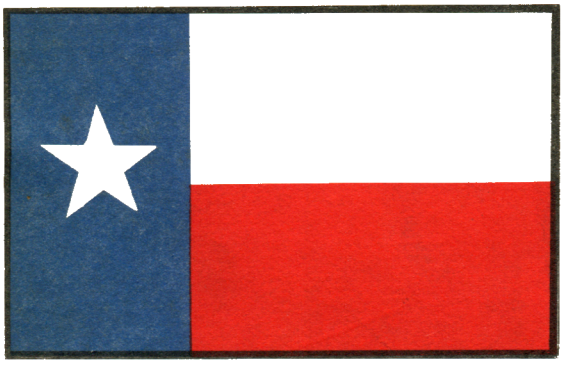
A GUIDE TO THE CAVES OF TEXAS

edited by James R. Reddell



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A G U I D E T O T H E C A V E S O F T E X A S

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T A B L E O F C O N T E N T S

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PHOTOGRAPH AT LEFT: Resembling a giant coralloid geode, a cave in the vast Edwards Limestone in West Texas is filled with wonders for a cautious and curious explorer. (Caverns of Sonora)

INTRODUCTION

Little has been published on the caves of Texas since the publication in 1948 of The Caves of Texas as BULLETIN TEN of the National Speleological Society. A few caves have been described in the NSS NEWS and some material from THE TEXAS CAVER has found its way into the SPELEO DIGEST. In general, however, little is known of Texas caves outside the state. It is the main purpose of this guidebook, therefore, to serve as a general introduction to Texas caves.

Texas' size, probably it's best known characteristic, serves both as an aid and a hindrance to cavers. It has enabled cavers to become familiar with a great diversity of caves within their home state, and yet at the same time has meant that frequently far more time must be spent traveling than caving. This year's Convention field trips, and in particular the pre-Convention trip, necessitates a considerable amount of travel. For conventioneers accustomed to an abundance of large caves within a comparatively short distance, this may seem more inconvenient than it is worthwhile. However, it is felt that the beauty, size, and diversity of the three caves on the pre-convention agenda will make the travel worthwhile. These caves are the best that Texas has to offer. They are among the most spectacular and best-known caves in the state, and people cannot leave Texas without seeing them and still do justice in sampling the state's caves.

Maps and detailed descriptions are supplied for the caves on the Convention field trip agenda, shorter descriptions of Texas' commercial caves are given, and a small selection of near-by and well known caves is made, giving descriptions and locations. This, together with sections on the geology of the state and the distribution of caves, should serve as an adequate introduction for anyone entering Texas for the first time. An appendix on caving areas in Mexico is included in the hope that people who wish to spend much time in the South will visit one of the real frontiers of speleology. This area has been given much attention by members of the University of Texas Grotto during the past few years, and it is probable that some of the deepest and most noteworthy caves will be found there.

Cavers who wish to search for new caves, or those who wish to visit caves not in the Guidebook are urged to contact members of the Texas Speleological Survey for information. The Survey has the most complete cave files ever compiled in the state and a near complete file of USGS topographic maps of the state. This material will be made available at the Convention. Copies of reports on caves in a few counties in Central and West Texas will also be on sale, and people wishing to do caving in these counties are urged to buy copies.

A few words are well in order here on conservation and rancher relations. Although much has been said on both of these subjects, the fact remains that some of Texas' more interesting and beautiful caves are now closed and others badly vandalized. This point should be stressed none too lightly. Those caves which remain both open and beautiful are usually recent discoveries. Caves such as Caverns of Sonora have seen gates, restricted entrance, and natural difficulties preserve most of their original beauty. Damage in even these caves has at times been considerable. Other well known caves have seen complete destruction of their formations. Much of this damage has been done thoughtlessly and needlessly by people who supposedly "knew t h e rules." For these people, and to remind everyone of their responsibility, the basic rules of conservation are summarized below.

1 - Take care in passing through formations areas. In some caves to be visited there are notable areas of beautiful and delicate formations. Heavy traffic in these areas will necessarily and unavoidably bring about some damage. Only the very greatest of care can prevent serious breakage or destruction of these areas. Keep to trails at all times and be careful.

2 - Remove and bury spent carbide. Carbide should never be dumped in a cave. It should be removed from the cave in some container, a bag, or spare lampbottom. This is especially important during the Convention because of the heavy traffic to which some of the caves will be subjected. The fact that carbide has been dumped openly on the ground in some caves is no excuse for anyone to follow suit.

3 - Do not collect cave fauna. An intensive study of the cave fauna of Texas is underway by the Texas Speleological Survey; the collection of animals is, therefore, strongly discouraged.

4 - Cave owner relations is important. Because of past malpractice, in most cases a breach ofhospitality,

many of Texas' better known and more interesting caves are now closed to all cavers. Many times this has not been the fault of cavers, but of local people. However, in many instances it has been the caver's fault. Caves in Texas are almost without exception located on private ranches, frequently quite large ones. No one should ever enter a cave without first obtaining the permission of the owner. Some ranchers will not hesitate to call out the Sheriff if trespassers are caught. This ruins caving on the ranch and in the area for many years. For this reason no caves are located except by owner. In every instance directions are given to the owner or manager of the land. Too many times the possibility of inconvenience to cavers causes them to forget their role as guest and to assume that the exploration of a cave is their "right". People wishing exact locations to caves may obtain them from the Texas Speleological Survey if for some reason this is necessary.

All of these points should be familiar to NSS members. They are intended merely as reminders in the hope that further unfortunate incidents will not occur. The complete cooperation of all cavers in and out of the state is requested and will be greatly appreciated.

Most of the material in this Guidebook has come from the files of the Texas Speleological Survey and the geology section has been written by the geologist for the Survey, Ruben M. Frank; the cartography has been done by Survey cartographer, A. Richard Smith and the Appendix on Mexican caves has been prepared by William H. Russell, an associate of the Association for Mexican Cave Studies. The author wishes to express his special thanks to each of these for their critical reading of the entire manuscript.

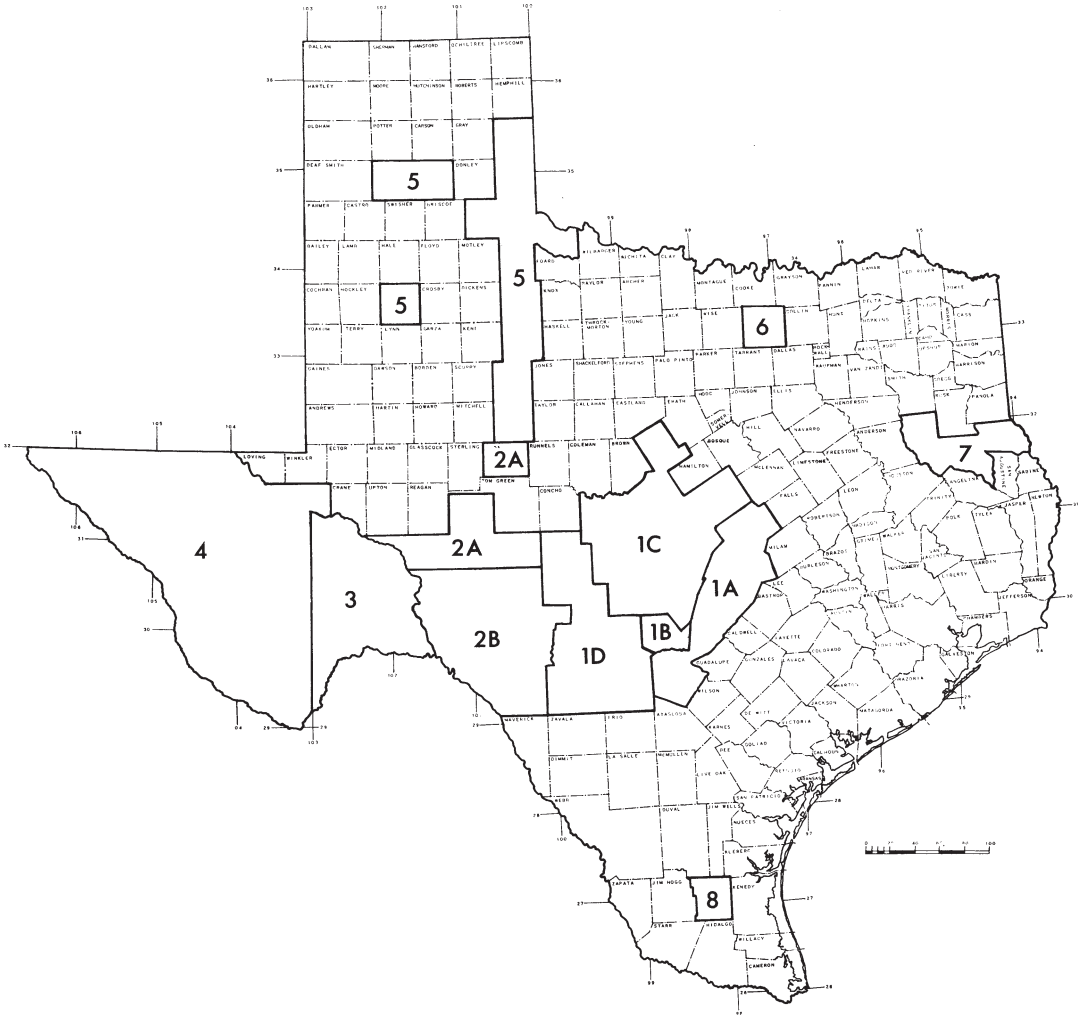
James R. Reddell, Editor

DISTRIBUTION OF CAVES

Texas may be roughly divided into four speleologic provinces, herein designated as Central, West, Far West and Northwest Texas (see map). North, East, and South Texas are of no real speleological interest, although a few caves are known from each area. Small exposures of gypsum and limestone occur throughout these parts of the state, but are lithologically unsuitable for the development of many or large caves.

Texas has been naturally divided by the escarpment of the Balcones Fault Zone, which extends north-south from Williamson County, runs through Austin and San Antonio, where it turns west, and cuts through Medina, Uvalde, and Kinney Counties. East of the fault zone the sediments are non-cavernous. To the south of the main fault zone a few caves are found where block faulting has exposed cavernous limestones. West and north of the fault, on the upthrown side, the Lower Cretaceous limestones of the Comanche Series are exposed. These extend in a virtually unbroken line through most of the Central and West Texas areas of the state and constitute the principal cavernous limestones of the state. The only other important cave-formers in Central Texas are sediments of Ordovician age, located in the Llano Region. Because of the remoteness and size of Far West Texas it is difficult to present a reasonable summary of cavern development in the area. It encompasses the six large counties of Presidio, Jeff Davis, Reeves, Culberson, Hudspeth, and El Paso, and the western halves of Brewster and Pecos Counties. Although much of Far West Texas is unsuited for caves, large cavernous areas are still very inadequately investigated.

Speleologically, the Central Texas area may be sub-divided into four major regions. The first of these is the Balcones Fault Zone, encompassing the counties of Bell, Williamson, Travis, Hays, eastern Comal, and Bexar. The area is one of numerous small caves, Travis with 105, Williamson with 69, and Bexar with 65. Although, in general, caves in the area are small, a few are among the largest and most extensive in the state. Among these are Cobb Caverns and Laubach Cave in Williamson County, Natural Bridge Caverns and



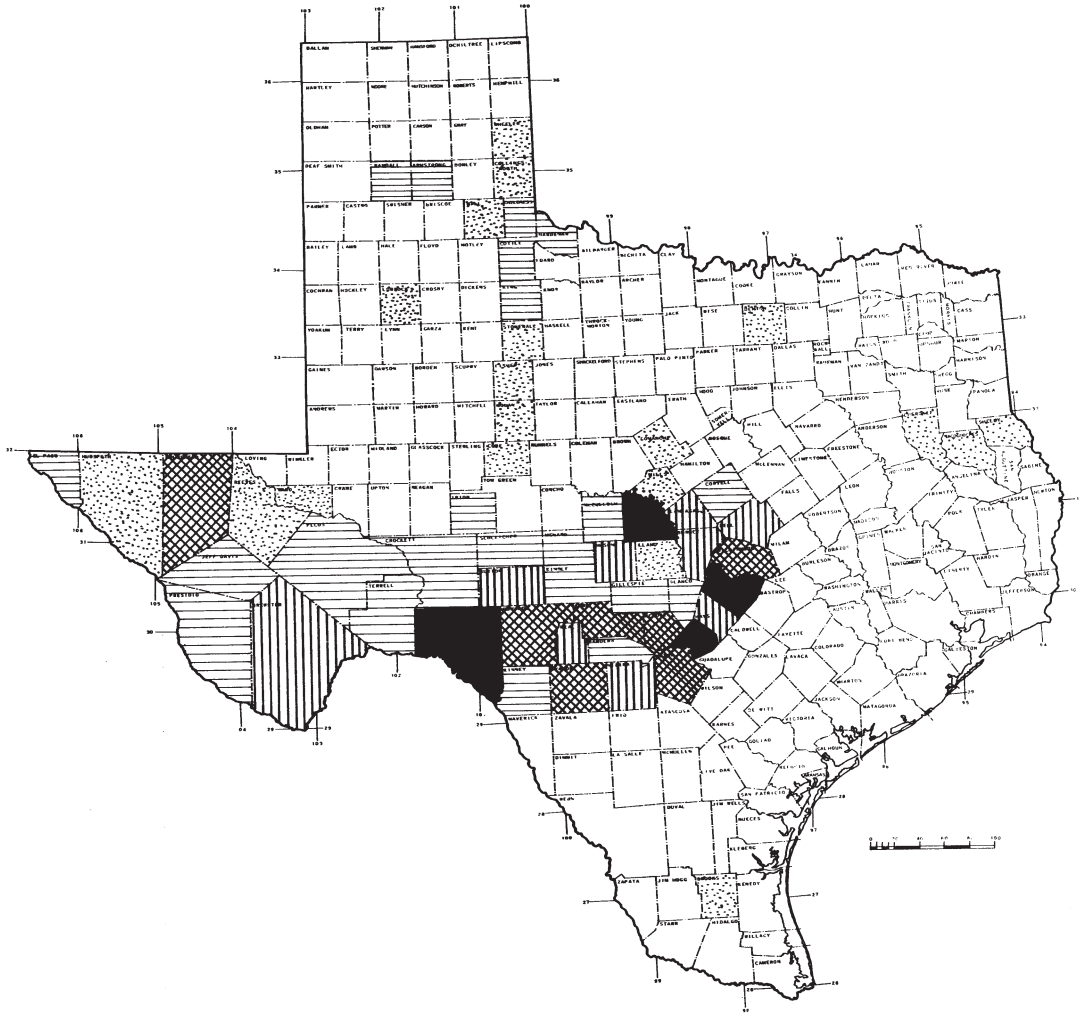
1	CENTRAL TEXAS
1A	BALCONES FAULT ZONE
1B	GUADALUPE RIVER AREA
1C	LLANO AREA
1D	WEST CENTRAL TEXAS
2	WEST TEXAS
2A	NORTHERN
2B	CENTRAL
3	TRANS-PECOS TEXAS
4	FAR WEST TEXAS
5	NORTHWEST TEXAS
6	NORTH TEXAS
7	EAST TEXAS
8	SOUTH TEXAS

