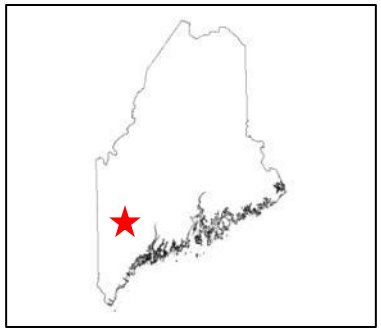
Geologic Site of the Month

January, 2012

Some Geological Features at Whitecap Mountain Rumford, Maine



44 34‘ 17.14“ N, 70 39‘ 35.74“ W

Text by
Robert Marvinney

Introduction

The relatively easy and short hike up Whitecap Mountain in Rumford affords the traveler spectacular views of the Ellis River valley and surrounding mountains. Maintained by the Mahoosuc Land Trust, this 751 acre preserve includes the summit (2,214 feet) and south slope of the mountain. The nearly bald summit extends for almost a mile from southwest to northeast and provides an excellent opportunity for examination of granite, pegmatite, and glacial features.

Photo by Robert Marvinney

Pegmatite

Pegmatite is a very coarse-grained igneous rock, like granite in composition, but with much larger crystals, usually measured in inches across and sometimes in feet! On Whitecap, the pegmatite consists of mostly large crystals of clear quartz, white feldspar, and silver muscovite. On a sunny day, this rock brilliantly reflects sunlight, justifying the mountain's name and necessitating sunglasses!

Figure 1. A wide pegmatite dike cutting medium-grained granite. This is near where the trail first comes out onto the open summit.

Pegmatite

Figure 2. Close-up view of the contact of a pegmatite dike (bottom half) and medium-grained granite (top half). The minerals in the pegmatite are feldspar (white) and quartz (gray).

Pegmatite

Figure 3. Some very large crystals in pegmatite. The white in the top half of the image is feldspar. Note the particularly large, roughly rectangular feldspar crystal just above the lens cap. The gray mineral under the lens cap and to the left is quartz. The dark clusters surrounded by quartz are masses of white mica.

Pegmatite

Figure 4. The dark material in the center of the image is a cluster of thin mica crystals seen on edge, surrounded by gray quartz and white feldspar.

Pegmatite

Figure 5. This image highlights the large mica crystals that are common in pegmatites. In the center of the image is a mica crystal, about ¾ inch across, with its flat face toward the camera. Just to the left of that is another crystal seen on edge, showing the strong cleavage that allows crystals to be peeled down to very thin layers - always a hit with kids!

