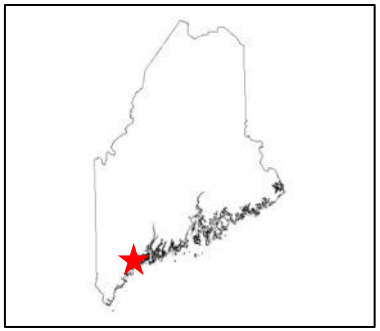
Geologic Site of the Month

September, 2014

Bedrock Geology At Wolfe's Neck Woods State Park



43° 49' 4.7" N, 70° 05' 35.8" W

Text by
Thomas K. Weddle
Henry N. Berry IV

Introduction

Wolfe's Neck Woods State Park is a gem in the list of Maine State Parks. It is a very popular park not far from Downtown Freeport. One of the reasons it is such a lovely park for geology is that it has access to the shore where one can see varied geologic features and rock types in a small area. The park provides a map of suggested walks. Ask for the map at the entrance gate. We will take the path along the Casco Bay Trail. The geologic features we will examine on this part of the walk are accessible by stair-steps to the rock-outcrop shore.

Photo by Thomas K. Weddle

Figure 1. Typical Wolfe's Neck Woods shoreline

Bedrock Types

Many geologic features in the park can be found along the shoreline. Most of the features shown here are located along the Casco Bay Trail (map).

Photo by Thomas K. Weddle

Figure 2. A very sharp contact between two rock types can be seen here. The light colored rock to the left of the orange notebook is a type of granite called pegmatite. The darker colored rock to the right of the notebook is a metamorphic rock. Metamorphic rock has been changed by heat and pressure at depth in the earth, which produces a characteristic flattened structure called foliation. In this view, the foliation runs across the photo and is nearly flat (parallel to the arrow). The granite is younger than the metamorphic rock and cuts diagonally across the foliation.

