

GEOLOGY OF THE SUPERSTITION WILDERNESS AREA

by Tom Kollenborn (c) 1997

The geology of the Superstition Wilderness Area can be divided into three distinct categories. They include (1) rock type, (2) structure and (3) process. The rock type consists primarily of extrusive igneous rocks associated with vulcanism. Structure is consistent with the type of landforms that result from volcanic action and tectonic activity. The process is related to mass wasting, erosion, faulting, mountain-building and volcanic activity. All three of these categories contributed to the rugged and spectacular beauty of the Superstition Wilderness Area we enjoy today.

The western portion of the wilderness area is dominated by igneous rock whose origin is primarily volcanic action. There are examples of sedimentary and metamorphic activity within the boundaries of the wilderness, however this activity is very limited. There are Pre-Cambrian granites in a few isolated areas of the wilderness that were formed from intrusive igneous rocks. Intrusive rocks are formed from molten magma cooling beneath the surface of the earth. In other words, the melt (magma) was not exposed to the atmosphere while it cooled. Eventually intrusive rocks are exposed on the earth's surface by erosion. Erosion is the wearing away process of the earth's surface by wind, water and ice. These intrusive rocks can be found along the First Water Road and the Apache Trail (SR 88) northeast of Apache Junction. Granite diabase can be found east and south of the IV Ranch.

Common volcanic landforms found in the area are calderas, blister cones, lava flows, mudflows and ash deposits. Dacite, Andesite, Rhyolite, Tuff and Breccia are the common igneous rocks found in the area.

During a more recent eruptive geologic period (3 million years ago) many erosional remnants were capped with black basalt from the Black Mesa, Willow Springs and Florence caldera systems. Most of these large lava flows were the results of fissures, cracks in the earth, not volcanoes.

North of the wilderness, sedimentary deposits of volcanic debris have been deposited by the action of running water during the eruptive stage. Many of these deposits have graded bedding, which is sometimes indicative of stream deposited gravel. In this case, the water was produced by volcanic steam and vented during the eruptions. It was very hot and viscous mudflows that formed the graded bedding deposits near Canyon Lake.

Along the Apache Trail, where the road crosses the Superstition Mining District between Superstition Mountain and the Goldfield Mountains, other rock types are prevalent. These include coarse-grain granites, indurated conglomerates and brecciated granites. Arkosics can also be found in this area. Faulting prevails throughout the area. Small stringers of quartz that were caused by epithermal and hydrothermal action intruded the rocks in the Goldfield area. These small veins carry small quantities of gold.

Near Roosevelt Lake, but still within the confines of the wilderness area, true sedimentary rocks can be found. These rocks are ancient Pre-Cambrian sediments of the Apache Group found in the upper Salt River Canyon some forty miles northeast of Globe, Arizona. This group includes limestone, sandstone, and conglomerates.

Outcrops of ancient metamorphics can be found in one isolated area near the southern boundary of the wilderness. These rocks include schist, marble and slate. The Hewitt Canyon metamorphics are commonly intermingled with volcanics. Most of this intermingling is the results of intrusion by igneous rocks. Severe tectonic activity and movement of the earth's crust was caused by the intrusion. This area appears to be the extreme eastern limits of the Superstition Mountain eruptive field.

Next Week, Part II

The geology of the Superstition Wilderness Area and adjacent areas are very complex. For the most part the region has a tremendous amount of geological diversity. The actual wilderness area has never proved to be highly mineralized near the surface. Deep-seated deposits of minerals still remain elusive to the modern prospector or miner. Major mining companies have avoided the area for almost a century. Extensive core drilling was done near the Woodbury Trailhead in the 1970's with no major mineral discoveries being made or announced.

Some geologist believed Superstition Mountain is the remains of a large collapsed caldera. This caldera has experienced three basic geologic stages in its evolution. The first stage involved the formation of dacite cones on a granitic basement complex more than twenty-nine million years ago. This resulted from magma intruding the granite and depositing basalt and ash in the forms of cinder cones and lava flows. The alternating layers of ash and basalt helped form the present mountain we call Superstition. After millions of years of eruptions the area was leveled by erosion. After a long period of inactivity the magma below the earth's surface began to recede leaving a massive cavity below the crust of the earth. The second stage in the formation of Superstition Mountain then occurred. The entire area collapsed into the cavity resulting in a huge caldera some seven miles in diameter. As parasitic cones developed within the caldera and began to issue forth ash, deposition occurred over some one thousand square miles. Remnants of these eruptions remain visible today. Picket Post Mountain, west of Superior, is a classic example of deposition remnant.

