GEOLOGY OF THE ADIRONDACKS

Photo Source: *Annual Report 2014*. Adirondack Park Agency. http://apa.ny.gov/Press/AnnualReport/2014/2014APAnnualReport.pdf.

THE ADIRONDACK DOME

The Adirondack Mountains are very different in shape and content from other mountain systems. Unlike elongated ranges like the Rockies and the Appalachians, the Adirondacks form a circular dome, 160 miles wide and 1 mile high. Although the Dome as we know it today is a relatively recent development, having emerged about 5 million years ago, it is made of ancient rocks more than a 1,000 million years old. Hence, the Adirondacks are "new mountains from old rocks."

BIRTH OF A GLACIER

A quarter of a million years ago, when the earth was a few degrees cooler, the snow which fell in the winter did not melt entirely in the cool summers. As it accumulated over millennia, its enormous weight compressed the lower layers of snow into ice, eventually becoming thousands of feet thick. The increased pressure softened the lower ice, causing it to flow like thick molasses. A glacier was born.

SHAPING THE LANDSCAPE

As the ice advanced southward into the Adirondack region, soil and rock was scraped from the land and embedded in the ice like sand in sandpaper. Alternately scratching and smoothing the earth's surface, the glacier pulverized boulders into pebbles, carrying the debris as it moved. As it thickened, the glacier crept over hills and, eventually, over the highest mountains, breaking and lifting rocks as it rounded their summits. When the ice sheet melted, these rocks, called erratics, were deposited throughout the Adirondacks, where they can be seen today in fields, along forest trails, and scattered on mountaintops.

GLACIAL LANDFORMS

Alpine Glaciers, Cirques, and Horns

As the massive continental glacier grew to the north, small alpine glaciers were forming in the Adirondack Mountains. These alpine glaciers carved the upper slopes of the mountains for thousands of years. Gradually, they became buried by the advance of the continental ice sheet. The

distinctive summit of Whiteface Mountain owes its shape to alpine glaciers. Bowl-shaped amphitheaters called cirques were carved from the rock on the north, east and west sides of the mountain by three separate alpine glaciers. Where the tops of the cirques joined, sharp ridges, called aretes, were formed. If this process had continued, the cirques would have ended up back-to-back, leaving a horn, and Whiteface Mountain would now look like the Matterhorn in Switzerland.

Kettle Holes & Kettle Ponds

As the glacier thawed, iceberg-sized chunks of ice broke off and were buried beneath accumulating sand and gravel washed from the ice. When these ice blocks melted, they left depressions - kettle holes - in the landscape. When a kettle hole went below the water table, a kettle pond was established as the steady supply of water remained in the basin. Many of the small, circular ponds and wetlands in the Adirondacks were created in this fashion.

Eskers and Kames

Meltwater streams, flowing under and within the glacier through tunnels in the ice, built their own stream beds from rock material embedded in the glacier. After the glacier melted, these riverbed sediments were deposited on the landscape as winding ridges called eskers. When sediment-laden water flowed over the glacier's surface, it filled depressions with sand and gravel. As the glacier melted, material from circular depressions was deposited on the landscape as mounds called kames.

Soil

Adirondack soils are young, having developed only since the glacial retreat about 10,000 years ago. Unglaciated areas in the rest of the United States have soils that have developed over millions of years. Soils in the Adirondacks are generally thin, sandy, acid, infertile, and subject to drought.

Outwash

The melting ice sheet created huge, sediment-laden rivers that roared across the Adirondacks, depositing sand and gravel outwash on giant, shifting floodplains. Coarse gravels and boulders settled on river bottoms; lighter sand particles, silts and clays were carried downstream. As the glacial rivers changed velocity and direction, layers of these various outwash materials built up on top of one another, forming the sedimentary strata normally found in valleys and lower elevations today.

Till

The debris that was deposited directly on the land by melting glaciers without being carried and stratified by meltwater streams contained unsorted rocks of all shapes and sizes. These are referred to as till. Because they have not been smoothed by the movement of the meltwater stream, till materials are often rough and jagged.

FORMATION OF WATER SYSTEMS

Melting ice, glacial debris, and changing glacial topography contributed to the continual disruption of the meltwater drainage system of the Adirondack region. Lakes and ponds were formed as ice debris dammed river valleys; as dams broke, sand and gravel were redistributed downstream. This process left glaciated regions like northern Minnesota, Wisconsin, and the Adirondacks dotted with thousands of beautiful, natural lakes. Yet for all this reconfiguration of the landscape, the major drainage patterns of the Adirondack Dome were essentially unchanged by glaciation. Taking the path of least resistance, Adirondack waters drain from the central high country to the region's periphery. Water flows east from the mountains to Lake Champlain, northwest to the St. Lawrence River, west to Lake Ontario, and southward to the Hudson and the Mohawk rivers, as it did before the arrival of the glaciers.

Source: “Geology of the Adirondack Park.” New York State Adirondack Park Agency. http://apa.ny.gov/about_park/geology.htm.