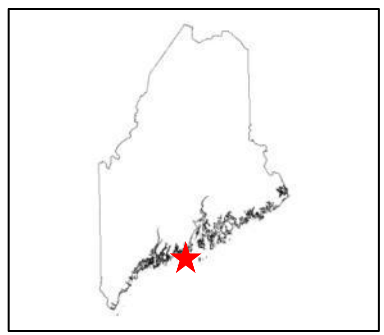
Geologic Site of the Month

March, 2000

Marshall Point Lighthouse and Geology
Port Clyde, Maine



43 55‘ 4.07“ N, 69 15‘ 38.80“ W

Text by
Robert Marvinney

Introduction

Spectacular scenery and geology combine to make a trip to Marshall Point Lighthouse near Port Clyde a worthwhile exercise for geologists of all ages and experience. Broad expanses of exposed bedrock greet the visitor along the raised walkway to the lighthouse. Most of what is exposed here is metamorphic rock of the Benner Hill sequence, a group of formerly sedimentary layers of probable Ordovician age (440-500 million years ago) that have been highly deformed and metamorphosed through a number of mountain building events that have shaped the geology of coastal Maine. Dikes of younger igneous rocks crosscut the metamorphic rocks.

Marshall Point can be easily accessed from Rockland by taking Route 131 south to Port Clyde. Follow signs to the lighthouse. To learn more, see Marshall Point Lighthouse and Museum.

Marshall Point Lighthouse

Figure 1. Marshall Point Lighthouse, built in 1832 and rebuilt in 1858, guards the eastern side of Port Clyde Harbor. Much of the geology described here can be viewed directly from the walkway in this photograph. For the more adventurous, a scramble across the rocks will reveal many interesting geological relationships.

Quartzite and Schist

Figure 2. Much of the rock exposed at Marshall Point is interlayered quartzite (the light bands) and gray mica schist (the dark bands), here wildly contorted. The complicated layering and folding is the result of several events. Probably some of the layers of sand and mud, originally deposited in an ocean basin, slid down the slope and became contorted before they hardened into rock. Some of the folding resulted from the heat and pressure of later mountain building events and the intrusion of nearby igneous rocks between 440 and 360 million years ago.

Quartzite and Schist

Figure 3. Close-up view of Figure 2. This is an example of the intense folding seen in these rocks.

Migmatite

Photo by Henry Berry

Figure 4. This photograph shows that other processes have affected these rocks since they were deposited. Much of the layered material is broken up into fragments of different size. Surrounding these blocks is migmatite, a granular quartz and feldspar rock that results from the melting in place of metamorphic rocks like these. The migmatite is additional evidence of the intense heat that affected these rocks which may be related to younger, local intrusions.

Dikes

Photo by Arthur Hussey, Bowdoin College

Figure 5. Cutting across the metamorphic rocks from bottom center to upper right is an igneous dike of younger age than the metamorphic rocks. It is probably of Silurian age (about 420 million years old), and related to nearby intrusions of this age. The gray granitic dike includes dark blobs or enclaves of a darker igneous rock called basalt. The dike is clearly younger than the quartzite, schist, and migmatite metamorphic rocks because it cuts across both units.

Dikes

Photo by Arthur Hussey, Bowdoin College

Figure 6. Close-up of the dike shown in Figure 4. Blobs or enclaves of dark basalt are surrounded by lighter colored granitic rock. The scalloping or cuspate nature of the edges of the basalt indicates that the separate magmas (molten rock) that became the basalt and the granitic rock were molten at the same time and interacted, but did not mix very well. Some fantastic shapes formed in the process. Because basalt solidifies at a higher temperature than granite, it solidified quickly and the granite solidified more slowly.

Dikes

Photo by Arthur Hussey, Bowdoin College

Figure 7. This is another example of a granite and basalt dike. The light gray granite surrounds dark masses of basalt.