# City of Rocks--New Mexico State Park series

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# City of Rocks

City of Rocks State Park, established in 1952, encompasses a square mile of scenic desert region in southern New Mexico at an elevation of 5,200 ft. Facilities include picnic units, campsites, fresh water supply, restrooms, a playground, and hiking trails. A desert botanical garden contains a wide variety of cacti and other Southwest flora. Wildlife includes owls, other native birds, and numerous desert animals and reptiles. Highlighting the scenic attractions of the park are rows of great stone blocks sculptured by nature into a fanciful representation of rows of houses crowded along narrow streets, as in a medieval village. To understand the origin of these rocks, we must trace the geologic record back to the Tertiary Period—more than 33 million years ago.

### Geology

What is now southwestern New Mexico was then undergoing one of its severest baptisms of fire by cataclysmic volcanic eruptions that spewed out glowing lava flows, masses of coarse rock fragments, and extensive blankets of *volcanic ash.* Rocks formed by compaction and consolidation of this ash are called *tuffs;* three major varieties are present in the vicinity of the park. *Ash-fall tuffs* resulted from explosive volcanic eruptions in which columns of ash and pebble-sized fragments were ejected into the air by steam and hot gases. Falling to earth (with some winnowing and wind drift), a wedge-shaped deposit of loosely consolidated tuff was laid down. *Ash-flow tuffs* are particularly significant in the origin of rocks in the park. In contrast to the brief explosive eruptions that created ash-fall tuffs, ash flows originated from extensive avalanches and clouds of incandescent particles that swept swiftly across vast areas about the volcano as a highly fluid sheet. In some instances, rocks formed by ash flows are similar to *air-fall tuffs.* In other instances however, the flows retained sufficient heat and plasticity to facilitate a high degree of compaction and welding of the particles to produce a dense, hard rock similar to that of cooled lava flows; these rocks are *welded tuffs.* The City of Rocks is a small segment of a once-extensive sheet of moderately welded tuff.

The third category, *water-laid tuffs,* is a product of the erosion and redeposition of loose air-fall and ash-flow tuffs in streams and lakes, usually resulting in thin-bedded, slabby rocks that resemble sedimentary rocks. Tuffs of this type are well exposed in stone quarries along NM-61, about 2 mi northeast of the park access road. The air-fall, ash-flow, and water-laid tuffs in this area constitute a geologic formation—the *Sugarlump Rhyolite Tuff,* which ranges in thickness from about 200 to 1,400 ft.

Welded tuffs are resistant to erosion and commonly form sheer cliffs atop slopes cut in the weaker, nonwelded tuffs and other softer rocks. The two cliff-forming layers visible in Table Mountain about 1 mi northeast of the park are examples. Another common feature is their tendency toward columnar jointing, also seen in Table Mountain and in the park. Joints are simple fracture planes along which no appreciable dislocation of the rocks has occurred. Joints commonly develop due to cooling strains following compaction and welding of the ash flow. Where two or more joint sets intersect, the rock is divided into a set of polygonal columns. The widths of the columns depend upon the spacing between the joint planes. In the City of Rocks, the jointing is widely spaced, hence the columns are broad. Once exposed to weathering by erosion of the overlying volcanic rocks that formerly covered the tuff beds, chemical and physical processes attack the tuff, penetrating readily along the joints. Probing roots of low-crowned Emory oaks find moisture and nourishment along these fractures. Chemical decomposition and physical disintegration of the walls of the joints coupled with erosion by water and wind progressively widen the joints, isolating the columns into monoliths. In massive, resistant rocks, such as the welded tuff in the park, a weathering process known as exfoliation results in spalling and scaling of thin layers along curved surfaces that lead to progressive rounding of the column, ultimately creating spheroidal forms. Notice the series of straight pathways forming the "streets" of the city—these are the courses of joints widened by erosion. Softer spots in the rock are more rapidly eroded, forming cup-shaped cavities and alcoves. The cavities provide nesting sites for kingbirds and swallows, while the alcoves provide shelter from the elements for park visitors.

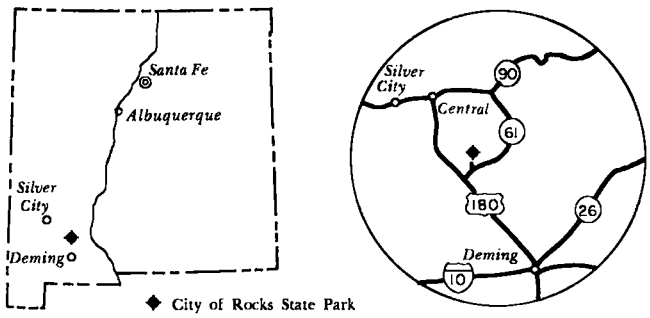
A close look at a freshly spalled surface will reveal the component minerals that distinguish a rhyolite. Although these are visible to the naked eye, a hand lens or magnifier will prove helpful. The shiny, black to bronzy crystals are hornblende. Less conspicuous because of their paler color are grayish-white grains of quartz, and the still whiter, glassy grains of sanidine and plagioclase feldspar. Although the matrix enclosing these crystals or phenoclasts is composed of fine-grained, angular particles of volcanic ash compressed and welded together, these features can be seen only under a microscope.

