Caumsett Park

Link here to get a printable brochure of this science walk.

Cliff and Beach Walk

Caumsett State Park is located on this scenic peninsula extending into Long Island Sound. Its recent history begins in 1921 when 1750 acres was purchased by Marshall Field III and developed into a self-sufficient farm, hunting preserve and home. He called it Caumsett, its original Matinecock name, which means, “place by a sharp rock”

Caumsett became a New York State Park in 1961 and offers a wide range of activities for visitors. We will focus on the geologic history whose events formed the features found along the cliffs and beach area bordering Long Island Sound. The advance and retreat of continental glaciers formed Long Island some 20,000 years ago.

Stop 1: Fisherman’s Parking lot

Link to Picture

Glaciers form when lots of snow falls and does not melt completely during the summer. As the snow accumulates, it is compressed much like when you make a snowball. In glacial terms this would be called firn. If you squeeze that snowball hard enough, it will become an ice ball. Same principal only bigger! When the pile of ice becomes thick enough, gravity forces it to begin moving away from the thickest part of the glacier.

As the Glacier moves south encountering warmer weather, the ice at its front begins to melt. A glacier is always moving forward. When its front is melting faster than its downhill movement the front of the glacier recedes, but the ice is not moving backward. This glacier has accumulated sediments within it from having scraped along the land beneath it, and from wind blown sediments that deposit on its surface. As the ice melts these sediments, called glacial drift are deposited at the front of the glacier

Stop 2: Bottom of stairs

Link to Picture

Looking north the water you see is Long Island Sound, a large body of salt water. Imagine that it is 20,000 years ago. A previous glacier has pushed south forming the Ronkonkoma Moraine, the central spine of Long Island. This glacier then retreats and forms a huge fresh water lake between it and the Ronkonkoma moraine. You are standing near the bottom of this lake, which was about 200ft deep. The glacier rises about 100 ft above the surface of the lake. Sea level then was much lower (350ft lower). The south shore of Long Island was 70 miles southeast of where it is today. Mastodons and saber-toothed tigers roamed the area.

At the base of the stairs is a large boulder. This granite boulder was probably brought here from western Connecticut. Boulders transported and deposited by a glacier are called erratics. Just east, another more pink erratic is a remnant of the 300 million year old collision of the North American Plate with the African Plate.

Walk east along the cliffs about 400 ft, glancing at them as you go. The rows of marine plant debris (rack) on the beach are placed there by the tides. Diurnal tides are caused by the gravitational attraction between the Earth,

moon and sun.

Stop 3:
Link to Picture

The sediments in the cliffs formed when streams of water carrying sand and gravel gushed from the glacier and entered the lake. The faster the water the larger size sand grains, pebbles or boulders it can carry. Upon reaching the still water, the streams slowed and dropped their sediments forming a delta. Do you know of any other deltas? They form for the same reasons.

You can see the many layers in the cliffs. The layers tell of periods of higher and lower water velocity (Summer, Winter).

Take a look at the beach. You are walking on gravel and sand. Where do you think it came from? (Hint: look at the cliffs). Walk east another 300ft.

Stop 4: Concave area at top of cliff
Link to Picture

The upper layers of sand and gravel are sloping downward to the west, but you cannot see the bottom face of the cliffs. Wind and weather are eroding the cliffs at a rate of 3ft per year. As the sediment falls from upper layers to the beach, it covers lower areas of the cliffs.

Twenty feet above beach level you can catch a glimpse of reddish sand and gravel. These sediments were deposited on the floor of the Sound 90 million years ago during the Cretaceous Period, during the time of the dinosaurs! As the glacier moved south during the Pleistocene Period 20,000 years ago, it pushed these Cretaceous sediments southward into this area. Later, Pleistocene sediments were deposited on top of the Cretaceous sediments.

Stop 5: Inspiration Point (sign at top of cliff asks visitors to keep off cliffs)
Link to Picture

Here the cliffs are at their highest elevation, about 126ft. (The top of the triangular shaped delta). Beneath the soil layer at the top is a layer of fine-grained yellowish sediments called loess. Loess is good at trapping water within its small particles.

