1937

DEATH VALLEY

NATIONAL MONUMENT

• CALIFORNIA •



United States
Department of the Interior
National Park Service

1937

Death Valley

National Monument [*CALIFORNIA*]

OPEN ALL YEAR

✦

United States Department of the Interior

Harold L. Ickes, Secretary

NATIONAL PARK SERVICE

Arno B. Cammerer, Director



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Rules and Regulations

THE MONUMENT REGULATIONS are designed for the protection of the natural features and scenery as well as for the comfort and convenience of visitors. The following synopsis is for the general guidance of visitors, who are requested to assist the administration by observing the rules. The monuments belong to the future generations as well as the present. Help us take care of them. Complete regulations may be seen at the monument headquarters.

The disturbance, destruction, and injury of any ruins, relics, buildings, signs, or other property are prohibited.

Camps may be made at designated localities and must be kept clean. Where possible, garbage should be burned on camp fires. Place tin cans in receptacles provided for that purpose. Do not throw refuse or trash on roads, trails, or elsewhere. Carry it until you can burn in camp or deposit in receptacle.

Fires shall be lighted in designated places only, and carefully extinguished when no longer needed.

Hunting, killing, wounding, capturing, or attempting to capture any wild bird or animal in the monument is prohibited, except in cases of poisonous snakes or dangerous animals, and then only to prevent them from destroying life or inflicting injury.

Gambling in any form is prohibited.

Private notices or advertisements shall not be posted or displayed in the monument except when authorized.

Lighted matches, cigars, cigarettes, or other burning refuse shall not be thrown away unextinguished.

The penalty for the violation of any of these regulations is a fine not exceeding $500, or 6 months imprisonment, or both.

The Government is not responsible for accidents of any nature.

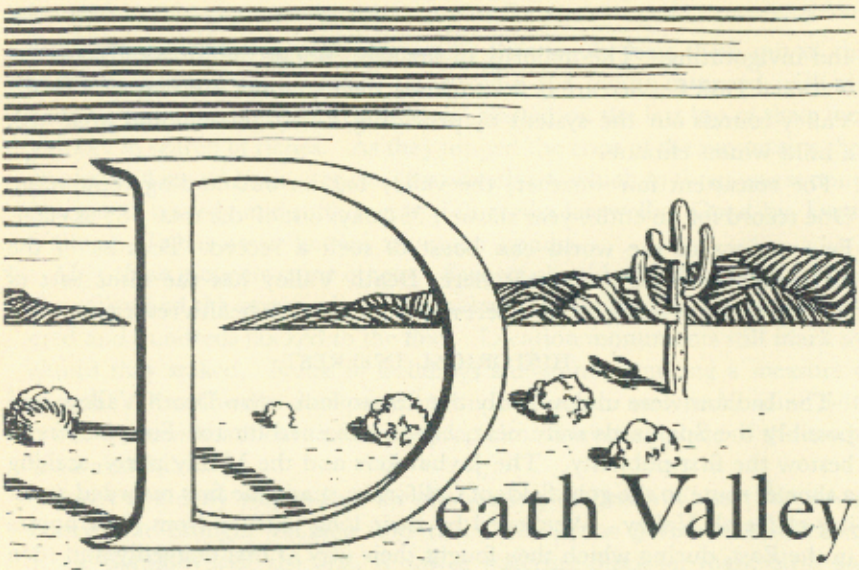
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Courtesy Santa Fe Railway.

ENTRANCE TO GOLDEN CANYON



Death Valley

NATIONAL MONUMENT

DEATH VALLEY, celebrated in history for its tragic episode in the California gold-rush drama of '49 and famed throughout the scientific world as a region of weird natural wonders, became a national monument on February 11, 1933, by Presidential proclamation.

The 2,500 square miles included in the monument embrace Death Valley itself and parts of the rough-hewn mountains that rise abruptly on all sides to guard its colorful desolation. The Amargosa River provides a natural entrance. To the west of the valley towers the Panamint Range and to the east the Amargosas, with the Last Chance Range pinching the north and the Avawatz Mountains blocking the south.

Death Valley National Monument lies in the southeastern corner of Inyo County and borders the California-Nevada boundary line. Approximately 400 square miles of the floor of the valley lie below sea level, and Badwater, 280 feet below mean tide, is the lowest point on the North American continent.

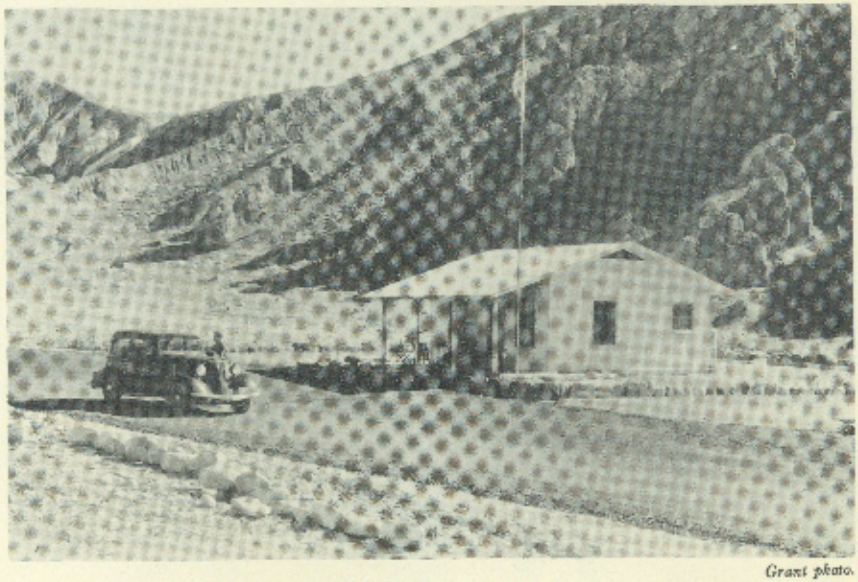
In addition to its record for low altitude, Death Valley also holds the record for high temperatures. In a standard instrument shelter at Furnace Creek a temperature of 134° F. has been recorded. Out on the salt beds, without benefit of shade, it undoubtedly is much higher. However, Death Valley is not always hot. The winter season, which begins the latter part of October, is ideal. The days are warm and sunny, the nights cool, clear,

and invigorating. The majority of the areas under the jurisdiction of the National Park Service are best known for their summer attractions. Death Valley rounds out the system by providing a vast recreational area with a mild winter climate.

For consistent fair weather, the valley has an outstanding reputation. One record for an entire year showed 351 days out of the total 365 as clear. Few regions of the world can boast of such a record. Because of the extreme dryness of the atmosphere, Death Valley has the same sort of climate that has made other desert regions famous as health resorts.

HISTORICAL INTEREST

The Indians were undoubtedly the first to look upon Death Valley, and possibly the Spaniards were next, but it remained for the Forty-niners to bestow the first publicity. The Jayhawkers and the Manly party, seeking a shorter route to the gold fields of California, made the first recorded crossing of Death Valley. Weakened by their long journey from their homes in the East, during which they fought their way at first doggedly and then despairingly, blazing their trail with abandoned equipment and bleaching bones, they ventured into Death Valley to find their way shut off by the towering Panamints. The Manly party, camping in the vicinity of Bennett Wells, named for one of its members, sent two of their number ahead



Grant photo.

CHECKING STATION AT THE ENTRANCE TO THE MONUMENT

to seek a route through the mountains that would lead them out of this valley of despair. After many weary days the scouts returned with the necessary information and the pioneers started on the last lap of their long journey in search of riches. As they topped the crest of the mountains they paused and gazed back over the vast wasteland, which to them was synonymous with tragedy and suffering, and uttered a farewell: "Good-by, Death Valley." It has never known any other name.

After these pioneers came others. Seekers of gold paused and prospected the valley and the surrounding mountains. Precious minerals were uncovered and hundreds flocked to the find. Location monuments still mark the claims they staked. Ruins of buildings still stand, marking a measure of success. Occasionally elongated mounds of earth and rock, some with crude wooden headboards, silently proclaim the resting place of those who tried and failed.

Borax is chiefly responsible for the taming of Death Valley, for it was borax that brought in men and their families as permanent residents. Eagle Borax Works, the first, is now a watering place for man, bird, and beast. The Harmony Borax Works, with a few adobe cabins surrounding it, bears mute testimony to the activity that once flourished there.

The abandoned mining towns of Leadfield and Skidoo lend color to the history of the region.

Nearby are other ghost towns such as Rhyolite, Bullfrog, Panamint City, Wildrose, and Ballarat.

