“Tuff Times”

Geronimo Head Formation in Arizona.

Arizona has a violent past, and by that I’m not referring to its “wild west” days. I’m talking about its “rocky” history, so to speak. And as you and my other loyal readers know by now, it’s the rocks, quiet now though they may be, that reveal glimpses of distant antiquity and times when the world here was a very different place.

In many places around the Valley of the Sun lie smooth, gentle-looking rocks that belie their origin. They weather into rounded slopes and rivulets, and many various-colored lichens love living on them. They even look like badlands in places, only on a miniature scale, and the surreal shapes they exhibit could give even Salvador Dali a lesson or two.

You can see them in the Superstition Mountains, the Usery and Goldfield Mountains, and out west of us in the Hieroglyphic Mountains, near Lake Pleasant. Some of the more scenic arrangements show golden or ocher colors, forming layers within other craggy, forbidding-looking rocks. Many people are surprised to learn that these picturesque rocks are simply volcanic ash – dust and cinders that fell from the sky after our landscape in other times was shaken and blasted by massive volcanic eruptions – really gigantic eruptions.

If you had been living in this area sometime between about 30 million years ago and around 15 million years ago, you would have had a chance to see one of a series of absolutely amazing sights: an eruption of a volcanic caldera. It would also have been the last thing you ever witnessed. It’s hard to say whether you would have been vaporized first, and then completely blown-away, or if it would have happened the other way around.

Where the Superstition Mountains now sit, evidence remains of at least three of the major eruptions, each resulting in a caldera formation. A volcanic caldera is like a crater, without a tall mountain cone surrounding it. Calderas are also very big – the ones of the Superstition Complex are 10 to 15 miles across, each. They form when molten rock, called magma, suddenly and explosively belches from the Earth’s subsurface, where it has been slowly, relentlessly, pooling and heating in great volume.

Some kinds of molten rock merely flow when loosed onto the landscape, but the kind that spews forth from calderas is thick and viscous, and when it reaches the surface, it blasts out and expands with awesome force. The resulting devastation can reach out thousands of miles.

Several decades ago, in Washington State, we witnessed the spectacular and deadly eruption of Mt. St. Helens. That eruption of magma was of this type – explosive. But that peak was, and is, no caldera. It is only a volcano, and its crater is less than a mile across.

Even so, ash from that event fell hundreds of miles to the east. A few hundred miles south of St. Helens lies Crater Lake, Oregon. There you can see an old caldera, although a small one. It is now filled in by a shimmering lake of sapphire color, and that scenic, circular opening is what is left of a mountain that blew its top some 8,000 years ago, and its subsequent collapse into the void below.

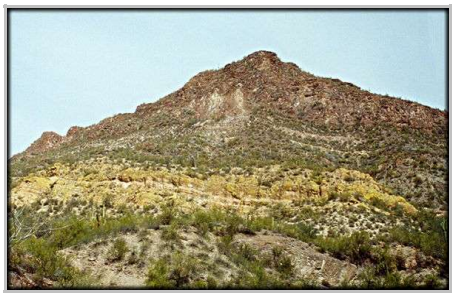
The Superstition Mountains, and, to a large degree, parts of the other above-mentioned ranges, are composed of thick layers of volcanic ash. In some places, you can readily see the layers. For the most part, the ash layers are now very hard rock, for when it fell from the sky, the ash was white-hot, and the particles all fused together when they settled down. Some ash was cooler when it fell, so it fused to a lesser degree, and those layers are now more crumbly and easily eroded.

One such thick layer (hundreds of feet) is known as the Geronimo Head Formation, and it is easily recognizable as a yellowish band, which has smooth, curved surfaces, and usually lots of those splotchy lichen colonies that thrive so well there.

Welded tuff layers in the Superstition Mountains, Arizona.

This kind of rock is called a tuff in “geology-speak”, or welded tuff, to be more specific. And because it is mostly silica, like sand, it is fairly devoid of other minerals. So, Lost Dutchman’s Gold fans, your chances of yellow treasure being in there somewhere are pretty slim.

Are there any such calderas active in the world today? The answer is yes. One is now called Yellowstone National Park. The last time it erupted was about 600,000 years ago, a mere blink of an eye ago, geologically speaking.



Volcanic ash beds near Phoenix.

When it bursts forth again – and it surely will – those people nearby and downwind of it had better have their disaster plans and supplies ready and waiting, those people being the residents of Montana, Wyoming, Idaho, Alberta, Saskatchewan, North Dakota, South Dakota, Iowa, Minnesota, and ….

Oh well, you get the idea.

To learn more about the Phoenix area’s engaging rock formations and prehistory, visit **www.gemland.com**, go to the "GeoScenery" section, and click on whichever name on the map interests you. That will initiate a series of images, together with geologic explanations, and you can even send any picture you like to your friends as an E-postcard for FREE!

----- *Richard Allen*

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