Maine Geologic Facts and Localities

June, 2009

Birch Point Beach State Park
Owls Head, mid-coast Maine

44° 2‘ 18.60“ N, 69° 5‘ 51.96“ W

Text by
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Introduction

This small park - Birch Point Beach State Park - is a quiet get-away, off the beaten track, and popular with local residents. Drive through the open gate to the end of a dirt road, and step onto the beach. There are outhouses, and picnic facilities, but no lifeguard or regular staff. And there is no fee!

Photo by Henry N. Berry IV

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Photo 1. Entrance to Birch Point Beach State Park, Owls Head, Maine.

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Photo 2. First glimpse of ocean at the end of the access road.

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Photo 3. Birch Point Beach at low tide. Muscle Ridge Islands on the horizon to the southeast.

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Photo 4. A "pocket beach" is protected by rocky headlands on each side.

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Photo 5. This air photo shows the smooth, natural curve typical of a pocket beach. .

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Photo 6. The dune at the head of the beach was formed in a major storm some time ago. The lines of seaweed were stranded at recent high tides. All these features follow the curve of the beach.

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Photo 7. The dune at the head of this beach is made of cobbles, moved by high-energy storm waves. The vegetated dune is fronted by a gravel berm (above the seaweed strand line) that joins a sand beach below the high tide line.

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Photo 8. Small waves on the incoming tide gently wash the sand up the beach toward the dune.

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Photo 9. At low tide, fresh water seeps from behind the dune and forms small streams that wash the sand back down the beach, exposing the cobbles beneath.

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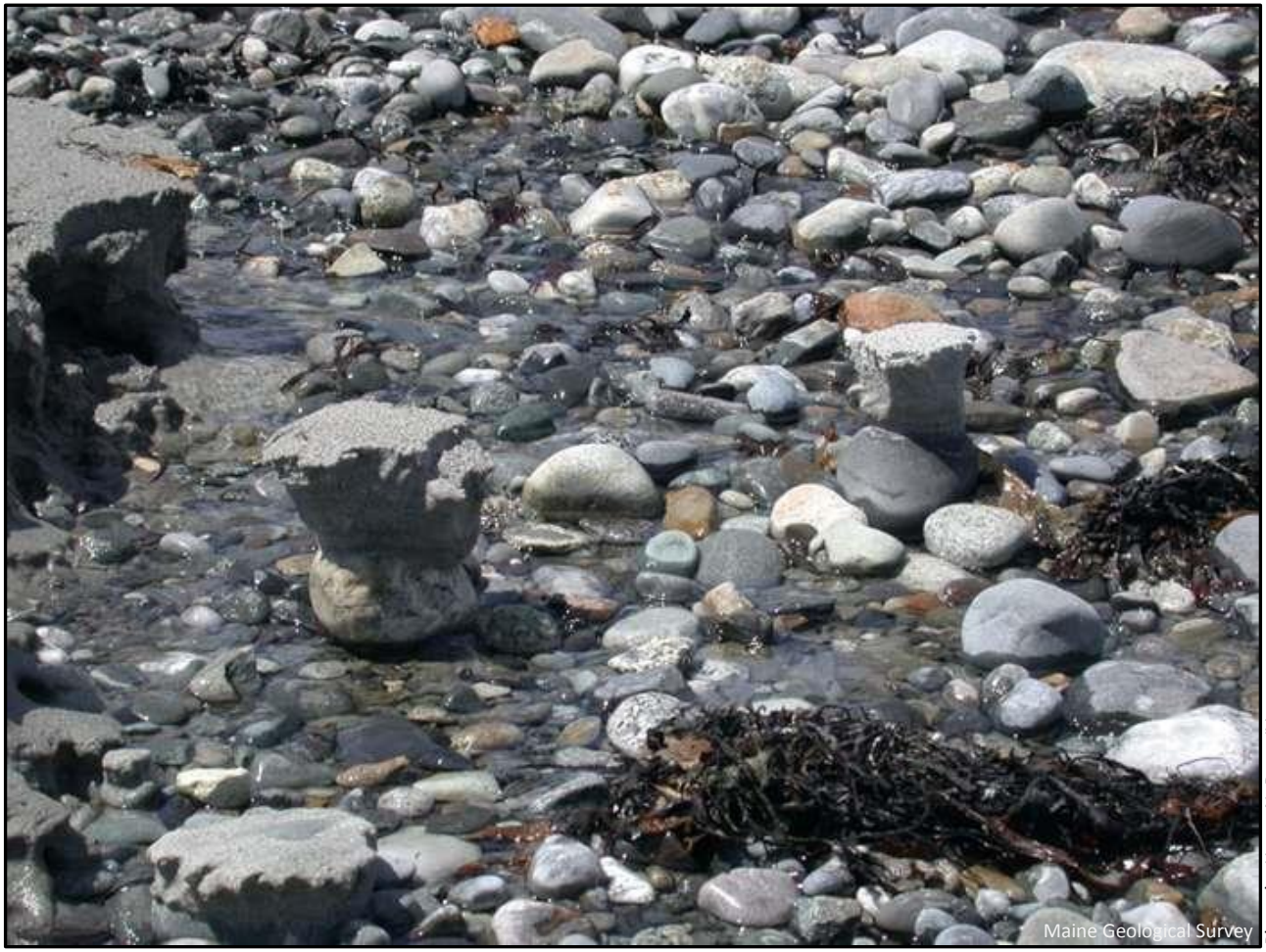

Photo 10. Not all of the sand washed ashore from the last high tide gets washed away completely, leaving "sand hats" perched on some of the cobbles.

