HANOVER CONSERVANCY
Protecting land & water in our community

Geology of the Greensboro Ridge Natural Area

Geologically, Greensboro Ridge is part of the Lebanon Dome, one of a series of granitic domes that form many of the hilltops along the eastern edge of the Connecticut River. Geologically similar nearby domes include the Mascoma Dome that forms Holt's Ledge and the Smarts Mountain Dome which forms the mountain of the same name. These domes, along with others that extend through western New Hampshire and central Massachusetts to Long Island Sound, are collectively known as the Oliverian Domes.

It is thought that the Lebanon, Mascoma, and Smarts Mountains domes may be connected at depth and likely were part of the magma chamber that fed the Ammonoosuc volcanoes. During Ordovician times (about 460 million years ago) the area that is now Greensboro Ridge was similar to the modern arc of volcanic islands of Indonesia. In Indonesia, the island arc is the surface manifestation of the subduction of the northbound Australian Plate beneath the Eurasian Plate. During Ordovician times, the Ammonoosuc volcanoes and their granitic magma chambers were the surface manifestation of the subduction of the floor of the ancestral Atlantic Ocean. The Oliverian Domes are thought to represent the magma chambers of an arc of island volcanoes, the Bronson Hill Complex, created during the first episode of Appalachian mountain building, or the Taconic Orogeny.

In the center of the Lebanon Dome is Lebanon granite that forms the highest parts of the Greensboro Ridge Natural Area. Encircling the granite is Lebanon border gneiss, granite that has been secondarily compressed and has developed a banded texture. The foliated (i.e., banded) border gneiss is visible at the lower elevations of the ridge. The Lebanon granite is pinkish in fresh exposure owing to its rich content of potassium feldspar, named orthoclase. The characteristic hue fades in the weathered surfaces of the rocks as the feldspar weathers to kaolinite, a white, chalky clay.

While the rocks of Greensboro Ridge are quite old, their present topography is much more recent and reflects the effects of the recurring ice sheets that covered the region during the last two million years. As the ice sheets advanced southward, they ground smoothly over the upstream, north-facing slopes of hills. But along south-facing ridges, such as Greensboro Ridge, rocks were subjected to slow but inexorable pulling and plucking, leaving a ragged and relatively steep surface.

-Carl Renshaw
Professor of Earth Sciences, Dartmouth College
Member of the Board, Hanover Conservancy