Limestone, with calcite veins. Penny shown for scale.

near Panther Creek; US 183 south of Roosevelt; Meers area.

Good exposures: *Mt. Sheridan Gabbro*
OK 115 crossing Medicine Creek.

Limestone – gray rock that can be scratched with a knife and reacts to acid; calcite crystals mostly too fine to be seen with naked eye. Part of stratigraphic *Arbuckle Group*.
Good exposures: Along OK 58 through the Slick Hills; Dolese Brothers Porter Hill Quarry.

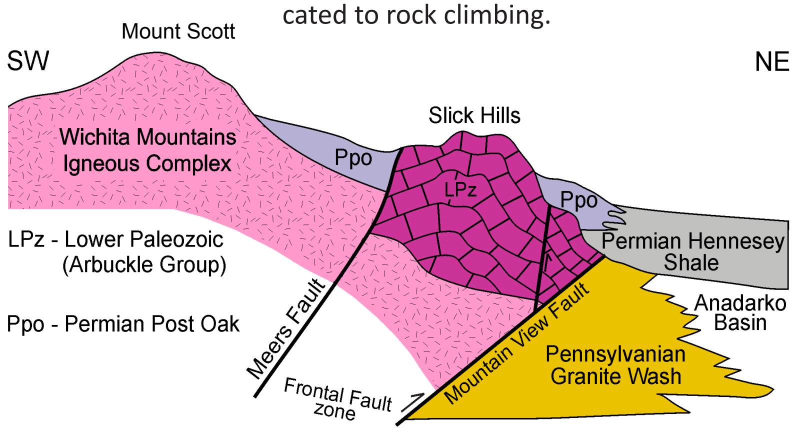
PALEOTOPOGRAPHY

Most of the topographic forms seen in the Wichitas, whether underlain by igneous rocks or limestones, were carved in the Early Permian 290–280 million years ago then buried in later Permian red shales and conglomerates.

All the igneous hills and limestone hills seen are sticking up out of the shale (see figure at right), showing that the hilly and mountainous topography extends beneath the shales and is therefore older than the shales. Because this can be seen everywhere, only a few illustrative locations are highlighted.

Good exposures:

- Along OK 58 in the Slick Hills, just north of the Kimbell Ranch headquarters, a knob of Permian red conglomerate sits on top of older limestone at the floor of Blue Creek Canyon, showing the valley existed before the conglomerate.
- On OK 49 extended, in the Refuge, 1 mile past the Mount Scott turnoff, near Quetone Point, looking south one can see a pre-existing drainage network of small, previously carved in granite, tributary canyons that disappear to the south under a layer of younger Permian conglomerate. These features are currently being uncovered.
- Along US 62 west of Lawton, and around the intersection with OK 54, small granitic knobs stick up through Permian shale on the south side of the highway. They connect with the larger granitic topography, as shown in the photo on the reverse.
- Particularly striking is the SW corner of Quartz Mountain State Park, which is dedicated to rock climbing.



Diagrammatic earth cross-section showing the rock structures of the eastern Wichitas.

MEERS FAULT

This is a great example of a Holocene (modern) geologic fault apparently tracing out the location of a much larger, older Pennsylvanian fault. During the Pennsylvanian uplift, the Meers Fault acted as a thrust lifting the area south of the fault 1 ½ miles higher than the Slick Hills side. However, about 1100 years ago, part of this fault moved up about 10–15 feet on the north side, creating a small scarp in the present topography and probably generating a large earthquake. For this reason, the Meers is famous to

Trace of the Meers Fault as it cuts NW across the Slick Hills.

neotectonic scientists. Now this fault seems to be relatively quiet, but it is being monitored by the Oklahoma Geological Survey.

Good exposures: A good public exposure is on OK 58 where an E–W section line road crosses OK 58, one mile north of the road to Meers and the location of Ann's Diner. Here, the modern Meers Fault scarp makes a small upward WNW–ESE bump in the present topography. At this intersection, if one stops on the section line road and looks northwest, one can see a notch on the skyline formed by the fault. This scarp was well studied in the 1980s by the OGS and USGS.

