Oliver Lee Memorial--New Mexico State Park series

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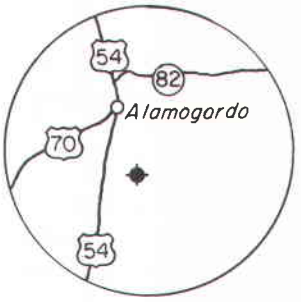
Oliver Lee Memorial

Oliver Lee Memorial State Park is located in Dog Canyon, a sharp cleft in the western escarpment of the Sacramento Mountains approximately 11 mi south-southeast of Alamogordo (15 mi via road) in Otero County. Steeped in human history, Dog Canyon is a spectacular geologic site, nurturing a spring of cool water on the edge of the desert and laced with a lush riparian vegetation along the streambed. The canyon is an apt location for a New Mexico state park.



History and scenery

Oliver M. Lee (1865–1941) was one of the prominent, respected, and picturesque pioneers in southern New Mexico. A rancher active in local and state politics, Lee was particularly able in developing water-control projects in the Otero County area. Eugene Manlove Rhodes and Albert Bacon Fall were his friends, and Pat Garret was one of his enemies. Remnants of Lee's home ranch still stand 1½ mi south-southwest of the Visitor Center at the park. He utilized the water from the Dog Canyon spring by building a ditch in 1893 from the spring to his ranch headquarters.

Many attempts were made to start a public park at Dog Canyon, but it took the political savvy of Senator Aubrey Dunn of Alamogordo to shepherd funds for construction of a state park through the 1977 State Legislature (Wimberly, Eidenbach, and Betancourt, 1979). Now a paved road from US-54 leads eastward from just south of Valmont for 4 mi to the mouth of Dog Canyon. An attractive Visitor Center with interpretive exhibits regarding the human and natural history of the area is built on the south shoulder of the alluvial fan at the mouth of the canyon. The building offers spectacular views to the west of the Tularosa Basin and to the east, upcanyon, of the limestone and dolomite cliffs of the Sacramento Mountains escarpment. Southwest of the Center are picnic shelters and camping sites. The park also has several hiking trails for the energetic.

PALEOZOIC SEQUENCE IN DOG CANYON, SOUTH-CENTRAL SACRAMENTO MOUNTAINS

About 2,000 ft of strata shown; bases of units designated are: **V**, Valmont Dolomite; **F**, Fusselman Formation; **D**, Devonian beds; **M**, Mississippian formations; and **P**, Pennsylvanian rocks. Upper sheer cliffs are Bug Scuffle Limestone Member of the Gobbler Formation.

The view to the west is of the Tularosa Basin. Shimmering white gypsum dunes of White Sands National Monument lie across the basin at the foot of the San Andres Mountains; on a windy day, a white haze of blowing gypsum sand marks that area. The prominent San Andres Mountains are about 40 mi to the west and are almost a mirror image of the Sacramento Mountains. High, jagged white peaks 50 mi southwest of Dog Canyon and south of the San Andres Mountains are the Organ Mountains—so named because of the resemblance to the vertical pipes of a church organ. On the flats of the Tularosa Basin, looking northwest from the park, is Holloman Air Force Base. And in the distance to the southwest, near the east side of the Tularosa Basin, are the low peaks of the Jarilla Mountains near Orogrande.

Eugene Manlove Rhodes' (1913) description of the Tularosa Basin is apropos, "A land of enchantment and mystery, decked with strong barbaric colors, blue and red and yellow, brown and green and gray; whose changing ebb and flow, by some potent sorcery of atmosphere, distance and angle, altered, daily, hourly; deepening, fading, combining into new and fantastic lines and shapes, to melt again as swiftly to others yet more bewildering." Thus the desert basin appears from the mouth of Dog Canyon, the sheer cliffs and cool waters of the Sacramentos showing a striking contrast.