The mining operations and scattered buildings made but small marks upon Death Valley and the surrounding region enclosed in the national monument. It is today much as it was when white men first saw it. The visitor can see without the exercise of imagination the grim and forbidding barrier that demanded and collected toll from the early travelers. Though the danger is held in check today by easy and rapid transportation, the threat remains, and unless the visitor is familiar with and prepared for desert travel he is advised to stay on the main roads.

COLORFUL SCENERY

The Death Valley country is often favorably compared with the Grand Canyon and justly so. From such points as Dante's View, Chloride Cliffs, and Aguerberry Point the panoramas unfolded before the awe-inspired visitor are characterized by blazing color. From Dante's View at an elevation of approximately 5,600 feet one looks down at the glistening white salt beds of the Badwater region that are below sea level. Across the crystallized floor of Death Valley, the eye sweeps up the red and purple



Courtesy Santa Fe Railway.

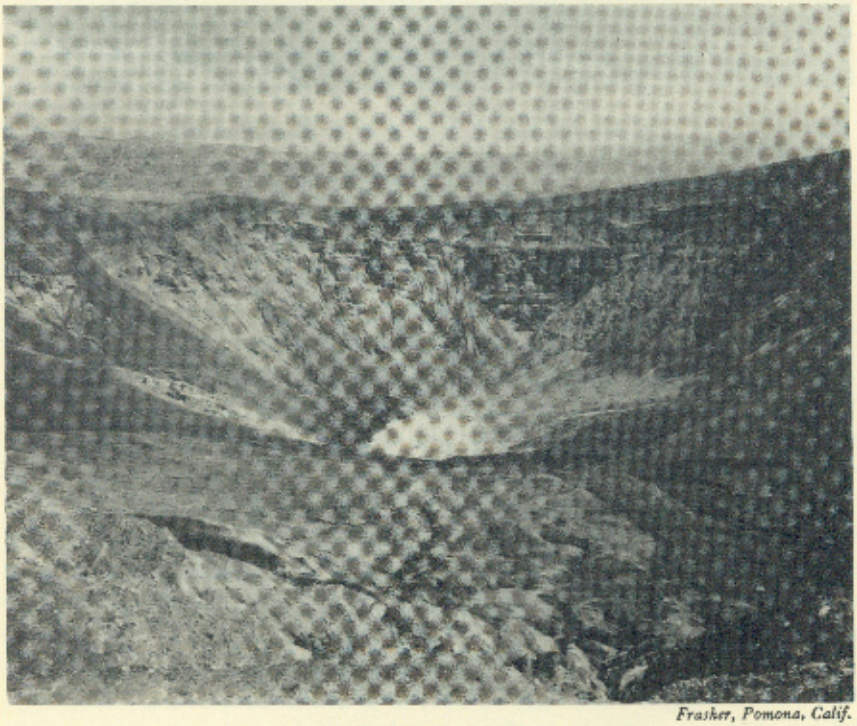
DEATH VALLEY FROM ZABRISKIE POINT

slopes of the Panamints to the summit of Telescope Peak, a majestic elevation of 11,045 feet. Shift the gaze to the north and just over the crest of this range to where Mount Whitney thrusts its rugged head into the sky a distance of 14,495 feet. Here, within sight of each other, are the highest and lowest points in the United States proper.

Ubehebe Crater is the chief natural attraction in the northern part of Death Valley. A car may be driven to its rim where the crater, shaped like a huge funnel, yawns at the skies. The bottom is 780 feet below the rim.

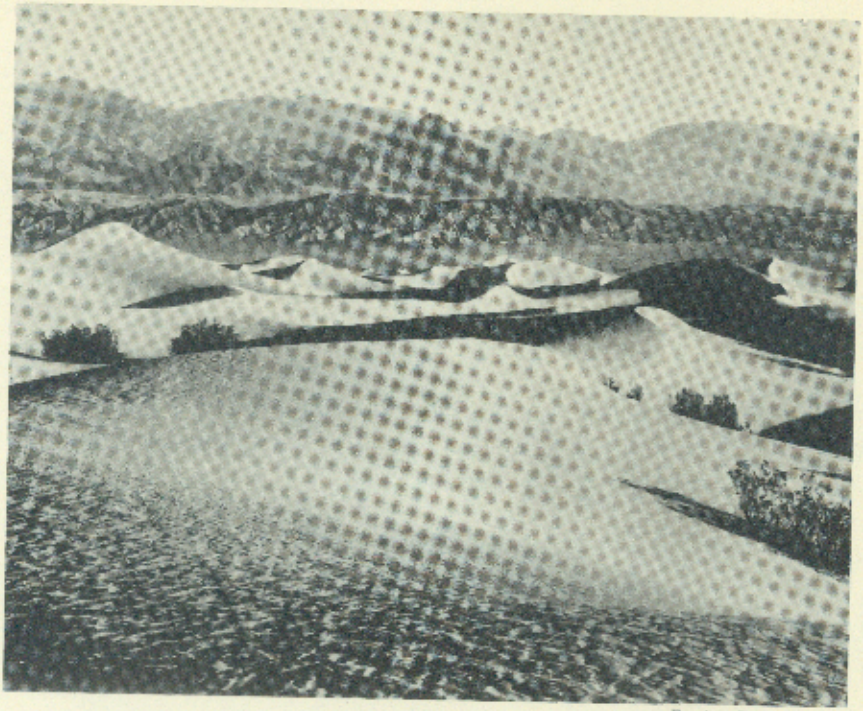
Titus Canyon, entered from the east side of the Grapevine Mountains through Leadfield, is a one-way canyon with an extremely narrow floor. Traffic is not permitted UP this canyon. The walls rise sheer for hundreds of feet and colors run riot. Designs in contrasting shades and forms support the belief of the imaginative that Mother Nature was in a playful mood when she carved this winding canyon.

The Devils Golf Course, lying south of Furnace Creek, is an expanse of salt, crystallized into weird and fantastic shapes varying from an inch to



Frasher, Pomona, Calif.

UBEHEBE CRATER



Frasher, Pomona, Calif.

SAND DUNES FROM STOVEPIPE WELLS

more than 3 feet in height. These dwarfed and twisted pinnacles cover the area so closely that a flat space large enough to lay one's hat cannot be found. The salt is not just thin surface strata, but is known to attain a depth of more than a thousand feet. This area is well named, for only the Devil could play golf on such a course.

The sand dunes, while not unusual in desert country, are nevertheless a notable attraction. Occupying some 60 square miles of the center of the valley near Stovepipe Wells, their surfaces rippled and their contours gracefully curved and rounded by the whimsical winds, they present an ever-changing picture of beauty.

Badwater, lowest point in America, is an open pool of alkaline water on the eastern side of the valley, 17 miles south of Furnace Creek. It is the terminal of the Amargosa River. Amargosa is Spanish for "bitter." Much of the water in the Death Valley region is either too salty or too alkaline to drink.

Mosaic Canyon opens into Death Valley from the Panamint Range and is so named because the surface of many of its conglomerate rocks, smoothed by the action of water, looks like a very beautiful mosaic.



ONE OF THE TWENTY-MULE BORAX TEAMS USED IN DEATH VALLEY IN THE 80'S

There are far too many natural wonders in Death Valley to describe them all, even briefly. The valley is a strange and beautiful land, enhanced by sudden, colorful sunrises and smoldering sunsets. Everywhere one looks, a colorful fantasy greets the eye. The color chart ranges from brilliant reds, greens, yellows, and all the intermediate tints to somber black.

GEOLOGICAL STORY

An investigation of the geology of Death Valley by the United States Geological Survey is now in progress, and the following information about this picturesque region was furnished by L. F. Noble, who is carrying out the work for the Government.

The Death Valley region contains rocks of all the great divisions of geologic time—Archean, Algonkian, Paleozoic, Mesozoic, Tertiary, and Quarternary—but earth movements in the area have been so profound and so recurrent that the rock masses form a complex mosaic of crustal blocks isolated one from another by folding, faulting, tilting, erosion, and burial under alluvium. Consequently the sequence is not complete at any one locality and can be pieced together only by examining many different parts of the area. If the strata were pieced together and restored bed above bed to the altitude in which they were deposited originally their aggregate thickness would exceed 40,000 feet.

