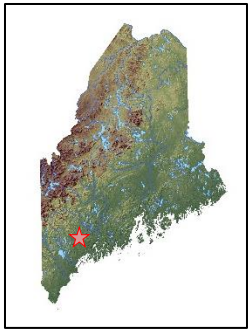
Maine Geologic Facts and Localities

October 2021

Mount David, Lewiston, Maine



44° 6’ 25” N, 70° 12’ 31” W

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Introduction

Mount David is a small hill located in Lewiston, Maine, on the edge of the Bates College campus. Named for the son of one of Lewiston's first settlers, David Davis, Mount David is an easily accessible example of the pegmatites which intrude the older rock units of the Lewiston Area. The easiest way to access Mount David's summit is by parking on Mountain Avenue on the northeast side of the hill and following the trail visible from the road (see Figures 1a & 1b). The trail up to the summit is short and direct, but quite steep.

Figure 1a. Satellite view of Mount David, with summit trail illustrated. Parking on Mountain Ave is the easiest way to access the trail.

Photo by Zane Rahabi

Figure 1b. Entrance to Mount David summit trail as seen from Mountain Ave.

Mount David, a Monadnock

Mount David rises abruptly from the relatively flat surrounding landscape to a height of 381 feet above sea level. When hiking the trail up to the summit, the steep slope makes this abrupt change in elevation readily apparent. Mount David could easily be considered a small monadnock (named for New Hampshire's Mount Monadnock), a type of geological formation defined as an isolated mountain or hill that rises abruptly from an otherwise flat plain.

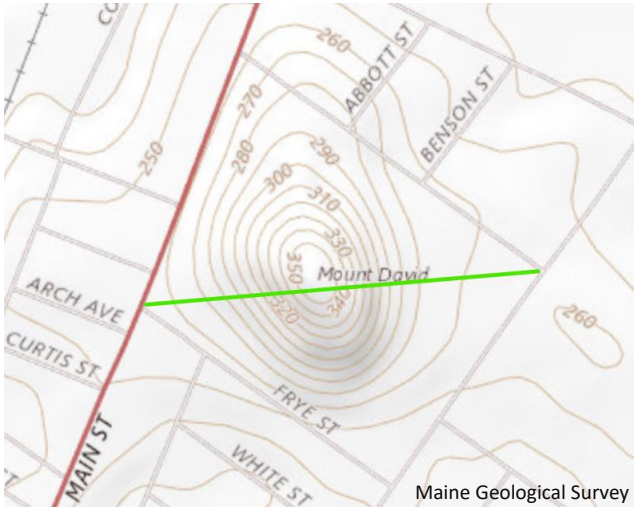

Figure 2a. Profile line (in green) across Mount David from the corner of Route 202 & Frye Street to the corner of College Street & Mountain Ave.

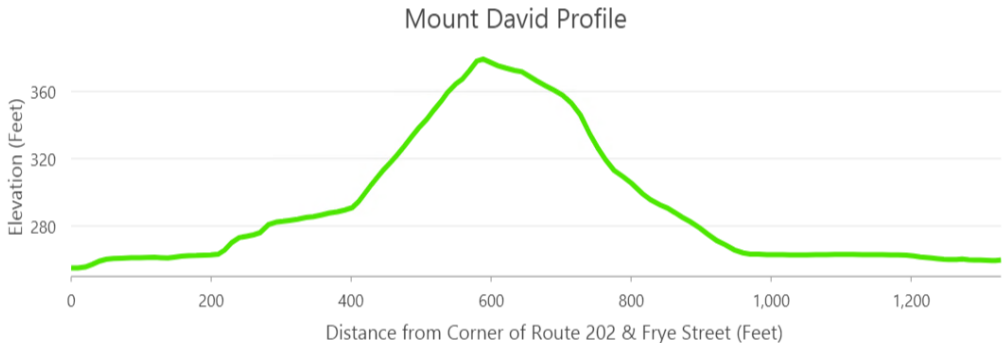

Figure 2b. Mount David's profile along the line in Figure 2a. The hill rises approximately 125 feet in height over a horizontal distance of about 400 feet.

