

“ Dividing Line ”



Black Mountain, north of Phoenix, Arizona.

It was late afternoon, with the sun orange and low in the southwestern sky—one of those late December days when the air around Phoenix has sort of a drab look—somewhat dusty, layered, and gray. But it was also the Holiday Season, and I felt a bit like celebrating. I had been looking forward to my drive to this part of the Valley all day, as I hadn't visited it before. Had the main reason for my anticipation been that it was another chance to get out and look at the landscape and rock formations? No, I have to confess. It was the thought of having an ice cold Martini, in the laid-back lounge of the Carefree area's most elegant resort, that had gotten me going.

I had just moved to Arizona, and I had read that this particular resort was a place not to be missed. That certainly proved out to be true. Rocks *did* get in the way that day, however, as they do so frequently in my life. Luckily for me, those interludes always make it interesting. They have a tendency to put things in perspective for me—they separate the little things of everyday life from the things of eternity, or at least the bigger picture, and the longer view.

I was passing Black Mountain, on its south side. I rolled down the window and tried to get a scent of the cool desert air, but there was none. Being new to Arizona, I only guessed that it must take heat to bring out the smell. The peak loomed high to the left; houses and various structures clinging to its barren slopes, interlaced by tiny roadways that snaked up through stands of tall *Saguaro* cacti, *Palo Verde* trees, and *Jojoba* bushes. Not cheap real estate, I figured. It would take a few more dollars in the old savings account before I could put something down on one of those. But the monetary “bottom line” separating me from a life of leisure and afternoons on a deck patio up there somewhere, was not what intrigued me. You guessed it—it was the rocks—and more precisely, a line *through* the rocks.

From the south, Black Mountain looks neatly divided in half. The western half is all dark, fragmented rock, and the *Saguaros* must like it, because there is a thin forest of them there. The other side of the mountain, or its eastern flank, looks like a giant pile of beige rubble. There are fewer of the tall, exotic cacti. Granite boulders abound, and the tan rock is all broken and rounded into picturesque shapes and crags. I mentally noted that hiking up that side of the mountain would be a real chore. Making my way on down the road, the division through the rocks stuck with me. I knew right then that I would “get into” the geology behind that granite, which rises above the resort's lodge, too.

And that the adventure that afternoon would pay off in more ways than one.

Why the stark division in those rocks? Why the strong contrast between the two sides of Black Mountain? I knew the hotel's bar would be the perfect place to ponder those very questions. It did end up taking a little more research, and eventually even a hike up to the summit, to fully grasp it all.

In other GeoStories™, I have discussed the great antiquity of many of the rock formations around the Valley of the Sun. I've also related how the Valley's mountains themselves, which include Black Mountain, are mostly young—meaning only about 15 or 20 million years old (yes, that's right, that's geologically *young*). They are composed of older rock in much the same way as bricks from old buildings have been recycled and used to create new structures. In my GeoStory™, “Missing Time”, I discussed Camelback Mountain, where you can see two formations in contact with each other, the line between them representing a vanished past. In this case, however, on Black Mountain, the line running so neatly up and over its divided summit is a *forced contact* between two ancient rock types—one literally having intruded *into* the other.

On the surface of the world about 1.7 billion years ago, where the places known as Cave Creek and Carefree now lie, sat thick formations of rocks laid down as sediments by vast, ancient river systems. Layers of rock, spewed out of nearby volcanoes, occasionally alternated throughout these. It was the landscape of a continent so old we can only speculate about its outlines. We know, though, that it was moving about the Earth's surface, as all the continental rocks have done throughout history (and still are doing).

Along with the movement, and its associated heat and pressure, the rock layers changed their nature a bit (this is called *metamorphism*). We know them now as slates and phyllites—the geologic names of the rocks of the western part of Black Mountain. Throughout the next few hundred million years, with this continental crust literally floating on the more dense, moving, plastic layers below, great crumpling forces caused the Earth to convulse and pulse. The energy drove its crust into long “belts” of distorted rock, that in this case actually stretched over a thousand miles to the northeast.

This particular period of deformation is called the *Mazatzal Orogeny* (sounds sexy, doesn't it?), and during its final throes an extremely hot, fluid body of rock, now described as 1.4 billion year old granite, pushed up and intruded into higher reaches of the older rocks. We see part of that intrusion today, the eastern side of the mountain, on the other side of the line dividing Black Mountain. The two rock formations, and the division between them, exist in other places in the Phoenix area, too, but they're a little harder to see. They have all been exposed, for us to view now, by recent millions of years of weathering and erosion.

How nice of those rocks, I thought, for they had once again made my day. That diversion was just what I had needed, and oh, by the way, the Martini was perfect.

For more on this subject, go to www.gemland.com, click on “GeoScenery”, and visit the series of pages beginning with “Black Mountain” on the map. There are seven views in that sequence, one of which will show you the granite up close—*really close*. Click on the button labeled “GeoHistory” to discover more on the entire geologic story of the scenic Valley of the Sun.

--- *Richard Allen*

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