The oldest rocks to be seen are of Archean age and are among the oldest known on earth. These are chiefly schists and gneisses but include bodies of limestone and quartzite and have all been recrystallized by heat and pressure so that they contain no recognizable traces of life. They greatly resemble the Archean rocks that make the Granite Gorge in the bottom of the Grand Canyon. They may be seen best from the road that follows the base of the steep mountain wall along the east side of Death Valley from Badwater southward. At many places above the road the mountain slopes are composed of them through a vertical distance of over 5,000 feet.

The next older group of rocks is of Algonkian age and is separated from the underlying Archean and from the overlying Paleozoic rocks by great breaks called unconformities that represent long periods of erosion. The Algonkian rocks consist of limestones, slates, and quartzites that in places contain bodies of dark volcanic rocks now altered to greenstones. They are interesting for their odd coloring and conspicuous banding and for deposits of talc that they contain along the contacts of greenstone and limestone. Some limestone beds contain remains of primitive plants (algae). In many of these respects they resemble the Algonkian strata in

the bottom of the Grand Canyon. Exposures may be seen in the mountain front just south of Ashford Mill by following the road along the east side of Death Valley.

FOSSILS INDICATE MARINE LIFE

The Paleozoic rocks, which are younger than either of the groups described above, consist chiefly of limestones and quartzites. Their dominant color is somber gray, but a broad zebra-like banding renders many sets of beds conspicuous from great distances, as for example in Pyramid Peak, visible from the Furnace Creek Road. Most of the great rock systems of the Paleozoic are represented at one place or another in the monument. Many strata contain fossil remains of sea animals whose existence proves that the Paleozoic rocks were deposited beneath the sea. The most abundant fossils in the Lower and Middle Cambrian beds are trilobites; in the Ordovician beds, gastropods; in the Devonian, corals; and in the Carboniferous, crinoids. A good view of the Paleozoic rocks may be had from many places on the road between Death Valley Junction and Furnace Creek Inn, where they form all the slopes of the Funeral Mountains several miles north of the road. Echo, Boundary, Titus, Cottonwood, Mosaic, Grotto, Trail, Hanaupah, and upper Warm Springs Canyons, all reached or traversed by roads, are eroded in Paleozoic rocks.

The Mesozoic era is represented only by granite, a rock which broke through the Paleozoic and older rocks in a molten state. A large body of this granite is exposed about the head of Cottonwood Canyon but is not accessible by road.

The Tertiary rocks were deposited across the upturned and eroded edges of all the older rock systems just described and, next to the Quarternary deposits, are the least disturbed and altered rocks in the area, but even they have been profoundly disturbed, as one may see along the road down the valley of Furnace Creek, which is bordered by them. They include large amounts of volcanic rock such as lava, tuff, and ash, as well as shale, limestone, sandstone, and conglomerate. Much of the volcanic rock is rhyolite and andesite; some of it is basalt. The rhyolites and rhyolite tuffs are particularly conspicuous for their coloring, exhibiting all shades of red, pink, yellow, green, and white. The basalts are black. The shales were deposited as mud and clay in intermittent lakes like those which exist in the region now; the sandstones and conglomerates were deposited as sand and gravel on alluvial fans like those which exist today. The basins of deposition probably resembled basins like the present Death Valley trough, but so completely has the region been wrecked by earth movements since

the beds were deposited that no trace of the Tertiary basins is preserved in the present topography. The only fossil remains of animal life that have been found in the Tertiary beds are those of a Titanotherium, a large mammal distantly related to the rhinoceros. The remains, which include a skull 3 feet long, were found in red sandstones on the Julian road grade near Leadfield. They are believed to be of early Oligocene age. The relation of the fossil-bearing red sandstones to the other Tertiary formations in the region is not yet known, but it is believed that many Tertiary beds elsewhere in the monument are of Miocene and Pliocene age. The Tertiary rocks are interesting for their weird and in places brilliant colors, and for the deposits of boron minerals (popularly called borax), salt, gypsum, and celestite which they contain. They are widely but irregularly distributed through the region, lying indifferently upon the mountain ranges and in the valley troughs. They are readily accessible by road at many places. The road from Furnace Creek Inn to Dantes View lies through the largest area of them in the monument, an area which extends southward from the Funeral Mountains to and far beyond Dantes View. The road is bordered by Tertiary rocks all the way to Dantes View, where the kiosk at the viewpoint stands upon Tertiary rhyolite; not far under the rhyolite, Archean gneiss forms all the precipitous slope to Death Valley. Many canyons in the Tertiary area just described are accessible by road, among them Gower Gulch, 20-Mule Team Canyon, Golden Canyon, Volcanic Drive, and a canyon north of Badwater which contains a natural bridge carved in Tertiary conglomerate by erosion. The most strikingly colored rocks, however, are to be seen by taking the road down the east side of Death Valley from Furnace Creek and following the road called Artists Drive. The coloring in the rocks along Artists Drive is not equaled anywhere in the monument.

The Quaternary or youngest deposits of Death Valley include all the alluvial fans and the salt and clay deposits in the bottom of the valley. The alluvial fans are built up of rock material (boulders, sand, and clay) eroded from the mountain slopes and swept down the canyons by intermittent floods until the material is spread out with even slope from the canyon mouths into the valley trough. So obvious is the process in Death Valley that the most casual observer can picture the fans ultimately filling up the valley trough and creeping up the canyons until the mountains are finally buried under the products of their own decay. The fans on the west side of the deeper part of Death Valley are in striking contrast with those on the east side, as one may see in traveling over the roads along the sides of the valley. The fans on the west side are great sloping plains of coarse boulder

gravel that extend several miles out from the Panamint Mountain front and rise as much as 2,000 feet between the salt flat and the mouths of the canyons. The fans on the east side of the valley south of Badwater are in comparison mere tiny dumps of boulders spilled out on the salt flat at the base of the steep Black Mountain wall. This tremendous contrast in size of the fans on opposite sides of the valley is significant in a study of the origin of the valley. The extreme youth of the fans on the east side suggests that the precipitous mountain slope back of them marks a break in the earth's crust, called a fault, along which the valley has sunk so recently that the newly-born fans have just begun to grow. At some places, as may be seen from the road, the fan gravels are broken by small scarps which face Death Valley—features which suggest that the faulting is still going on. Small fault scarps on alluvial fans may be seen in other parts of Death Valley, as, for example, at a point on the road down the east side of the valley about a mile south of Furnace Creek Inn. The scarp lies just east of the road and runs some distance parallel with it. On the west side of the valley a prominent scarp on the Hanaupah Canyon fan is crossed by the road leading to Hanaupah Canyon.

The deposit of rock salt (Devils Golf Course) on the floor of Death Valley represents the saline residue of an evaporated lake. A well 1,000 feet deep drilled in the rock salt on the road across the Devils Golf Course went through alternating beds of clay and salt without reaching bedrock, from which it is evident that the rock floor of the valley at this place must lie more than 1,250 feet below sea level. Each pair of salt and clay beds probably represents the drying up of a lake, the uppermost representing the latest. Sets of faint terraces here and there, as at Mormon Point and on a hill of black basalt which rises above the west valley road a mile northwest of Ashford Mill, may mark the shores of this lake. At the stage marked by the highest shore line the lake must have been 100 miles long and 600 feet deep. The Ubehebe Craters in the northern part of Death Valley include some cinder cones of very late Quaternary (recent) age which may not be more than a few hundred years old.

HOW WAS THE VALLEY FORMED?

Structural studies of Death Valley are incomplete, but it is known that Death Valley and the bordering mountain ranges owe their existence primarily to fracturing and dislocation of the earth's crust and not, like the Grand Canyon, to stream erosion. It also is evident that the region has undergone many periods of profound disturbance, including folding and faulting, from earliest to most recent times. Long periods of erosion have



Frasher, Pomona, Calif.