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Photo 11. The small streams that run down the beachface move side-to-side as they deposit sand in their own shallow channels. Because of the resulting pattern, this is called a "braided stream.

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Photo 12. The small channels are accentuated by concentrations of pinkish-red garnet. The lighter colored, less dense grains of quartz and feldspar sand are washed to the side. How pretty!

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Photo 13. White rock ledges to the northeastern side of the beach.

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Photo 14. White bedrock of the mainland coast here and Ash Island to the east, is white rock of the Spruce Head pluton. This was once a large mass of molten rock that solidified deep underground approximately 421 million years ago (± 1 million). It was then exhumed by uplift and erosion over geologic time. (See Ayuso and others, 1997; Tucker and others, 2001.)

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Photo 15. An example of medium-grained rock called "granodiorite," a rock that differs from granite only in its feldspar composition. The small, black mineral is hornblende.

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Photo 16. Granodiorite. If sunlight hits a feldspar grain in just the right orientation, you may see a reflection of light like the one in the right-center of this photo.

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Photo 17. The pink feldspar is slightly larger than the other minerals in this granite, a texture called "porphryritic."

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Photo 18. Another porphyritic granite. This surface has been exposed to weathering, which enhances the surface texture.

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Photo 19. A mass of dark gray igneous rock embedded in the granite is called an "enclave".

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Photo 20. Enclaves originate as blobs of different varieties of molten rock that become incorporated in the molten granite as it forms.

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Photo 21. Three enclaves the size of basketballs, and several smaller blobs. Enclaves are common in the rocks of Birch Point Beach.

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Photo 22. This enclave began to mix with the surrounding granite along the edges while it was still partly molten.

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Photo 23. Large, rounded grains of white feldspar and gray quartz inside an enclave started to form as part of the granite, but were somehow mixed into the enclave before the rocks had completely solidified.

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Photo 24. A small enclave of fine-grained dark rock in granite.

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Photo 25. Another small enclave. Notice that several of the feldspar grains are in the precise orientation to reflect sunlight to the camera.

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Photo 26. This thin sheet of white rock formed after the granite had solidified, but was probably still hot. The granite cracked and was immediately filled with molten rock that hardened to make this white "stripe" that cuts through the rock. Such a thin sheet of igneous rock is called a "dike."

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Photo 27. In contrast with the speckled, medium grain size of the granite, the younger white dike is made of rock with a very fine grain size. This fine-grained rock is called "aplite."

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Photo 28. Here is another dike, but this one is thicker, not so straight, and is made of rock with different textures.

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Photo 29. This pink dike is composite, with fine-grained aplite in the middle, and coarse grained rock (pegmatite) along the margins.

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Photo 30. Straight fractures form in response to stress when rocks are brittle, some time after the igneous rock has solidified and cooled.

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Photo 31. Hot, mineralized fluids circulated through some of the thin, open fractures, leaving behind greenish mineral deposits on the rock surfaces (in this case, mainly epidote and chlorite).

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Photo 32. Some fractures were not filled by minerals, and remain open enough to collect water and soil so grass can grow.

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Photo 33. This rock surface at the north end of the beach is scarred with aligned grooves and scratches caused by an overriding glacier during the last ice age. The arrow is aligned with the direction the ice moved (25º East of South).

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Photo 34. The smoothly curved surface of the rock was sculpted by the glacier ice. This rock surface is essentially unchanged since about 14,000 years ago, although sea level has changed dramatically in that time.

Dedication

This Site of the Month is dedicated to the memory of Prof. Charles V. Guidotti of the University of Maine, who visited this place with many students through the years (even though it's igneous rock).

Photo 35. Charcoal grills and picnic tables are sheltered by the woods along the path north of the beach. Come visit!

References and Additional Information

Ayuso, Robert A., and Arth, Joseph G., 1997, The Spruce Head composite pluton; an example of mafic to silicic Salinian magmatism in coastal Maine, northern Appalachians in Sinha, A. Krishna, Whalen, Joseph B., and Hogan, John P. (editors), The nature of magmatism in the Appalachian orogen: Geological Society of America, Memoir 191, p. 19-43.

Osberg, Philip H., and Guidotti, Charles V.,1974, The geology of the Camden-Rockland area in Osberg, Philip H. (editor), Guidebook for field trips in east-central and north-central Maine: New England Intercollegiate Geological Conference, 66th Annual Meeting, Orono, Maine, p. 48-60.

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