Geologic History & the Big Picture

As previously stated, Mount David is an example of a pegmatite, which is a type of intrusive igneous rock; this type of rock is created by the solidification of magma deep underground. The magma that would become the Mount David pegmatite intruded the surrounding rock, the metamorphosed sedimentary rocks known as the Sangerville Formation. Long after the magma had solidified into pegmatite, the surrounding rocks were eroded away leaving the more resistant pegmatite behind.

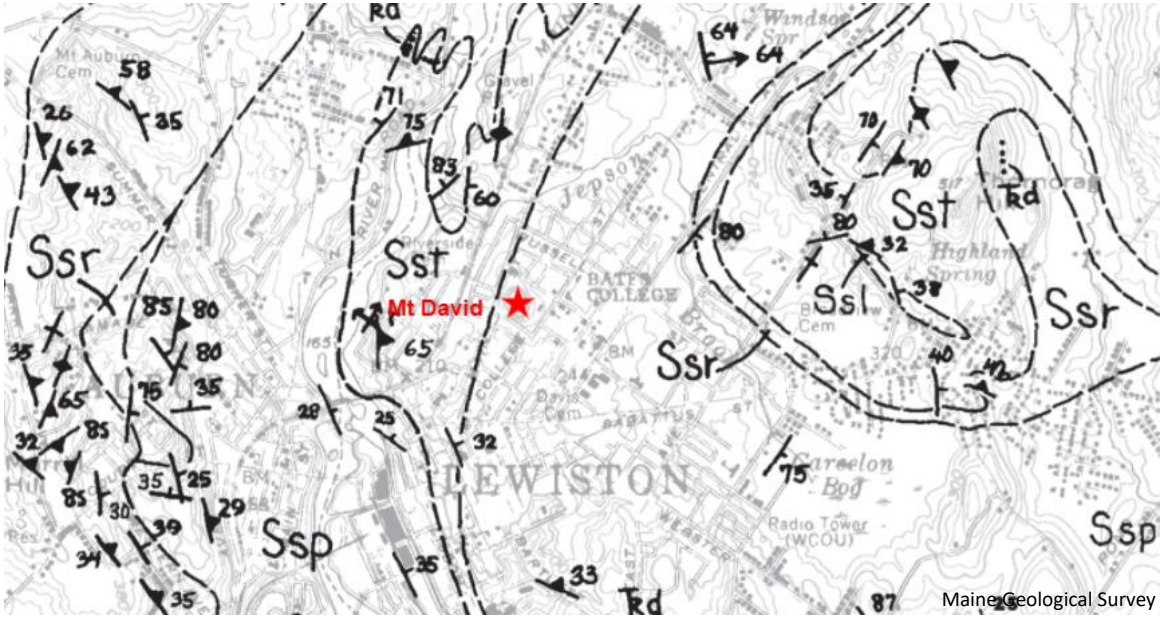

Figure 3. Mount David's location marked on Arthur M. Hussey's 1983 map of the Lewiston Quadrangle. Entirely surrounded by the rocks of the Sangerville Formation (units Ssr, Ssp, Sst, & Ssl), the Mount David pegmatite is so small that it was not even noted as a unique geologic unit.

Sillimanite at the Summit

Near the end of the trail, at the edge of the summit, a tan-colored patch of the pegmatite is visible where the weathered surface has been broken away (see Figures 4a & 4b). Upon closer inspection, seen throughout this patch is a fibrous-looking mineral called sillimanite, which is not commonly found in pegmatites. Sillimanite is, however, found within the metamorphic rocks of the surrounding Sangerville Formation. It is likely that the sillimanite seen here came from a piece from the Sangerville Formation that was caught up in the magma as it forced its way through the metamorphic rocks; a fragment of the surrounding rock that is stuck in an igneous rock is called a xenolith. In this case, the xenolith was probably partially melted, leaving only the sillimanite to show where it had originally been. Similar remnants can be found elsewhere on the summit.