SPELEOLOGIC REGIONS OF TEXAS

Bracken Bat Cave in Comal County, and Robber Baron's Cave in Bexar County. The Guadalupe River area is the second to be considered, encompassing Kendall and north western Comal Counties. A large part of the drainage in this area is by way of sinks and caves, which in turn lead into large stream passages which emerge as springs in creeks draining into the Guadalupe River. Among the most important of these springs are Spring Creek Cave, Honey Creek Cave, and the Spring issuing from the Dead Man's Cave entrance of the Century Caverns-Dead Man's system. Besides these large stream passages, which attain miles in length, there is a potential of several hundred small and medium-sized caves. The third area is that of the Llano Region. Here considerable fracturing and faulting has produced a situation similar to that along the Balconss Fault Zone, except on a potentially greater scale. The area includes the counties of Llano, Mason, Gillespie, San Saba, McCulloch, Doryell, Lampasas, Blanco, Burnet, Mills, and Comanche. Much of Mills and Comanche Counties is covered by non-cavernous sediments and most of Llano County is covered by igneous and metamorphic rocks, so that few caves will probably be found in them. Much of the rest of the area, however, is covered by Ordovician limestones and dolomites of the Ellenberger Group and contains numerous caves, including Gorman Cave in San Saba County and Longhorn Caverns in Burnet County. San Saba, with 122 reported caves, contains more than any other county in the state and will probably be found to contain more than twice that number. With a few exceptions only small caves will probably ever be found in the county. The most important caving area in Central Texas is that designated as West Central Texas. This includes Menard, Kimble, Real Kerr, Bandera, and Uvalde Counties and contains caves distinguished by large rooms or long stream passages. The area is essentially an overlap between the eastern and western extremes of the Edwards Plateau; it is, therefore, a transition zone between the extreme jointing and faulting which has produced numerous small caves and the principal exposures of primarily unfaulted limestones. Menard and Kimble Counties have been seldom visited and, therefore, have few known caves. The area, however, holds considerable promise as is attested by the presence of Powell's Cave, the longest surveyed cave in the state, in Menard County. The caves of Kerr and Bandera Counties, when more than small pits, are made up of large rooms, as in Station "C" Cave No. 1. Much of the area, however, has been

considerably eroded with resultant collapse and filling of many caves. Obviously large caves such as Goat Shelter and Priour's Pride are now filled almost entirely by the collapse of huge rooms. The only caves in the area of any extent, with a few exceptions, are those with relatively small holes opening into the center of large rooms. Cavern development in Medina and Uvalde Counties, however, has been of a different order. Although large rooms exist, as in Frio and Ney Caves, most of the large caves are long stream passages as in Indian Creek Cave and Valdina Farms Sinkhole. These constitute some of the largest and most interesting caves in Texas. Almost all of the water found in the area comes from caves such as these and a study of them should reveal considerable information of value to a study of the hydrology of the area.

The greatest caving area in the state is that of West Texas. It may be subdivided into at least three major divisions. The first of these, Northern West Texas, is an area of large sinks and few caves. It includes Irion and Schleicher Counties and the Northern part of Crockett County. The surface is flat, barely eroded, and most of the drainage is by large sinks. Sinks and sinkhole lakes as much as 500 feet or more in diameter and 50 to 100 feet deep are found in abundance. The only caves of any consequence are O-9 Well in Crockett County and Cave "Y" in Schleicher County. The presence of many caves without entrance is well testified both by the almost complete sinkhole drainage and by large cavities hit by well-drillers. The second major sub-division is the large cavernous areas of Central West Texas. In southern Crockett, Sutton, Edwards, Kinney, and eastern Val Verde Counties large caves are found. It is an area of great diversity, with caves of such varying natures and origins as the maze-like Caverns of Sonora in Sutton County, large pits such as the Devil's Sinkhole and Abominable Sinkhole in Edwards and Val Verde Counties, large passages such as Fern Cave and Kickapoo Cave in Val Verde and Edwards Counties, and deep caves like Deep Cave and H. T. Miers Cave in Edwards and Val Verde Counties. Although much work has been done in the area, the presence of other large caves is rumored and the possibility of locating still more is considerable. A third area to be considered is that of western Val Verde, Terrell, and eastern Brewster and Pecos Counties. The only part of the area that has been studied intensively is near Langtry in western Val Verde County. Here 18 caves are known, 14 within five miles of the town of



NUMBER OF CAVES PER COUNTY	SYMBOL
80 OR MORE	
40 TO 79	
20 TO 39	
5 TO 19	
1 TO 4	
0	

DISTRIBUTION OF TEXAS CAVES

Langtry. These include the state's deepest cave, Langtry Lead Cave, and three other caves deeper than 250 feet. Only seven caves are known from Terrell County, but three of these are large and the potential for finding large caves both here and in eastern Pecos and Brewster Counties is great.

Far West Texas includes an area larger than the entire state of West Virginia; yet only 76 caves are known in the area and many of these have not been studied. It is highly complex geologically and much of it is not suited for cavern development. The areas, however, that are likely to contain caves or are known to have caves may well prove to be among the best in the state. Most of the caves reported from Presidio County are small solution pockets, seldom more than 30 or 40 feet long, in rhyolite of the early Oligocene. Comanche limestones are exposed near Shafter and should contain caves. In Brewster County west of the 103rd meridian the principal cavernous limestones are of Permian age in the Glass Mountains and exposures of the Comanche Series near Terlingua. Although numerous caves are rumored to exist in the Glass Mountains, few have been found and the only one known to be of any extent is 400-foot Cave. Other caves visited in the area have proven to be small, but the area is rough and permission to enter difficult to obtain so that other large caves certainly may exist. Most of Reeves County is covered by Quaternary deposits and most of Jeff Davis County by igneous rocks, but along the Jeff Davis Reeves County line there are exposed Cretaceous limestones of the Comanche series. It is from this limestone that the cave spring near Balmorhea State Park issues. Both this cave and other caves near it are fairly large; the area, however, is small and it is doubtful that many other caves will be found.

One of the greatest potential caving areas in Texas lies in Culberson County, which is covered mostly by Permian limestone and gypsum. Three ranges of mountains exist in the area, all of which are cavernous. These are the Guadalupe Mountains, the Delaware Mountains, and the Apache Mountains. Caves are known to exist in the Apache Mountains and are rumored from both the Guadalupe and Delaware Mountains. Some work has been done in the area, much of which appears to be unsuitable for caves, the thickness of the limestone deposits is great and the potential for finding large caves is high. The principal caving area in Culberson County, however, is the great gypsum plain, which extends from the Texas-New Mexico border on the north

almost to Kent on the south and from the Delaware Mountains on the west to the Rustler Hills on the east. No major streams cut across the area, drainage being almost exclusively by way of sinks and caves in the gypsum. Much of the area is covered by non-cavernous deposits, but where the gypsum is exposed many caves are to be found, some fairly extensive. In an area of one square mile just south of the Texas-New Mexico state line twenty caves are known, one in excess of 1,000 feet long and several in excess of 250 feet. Although forty caves are known from the county only isolated patches have been investigated. The country is quite fough and there are few roads and fewer people. When the county is adequately covered, it will doubtless be found to contain hundreds of caves. The most distinctive cave in the county is Plateau Cave, located in the southwestern part of the county. The first 100 feet of the cave is in conglomerate sandstones which collapses into Permian limestone. Total depth of the cave is 350 feet, but little passage is known. Much of Hudspeth County is covered by Quaternary sediments, but in the Sierra Diablo there are extensive exposures of Permian limestone and a large exposure of Cretaceous limestone in the central part of the county. The four known caves in the county represent only a fraction of those which probably exist. Reports of large caves such as the Hudspeth County Shaft indicate the possibility that it may become a major cave county once it is better known. Most of El Paso County is covered by non-cavernous deposits, but two mountain ranges are known to be cavernous. The most important is the Hueco Mountains from which one 300-foot deep cave is known and other caves are rumored. The other mountain range is the Franklin Mountains near the far western border of the county. Only one cave has been reported from the range but others are rumored. In general, the far western portions of Texas constitute one of the principal speleologic frontiers of the United States. The presence of caves exceeding 300 feet in depth and the rumored vast caverns of Brewster, Hudspeth, and Jeff Davis Counties indicate a potential of cavern discovery greater than any now known in the state.

The caving area most recently investigated is the extensive gypsum area of Northwest Texas. This area includes the counties of Nolan, Fisher, Stonewall, King Hardeman, Cottle, Childress, Collingsworth, and Wheeler Counties. Caves in gypsum are known in Armstrong County and in sandstone from Randall County, where the Palo Duro Canyon has cut through Triassic red beds and into

the Permian gypsum beds. Recent explorations have revealed the presence of 57 known caves. Although many of the caves are small, others exceed 3,000 feet where large streams have been pirated by caves. The largest and most interesting system is River Styx Cave in King County. This cave has been explored for 7,000 feet with much left unexplored. The cave is located in an area of karst, most drainage being entirely by large sinks and closed valleys, some up to one-fourth mile long and 100 feet deep. Although the caves in gypsum are rumored to be highly unstable, it is doubted if little or any collapse occurs except during the violent floods to which many are subject. Caves are also known from Lubbock County where a thin bed of limestone has been exposed in the walls of the canyons of the Double Mountain Fork of the Brazos River. These are quite small, and although other caves will probably be found in this and neighboring counties, no large caves will probably ever be found.

Of only passing interest are the isolated counties throughout the state which contain caves. Denton County, is North Texas, has one cave reported from it. Nothing is known of it except that it houses the relapsing fever tick. Nacogdoches and Shelby Counties in East Texas are known to have a few small caves of little, if any, consequence; Cherokee County contains at least two man-made caves in sandstone of some historical interest. The southernmost county in Texas containing caves is Brooks, where one now-destroyed cave is reported in gypsum and others are rumored. The outcrop, however, is small and few caves are to be expected from this or neighboring counties.

With about 1,500 caves cataloged in the state it may be assumed that the study of speleology in Texas is at last seriously underway. The rate at which caves are being discovered has increased tremendously; should this pace be maintained for long, the known caves in the state will more than double within a few years. It is interesting to note that in the last four years five of the longest caves in the state have been discovered and/or fully explored. An increase in the number of serious cavers in the state, publication of the Texas Speleological Survey, and an increased interest in Far West Texas give great promise that the systematic study of known caves will continue and that other caves as large or larger than any now known will be discovered.

T H E G E O L O G Y O F T E X A S

by Ruben M. Frank

INTRODUCTION

Due to the rather large area involved, I shall restrict my comments to a brief mention on the overall geology of the state and elaborate only on those areas and rocks which are of speleologic importance. The accompanying maps, though greatly generalized, will give some idea of the geology of the state and the relation of the caving areas to it. A more detailed geologic map with cross sections, structure, and physiographic provinces will be on display during the Convention for your inspection.

GEOLOGIC HISTORY

Texas has had a moderately complicated geologic history. The state has been transgressed by seas several times since the Precambrian, and two mountain building orogenies have occurred within its boundaries. The results of one of these orogenies, the Ouachita, has been covered by deposition of later sediments, however, so that the only part of the state that remains structurally complicated is the far west.

The crystalline basement rocks of the Precambrian are poorly exposed and very little is known of their history. The oldest Cambrian rocks are of marine origin, and the sea that covered Texas at that time prevailed during most of the Paleozoic Era.

This provided an environment for the deposition of varied types of marine sediments. A particularly thick sequence of strata was deposited in the subsiding Ouachita Geosyncline. This narrow trough was located approximately along the line of the present Balcones Fault Zone. (See geologic map) It extended northward into Oklahoma and westward into the Big Bend region of Texas.

Toward the end of the Paleozoic Era, during the Mississippian Period, a mountain building orogeny began. The sediments in the Ouachita geosyncline underwent compressive forces and were greatly folded and faulted resulting in the O u a c h i t a Mountains. This orogeny continued into the Permian Period, and the mountains provided the source of sediments that were deposited in the sea to the north

and west of the mountain range. As this sea became shallower toward the end of the Permian, a large reef complex was being built up in West Texas and eastern New Mexico. The reef further restricted the sea so that in the late Permian Period, evaporites were deposited extensively over the northwestern part of the state.

By the beginning of the Mesozoic Era, most of Texas was a land area and continental sediments were deposited over the Permian evaporates. In the middle Mesozoic, during the early Jurassic Period, a shallow sea invaded southern Texas and by the middle of the Cretaceous Period the state was almost completely covered by this sea. As a result, Cretaceous limestone was deposited extensively over the state.

During the next period, the Tertiary, orogenic movements occured which produced the present-day Rocky Mountains. The southern end of this chain of mountains extends into far west Texas. Volcanic activity concurrent and subsequent to the Rocky Mountain orogeny also produced many igneous rocks in the same area. Deposition of continental Tertiary sediments, derived from the Rocky Mountains in New Mexico, occurred on the High Plains in the panhandle of Texas. Meanwhile, the sea was receding to the east and be the Early Tertiary the shoreline was roughly parallel to the present day coast, but about 200 miles inland. During the remainder of the Tertiary, the sea continued to recede eastward leaving behind sediments of sand and clay.

Near the middle of the Tertiary, in the Miocene Epoc, major faulting began across Central Texas. Fault movement continued on through the Pliocene Epoc and into the Quaternary, producing the Balcones Fault Zone. This fault zone is downthrown to the east and has as much as 1,000 feet of displacement. The resulting escarpment extends from Williamson County south to Bexar County where it turns west and continues as far as Kinney County.