SALT POOL IN THE LOWEST AREA IN THE UNITED STATES

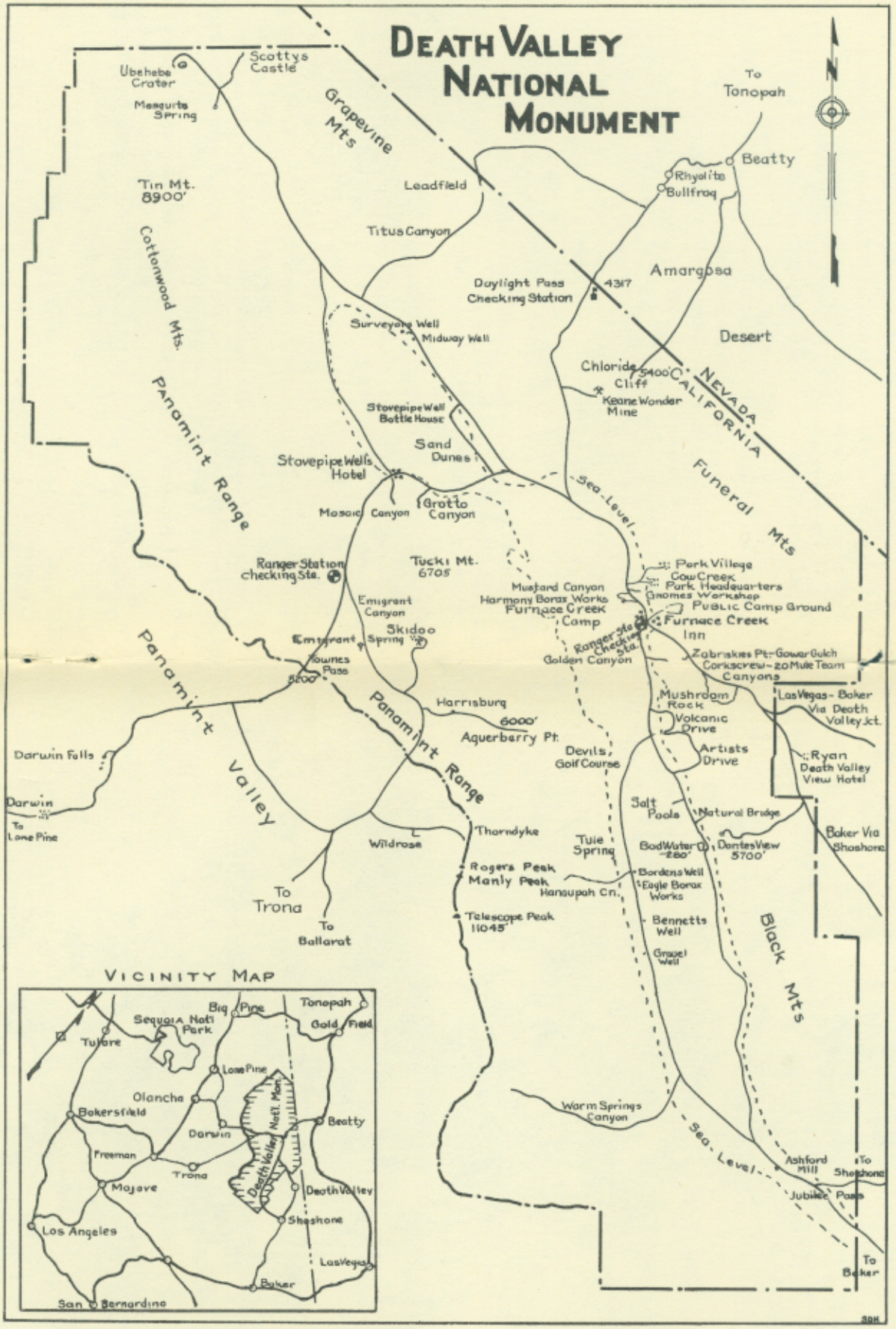
intervened between successive disturbances. Different parts of Death Valley even have had a different structural history. The story is far too long and complex to present here.

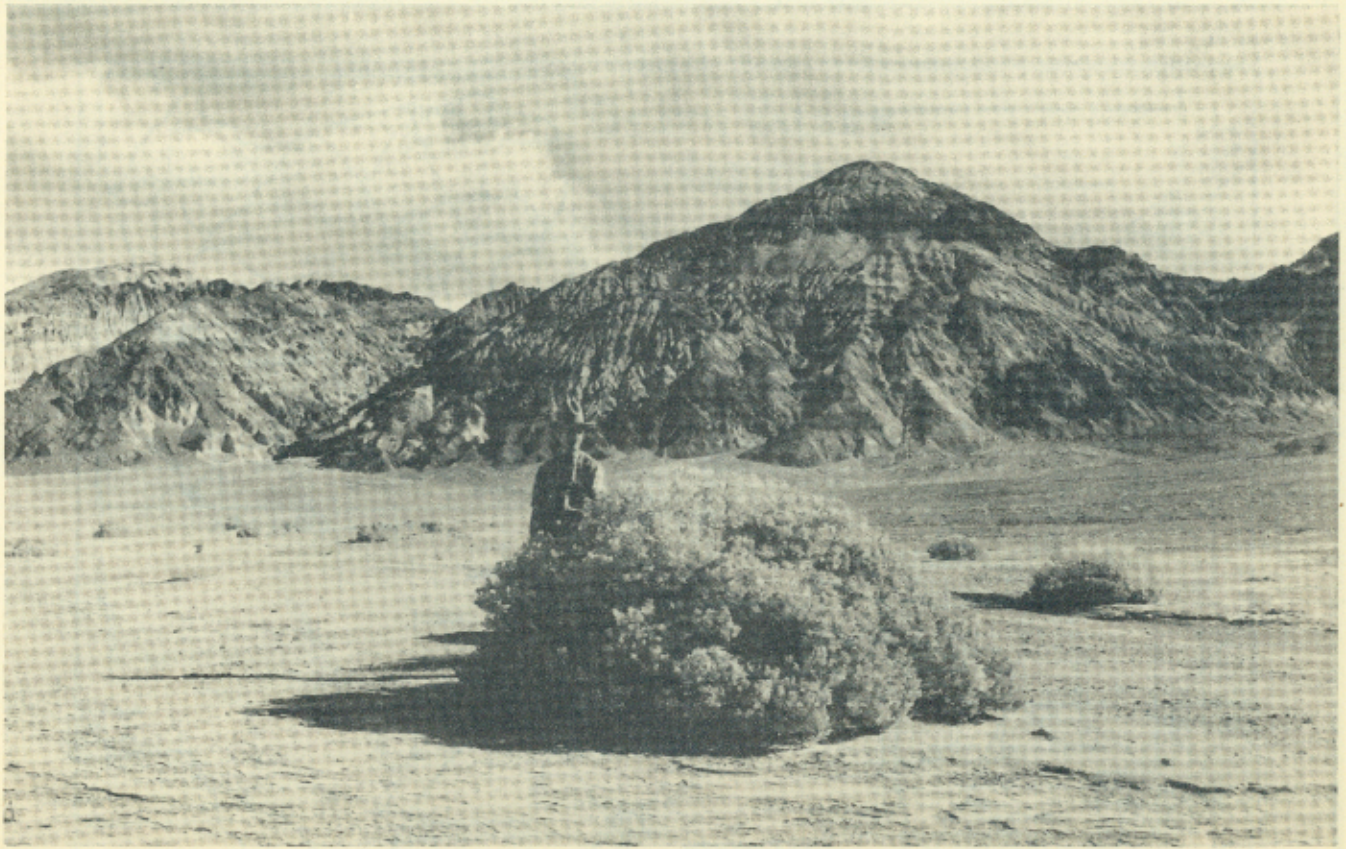
The deep part of Death Valley that lies between the Panamint and Black Mountains is a trough formed originally by faulting and now being filled up by alluvial-fan material washed from the mountains. The age of the trough is not definitely known because no fossils have yet been found in the sedimentary beds involved in the faulting, but it is believed that the trough was formed in late Tertiary or early Quaternary time and that it is an older topographic feature than the Grand Canyon. The precipitous face of the Black Mountains east of the valley marks the major line of faulting upon which the trough has sunk. It has been battered considerably by erosion but is still one of the freshest and most spectacular examples of a fault scarp in the United States. The fault is not a single, continuous straight break but is a complex zone of intersecting faults some of which run parallel with Death Valley and some of which run into the mountain range. Hence the pattern of the mountain front is irregular in detail. The planes of many of the faults are curiously curved or warped on a huge scale, usually steepening as they approach Death Valley. The most recent faults lie directly at the base of the mountain front and as a rule are nearly vertical.

The road along the east side of Death Valley south of Furnace Creek runs the length of the great fault scarp and affords a magnificent opportunity to examine the faulting. For 15 miles south of Furnace Creek the faults involve only Tertiary rocks, as may be well seen from Artists Drive. South of this area the long precipitous slopes of Archean gneiss in the mountain front, although deeply ripped by erosion gullies, outline roughly the planes of faults. Three miles north of Badwater a fault between Tertiary and Archean rocks is clearly exposed for many thousands of feet where it runs upward into the mountain mass, and the fault plane is seen to be continuous with the long steep slope of Archean gneiss south of the fault. This fault may be reached by walking to it from the road leading to the natural bridge. Another fault which exhibits almost identical features may be seen just east of Copper Canyon fan, where the Tertiary beds that occupy the Copper Canyon Amphitheater are faulted against Archean gneiss.