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Cover photo: Mount Scott

For more information on the Wichitas, visit:
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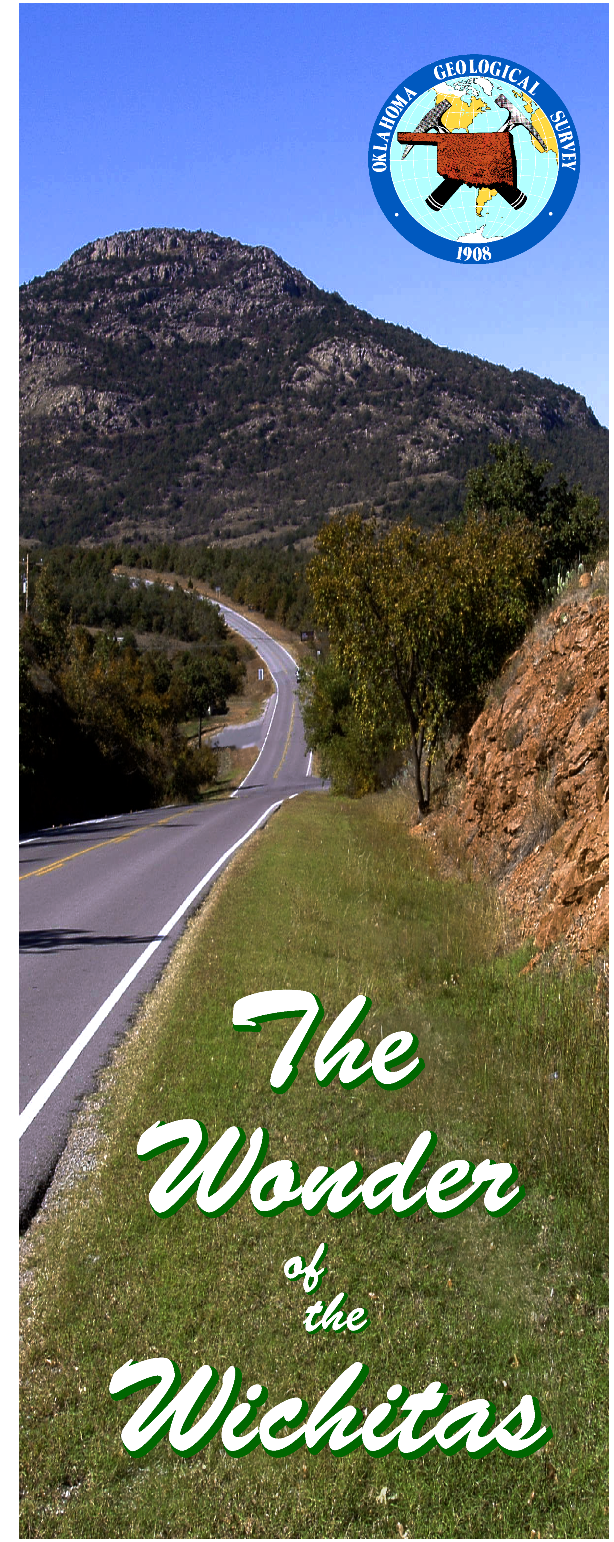


INTRODUCTION

The Wichita Mountains extend about 60 miles WNW from Fort Sill out to the town of Granite. They cover a good part of Fort Sill, all of the Wichita Mountains Wildlife Refuge, the Slick Hills (where all the wind towers are), Great Plains State Park, Quartz Mountain State Park and many areas in between. These mountains are a beautiful illustration of a “fossil” mountain range, one that existed 290–280 million years ago. This range was buried in the red shales making up the plains and is now being uncovered. So parts of the range are still buried beneath the present surface. What a geologic story can be seen and is displayed!

GEOLOGIC HISTORY

There are two groups of rocks making up the Wichitas: the older igneous, and the younger

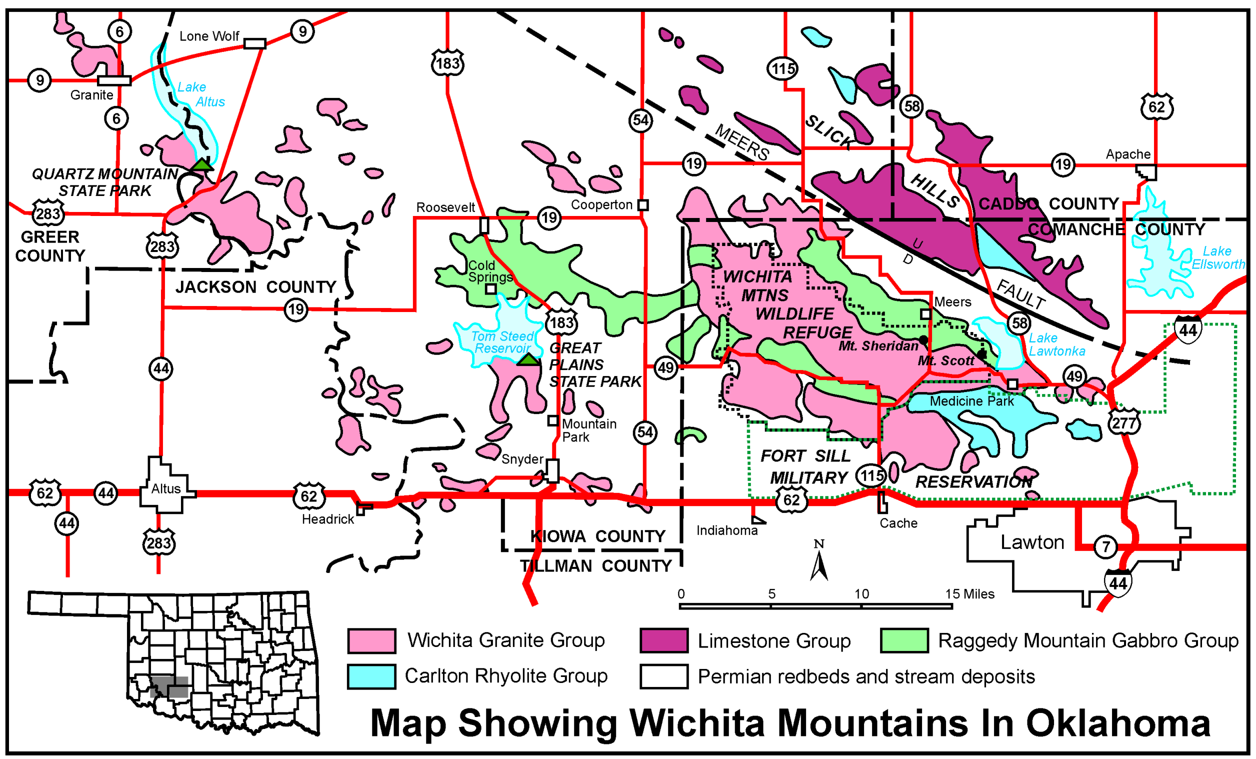
View of Baldy Point , Quartz Mountain State Park, shows the Cambrian basement rocks of the mountains and the overlying Permian strata.