Large Crystals in Pegmatite

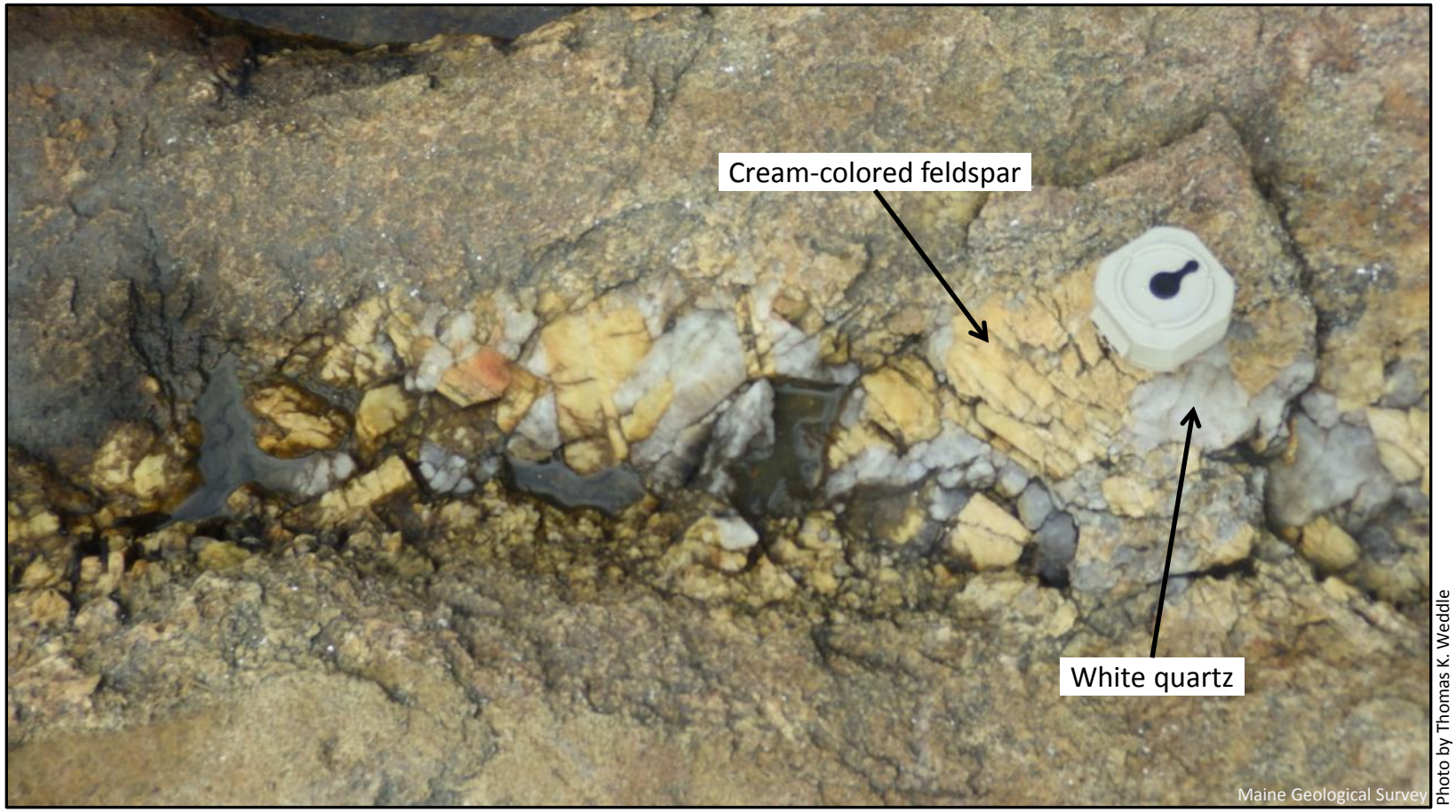


Photo by Thomas K. Weddle

Figure 3. Here is a place in the granite where the mineral grains grew very large, up to several inches across. A special name, pegmatite, is used for granite with very large mineral grains such as this. Ordinary fine-grained granite is at the top and bottom of the photo. (The compass is about 3 inches wide.)

Differential Weathering

The metamorphic rocks commonly show interesting surface patterns caused by differential weathering. Differential weathering reveals the internal structure of the rock by gradually wearing away the softer or less resistant areas.

Photos by Thomas K. Weddle

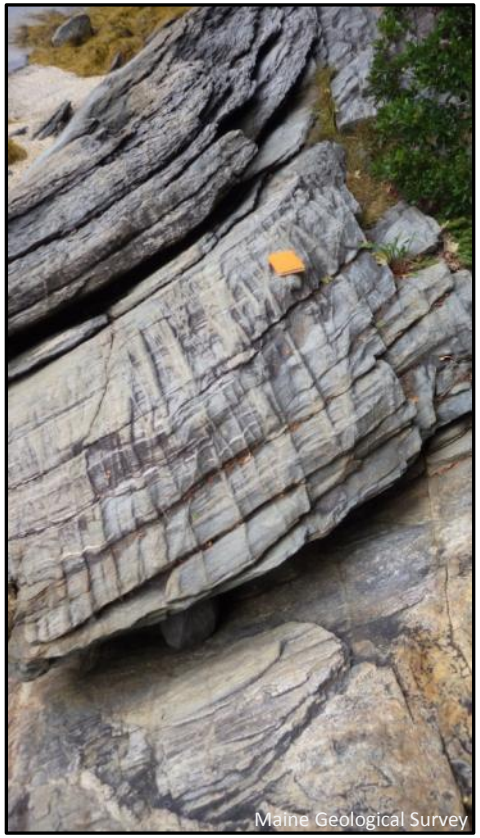


Figure 4. Here you can see thin, almost imperceptible mineral veins that stand out from the outcrop surface, enhanced by differential weathering. The less resistant rock has been gradually worn away over time.

Basalt Intrusion

Photo by Thomas K. Weddle

Figure 5. This photo shows the youngest type of bedrock found at the park, a dark rock called basalt. The layer of basalt (B) cuts straight through the older "country rock" (C).