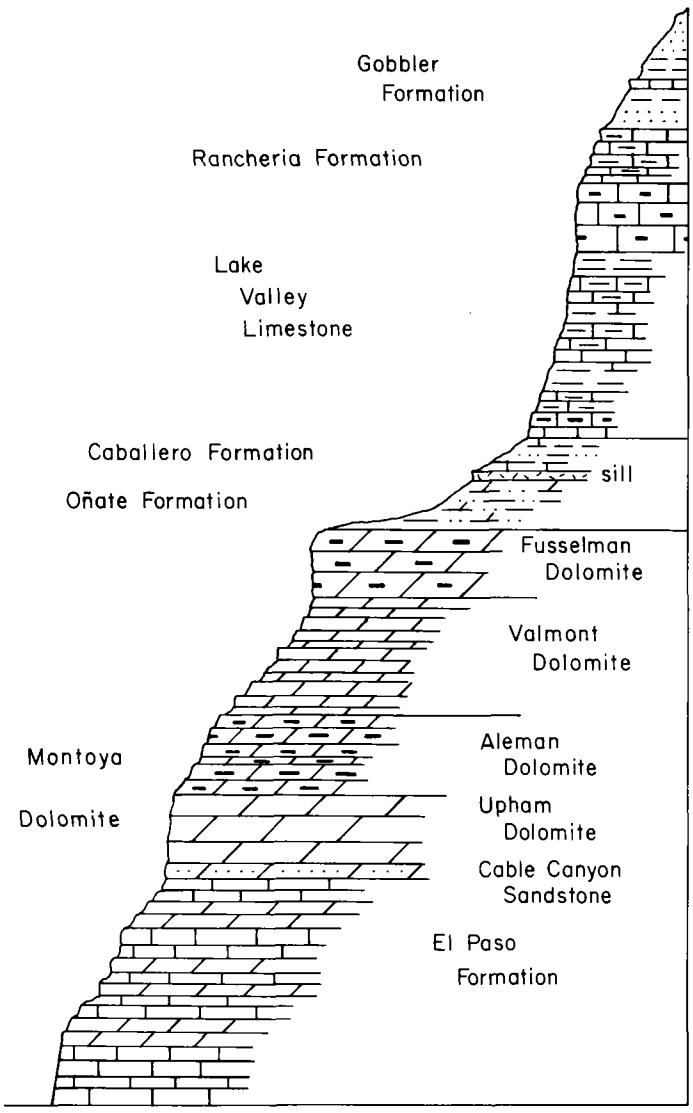
For at least 50 centuries, from the time of the Archaic period, Dog Canyon has served as an access route for human movement from the Tularosa Basin into and eastward beyond the Sacramento Mountains. In the early Historic period the canyon shelf above the spring was a stronghold for the Apaches. From 1849 to 1881, at least five engagements between the Mescalero Apaches and the U.S. Army were fought in Dog Canyon. In the early 1880's, Francois Jean Rochas ("Frenchy") settled on the south terrace overlooking the mouth of Dog Canyon; at about the same time, Oliver Lee began his ranch southwest of the canyon, near the base of the mountains' alluvial fans. The ruins of Frenchy's cabin, his extensive system of rock walls, Oliver Lee's diversion ditch, and the numerous mortar holes in boulders and rock ledges (ground into the surfaces by prehistoric users) are features of the human history of the park.

A nature trail leads up the canyon bottom from the Visitor Center, through ledges of Ordovician dolomite, to the spring. Along the trail, the plants of the three vegetation communities are labeled, the creosote group on the upper alluvial fan, the riparian plants along the streambed, and an arid shrub-and-grass community on the canyon walls and ledges. Southeast of the Visitor Center, a rocky trail leads up the ledges and low cliffs on the south side of the canyon, switchbacking for 500 vertical ft until it reaches the broad erosional bench cut on the Fusselman Dolomite. On this bench, the trail winds eastward above the lower canyon to the "back" of the box canyon and then turns northward on the "Eyebrow Trail," crossing talus slopes and cliffs in a maze of switchbacks, climbing about 1,900 ft in a ½ mi beeline to the top of Joplin Ridge which overlooks to the canyon from the north. From the ridge eastward in piñon and juniper woodlands, the trail goes to the higher but more gentle slopes of the upper Sacramento Mountains. Most of this trail is east and outside of the park in the Lincoln National Forest, but it allows access to the major part of the geologic section.

Thus the park has scenery, both desert and mountain, American Indian prehistory and history of classic western events such as Indian battles, open-range ranching and use of precious water, and the delight of a cool wet canyon on the edge of the desert. Above all, though, Oliver Lee State Park is a geologic exhibit, exposing the ribs of the earth and the contrasts of an uplifted mountain block and a downdropped basin.

