The geologic history of new jersey

Business

In the northernmost locations of the state of New Jersey, a region called the Highlands Province can be found. Geological events occurring over a billion years ago continues to shape the populated landscape of northern New Jersey, characterized by its complicated physical history.

Distinctive rocks, landforms, elevations, and other geographical features combine to create a unique and irreplaceable area whose geology is hundreds of millions of years in the making. The earliest confirmed development of this region’s geology started between 1. 3 and 1 billion years ago during the Precambrian time in the event called the Grenville orogeny. During this process involving the shifting of tectonics, several continental plates collided resulting in the formation of folded mountains along the eastern edge of North America. The oldest dated igneous and sedimentary rocks in the area were involved in the continent’s underground growth at this time. These ancient rocks serve as the underlying foundation for all geographical features in the Highlands, covered with layers of younger rock.

Due to the extremely high pressures and temperatures of this age, buried sandstone, dolomite, granite, and mudstone were easily transformed into gneiss while limestone changed to marble. A crystalline and metamorphic rock, the widespread gneiss is visible in nature today in places such as the Route 23 Rest Stop. This roadside wonder features various layers of the stone formed by anticlines (rock folds created by an upward force) and synclines (trough-shaped formations consisting of variously aged rocks). Around 900 million years ago in the Paleozoic Era, the activity of the plates caused ocean basins to form as underwater continents created by the Grenville orogeny began to rift. Approximately 550 to 470 millions years ago

the land that is New Jersey began to rise, covered by shallow tropical seas that developed into oceanic depths. Eventually the basins that submerged North America closed as the sea level continued to rise and fall sporadically in the Ordivician period.

Meanwhile, the continental plates of Europe and Africa shifted underneath North America on its eastern edge in yet another mountain-building period called the Taconic orogeny. The converging of the plates caused metamorphic rocks, young limestone and shale created by deposited silt to fold and fault, thus establishing the original mountains that include the Appalachian Mountains of the Highlands. It is believed that the geographical features formed during this time were extremely steep and jagged, more so than the Rocky Mountains today in the western United States. Although the plate movements ceased about 40 million years later, rivers continued to deposit massive amounts of sand and gravel, contributing to the erosion of the newly formed mountain ranges. This material serves as underlying layers of today’s mountain ranges in the Highlands province. Because the layers of new sedimentary rocks were easily weathered by varying conditions, mountains eroded further while a shallow sea again covered New Jersey’s surface.

The spreading waters transported the eroded limestone and shale towards the seafloor, contributing new stone to the growth of quartzite-covered mountains. This progress in the Highlands landscape shaped a narrow belt of elevation along with the base of the Kittatinny Mountains. Although the presence of geologic activity is present in rocks found in Pennsylvania, all evidence of New Jersey’s history for the following 150 million years has been

destroyed due to erosion. Despite these mysteries it has been confirmed that the Alleghany orogeny occurred about 300 to 250 million years ago, another long period of plate collision that led to mountain-building. Rocks throughout the all provinces of New Jersey compressed to create folds, allowing the rock layers of different textures to form the ridges and valleys remaining today in the Highlands among other places.

Once the sea level decreased, it was clear that the combination of orogenies had created the super-continent known as Pangea. New Jersey at this time was shaped by flashfloods. During the Triassic period of the Mesozoic Era, however, the continents begin to rift apart, leading to the creation of the seven separate continents. Flash flooding in New Jersey caused mud and silt to travel towards large deposits that slowly filled rift valleys and faults that resulted from the division of continents. As the large valleys filled, basins were formed.

The Newark Basin, which runs through New Jersey, helped to shape most of the state surrounding the Highlands. Shale rocks of a reddish hue along with sandstone and conglomerate deposition characterize the entire rift basin. Besides these areas, the breakup of Pangea resulted in the volcanic flow of magma close to the land’s surface during the Jurassic period. By traveling between different layers of stone, it gradually cooled into layers of igneous basalt and diabase among sedimentary rock. When the rocks were completely solid they became embedded in the older layers of rock to create sill. Because this mixture increased resistance to eroding forces in the Cretaceous period, it eventually became landforms identified today as the Watchung and Palisades Mountains.

Apart from that still were the faults created worldwide by the earth’s crust breaking in the course of the super continent’s separation. Among the countless formed in eastern North America, a major fault that runs through the Highlands province is the Ramapo Fault. Created by the rapidly eroding sedimentary rocks among the region’s ancient metamorphic rocks, the fault line hidden under the Ramapo Mountains has not been active for an extensive period of time but poses a threat for New Jersey’s future. Most of the changes in the Highlands landscape over the past two million years is credited to three major glaciations caused by increasingly cold climates (an Ice Age). The weight of snowfall turned to ice, which built up to form colossal glaciers that trekked the earth.

These moving masses served as powerful forces of erosion to the geologic formations of the Highlands. Even though the Kansan and Illinoisan glaciations were responsible for much of the changing land, the evidence of their appearances was weathered away throughout thousands of years. It is currently evident that approximately 20, 000 years ago the Wisconsin glaciation advanced through the land, leaving its mark by eroding geologic details, carving out lakes, and redirecting the location’s rivers. As the ice roamed, it collected massive amounts of silt, sand, gravel, and other rock material that is called till. By doing so the glacier removed soil to expose the bedrock underneath, leading to the formation of the Highlands unique rocky topography.

About two thousand years later, this glacier melted as a result of a warmer climate, leaving behind deposits of till that is called terminal moraine. The terminal moraine from the Wisconsin glaciation was deposited throughout

New Jersey and can still be found throughout the area, especially in natural lakes, potholes, and rivers. Besides the moraine it left behind, floods of water resulted from the melting of the glacier. The rising sea level contributed to the creation of today’s bays and estuaries. Excess water from the Highlands drained into the Atlantic Ocean, to create various lakes.

In West Milford, we can find lakes that stem from this occurrence: Greenwood Lake, Bearfort Lake, and Waywayanda lake. In Waywayanda State Park, evidence of such glaciation is also found in swamps and bogs from irregular drainage and carved gneiss bedrock from ancient times. Through research it is clear that the Highlands province’s complex geological history has shaped the town of West Milford remarkably. Along with narrow valleys and an abundance of natural lakes, dominant mountains elevated over 1, 000 feet distinguish the area, first rising from tectonics in Earth’s early history then modified by glacial activity later on. This information reflects how West Milford in Passaic County, New Jersey came to be. Bibliography: Lurie, Maxine & Mappen, Marc.

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