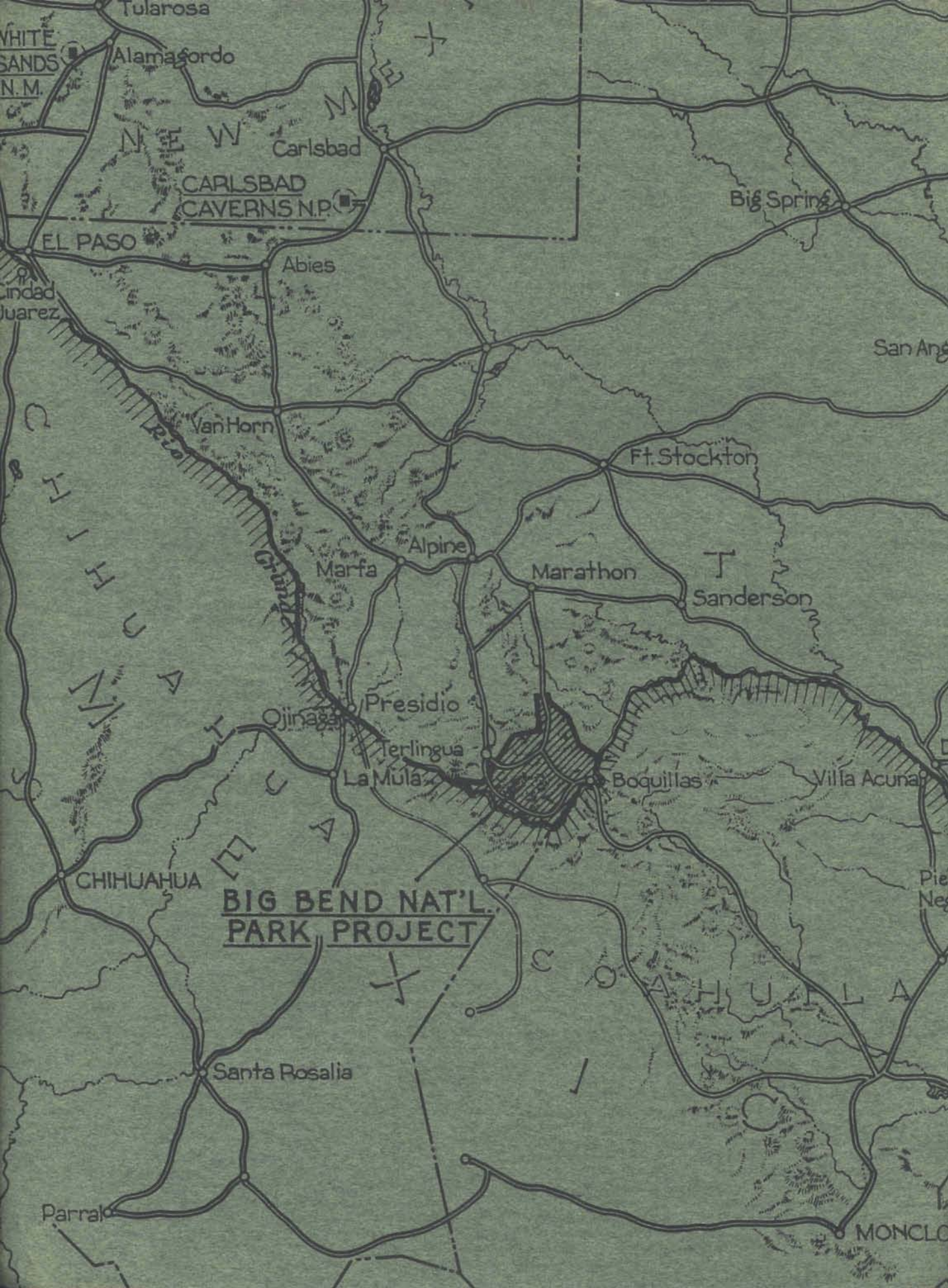




THE
BIG BEND NATIONAL PARK PROJECT
TEXAS



WHITE SANDS N.M.

Tularosa

Alamogordo

Carlsbad

CARLSBAD CAVERNS N.P.

Big Spring

EL PASO

Abies

Van Horn

Ft. Stockton

Marathon

Sanderson

Alpine

Marfa

Presidio

Ojinaga

Terlingua

La Mula

Boquillas

Villa Acuna

CHIHUAHUA

Santa Rosalia

Parral

MONCLO

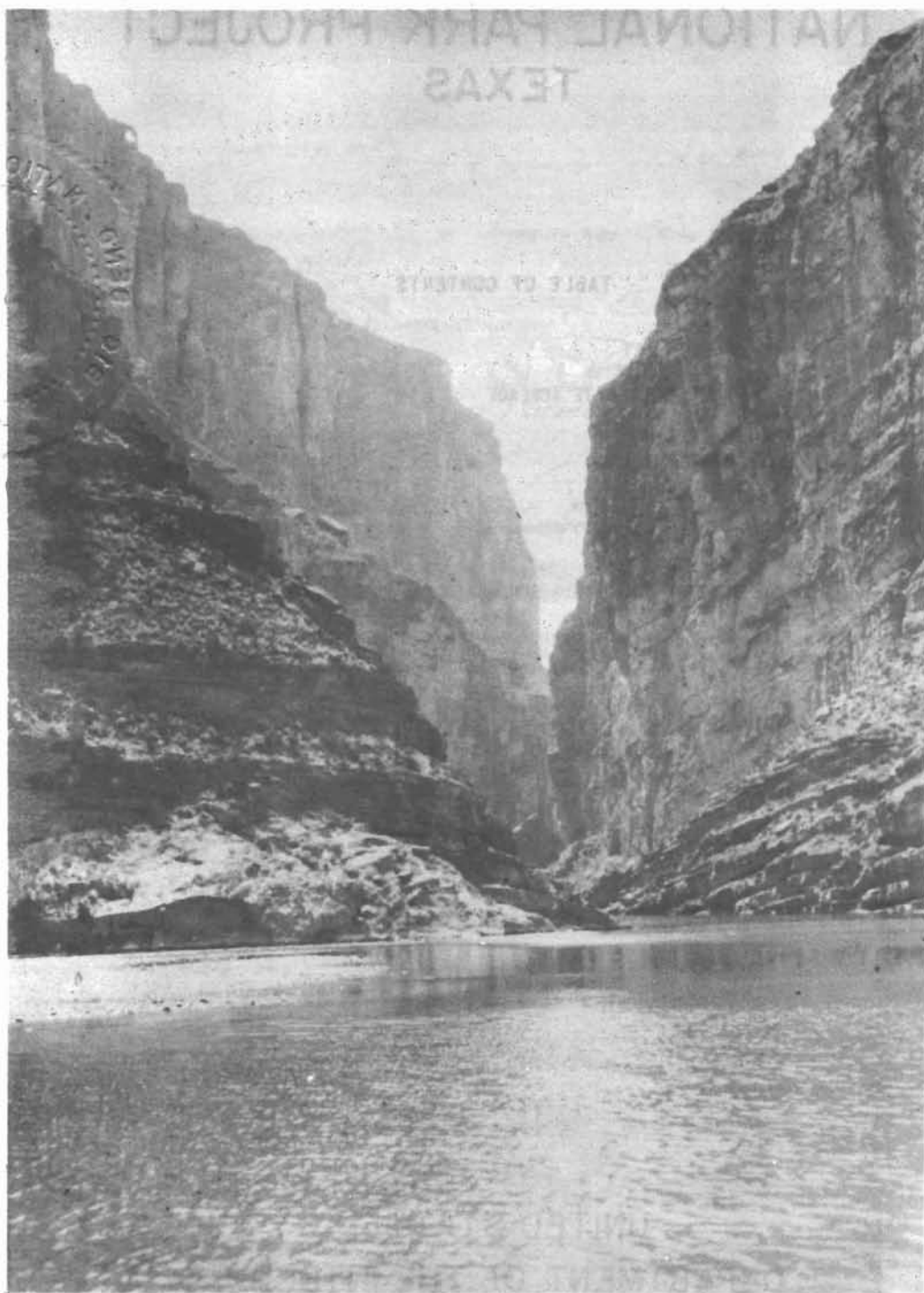
BIG BEND NAT'L PARK PROJECT

BIG BEND NATIONAL PARK PROJECT TEXAS

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UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE



MOUTH OF SANTA ELENA CANYON

BIG BEND NATIONAL PARK PROJECT

LOCATION AND APPROXIMATE ACREAGE

The area proposed for establishment as the Big Bend National Park in accordance with the provisions of the Act of June 20, 1935, is the southern portion of Brewster County, Texas. The southern portion of the area is bounded by the Big Bend of the Rio Grande River, from which the area has its name.

The area is approximately 260 miles (airline) west of San Antonio, 420 miles southwest of Dallas, and 220 miles southeast of El Paso, Texas. It is approximately 650 miles south of Denver, Colorado, and 750 miles southwest of Kansas City, Missouri. Highway and rail distances are somewhat greater. The Southern Pacific Railroad running from New Orleans to Los Angeles passes by the proposed park near Alpine and Marathon, Texas. Alpine is also on the main line of the Atchison, Topeka, and Santa Fe Railroad running between Kansas City, Missouri, and Mexico. U. S. Highway #90 parallels the Southern Pacific Railroad about 90 miles north of the proposed park area.

The approximate acreage of the proposed Big Bend National Park is 788,682 acres.

PHYSICAL FEATURES

The Big Bend area is a semi-arid plain verging on desert, through which a group of mountain ranges, principally the Chisos, have been thrust. These are the southernmost spur of the Rocky Mountains and attain an altitude of 7,835 feet. The Chisos Mountain Group is literally a biologic island.

The Big Bend area is the last great wilderness of Texas. No railroad traverses its vastness. Its few ranches and mining claims are served by unimproved roads and wagon trails. The reason for the long isolation of this area is the fact that the land is unsuitable for profitable agricultural or industrial use. The semi-arid character of the plains surrounding the mountain ranges have offered little encouragement to profitable agriculture and the major portion of the area can be classified at best as low grade grazing land. The varied forest cover in the Chisos Mountains is still virgin. The vegetation of the surrounding semi-arid plains is principally a growth of chaparral and cacti. As the elevation increases, however, Douglas spruce, pine, cedars, junipers and oak are



FOREST COVER IN HIGHER ALTITUDES - BIG BEND AREA

well represented.

One of the dramatic features of the region is the Rio Grande River which in its tortuous course cuts through three steep walled canyons, Santa Elena, Mariscal and Boquillas, and meanders over the flat river plains.

From the south rim of the Chisos Mountains, a magnificent panorama stretching far into old Mexico, greets the eye. The scenery of the Big Bend area has been adjudged in the same class as other outstanding national attractions found in other established national park areas.

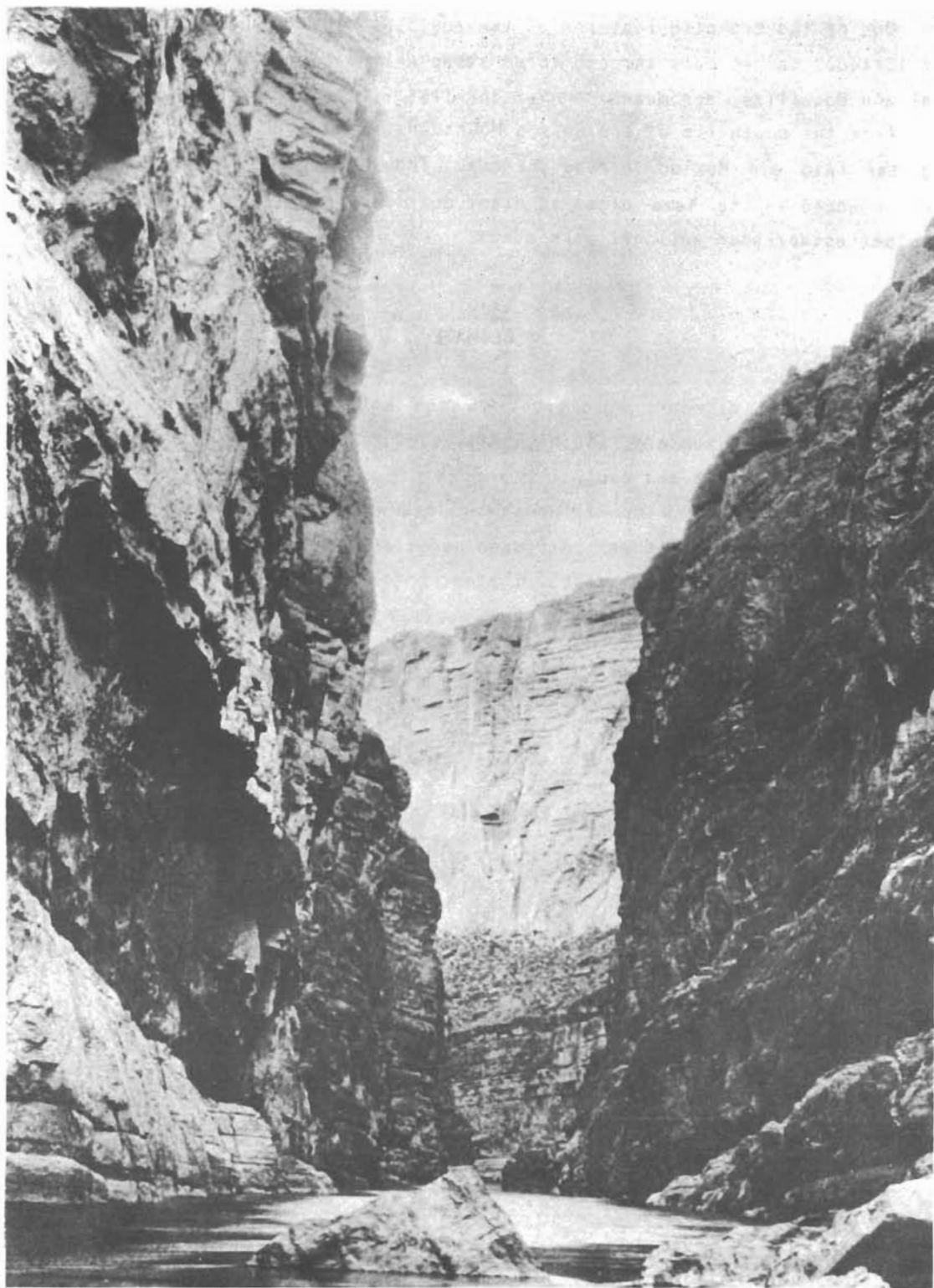
CLIMATE

In general, climatic conditions in the entire Big Bend region are mild. Even in the hottest summers, the high altitude of the Chisos Mountain sections are unusually moderate and cool.