ANIMAL LIFE

Life in surprising abundance is found below sea level. Desert coyote, kit fox, wild cat, and Mexican badger are to be seen by the careful observer. The Nelson bighorn, still found in the mountains, has been known to visit the valley floor. The smaller mammals of the region are the jack rabbits,


DEATH VALLEY NATIONAL MONUMENT
Ubehebe Crater
Scottys Castle
Mesquite Spring
Grapevine Mts
To Tonopah
Beatty
Rhyolite
Bullfrog
Tin Mt. 8900'
Leadfield
Titus Canyon
Cottonwood Mts.
Amargosa
Desert
Daylight Pass Checking Station
4317
Surveyors Well
Midway Well
Chloride Cliff 5400'
NEVADA
CALIFORNIA
Keane Wonder Mine
Stovepipe Well Bottle House
Panamint Range
Sand Dunes
Stovepipe Wells Hotel
Sea Level
Funeral Mts
Mosaic Canyon
Grotto Canyon
Ranger Station checking Sta.
Tucki Mt. 6705
Park Village
Cow Creek
Park Headquarters
Gnomes Workshop
Public Camp Ground
Mustard Canyon
Harmony Borax Works
Furnace Creek Camp
Furnace Creek Inn
Emigrant Canyon
Emigrant Spring
Skidoo
Ranger Sta. Checking Sta.
Golden Canyon
Zabriskies Pt-Gower Gulch
Corkscrew-20 Mule Team Canyons
Townes Pass 5200'
Mushroom Rock
Las Vegas - Baker Via Death Valley Jct.
Harrisburg
6000'
Volcanic Drive
Aguerberry Pt
Artists Drive
Devils Golf Course
Ryan Death Valley View Hotel
Darwin Falls
Darwin
To Lone Pine
Salt Pools
Natural Bridge
Baker Via Shoshone
Thorndyke
Wildrose
Tule Spring
Bad Water -280'
Dantes View 5700'
Rogers Peak
Manly Peak
Hanaupah Cn.
Bordens Well
Eagle Borax Works
To Trona
To Ballarat
Telescope Peak 11045'
Bennetts Well
Gravel Well
Black Mts
Warm Springs Canyon
Sea Level
Ashford Mill
To Shoshone
Jubilee Pass
To Baker
VICINITY MAP
Big Pine
Tonopah
Sequoia Natl Park
Gold Field
Tulare
Lone Pine
Olancha
Bakersfield
Death Valley Natl. Mon.
Darwin
Beatty
Freeman
Trona
Mojave
Death Valley
Shoshone
Los Angeles
Las Vegas
Baker
San Bernardino



Frasher, Pomona, Calif.

DESERTHOLLY

Arizona cottontail, two species of ground squirrels, the kangaroo rat, wood or trade rat, several smaller rodents, and six varieties of bats. Among the permanent bird residents of the valley are the road runner, prairie falcon, raven, LeConte thrasher, burrowing owl, and the rock wren. The winter bird visitors are several species of ducks and geeese, a number of the wading birds, hawks, and owls. Of the smaller migrants there are warblers, sparrows, blackbirds, flycatchers, bluebirds, doves, and robins. The horned toad and chuckwalla, interesting lizards, are rarely seen because of their protective coloring.

Strangely enough, there are fish in Death Valley. At Salt Creek and Saratoga Springs one may see the small "desert sardine", so called locally because the only other known name is *Cyprinodon macularius*, in reality a small killifish. It is a "relict" fish—all that is left of the once abundant ichthyological life of the great inland sea that is now Death Valley.

PLANTS OF DEATH VALLEY [1]

Within the present watershed of Death Valley, exclusive of the Amargosa Valley, have been found 528 species of wild plants. Over most of the area trees are wanting, the ground having a scattered covering of drought-resistant shrubs interspersed with a smaller number of herbaceous perennials, and after unusual winter and spring rains a large variety of annuals, some of them of great beauty, which spring up, bloom, produce their seeds, and, with the coming of summer, die and blow away, leaving their seeds to germinate after the favoring rains of some later year.

TREES

The mesquite (Prosopis glandulosa) occurs in abundance in situations near the bottom of the valley where its roots can reach ground water. The screwbean (Strombocarpa pubescens) is often found growing with the mesquite. On the Death Valley slope of the Panamint Mountains occur at successively higher elevations, beginning at about 5,000 feet, Utah juniper (Juniperus utahensis), singleleaf pinyon (Pinus monophylla), curlleaf mountain-mahogany (Cercocarpus ledifolius), Rocky Mountain maple (Acer glabrum), western juniper (Juniperus occidentalis), limber pine (Pinus flexilis), and bristlecone pine (P. aristata). Two other trees, of weird appearance suggestive of great antiquity, the Joshua-tree (Yucca brevifolia) and the Mohave yucca (Y. mohavensis), occur as rarities in Death Valley, the Mohave yucca near the upper end of Cave Springs Wash and the Joshua-tree in the upper part of Grapevine Canyon.

[1] Furnished by Dr. Frederick V. Colville of the U. S. Bureau of Plant Industry.

SHRUBS

Among the curious shrubs of the valley are the desertholly (Atriplex hymenelytra), which has leaves shaped like those of holly but light gray or sometimes pinkish in color, and which bears no berries; covillea (Covillea tridentata), bright green in color, but its twigs and leaves varnished and resistant to the extreme heat and dryness of the valley; sprucebush (Peucephyllum schottii), also bright green, and frequent as a tree-shaped bush in the gravelly beds of canyons; stingbush (Eucnide urens) with pale yellow flowers 2 inches long, and leaves and stems armed with stinging and barbed hairs; paper-bag-bush (Salazaria mexicana), with inflated calyxes which blow about the desert, scattering the ripe seeds; greenleaf desert-beauty (Parosela johnsoni), covered at flowering time with deep violet-blue, pea-shaped flowers; the brittlebushes, species of Encelia, with sunflower blooms and white, brittle stems; desert cassia (Cassia armata), a seemingly leafless shrub blooming as a golden mass of sweet-scented flowers; sweet-bush (Bebbia juncea aspera), a rounded canyon bush with straight, apparently leafless stems terminating in a yellow flower head, like an aster without its rays, delicately fragrant; the beautiful Death Valley sage (Salvia funerea), secluded in shaded but dry canyons, the stems and the small, spine-tipped leaves white, the slender flowers blue, and the fruiting calyxes resembling miniature powder puffs.

Rockmat (Petrophytum caespitosum), a curious shrub related to spirea, known in Death Valley in but two places, at an elevation of some 8,000 feet in the Panamints, forms mats of extremely slow growth, sometimes 4 feet in diameter, tightly pressed to the limestone, its gray-green leaves not rising more than an inch above the rock and the soil that accumulates about it.

Death Valley has four species of ephedra, curious leafless, jointed shrubs, one of them (Ephedra funerea) only recently described as new. The ephedras have a local reputation for medicinal virtues, which is unsupported by scientific tests but which has given rise to the local names desert-tea and Mormon-tea.

CACTUSES

Eleven species of cactus are known from Death Valley. Some of them are common, like the cylindrical-stemmed strawtop cactus (Opuntia echinocarpa); the cottontop cactus (Echinocactus polycephalus), with several to many big spiny heads giving off cotton at the top where animals have been digging out the edible black seeds; the flat-jointed, spineless beavertail cactus (Opuntia basilaris); and the calico cactus (Echinocereus engelmanni), with cylindrical stems and many-colored spines. Among the rarer species



A DESERT SENTINEL

are the Mohave mound-cactus (Echinocereus mojavensis), with scarlet flowers and often more than a hundred stems in a single cushion, which grows at middle elevations in the Panamints; beehive cactus (Ferocactus johnsoni) a single-headed species almost completely covered with straight or only slightly curved red spines; Mohave pricklypear (Opuntia mojavensis), a prostrate species with large, erect, spiny joints and yellow flowers, known in Death Valley only from Hanaupah Canyon; diamond cactus (Opuntia ramosissima) an erect plant with cylindrical branchlets about a quarter of an inch in diameter and with diamond-shaped stem markings; corkseed cactus (Phellosperma tetrancistrum), a small usually single-headed cactus, fully covered with white spines in rosettes, from the center of each of which project one or more purplish spines three-quarters inch or less in length, with hooked tips, the seeds provided with a corky appendage nearly as large as the body of the seed itself; and polly-anns-sister (Sclerocactus polyancistrus), a nearly spherical, single-headed plant a few inches in diameter with a much thinner covering of white radial spines, and with sometimes as many as six red-purple hooked spines coming from each rosette. The grizzly cactus (Opuntia erinacea) is a common species in the Panamint Mountains among the pinyons, and has small pads, most of them rising from the ground, red flowers, and slender, weak, almost hairlike white spines, often 3 to 5 inches in length.