Geology

Dog Canyon is just one of the rugged box canyons that drain the westfacing escarpment ☞



PROFILE AND COLUMNAR SECTION OF LOWER DOG CANYON

of the spectacular Sacramento Mountains, leading out onto alluvial fans of the Tularosa Basin. The basin is floored by Quaternary deposits with coalescing alluvial fans, generally with low gradients, extending westward from the base of the escarpment. Drainage is internal to playa lakes along the west side of the basin.

Driving from US-54 eastward to the park, the Sacramento escarpment is seen as an eroded fault scarp resulting from uplift of the mountains during Cenozoic basin-and-range faulting. Only the lower part of the stratigraphic section can be seen from the Valmont area because of the steplike erosional pattern of the Sacramentos. The Gobbler Formation (Pennsylvanian) forms the steep cliffs visible from the basin floor; east of these cliffs, the slopes and ledges of upper Pennsylvanian rocks can be seen. The overlying Permian beds are out of sight to the east.

Approaching Dog Canyon from the west, one can view Mississippian bioherms visible along the escarpment about halfway up the lower cliffs. North of Dog Canyon are two large biohermal mounds; the northernmost mound, at Muleshoe Canyon, is more than 350 ft high at its center. Post-biohermal Mississippian strata can be seen pinching out against these limestone buildups.

The spring of Dog Canyon originates from the Montoya Dolomite and is caused by rainwater seeping down fractures and flowing along bedding planes into the canyon bottom. Travertine has formed along the canyon walls at the spring, with patches of lush vegetation developed under overhanging rock walls where water trickles out of the rocks and drips through maidenhair ferns into small pools. For a short stretch the water flows over bedrock of the Montoya and El Paso formations, but westward it sinks into the sand and gravel on the canyon floor.

The Sacramento Mountains are the southern part of a north-south-trending range that extends for 80 mi in south-central New Mexico. The northern part is Sierra Blanca which rises to an altitude of 12,003 ft at Sierra Blanca Peak. That part of the range is a large Tertiary volcano and associated intrusive rocks. The southern part of the range, the Sacramentos, are the result of basin-and-range faulting and eastward tilting. To the southeast, the Sacramento Mountains gradually merge into the northern Guadalupe Mountains; to the south, the Sacramentos end abruptly in the tablelands of Otero Mesa.

The Sacramento Mountains are a cuesta, with the western part forming a steep escarpment approximately 35 mi long and standing more than 1 mi above the Tularosa Basin in some areas. The highest point on the crest of the cuesta is 9,700 ft above sea level. The escarpment rises from the basin to the crest in two steps. A precipitous slope rises from the Tularosa Basin to a broad bench at 7,000–8,000 ft above sea level. Above this, the slopes are smooth and less steep and rise 1,500–2,000 ft to the crest. The eastern side of the cuesta, the second step, slopes gently toward the Pecos River 80 mi to the east and 6,000 ft lower.

The Tularosa Basin is underlain by the same rock layers that are exposed in the Sacramento Mountains, but in many places these Paleozoic strata are beneath thick sections of Quaternary (and some Tertiary) basin-filling sediments, streamlain and lake-deposited clays, sands, silts and gravels, and gypsum beds.

Rocks exposed in the Sacramento Mountains range in age from Precambrian to Cretaceous. Precambrian rocks crop out only in limited areas in the southwesternmost part of the range, and the Cretaceous strata are in the extreme northeastern area.

The Paleozoic is represented by three major sequences. The early Ordovician through Mississippian include beds composed mainly of carbonate rocks, deposited in a broad relatively stable marine-shelf sea. Local bioherms are conspicuous in the Mississippian beds. The Pennsylvanian strata are complexly interbedded units of limestone, sandstone, and shale, primarily marine in origin, but with some deltaic units having sediments derived from the Pedernal Mountains which lie to the east. The third sequence of strata are Permian red beds and evaporites that represent a transition from nonmarine to marine deposition.

Within the park, the oldest rocks are the middle and upper parts of the El Paso Limestone (Ordovician); these crop out just east of the Visitor Center. Farther south in the Sacramentos, the Bliss Sandstone underlies the El Paso and overlies Precambrian rocks.

The El Paso Limestone is about 430 ft thick and consists of light-gray, finely to medium crystalline limestone and dolomite in thin to medium-thick beds; wavy laminae of silt and sand are common. The El Paso weathers to light-gray slopes easily distinguished from the darker cliffs of the overlying Montoya Dolomite.