Basalt is an igneous rock that solidifies from molten rock. The molten rock, produced by melting deep in the earth, flows up through fractures in the earth's crust. If it is trapped below the surface, as it was in this case, it hardens into a vertical dike with older rock to both sides. If the molten rock finds its way to the surface, it produces a volcanic eruption. The rocks now visible at Wolfe's Neck Woods State Park must have been deep underground at the time these basalt dikes formed.

Basalt Intrusion

Photo by Thomas K. Weddle

Figure 6. This photo shows a thin layer of basalt (B) along the right edge of a thicker basalt dike. The thinner layer of basalt may have forced its way into the contact between the thicker basalt unit and the gray country rock (C) to its right. Alternatively, the thin layer of basalt may be a part of the larger dike that cooled rapidly against the country rock. The thinner layer of basalt is more highly fractured.

Basalt Intrusion Close-up

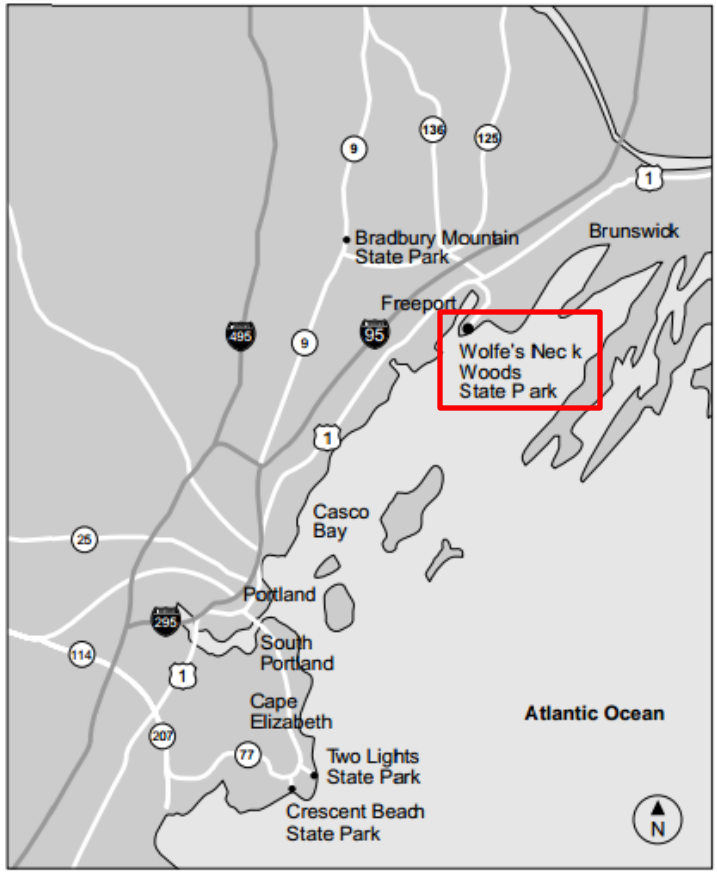
Photo by Thomas K. Weddle

Figure 7. Close-up of the two basalt dikes (B) in Figure 6. The camera case is sitting on the larger basalt dike. The pale color of the country rock (C) along the contacts indicates alteration of the rock caused by intrusion of the hot, molten basalt.

Directions

At the main intersection in front of L.L. Bean, turn down Bow Street away from L.L.Bean (see Map 6 in Delorme Atlas and Gazetteer). Stay on Bow Street until you come to Mast Landing and the junction with Pleasant Hill Road and Flying Point Road. Turn right onto Flying Point Road until you come to Wolfe's Neck Road. Turn right and stay on that road until you see signs for the park entrance.

For current information on hours of operation and fees, please visit the Maine Bureau of Parks and Lands web site for Wolfe's Neck Woods State Park.



By Maine Bureau of Parks and Lands

References

Maine Bureau of Parks and Lands. "Wolfe's Neck Woods State Park." Maine Department of Agriculture, Conservation and Forestry, 2013. Web. 26 August 2014 <http://www.maine.gov/cgi-bin/online/doc/parksearch/details.pl?park_id=31>.