Pegmatite

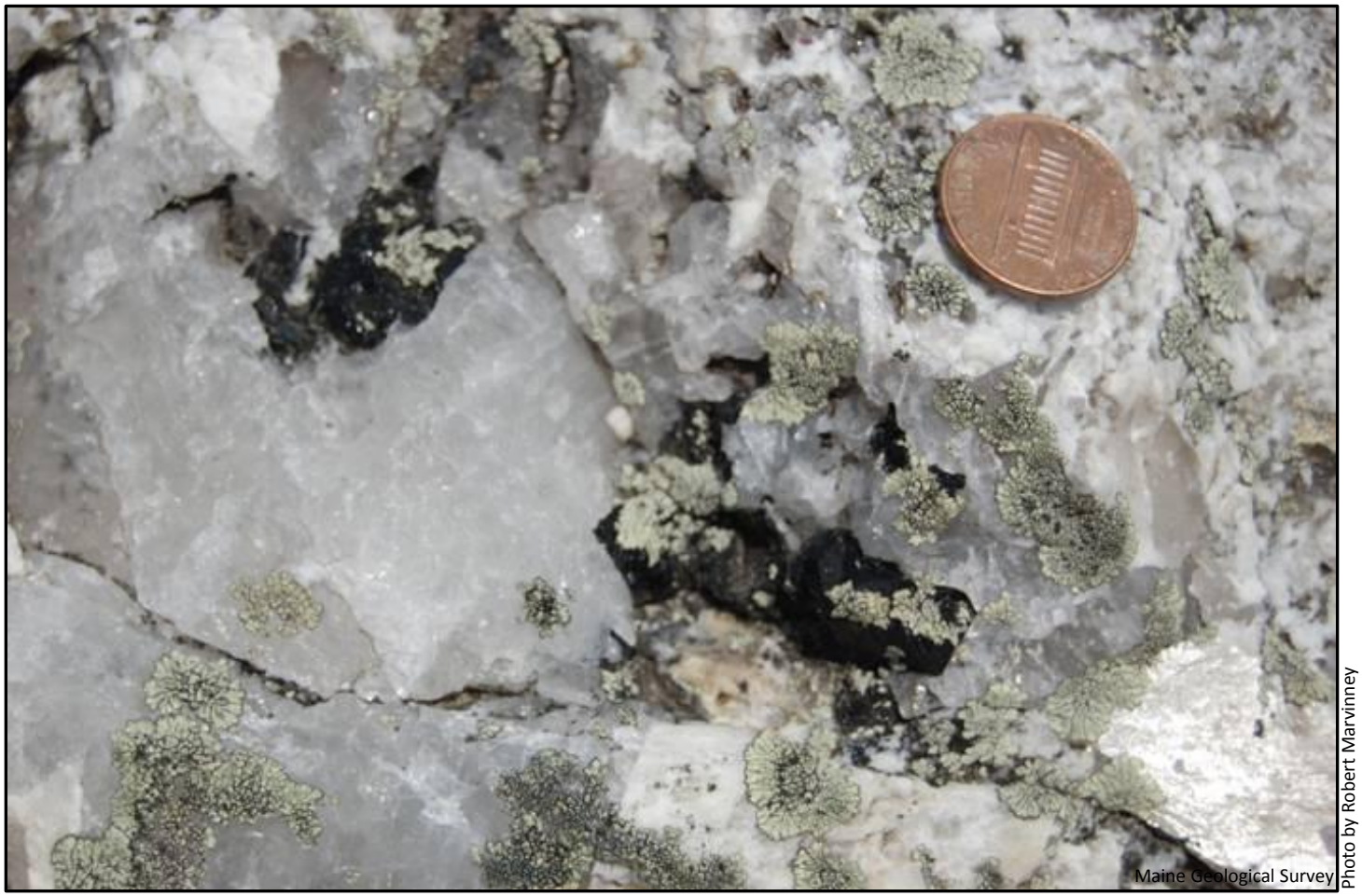


Figure 6. The dark crystals here are tourmaline, the black variety called schorl. Although green and pink varieties are common across the valley at the Newry Mines, they have not been seen here.

The Summit

Most of the summit of Whitecap is pegmatite along with some medium-grained granite. There are some interesting textures in the pegmatite that bear on the conditions of its origin.

Figure 7. A general view of the summit looking toward the Androscoggin River valley. The entire area is underlain with pegmatite and granite. (Unfortunately, haze on this warm summer day obscured much of the spectacular view.)

The Summit

The graphic texture seen in Figure 8 is an intergrowth of feldspar (white) and quartz (gray) in thin layers that resemble cuneiform or hieroglyphic writing. The texture is particularly well displayed to the left of the penny. This texture often indicates that the cooling magma contained a lot of fluids (mostly water) at the time of crystallization.

Figure 8. Graphic texture in granite.

The Summit

Below the penny in Figure 9 is a complex intergrowth of quartz, white mica, and a dark mineral (perhaps tourmaline), that also suggests the magma was very fluid-rich as these minerals were crystallizing. Geologists call this a symplectic texture. This texture is very common near the summit of Whitecap.

Figure 9. An unusual plumose texture below the penny.

Glacial Features

All of Maine experienced several glacial episodes, with ice many thousands of feet thick covering all of the state periodically during the past 2 million years. This area most recently became ice-free about 12,000 years ago, but the glacial ice left a profound impact on the landscape: scraping and rounding the mountain tops, deepening and broadening the valleys, and choking the valleys with enormous quantities of eroded materials.

Figure 10. Glacial striations on granite. These striations were produced when rocks and cobbles imbedded in glacial ice scraped across the granite from lower right to upper left. Similar striations are common on Whitecap.

Glacial Features

Figure 11. Glacial polish. The sheen on this quartz knob was created through abrasion at the base of the glacier. Fine striations, also caused by abrasion, cut across this quartz knob from right to left.

Glacial Features

Figure 12 shows two rows of crescent-shaped gouges in granite, roughly aligned from right to left. Geologists refer to these as chatter marks, and they form when cobbles in the base of the glacier bear down in one location, causing the underlying rock to fracture in this characteristic shape. They are important because their shape shows that the glacier moved from top to bottom.

Figure 12. Chatter marks on granite.

Glacial Features

Figure 13. Glacially transported boulders. Large boulders like this are common near the summit of Whitecap. Technically these are not "erratics" because they are made of the same granite and pegmatite that underlies most of the mountain. To be an erratic, the boulder must be of a different composition than the ledge upon which it rests.

Enjoy the hike!

Don't pass up the blueberries in the late summer and fall!

Photo by Robert Marvinney

References and Additional Information

Moench, R.H., and Hildreth, C.T., 1976, Geologic map of the Rumford quadrangle, Oxford and Franklin Counties, Maine: U.S. Geological Survey Map GQ-1272, 1:62,500 scale.