Maine Geologic Facts and Localities
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The Ovens, Bar Harbor, Maine

44° 26′ 15.65″ N, 68° 15′ 51.80″ W

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Introduction

Since the days of horse and buggy, visitors to the northeastern coast of Mt. Desert Island have been intrigued by the curious craggy cavities called The Ovens. Located on the headland between Salsbury Cove and Hulls Cove, The Ovens are best approached by kayak at low to mid-tide. They are largely submerged at high tide, and there is no public land access.

Figure 1. Archival postcard of The Ovens
How did The Ovens form?

From their location, it is clear that The Ovens have been carved out by the sea, and yet there must be something about the geology here that is different from other places around the island, to produce these curious cavities (Figure 2). Sure enough, three geologic features come together in these rocks in just the right way: horizontal rock layers, vertical fractures, and small inclined faults.

Figure 2. The Ovens at low tide
The Bar Harbor Formation

The bedrock at The Ovens is part of the Bar Harbor Formation. It is a series of layered rocks, primarily siltstone and shale, that have been baked by intrusion of the Cadillac Mountain granite which underlies most of the interior of Mount Desert Island. The Bar Harbor Formation is named for exposures along the shore in the town of Bar Harbor, and outliers of the formation are found in other small areas around the edge of the island. In most places, the many layers that comprise the Bar Harbor Formation are each a few inches thick. This sort of layering is found in the rocks just east of The Ovens (Figure 3).

Figure 3. Layering typical of the Bar Harbor Formation.
The Bar Harbor Formation

At The Ovens, however, the rock is more massive and uniform, so the layers are difficult to distinguish. It appears that there is a layer a few feet thick that is more easily eroded than the overlying rock. It is this more easily eroded layer that has been excavated by the sea to produce The Ovens (Figure 4).

Figure 4. Rock with layering (foreground) does not have ovens. The more massive rock in the background does.
Vertical Fracturing in the Bar Harbor Formation

While the layering is approximately horizontal, the rock is cut by a set of vertical fractures. These fractures have several orientations, best seen by looking down on a horizontal surface.

Figure 5. Horizontal surface showing the abundance of fractures in the rock.
Vertical Fracturing in the Bar Harbor Formation

In places along the cliffs, one orientation is prominent, causing the rock to break into flat, vertical faces.

Figure 6. Steep, high cliffs are produced where strong vertical fractures cut through massive rock.
Vertical Fracturing in the Bar Harbor Formation

It is the massive nature of the rock here that allows the fractures to be so long and straight. Where layering is more prominent, the vertical fractures are shorter and the rock breaks into smaller blocks. The intersection of various vertical fractures gives the rock a natural column-like structure that has lent the name "The Cathedral" to one prominent rock headland.

Figure 7. "The Cathedral" owes its shape to vertical fractures in the rock.
The Cathedral

Behind "The Cathedral" is a tunnel through the rock over 10 feet high. This narrow tunnel is at the intersection of the weak horizontal layer and a prominent vertical fracture. The rock above the hole is strong enough to remain intact. Sighting along this tunnel, it is clear that it is on a major vertical fracture, because it lines up with other steep vertical faces farther down the shore.

Figure 8. The high, narrow tunnel behind "The Cathedral."
The Cathedral

A close look at the weaker, tunneled layer shows white streaks of volcanic debris that may explain why this layer is more easily eroded. White streaks are concentrations of feldspar crystals, probably deposited by volcanic eruption in the Silurian Period, about 420 million years ago.

**Figure 9.** Close-up of the rock that makes up the weaker layer of The Ovens. Note the white streaks.
Inclined Faults

A third feature important in the formation of The Ovens is faulting. In places where the layering is well developed, it is clear that the layers have been offset along small faults (Figure 10).

**Figure 10.** Minor faults, probably dating to the Silurian Period, have broken and offset the layers.
Inclined Faults and The Ovens

Where the layers are all about the same strength, the faults do not make a notable difference in the erosion pattern (Figure 11). But at The Ovens, where there is a massive, stronger rock layer above a thinner, weaker one, the faults break up the weaker layer enough that it can be excavated by the sea (Figure 12).

**Figure 11.** Faulted layers of similar strength do not exhibit “ovens.”

**Figure 12.** Inclined faults provide the roofs of these “ovens.”
Putting It All Together

The Ovens are a fascinating example of differential erosion, where certain rocks are more easily eroded than others. In this case, the mechanical breaking and erosion by the ocean is much more effective where there is a combination of a weaker rock layer overlain by a more resistant one, vertical fractures to break the weak rock into smaller pieces, and minor inclined faults that effectively undercut the roofs of The Ovens.

Figure 13. Diagram of the mechanisms creating “ovens.”

Archival post card courtesy of Wally Gray at Emery's Cottages, Bar Harbor

Seeing the shore by kayak is the best!