STRATIGRAPHY

The great majority of Texas caves occur in some fifty counties in the northwest, central, and southwest part of the state (see distribution map). There are only five known caves on the Gulf Coastal Plain and two of these are man made. There are only a few small caves and shelter caves in the High Plains of the panhandle of Texas. Much of far west Texas contains igneous and sedimentary rocks which are poorly suited to cavern development. Almost all of the caves in the

state are in rocks of Ordovician, Permian, and Cretaceous age. It was during these times that considerable thicknesses of evaporites and blanket and reef carbonates were deposited. The following discussion will, of course, concentrate on rocks of the above ages with only a mention of the non-cavernous strata. Additional specific information about the geology of Texas may be gained by reading the articles listed in the bibliography at the end of the book.

Lower Paleozoic - There are no known caves in Texas occuring in Precambrian or in Cambrian strata. The first speleologically important lithologic unit, the Ellenberger Group, was deposited during the Ordovician Period. The Ellenberger has been divided into three formations: the Tanyard, the Gorman, and the Honeycut. These formations differ only slightly lithologically and the entire group may be considered as one speleologic unit. The Ellenberger outcrops in the central part of the state and though the outcrop area is small, the unit is the second most prolific cave former, containing hundreds of caves. The Ellenberger is composed of limestone and dolomite, with limestone predominating in the outcrop area. Its' average thickness in the outcrop area is about 1700 feet and it thins to the north. The unit dips regionally a few degrees to the west.

There are two rather curious sidelights on caves in the Ellenberger. The first is bad air caves. To my knowledge, there are only a small number of caves in the United States which contain high concentrations of carbon dioxide. Of the approximately fifty known CO_2 caves in Texas, about 85% are in the Ellenberger.

The second item of interest concerns the ancient filled caves in the Ellenberger. These caves, or sinkholes, occur in a number of places where the Lower Paleozoic rocks outcrop surrounding the Llano Uplift and are known from Burnet, Lampasas, Blanco, and Mason Counties. The ones that occur in Burnet, Lampasas, and Blanco counties are in the upper part of the Ellenberger and are filled with the Lower Devonian Pillar Bluff limestone. They are small, the exposed cross sections being only a few feet in diameter. The sinkholes in Mason County are in the middle Ellenberger and are filled with Middle and Upper Devonian limestones of the Bear Spring Formation and the Zesch Formation, respectively. These are larger and average 200 feet across and several tens of feet deep.

Middle and Upper Paleozoic - There are a very

small number of caves occuring in rocks of Silurian, Devonian, Mississippian, and Pennsylvanian age. Almost all of these are in the central part of the state, a few are in Far West Texas.

In northwest Texas, there is a relatively large outcrop of caverniferous Permian strata. These rocks consist of interbedded gypsum, dolomite, sandstone, and shale. The total thickness of the beds is about 1300 feet. About 100 feet of this is gypsum and dolomite. No one bed of gypsum is more than 30 feet thick, however, and the dolomite occurs only as very thin beds usually not exceeding one foot. The Blaine Formation, which comprises the bottom 600 feet of this sequence,is the most caverniferous. There is another concentration of gypsum in the middle part of the sequence in the Peacock Formation.

Caves within this area are not delimited by the near pure gypsum beds; indeed the ceiling heights of some caves exceed 50 feet where they occur in gypsum beds only 30 feet thick. This is caused either by a collapse of the gypsiferous shale from the ceiling of the cave or by stream erosion of the shales of the floor. The collapse of the ceiling will sometimes result in a cave's acquiring many vertical entrances, such as Ransom Cave in Armstrong County which has 39. Further collapse will result in the formation of an open canyon. Many such canyons occur throughout the area.

In general, the caves of Northwest Texas are small averaging about 500 feet in length. Many exceed 1000 feet, though, and the longest is River Styx Cave in King County, with over 7,000 feet of passageway.

There are scattered patches of Permian limestone and gypsum in the far western part of the state which contain caves. Undoubtedly the most famous of these is the Capitan limestone of the Guadalupe Mountains, in which Carlsbad Caverns is developed. This formation is also exposed in the Glass Mountains farther to the southwest. Here it contains a number of caves, one of which (400 Foot Cave) may be the deepest in the state.

Stratigraphically above the Capitan is a sequence of gypsum and anhydrite known as the Castile Formation. Most of it outcrops in Culberson County on the eastern edge of the Guadalupe and Delaware Mountains. The next higher unit, the Rustler Formation, is exposed in the eastern part of Culberson County and consists of about 300 feet of limestone and dolomite.

Mesozoic - There are a few small caves known to occur in the clays and sandstones of the Triassic

Dockum Group. These rocks outcrop along the eastern edge of the High Plains, in Palo Duro Canyon, and in the valley of the Canadian River in the Panhandle of Texas.

The outcrop area of Jurassic in Texas is restricted to about twenty square miles in the southern area of Hudspeth County in the far western part of the state. It contains no caves.

The areal extent of Cretaceous rocks in Texas is rather large and most of them are limestones. The Lower Cretaceous exposed in the central, southwest, and far west parts of Texas contain the majority of caves. These Lower Cretaceous limestones are delimited to the south and east by their faulted contact with the Upper Cretaceous along the Balcones Fault Zone. In general, they have a regional dip of a few degrees to the southeast except in far west Texas where subsequent deformation has affected them. There is a general thinning and an increase in the amount of interbedded clays, marls, and sands to the northweast so that few caves occur north of Coryell County.

The lowermost Cretaceous unit of any speleologic importance is the Glen Rose Formation. Throughout its entire exposure it is interbedded with marls and in general its lithology is not conducive to cave formation. In the south central part of the state, in Bandera, Kendall, Comal, and Bexar Counties, it is composed of more pure limestone and contains many small and medium sized caves.

The next two prominent cave-forming limestones above the Glen Rose, the Comanche Peak Formation and the Edwards Formation, are lithologically distinct only in the north and north central part of the state. Hydrologically and speleologically they are considered as one unit in south central and southwest Texas. This unit outcrops throughout the Lower Cretaceous exposure. It is composed of massive limestone and dolomite, and much of it is also reef limestone. It ranges up to 1,000 feet thick in the outcrop area but is usually thinner. In southwest and Far West Texas the next higher unit, the Georgetown Limestone, is included with the Edwards and Comanche Peak to form one lithologic formation known as the Devils' River Limestone. The jointed, massive, and reefy character of the Edwards-Comanche Peak make it an ideal cave-former and it ranks first in total number and diversity of caves.

In the southwest part of the state, particularly in Bexar, Medina, Uvalde, and Kinney Counties, the Edwards-Comanche Peak is the primary aquifer. In this

area where ninety percent of all water for industrial and private use comes from wells or springs, the caves in the Edwards-Comanche Peak serve as storage places for these vast quantities of water. In recent years the state and federal governments have become concerned, about the rapid depletion of this water by creating recharge wells. Many of these recharge sites use natural caves as intakes for floodwaters that would otherwise be lost by rapid runoff over sparsely vegetated lands.

The Georgetown Limestone, where it is distinguished from the underlying Edwards, is, in general, not cavernous. Only a few caves in the central part of the state are known to occur in it.

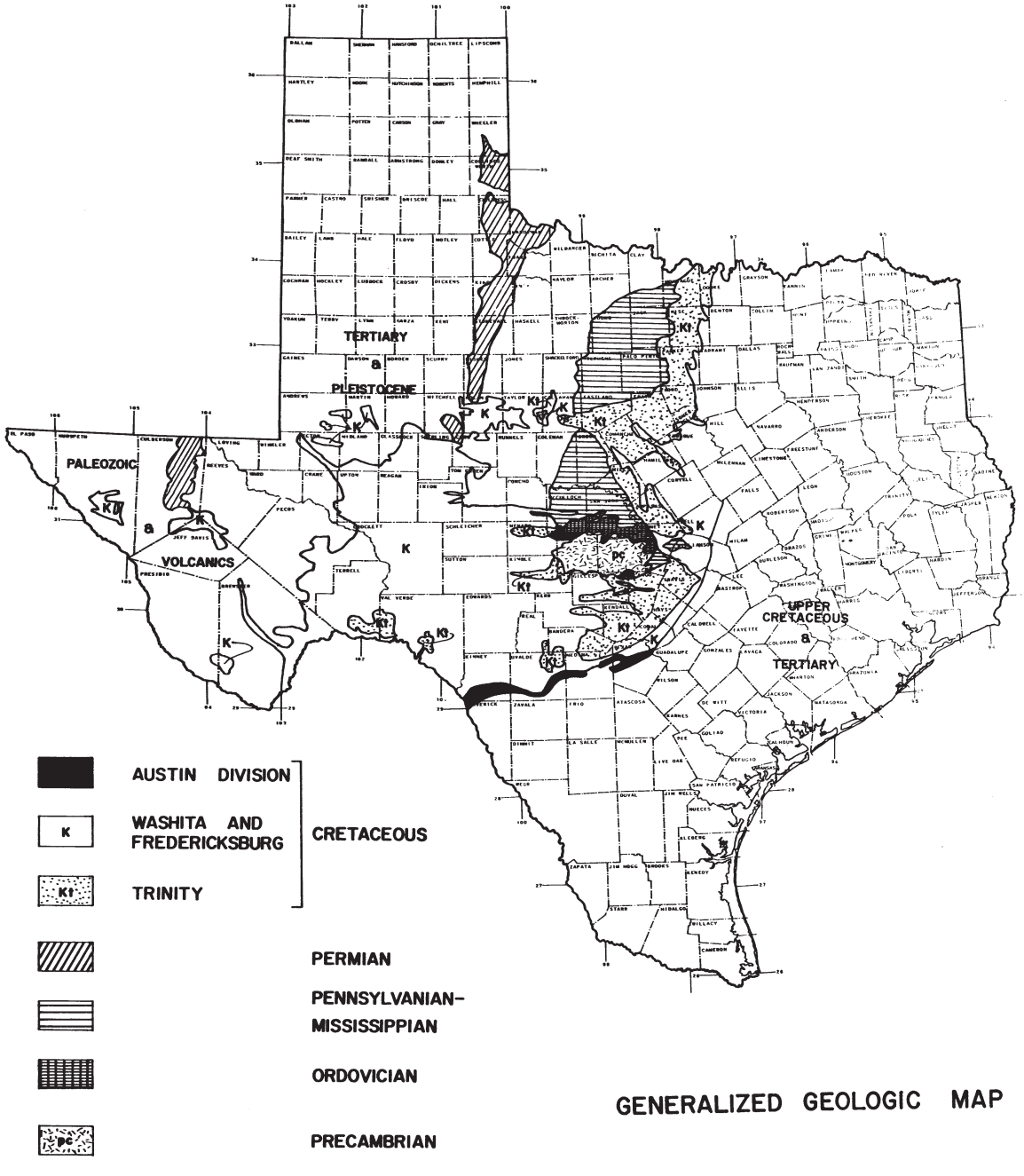
The Buda Limestone is the next higher cavernous unit. In central and south central Texas it is rather thin and marly and is not a good cave former. However, it thickens toward the west and becomes more pure, even resembling the Edwards in places, and in the west and far west it contains a number of small and medium sized caves.

The Austin Chalk is the only Upper Cretaceous formation which contains caves of any significance. Generally it is too marly or flaggy to be a good cave-former, but in the south central part of the state, in Bexar and Medina Counties, it is more massive and crystalline. It has one feature in common with the Ellenberger Limestone; that of bad-air caves. Some of the caves which occur in it contain noticeable amounts of CO_2, although the concentration is generally not as high as it is in those occurring in the Ellerberger.

Cenozoic.- Unfortunately, more than half of the state is covered by Cenozoic sands and clays. As mentioned earlier there are only five known caves from the Cenozoic deposits of the Gulf Coastal Plains. There are a few small caves and shelters in the Tertiary volcanic rocks of far West Texas and about the same amount known from the Tertiary deposits of the High Plains in the Panhandle. It is this latter area that provides the only speleologically interesting note about the Tertiary sediments.

In the northeast part of the Panhandle solution of the underlying Permian gypsum has resulted in deep collapse structures. Some of these involve as much as 500 feet of overlying rock. The collapse took place during the Pliocene Epoch and probably extended over a considerable length of time. The Ogallala Formation (Middle Pliocene) is involved in the collapse in some instances while in others it occured after the Ogallala

was deposited. These sinks probably never took the form of caves and today they are reflected on the surface only as slight topographic depressions. A considerable number of vertebrate fossils have been recovered from the Pleistocene sediment deposited in these depressions.



GENERALIZED GEOLOGIC MAP

C O N V E N T I O N F I E L D T R I P
S C H E D U L E

Three caves will be visited during the two and one half days period from 6:00 PM Sunday, June 14 to noon, Wednesday, June 17. The official caves to be visited are:

1. CAVERNS OF SONORA, SONORA, TEXAS
2. THE DEVIL'S SINKHOLE, ROCKSPRINGS, TEXAS
3. INDIAN CREEK CAVE, UVALDE, TEXAS

Caverns of Sonora tour in the commercial section only will begin as soon as commercial tours are over for the day. This is approximately at 6:00 PM, Sunday, June 14. Trails will be well lighted, and monitors will be stationed at intervals to assist persons in direction and information. Closing of the cave will be at an hour determined by the management.