Throughout the less mountainous portions of the area the average rainfall is from ten to twelve inches. Although no official observations have been made in the Chisos Mountains themselves, the estimated rainfall there is approximately 20 inches. A small amount of snow usually occurs each winter in the moun-



THE CHISOS MOUNTAINS FROM THE SOUTHEAST NEAR THE BOQUILLAS ROAD



SANTA ELENA CANYON, SOME 1200 FEET DEEP, ON THE RIO GRANDE

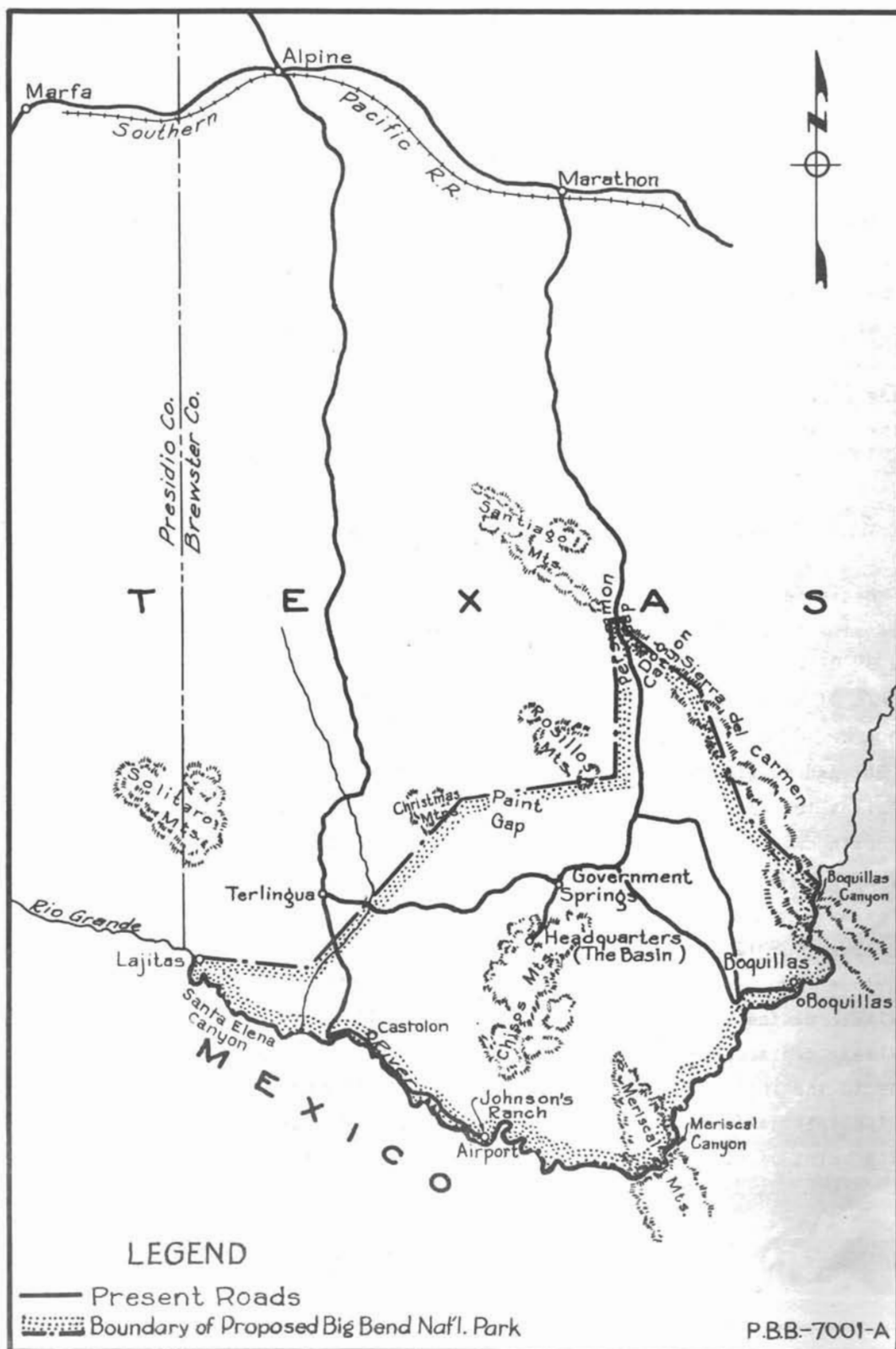
tains, but is never sufficient to prevent year-round use of the entire area for recreational purposes.

BOUNDARY

The map indicates the boundary of the Big Bend National Park Project which has been designated by the Secretary of the Interior in accordance with the provisions of the Act of June 20, 1935 (49 Stat. 393). It may be necessary to make some minor changes after a complete survey of the region has been made. The main purpose of the present map is to indicate the features that are within the boundary line. The boundary line of private property may also have an influence on the establishment of the final boundary line of the park.

BOUNDARY DESCRIPTION OF PROPOSED BIG BEND NATIONAL PARK

Beginning on the international boundary line at a point on the Rio Grande River at latitude $20^{\circ} 20'$ and longitude $102^{\circ} 53'$, thence on a line which bears N. $290^{\circ} 0'$ W. a distance of 1.75 miles approximately to B. M. (3940), thence N. $49^{\circ} 0'$ W. a distance of approximately 6.75 miles to B. M. on Sue Peaks, thence N. $18^{\circ} 0'$ W. approximately 11.8 miles to an intersection with latitude $29^{\circ} 35'$ and longitude $103^{\circ} 02\frac{1}{2}'$, thence N. $52^{\circ} 30'$ W. an approximate distance of 9.4 miles to a point which is latitude $29^{\circ} 40'$ and longitude $103^{\circ} 10'$, thence due north on longitude $103^{\circ} 10'$ a distance of $\frac{1}{2}$ mile, thence due west a distance of $\frac{1}{2}$ mile, thence due south $\frac{1}{2}$ mile to latitude $29^{\circ} 40'$, thence S. $5^{\circ} 15'$ E. an approximate distance of 5.8 miles to a point which is latitude $29^{\circ} 35'$ and longitude $103^{\circ} 10'$, thence due south on longitude $103^{\circ} 10'$ to a point on said longitude line 2 miles south of latitude $29^{\circ} 30'$, thence S. $83^{\circ} 30'$ W. an approximate distance of 13.7 miles to B. M. (4405), thence S. $42^{\circ} 30'$ W. an approximate distance of 20.6 miles to B. M. (2316), thence N. $6^{\circ} 30'$ W. about $9\frac{1}{2}$ miles to the international boundary line on the Rio Grande River, thence following the international boundary along the river in a general easterly direction to the point of beginning, containing approximately 782,682 acres.



HISTORY

The Big Bend country is extremely important from an archeological standpoint, as it is one of three areas in the United States where perishable artifacts have been occasionally preserved in dry caves through the centuries. Good collections of sandals, matting, wooden implements, baskets, and cooking utensils have been secured in the caves of the Chisos Mountains. These artifacts constitute excellent material for the study of the little-known cave dweller culture of West Texas and are excellent specimens for museum purposes. In the Big Bend area, also are found camp-sites and other archeological evidence of the peoples who followed the cavedwellers, particularly of the Comanches who came a thousand miles out of the north to plunder the haciendas of Mexico.

In the 16th and 17th centuries it is possible that Spanish adventurers seeking the elusive El Dorado and Spanish friars working for the salvation of men's souls, found their way into the big Bend country. Certainly, the area was crossed many times in the period after 1700 when the Spanish occupation of Texas occurred. But, on the whole, the Big Bend country remained isolated from the outside world, retaining to the full its primitive characteristics. In 1852, W. H. Emory came to establish the Rio Grande boundary between the United States



STREET SCENE IN BOQUILLAS, COAHUILA, MEXICO

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STREET SCENE IN BOQUILLAS, COAHUILA, MEXICO

and Mexico. The principal peak of the Chisos Mountains was named in his honor. In the great days of the range cattle industry, cattlemen settled along the border and grazed their herds in the Big Bend area.

Even to this day the Big Bend country is one of the most isolated parts of the Southwest. The old trail from San Antonio, Texas to San Diego, California, once offered very limited contact with the settled world. Then in the early eighties, the railroad was built along part of the old trail 90 miles to the north of the Big Bend area. In the late nineties, cinnabar mines were opened at nearby Terlingua, Texas. These mines are outside the boundary of the proposed Big Bend National Park. The population of the area, which is very sparse, has remained practically constant for the past twenty years, indicating that the region has reached its maximum productivity under the present form of land use. People are still "few and far between" in the Big Bend, and the jagged Chisos Mountains like ghosts of the past, look down upon a varied land that nature herself has dedicated as a perpetual wilderness. But, although the wilderness has withstood the assaults of man for many centuries, modern man, more effective than his ancestors, may soon destroy the essential values of an area, the highest use of which is for the inspiration and enjoyment of the people as a national park.



THE MULES EARS FROM THE MESA NORTH OF JOHNSON'S RANCH

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GEOLOGY

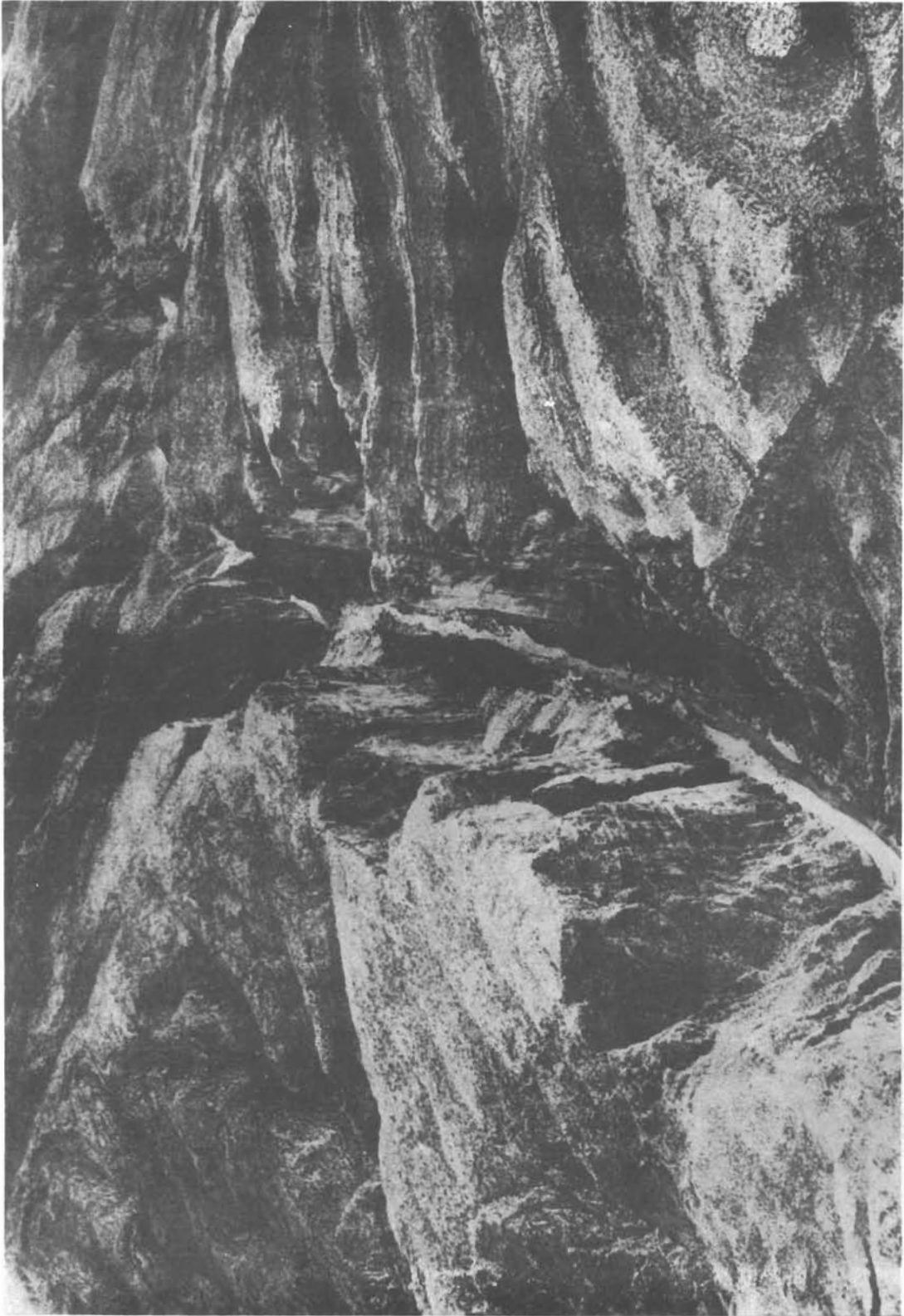
The Big Bend is a land of contrasts! The desert is interrupted by mountain masses; the streams alternately meander over broad flood plains and plunge through narrow canyons; the area which now is desert was once a lake, and before then was part of a great ocean; fragments of fossil trees, millions of years old, are found in the existing forests. These contrasts, as well as many others, are traceable to the geologic history of the area. This history is not difficult to understand. In fact, the Big Bend is one of those places where earth processes are so plainly shown that the layman can readily understand them, and yet the interrelation of these processes is so varied that for many years to come the trained scientist will find problems to tax his ingenuity.