Photo by Zane Rahabi

Figure 4a. Approaching the summit of Mount David. Backpack for scale located directly behind sillimanite-rich patch.

Figure 4b. Sillimanite-rich patch, with 10 cm north arrow for scale. Fibrous, tan-colored sillimanite is indicated, as well as a small garnet crystal.

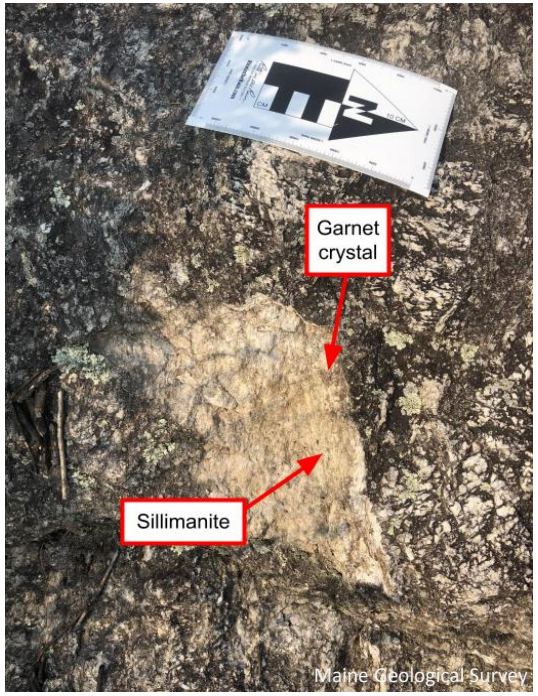

Photo by Zane Rahabi

The Mount David Pegmatite

The pegmatite is well exposed at Mount David's summit. A close look shows that it is primarily composed of an opaque white to tan mineral called feldspar, translucent white to gray quartz, black tourmaline (also known as schorl), and silvery, flaky, scale-like muscovite mica. One can also find the occasional dark red garnet crystal, though they are few and far between. Large masses of feldspar, up to several feet in length, are common, and individual grain sizes throughout the rock are generally quite large, a defining feature of pegmatites.

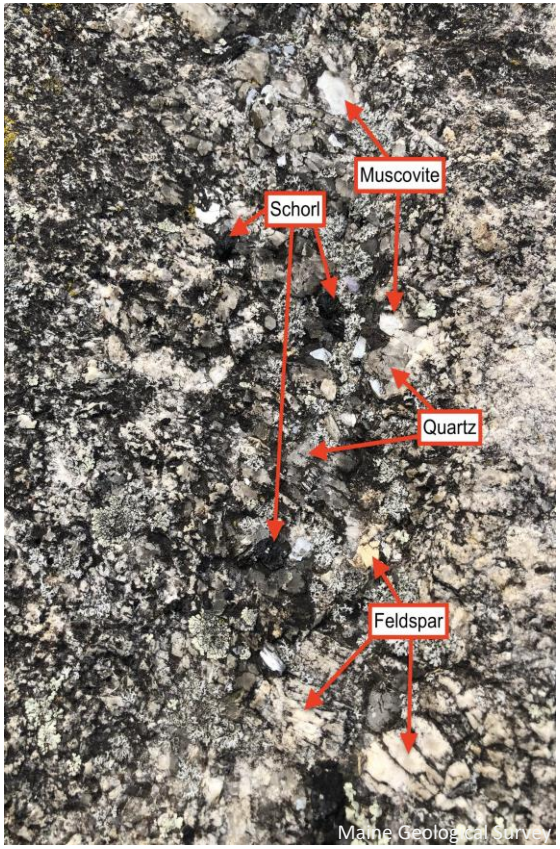

Photo by Zane Rahabi

Figure 5a. A close look at the pegmatite; feldspar, quartz, schorl, and muscovite are indicated.

