

Geologic Site of the Month
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Litchfieldite and the Litchfield Sodalite Locality



Text by
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Introduction

A short distance from the Kennebec River, in the towns of Litchfield and West Gardiner, and not far from the village of Purgatory, are deposits of a most unusual rock, an eleolite-syenite, variety litchfieldite, which has aroused the interests of scientists and mineral collectors for over a century and a half. **Please note that these deposits are on private property and not open to collectors.**



Photo by Marc Loisel

Maine Geological Survey



Photo by John Poisson

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Figure 1. (Left) A weathered boulder of type litchfieldite. The deeply pitted surface is characteristic and due to the rapid weathering and dissolution of the essential nepheline in the rock. (Right) Freshly exposed surface.

Litchfieldite

While in situ outcrops of litchfieldite are infrequent; good samples of the rock, abundant nepheline and cancrinite, and rarely sodalite have been found in boulders.



Photo by Marc Loisele

Figure 2. A most interesting fungus found at the main sodalite locality in Litchfield.

Litchfieldite

Excellent descriptions of the occurrences of the minerals are provided in King and Foord (1994; cancrinite on p. 71; nepheline on p. 251; sodalite on p. 324).



Figure 3. Dr. Henry Berry of the Maine Geological Survey examining one of the many areas of broken rock at the main sodalite locality in Litchfield. In addition to the abundant cancrinite and nepheline found at the locality that day, sodalite was found in one sample.

Sodalite and Cancrinite in Litchfieldite

The first known mention of the deposits occurs in the proceedings of the Sixth Annual Meeting of the Association of American Geologists and Naturalists, held in New Haven, Connecticut, in 1845, where C.T. Jackson (who had just completed the first survey of the geology of Maine in 1837-39) described the minerals and provided chemical analyses of the sodalite (which he unfortunately misidentified as cancrinite) and cancrinite (which he unfortunately misidentified as nepheline) (see King and Foord, 1994, p. 324) (Jackson, 1846).



Figure 4. (Left) A fine specimen of sodalite in litchfieldite from the Maine Geological Survey collection. Finds like this are rare. (Right) Cancrinite in litchfieldite from the Maine Geological Survey collection.

Work by W. S. Bayley

These unusual minerals and the rock that hosted them continued to attract the attention of collectors and chemists through the latter half of the 19th century, but it was left to W. S. Bayley, in 1892, to present the first discussion of the distribution and origin of the "eleolite-syenite of Litchfield and other localities in Maine." (Bayley, 1892). In this work he named the rock variety at present known as litchfieldite:

"...Consequently, in spite of the great predominance of albite over orthoclase, we are quite justified in calling our rock an eleolite-syenite [or in more current terminology, a nepheline syenite, as eleolite is a synonym for nepheline, used to describe a massive to coarsely crystalline variety of the mineral - the author] . Its large percentage of albite, however, and its possession of but one bisilicate constituent, and that a biotite (lepidomelane), seem to distinguish it as a very well defined variety of eleolite-syenite, as well characterized in the hand-specimen as in the thin section. Its peculiarities are so strongly marked that the rock seems worthy of a distinctive varietal name, for which no more appropriate one can be found than litchfieldite, derived from the familiar locality - Litchfield - whence nearly all the specimens in museums were obtained."



Work by R. A. Daly

A more thorough investigation of the "field relations of litchfieldite and soda-syenites of Litchfield, Maine" was left until the field seasons of 1916 and 1917, when R.A. Daly visited the district (Daly, 1918).



Photo by Marc Loisele

Maine Geological Survey

Figure 5. Looking north from Dennis Hill in Litchfield. Boulders of syenite, nepheline syenite, and litchfieldite are common along the pipeline right-of-way and in the woods on either side.



Work by D. S. Barker

Half a century later, a modern petrologic investigation of the alkalic rocks at Litchfield, Maine, was undertaken by D. S. Barker (1965). Barker identified a suite of rocks ranging in relative age from an older leucosyenite (a rock composed of more than 95-percent alkali feldspar with scant dark minerals - primarily sodic pyroxene and amphibole), through nepheline-free biotite syenite, to a younger nepheline syenite (including the type litchfieldite), and minor younger mafic syenite and albitite pegmatite dikes.



Photo by Marc Loisel

Figure 6. Sand Pond, in the Tacoma Lakes, Litchfield.



Litchfield and Litchfieldite

The rock achieved such notoriety that the town of Litchfield has placed a specimen of litchfieldite on its town seal.



Figure 7. Town seal of Litchfield, Maine, showing specimen of litchfieldite.

References and Additional Information

Barker, Daniel S., 1965, Alkalic rocks at Litchfield, Maine: *Journal of Petrology*, v. 6, part 1, p. 1-27.

Bayley, William S., 1892, Eleolite-syenite of Litchfield, Maine, and Hawes' hornblende syenite from Red Hill, New Hampshire: *Geological Society of America, Bulletin*, v. 3, p. 231-252.

Daly, Reginald A., 1918, Field relations of litchfieldite and soda syenites of Litchfield, Maine: *Geological Society of America, Bulletin*, v. 29, p. 463-470.

Jackson, Charles T., 1845, On cancrenite, nepheline, elaeolite, and zircon from Litchfield, Maine: *Association of American Geologists and Naturalists, Proceedings*, v. 6, p. 44-49.

King, Vandall T., and Foord, Eugene E., 1994, *Mineralogy of Maine Volume 1: Descriptive Mineralogy*: Maine Geological Survey (Department of Conservation), 418 p.