The geologic story revealed in the proposed park does not go back to the remote beginnings of the earth's history but is concerned chiefly with the last 100,000,000 years, or about a fifth of the total period of the earth's known history.

The story begins at the time when the cold-blooded reptiles were leaving the sea for permanent abode on the land. Their new environment must have been favorable because some of them, the dinosaurs, grew to enormous size. They were not in the Big Bend at the opening of this geologic story because that area was



A LAND OF CONTRASTS: MOUNTAINS, PLAINS, DESERTS, WATER



AIRPLANE VIEW OF MERISCAL CANYON, SOME 1500 FEET DEEP. TO THE LEFT OF THE RIO GRANDE IS THE UNITED STATES; TO THE RIGHT IS MEXICO.

submerged beneath a great ocean which occupied most of the area between the eastern and western margins of the continent. But this ocean was doomed to extinction. Great quantities of material were dumped into it from the bordering lands so that the sea became shallower. Furthermore, the retreat of the sea was hastened by a slow elevation of the sea floor.

In the area which is now Big Bend, the filling process was first accomplished by the deposition of great quantities of lime sludge, later turned to limestone. As the sea retreated, the limey sediments were covered first with clays and then with sand. It was in these shore-line deposits that the great trees grew which later became petrified and are now composed of agate, opal, amethyst, chalcedony, and jasper. Here also grew the swamp vegetation on which the plant-eating dinosaurs thrived.

While this transformation of sea into land was taking place, 'harbingers of a great catastrophe came drifting into the area. Fine dust and porous ash fragments, borne by westerly winds or streams in flood, showed that the period of violent volcanic activity which was later to break out in the Big Bend had already begun in the mountain areas to the northwest. These occurrences became more numerous in the waning days of the Age of Dinosaurs. To add to the uncer-



MASSIVE BEDS OF LIMESTONE DEPOSITED ON THE FLOOR OF AN ANCIENT OCEAN NOW FORM THE SHEER WALLS OF THE CANYONS

tainty of the times, the earth's crust began to break, and the limestone, long since covered by clays and shallow-water sands, was forced to the surface to form the beginnings of the present mountain ranges which flank the area.

It is probable that dinosaurs had become extinct before volcanic eruptions occurred in the Big Bend, the first of which were mild as compared to those that came later. This early activity consisted of slow upwelling of molten igneous rock which in some places filled crevasses in the fractured strata and elsewhere arched it upward to form dome-like structures.

These eruptions were followed by a long period of quiet, but it was only the lull before the storm of revived volcanic activity which burst upon the area. Showers of volcanic ash and torrents of gray mud and stones accumulating over a long period of time buried to a depth of more than 2,000 feet the area where now the Chisos Mountains stand. One of the most spectacular remnants of this series of sediments, called the Chisos beds, is Cerro Castellan, the castle-like mountain near Santa Elena Canyon. The climax of this phase of the Big Bend history was marked by floods of molten rock which time and again covered the area of the Chisos Mountains with sheets of black lava. These eruptions were not only the climax but also marked the end of the period of rock formation. No new rock has been added since, although volcanism ceased millions of

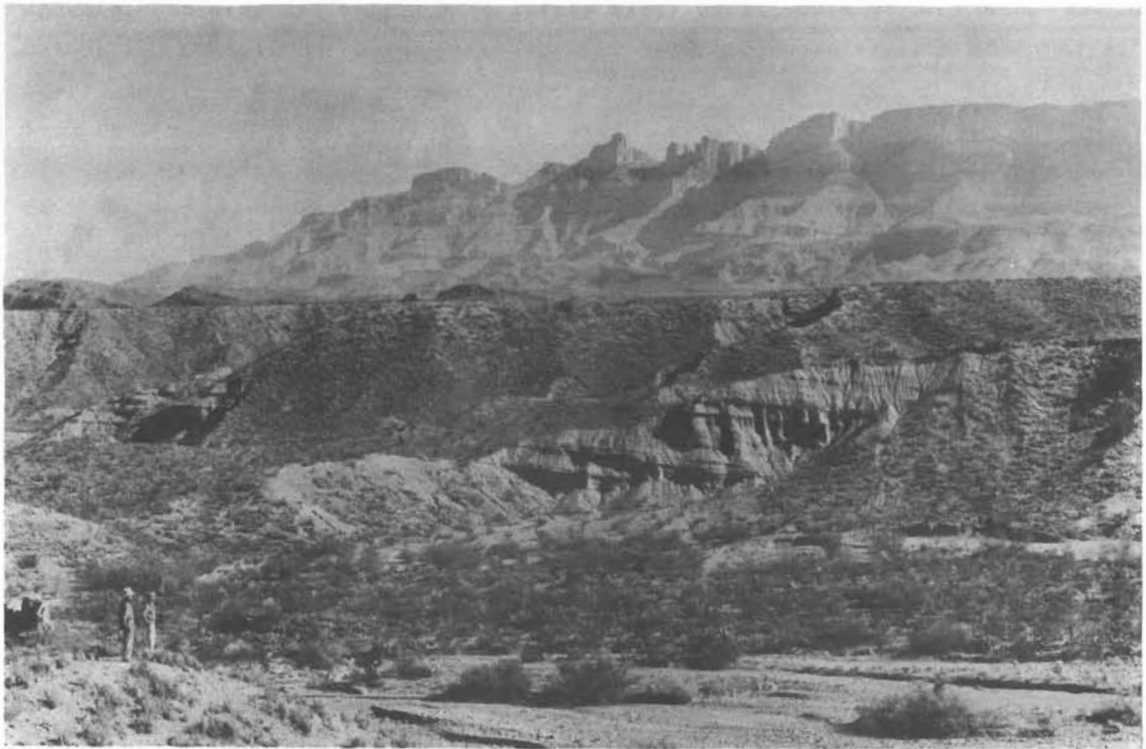


PUNTA DE LA SIERRA IS CARVED FROM LAVA FLOWS.

years ago. The constructive earth processes had had their day. They had supplied the limestone from which the border mountains were to be formed, the yellow and purple shales from which the badlands would be cut, and the lava to form the South Rim and the Pinnacles. From this time until the present, destructive processes have been dominant. These have been largely erosional and the Rio Grande, with its tributaries, has been the agent. It might well be called The Great Excavator.

The land has not been quiet under these ministrations, but, like a patient in a dentist's chair, it has struggled during the excavation. These convulsions have raised the border mountains a little higher, strained, bent or broken some of the rocks, but they only increased the activity of the streams which, like the dentist with his instruments, simply bored a little deeper. At least once during that period the Rio Grande was dammed and a large lake was formed at the foot of the Chisos Mountains. The dam was finally cut through, and the river has resumed its work of wearing away the land and transporting it to the sea.

During this process the soft rocks have been worn away rapidly, and the hard rocks have been left to form the cliffs, pinnacles, and mountains. Were it not for this erosion, the processes by which the rocks were formed would not have been revealed.



THE LAYERS OF SILT IN THE SIDE OF THE ARROYO SHOW THAT A LAKE ONCE EXISTED HERE.

The undercutting of the lava flows has produced the South Rim and has shown the succession of rock which tells the story of volcanic activity. The scouring of the Rio Grande has uncovered Mesa de Anguila and revealed the break in the earth's crust as a result of which this huge block of limestone was tilted and moved upward approximately 4,000 feet. With every rain Ward, Pulliam, and Maverick Mountains are uncovered a little more, and we are shown the shattered ends of the rock layers through which they forced their way when as a molten fluid they moved toward the surface.

These are but a few of the earth's secrets which are plainly told in the Big Bend and which make it one of the country's finest geologic exhibits.

FLORA AND FAUNA

Wildlife in Big Bend is more closely allied to the fauna and flora of Mexico than to existing conditions elsewhere in the United States. While there is some evidence that the Rocky Mountains to the north have affected the biota of the Chisos Mountains, it is quite evident that the Sierra Madres of Mexico are of greater importance. This is due to the fact that the Chisos highlands are



CASA GRANDE, IN THE CHISOS MOUNTAINS

separated from other mountainous sections of Texas and New Mexico by a great expanse of flat, desert country.

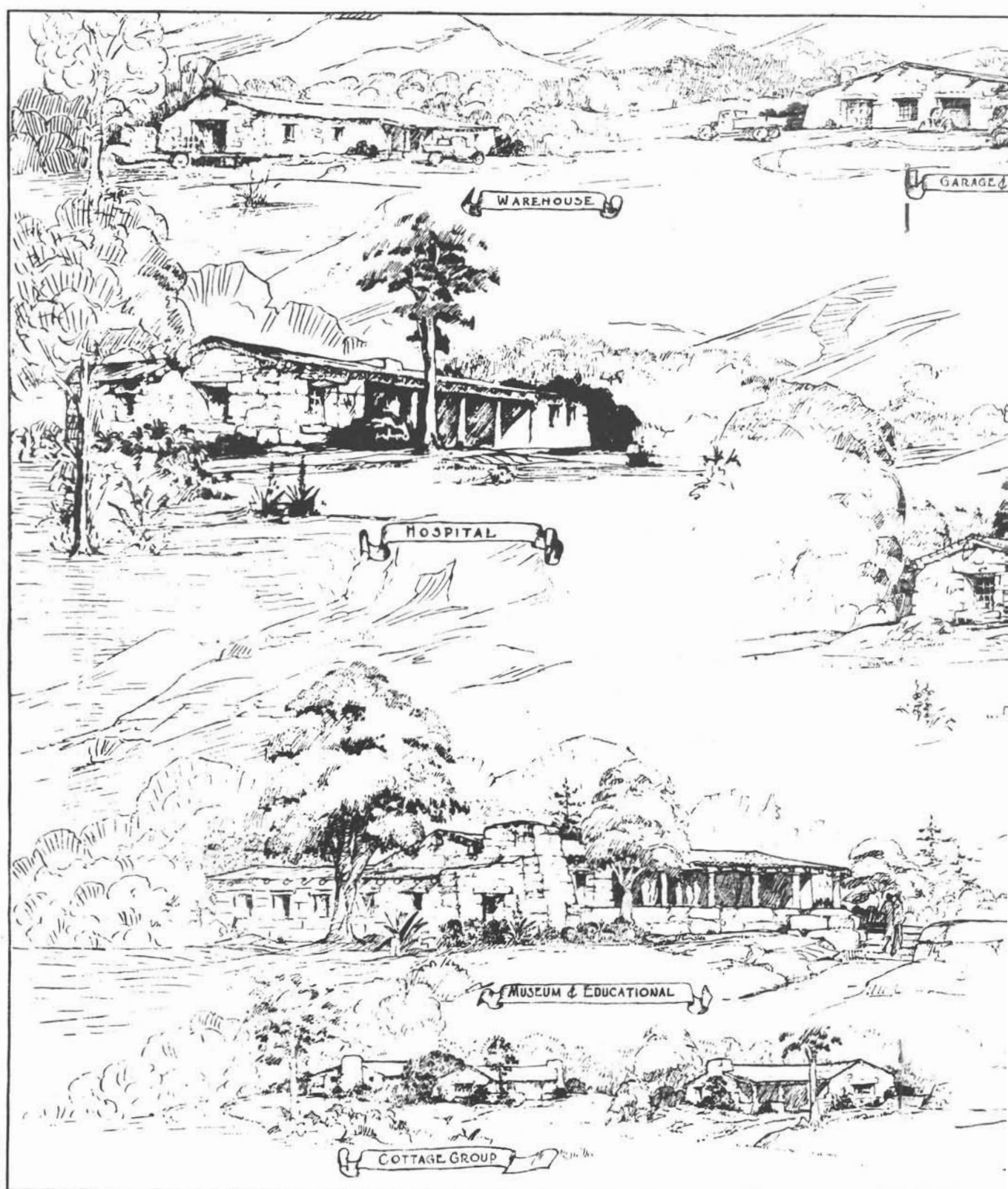
The lowlands were at one time more hospitable to wildlife than under present conditions, although they were never as valuable biologically as the Chisos country. Over-grazing by domestic stock quickly robbed the desert lowlands of their natural forage. Fortunately, this is a correctable condition and with management the area can be brought back to its original wildlife value.

