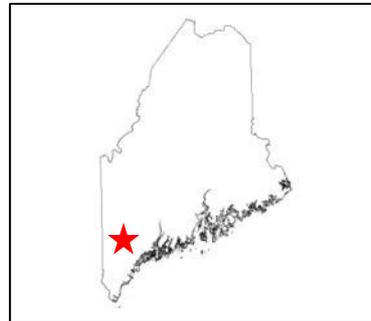


Geologic Site of the Month
February, 2013

Hacker's Hill, Casco, Maine



Text by
Robert G. Marvinney



Introduction

Hacker's Hill, also known as Quaker Hill, is a popular location for viewing sunrises and sunsets in the town of Casco, Maine. Sweeping views of Sebago Lake and the White Mountains greet visitors from the open summit that stands 300 feet above the surrounding landscape.



Maine Geological Survey

Photo by Walter Anderson

View northward from Hacker's Hill



Bedrock Geology

Several rock units underlie the landscape surrounding the hill and are well exposed on the summit. This portion of the geologic map shows two varieties of the Sebago granite, labeled Cg and Cbg. The granite of Cg contains feldspar, quartz, and two mica varieties – white mica (muscovite) and dark mica (biotite). Cbg is similar except that biotite is more abundant. The granite in this area has been dated at 296 million years old by radiometric techniques, placing it in the Carboniferous time period, and represents one of the final phases in the construction of the Appalachian mountains.

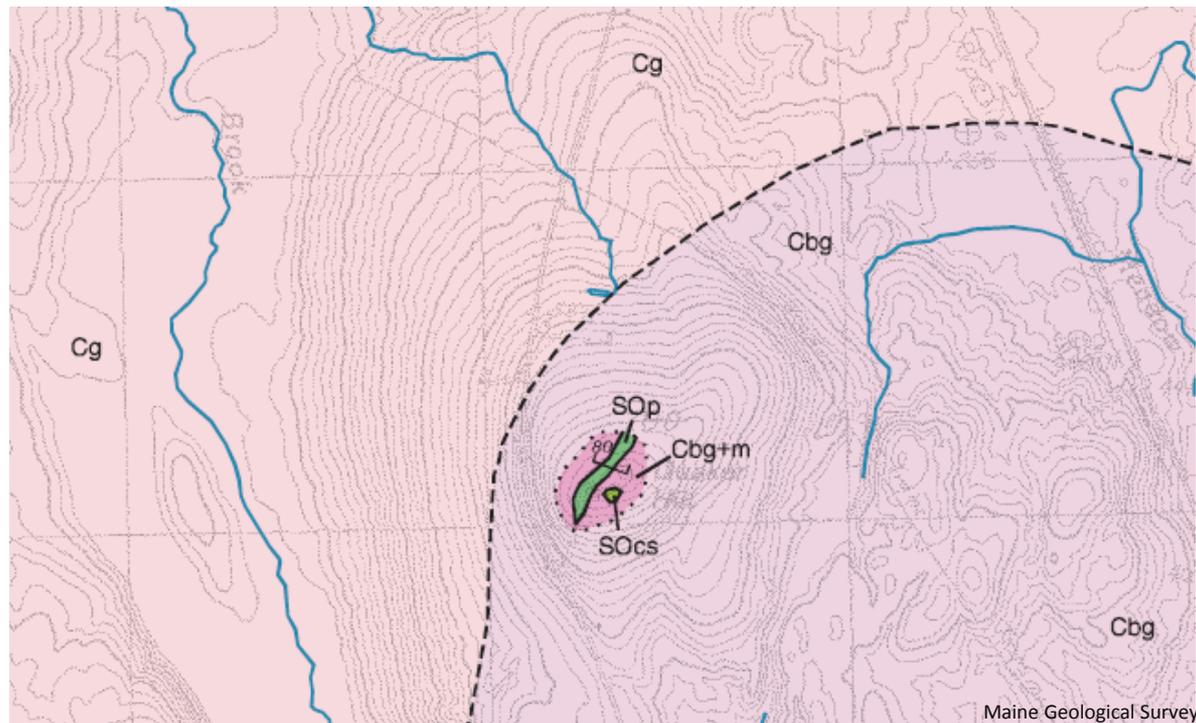


Figure 1. A portion of the bedrock geologic map of the Naples quadrangle (Creasy, 1996).



Bedrock Geology

At the summit of Hacker's Hill, in the lower center of the map, the granite includes many blocks of the metamorphic rocks into which it intruded. The general area of these features is shown in the darker pink color and is labeled Cbg+m. Some particularly large metamorphic blocks are shown in green. Geologists interpret the Sebago granite as a thin sheet underlying a broad area of southwestern Maine. The abundance of large blocks of metamorphic rock at Hacker's Hill suggest that this location was near the top of the intrusion.