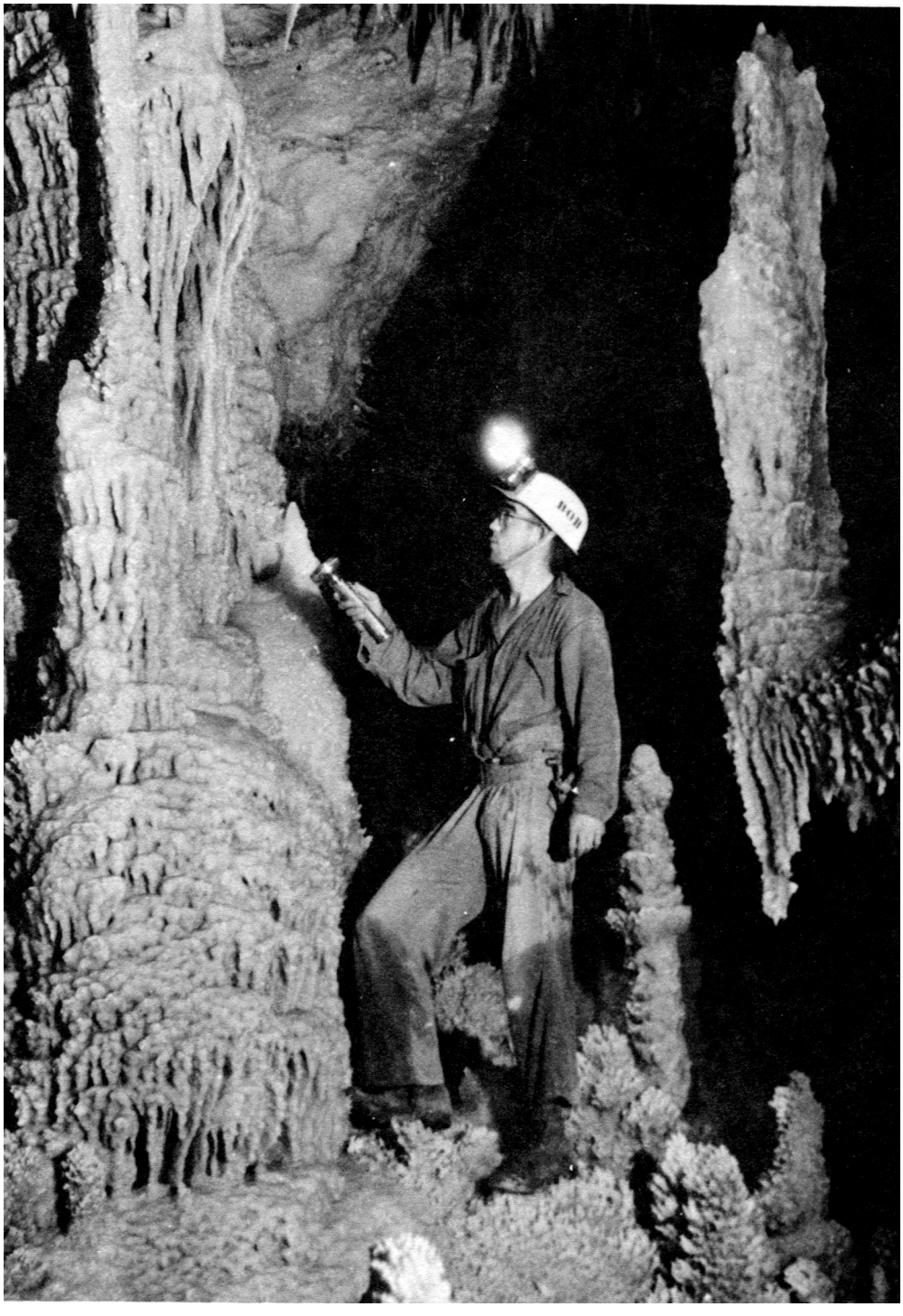
The Devil's Sinkhole will be visited on Monday, June 15, beginning at 9:00 AM. The University of Texas Grotto members will assist in lowering visitors into the cave. Only U.T. Grotto equipment will be used. To reach the cave, follow U. S. Highway 377 northwest o f Rocksprings and turn right (east) on Texas 41 for about one mile or until a bump gate on the right is reached . This road only will be used to go to the cave, which is about two miles distant. A waiver is required to enter the property.

Indian Creek Cave may be visited beginning Monday, June 15 at 8:00 AM, or on Tuesday, June 16 any time . University of Texas Grotto members will be in charge of groups which will be kept rather small. Persons may camp at Indian Creek Cave both Monday and Tuesday nights.

Other caves listed in the Guidebook may be visited any time instead of or between pre -arranged t r ips listed above, but only after receiving permission from landowners or ranch foremen.

Gruta del Palmito is a post-Convention field trip and will begin on Sunday, June 21 from New Braunfels.

HAVE A GOOD TIME!



CAVERNS OF SONORA (MAYFIELD CAVE)
A caver in the Corinthian Room (Photo Bart Crisman)

C O N V E N T I O N F I E L D T R I P N O. 1

CAVERNS OF SONORA (SUTTON COUNTY)

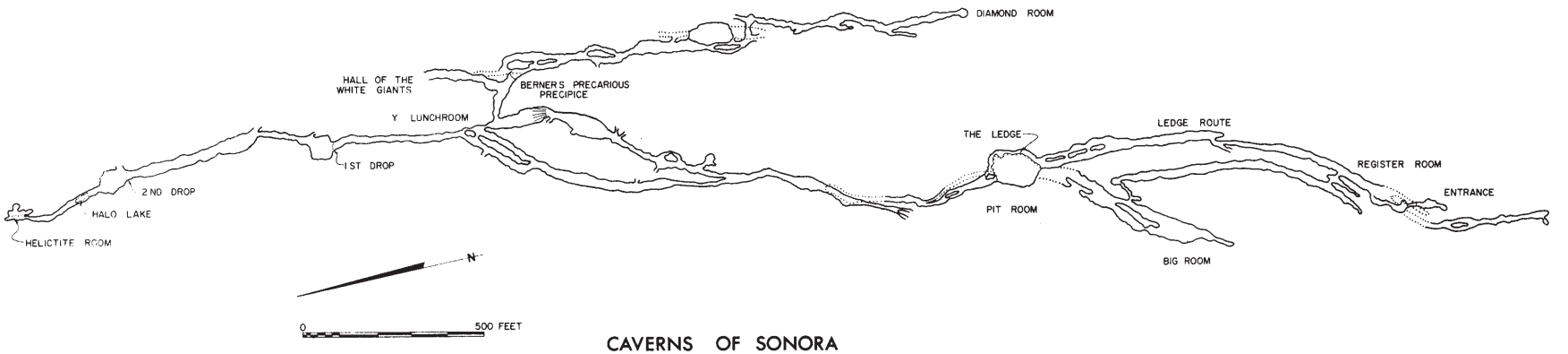
The Caverns of Sonora is located about ten miles southwest of Sonora. One of Texas' most recent commercial caves, it may be reached by driving west on US Highway 290 and following the signs to the cave.

The cave was originally known as Mayfield Cave and for a short time as Secret Cave. The latter name was applied shortly after the discovery of the formation areas in an attempt to further protect the cave. The front sections of the cave have been known since the first part of the twentieth century, but the main portion was discovered in September of 1955. At that time members of the Dallas Speleological Society crossed a 70 foot deep pit by way of a narrow, dangerous ledge and reached a vast system of interconnected passages.

The entrance to the cave was originally an 18 inch in diameter hole located on the gentle slope of a hill. From the bottom of this hole a succession of crawls and small pits led to a junction of two passages. The right-hand passage, the Ledge Route, leads to the ledge over which the early explorers were forced to pass to reach the back of the cave; the other passage, the Subway, is not utilized as the commercial trail. This leads in turn to a series of bridges and rampways which cross the pit. This part of the cave consists of a maze of walking and crawling passages with about one mile of passage on many levels. The only decoration in this portion of the cave consists of a few dripstone formations and much popcorn and cave coral.

Almost immediately beyond the pit, however, the character of the cave changes drastically. Although still a fantastic maze of multi-level passages, the walls, floor, and ceiling of most of the cave are covered with formations of every variety. The present commercial tour extends through some of the most beautiful of these passages, although others are omitted because of difficulty in reaching them and the already great abundance of formations to be seen. The convention field trip will be limited to the commercial trail. The great delicacy of the cave makes this an absolute necessity. No one will be allowed to make trips off the commercial trail at any time.

From the Pit Room one main passage extends for



CAVERNS OF SONORA

about 1,000 feet to the Y Lunch Room. Straight ahead, but not on the commercial trail, a large and beautiful passage extends down a short drop to the Lake Room where a crystal-clear emerald green pool is found ; shortly beyond here a passage to the right leads to the Hall Of The White Giants where tall coralloid-covered formations are found in a beautiful room. The main passage continues to a second drop and from there over Halo Lake to the Helictite Room. In this remarkably beautiful room literally thousands of clear helictites up to eighteen inches in length cover the walls and ceiling, while two-foot high helictites rise from the floor to form Snake Dancers. The cave ends in this direction at the Helictite Room. From the Y Lunch Room the commercial trail turns right and leads up a set of stairs at Berner's Precarious Precipice, past the famed Butterfly, below the White Falls, and into the helictite-studded Diamond Room Passage. Difficulties in reaching the Helictite and Diamond Rooms have prevented their inclusion on the commercial tour.

Probably nowhere else in the United States is there one cave with so many formations of such great beauty. Beyond the Pit Room there is little limestone exposed and when it may be seen it is a pure white, beautifully contrasting with the oranges and rusts of the formations. Although helictites and coralloids are most abundant, all types of formations are found, ranging from five foot long soda straws to moon-milk.

The cave is formed in Lower Cretaceous Edwards Limestone. A study of the origin and development of the cave is badly needed and progress on a detailed map is slow because of the great complexity of the cave. Over three miles have been surveyed with large portions of the cave still unmapped.

C O N V E N T I O N F I E L D T R I P N O. 2

DEVIL'S SINKHOLE (EDWARDS COUNTY)

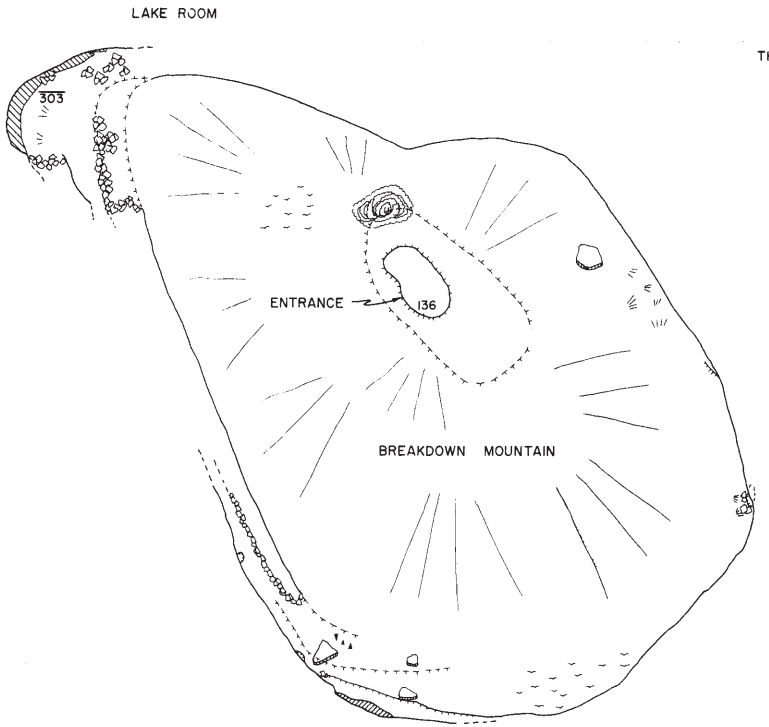
To reach the devil's sinkhole drive northeast from Rocksprings on US 377 for approximately seven miles. A bumpgate on the right (east) side of the highway admits one onto a dirt road which extends through two other gates. The owner, Clarence Whitworth, lives at the last house on the road. A notarized release form is required before exploration will be permitted.