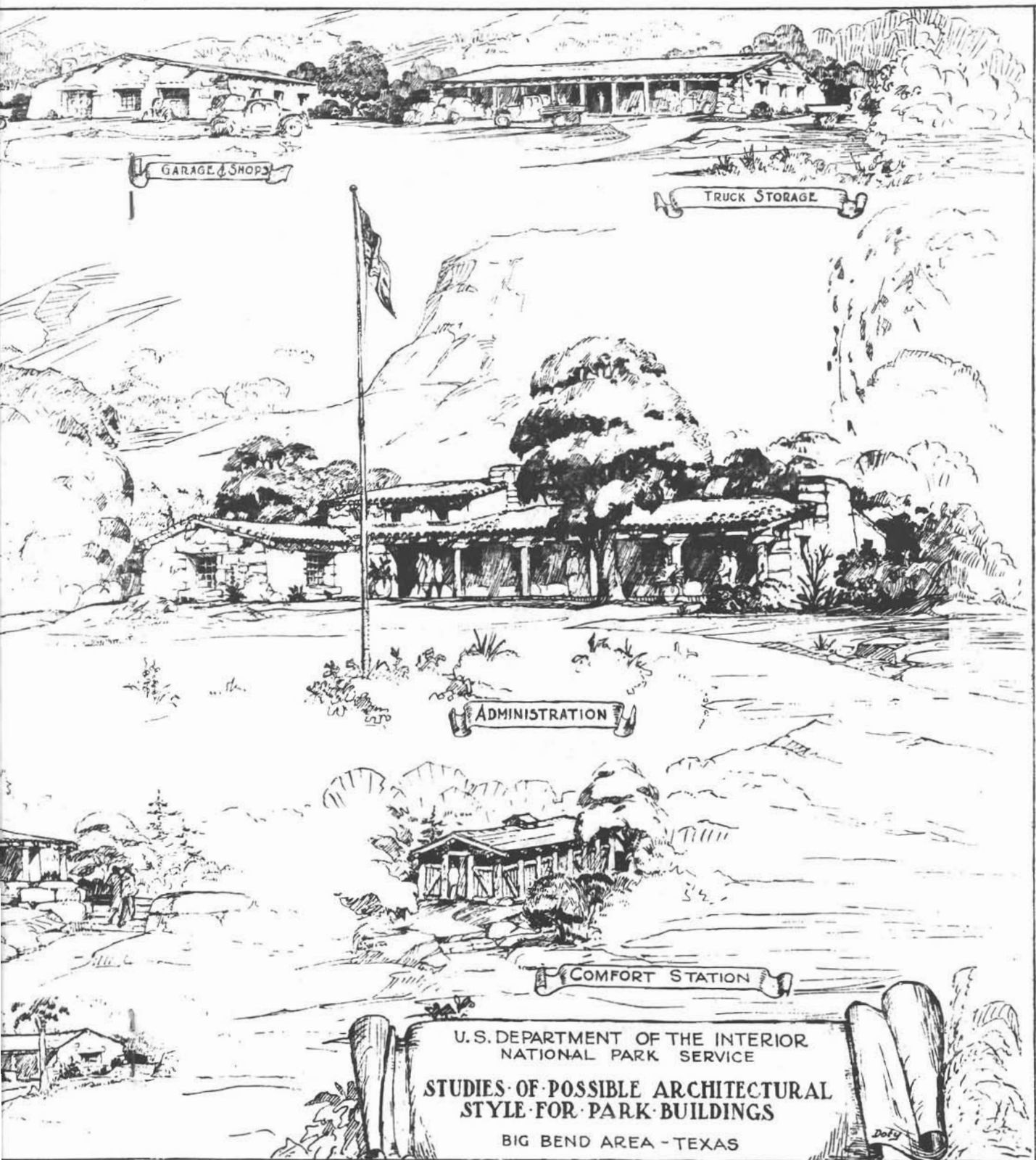
In the Chisos Mountains there are a variety of life zones and habitats for native wildlife species. The area has never been completely explored botanically, but already over 800 species of plants have been identified.

At one time, antelope were found occasionally in the Big Bend. They disappeared from the area in the early part of this century and are only now beginning to reappear as the result of restocking in the plains to the north. The early, unfortunate, part of this story is also true of the bighorn. Constant hunting and poaching have adversely affected all animal life so that when the area becomes a national park it will be of inestimable value in restoring and protecting the unique plant and animal communities. Among the native mammals are the Rio Grande beaver, Texas peccary, Sonoran deer, and kit fox, all of which are endangered species that may be saved in this part of the United States. Jaguars, ocelots, and native wild turkey still occur south of Big Bend and may become a part of the park fauna in the future. Birds include Mearns' quail, scaled quail, zone-tailed hawk, blue-throated hummingbird, band-tailed pigeon, Inca dove, white-necked raven, cactus wren, curve-billed thrasher, and many others rare or unknown elsewhere in this country.

The reptiles of Big Bend are characteristic of the Rio Grande country and include the yellow mud turtle, banded gecko, Texas zebra-tailed lizard, amate lizard, tessellated lizard, blind snake, red racer, and black-headed tantilla.

Few of the plants or animals that characterize the Big Bend country are found in either federal or state lands where they can be protected. Yet, these highly interesting species are of great scientific and public importance to the United States.







U.S. DEPT. OF THE INTERIOR • NATIONAL PARK SERVICE •
STUDY FOR • HACIENDA • LODGE •
DIG BEND AREA - TEXAS •

Daly

GENERAL DEVELOPMENT

The announcement of a "Development Program" for the proposed Big Bend National Park, would be premature at this time since further, and more detailed, studies will be necessary before it can be determined which areas within the proposed park will lend themselves to developments of a recreational nature and which areas should be preserved in their present wilderness condition. As a result of studies made thus far, however, the following general outline of facilities are considered as essential to the development of a park area of this kind.

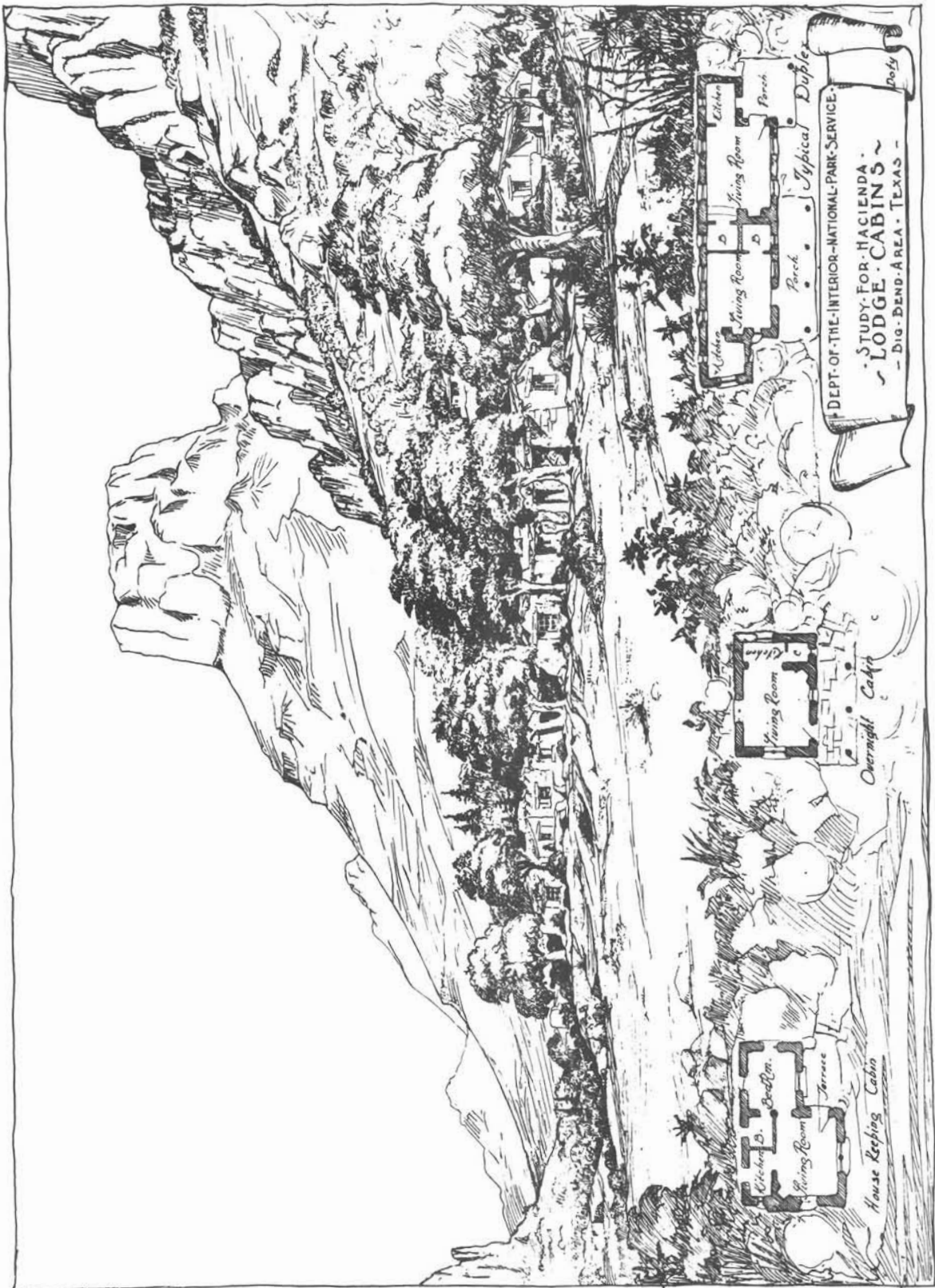
Facilities for park administration purposes and public accommodations will be developed simultaneously with provisions made to meet every requirement of visitors whether for a single day or extended visits.

Roads within the park proper will (in accordance with established policies) be kept to a minimum. The location will, of course, be dictated by the development of the park as may eventually be worked out. Any development of any kind, whether they be buildings, trails, or roads, will in every case consider the scenery of the various canyons, and the inspiring climax panorama as seen from the south rim; and every effort will be made to avoid damage by the construction of unnecessary and too numerous roads.

In view of the international aspect of the Big Bend area and since the Mexican Hacienda type of architecture as developed in this region seems so well adapted to the locale it is quite likely that the architectural style of buildings as may be developed by the Park Service will reflect this type as a precedent.

As the park is developed and made accessible to the public it is likely that over-night tourist accommodation will be needed in the vicinity of the Santa Elena Canyon and the headquarters area (wherever it is located) will very likely be expanded to include such structures as a lodge, cabins, camp and trailer sites for visitors. It is natural to suppose that any buildings constructed will be either of stone or adobe and that at least one area will be given over to a development similar to the phantom ranch at Grand Canyon National Park. It is anticipated that the similar need of a ranch-like development will eventually be necessary at Boquillas along the international border to the East.

Consideration has been given to the development of the old time longhorn steer ranch somewhere in the Big Bend National Park as now proposed. Longhorns were in a great measure responsible for the development of the cattle industry in the western plains country and sufficient justification for a ranch of the type associated with the growth of the country can be found in comparing the



DEPT. OF THE INTERIOR-NATIONAL PARK SERVICE.

STUDY FOR HACIENDA
LODGE CABINS -
BIG BEND AREA, TEXAS

Doty

House Keeping Cabin
Kitchen, B. Room, Living Room, Terrace

Overnight Cabin
Living Room, Kitchen

Typical Duplex
Living Room, Living Room, Kitchen, Porch, Porch

present status of the longhorn cattle with the buffalo that roamed the plains before them. In addition to the historical value of such a development an old-fashioned spring and fall round-up and branding will be of interest to the many who visit the Park. A suitable locale for such a ranch has been found along the eastern boundary of the Park with the Banta-Shut In area as headquarters.

