The Geology of Mt. Gassan

Mt. Gassan (1,984 m) is an extinct stratovolcano, a type of volcano that consists of layers of hardened lava, pumice, and ash. It was formed around 300,000 to 700,000 years ago when a tectonic plate shifted beneath the sea and uplifted.

The mountain is located on a fault that runs north to south. Over hundreds of thousands of years, this fault is likely to have caused innumerable volcanic eruptions, subsequent uplift, and destruction. Together, this volcanic and seismic activity have given Mt. Gassan its extraordinary shape. The angular, jagged lines on its western side are attributed to the volcano's formation and then collapse in the middle Pleistocene, during the Ice Age. This side faces towards the Sea of Japan and is subjected to strong winds, which keep the terrain scrubby at altitudes that would typically be the habitat of towering trees. The gentle eastern side of the mountain has been smoothed by flowing lava from numerous eruptions. In winter, snow builds up on this side of the mountain. During winters with particularly heavy snowfalls, the snowpack can reach up to 30 meters. As the snow melts, alpine flowers bloom.

Although Mt. Gassan has not erupted for a few hundred thousand years, geologists can understand its volcanic history by examining the matter that makes up the mountain. One material that reveals past eruptions is xenoliths, or fragments of older rocks that become trapped within magma when it is still fluid. Mt. Gassan is also made up of perlite, a material that reveals the presence of water when the volcano was active. Perlite is a volcanic glass that is typically formed when lava flows into a body of water. Mt. Gassan's perlite, which is about one million years old, suggests not only that there was a volcanic eruption but also that a caldera lake may have existed on the site. Finally, its topography indicates a half-ring caldera structure around the mountain, which indicates that a completely different type of volcano may have existed here around one million years ago, before the formation of Mt. Gassan.

Mt. Gassan's deep eastern snowfields and its steep and barren western face create a harsh, yet beautiful, environment. These conditions have provided the backdrop for followers of Shugendo, an ancient tradition of mountain asceticism incorporating elements of both Buddhism and Shinto, to carry out their extreme physical training. They once relied on the diverse plant life that thrived in these conditions for sustenance during long training sessions on the mountain. Over the centuries, ascetics have discovered medicinal uses for many of the plants that grow here. Among the many plants they used medicinally were *koshiabura* (*Chengiopanax sciadophylloides*), a native deciduous tree used to reduce blood pressure, and *uwabamiso* (*Elatostema umbellatum* var. *majus*), a leafy perennial used to treat insect bites and cuts.