the same quarry in the tourmalinized portion of the wall rock. The largest of the autunite flakes was 4 mm. in diameter, but most of the scales are considerably smaller. They are characterized by their well-developed cleavage and brittleness as well as yellow color. Under the microscope the mineral is seen to have a biaxial negative character with a very small optical angle. Autunite is reported from several localities in New England,⁶ and in New Hampshire occurs at Acworth⁷ in small tabular crystals of a light green and straw-yellow color coating the feldspar.

² Kunz, G. F., History of the gems found in North Carolina, *North Car. Geol. Surv., Bull. 12*, p. 45-48 (1907).

³ Dana, E. S., The system of mineralogy of James Dwight Dana. Descriptive mineralogy, 6th ed., p. 368, *New York* (1892).

⁴ Hitchcock, C. H., The Geology of New Hampshire, Vol. III, Part IV, pp. 60, 136, *Concord* (1878).

⁵ Bastin, E. S., Geology of the pegmatites and associated rocks of Maine, *U. S. Geol. Survey Bull. 445*, pp. 16, 78 (1911).

⁶ Dana, E. S., *op. cit.*, p. 858.

Bastin, E. S., *op. cit.*, pp. 16, 53, 78, 88, 102, 104.

⁷ Hitchcock, C. H., *op. cit.*, p. 126.