* * *

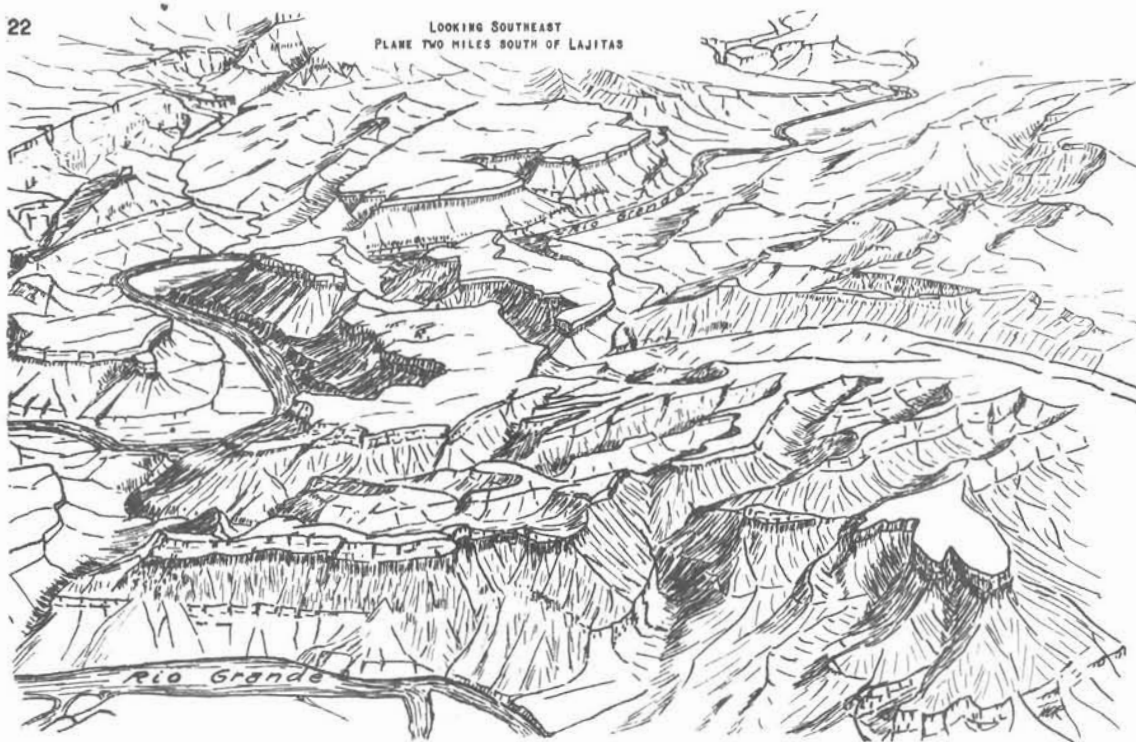
AERIAL VIEWS OF THE PROPOSED

BIG BEND NATIONAL PARK

The following pages were selected from the publication "Behind the Scenery in the Proposed Big Bend National Park, Texas," by H. E. Rothrock, Assistant Chief, Naturalist Division, National Park Service. The photographs were taken by the Texas National Guard during a flight down the Rio Grande to the eastern borders of the Park and thence over the Chisos Mountains. The supplementary sketches were made in order to name the land marks and explain the origin of the spectacular scenery.

The mountains, valleys, bad lands and fantastic rocks were produced by a combination of numerous factors such as rock types, stresses in the earth's crust and various erosional processes which with interminable persistence are slowly reducing the land forms to a common level.

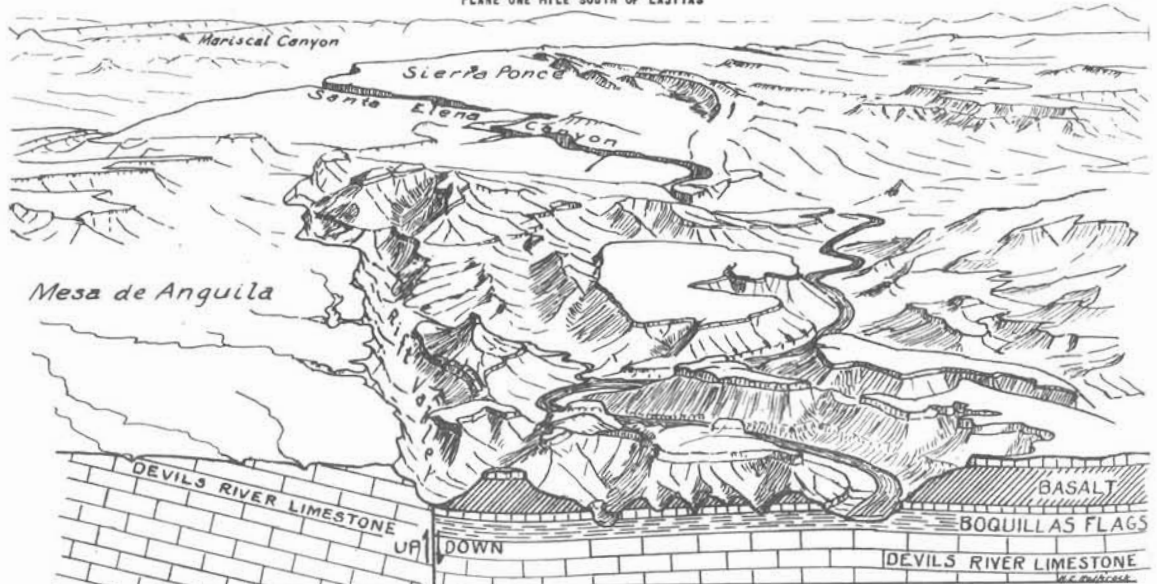
In interpreting the scenes, frequent use was made of the geological work of Dr. Ross A. Maxwell.



THE VIEW AHEAD OF THE PLANE SHOWS THE RIO GRANDE WINDING THROUGH A LABYRINTH WHICH IS ILLUSTRATIVE OF THE NAME, MESA DE ANQUILA, MEANING "TABLELAND OF THE EEL". ACCORDING TO SOME AUTHORITIES THE NAME ORIGINALLY WAS MESA DE AGUILA OR MESA DE ANGEL, MEANING "TABLELAND OF THE EAGLE" OR "TABLELAND OF THE ANGEL." CONSIDERING THE FORBIDDING NATURE OF THE TERRAIN, THE LAST VERSION SEEMS TO BE DEFINITELY INAPPROPRIATE.

THE DARK BANDS IN THE MESA SIDES INDICATE THE PRESENCE OF BLACK BASALT WHICH, AS MOLTEN ROCK, WAS FORCED BETWEEN THE LAYERS OF GRAY LIMESTONE (THE BOQUILLAS FORMATION) WHEN THEY WERE FAR UNDERGROUND.

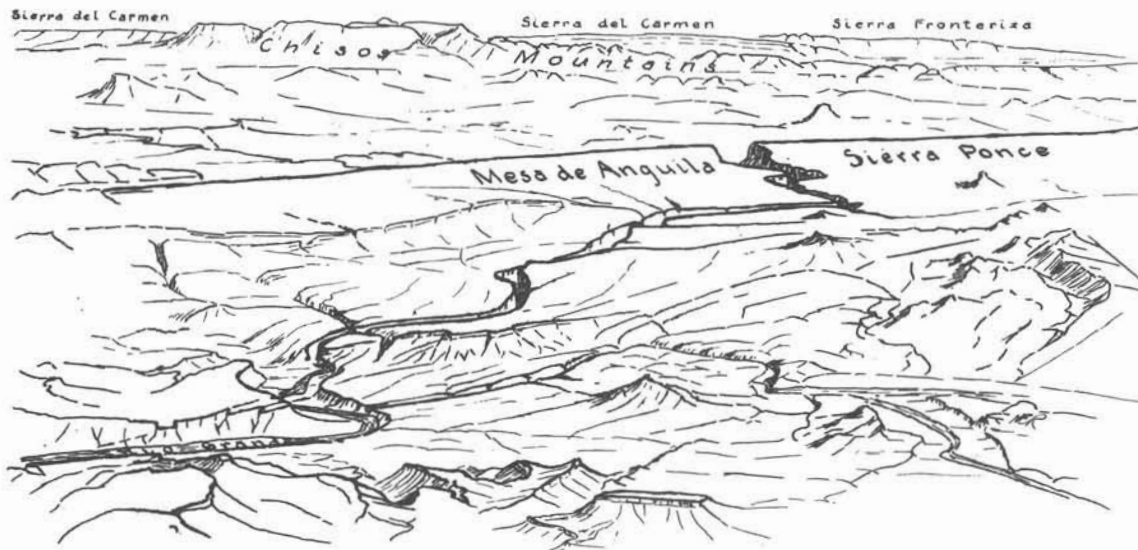




THE RIO GRANDE HAS CARVED THREE SPECTACULAR CANYONS WITHIN THE PROPOSED PARK: SANTA ELENA CANYON ON THE SOUTHWEST, MARISCAL CANYON ON THE SOUTH, AND BOQUILLAS CANYON (NOT VISIBLE IN THIS VIEW) ON THE SOUTHEAST. SANTA ELENA CANYON HAS BEEN CUT THROUGH THE TILTED STRATA WHICH FORM MESA DE ANGUILA-SIERRA PONCE. THE EASIER COURSE WOULD HAVE BEEN DOWN THE VALLEY SOUTHWEST (TO THE RIGHT) OF THE MESA BUT THE RIVER WAS FORCED TO CUT A CANYON THROUGH THE HARD LIMESTONE BECAUSE ITS COURSE WAS DETERMINED WHEN IT FLOWED 2000 FEET ABOVE ITS PRESENT LEVEL, BEFORE THE MESA HAD BEEN UNCOVERED.

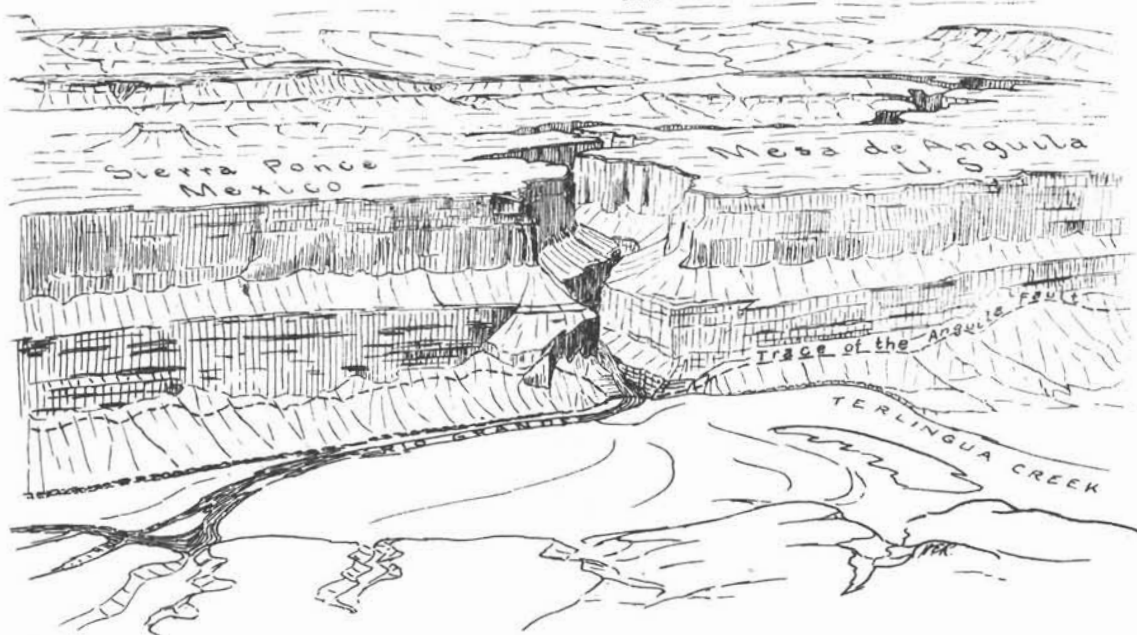
THE CURVED CREST OF THE MESA MARKS THE POSITION OF A GREAT FRACTURE (FAULT) IN THE EARTH'S CRUST BUT A SMALLER FAULT IS HERE PLAINLY VISIBLE WITHIN THE BLOCK. THE BANDED ROCKS IN THE RIGHT FOREGROUND - THE BLACK BASALTS AND LIGHT GRAY LIMESTONES - ONCE STOOD ABOVE THE MASSIVE DEVILS RIVER LIMESTONE WHICH NOW FORMS THE SURFACE OF THE MESA. THEIR POSITIONS HAVE BEEN REVERSED, HOWEVER, BY THE FAULT, NOW REVEALED BY THE NARROW RIFT VALLEY.