At the base of the cliffs, you can see more Cretaceous deposits. If the slumped sediment were not covering the cliff face, you would see that all the layers are continuous. If you could cut into the cliff face, you would see the original fine sedimentary layers folded and faulted. When you push a piece of paper between your hands it bends and crumples. When a glacier pushes horizontal layers of sediment forward, the same thing happens to the layers in the sediment.

Walk east past one erratic to the next, a large pink granite.

Stop 6: Large pink granite erratic
Link to Picture

Granite is an igneous rock formed from the slow cooling of molten magma far below the earth's surface. The magma forming this rock had lots of pink orthoclase feldspar and quartz in it that cooled slowly enough to form large crystals called pegmatite.

Turning to the cliffs you notice holes in the loess layer near the top. The loess here

is soft enough for the cliff swallows to burrow into, making it a perfect place for them to nest.

Walk east to next dark gray erratic.

Stop 7: Dark gray boulder
Link to Picture

This basalt boulder is another igneous rock which formed as a volcanic rock or as a dike or sill. It is fine grained because it cooled quickly.

Just below the loess in the cliff, is a layer of sediment consisting of all sizes from clay to boulders. This is till. Till is found at the bottom of glaciers and consists of a wide range of sediment sizes. Notice a huge boulder stuck in the till. How do you think it got there? After the formation of the delta, the glacier proceeded to advance and run right over it. Soon after, it melted, leaving the sediments at the bottom of the glacier, the till. The loess was deposited on top of the till by the strong winds associated with glaciers.

How do you think the erratics got to the beach? (Hint, look at the cliff). They were all part of the till layer originally and dropped as the cliff eroded.

Walk east to a large slab erratic.

Stop 8: Grey rock slab
Link to Picture

The other erratics in this area have many wavy lines on them. They are highly deformed. What could have caused this? The intense pressure and heat generated when tectonic plates collide causes rock to become metamorphic. The minerals in the rock get recrystalize forming layers. If the area is tectonically squeezed, the layers bend and fold.

Are you wondering why some erratics have sharp edges, while others are more rounded? Wave action here is not sufficient to round the edges of the boulders. As boulders are carried by a glacier, they bump and grind against each other and along the rock the glacier travels over, rounding the edges. Rocks that travel greater distances are generally more rounded. Those that travel shorter distances can be expected to be more angular. The angular boulders may have come from bedrock just offshore.

Walk East to next dark grey erratic.

Stop 9: Basalt rock with mud around it.
Link to Picture

The white lines you in this rock formed when cracks in the basalt were filled by quartz crystals. If the mud is dry, you should notice the geometric design of the mud cracks. If this mud hardens to rock (lithifies), the cracks may then be filled in with other minerals.

Where do you think the mud came from? (hint: look at the cliffs) As rocks are ground to dust in the glacier, fine clay sediments are produced. The clay is deposited with the sand and gravel in layers in the cliffs.

Walk east to the area four large outcrops of Cretaceous sand and clay.

Stop 10: Mt. Rushmore (You have to imagine the faces. Extinct dinosaurs maybe?)

Link to Picture

This beautiful outcrop of bright colored Cretaceous sand and clay displays red and white layers that change direction. The downward slope of the cross bedding indicates points in the direction of the water flow which deposited these sediments, possibly in a stream or

delta setting.

Pick up a handful of beach sediment. Notice the variety of the particle sizes.

Walk east to a large flat topped erratic.

Stop 11: Table rock

Link to Picture

This erratic is a metamorphic granite gneiss made up of pink and yellow feldspar, quartz and muscovite (white mica). It's a good place to sit and take a break!

East of Inspiration Point you may have noticed that the layers are sloping downward to the east. In this area the eastern edge of the delta reaches close to the beach level. Just east of here you can see Smugglers Cove. How do you think it got its name?

As you rest, try to imagine global temperatures rising at the end of the Pleistocene Ice Age. Melting of the world's glaciers adds water to the seas. Rising sea levels reach and breach the Long Island Sound basin, changing it from a fresh water body at the time of the glaciers to the salt water we see today.

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