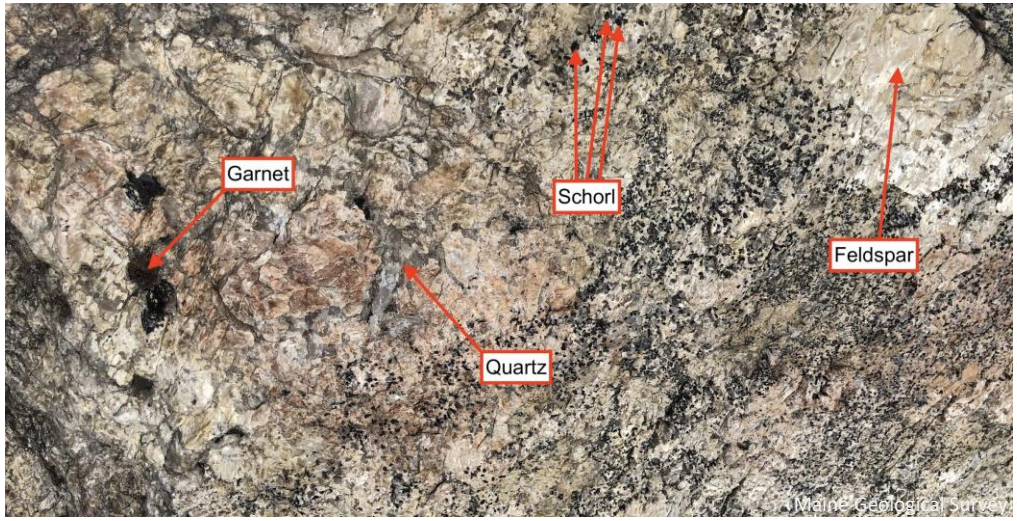

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Figure 5b. A large mass of feldspar surrounding other minerals including quartz, many small schorl grains, and even a small garnet crystal, all indicated.

Joint Sets

In several locations on the summit, fractures in the pegmatite may be found, occasionally forming the shape of an "X" (see Figure 6). These fractures are known as joints, which are common in most rock types. These fractures indicate that at some point after its solidification, the Mount David pegmatite was subjected to processes that put stress on the rock unit, causing it to crack. This could be due to contraction as the rock cooled, or due to unloading as the overlying material was eroded away.