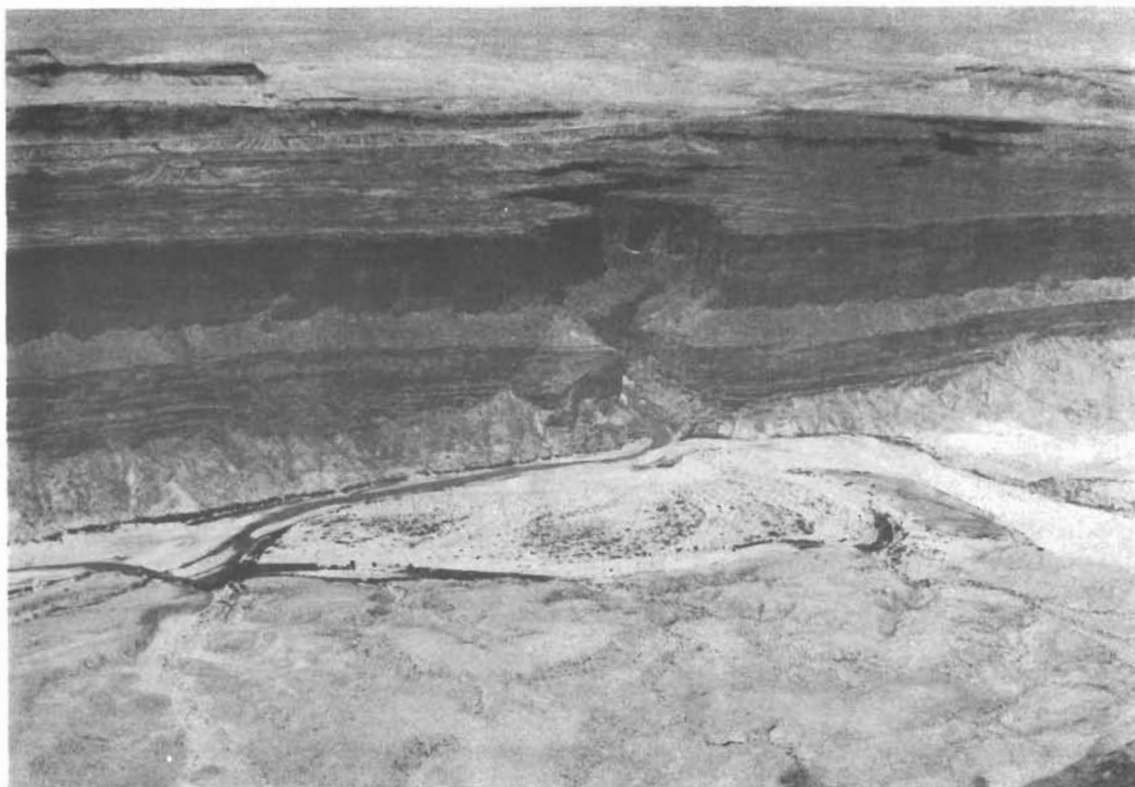


AS THE PLANE GAINS ALTITUDE A VIEW ACROSS THE PARK AREA IS OBTAINED. ITS BOUNDARIES CLOSELY FOLLOW THE NATURAL BARRIERS OF MESA DE ANGUILA ON THE WEST AND SIERRA DEL CARMEN ON THE EAST. BETWEEN THESE ELEVATED MASSES, LIES THE SUNKEN PLAIN FROM WHICH THE CHISOS MOUNTAINS RISE TO A HEIGHT MORE THAN A MILE ABOVE THE RIO GRANDE. THE PLAIN AND THE CHISOS MOUNTAINS CONSTITUTE THE BIG BEND GRABEN, A HUGE BLOCK OF THE EARTH'S CRUST THAT HAS BEEN BROKEN AWAY FROM THE FLANKING ROCKS AND DROPPED DOWNWARD. SUCH BREAKS ARE CALLED FAULTS. THEY ARE MARKED BY THE INWARD FACING CLIFFS (FAULT SCARPS) OF THE BARRIER MOUNTAINS.



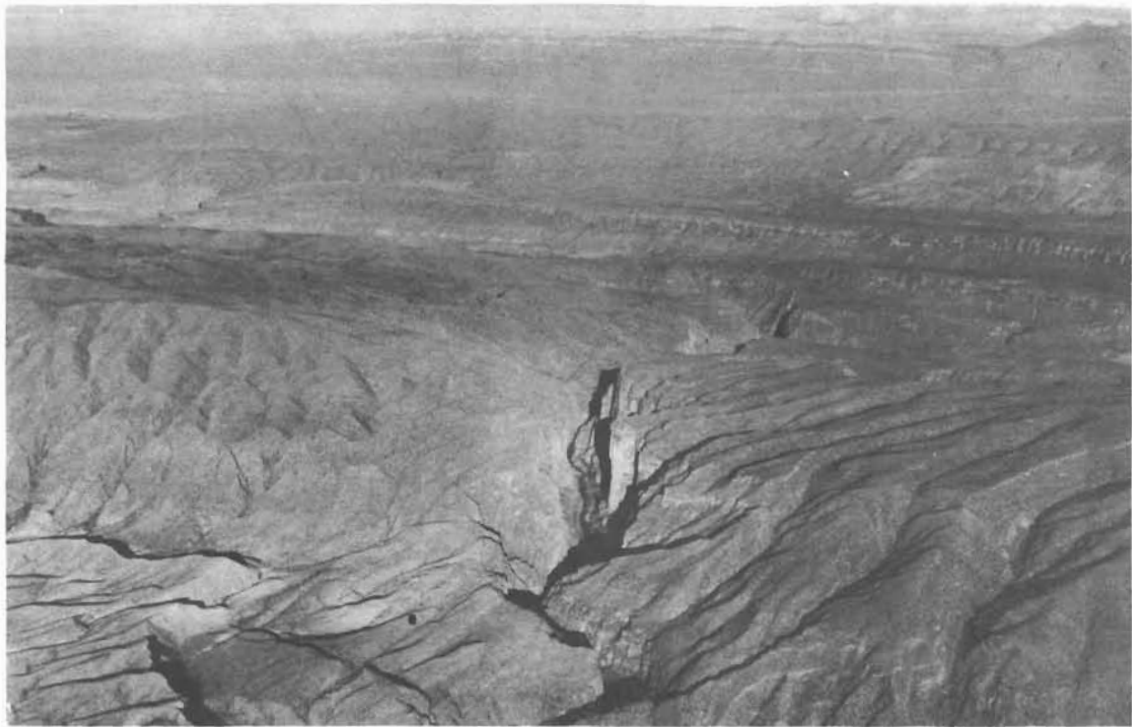


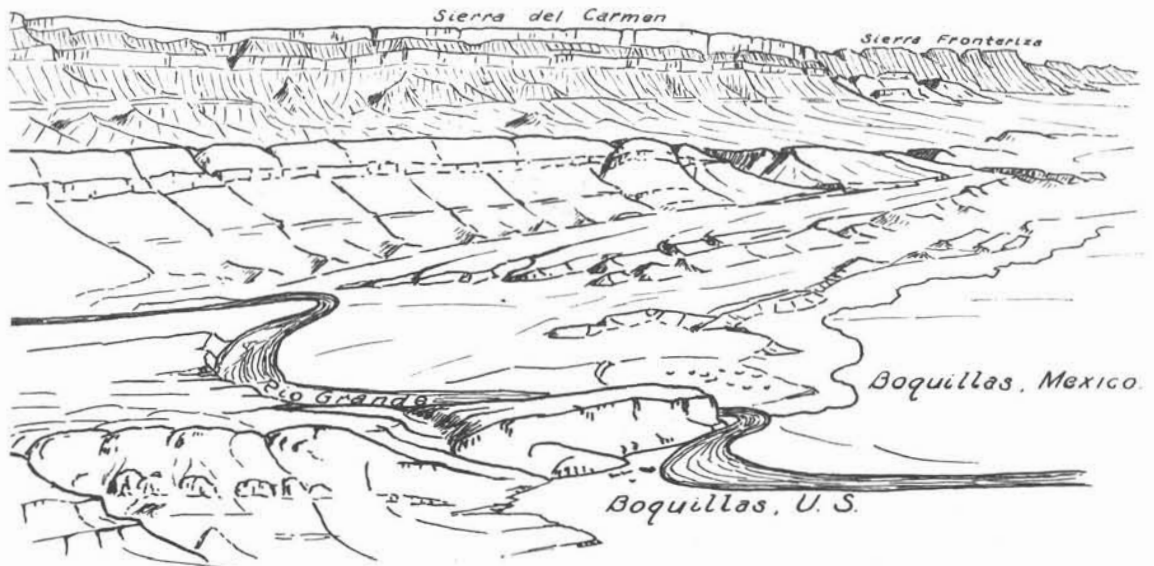
LOOKING BACKWARD AS WE FLY OVER THE EDGE OF THE MESA WE SEE THE MOUTH OF SANTA ELENA CANYON, WHERE THE RIO GRANDE CUTS THROUGH THE SHEER ESCARPMENT TO MEANDER SLUGGISHLY ON THE LOWLAND PLAIN. THE GREAT FAULT, CALLED THE ANGUILA FAULT, WHICH HAD MUCH TO DO WITH THE FORMATION OF THE MESA AND ITS ESCARPMENT, CAN BE TRACED ALONG THE FOOT OF THE CLIFFS. ALONG THIS FAULT THE MESA MOVED UPWARD - OR THE LOWLANDS MOVED DOWNWARD - SEVERAL THOUSAND FEET, CARRYING THE HARD DEVILS RIVER LIMESTONE OF WHICH THE MESA IS FORMED FAR UNDERGROUND ON THIS SIDE OF THE FAULT AND EXPOSING IT TO THE EROSION OF THE STREAMS ON THE OTHER. THE SOUTHWESTWARD TILT OF THE STRATA RESULTING FROM THIS MOVEMENT CAN BE EASILY SEEN.



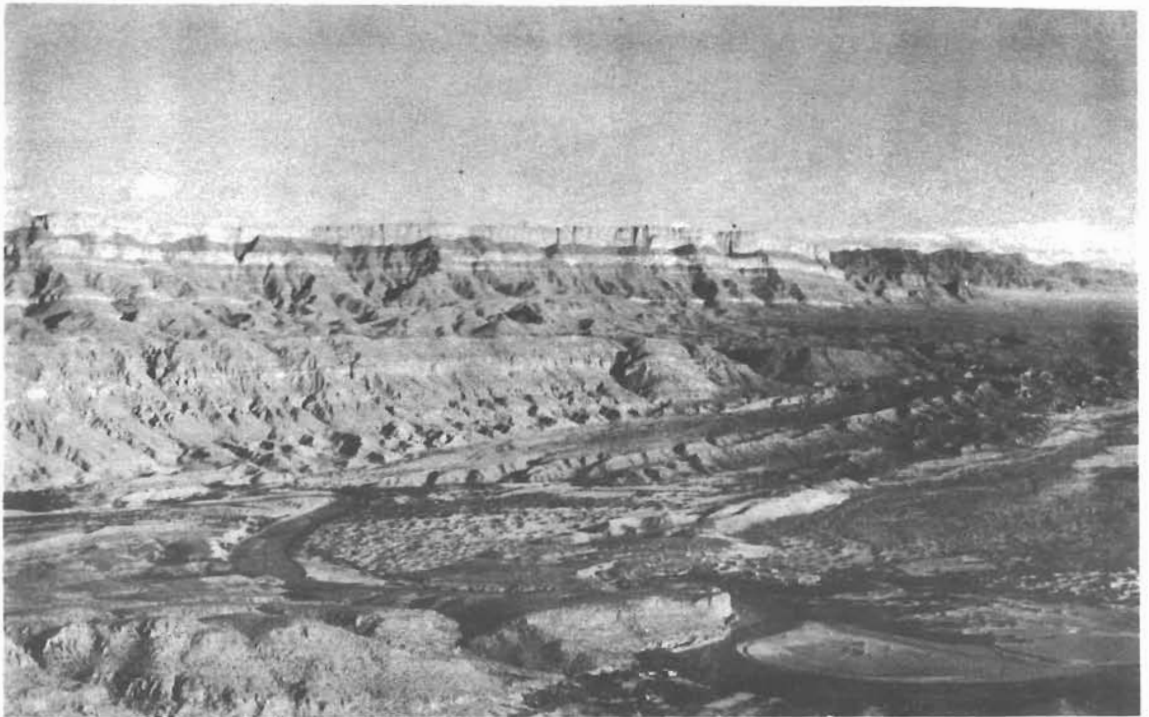


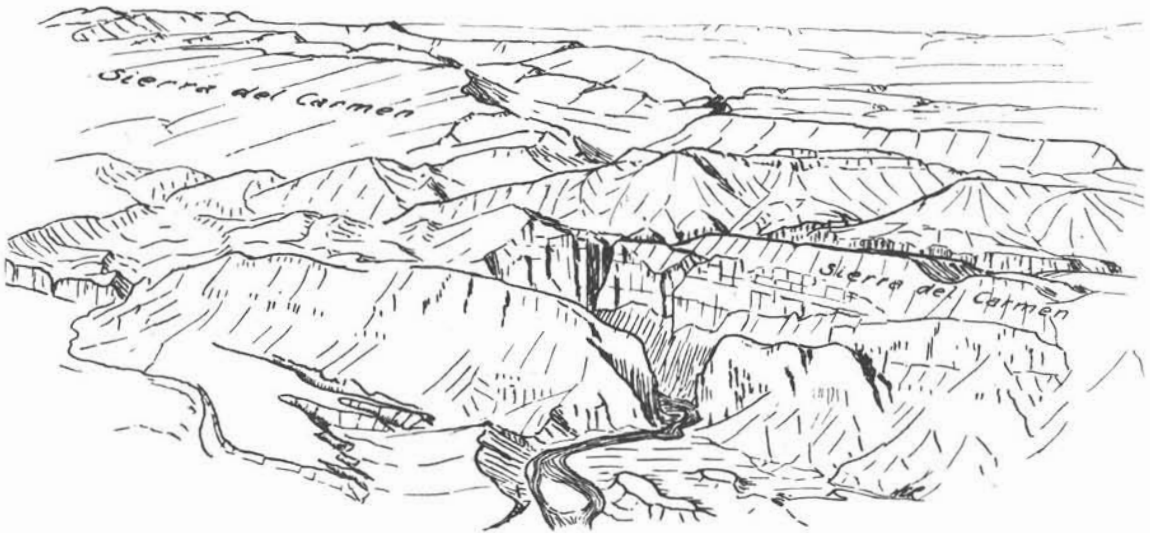
THREE OF THE GREAT SPECTACLES IN THE PROPOSED PARK ARE SANTA ELENA CANYON, SEEN EARLY IN THE FLIGHT, MARISCAL CANYON, BELOW THE PLANE AT THIS POINT AND BOQUILLAS CANYON IN THE DISTANCE. MARISCAL MOUNTAIN IS COMPOSED OF DEVILS RIVER LIMESTONE FOLDED LIKE A WRINKLE IN A CARPET. THE CENTER OF THE FOLD IS VISIBLE IN THE CONCENTRIC LAYERS IN THE SIDE OF THE CANYON, THE REMNANTS OF OUTER LAYERS CAN BE SEEN CLINGING TO THE MOUNTAIN SIDES. CERRO SAN VICENTE IS A SIMILAR FOLD BUT THE CLIFFS ON ITS SIDE MARK THE LOCATION OF FAULTS, PLACES WHERE THE ROCKS COULD NOT STAND THE STRAIN OF FOLDING BUT BROKE AND MOVED UPWARD OR DOWNWARD ALONG THE FRACTURES.