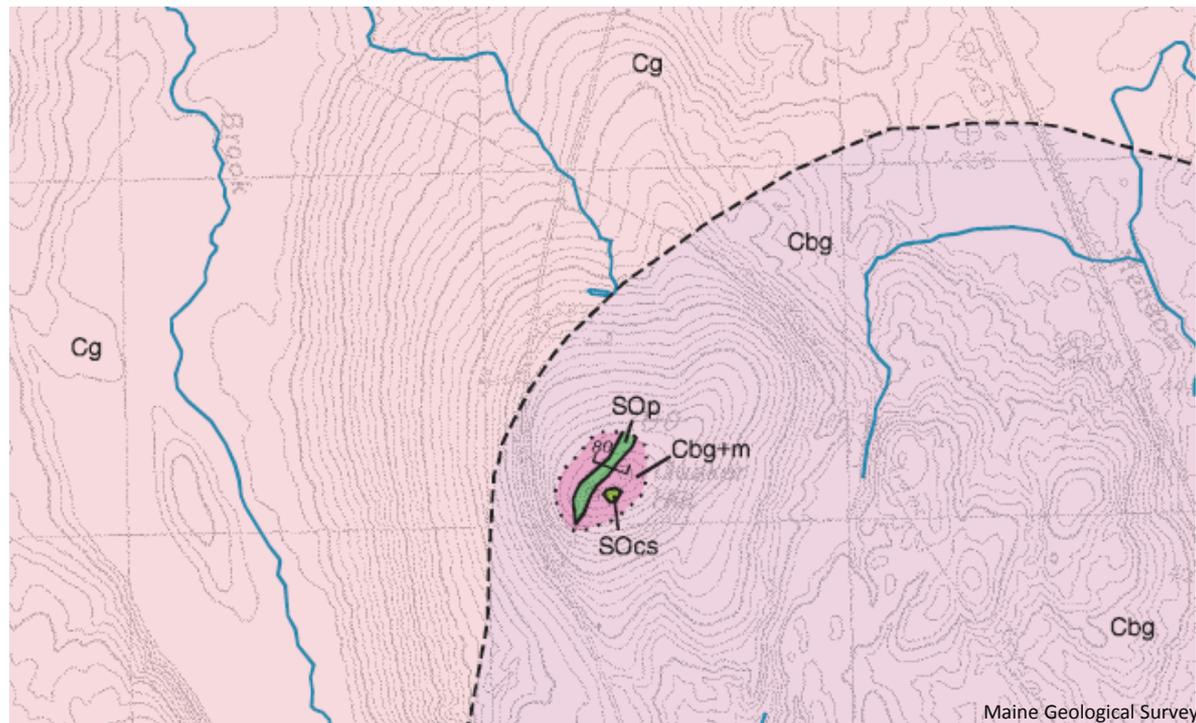


Figure 1. A portion of the bedrock geologic map of the Naples quadrangle (Creasy, 1996).



Rock Types - Granite



Figure 2. Typical granite of medium grain size exposed on the summit of the hill where bedrock is not covered by moss and lichen. The white grains are feldspar, and the gray are quartz. Some dark grains are the black mica, biotite.

Rock Types - Pegmatite



Photo by Robert Marvinn

Figure 3. In several locations, you can see pegmatite like this. Pegmatite is a rock with the same general composition as granite, but is very coarse-grained. Most of the crystals in this image are several inches long. Feldspar is white and quartz is gray.

Rock Types – Metamorphic



Photo by Robert Marviny

Figure 4. Typical layering in the metamorphic rocks, crossing the image from left to right. The light layers are more quartz-rich, and the darker layers have abundant mica minerals. These were once layers of sand and mud at the bottom of the ocean. Millions of years of geological processes have changed the sediment into rock and exposed them at the surface. Surface striations which cross the image from upper right to lower left are more recent features, caused by moving glacier ice during the last great Ice Age several thousand years ago.