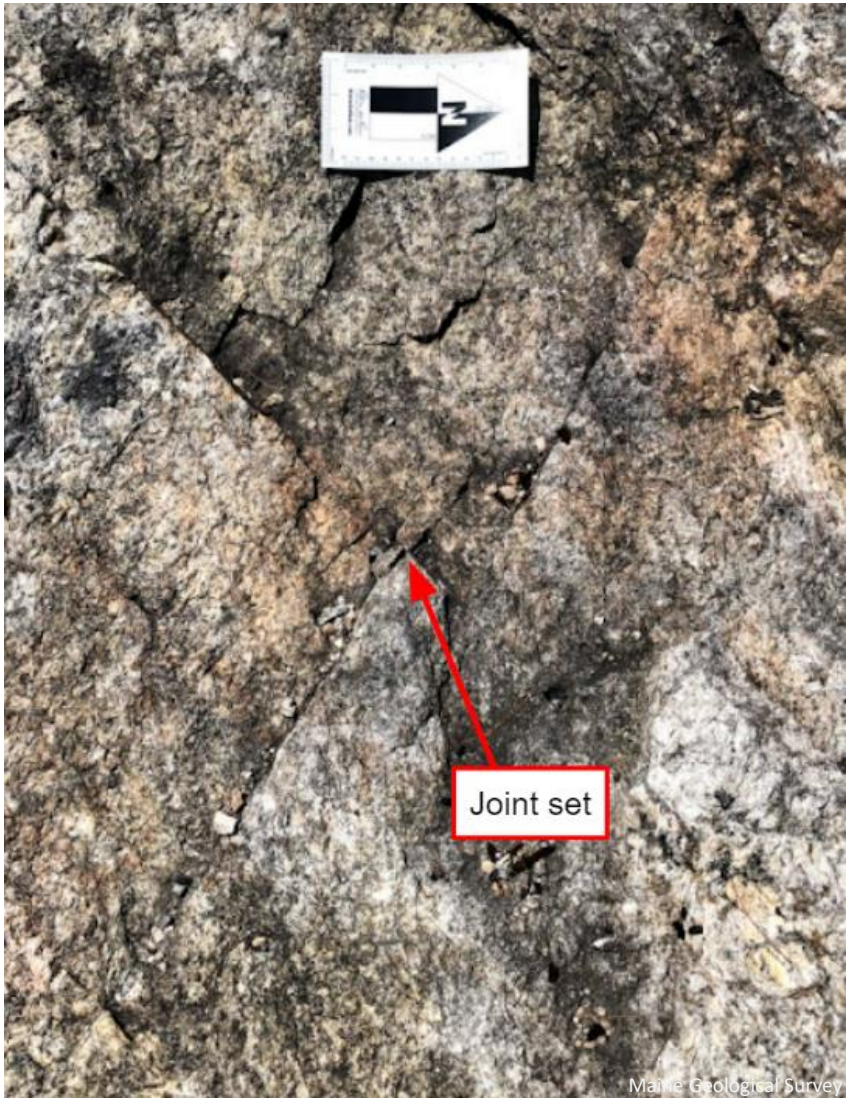

Photo by Zane Rahabi

Figure 5a. An X-shaped joint set, 10 cm north arrow for scale.

The Schorl-rich Zone

A darker colored line clearly visible on the summit contains a larger amount of schorl crystals than the surrounding rock, appearing aligned as if they grew outwards from the surrounding rock (see Figures 7a & 7b). This aligned schorl-rich zone likely crystallized last, as the elements necessary to form schorl were concentrated in any leftover magma as other minerals crystallized first, giving that magma a different bulk composition than the already-crystallized material (a geologic process called fractional crystallization). The schorl crystals therefore likely then began crystallizing on the surface of the surrounding solidified material and grew outwards into the still-liquid zone as it cooled.

Photo by Zane Rahabi

Figure 7a. The aligned schorl-rich zone, backpack for scale.

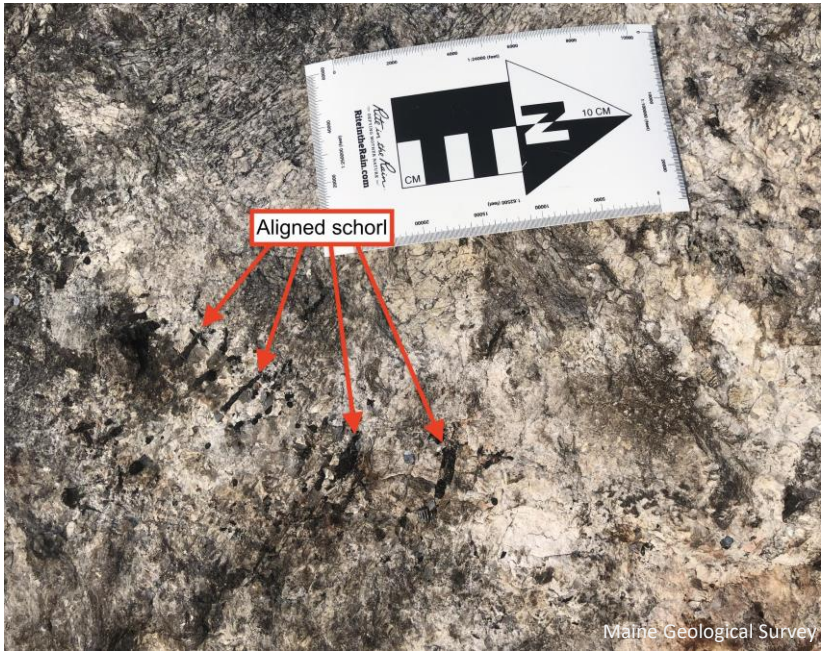

Photo by Zane Rahabi

Figure 7b. Aligned schorl grains within the zone, 10 cm north arrow for scale. While the zone has a north-south orientation, the schorl crystals are aligned perpendicularly, with an east-west orientation.