The Montoya Dolomite (Ordovician) is about 200 ft thick in Dog Canyon. It consists of a lower 25 ft of dolomitic sandstone (the Cable Canyon Sandstone), a middle 75-ft cliff

(continued on p. 63)

MINING REGISTRATIONS (continued)

Date and operation	Operators and owners	Location
5-12-81 gold, silver, lead mill	Operator—Resources of America, Inc., P.O. Box 705, Socorro, NM 87801; Supt.: Ruben Valenzuela, same address; Gen. Mgr.: David W. Smith, phone: 835-3511; previously operated by U.S. Mining & Milling Corp.	Socorro Co.; secs. 5, 8, T. 5 S., R. 1 E.; 1.4 mi south of San Antonio on old Rt 85
5-15-81 uranium	Operator—The Anaconda Copper Company, Box 638, Grants, NM 87020; Person in charge: John Anderson, phone: 552-6646; Gen. Mgr.: R. D. Lynn, phone: 876-2211; Supt.: John Anderson Property owner—The Anaconda Copper Co.	Valencia Co.; secs. 2, 3, T. 10 N., R. 5 W.; Leave I-40 at Laguna Exit, west on old US-66 to NM-279, north approximately 5 mi to intersection of Anaconda shop, turn right, mine office is 300 yds from intersection; deposit: underground; private land
5-18-81 uranium	Operator—The Anaconda Copper Company, Box 638, Grants, NM 87020; Person in charge: John Anderson, phone: 552-6646; Gen. Mgr.: R. D. Lynn, phone: 876-2211 Property owner—The Anaconda Copper Co.	Valencia Co.; secs. 2, 3, T. 10 N., R. 5 W.; Leave I-40 at Laguna Exit, west on old US-66 to NM-279, north approximately 5 mi to intersection of Anaconda shop, turn right, mine office is 300 yds from intersection; deposit: underground; private land
5-20-81 gold, silver	Operator—Deadwood Golden Hillside Mining Co., 5700 N. Campbell Ave., Tucson, AZ 85718; Person in charge: Dan Larranage, Box 94, Bayard, NM, phone: 537-3262; Official: James Aspell, 5700 N. Campbell, Tucson, AZ 85718	Catron Co.; Glenwood to Mogollon, then to sign to Deadwood mine; exploration, solely to rehabilitate the Deadwood mine shaft to permit geologists of mining companies to inspect and evaluate property; private land
6-1-81 uranium	Operator—Section 13, Homestake Mining Company, P.O. Box 98, Grants, NM 87020; Person in charge: Frank J. Murray, phone: 287-2968; Gen. Mgr.: John M. Parker, phone: 287-4456; Prod. Mgr.: Gary E. Boyer; previously operated by UN-HP Property owner—SF Pac. RR	McKinley Co.; sec. 13, T. 14 N., R. 10 W.; Grants mining district, Ambrosia Lake area; deposit: underground; private land
6-1-81 uranium	Operator—Section 15, Homestake Mining Company, P.O. Box 98, Grants, NM 87020; Person in charge: Frank J. Murray, phone: 287-2968; Gen. Mgr.: John M. Parker, phone: 287-4456; Prod. Mgr.: Gary E. Boyer; previously operated by UN-HP Property owner—SF Pac. RR	McKinley Co.; sec. 15, T. 14 N., R. 10 W.; Grants mining district, Ambrosia Lake area; deposit: underground; private land
6-1-81 uranium	Operator—Section 23, Homestake Mining Company, P.O. Box 98, Grants, NM 87020; Person in charge: Frank J. Murray, phone: 287-2968; Gen. Mgr.: John M. Parker, phone: 287-4456; Prod. Mgr.: Gary E. Boyer; previously operated by UN-HP Property owner—SF Pac. RR	McKinley Co.; sec. 23, T. 14 N., R. 10 W.; Grants mining district, Ambrosia Lake area; deposit: underground; private land
6-1-81 uranium	Operator—Section 25, Homestake Mining Company, P.O. Box 98, Grants, NM 87020; Person in charge: Frank J. Murray, phone: 287-2968; Gen. Mgr.: John M. Parker, phone: 287-4456; Prod. Mgr.: Gary E. Boyer; previously operated by UN-HP Property owner—SF Pac. RR	McKinley Co.; sec. 25, T. 14 N., R. 10 W.; Grants mining district, Ambrosia Lake area; deposit: underground; private land
6-1-81 uranium	Operator—Section 32, Homestake Mining Company, P.O. Box 98, Grants, NM 87020; Person in charge: Frank J. Murray, phone: 287-2968; Gen. Mgr.: John M. Parker, phone: 287-4456; Prod. Mgr.: Gary E. Boyer; previously operated by UN-HP Property owner—SF Pac. RR	McKinley Co.; sec. 32, T. 14 N., R. 9 W.; Grants mining district, Ambrosia Lake area; deposit: underground; state land
6-1-81 mill—uranium	Operator—Homestake Mining Co. P.O. Box 98, Grants, NM 87020; Mgr. of milling: Theodore R. Beck; Gen. Mgr.: John M. Parker; Prod. Mgr.: Gary E. Boyer; previously operated by UN-HP	Valencia Co.; sec. 26, T. 12 N., R. 10 W.; Grants mining district; NM-53 N.; ores milled or refined: uranium; custom milling; capacity of mill-3,000 tons per day