### Panoramic view

The panoramic diagram identifies some of the prominences on the skyline visible from the park; the more distant ones require a clear day (typical of New Mexico). Orientation may be made with reference to the north arrow or by aligning with nearby Table Mountain, a short distance to the northeast.

To the north-northeast, the prominent peak is Mimbres Peak on Whitehorse Mountain, composed entirely of volcanic rocks that include basalt, andesite, and rhyolite lava flows, breccias, and tuffs. Possibly visible on the distant skyline beyond is the crest of the Black Range, one of New Mexico's major mountain ranges.

Nearby to the northeast is Table Mountain




—with an upper and a lower cliff of welded rhyolite tuff and slopes of softer bedded rhyolite tuffs, all part of the Sugarlump Formation.

To the east is Round Mountain, composed of andesite and latite flows, breccias, and tuffs. Unseen—midway between the park and Round Mountain—is the course of the southward-flowing Mimbres River.

Cooke's Peak, a prominent landmark for early travelers, pierces the skyline to the east-southeast. The peak is a massive body of granodiorite, an intrusive igneous rock similar in appearance to granite. The granodiorite was injected as a hot, molten mass into a thick sequence of sedimentary rocks consisting of limestone, sandstone, and shale. Some of these sediments, particularly the limestones, contain fossils indicating that seas covered this region nearly 500 million years ago. Clustered about the foot of the peak are a number of small lead, zinc, and copper mines and prospect holes.

Just to the right of Cooke's Peak, and slightly more than 4 miles away, is the intrusive rhyolite dome of Taylor Mountain—at the western foot of which lies the channel of the Mimbres River.

On the horizon to the southeast are the jagged peaks of the Florida Mountains jutting abruptly upward from the flat surface of the Deming Plain. The higher peaks on the north are sculptured from volcanic tuffs and breccias overlying limestone, shale, and sandstone. The bulk of the range, however, consists of ancient igneous rocks (Precambrian) probably well over a billion years old.

Nearer, to the south-southeast, is the basalt-capped volcanic peak of Black Mountain. Volcanic peaks cluster about Grandmother Mountain to the south-southwest; farther to the southwest the highest prominence is Soldier's Farewell Hill. The old Butterfield Trail passed the foot of the poignantly named hill.

Nearly due west on the horizon is the broad crest of the Big Burro Mountains, a large uplifted fault block stripped of its former mantle of younger rocks to expose the ancient Precambrian basement complex of granite and metamorphic rocks. The pale band of mill tailings from the Hurley mill of Kennecott Copper Corporation is to the west-northwest. Here the copper ores from the Chino open-pit mine at Santa Rita are processed to yield much of New Mexico's current copper production. In the middle distance to the northwest are the volcanic Cobre Mountains overlooking the Chino mine on the north side. Beyond, on the distant skyline, is the Pinos Altos Range, also composed of volcanic rocks.

### History

The mute rocks of the park have witnessed a colorful parade of visitors down through the centuries. Among the earliest were the Mimbres Indians, inhabitants of the Mimbres River Valley area from the beginning of the Christian era to about 1250 A.D. The Mimbreños, a major branch of the Mogollon culture, lived in small villages along the stream whose clear waters irrigated fields of corn, squash, beans, and cotton. Arts and crafts flourished; most noteworthy were pottery decorated with geometric and animal figure designs unexcelled by any other group of American Indians.

During the early historic period of the Spanish conquest of the American Southwest, soldiers and priests pressed northward out of Mexico in the 1500's, but did not settle until much later. These hardy colonists began mining copper at Santa Rita in 1804 and continued for some 40 years. Mule packtrains burdened with the red metal trailed yellow ribbons of dust southward across the sandy plains enroute to the mints of Mexico, where copper was in demand for coinage.

During and after the Mexican War of 1846-1847, trails were blazed to link the newly acquired territories with eastern trade centers and the seaports of California. Among the earliest military expeditions was that of the Mormon Battalion under Captain Philip St. George Cooke, whose route westward passed but a few miles south of the City of Rocks. Cooke's name is emblazoned on landmarks of the area: a prominent mountain range, a mountain peak, and a large spring that slaked the thirst of many weary travelers. John Russell Bartlett, during his survey of the southern boundary of the United States, visited the area in May 1851 and sketched a group of columnar rocks nearby on the Mimbres River.

The Butterfield Overland Mail Route began service in 1858 and brought a stream of travelers and regular mail service across the dusty trace of Cooke's wagon road. Although service ended in 1861 because of the Civil War, the silence was soon to be broken by the sound of the bugles. Fort Cummings (from 1863-1873 and 1880-1886) was established at Cooke's Spring to protect travelers and settlers against Apache bands that roamed the countryside. Not until the mid-1880's were these elusive raiders subdued, making possible the settlement by miners, cattlemen, and homesteaders.

With the westward expansion of railroads reaching Deming in 1881, a swelling flood of settlers spread over the land. Colonel Richard Hudson, a veteran of the Civil War who came to New Mexico with the California Column, purchased a plot of homestead land with a fine mineral hot spring a few miles southwest of the park. This spring became one of the famous western resort spas; its waters were bottled and widely distributed.

With main trade centers at Silver City and Deming, mining, ranching, and farming are now the principal industries of the region. It is a land of clear skies and warm sun, crisp, cool nights, and distant horizons in which one can recapture the drama of the turbulent events of the past. □

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