Rock Structure - Folds

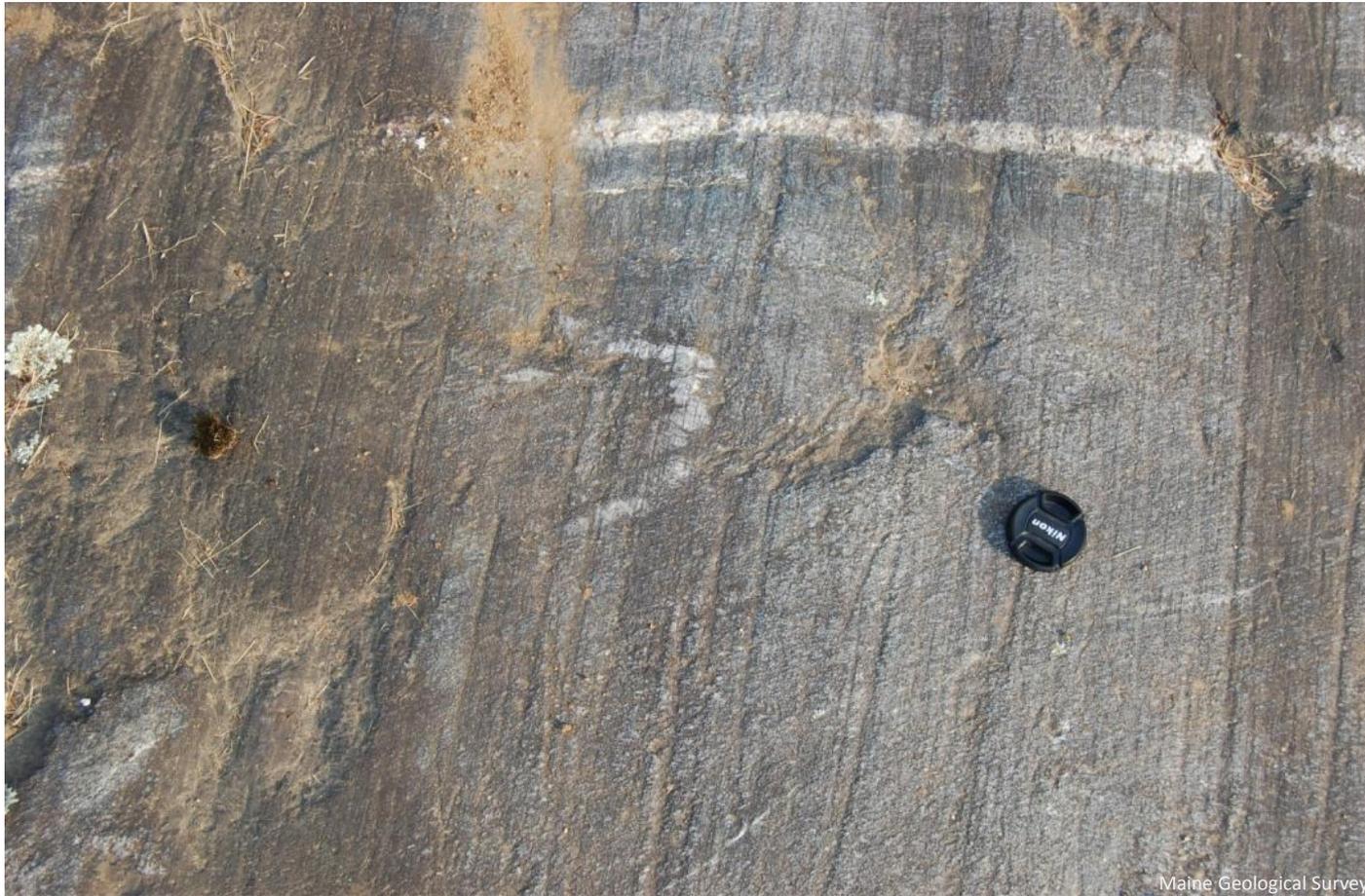


Figure 5. Layers in the metamorphic rock are folded. The white quartz vein to the left of the lens cap forms a broad U-shape that is open to the left. If you study the image carefully, you can see layering near the lens cap that also follows the fold shape. The heavy lines that run roughly from the top of the image to the bottom are glacial striations.

Rock Types - Basalt



Figure 6. The youngest rock exposed on Hacker's Hill is medium gray basalt, shown in the bottom half of this image. Basalt is a very fine-grained smooth-weathering igneous rock. The basalt resulted from the intrusion of magma into fractures in the solid granite, forming narrow dikes that cut through the earth's crust and may be traced across the outcrop. The basalt is probably around 200 million years old and represents one of the early stages of the opening of the modern Atlantic Ocean basin.

Rock Structure – Dike Contact



Figure 7. Close-up image of the contact between the basalt (gray lower half) and granite (white and gray upper half). The contact is very sharp and straight, which suggests to geologists that the granite was cold and brittle when the basalt intruded into the fracture.

Glacial Geology - Striations



Photo by Robert Marvinnay

Maine Geological Survey

Figure 8. The final geological process to affect the landscape at Hacker's Hill was the erosive action of continental glaciers. In this part of Maine, glacial ice was perhaps 10,000 feet thick at its maximum. As the glacier moved slowly across the land, rocks embedded in its base gouged deep grooves, shown here extending from the top of the image toward the viewer.



Glacial Geology – Crag and Tail Structure



Photo by Robert Marvinnay

Maine Geological Survey

Figure 9. Crag and tail structure shows direction of ice movement from bottom of image (N) to top of image (S). The white quartz vein (the crag) to the right of the lens cap is resistant to erosion and shields the area behind it (above it in this image) from glacial scouring, forming a low ridge (the tail).

Directions

From Portland, follow Rt. 302 west. Turn right onto Quaker Ridge Rd. in Casco. The access road to Hacker's Hill is located on the right about 3.5 miles north at the height of land on the north end of Quaker Ridge Rd.

Open five days a week from May to October, Hacker's Hill is easily accessed via a paved roadway leading to the top of the hill. A gate at the bottom of the hill remains open from dawn to dusk and is closed on Tuesdays and Thursdays.

For more information on Hacker's Hill, visit the Loon Echo Land Trust's web pages: loonecholandtrust.org



Photo by Jon Evans

View northward from Hacker's Hill



References and Additional Information

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Photo by Jon Evans

View northward from Hacker's Hill