Additional points of interest

Also indicated in Figure 7a is another possible xenolith of the Sangerville Formation trapped within the pegmatite. This area has a noticeably different appearance than the surrounding rock and contains a black variety of mica called biotite, something not found elsewhere within this pegmatite (see Figure 8).

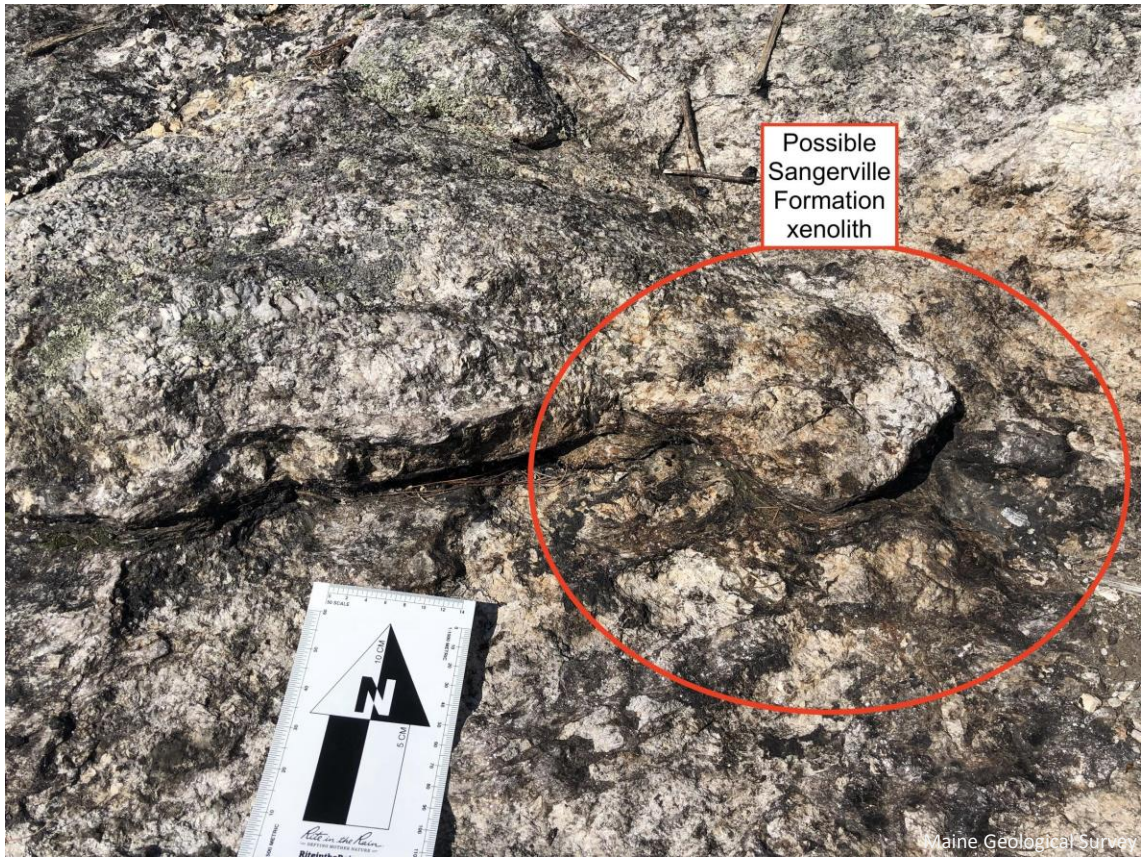

Figure 8. The possible xenolith, 10 cm North arrow for scale. The appearance and composition of this area is similar to that of the metamorphosed sedimentary rocks of the surrounding Sangerville Formation.