Probably the best known cave in Texas, the Devil's

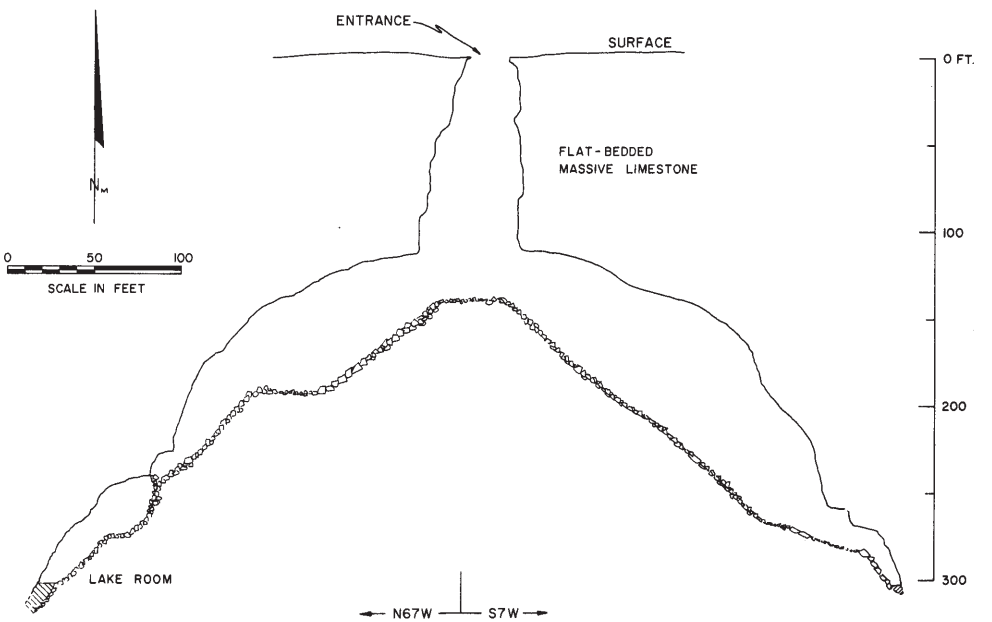
DEVIL'S SINKHOLE

EDWARDS COUNTY, TEXAS

BRUNTON & TAPE SURVEY BY
THE UNIVERSITY OF TEXAS GROTTO
1963



PLAN



PROFILE

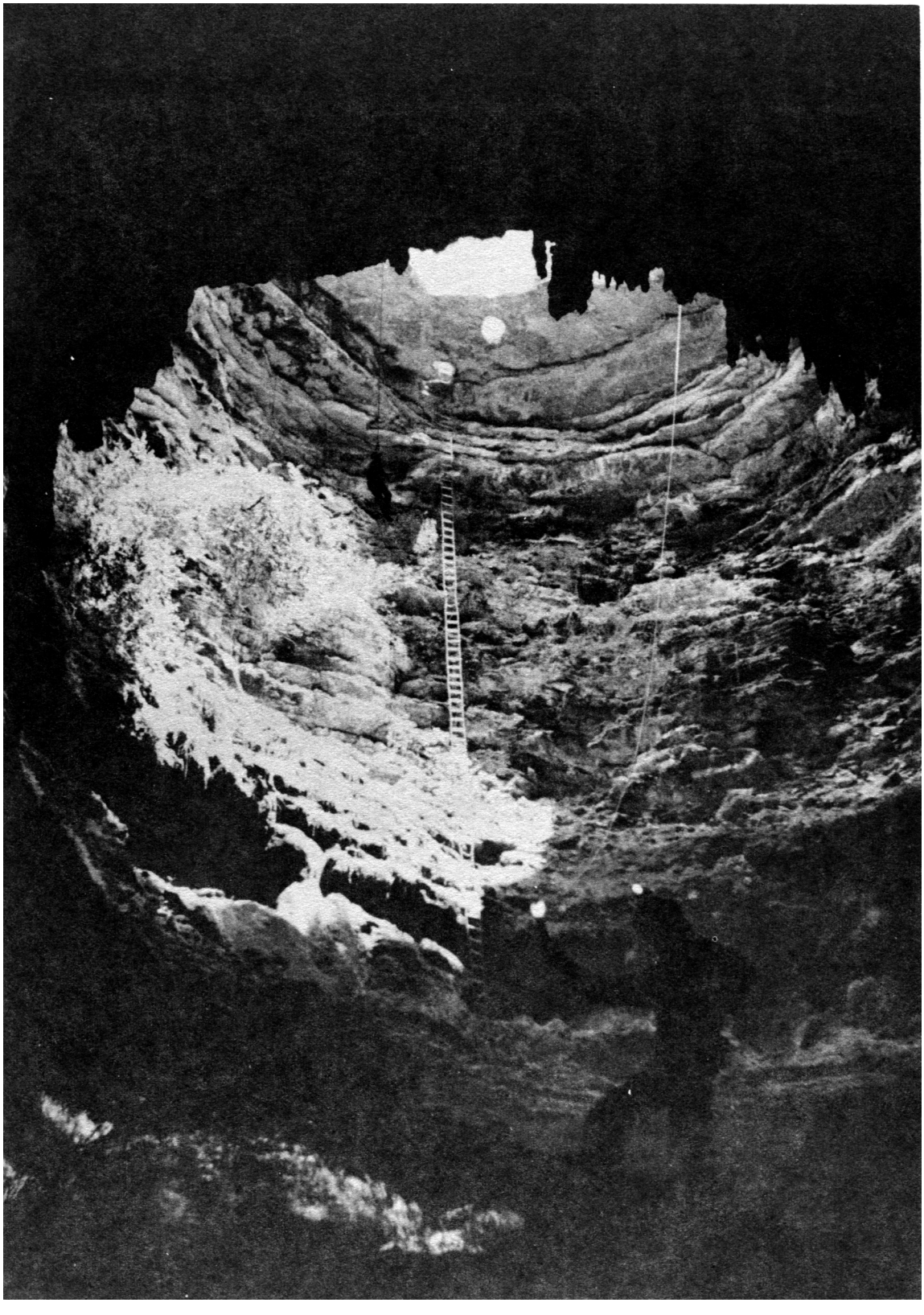
Sinkhole has been known since the last part of the nineteenth century when it was called alternately Hell Hole and Devil's Sinkhole. Until the last few years it was marked on a highway map and signs pointed the way to the cave. In 1960, however, the fatal accident to a boy scout caused the owner to lock the gates leading to the cave,and the location is no longer marked either by signs or on a highway roadmap.

The large bat colony, estimated at eight-to-ten million animals, has attracted the attention of biologists and guano miners. The latter have installed elevators, booms, rigs, and other equipment over and in the cave in an attempt to facilitate entry. Much of this equipment now lies in and around the entrance. No mining is being done at the present time. The earliest explorations of the cave are not recorded, but it is known to have been entered in the 1940's by Dr. Lytle Adams during his bat bomb project. The best-known exploration is that in 1947 by Patrick White, Floyd Potter, Eddie Raney, and Ralph Velasco. Pat White's thrilling account of their exploration was published in BULLETIN TEN of the National Speleological Society,and reprinted in Celebrated American Caves. These early explorations, made with inadequate equipment by relatively inexperienced people, show vividly the advances which have been made in the last fifteen years. Now a trip to the Devil's Sinkhole is a simple, safe, and essentially commonplace practice.

The entrance to the cave is about 60 feet in diameter and drops vertically on all sides for about 140 feet. After a few feet it is deeply undercut. From the bottom of the entrance drop a steep breakdown slope leads down on all sides for an additional 160 feet to a series of lakes encircling the breakdown slope. Some of these are found in rooms where large breakdown slabs have limited access to the water. In these deep, clear pools blind amphipods and isopods live. Although originally reported as being 409 feet deep the actual depth of the cave is about 310 feet, and the actual dimensions of the room are about 240 feet by 360 feet. The terraced ceiling and great breakdown mountain add to the impression of great size and depth.

Few people who have ever been to the Sinkhole will forget the awe-inspiring view of the entrance from the base of the breakdown slope. The mountain rising from the center of the huge room, the formation and moss-hung ledges, and the large entrance 300 feet above are sights never to be forgotten..

The great size, depth, and impressiveness of the



THE DEVIL'S SINKHOLE (Photo by Jimmy Walker)

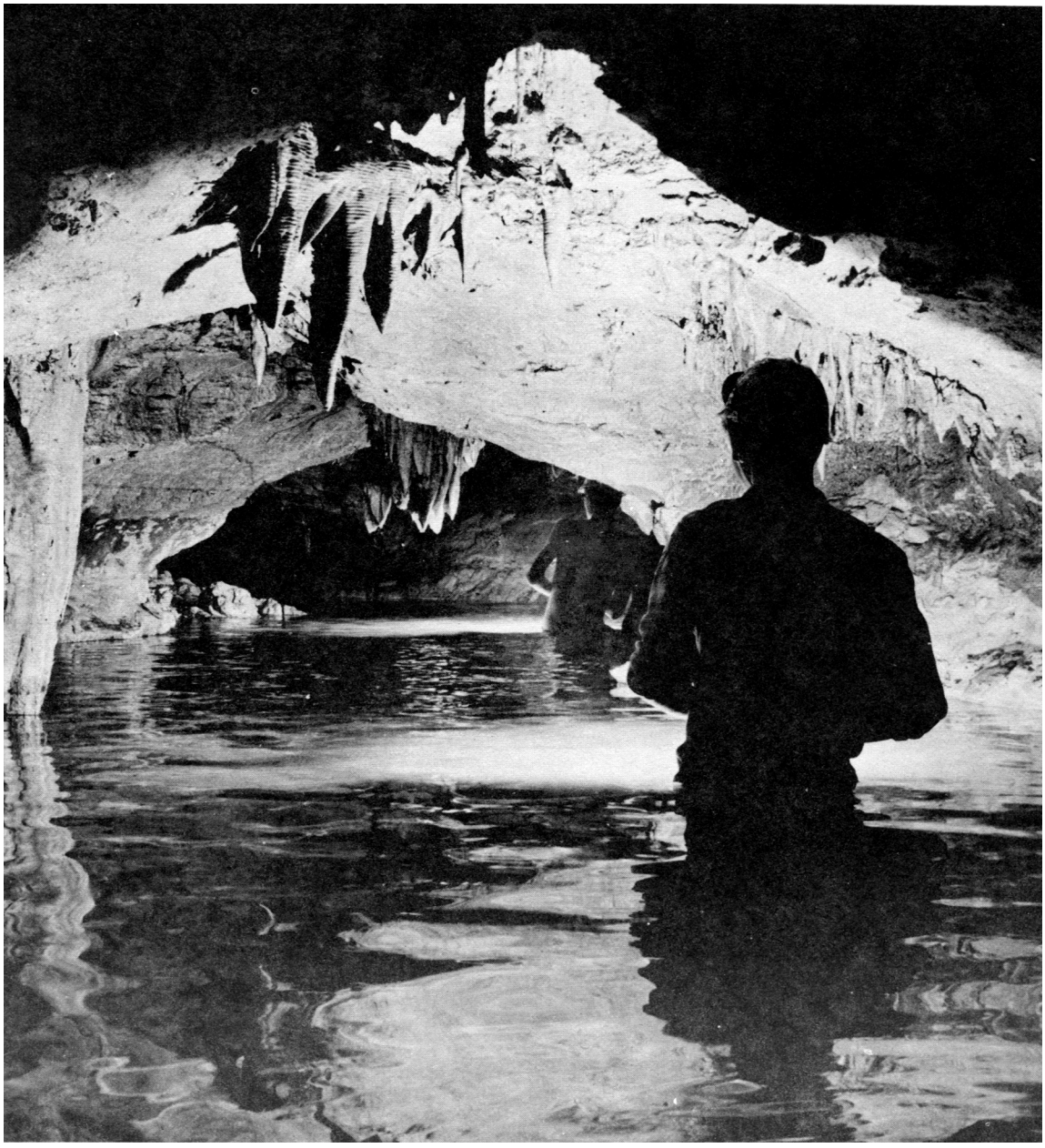
cave have inspired many legends of vast rooms and extensive passages. Tales of miles-long passages with skeletons, great rivers, and oaken doors abound; and more than one spelunker in search of these vast rooms has spent hours crawling through breakdown and shivering in cold water. Divers have reached depths of 40 to 80 feet in the lakes. All indications, however,are that there was one large room and if others exist they must be hopelessly hidden by tons of rock.

C O N V E N T I O N F I E L D T R I P N O. 3

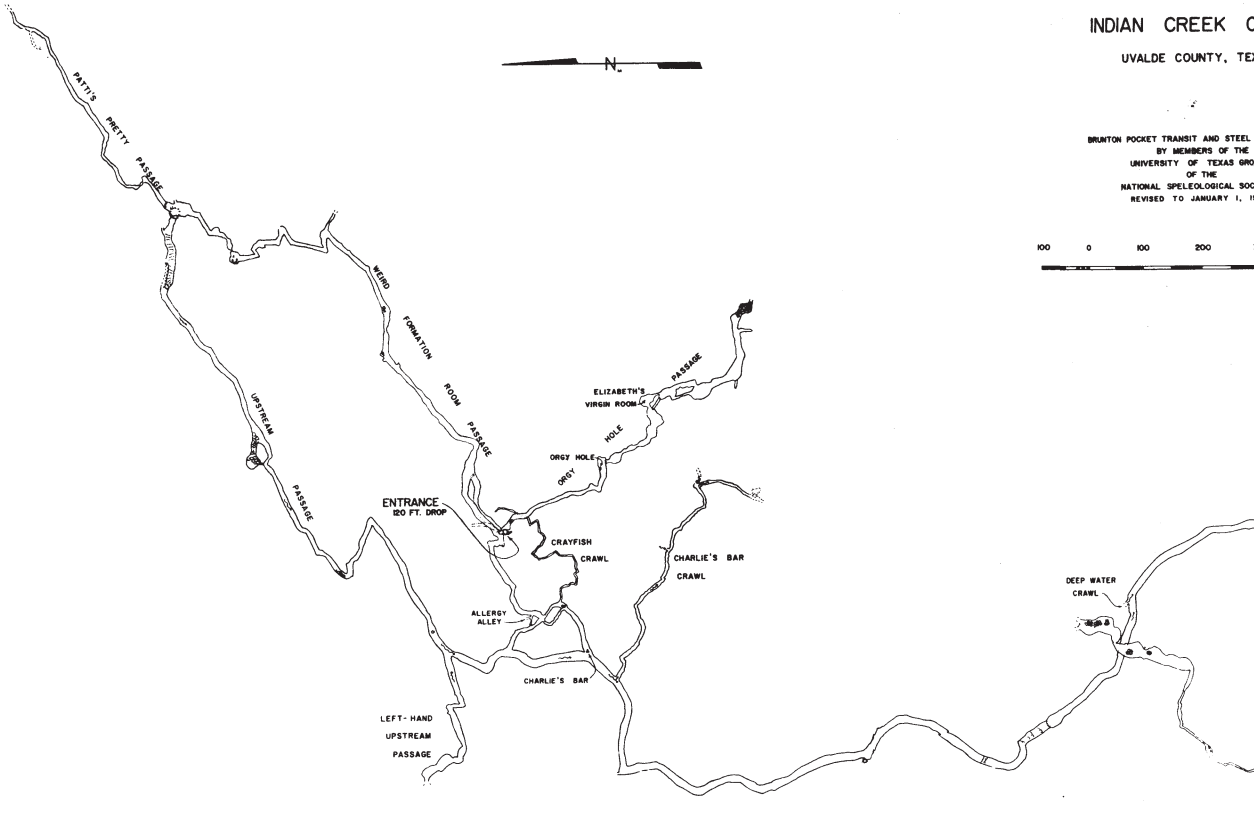
INDIAN CREEK CAVE (UVALDE COUNTY)

This cave is owned by Mr. Fred Mason of Uvalde. He should be contacted at his residence in Uvalde by anyone who wishes to visit the cave at times other than on the scheduled NSS Convention field trip. To reach the cave drive north from Uvalde 11 miles on the Rocksprings highway (Texas 55) to a low-water crossing of the normally dry creek bed of Indian Creek. Immediately after this crossing the Indian Creek Road leads off to the right. The Mason ranch is the last ranch on the road. It is necessary to go through several bump-gates and one regular gate before reaching the house. Follwo the main road to the ranch; where there might be some question as to the right way there will be a sign to the cave. From the ranch house signs point the way to the cave.

