In Layman's Terms:
Geologic Highlights of the Ross Maxwell Scenic Drive

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Have you ever been frustrated in your attempt to understand geological text in a book or exhibit? Many of us have. Here is an opportunity to take the Ross Maxwell Scenic Drive and learn, in layman's terms, about its many distinctive and unique geologic formations. It is a drive that mainly tells a story about the unnamed, small volcanic vents scattered throughout the western portion of the park. Allow for a good part of the morning or afternoon, especially if you choose to take the 12.8 mile gravel Old Maverick Road back.

Begin your tour at the beginning of the Ross Maxwell Scenic Drive, thirteen miles west of Panther Junction.

MILE 1

The low-lying, non-descript hills immediately surrounding you, colored tan to grey, sometimes covered with a dark brown layer, are sedimentary rocks from the late Cretaceous Period, deposited 88 to 65 million years ago (mya). Mostly shale, claystone, siltstone and sandstone, these deposits are easily eroded and are often covered by alluvium or gravel carried down from the taller mountains. Read the article on Cretaceous dinosaurs on page seven and learn about the environment which created these rocks. The rest of the tour will highlight volcanic features that are sitting on these sediments.

MILE 2

As you drive the first few miles of this road, the Chisos Mountains fill your windshield. The 'V' shaped notch in the middle of the mountains is the back side of the "Window." From mile two, the flat-topped mountain, Casa Grande, is centered through the Window. It is formed from layers of lava and ash possibly topped by a *volcanic dome*.

MILE 4

Notice the rock walls on your left, running down from the slopes of the Chisos Mountains at a 45 degree angle to the road. These ridges are dikes, *intrusive* magma which filled up cracks in the earth and solidified underground during the Basin and Range Faulting Period, 24 to 28 mya. In the intervening years, the softer overlying and surrounding sediments eroded away, exposing these parallel dikes.

MILE 8—BLUE CREEK RANCH OVERLOOK

Stop here to look at the old ranching house or to hike a mile up the canyon to the red rock formations. The red rocks represent another geologic mystery, as there is no explanation behind their formation at this time.

MILE 8.3—SOTOL VISTA OVERLOOK

Do not miss this spectacular view as the desert drops below you. As you gaze out from the viewing area, notice the cliff face, forming a long mesa that fills the western horizon. The cleft in the middle of this mesa is Santa Elena Canyon.

MILE 11.6

Turn here to hike the Lower Burro Mesa Pour-off Trail. From here the face of this mesa is well exposed, giving us a nice cross-section of what is currently theorized to be a *volcanic dome* complex. About 29 mya, several local volcanic vents spewed out red hot clouds of ash, rock fragments, and molten rock droplets (light bands), followed by thick, slow moving lava that formed into domes (dark bands). An exhibit at your next stop provides details on the volcanic dome theory.

MILE 14.8

Goat Mountain has long been a required stop for geology students visiting Big Bend. The roadside exhibit here details the most recent theory on the formation of Goat Mountain. The recent replacement of this exhibit is an example of how our interpretation of geology is constantly changing as we continue to learn from years of research.

MILE 15.5

Underground volcanic activity was pretty extensive 28-24 mya. Mule Ears are two eroded dikes from this time period. Did you notice all the brown hills and spires, on either side of the road, before and after the turn for Mule Ears? Igneous rock seeped to the surface through older layers of sediment and formed unusual shapes made up of a rock called *rhyolite*.

MILE 20—TUFF CANYON

This canyon was formed as run-off down Blue Creek carved through layers of *pyroclastic ash flows* and *surge-deposits*, deposited 29 mya, from a volcanic vent located on the east side of the road. Make sure to experience the dizzying view of the canyon from all three viewpoints.

MILE 20.5

Ash in the air from another nearby volcanic vent settled to form ashfall *tuff*, the material that composes these striking white hills that surround you. The black rocks sprinkled on top are the remains of a thin lava flow, basalt, possibly from the same vent.