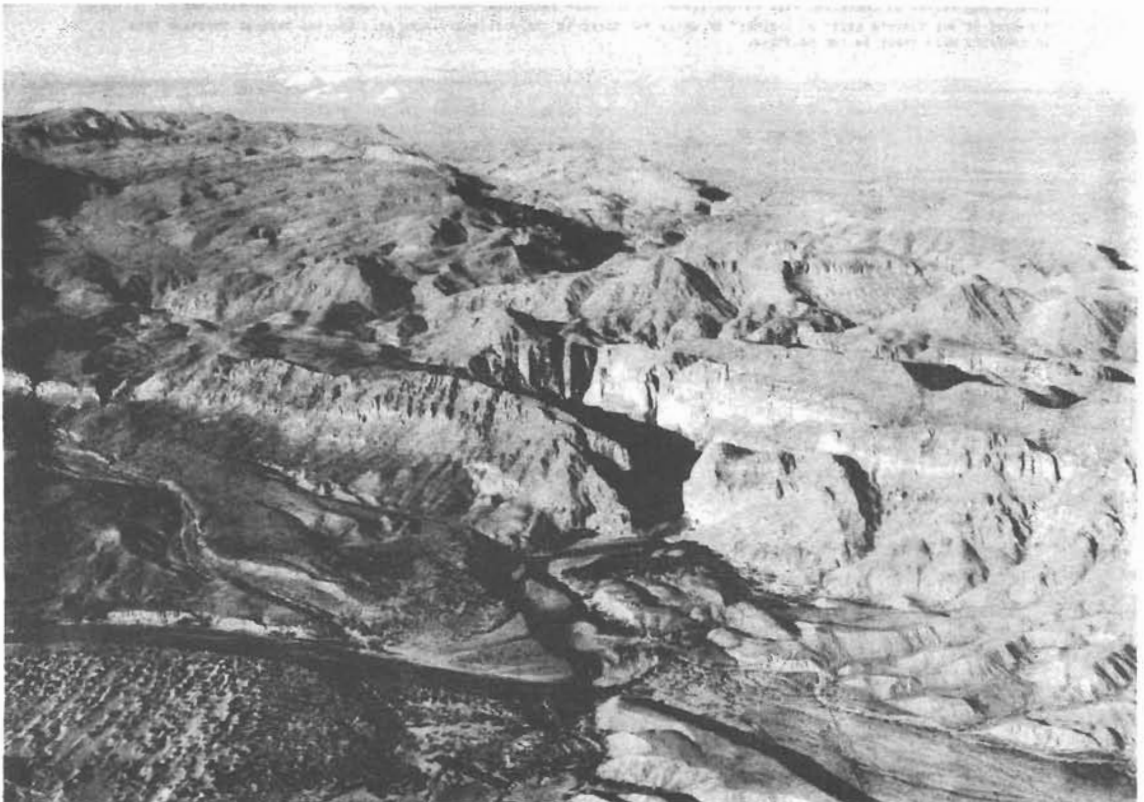


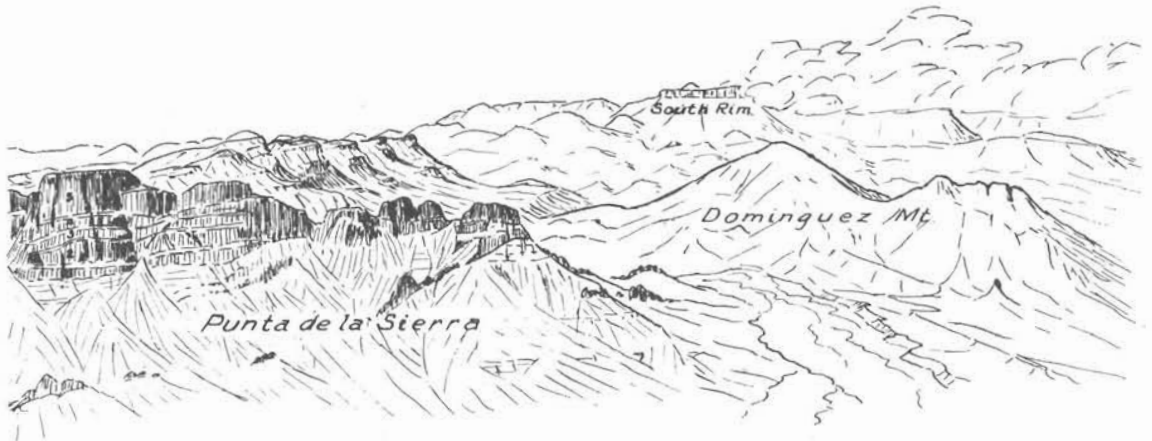
BOQUILLAS, U. S., AND BOQUILLAS, MEXICO, ARE MUDDLED NEAR THE FOOT OF SIERRA DEL CARMEN. THE MOUNTAIN DERIVES ITS NAME FROM THE FACT THAT THE BANDS OF LIMESTONE OF WHICH IT IS FORMED REFLECT THE RUDDY GLOW OF THE EVENING SUN. ALTHOUGH EROSION HAS PLAYED AN IMPORTANT PART IN THE FORMATION OF THESE BOLD ESCARPMENTS, THE PRIMARY CAUSE WAS FAULTING OR BREAKING OF THE EARTH'S CRUST AS A RESULT OF WHICH THE ROCKS IN THE FOREGROUND HAVE BEEN LOWERED SEVERAL THOUSAND FEET AS COMPARED WITH THOSE IN THE MOUNTAIN.





BOQUILLAS CANYON IS SO CROOKED AND THE TOPOGRAPHY THROUGH WHICH IT PASSES SO ROUGH THAT IT IS DIFFICULT TO FOLLOW THE COURSE OF THE RIO GRANDE AS IT WORKS ITS WAY THROUGH THE MOUNTAINS WHICH FLANK THE EAST SIDE OF THE AREA. ANCIENT LAKE DEPOSITS WHICH LIE BENEATH THE ALLUVIAL TERRACES IN THE FOREGROUND SHOW THAT THE RIVER ONCE WAS DAMMED BY SOME BARRIER IN THE CANYON. THE DAM MIGHT HAVE BEEN CAUSED BY MOVEMENT ALONG ONE OF THE SEVERAL FAULTS ACROSS WHICH THE RIVER FLOWS. AT ANY RATE, A LARGE LAKE WAS FORMED WHERE NOW THERE IS DESERT. MUCH OF THE AREA BETWEEN THE SIERRA DEL CARMEN AND THE CHRISOS MOUNTAINS WAS FLOODED BY THE LAKE.



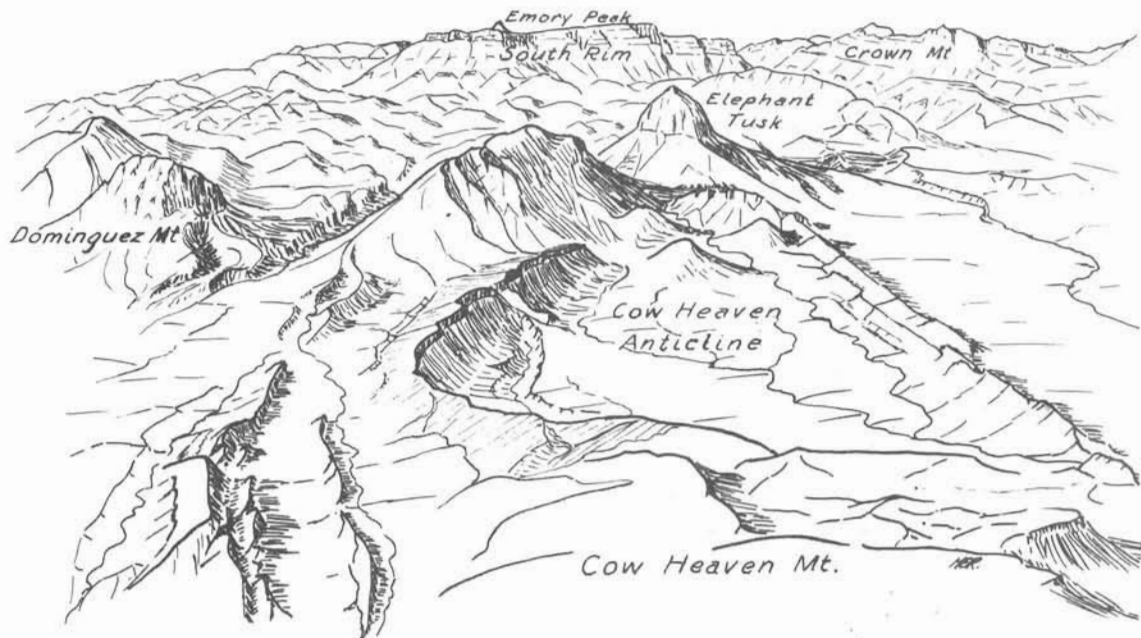


AS WE CIRCLE PUNTA DE LA SIERRA TO HAVE A GOOD VIEW OF THE NORTHERN PART OF THE CHISOS MOUNTAINS SOME INTERESTING EVENTS IN THE STORY OF VOLCANIC ACTIVITY ARE REVEALED. THE FIVE BANDS IN THE BLACK CREST OF THE RIDGE IN THE FOREGROUND INDICATE THAT LAVA (THE CHISOS FLOWS) COVERED THIS AREA AT LEAST FIVE TIMES. ALTHOUGH THE STREAMS HAVE CARRIED AWAY A GREAT DEAL OF THE LAVA ITS PRESENCE IN PUNTA DE LA SIERRA, IN THE SOUTH RIM, AND ELSEWHERE IN THE BIG BEND IS A MEASURE OF ITS DEVASTATING EXTENT, AND THE PRESENT DIFFERENCES OF ELEVATION OF THESE AREAS SHOW HOW MUCH THE FLOWS HAVE BEEN WARPED AND BROKEN SINCE THEY WERE FORMED.

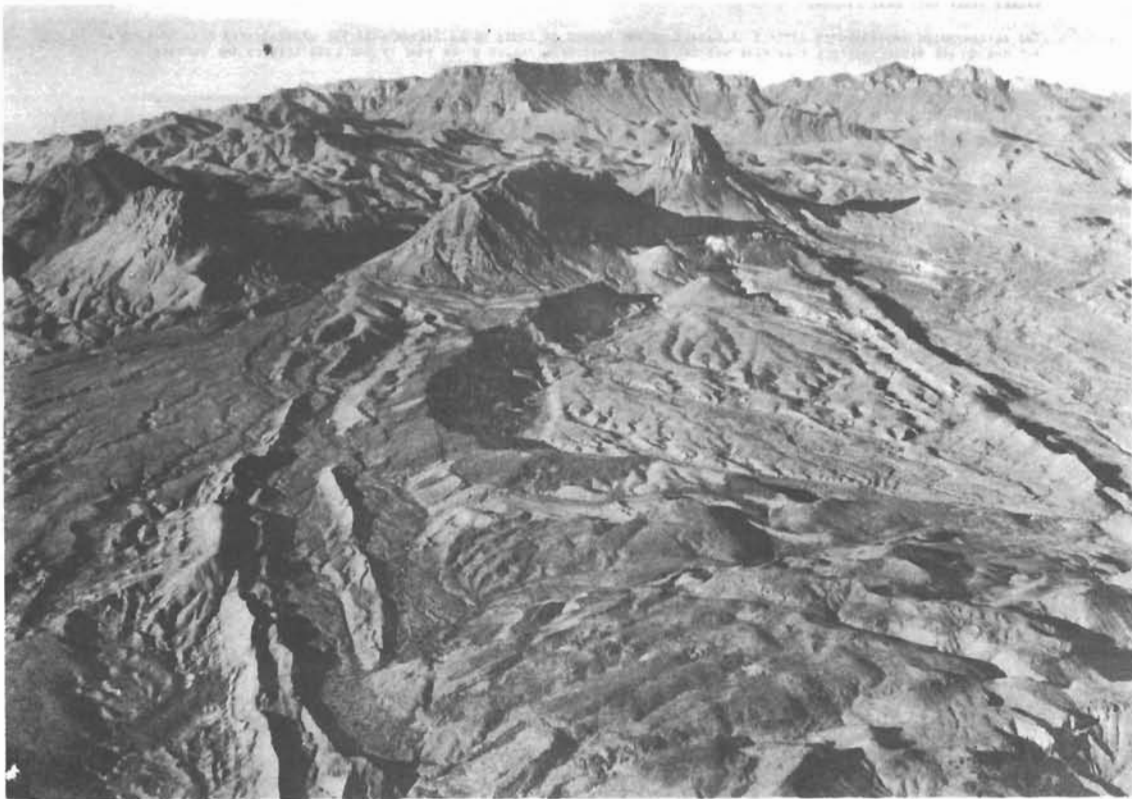
THE ALIGNMENT OF THE ISOLATED PATCHES OF BASALT ON THE FLANKS OF PUNTA DE LA SIERRA WITH THE WEDGE-SHAPED MASS OF LAVA AT THE END OF THE RIDGE SUGGESTS THAT HERE WAS ONE OF THE FISSURES THROUGH WHICH SOME OF THE LAVA REACHED THE SURFACE.