The entrance to Indian Creek Cave was originally a crack in the bed of Indian Creek too small to enter. About 1955 it was excavated by the owner and the presence of a large cave system verified by exploration of the cave, although the entrance to the downstream portions of the cave were blocked by red clay. In 1956 the organization of the Uvalde County Water District Underground Recharge Program made the location of suitable recharge sites imperative. Because of its location in the creekbed Indian Creek Cave was an ideal recharge point. A dam was built downstream from the entrance and gratings placed over the cave entrances to prevent their being plugged by logs and other debris. In May, 1957, a sudden flash-flood poured about 290 acre-feet of water into the cave, thus preventing its loss by evaporation and run-off. This and another large flood in October, 1959, succeeded in removing the clay fill blocking the downstream end of the cave, so when the cave was entered by cavers in February, 1960,



INDIAN CREEK CAVE water passage (Photo by Mills Tandy)



INDIAN CREEK C

UVALDE COUNTY, TE

BRUNTON POCKET TRANSIT AND STEEL
BY MEMBERS OF THE
UNIVERSITY OF TEXAS GRO
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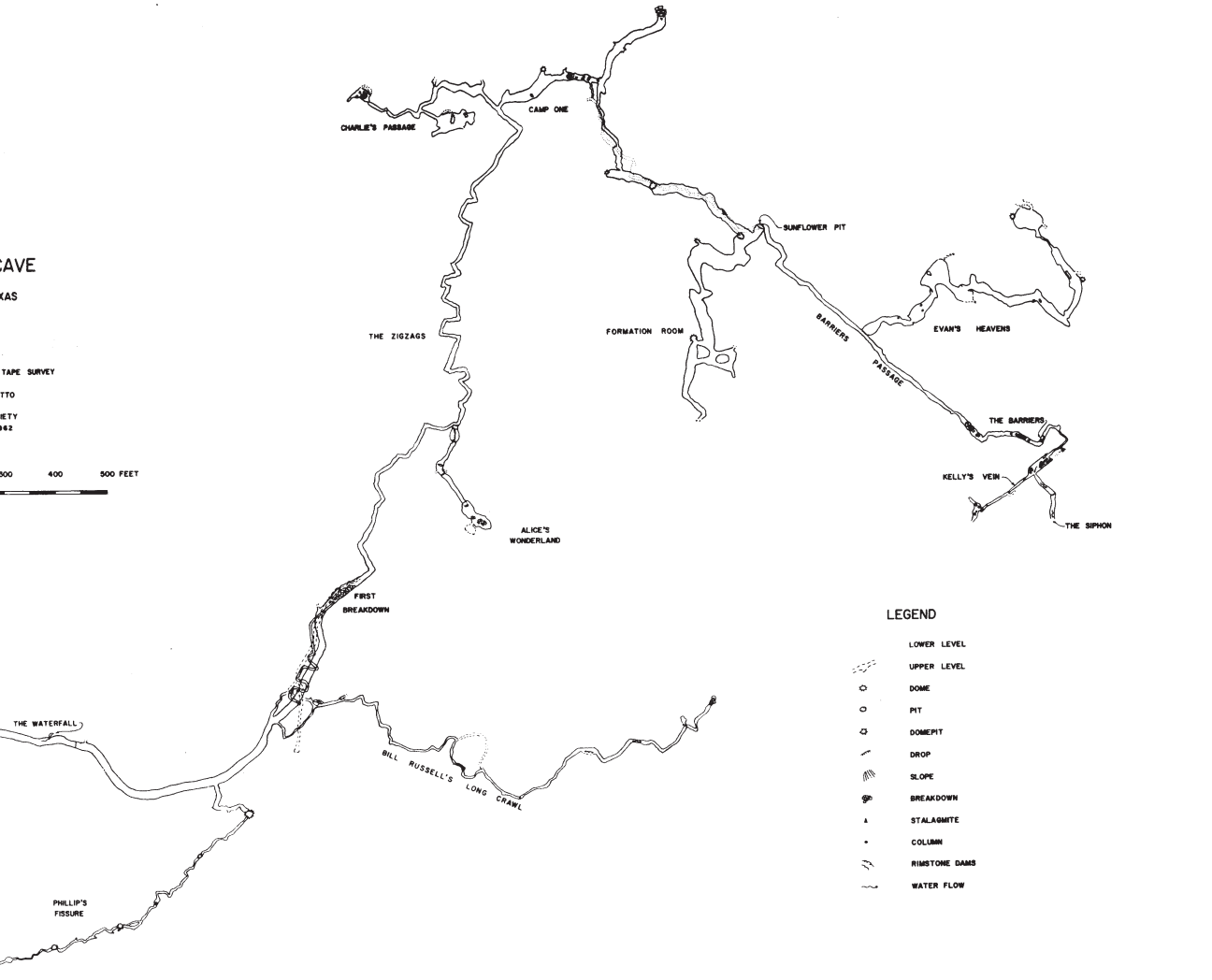
CAVE
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CHARLIE'S PASSAGE
CAMP ONE
SUNFLOWER PIT
THE ZIGZAGS
FORMATION ROOM
BARRIERS PASSAGE
EVAN'S HEAVENS
THE BARRIERS
KELLY'S VEIN
THE SIPHON
ALICE'S WONDERLAND
FIRST BREAKDOWN
THE WATERFALL
BILL RUSSELL'S LONG CRAWL
PHILLIP'S FISSURE
LEGEND
LOWER LEVEL
UPPER LEVEL
DOME
PIT
DOMEPIT
DROP
SLOPE
BREAKDOWN
STALAGMITE
COLUMN
RIMSTONE DAMS
WATER FLOW

it was essentially as it is now, with the exception of the addition of ladders at the entrance.

The cave is entered by two holes in the bed of Indian Creek. A series of 15 and 30-foot drops admits explorers to the main floor of the cave, 120 feet below the entrance. At the 60-foot level a series of fairly small passages extend about 1,500 feet and contain some of the better helictites in the cave. From the bottom of the entrance drop a passage extends to the north and another to the south. To the north a five to ten foot wide walking passage extends about 1,000 feet to the Weird Formation Room. From here a tight crawl admits one to Pattie's Pretty Passage, a 500-foot long crawlway and stoopway highly decorated with helictites and other small formations. To the south a ten foot wide, twenty foot high passage leads to the Four-Way Junction and from there to Charlie's Bar, where the main stream is encountered. Upstream the passage extends a few feet at which point it forks, streams flowing from both passages. To the right a 1,200 foot passage in ankle-to-neck deep water extends to the North Siphon while to the left a few hundred feet leads to the Left-Hand Siphon. Divers have explored 600 feet of large underwater passage at the North Siphon without reaching an end or air space. Exploration in the Left-Hand Siphon has also discovered much underwater passage. After about 500 feet of large passage, however, a rise in the ceiling admits one to walk in a 2,000 foot long air-filled passage before the West Siphon is reached. This siphon remains unexplored.

From Charlie's Bar the cave extends downstream as a large walking passage with no more than a few feet of water for about 1,200 feet. At this point a three foot drop into the Deep Water occurs. Here the stream has formed a lake five to fifteen feet wide, three to eight feet deep, and 700 feet long. A well has been drilled into this lake about 200 feet beyond the beginning of the deep water. In exploring this passage people are urged to stir up as little mud as possible and not to interfere with the well in any way. This well supplies drinking water for the camp. Near the end of the lake the stream exits by a small passage to the left, going over a small waterfall and into a siphon. From the end of the lake the main passage extends as a five to ten foot high, ten foot wide clay-floored passage for about 600 feet to the First Breakdown. Here large blocks have fallen from the ceiling and all but block the passage. It is necessary to climb over the rocks to

enter the Zig-Zags, a strongly joint-controlled passage about 1,500 feet long. Extensive upper levels occur throughout this area and include the finest formations in the cave, especially in Alice's Wonderland. These, however, are difficult to reach and the regular Convention field trips will probably not include them. From the end of the Zig-Zags a passage to the right leads to Camp One, a room about 30 feet high, 30 feet wide, and 100 feet long. The main passage from this room is eventually blocked by breakdown and fill, but a two-level side passage extends after several hundred feet to the Formation Room. Although washed-in silt and clay has dirtied the formations, there are still fine displays of draperies and other formations. Before reaching the Formation Room, the lower-level passage leaves the upper level and continues as the Barriers Passage for about 1,200 feet where it passes over two muddy saddles, up a mud slope, and through the Nasties to the Lower River Room. Here a large stream has entered the cave, runs through a room formed by collapse of limonite fill from a vein crossing the cave, and into a siphon. This siphon has been explored for 1,000 feet of water and air-filled passage before ending in breakdown. Together with several long side crawls and fissure-like passages the total surveyed length of the cave is over 18,000 feet, making it the second-longest mapped cave in the state. The cave is formed on or near the contact of the Edwards Limestone and the less permeable Glen Rose Formation. This forms the local water base-level. The stream contitutes the only sizable water supply on the ranch.

C O N V E N T I O N F I E L D T R I P N O. 4

BRACKEN BAT CAVE (COMAL COUNTY)

To reach Bracken Bat Cave drive west from Interstate 35 towards Bracken. About one miles east of Bracken take the Bat Cave Loop, a paved road to the north. After several miles the road makes a sharp turn to the east. Instead of turning go straight over a cattleguard. The owner of the cave lives at the first house on the left down this dirt road. Inquire at the house for directions to the cave. It will be necessary to pay 50¢ per car to visit the cave. For the Convention field trip special arrangements will probably be

made with the owner to prevent the necessity of stopping at the house. For other trips, however, be sure to stop.

A shallow 100 foot in diameter collapse sink slopes steeply downward to the south-southeast for several hundred feet, to a depth of 96 feet. From the floor of this slope a 75 foot wide, 30 foot high passage extends for about 300 feet, at which point a large breakdown slope rises to within a few feet of the ceiling. This forms a hill about 30 feet high and 100 feet in diameter, dropping off steeply on all sides. Beyond the "hill" a slope leads down into a 100 foot in diameter dome room. A shaft to expedite the removal of guano from the cave has been sunk into the center of the dome. A second, smaller dome about 70 feet high on one side of the room leads to what appears to be passages, but actually goes nowhere. Rotten wooden ladders placed at this dome many years ago still remain in place.

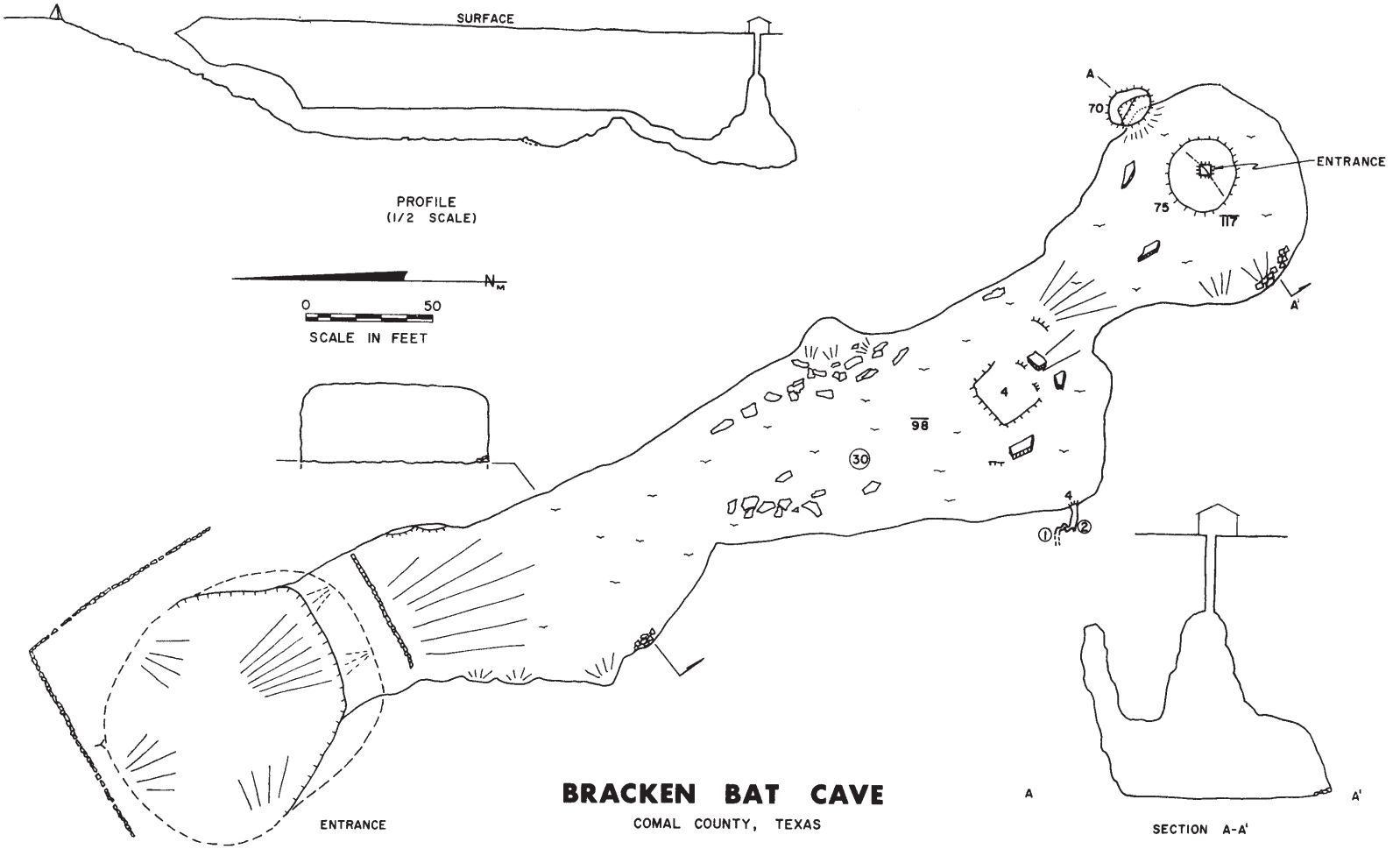
The main interest of Bracken Bat Cave is the huge bat colony it houses. The cave, in mid-summer is estimated to contain over 20 million Mexican Free-tailed Bats, Tadarida brasiliensis mexicana. A large and impressive colony should be present by June. For people not accustomed to the presence of millions of bats in the comparatively small area of Bracken Bat Cave it is an experience not to be missed nor quickly forgotten. It is virtually impossible to explore beyond the entrance room of the cave when the colony is at its height. Ammonia, millions of flies, mites, and other bat parasites, and the heat generated by the bats and ammonia makes the cave virtually unbearable.

The entrance to the cave is impressive, especially when seen from the bottom of the breakdown slope; but the one memory anyone will bring back from the cave is the fact that he has seen one of the greatest bat caves in the United States.

C O N V E N T I O N F I E L D T R I P N O. 5

NATURAL BRIDGE CAVERNS (COMAL COUNTY)

Natural Bridge Caverns is located about six miles north of Bracken. To reach the cave follow the directions to the owner of Bracken Bat Cave, but continue beyond his house, through several gates, to the end of



BRACKEN BAT CAVE

COMAL COUNTY, TEXAS

BRUNTON & TAPE SURVEY BY
THE UNIVERSITY OF TEXAS GROTTO

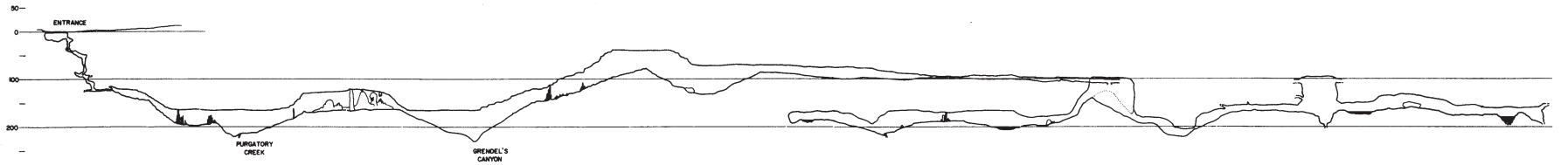
1963

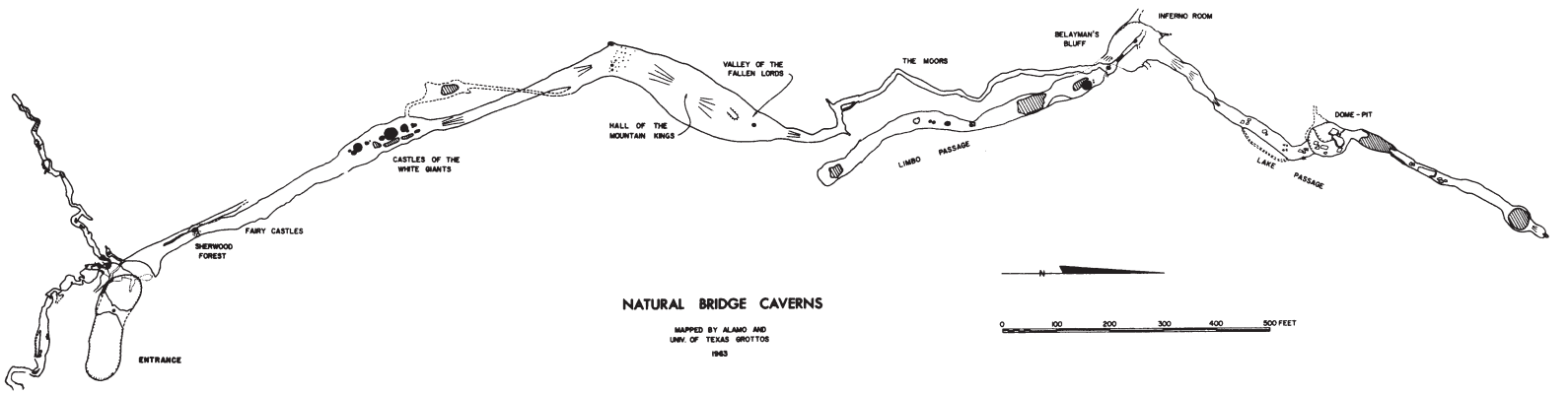
the road. Signs will point the way to the cave, even if it is not yet opened commercially by convention time.

