

The Solitario

The Solitario, or El Solitario, is an appropriate name for this circular Geologic structure, for it is somewhat isolated and in a sparsely populated harsh desert region of West Texas.



Image by Jiri Hajek, Nov 14, 2017 near Lajitas, TX

More accessible now since the State of Texas purchased the Big Bend Ranch which The Solitario is nestled in. R.O. Anderson, the then CEO of ARCO Oil & Gas Company, raised longhorn steer on the Ranch before selling the property that was turned into the Big Bend Ranch State Park. This addition added a park that was half again to the size of the existing Big Bend National park.

Straddling the Presidio/Brewster county line, The Solitario is nine miles North of both Lajitas Texas and the Rio Grand River. The structure is situated in the

Northern half of the Chihuahuan Desert that stretches for hundreds of miles from the central Mexican State of Chihuahua, overlapping the West Texas boarder, and reaching into New Mexico.

It is a fascinating circular Geological structure forming a mountain ring of rocks from the Cretaceous Period (last of the Dinosaurs) nine miles in diameter. The center of the structure is a five mile in diameter and is eroded down to a suite of Paleozoic Era rocks dating back more than 251 million years. Much older in time to the surrounding Cretaceous rocks.

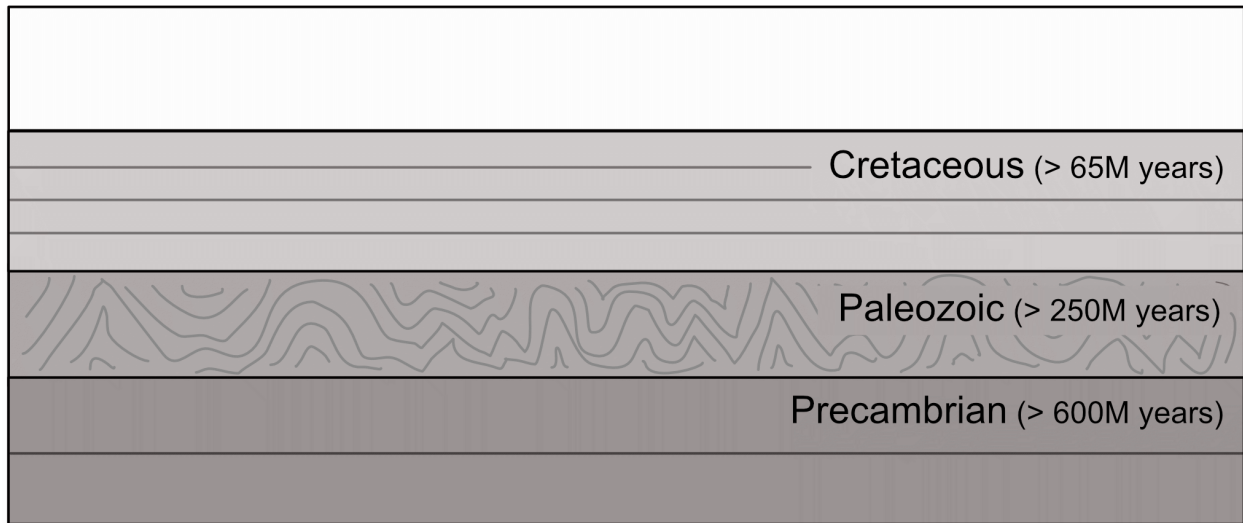
The structure is sometimes misinterpreted as a collapsed volcanic caldera but, it is actually an eroded uplifted dome dramatically exposing rock sections of those two Eras.

The Deposition

Some basic understanding of the Geology of The Solitario area will make the story more interesting and a visit there more informed and exciting.

Let's start with layers of rocks hundreds of feet thick. The ones that make up The Solitario are in two very distinct groups. Older Paleozoic rocks that have been compressed and folded by the collision of Continental Plates. These collisions are the supreme mountain-building process on the Earth. This particular event, called the Marathon Uplift, was part of the Ouachita Orogeny (Mountain Building Event) that stretched into Eastern Oklahoma and Arkansas.

Sixty million years ago, this layer of folded rocks was submerged under an expansive shallow sea stretching from Texas to Western Canada and connecting what would become the two oceans of the Atlantic and the Arctic. Sediments from the second layer where deposited, and these two layers are what is preserved and exposed in The Solitario today.



Images by David Bagstad. Vertical scale is exaggerated.