Of the six species of lupine native in Death Valley, one, sagebrush lupine (Lupinus excubitus), is a shrub. It is of frequent occurrence in the Panamint Mountains from about 4,000 to 8,500 feet, grows to a height of 2 to 4 feet, and has long erect racemes of pale blue, sweet-scented flowers. Another species, princess lupine (Lupinus magnificus), is a perennial with densely white-wooly leaves from which rise a flower stalk and raceme having a combined length, sometimes, of 3 feet. The flowers are pink. This species occurs on both slopes of Wildrose summit, the divide between Wildrose Canyon and Hanaupah Canyon, Panamint Mountains. One of the several annual species is yellow-eye lupine (Lupinus rubens), found in Echo Canyon and Boundary Canyon, which has deep violet-blue flowers with a bright yellow spot in the banner, the yellow spot changing to black as the flower fades.

HERBACEOUS PERENNIALS

Among the perennial herbaceous plants of Death Valley are wetleaf (Boerhavia annulata), with begonialike leaves which are always wet, even under the burning heat and dryness of the gravel washes on which it grows; bearpoppy (Arctomecon merriami), with white, crapelike flowers and

bluish foliage bearing long, coarse, white hairs sometimes seven-eighths of an inch in length; honeysweet (Tidestromia oblongifolia), white-woolly, much branched, with minute, buckwheat-scented, yellowish flowers blooming in the autumn; turtleback (Psathyrotes ramosissima), a low, gray-leaved, turpentine-scented, round-topped plant of the aster family, broader than high; wishboneplant (Hesperonia retrorsa), a white-flowered plant of the four-o'clock family, the wide-branching, dead, and whitened stems of which look like a succession of wishbones; deserttrumpet (Eriogonum inflatum), with smooth, branching, hollow stems, swollen below the joints, which when dead and broken from winter exposure stand forth like ghostly trumpets; scarlet loco (Astragalus coccineus), with white-woolly, pinnate leaves, white-hairy pods, and scarlet, pea-shaped flowers 1½ to nearly 2 inches long, a rare and beautiful plant on limestone slopes in several canyons of the Panamints; desert mariposa (Calochortus kennedyi), with large, tulip-shaped, orange-scarlet flowers; and rocklady (Maurandya petrophila), tufted, in limestone rocks, having soft, nearly oribicular leaves with raggedly cut margins, and pale yellow flowers more than an inch in length, one of the rarest of plants, known in Titus Canyon and nowhere else in the world.

ANNUALS

In the year of unusually heavy winter and spring rains in Death Valley, such as the nearly 2½ inches of rainfall from October 1 to March 1, 1934–35, there is a brilliant show of annual plants in spring. Among these the evening-primroses are conspicuous, especially the very sweet-scented golden evening-primrose (Oenothera brevipes) and the brown-eyed evening-primrose (O. clavaeformis), with white flowers with a Morocco-red center, and slightly sweet-scented. Nine species of evening-primrose are known from Death Valley, including the perennial, yellow-flowered heart-leaf evening-primrose (O. cardiophylla), which has a simple heart-shaped leaf blade without additional leaflets, and the perennial, tufted silver moonrose (O. marginata), which has large, white, sweet-scented flowers sometimes 3 inches in diameter.

The spring annuals in Death Valley include several species of curly-bloom (Phacelia), with blue, violet, purple, lavender, and even white flowers. Eleven species of this genus are known from Death Valley.

Other annuals of the valley include evening-snow (Linanthus dichotomus), the white flowers of which open just at dusk; whisperingbells (Emmenanthe penduliflora), whose half-dry yellow corollas rustle in the wind; Chinese-lantern (Eremalche rotundifolia), with globe-shaped pink corollas

marked by a dark red spot on the inside at the base of each of the five petals; bird-in-the-bush (Adenostegia cremica), which grows at Wild-rose summit, a small, branching plant in which the upper part of each flower resembles the head and beak of a bird; and goldcarpet (Phyllogonum luteolum), one of the rarest plants in the world, discovered in Furnace Creek Canyon by the Death Valley Expedition, 1891, found again by S. B. Parish in 1915, by Willis L. Jepson in 1917, and by M. French Gilman in 1935, always one, or two, or a few plants only, and known nowhere outside of Death Valley, a branching annual, lying flat on the ground, with three yellowish-green, rounded, stalked leaves at each joint of the yellowish-green stems, and clusters of minute yellow flowers with a six-cleft calyx.

The genus Eschscholtzia, to which belongs the California-poppy, the State flower of California, is represented in Death Valley by the desert goldpoppy (E. glyptosperma), with petals about half an inch to nearly an inch in length, and the little goldpoppy (E. minutiflora) with petals sometimes only an eighth of an inch long.

SALT-TOLERANT PLANTS

In the bottom of the valley are such concentrations of salt and alkali that no plants can live there. At first covillea and other shrubs of the uplands give way to species of saltbush (Atriplex) and to bush seepweed (Dondia ramosissima), and these, with increasing alkali, yield to tussocks of alkali sacaton (Sporobolus airoides) a coarse but highly nutritious grass, and of Cooper rush (Juncus cooperi), with areas of arrowweed (Pluchea sericea) and of desert saltgrass (Distichlis stricta), and finally picklebush (Allenrolfea occidentalis), the plant that is more resistant than any other to salt and alkali.

Near old Stovepipe Wells, curious stacks, sometimes more than 12 feet high, have been built up with salty sand lodged among the lower dead branches of clumps of arrowweed, the upper branches projecting, alive and green, from the summit of the stack. These arrowweed stacks constitute the "devil's cornfield" of the old prospectors.

PLANTS USED BY THE INDIANS

The Panamint Indians who originally inhabited Death Valley, and some of whom still live there, cultivated no food plants but they ate the roasted seeds of many wild plants, such as pinyon (Pinus monophylla), Indian ricegrass (Oryzopsis hymenoides), cottontop cactus, the ephedras, golden evening-primrose, the species of stickleaf (Mentzelia), and greenleaf

desertbeauty. They made bread from the ground pods of mesquite. The new joints of the beavertail cactus were eaten roasted, or dried and boiled. They collected and ate a sugar deposited on the leaves of the reed (Phragmites communis) by an insect. They ate the roasted stem tips of the Joshua-tree, taken just before the flower clusters pushed out from the leaves.

The Panamint Indians made bows of Utah juniper, arrows of reed and willow, and rabbit nets and bowstrings of the fiber of hemp dogbane (Apocynum cannabinum). They made many kinds of baskets, for everyday use and for ceremonial purposes, using withes of willow and of lemonade sumac (Rhus trilobata), black patterns made from the tough horns of the unicornplant (Martynia), and red patterns from the roots of the Joshua-tree. In early times they made some of the most exquisitely beautiful baskets of any tribe of American Indians, extracting at great labor and using as one of the finest materials the interior tough cylinder of the rootstock of the prairie bulrush (Scirpus paludosus).

ADAPTATIONS TO HEAT AND DROUGHT

The most extraordinary thing about Death Valley plants is the strange provisions by which the upland shrubs keep alive through the burning heat and dryness of Death Valley summers. They reduce the evaporation of moisture from their surface in many ways; by having no leaves, as in all the cactuses except Opuntia; leaves reduced to scales, as in Ephedra; very small leaves, as in sweetbush; leaves that drop off with the heat of summer, as in Opuntia and Cassia; leaves that are varnished, as in Covillea; leaves with a dense covering of hairs, as in the saltbushes, Death Valley sage, and many others. Many of the shrubs have two or three of these adaptations combined.

Some of the cactuses, such as the strawtop cactus, have a very large root system spread out close to the surface of the ground, by means of which they take up water quickly, after even a light rain, and store it in their stems for very slow use during months of no rainfall.

Most of the desert shrubs have long, deep roots which enable them to pull from the cooler, moister soil far below the surface sufficient water to keep them alive through the severest drought. In a vertical wall of gravel exposed by a cloudburst and local torrent in a Death Valley arroyo in 1931, a saltbush 26 inches high had its roots laid bare to a depth of 14 feet 5 inches, and at this point one of the roots, five-eighths of an inch in diameter, disappeared in the gravel wall, penetrating to further unknown depths.