As the volcanic action of the second stage began to subside, the third stage of the mountain's evolution began. Uplift and subsidence were both common during this period. However, uplift dominated the development scene for several million years resulting in the familiar landmark we know today as Superstition Mountain. Originally the mountain was some three to four thousand feet higher, but water erosion reduced it to its present configuration and size.

The deeply incised canyons and large alluvial fans are landforms resulting from millions of years of erosion. This is the basic geologic evolution as reported by Dr. Michael Sheridan, Vulcanologist at Arizona State University from 1970-1989. Today there are other theories as to how Superstition Mountain formed and the other geologic formations in the area. So far none of the theories are conclusive.

Geologists have studied other theories as to how Superstition Mountain formed. The degree of uplift or resurgence as reported by Sheridan is in direct contrast with the findings of some U.S.G.S. geologist have found. Some geologist report Weaver's Needle was formed the same way Superstition Mountain. Weaver's Needle was formed as an erosional remnant. Some geologist believed this theory is applicable to Superstition Mountain. However there is not sufficient geologic evidence to support the theory Weaver's Needle is volcanic plug.

The geology of the Superstition Wilderness Area is a fascinating study of igneous rock and their various formations. The rocks of the western portion of the Superstition Wilderness are eruptive igneous in origin. These rocks formed a wonderland of beautiful volcanic formations deposited between 3 – 25 million years ago.

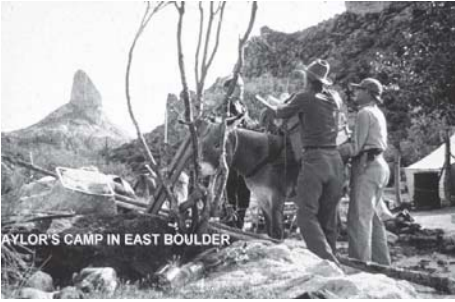
We can only marvel at the beautifully textured and varied landscape the Superstition Wilderness Area has provided for us. For us, the future lies in protecting this region for our grandchildren to enjoy and marvel at.



A formation in the Superstitions that results from volcanic activity.



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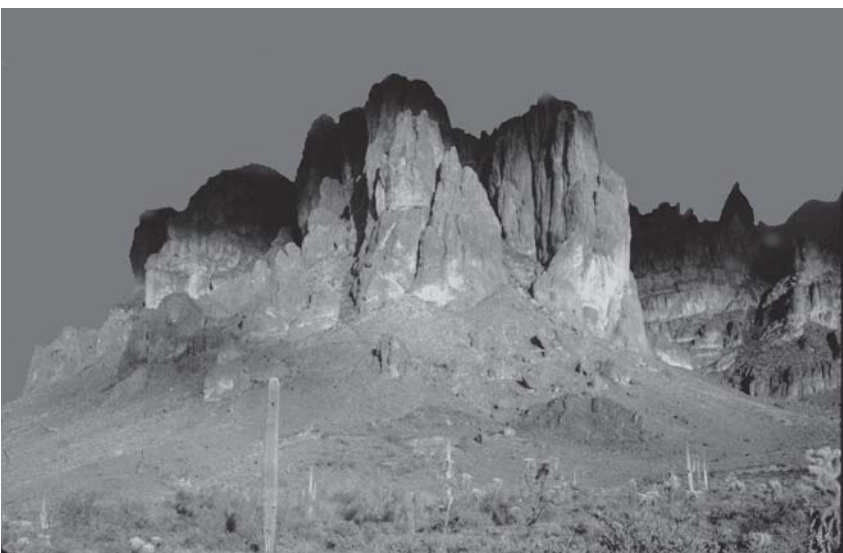
Here at Aylor's camp you can see Weaver's Needle, one of the unique erosion remnants of the Superstitions.



At 3 million years old, this Black Mesa basalt is the youngest rock in the Superstition Wilderness.



The western facade of Super



The remnants of a dacite core on the facade of Superstition Mountain.
Note the alluvial fans at the base of the cliffs.