

“Simple Mines”



Volcanic spires in Monument Valley, Arizona.

What makes a mine? A certain cynic once described a mine as “a hole in the ground, owned by a liar.” Well, that statement aside, what *is* necessary for such diggings (successful ones, anyway) is a *concentration of minerals*. Fortunately for us, Earth is not a homogeneous body of rock.

In all kinds of places, in all kinds of environments, elements and minerals are concentrated by a variety of means: chemical, hydrological, physical, and organic.

It is that last method of consolidation that bridges the world of rocks and the world of larger life, and it is a fascinating one, once you start to look into it. Last month, I talked about life *inside the rocks*. Here’s an Arizona story about non-human life *organizing rocks*.

The spires and pinnacles of Monument Valley, in the Four Corners area of Arizona and Utah are of two types. One is of massive reddish and brownish sandstones of Permian age – a time where in this part of the world, vast deserts blanketed the landscape, and dinosaurs had yet to leave their footprints in those barren dunes.

The other type, much younger, is of volcanic origin – and when you scrutinize examples of it, you can see it has a different look. These outcrops are more gray, more jagged, and more “blade” shaped than the flat-topped, older ones. A very scenic minaret of this type is Agathla Peak, just north of Kayenta, and another is Shiprock, just over the state line in New Mexico. But there are others, too, and they are all part of what geologists call the Navajo Volcanic Field.

Some 15 or 20 million years ago, rich, dark lava blasted loose in various places from far beneath the flat, sedimentary rocks of the Colorado Plateau. Much of that now-hardened rock has eroded away, leaving only the “necks” within the old volcanoes standing, as well as some of the once-molten rock radiating out from those ancient structures – rock that had filled in giant, resultant fractures across the landscape. These shapes form what geologists call “dikes”, certain of which form the blade-like towers, seen marching across the valley floors.

One of the minerals to be found in these volcanic features is called serpentine. It is generally relatively soft, and hence erodes quickly. Within it occurs another much more durable mineral: garnet. It forms in nice, compact crystals of a rounded, angular nature, with exotic-sounding names like *dodecahedrons*, and *trapezohedrons*. Here, many of them are fairly clear, and when faceted, they make wonderful gemstones, though usually small in size.

Garnets constitute a whole group of minerals. They are found in many locations, and they come in many colors. The kind that occur in the Navajo Nation are called *pyrope* garnets. They are sometimes confused with rubies, as they are a saturated, deep red in color.

Because they also are found in a part of the Czech Republic called Bohemia, they are often called “Bohemian” garnets, and they have been used distinctively in older, European styles of jewelry.

In the Southwest, we call them *Arizona garnets*, or “anthill” garnets. I don’t really like that latter name,



as one of the qualities allied everywhere with jewels is a “high-end” image, and such name association with the lowly (and generally non-upscale) anthill tends to work against our garnet’s reputation. However, jewelers most anywhere do know that designation, and if anything, it is apt.

Arizona garnets are mined by a very uncomplicated process. It really couldn’t be easier. Those busy little insects called ants are not dumb. They like to choose lasting materials for their homes – ones that withstand wind, rain, and frost.

Garnets, being hard and durable, nicely equidimensional, and of a variety of small sizes, are the ideal thing. Because they are also quite dense, and therefore heavier than other sand and gravel grains, the garnet crystals are less likely to blow away in the wind. Sought out by the ants, they are collected from ground below the weathered volcanic outcrops, and piled up with other stones into the mounds that form the entrances into their maze-like subterranean worlds.

What a perfect example of "letting others do the work for you"! No muss, no fuss. Navajo traders find those anthills, sort through them, and pick out the good, quality stones, and sell them into the gemstone trade where they are subsequently cut and polished, and set into finished jewelry.

Without the ants doing the work, it would take too long, and be ultimately too expensive, to find each individual garnet crystal. So, as it turns out in this case, ants are an integral part of the modern-day gem mining business.

Luckily besides, the ants are not very good liars, either.



Sandstone pinnacles in Monument Valley, Arizona - Utah.

To learn more about Arizona'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.

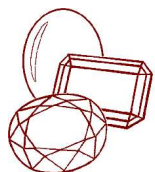
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----- *Richard Allen*

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*At right: natural Arizona Peridot and 22K Gold
gent's ring by GemLand © 2006*



by Richard Allen

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