Like Caverns of Sonora, Natural Bridge Caverns concealed its wonders for many years. Not until 1960 was it thought to be more than another interesting but not very large cave. On March 27, 1960, a rubble-filled crawlway was excavated by Orion Knox, Preston Knodell, Al Brandt, and Joe Cantu of the St. Mary's Speleological Society. This crawl led to the North Caverns, by far the largest and most beautiful portion of the cave; and an axiom that large caves are not found along the Balcones Escarpment was disproven.

The name of the cave is derived from a sixty foot long natural stone bridge that spans the entrance sink. At the bottom of this sink a small crawl originally led into a series of small rooms and minor passages known as St. Mary's Halls, the South Fault, and the Coon Rooms. Although containing some pretty formations and being up to 2,000 feet long, these are all relatively small. In excavating the entrance sink and enlarging passages, remains of bear and prehistoric Indians were found. This find, together with the presence of large quantities of very old guano far back in the cave indicates that the entrance to the cave at one time must have greatly resembled that of Bracken Bat Cave.

The commercial tour takes a series of enlarged passages and tunnels directly to the North Caverns. The first room in the North Caverns is Pluto's Anteroom. Two passages extend from this room, Fool's Hall on the left and the main passage. Fool's Hall ends after about 200 feet, but the main passage extends down a steep passage that leads to a group of totem pole formations called Sherwood Forest. Only a few inches in diameter some of these delicate totem poles are 25 feet high. The floor continues to descend, but the ceiling remains level until it is about 35 feet above the floor; the passage is about 20 feet wide. The next group of formations in the passage is the Fairy Castles, a grove of stalagmites rising from a mound of breakdown. From the Fairy Castles the floor again drops steeply into Purgatory Creek. Ceiling height above this canyon is about 60 feet; the floor is covered with sticky mud up to several inches in depth. A long ascent leads from Purgatory Creek to the most beautiful chamber in the cave, Castle of the White Giants. In this room several formations rise up to 40 feet high, while at their base beautiful travertine dams are filled with





NATURAL BRIDGE CAVERNS

MAPPED BY ALAMO AND
UNIV. OF TEXAS GROTTOS
1963

water running and dripping from the formations. From this room the floor again begins to descend, a descent that leads to Grendel's Canyon, the deepest surveyed point in the cave, where the floor is 270 feet below the surface. Leaving Grendel's Canyon a steep ascent leads into the Hall of The Mountain Kings, the floor of which is 140 feet above the bottom of Grendal's Canyon. One of the largest rooms in the cave, it contains much old guano and an abundance of unusual formations. From this room the cave extends a few hundred feet before it changed character. A rise in floor level leads to a small undecorated passage no more than twelve feet wide and ten feet high. This leads in turn to Belayman's Bluff after several hundred feet. Beyond Belayman's Bluff a complex of pits, crawls, and chimneys occurs with hundreds of feet of unsurveyed passage. Below Belayman's Bluff lies the Inferno Room.

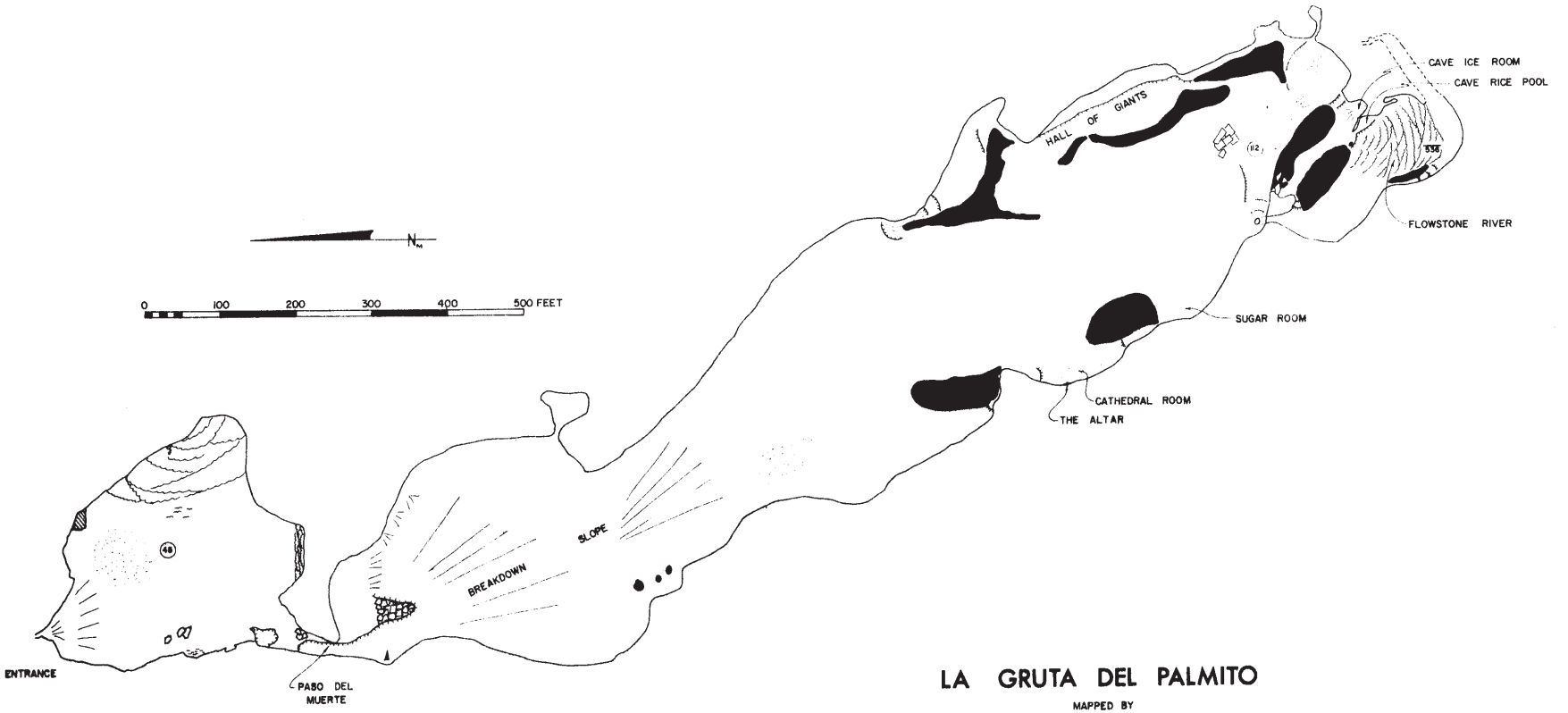
Two large lower-level passages extend from the Inferno Room: Limbo Passage and the Lake Passage. Limbo Passage extends to the south for about 700 feet as a 30 foot high, 35 foot wide passage, before coming to an abrupt dead-end. The Lake Passage is over 900 feet long and averages 25 feet wide and 30 feet high, although in the Dome Pit the ceiling is over 100 feet above the floor. Except in the area of the Dome Pit and the First Lake there are few formations. Two pits lead into muddy lower-level water passages of little extent. They are among the muddiest passages anywhere, with the caver literally swimming through soupy mud.

The cave is formed in the Edwards Limestone with the streams probably lying at the top of the more insoluable Glen Rose Formation. Total length of the cave is in excess of two miles, although only about 6,000 feet have been mapped. In size it is one of the largest and most impressive in the state.

C O N V E N T I O N F I E L D T R I P N O. 6

GRUTA DEL PALMITO (NUEVO LEON, MEXICO)

The Gruta del Palmito (or as it is perhaps better known, Gruta de Bustamante), located about eighty miles south of Laredo, is one of the outstanding caverns of North America, and no caver travelling through Texas should miss the opportunity to visit this cave. The cave is located in the rugged Sierras de Gomas, about



LA GRUTA DEL PALMITO

MAPPED BY
TEXAS SPELEOLOGICAL ASSOCIATION
1961

three miles southwest of the town of Bustamante. To reach the cave follow the Pan American Highway (Mexico 85) south from Laredo to Sabinas Hidalgo. At Sabinas Hidalgo, turn to the right just before the bridge in the center of town. Follow the main road to the west. The paved road leads through the scenic Sabinas Canyon to Villaldama, and from there to Bustamante. Follow this road into Bustamante, then continue straight ahead through the town square, and go to the last street at the edge of town and turn right just past the new pink clinic. Follow the bulldozed road to the southwest toward a large canyon in the range. Drive to the end of the road, about two miles, then follow the trail into the canyon and up to the cave. The first of this trail is level, but the last part rises about 1,500 feet in a series of steep switchbacks.

The cave entrance is a small, walking size opening almost hidden by two large rocks. Just past the entrance, however, the cave opens into a room about 400 feet long and 300 feet wide. At the bottom of a 90 foot breakdown slope leading to the floor of the room are several large travertine pools to the left and to the right massive columns reaching about 60 feet to the ceiling. The pools contain water which is drinkable with halazone. At times a small spring issues from the wall above the pools, but most of the year it is dry. Beyond the columns the cave narrows and to reach the interior of the cave one can either swing to the right and work their way down over large breakdown, or stay high on the left wall and cross the Paso de Muerte. This last way leads directly to a trail marked by wire and now-rotten posts. Both ways lead down a slope formed by huge breakdown slabs to the main level of the cave, about 300 feet below the entrance room. This part of the cave is essentially one room about 400 feet wide, 1200 feet long, and 75 to 125 feet high. From the bottom of the breakdown slope the trail leads along the right wall of the room and up among large beautifully-shaped stalagmites and columns. After a few hundred feet is the Cathedral Room, formed by its almost complete enclosure by large formations. On the right side of the room a beautiful cascade of flowstone has formed. From the Cathedral Room the trail continues into the last part of the main room, known sometimes as the Sugar Room because of accumulations of white sugar-like crystals over many large slabs of breakdown. What appears to be the left wall of this room is

actually a line of huge columns which may be encircled. This series of columns and a second row of columns and draperies forms the Hall of The Giants, one of the most beautiful and spectacular parts of the cave. At the end of the Sugar Room a small hole drops through a wall of flowstone to a series of small rooms and shallow pits. These contain some remarkable accumulations of helictites, cave ice, cave "rice", and crystals. Below this level a flowstone waterfall drops about 50 feet to a narrow passage which continues down several small pits to the bottom and end of the cave at about 670 feet below the entrance.

As in most large caves there persists rumors of lost rooms, bottomless pits, and vast undiscovered chambers; and although nothing of this sort has been found in much searching in a cave such as this where it is virtually impossible to see across the passage, anything is possible.

The cave has seen much vandalism by various Mexican groups (and probably American) and other visitors. Marking on walls, breakage of formations, and large-scale dumping of carbide is extremely common. The cave's main attractions, however, are its size and the beauty of the shape of its formations; these have not been affected by vandalism; and in rooms off of the large breakdown slope and in the more inaccessible recesses extremely beautiful displays of helictites and other delicate formations remain untouched.

C O M M E R C I A L C A V E S

LONGHORN CAVERNS (BURNET COUNTY)

Longhorn Caverns is one of the best known caves in Texas, and is located in the Longhorn Caverns State Park southwest of Burnet. Known since the mid-nineteenth century the cave was developed by the Civilian Conservation Corps in the early 1930's and has been operated since that time as a state park. Although reputed to be quite extensive and advertised as the "third largest cave in the world" it is actually only 7,500 feet long, with less than one mile of commercial trail. The cave is, however, well worth a visit. It

is without many dripstone formations, but the beautiful sculpturing of the walls and occurrence of large crystals of calcite on the walls in many places combine to make it an interesting and attractive cave. Beyond the commercial tour the cave extends as a muddy, wet crawl and walkway for several thousand feet before its various passages are blocked by mud fill or siphons. At certain times, when the water level is unusually low, these siphons may be negotiated and much more passage entered. The cave is also well-known as an important site of Pleistocene vertebrate remains.

CASCADE CAVERNS (KENDALL COUNTY)

Cascade Caverns is located about five miles south of Boerne. Although its opening was greeted with sensational publicity, it failed as a commercial venture before World War II, but has since been improved and re-opened. The entrance to the cave, an impressive hole at the base of a 60-foot cliff, opens into a half mile long passage well-decorated with formations. Three large rooms are present in the cave, one about 650 feet from the entrance is 380 feet long by 60 wide, by 68 feet high; the second is 1100 feet from the entrance and measures 50 feet by 30 feet by 30 feet high; and the third room is about 40 feet square. The cave is both interesting and attractive.

CENTURY CAVERNS (KENDALL COUNTY)

Originally operated under the name of Cave-Without A-Name, Century Caverns is located eleven miles northeast of Boerne. Commercial passage in this cave is only about 600 feet in length, but the cave is one of the most attractive and best-decorated in Central Texas. The main passage of the cave lies at a depth of 110 feet below the surface. A short passage leads from the stairs into the main tunnel. Excavations in the entrance sink have revealed an abundance of Pleistocene vertebrate remains. This material is now under study by Dr. Ernest Lundelius of the University of Texas. The main tunnel consists of one large passage subdivided into rooms by groups of beautifully colored formations. About 600 feet from the entrance the

commercial tour terminates at a stream. To the left this stream extends for several thousand feet before exiting as a spring known as Dead Man's Cave. To the right the stream extends for several thousand feet where siphons block exploration except with aqua lungs. Exploration beyond these siphons has indicated little passage of importance.