Frasher, Pomona, Calif.

CACTUS GARDEN AT SCOTTY'S CASTLE



Frasher, Pomona, Calif.

AN INDIAN RESIDENT OF DEATH VALLEY

DEATH VALLEY SCOTTY'S CASTLE

Scotty's Castle is the most impressive example of man's handiwork to be found in the Death Valley region. Located near the mouth of Grapevine Canyon and built by Walter Scott, ex-cowboy of Buffalo Bill fame, and his partner, A. M. Johnson, the castle is an unforgettable sight. Nestled against the dark sun-baked hills, with massive gates blocking the bridge that gives entrance to the grounds over the wash, it has the appearance of a medieval stronghold guarded by its moat and portcullis. All that is lacking is the drawbridge. Of concrete construction in Provincial Spanish architecture, with towers and gardens, pools and plazas, it is as fantastic as the country around it.



Courtesy Santa Fe Railway

PALM GARDENS AT FURNACE CREEK INN

ACCOMMODATIONS

FURNACE CREEK INN

Open November 1 to May 1.—This hostelry, located in the northern part of the monument where Furnace Creek Wash spreads out into Death Valley proper, offers up-to-date accommodations and has a swimming pool, solarium, tennis courts, and golf course. Horseback riding facilities also are available. Rates are $7.50 a day and up, American plan. There is a fine airplane landing field less than half a mile from the inn. The air trip from Los Angeles to this field can be made in less than 2 hours.

FURNACE CREEK RANCH

Open September 1 to May 31—Emergency accommodations June 1 to August 31.—At the ranch, located about a mile from the inn, there is almost every type of cabin, from those containing the simplest of sleeping accommodations to those with de luxe housekeeping quarters. Rates are $2 a day and up, European plan. An excellent restaurant and camp store is operated in conjunction with the ranch.

STOVEPIPE WELLS HOTEL

Open November 20 to May 1.—This charming desert caravansary is situated on the western side of the valley close to the famous sand dunes. In addition to hotel accommodations there are a number of attractive cabins; also a restaurant, gas station, and an interesting desert museum. Rates range from $4 a day and up, American plan, and $1.50 a day and up, European plan.

AMARGOSA HOTEL (OUTSIDE THE MONUMENT)

Open all year.—Located at Death Valley Junction, this hotel offers a wide range of accommodations with prices ranging from $2.50 a day and up, European plan. There is an excellent store, gas station, and service garage; also telephone and telegraph facilities and a post office at this point.

DEATH VALLEY VIEW HOTEL (OUTSIDE THE MONUMENT)

Open December 20 to April 20.—This hostelry is located at the old mining town of Ryan, 14 miles from Furnace Creek Checking Station. There is a restaurant operated in conjunction with it. The famous "Baby Gauge" Railroad through the old borax workings operates out of Ryan. Rates are from $3 a day and up, European plan.

All the aforementioned accommodations are operated on private property, and the National Park Service exercises no control over them.

PUBLIC CAMPGROUNDS

The National Park Service, which began the development of Death Valley National Monument for the use of visitors in the fall of 1933, has provided sanitary public campgrounds near Furnace Creek and at Stovepipe Wells, Mesquite Springs, and Bennett Wells, where travelers carrying their own equipment can make themselves very comfortable. Additional campgrounds are under construction.

The establishment of Civilian Conservation Corps camps in the valley greatly expedited the development of this desert region for the safe use of visitors. In addition to providing free campgrounds, rapid progress is being made in building roads and trails and providing a system of wells to insure a water supply adequate for safe travel over the regular road and trail system. Good signs point to these watering places. Death Valley is perhaps the best watered region in the Mojave.

HOW TO REACH DEATH VALLEY

Good desert roads, well signed, lead into Death Valley National Monument from all directions, and the road system within the area is being rapidly improved and extended. Automobile travelers are directed to enter by one of the following routes:

By United States Highway No. 66 to Barstow, thence United States Highway No. 91 (Arrowhead Trail) to Baker, thence north on a good oiled road through Shoshone and Death Valley Junction to Death Valley at Furnace Creek. The driving time to Furnace Creek from Los Angeles by this route is from 7 to 8 hours.

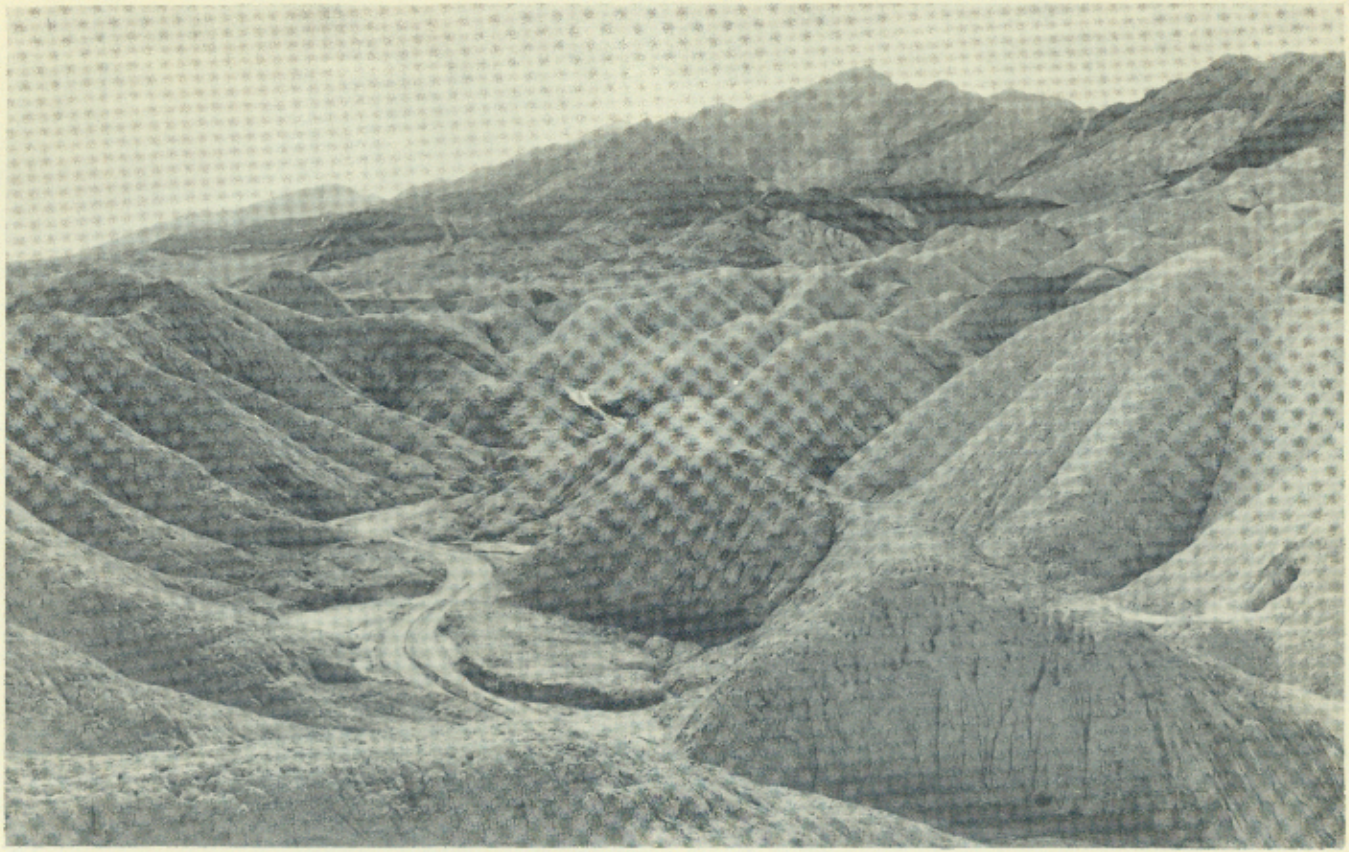
From the vicinity of Bakersfield: Over either Walker Pass or Tehachapi Pass and into Owens Valley. Leave the Owens Valley Road at Olancha or Lone Pine, and go to Darwin and over Towne's Pass into the valley. The driving time from Los Angeles to Stovepipe Wells Hotel is from 7 to 8 hours.

From the east on United States Highway No. 91 to Las Vegas, thence by Indian Springs to Death Valley Junction and on into the valley; or on United States Highway No. 50, south from Ely, Nev., to Beatty, thence over Daylight Pass and down Boundary Canyon to the valley.