Additional points of interest

To the left of where the large schorl-rich zone tapers off at its south end, an area in which two smaller schorl-rich zones and a large garnet crystal can be found (see Figure 9).

Photo by Zane Rahabi

Figure 9. Two more schorl-rich zones and a large garnet crystal, 10 cm north arrow for scale. Were the summit not so fractured, it may have been possible to determine whether the schorl-rich zones seen here were a continuation of the one seen in Figure 5a.

Additional points of interest

On the east-southeast side of the summit, a brief path through the trees leads to an area of particularly large and well-formed (euhedral) schorl crystals (see Figure 10).

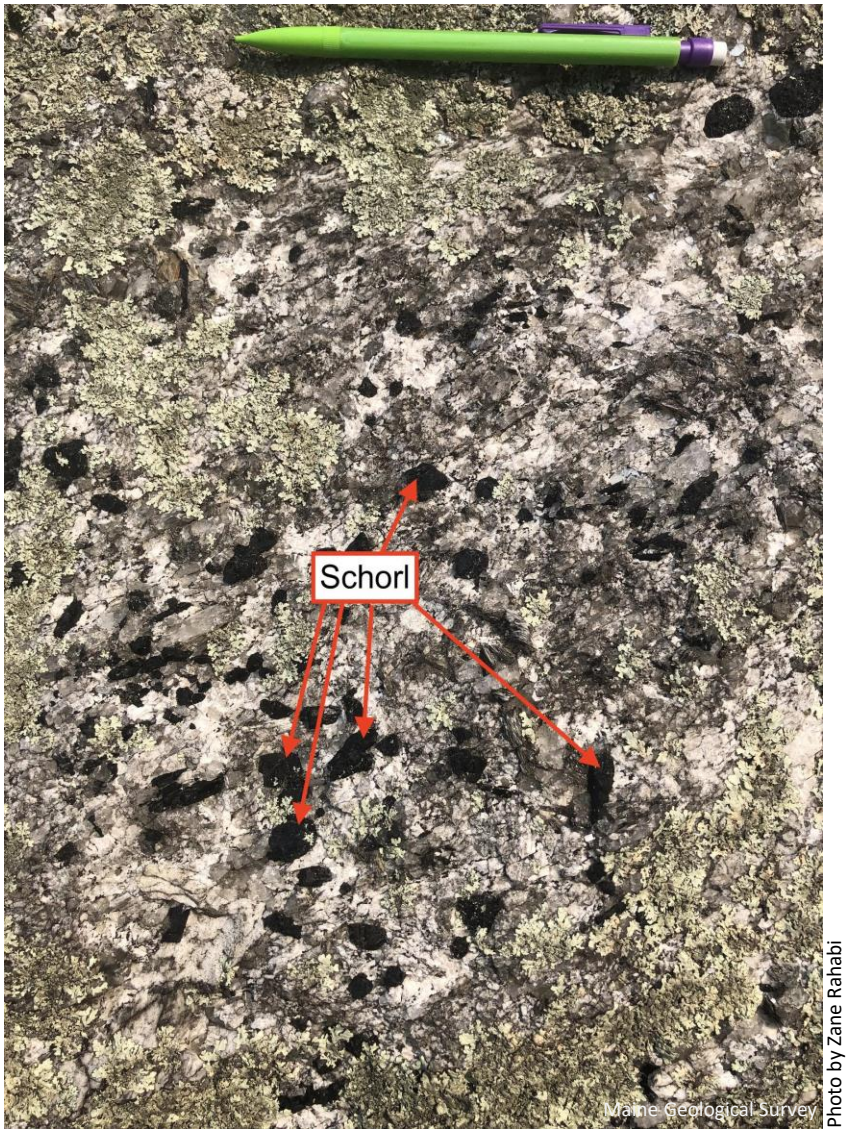

Figure 10. Large euhedral schorl crystals, mechanical pencil for scale. While not as eye-catching as some of the gem-quality tourmaline found in the pegmatites of western Maine, these black tourmaline crystals are still impressive.

References and Additional Information

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