MILE 21.1

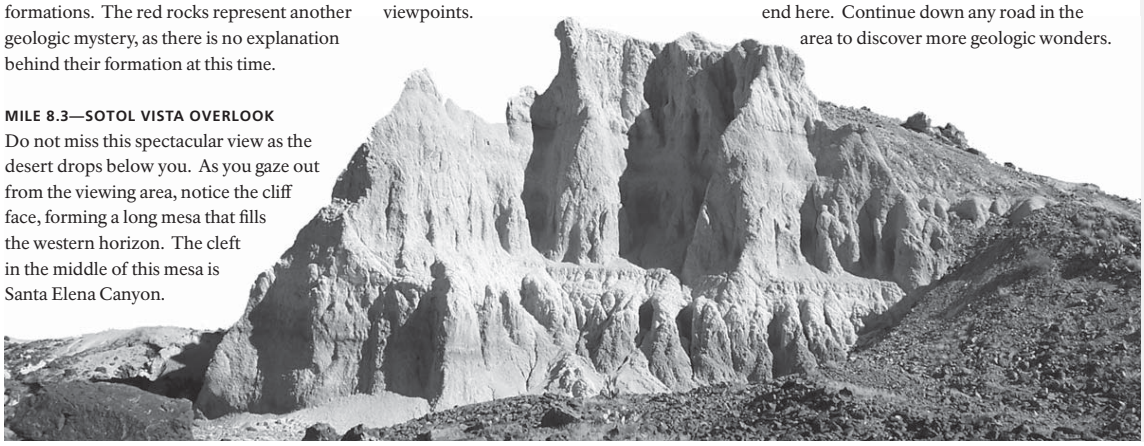
The layered mountain in front of you is Cerro Castolon. Although Cerro Castolon, Burro Mesa, and Goat Mountain are formed from three entirely different vents, they all have similar pyroclastic rock layers, topped by a lava dome. From top to bottom, the layers are *rhyolite*, *breccia*, and *basalt*.

SANTA ELENA CANYON

Travel down this trail to the base of these sheer cliff walls of limestone towering 1500 feet above you. Stop for a moment at one of the large boulders and look for fossils of shells that formed these walls. Imagine how many millions of years it would have taken to deposit all these tiny shells and form these enormous limestone cliffs. The limestone was deposited 144 to 88 mya.

There are many theories, and not very much evidence, on how the Rio Grande formed Santa Elena Canyon. One theory is that this area was once a large basin of water and faulting created a channel for the water to drain. Another theory is that previous rock layers that once sat on top of the limestone have channeled the river to its present location over the last few million years. To experience the canyon and its imposing rock walls, following the trail across Terlingua Creek.

The scenic tour of Big Bend geology does not end here. Continue down any road in the area to discover more geologic wonders.



Geology Terms

Basalt
Dark gray to black dense to fine-grained igneous rock, mainly found under the ocean, rich in iron and magnesium created by the partial melting of the mantle; basalt is runny as molasses when liquid and can flow long distances in thin sheets.

Breccia
Extrusive igneous rock consisting of sharp fragments embedded in a fine grain mixture such as sand or clay.

Extrusions
Igneous rock formed from magma that has erupted onto the surface of the earth; includes lavas, pyroclastic flows, and volcanic ash.

Granite
Silica-rich rock forming the make-up of most of the continents; intrusions are made of granite.

Igneous rock
A rock made from molten or partly molten material.

Intrusions
Igneous rock that has formed from a magma that never reached the earth's surface, but instead seeped in between pre-existing rock layers.

Lava
Magma that comes to the earth's surface through a volcanic vent or fissure.

Magma
Naturally occurring mobile rock material, generated within the earth and capable of being extruded and intruded, from which igneous rocks are derived through cooling.

Pyroclastic surge deposit
Hot clouds of particles and gas from a volcanic vent that swept over the ground surface rapidly in a turbulent flow.

Pyroclastic ash flow
Hot clouds of particles and gas that were denser than surges and moved in a sliding flow.

Rhyolite
The lava form of granite; very acid lava rock, fine grained, high in silica, which is quite viscous. If rhyolite does not contain water, it oozes out and creates volcanic domes. If rhyolite contains water, or comes in contact with water, the water becomes superheated and the lava explodes on release of pressure, creating clouds of dust and ash.

Tuff
A rock composed of consolidated or cemented volcanic ash; a mixture of clay and glass; includes ash-flow tuff and ash-fall tuff.

Volcanic dome
Extrusive igneous rock, composed of rhyolite, exposed to the surface from a volcanic vent, that oozed out but did not flow and cooled slowly.

Who was Ross Maxwell?

Ross Maxwell (1904-1993) served as the first superintendent of Big Bend National Park, from 1944-52. A research geologist, Maxwell first came to the Big Bend in 1936 to work on a geological survey of the region for the National Park Service. While superintendent, Maxwell laid out the route of the road today named in his honor to highlight the more spectacular geologic features on the west side of the park.