Valley of Fires--New Mexico State Park series

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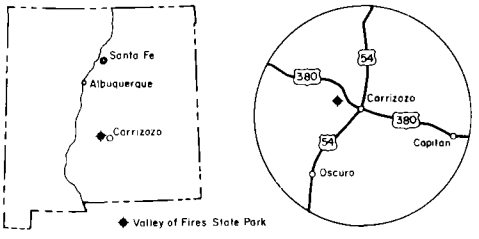
Valley of Fires



The black, fissured lava of the Carrizozo Malpais on US-380, west of Carrizozo, has fascinated travelers for many years. Because of its unusual scenic and scientific features, a 463-acre tract adjoining the highway was dedicated as the Valley of Fires State Park on May 6, 1966.

Located about 3 mi northwest of Carrizozo at an elevation of 5,250 ft, park facilities include campsites with shelters, tables, barbecue grills, playground equipment, rest rooms, and electrical hookup for trailers. Motels and restaurants are available in Carrizozo (population 1,546), the county seat of Lincoln County.

Geology

The Carrizozo Malpais is one of the youngest and best preserved lava fields in the United States. The term *malpais* (meaning "badlands"), was used by Spanish explorers and travelers in the Southwest to designate rough-surfaced lava flows that seriously obstructed travel. Even today, 4-wheel drive vehicles are no match for this terrain.

The two principal olivine basalt flows comprising the Carrizozo Malpais issued from a volcanic vent at Little Black Peak near the northern end of the Tularosa Valley. The glowing, molten lava flowed southwestward 44 mi, blanketing an area of 127 sq. mi of valley floor. In narrow segments of the valley the flows were constricted to a ribbon one-half mile wide, whereas in wider parts of the valley they spread out to a width of over 5 mi. A thickness of 162 ft was measured at one point 2 mi south of the highway. As the lava flowed down the valley, the surface crust cooled and solidified, preserving the ropy surface corrugations characteristic of *pahoehoe* (a Hawaiian term for very fluid basalt flows). Molten lava continued to flow down the valley and laterally toward the margins beneath the increasingly rigid crust that bulged locally into domelike mounds, buckled and cracked along pressure ridges, and collapsed into subcircular pits where fluid lava beneath pressure domes was withdrawn.

Eruptions of fluid lava were interrupted at least three times by explosive episodes that built conical mounds of cinders, bombs, and ash about the mouth of the volcano. The last of these explosive events created the small cinder cone composing Little Black Peak, which rises to a height of 85 ft and contains an intact crater 32 ft deep.

In time, the entire lava mass cooled and crystallized to solid rock, exhaling steam and other gases during the cooling process. These gaseous substances released during cooling left vesicles (bubble cavities) in the upper crust. Strong winds blew sand and silt into pits and crevices in the malpais surface, providing a fertile soil that now supports abundant plant life sustained by scanty rains that penetrate readily into the fractured, porous rock. Mammals, reptiles, and birds soon found shelter and sustenance here among the protective crevices and ledges.

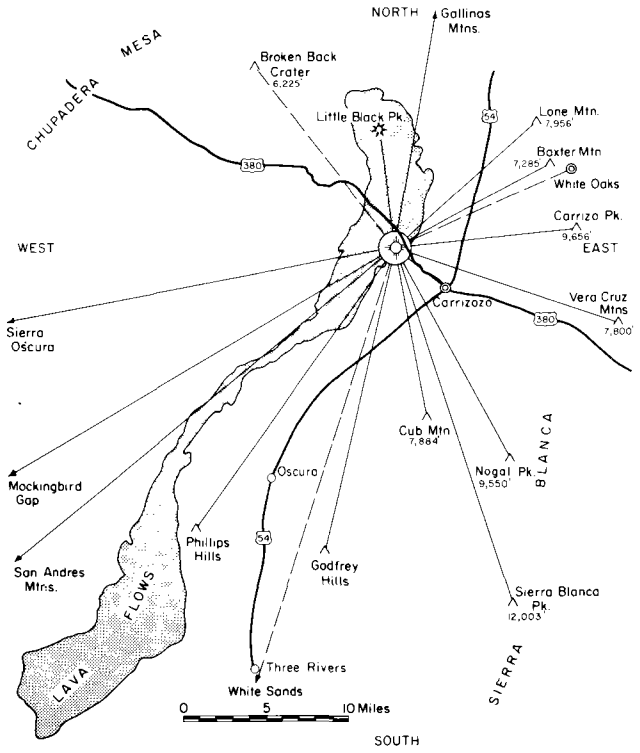
Beneath the glassy to very fine grained crust, close examination reveals the minerals composing olivine basalts. Visible to the naked eye are scattered, glassy green crystals (phenocrysts) of olivine set in an interlocking network of smaller crystals of plagioclase feldspar and minor amounts of augite too small to be recognized without a microscope.

When these volcanic eruptions took place cannot be precisely determined as yet. A search for charcoal in trees inundated by the lava flows, that would permit dating by the carbon-14 method, has been unsuccessful. Geological and archeological evidence, however, suggests an age of approximately 1,500 to 2,000 years.

Access roads and facilities at the park are situated on an "island" of older rock, a *kipuka* in Hawaiian terminology, surrounded by a "sea" of lava. The kipuka consists of a hill of Dakota Sandstone deposited along the shores of a Cretaceous sea roughly 100 m.y. ago. Weathered surfaces are stained brown by iron oxides; some of the more resistant surfaces bear a black coating of desert varnish—a mixture of iron and manganese oxides that accumulate during prolonged exposure to the weather in dry climates. Red clays of still older rocks in the Chinle Formation (Triassic age, about 200 m.y. old) are poorly exposed below the Dakota Sandstone on the western slope of the kipuka. These beds were deposited by streams on the continental land surface prior to encroachment of the Cretaceous sea. Beds of shale and sandstone also of Cretaceous age, but overlying the Dakota Sandstone (hence somewhat younger), are exposed along the eastern margin of the malpais and eastward toward the base of the mountains. Fossil shells of sea animals and beds of bituminous coal in these rocks attest to shallow seas and swampy coastal forests during the Cretaceous Period.