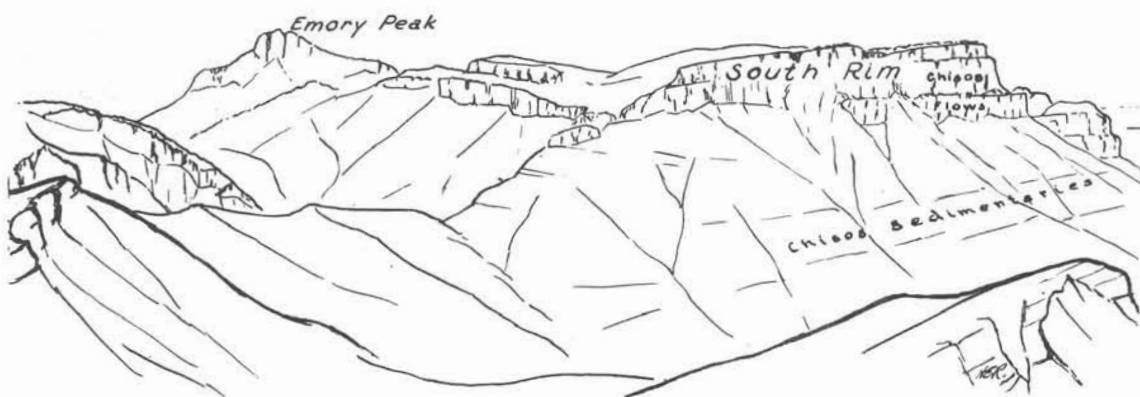


LOOKING NORTH
PLANE FOUR MILES WEST OF LINSEY'S MINE



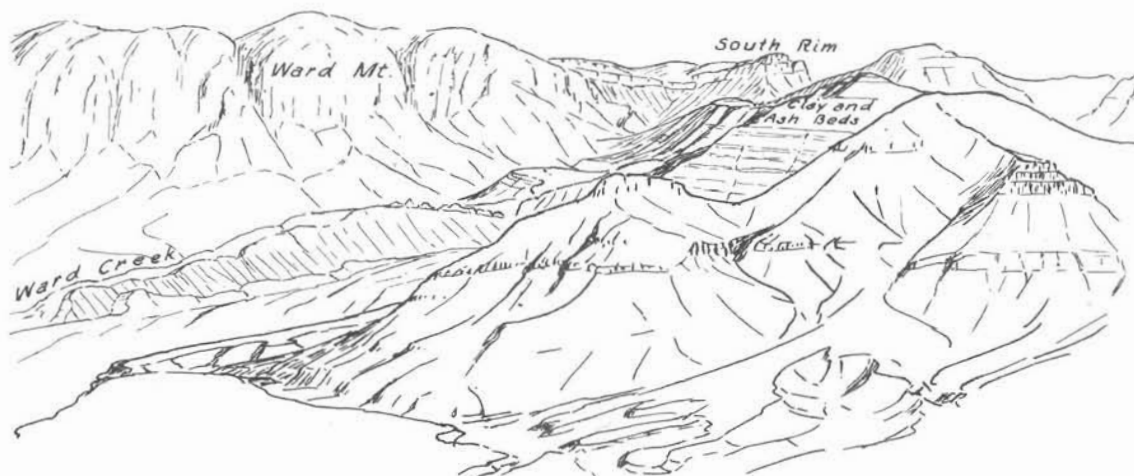
THE PARALLEL RIDGES IN THE FOREGROUND ARE THE UPTURNED, BEVELLED EDGES OF ROCKS WHICH WERE FOLDED DURING ONE OF THE PERIODS OF UPLIFT IN THE ROCKY MOUNTAINS. THE PERIOD OF EXTRUSIVE VOLCANIC ACTIVITY DURING WHICH MOST OF THE ROCKS OF THE CHISOS MOUNTAINS WERE FORMED CAME LATER. THE MOUNTAINS IN THE FOREGROUND ARE CALLED COW HEAVEN MOUNTAINS BECAUSE OF THE GOOD STAND OF CHINO GRASS WHICH GREW THERE BEFORE THE AREA WAS OVERGRAZED. THE STRUCTURE FORMED BY THE UP-FOLDED ROCKS IS CALLED THE COW HEAVEN ANTICLINE.





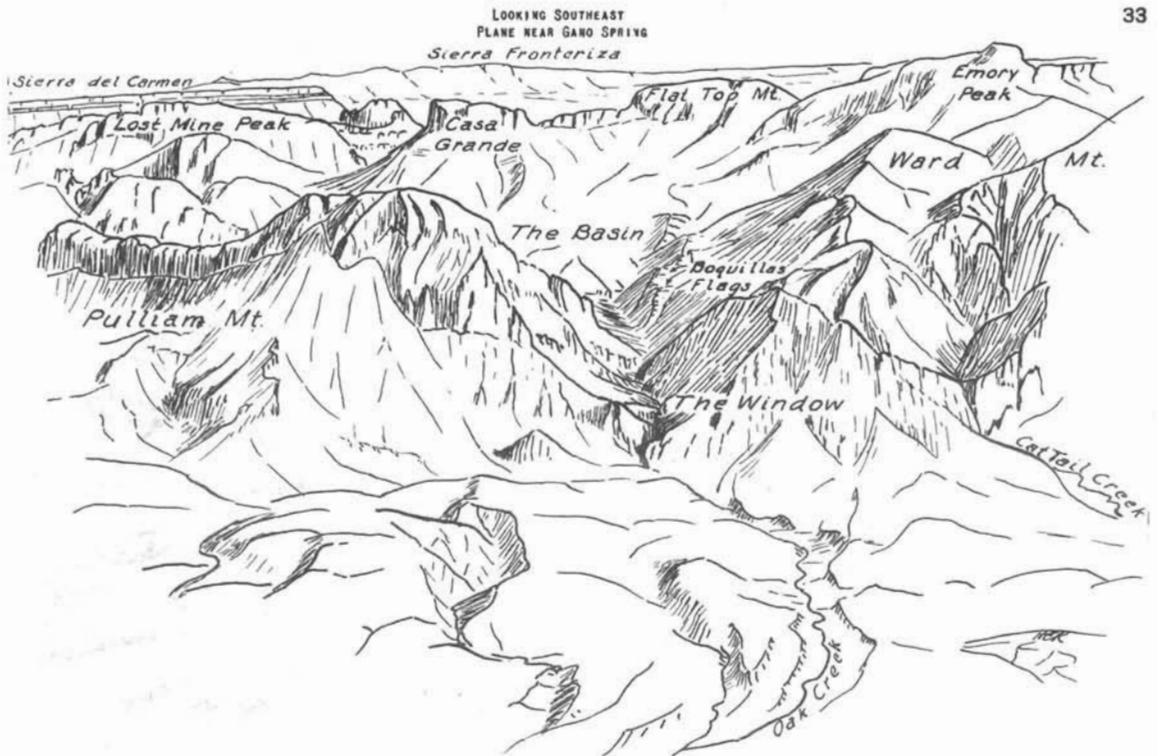
A CLOSE-UP OF THE SOUTH RIM, WITH ITS PRECIPITOUS CLIFFS ALMOST 1000 FEET HIGH SHOWS CLEARLY THREE OF THE LAVA FLOWS OF WHICH IT IS FORMED. THE ORIGIN OF THE LAVA IS NOT DEFINITELY KNOWN. IT MAY HAVE COME FROM EMORY PEAK (ELEVATION 7835 FEET), THE CORE OF AN EXTINCT VOLCANO. IT MAY HAVE COME FROM SOME UNDISCOVERED VOLCANO, OR FROM FISSURES WHICH NOW SHOW NO CONNECTION WITH THE LAVA BEDS. THE DARK COLORED LAVA FLOWED OVER AN UNEVEN SURFACE WORN IN THE LAYERS OF GRAY VOLCANIC ASH, CLAY OR CONGLOMERATE (CHISOS SEDIMENTARIES) MOST OF WHICH WERE DERIVED FROM VOLCANIC ROCKS FORMED DURING AN EARLIER PERIOD OF RUPTION.





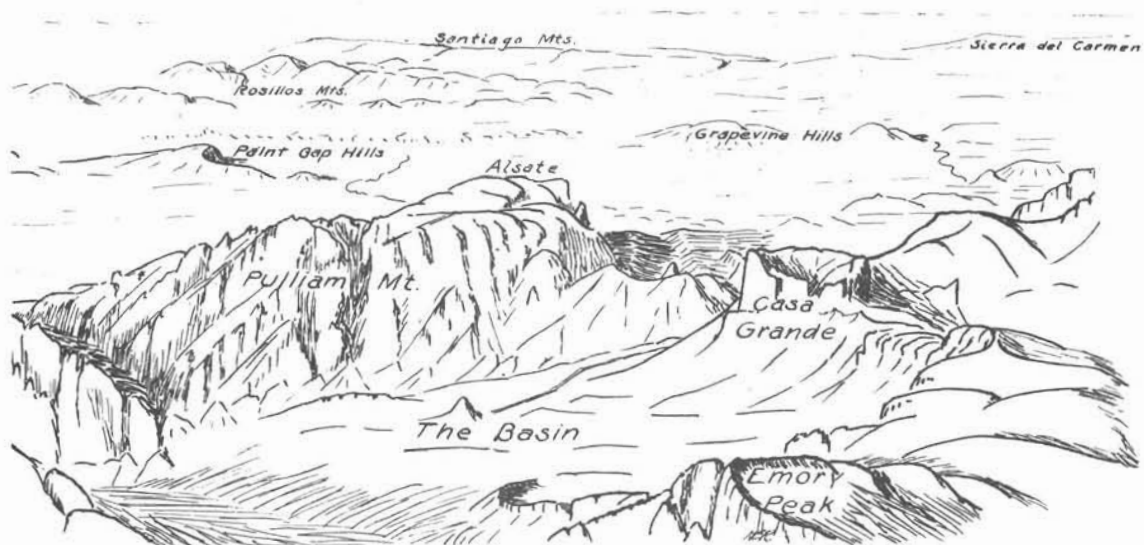
ONLY A SMALL PORTION OF THE STORY OF VOLCANISM (IGNEOUS ACTIVITY) IN THIS AREA HAS BEEN UNRAVELLED, BUT THREE DISTINCT PHASES HAVE BEEN RECOGNIZED. ALL THREE ARE REPRESENTED IN THIS PHOTOGRAPH. THE LIGHT GRAY BEDS (CHISOS SEDIMENTARIES) REPRESENT AN EARLY PERIOD OF ACTIVITY DURING WHICH VOLCANOES LOCATED OUTSIDE OF THE PARK AREA - PROBABLY AT CONSIDERABLE DISTANCE - ERUPTED ASH AND LAVA WHICH WAS DISINTEGRATED AND CARRIED BY WIND AND WATER TO THIS AREA. ANOTHER PHASE IS REPRESENTED BY THE HOLTON ROCK THAT CRYSTALLIZED UNDERGROUND (INTRUSIONS) SUCH AS WARD, PULLIAM AND MAVERICK MOUNTAINS. A THIRD PHASE, BUT NOT NECESSARILY A LATER ONE, CONSISTED OF THE OUTPOURINGS (EXTRUSIONS) OF LAVA (CHISOS FLOWS) WHICH FORMED SOUTH RIM, SIERRA DE LA PUNTA, THE MOUNTAIN IN THE FOREGROUND AND OTHERS.





THE TWO V-SHAPED NOTCHES IN THE WEST SIDE OF THE MOUNTAINS HAVE BEEN CUT BY CAT TAIL CREEK, WHICH CONTAINS THE ONLY SWAMPS IN THE AREA, AND OAK CREEK, WHICH DRAINS THE BASIN. THE OUTLET OF OAK CREEK IS CALLED THE "WINDOW" BECAUSE THROUGH IT THE VISITOR TO THE BASIN MAY OBTAIN SPECTACULAR VIEWS OF THE DESERT BELOW. THE POINTED SEGMENTS OF BOQUILLAS FLAGS ARE HUGE SLABS OF HARDENED LIMESTONE THAT WERE PUSHED UP SEVERAL THOUSAND FEET BY WARD MOUNTAIN WHEN IT WORKED ITS WAY TOWARD THE SURFACE AS A MOLTEN MASS.





THE BASIN IS A STADIUM OF TITANIC PROPORTIONS IN WHICH THE FORCES OF EROSION HAVE BEEN BATTLING AGAINST THE ENCIRCLING CLIFFS WEARING THEM AWAY AND DUMPING THE DEBRIS INTO THE AMPHITHEATER. AT THE NORTHEAST END OF PULLIAM MOUNTAIN CAN BE SEEN THE PLATED HEAD-DRESS, FOREHEAD, AND NOSE OF THE STONE LIKENESS OF ALSATE, THE LEGENDARY APACHE CHIEF WHOSE SPIRIT PRESIDES OVER THE CHISOS MOUNTAINS, AND WHOSE IMAGE ETERNALLY WATCHES THE PASS IN THE SANTIAGO MOUNTAINS.