Service stations are to be found en route, but it is wise for the automobile traveler to carry reserve supplies of gasoline, oil, and water, particularly if leaving the main highway.

Airports are located near Furnace Creek Inn and Stovepipe Wells Hotel.

The Union Pacific Railroad provides passenger service three times weekly from Crucero, Calif., to Death Valley Junction, and there stage service may be arranged.



Frasher, Pomona, Calif.

CORKSCREW CANYON, FUNERAL MOUNTAINS

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LITERATURE CONCERNING NATIONAL PARKS

Booklets about the national parks listed below may be obtained free of charge by writing to the Director, National Park Service, Washington, D. C.

Acadia, Maine.
Carlsbad Caverns, N. Mex.
Crater Lake, Oreg.
General Grant, Calif.
Glacier, Mont.
Grand Canyon, Ariz.
Grand Teton, Wyo.
Great Smoky Mountains, N. C.-Tenn.
Hawaii, Hawaii.
Hot Springs, Ark.
Lassen, Calif.
Mesa Verde, Colo.
Mount McKinley, Alaska.
Mount Rainier, Wash.
Platt, Okla.
Rocky Mountain, Colo.
Sequoia, Calif.
Wind Cave, S. Dak.
Yellowstone, Wyo.-Mont.-Idaho.
Yosemite, Calif.
Zion and Bryce Canyon, Utah.

DO YOU KNOW YOUR NATIONAL PARKS?

ACADIA, MAINE.—Combination of mountain and seacoast scenery. Established 1919; 24.08 square miles.

BRYCE CANYON, UTAH.—Canyons filled with exquisitely colored pinnacles. Established 1928; 55.06 square miles.

CARLSBAD CAVERNS, N. MEX.—Beautifully decorated limestone caverns believed largest in the world. Established 1930; 15.56 square miles.

CRATER LAKE, OREG.—Astonishingly beautiful lake in crater of extinct volcano. Established 1902; 250.52 square miles.

GENERAL GRANT, CALIF.—Celebrated General Grant Tree and grove of Big Trees. Established 1890; 3.96 square miles.

GLACIER, MONT.—Unsurpassed alpine scenery; 200 lakes; 60 glaciers. Established 1910; 1,533.88 square miles.

GRAND CANYON, ARIZ.—World's greatest example of erosion. Established 1919; 1,009.08 square miles.

GRAND TETON, WYO.—Most spectacular portion of Teton Mountains. Established 1929; 150 square miles.

GREAT SMOKY MOUNTAINS, N. C.-TENN.—Massive mountain uplift covered with magnificent forests. Established for protection 1930; 617.76 square miles.

HAWAII: ISLANDS OF HAWAII AND MAUI.—Interesting volcanic areas, including Kilauea, famous for frequent spectacular outbursts. Established 1916; 245 square miles.

HOT SPRINGS, ARK.—Forty-seven hot springs reserved by the Federal Government in 1832 to prevent exploitation of waters. Made national park in 1921; 1.58 square miles.

LASSEN VOLCANIC, CALIF.—Only recently active volcano in continental United States. Established 1916; 163.32 square miles.

MAMMOTH CAVE, KY.—Interesting caverns, including spectacular onyx cave formation. Established for protection 1936; 38.34 square miles.

MESA VERDE, COLO.—Most notable cliff dwellings in United States. Established 1906; 80.21 square miles.

MOUNT McKINLEY, ALASKA.—Highest mountain in North America. Established 1917; 3,030.46 square miles.

MOUNT RAINIER, WASH.—Largest accessible single-peak glacier system. Third highest mountain in United States outside Alaska. Established 1899; 377.78 square miles.

PLATT, OKLA.—Sulphur and other springs. Established 1902; 1.33 square miles.

ROCKY MOUNTAIN, COLO.—Peaks from 11,000 to 14,255 feet in heart of Rockies. Established 1915; 405.33 square miles.

SEQUOIA, CALIF.—General Sherman, largest and perhaps oldest tree in the world; outstanding groves of Sequoia gigantea. Established 1890; 604 square miles.

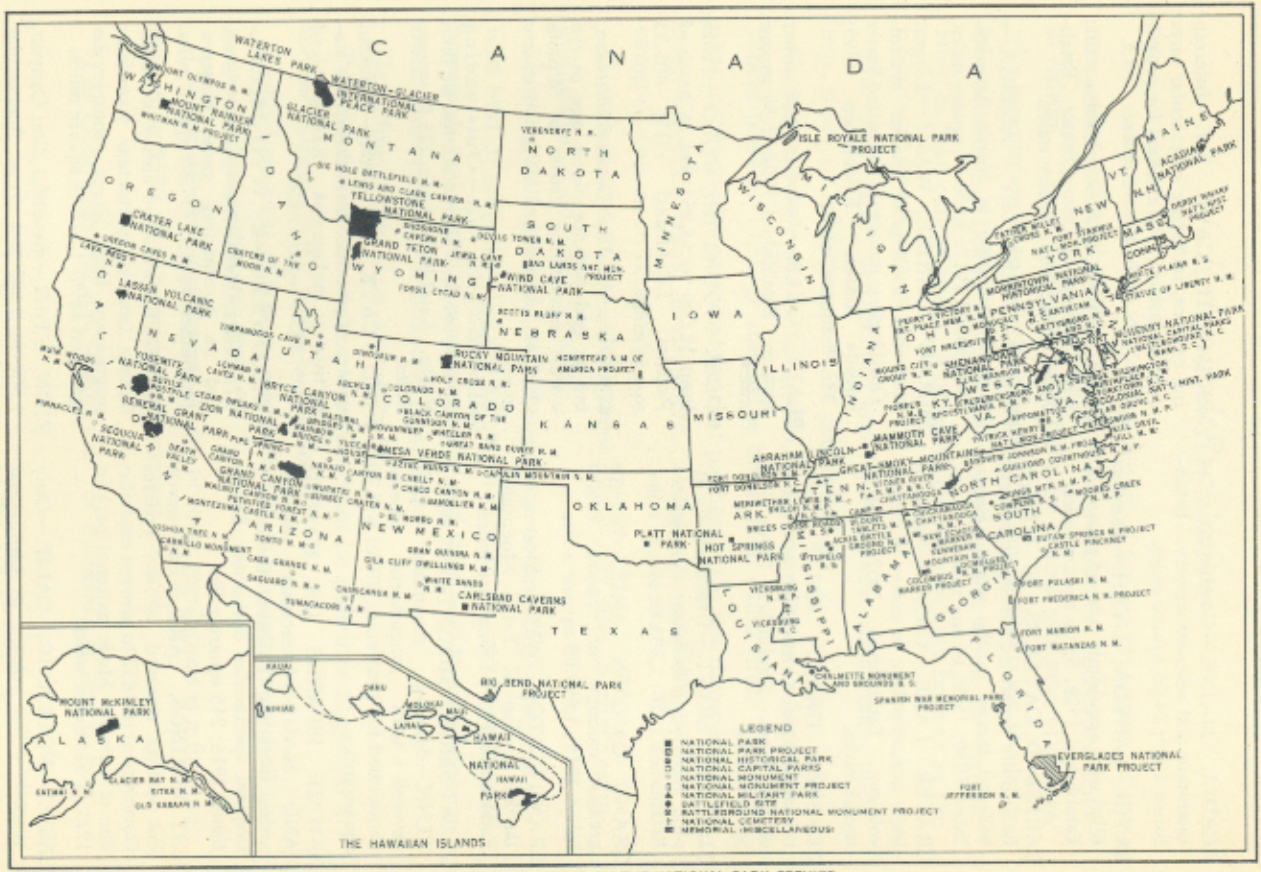
SHENANDOAH, VA.—Outstanding scenic area in Virginia section of Blue Ridge. Established 1935; 275.81 square miles.

WIND CAVE, S. DAK.—Beautiful cavern of peculiar formations. No stalactites or stalagmites. Established 1903; 18.47 square miles.

YELLOWSTONE: WYO.-MONT.-IDAHO.—World's greatest geyser area, and an outstanding game preserve. Established 1872; 3,437.88 square miles.

YOSEMITE, CALIF.—Valley of world-famous beauty; spectacular waterfalls; magnificent High Sierra country. Established 1890; 1,176.16 square miles.

ZION, UTAH.—Beautiful Zion Canyon, 1,500 to 2,500 feet deep. Spectacular coloring. Established 1919; 148.26 square miles.



AREAS ADMINISTERED BY THE NATIONAL PARK SERVICE