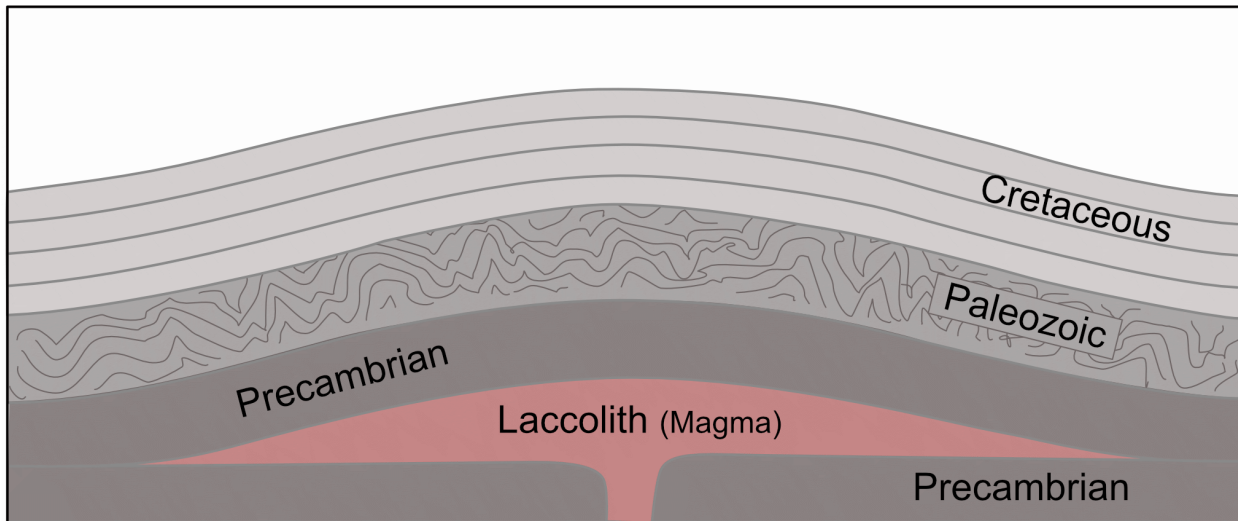
These two rock groups sit on an ancient metamorphosed rock known as the Precambrian which are exposed in the West Texas region and also at the Llano Uplift in Central Texas.

The Volcano That Wasn't

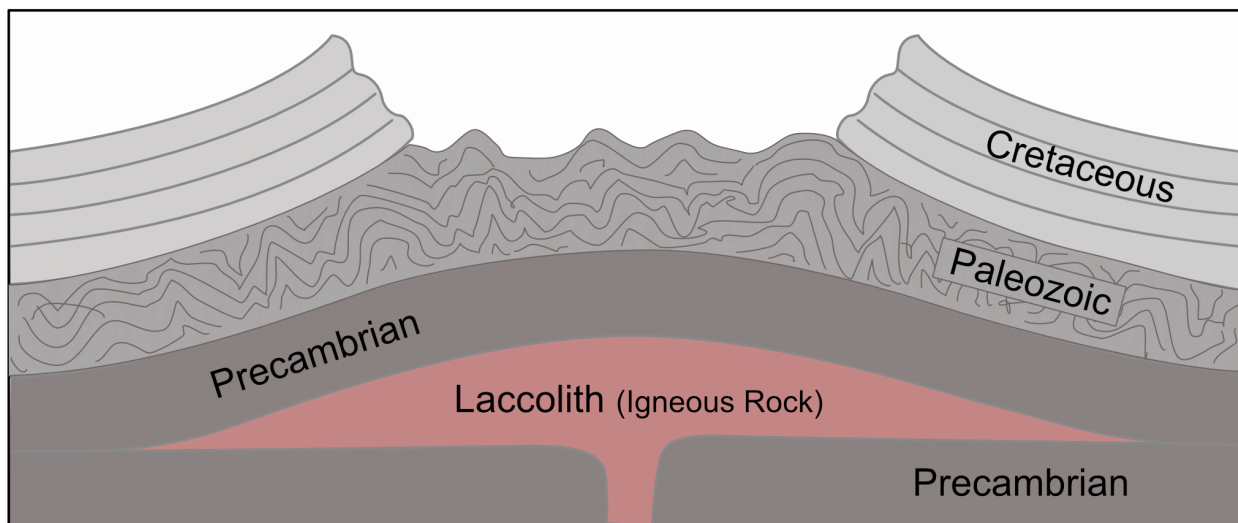
When continental plates collide with oceanic plates, subduction of the oceanic plate occurs. The heat generated from this subduction melts the plate contacts as they plunge deep in the crust. The result is molten lava and volcanic activity.

Sometimes, the volcanic magma (melted rocks) can't find a fracture and path to the Earth's surface, its natural tendency, to be released as volcanos. So it tries to find another path. A path of least resistance. It often finds a horizontal rock layer boundary that is weak, penetrable, and expandable.

It then squeezes between those layers creating a lava lens (Geologic term is Laccolith) and bowing up the rocks above it. Kind of like when you get a blood blister and the skin's surface was not breached by the injury and the blood can't escape and it therefore forms a bubble.



Fast forward a few hundred million years and the angle of the Earth to the Sun has shifted many times and the Earth cools and the oceans get sucked up into Polar Ice Sheets and mountain glaciers. Sea level has dropped and the most recent rocks, the Cretaceous rocks, are now at the continents surface and exposed to the elements and to the effects of weathering. Where they are bowed up, over the deeply buried Laccolith, they weather faster, exposing the Paleozoic rocks beneath them.



In time, weathering takes its toll on the land and the Cretaceous rocks over the buried volcanic blister (Laccolith) wear away and a feature is created that mimics a volcanic caldera. A circular valley with mountains made up of more resilient (Cretaceous) rocks forming theater bleachers around this basin.

And, the modern Solitario is born.

To view the Thesis I conducted and wrote on The Solitario, go to:

<http://hdl.handle.net/2346/13759>

Click on View/Open linked document number to open a pdf of the thesis.

David P Bagstad

Geologist

Masters Thesis - A Structural Study of The Solitario

Texas Tech in 1981