The bluffs at the David Weld Sanctuary

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The above photograph represents the research I am conducting on the bluffs at the David Weld Sanctuary. The yellow numbers correspond to specific sedimentary features on the cliff and the blue numbers correspond to structural features. Link here for close up photos of these features.

To get a better understand the processes that have occurred in this area, I am including a brief glacial history and tutorial of sedimentary structures.

A brief glacial history of Long Island:

Approximately 20,000 years ago, glacial advances and retreats helped construct the hills and plains of Long Island. Acting like a giant bulldozer, it pushed sediment toward the South dumping its load to form a moraine that runs through central Long Island and extends to the south fork. This is the *Ronkonkoma moraine*. Another advance (from either the same glacier or another) created a moraine on the north shore known as the *Harbor Hill moraine*. The sediment in these moraines is typical glacial till, composed of unsorted material. *Meltwaters* running over the moraines deposited finer sediment called *outwash.* The outwash created the plains of Long Island.

Glaciers transport an enormous amount of sediment. When the material is unloaded from the various areas of the glacier, distinct landforms are created. In addition to landforms, glaciers leave many "footprints" that give clues to its presence. The temperature was extremely cold when they passed through this area and strong winds prevailed with speeds up to 100 MPH. Sand particles blew in the wind and acted like sandpaper, abrading rocks flat on one side. Rocks shaped in this way are called *ventifacts.* The rocks carried within the glacier were banged around during transport. The results of this are small crescent shaped indents called *chatter marks.* Another feature created during transport are *striations*, which are parallel grooves etched into the rock. The ice was quite thick and capable of lifting large boulders the size of houses and depositing them in areas different from their origin. These boulders are known as *erratic boulders.*

A little about the Long Island Sound:

The sound, which is 110 miles long, 21 miles wide and approximately 65 feet deep, was once a fresh water glacial lake for several thousand years. Sediment, hundreds of feet thick accumulated in this lake. Eventually it broke through in the east and drained. Sea level, which was 350 feet lower 20,000 years ago, began to rise from the melting glaciers, and the abandoned lake filled.

Sedimentary structures:

Just as the glaciers leave their "footprints", so do sedimentary structures. The importance of constructing a stratigraphic column is to analyze the sedimentary structures that are found within the beds to determine the depositional environment of the sediment. Certain features (such as fossils) are excellent indicators of the age of the sediment. Other features (such as ripples and clast orientation) reveal the flow direction of the water which deposited the sediment. It is even possible to discover climatic conditions during deposition.

Evidence of a glacier:

Scattered along the beach are an abundant amount of rocks containing striations, chattermarks and ventifacts. Erratic boulders rest along the shore and many more are exposed several hundred feet offshore, during low tide.

Getting the big picture:

When trying to reenact events that occurred in an area it is important to look at the "big picture" and not base your theories on an isolated spot. In the field, a sedimentologist will dig several columns a distance from each other, using one column as a reference to compare to the others. I not only dug three columns, but also dug many "half columns" between the main ones. The purpose of this exercise is to "connect the beds" over a broad distance. This enables you to isolate the minor events from the main one.

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