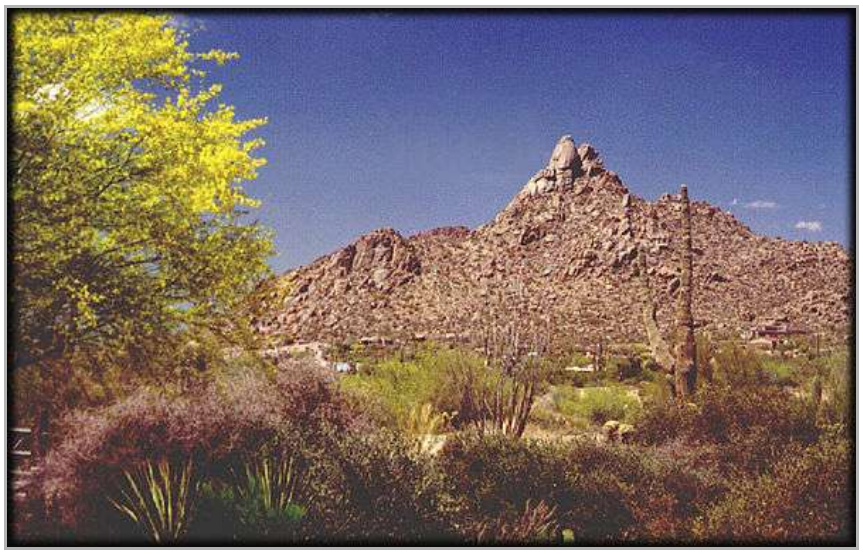
"Mistaken Identity"



Pinnacle Peak, near Phoenix, Arizona.

Volcanic eruptions, glaciers, landslides, and earthquakes. Those are all topics that elicit questions in the minds of the tourists (and locals) I talk to every week—not so much in terms of present-day activity (or potential), but in reference to the cause of the many very picturesque and unusual rock formations scattered around the valley.

Sometimes they are surprised to learn from me that the surrealistic boulder formations around Carefree, for example, were not “pushed there by glaciers,” as had been told to them by a Jeep tour driver. Or that those same massive, rounded blocks of granite were not “blown out of volcanoes and that’s where they fell,” as had been told to them by a hot-air balloon pilot.

And not that I mind answering their questions and talking about these things. I love it. What better way to help someone discover that geology is about the real world; that it's not just some boring subject in a dusty textbook. Here in Phoenix, we live in an incredibly engaging place to experience geology, and one in which the Earth’s workings and mysteries reveal themselves easily to us. After all, it is desert here, and in the desert you can see for miles and miles, and much of what you do see is bare, naked rock.

Take Pinnacle Peak, for example (see picture). This strikingly sculptured, towering rock formation stands near the north end of the McDowell Mountains, in north Scottsdale. Those lucky enough to be sipping margaritas on the lovely patio at the *Four Seasons Resort* see it right there in front of them.

Most tourists I’ve talked to suppose it to be an ancient volcano. It does kind of have that look, I admit, but it is not a volcano. The rock it is made of, an ancient granite, has simply weathered into the shape you see. And it has taken a long, long time. That rock was once buried deeply in the Earth’s crust. How deep? Probably several miles deep, at least.

That granite is around 1400 million years old—meaning it cooled down from a molten state almost a billion and a half years ago, when it lay underneath a landscape completely different from that around us now.

Then, over a vast, almost incomprehensible stretch of time, it got exposed by erosion. Cracks that had formed in it, many of which are nearly vertical, allowed for advanced weathering, and the shape of Pinnacle Peak you see now is just a result of that weathering. Look around at all the other granite in the area, and note that it has the same general cracked and blocky appearance. It simply differs from that one nice spire-like shape, you see. (See my GeoStory “Bones of the Earth” for a similar explanation of the rocks around Carefree.)

Speaking of Carefree, there are a few other features near that laid-back little town that generate questions for me. They are the gently conical hills a few miles to the southeast of the town center. These are known locally as Big Brownies Hill, Little Brownies Hill, and an unnamed third cone. Once again, people’s first impression is that they are volcanic, which in this case, is *partially* true. Just not as you might think, however.

Most of the rock forming those two hills *is* volcanic, but the hills are not volcanoes, though once again, they do look like they must be. So what do I mean? The volcanic rock there is mainly of a type called basalt, and when hot and fluid, it flows very readily from its source vent. It forms layers, now mostly tilted and broken-up, which can be seen in many places north of Phoenix.

In the Brownies Hills, already hardened basalt (along with some other rock types) has simply weathered into cone-shaped hills. From a distance, they look like they *have* to be volcanoes, meaning they look like they should have been major eruptive sources of the rock. A close-up inspection, however, reveals no craters at the summits, and no flows emanating from their slopes.

By the way, the forces that have shaped Pinnacle Peak and the Brownies Hills are still at work, slowly, slowly every day. Those mounds of rock are as ephemeral as the clouds in the sky. They're just in a different time frame, that's all.

The study of landforms is called *geomorphology*, and I think it is one of the most fascinating branches of geology. And now that we are mapping and photographing the strange surfaces of other planets and moons, we have even more to figure out about the processes of nature. All those shapes around us in the world are not always what they appear to be.

To learn more about Arizona's natural wonders, including the Phoenix area's engaging rock formations and prehistory, visit **www.gemland.com**, and go to the "GeoScenery" section. Click on any name on the map to begin a series of images. There are geologic explanations available in pop-up windows, and you can send any web scene to your friends as an E-postcard for FREE!

----- *Richard Allen*

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