(TO BE CONTINUED NEXT ISSUE)

overlying Caballero Formation, a Tertiary-age sill of greenish-gray hornblende trachyandesite porphyry is located. The hornblende crystals weather out and form conspicuous grains, up to 2 cm long, on the slope of Oñate soil.

The rest of the Paleozoic sequence is outside the park, but it is easily accessible (to strong legs and lungs) along the ridge-Eyebrow Trail. These are the Caballero, Lake Valley, and Rancheria Formations (Mississippian) and the complex Gobbler, Beeman, and Holder Formations of Pennsylvanian age. The Bug Scuffle Limestone Member of the Gobbler Formation forms the prominent sheer 600-ft cliff crossed by the Eyebrow part of the trail. Above, and mainly to the east of Joplin Ridge, are the Permian units, the Laborcita-Bursum, Abo, Yeso, and San Andres Formations.

Fossils are present in all of the marine rocks but unfortunately in the Dog Canyon area they are sparse, occurring in hard dolomites and limestones, and difficult to collect.

The El Paso and Montoya formations crop out along the nature trail in the canyon; these two units along with the strata up to the Caballero Formation crop out along the ridge trail; farther east and north on the Eyebrow part of the trail, the Mississippian and Pennsylvanian formations occur. These rocks can be seen "up-canyon" from the eastern window of the Visitor Center at the geology display.

On the north side of the canyon above the Visitor Center, a cascade of yellow-brown rocks originates from a shaft, 15 ft deep and 4 ft wide, that cuts the Montoya and upper El Paso beds. This "mine" was dug along fractures carrying limonite-strained dolomite and calcite-lined vugs. No ore minerals were seen.

The well exposed rock strata of Dog Canyon are clues to the geologic history of the region, just as the artifacts of the area tell the tales of early American Indians, Apaches, Frenchy, and Oliver Lee.

ACKNOWLEDGMENTS—Any report on geology in the Sacramento Mountains draws heavily on the classic bulletin by Pray (1961). Much of the nongeologic material is from Wimberly, Eidenbach, and Betancourt (1979). Barbara Spence helped compile the geology. Peter Green, New Mexico State Parks and Recreation Division, encouraged us to review the geology of Dog Canyon to aid in the Visitor Center displays.

Oliver Lee Memorial State Park *(continued from p. 60)*

of dark-gray massive coarsely crystalline dolomite (the Upham Dolomite), and an upper 100 ft of light to olive-gray, finely crystalline dolomite (the Aleman Dolomite) that contains numerous black chert seams and nodules.

The Late Ordovician Valmont Dolomite (or Cutter Dolomite of central New Mexico), about 150 ft thick, of light-gray weathering, finely crystalline dolomite in thin to medium-bedded ledges, lies above the Aleman Dolomite of the Montoya.

Above the Valmont is the Fusselman Dolomite (Silurian), approximately 85 ft thick, with sugary texture, and forming a resistant cliffy ledge of brownish-gray, finely crystalline dolomite with abundant chert layers and nodules. This rock unit underlies the distinctive shelf of Dog Canyon; it is the upper unit of the shelf that is about 500 ft above the Visitor Center, along the ridge trail.

The Oñate Formation (Devonian) lies unconformably above the Fusselman and is 60 ft of brownish dolomitic siltstone; it weathers to a low slope above the Fusselman. In the upper part of the Oñate, or in the lower part of the

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—Frank Kottlowski, 1981