Plants and animals

Although geologic features are the park's chief attraction, various plants and animals native to the area also merit mention. Many plants flourish here in greater abundance and luxuriance than on the adjacent valley slopes. Because rain penetrates the porous basalt readily, there are fertile patches of soil in crevices and depressions. In addition, the black lava



PANORAMIC INDEX AT VALLEY OF FIRES STATE PARK.

surfaces absorb heat from the midday sunshine and reradiate it at night. Among the more conspicuous plants of the malpais are juniper, hackberry, algerita (hollygrape), squawbush, saltbush (chamiso), sparse clumps of desert olive and Apache plume, sotol, yuccas (2 species), beargrass, chollas (2 species), prickly pear, claret cup cactus, and various grasses. The dry, rocky soil of the kipuka supports a less luxuriant assemblage that includes stunted juniper, algerita, and mesquite; beargrass, yuccas (2 species), chollas (3 species), prickly pear, saltbush, creosote bush, Mormon tea, snakeweed, and grasses.

Among the smaller mammals are numerous rodents—mice, rats, squirrels, and rabbits. Larger mammals include the skunk, bobcat, fox, coyote, mule deer, and an occasional black bear. Mice, snakes, and lizards have developed dark-hued colorations that protect them from predators among the dark rocks. At the White Sands gypsum dunes, within a few miles of the southern tip of the lava field, these same species have adapted to the glaring whiteness of the sands by acquiring very pallid colorations.

History

Prehistoric man also found shelter here, undoubtedly collected plant foods and fiber, and hunted and trapped animals. Petroglyphs pecked and scribed into the rock surfaces along the edges of the flows, and occasional bits of pottery and spalls of stone testify to visits by Indians of the Jornada Branch of the Mogollon Culture during the period prior to 1400 A.D. The region subsequently was to become the domain of the Mescalero Apache, whose resistance to intrusions of white settlers led to establishment of nearby Fort Stanton in 1855. The vast open rangelands extending eastward across the Pecos into Texas attracted cattlemen such as John Chisum, whose brand was registered in Lincoln (then the county seat) in 1869. Amicable relationships among the ranchers were shattered in the interval from 1878 to 1881 by the Lincoln County range wars; and an early-day delinquent, William "Billy the Kid" Bonney, left his mark in the register of infamy. In the more peaceful years that followed, ranching, mining, farming, and railroading became the principal activities in the development of the area.

Panoramic view

An excellent panorama of the surrounding countryside may be seen from the rocky Dakota Sandstone hillock, where the flagpole is located (see accompanying diagram). Viewed in clockwise sequence, the following features may be seen. Slightly west of north is the cinder cone of *Little Black Peak. The Gallinas Mountains* are on the distant horizon slightly east of north. To the northeast are *Lone Mountain,* a stock or laccolith of intrusive igneous rock of Tertiary age (about 30 m.y. old), and *Baxter Mountain,* where rocks of Cretaceous age are cut by gold-bearing veins. Hidden in the adjacent canyon is the town site of *White Oaks,* now faded from its boom days of gold mining in the period from 1879 into the early 1900's, and memorialized as the setting of Emerson Hough's novel, *Hearts Desire.* South of White Oaks, the Tertiary intrusive mass of *Carrizozo Peak* juts up abruptly. Farther south are the *Vera Cruz Mountains.* To the southeast is *Carrizozo* (Spanish for "abundance of reed grass"), founded in 1905 on the El Paso & Northeastern Railroad. The high, forested mountain range south of Carrizozo is the *Sierra Blanca* (White Mountains), a thick pile of volcanic rocks (andesites) of Tertiary age (35-40 m.y. old), surmounted by *Nogal Peak* on the north (9,550 ft) and by *Sierra Blanca Peak* on the south. The Mescalero Apache Indian Reservation encircles Sierra Blanca Peak. *Cub Mountain* is the prominent peak at the western foot of the Sierra Blanca. Slightly west of south are the *Godfrey Hills,* also composed of Tertiary volcanic rocks.

Although not visible from this point, White Sands National Monument is located on the floor of the Tularosa Valley 65 mi to the south-southwest. The *Phillips Hills* are a tilted block of marine limestones and associated sedimentary rocks of Permian age (about 250 m.y. old). The *San Andres Mountains,* a tilted fault-block range, form the western border of the valley to the southwest. At the northern end of that range is *Mockingbird Gap,* famous as the test site of the first atomic bomb in 1945. The *Sierra Oscura* are the tilted fault-block range north of the gap. Eastern slopes of *Chupadera Mesa* to the northwest are obscured by the hill in the foreground on the Carrizozo dome (an anticlinal upfold), composed of limestone, dolomite, and gypsum of Permian age.

The Valley of Fires is a vivid example of some of the dynamic processes that have shaped the face of the earth. This is a region of many contrasts, ranging from cactus-studded plains to mountains verdant with pine and fir; dry arroyo beds, clear mountain brooks with trout to lure the angler; snow-covered slopes for skiing, and warm winter sun for basking. All are close at hand or within little more than an hour's drive from each other, beckoning the visitor to seek them out.

—Robert H. Weber (1971)
NM BUREAU OF MINES AND MINERAL RESOURCES

Editor's note—A nature trail through the malpais has recently been added to the park. □