sedimentary limestones. The igneous rocks, such as granites, rhyolites and gabbros, were formed from molten magmas 540–525 million years ago. These magmas came up from below and filled in a continental rift, a place where the crust was being partially pulled apart, as in the present East African Rift or the Rio Grande Rift. These rocks are a record of that part of Oklahoma’s geologic history. Good examples of these rocks are readily seen in the Wildlife Refuge.

The other major rock type is the limestone forming the Slick Hills. These sedimentary rocks formed 500–480 million years ago when the sea flooded the rifted zone and the rest of the surrounding continent. The limestones, called the Arbuckle Group because the same rock units are exposed in the Arbuckle Mountains along I-35, were formed from the shells of many tiny marine animals. The limestones sit on the igneous rocks but once also covered Mount Scott and all the igneous rocks of the Wichitas. A major fault, the Meers Fault, separates the Slick Hills from the rest of the Wichitas.

The uplifts that brought the igneous part of the rift to the surface occurred 320–300 million years ago when South America and North America collided, resulting in crustal deformation in the Appalachians and in the Ouachitas of Arkansas and SE Oklahoma. This plate tectonic collisional process also deformed the old and buried rift zone, causing the uplift of the Wichita Mountains and Arbuckle Mountains.

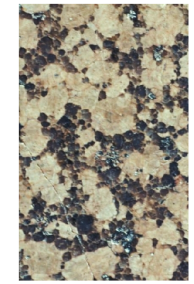
Then deep erosion of these uplifted blocks took off most of the overlying sedimentary rocks and exposed much of the older igneous rocks. The paleotopography of this erosional remnant is what we see today in the Wichitas. The Wichita landforms were preserved for us by being buried in the sediments eroding off the higher lands to the east 280–270 million years ago.



Map Showing Wichita Mountains In Oklahoma

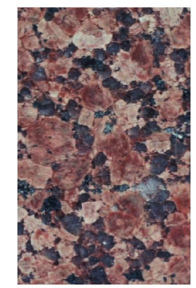
ROCK TYPES

Rhyolite – equivalent to granite in composition and mineralogy but texturally different because magma flowed out on the surface and cooled quickly. Usually buff, pink, or red. Individual crystals of feldspar and quartz can be seen by the naked eye.
Good exposures: Medicine Bluffs, Fort Sill; West end of Mt. Scott picnic area; East side of OK 58, southern Slick Hills.



Quanah Granite.

Granite – red/pink rock forming most mountains; easily seen crystals of feldspar, quartz and dark clusters of mica, hornblende, and/or magnetite. Mount Scott Granite is most widespread and fine-grained.
Good exposures: *Mount Scott Granite* (fine-grained): Top of Mount Scott; Lake Elmer Thomas dam; and Lake Tom Steed dam.
Quanah Granite (coarser-grained): Quanah Parker Lake dam; Camp Boulder; Elk Mountain.
Lugert Granite (fine-grained): Quartz Mountain Lodge area.
Reformatory Granite (coarser-grained): Quartz Mountain Park; Willis Quarry in Granite, OK and many public monuments in Oklahoma.



Reformatory Granite.

Gabbro – dark gray rock forming most of the mountains in the Roosevelt area (Glen Mountains), the Central Lowland in the Wildlife Refuge, the heavily treed slopes on the north sides of Mt. Sheridan, Mount Scott, and along OK 115 between the Refuge and Meers.
Good exposures: *Glen Mountains Layered Complex* (laminated plagioclase, a calcic feldspar, reflective pyroxene, and magnetite); along the E–W Refuge road (OK 49, extended)