COBB CAVERNS (WILLIAMSON COUNTY)

Cobb Caverns is located a few miles north of the Florence highway about fifteen miles northwest of Georgetown. It has only recently been opened to the public and not all of the cave is open for tours. That which is, however, is quite attractive if not too extensive. The entrance to the cave opens into the middle of a 2,500 foot long passage running east-west. This is a very straight passage following a strong joint in the Edwards Limestone. The passage has been commercially developed for about 1,000 feet to the east. It ranges in width from about five feet to as much as 20 feet, while the ceiling height varies from six to twenty-five feet. The first few hundred feet of the cave contains only a few formations, but after about 400 feet, beautifully formed totem poles and varicolored draperies serve to make the remainder of the tour quite attractive. To the east, beyond the commercial trail, the cave continues through a low crawl to an attractive area of formations for an additional 500 feet to a recently excavated entrance. To the west from the main entrance about 1,000 feet of cave extends along the same joint before ending in formations.

WONDER CAVE (HAYS COUNTY)

Wonder Cave, located in San Marcos, is Texas' oldest commercial cave, having been opened to the public prior to 1915. A small cave, it is more interesting geologically and biologically than scenically. It is formed along a fault in the Edwards Limestone associated with the Balcones Fault Zone. The floor of the cave is covered with large slabs of breakdown. A well drilled in the bottom of the cave reaches water connected to the Purgatory Creek System. This under-

ground stream system is best known for its abundance of cave animals and, in particular, the Texas Blind Salamander, Typhlomolge rathbuni. The cave contains few formations and has a total length of only a few hundred feet.

GRUTAS DE GARCÍA (NUEVO LEON, MEXICO)

This large cave is near the Villa García west of Monterrey and should convention goers get as far south as Monterrey they should visit it. García Caverns is reached by a cog-railway rising 900 feet above the valley. The scenery around the cave is typical of western Mexico in its dryness, but the tremendous cliffs and towering mountains here and in the vicinity of Monterrey make a trip to the cave pleasant both for the sake of the cave and the scenery. The cave itself is only one room; it is, however, one of the largest rooms in Mexico with the ceiling height at times approaching 200 feet. At one point a skylight lets in a large shaft of light from over 300 feet above the floor of the cave. Abundantly decorated, it is well worth the time and trouble to visit.

C A V E S I N T H E N E W B R A U N F E L S V I C I N I T Y

LITTLE GEM CAVE (COMAL COUNTY)

This cave is located four miles west of New Braunfels. Persons wishing to visit it should contact Mr. H.E. Adams in New Braunfels. A member of the Alamo Grotto, he will be quite happy to direct people to the cave. A small entrance in the bottom of a shallow sink has been recently excavated to reveal the presence of a small but attractive cave. A sloping passage extends from the entrance for about 200 feet before ending in breakdown and fill. Although the cave consists of one passage about 40 feet wide it has been broken up into many small alcoves and rooms by formations and breakdown. Many of these formations are quite attractive and the cave offers promise to anyone interested in photographing formations. Its proximity to New

Braunfels makes it an easy and pleasant short trip. Great care should be taken in exploring the cave, however, because of the extreme delicacy of the formations.

BREHMMER-HEIDRICH CAVE (COMAL COUNTY)

To reach the owner or manager of this cave drive northwest from New Braunfels on State Highway 46 to the Bulverde Road. Turn west on the Bulverde Road and go 1.5 miles to a house on top of a small hill on the right side of the road. Stop at this house and ask permission to visit the cave and obtain directions to it. The main entrance to the cave is a slope to the south leading down between large limestone boulders. About fifty feet from the entrance a shaft, excavated during the Civil War when the guano in the cave was being used in the manufacture of nitrates, drops from the surface into the first room. Although at one time the cave was quite beautiful it has been almost completely vandalized. Those formations which remain are attractive, however, and the cave is worth a visit. Rattlesnakes are reported to be common around the entrance, so people are urged to take extreme caution in entering the cave. Its total length is several hundred feet.

LITTLE BREHMMER-HEIDRICH CAVE (COMAL COUNTY)

Located about one mile from Brehmmer-Heidrich Cave, this is a small but interesting cave. The cave is only about 150 feet long but contains numerous formations. It was originally one room, but it has been subdivided into many small chambers by formations.

DINOSAUR CAVE (COMAL COUNTY)

To reach the cave drive west of New Braunfels on State Highway 46. About eleven miles before the junction of Ranch Road 311 a road to the right goes to Cranes Mill. Continue along this road for about five miles. The cave is on the land of Marion Wilson, but

the manager is a Mr. Decker who lives in a house on the ranch, about two miles from the main road. The entrance to Dinosaur Cave is a small hole located in a creekbed and drops about 10 feet to a crawl. This crawl in turn leads into a twenty to thirty foot wide, ten to fifteen foot high breakdown-floored passage which extends about 800 feet before ending. Although the front part of the cave is muddy, there are attractive formations near its end. The name of the cave is derived from dinosaur tracks which are reported in or near the cave.

O T H E R W E L L - K N O W N C A V E S

LAUBACH CAVE (WILLIAMSON COUNTY)

The entrance to Laubach Cave was opened during test drilling for bridge sites for the re-routing of Interstate #35 around Georgetown. A 30-foot deep core hole opened into the ceiling of a 20 foot high room in Edwards Limestone. From this large room an extensive maze of passages leads with over one mile of surveyed length. Since it is a major vertebrate paleontological site and one of the most beautiful caves in Central Texas, cavers in the state have been active in trying to obtain a new and permanently accessible entrance off of highway right-of-way and on the land of the owner, Dr. W. W. Laubach. A new entrance in a remote section of the cave is promised by the highway department, but if this will be open by Convention time is not known at present. If so, a field trip or trips will be planned so that cavers may see this extremely interesting cave.

ROBBER BARON'S CAVE (BEXAR COUNTY)

One of the most famous caves in Texas, ex-commercial Robber Baron's Cave is located at the junction of Cave Road and Nacogdoches Street in northern S a n Antonio. A large sink drops about twenty feet to a mound of trash from which a tight squeeze leads into a complex maze of walking and crawling passages with over 3,000 feet of known passage. Devoid of formations, the cave's main interest perhaps lies in its history. Many

legends surround it and its history of subsequent openings and attempts to seal it has made it notorious. At the time of this writing the owner will not allow exploration.

GORMAN CAVE (SAN SABA COUNTY)

To reach Gorman Cave drive to the small town of Bend, then follow the signs to Gorman Falls Fishing Camp. Once at the camp it will be necessary to pay $1.00 per car to spend the day at the camp. Once at the camp grounds visiting the cave simply involves driving and walking about one mile down the river. The falls at the camp are quite beautiful and the walk down to the river below the falls is more than worth the little trouble and time necessary. So rapidly is travertine being deposited that beer cans are found covered with calcite; the falls themselves are festooned with beautiful draperies, stalactites, and stalagmites. These are colored with varying shades of green and purple by moss and branches caught in the travertine. A small cave, Gormlette Cave, exists in the travertine at the far east end of the falls. Gorman Cave is a 3,000 foot long passage opening onto the Colorado River. Although climbing among breakdown is necessary in places to reach the back, most of the cave is a large walking passage floored with stream gravel or travertine dams. A clear, pure spring arises at its end only to disappear down a small hole after running a few feet. This probably reappears as a spring on the river below the entrance to the cave. The cave is in Ellenberger limestone of Ordovician age.

STATION "C" CAVES NO. 1 AND NO. 2 (BANDERA COUNTY)

From the small town of Hunt in Kerr County drive west on the Leakey highway. About two miles from the intersection of this highway with U.S. 83 a large sign indicates the road to the old Humble Pumping Station "C". Drive along this road to the south for several miles, keeping to the right at all times. The owner, Claude Hans, lives on the left side of the road after about fifteen miles. If confusion arises, stop at any house along the way to ask directions. At the Hans

residence ask directions to the two caves. The entrance to Station "C" No. 1 (also known as Deep Station "C") involves a fifty foot ladder climb. This drops into the center of a room about 40 feet wide, 100 feet long, and 15 to 30 feet high. To the right the cave continues to a second room. This is reached by following a low crawl along the left wall and through formations which have been broken out. To the left the cave ends after about 100 feet. Several pits and crawls from both rooms lead to lower level rooms and crawls, but no passage of any note is known in these lower levels. The cave is quite well-decorated and one of the more frequented in the state. Station "C" No. 2 (or Station "C" By-The-Road) consists of one large room floored with breakdown. A maze of crawlways lies below this room, but there is little passage of any importance.

VALDINA FARMS SINKHOLE (MEDINA COUNTY)

The Valdina Farms may best be reached by going north from Sabinal in Uvalde County on Ranch Road 187 for about seven miles to the intersection with Ranch Road 1796. Turn right on 1796 and go a few miles until a dirt road to the right leads off. A sign points the way to the Valdina Farms. The owner is Mr. Robert Woodward. It is usually best to contact him in advance. Valdina Farms Sinkhole (also known as Woodward Cave and Donaho Cave) is one of the best-known and most interesting caves in the state. The entrance is a 30-foot in diameter sink dropping vertically on all sides for 90 feet. At the bottom of this drop a slight offset occurs at which point an additional 60 foot drop is found. Equipment is required on both of these drops. At the bottom of the second drop a large breakdown floored passage extends a short distance before intersecting a passage running two ways. To the left it extends for some distance before encountering the first of two lakes. This and a subsequent dome room beyond the first lake contain many bats, including the rare Old Man Bat, Mormoops megalophylla senicula. A second lake has not been crossed because of the need for flotation equipment. Water in the first lake is also over six feet deep but it may be crossed by clinging to the walls. From the entrance the passage to the right extends over a mud slide, through breakdown and a waist-deep pool to an intersection. To the left this

leads over mud slopes, through a low water crawl, and up a hole in the ceiling through loose breakdown into a 100 foot long, 40 foot wide, 40 foot high room which marks the end of this passage. The passage to the right extends several hundred feet, over steep almost unclimbable mud banks, through soupy thigh-deep mud, and through water crawls to an unexplored 40 to 60 foot deep pit. Difficulty in reaching this point and the sticky mud has prevented the pit's being explored. The cave is also of interest as the type (and only known) locality of the troglobitic salamander, Eurycea troglodytes. People are urged not to collect this rare animal. The cave salamanders of Texas are possibly headed for extinction unless extremely stringent measures are taken for their preservation.

RAMBIE'S CAVE (UVALDE COUNTY)

To reach Rambie's Cave take Texas Hwy. 55 towards Rocksprings from Uvalde. About one-mile from this highway's intersection with U.S. 83 a county road to the right leads to the home of the cave owner, Marcellus Rambie. His is the last house on the road. The county road is the first road on Texas 55 from its intersection with U.S. 83 and is marked with a sign which includes the name of Mr. Rambie. Directions to the cave may be obtained at the house. The entrance to the cave is a small hole at the end of a drainage channel cut to allow run-off water to enter the cave as part of the Uvalde County recharge program. A twenty foot drop leads to a shelf from which an additional fifteen foot drop occurs. Equipment is required for both of these drops. The second drop admits one into a large room about 300 feet long, 40 feet wide, and 20 feet high. To the left several small passages extend from the end of the room while to the right the cave continues to several other medium-sized rooms. Although containing few formations, the cave is quite interesting; it contains an unusual substance known as enigmatite. People are asked not to take samples of the material as it has already been studied and the substance is not overly abundant. Mazes of crawlways off of domes and holes in the wall are only poorly explored.

FRIO BAT CAVE (UVALDE COUNTY)

Frio Bat Cave is one of the largest caves in the state and its entrance is marked on the Concan Quadrangle. For this reason it may attract attention and is, therefore, included in this Guidebook. The cave has been closed by the Public Health Department and gates are reported to have been installed over the entrances. Through recent bat rabies studies it has been determined that animals placed in this cave contact rabies without having been bitten by rabid animals. Although these studies may give rise to alarm about any and all bats and bat caves, investigations are far from conclusive and it is significant to note that of thousands of cavers and guano miners who have spent untold hours in this and other bat caves none have contracted the disease. Of possible interest to people who wish to do original exploration two other caves are marked on this same topographic map. One, simply marked "cave", has been explored and found to be merely a large sink; the other, Dripstone Cave, has not been explored as of this writing. Its presence on the map may indicate more than casual interest.

DUNBAR CAVE (EDWARDS COUNTY)

To reach Dunbar Cave drive southwest from Rocksprings on U.S. 377 for about 21 miles. Just after crossing the fifth cattleguard from Rocksprings a dirt road leads to the right (20 to 25 miles from town.) Go through a bump gate by the highway and stop at the ranch house on the right. This is the owner's home, Mr. Allen Dunbar. Get permission and directions to the cave here. The entrance to the cave is a 25 foot drop into a large room. A cable ladder or rappel rope is needed to negotiate the entrance. The cave consists essentially of one large room-like passage several hundred feet long. Many lower level crawls exist in the back room which contains some large formations. The cave is inhabited by cave swallows and a small colony of bats. Rumors exist of an extensive lower level passage, but to date none has been found.

WEBB CAVE (KINNEY COUNTY)

Webb Cave is located on the Shahan Ranch north of Brackettville. To reach the cave follow the signs to Alamo Village, a commercial attraction also on the same ranch. Shahan lives on the road beyond the gate to Alamo Village (where the John Wayne movie "Alamo" was filmed). The cave is fairly hard to find and directions should be obtained at the house. There are four entrances to the cave; two 60-foot deep shafts, a large 40 to 60 foot deep vine-enshrouded sink, and a smaller nearby hole which may be climbed. The main entrance is quite impressive and the cave itself is an interesting and enjoyable one. There are few formations and it is inhabited by bats in certain sections. About 3,000 feet of passage has been surveyed.

DIABLO CAVE (VAL VERDE COUNTY)

To reach Diablo Cave drive north and west from Del Rio on U.S. 90 until the access road to the Amistad Reservoir is reached. Turn right on this paved road and drive to the office of the reservoir. The cave lies on Government property and directions should be obtained at the office. The main entrances to the cave lie on the Rio Grande. These admit one into the main part of the cave, which is essentially a large subway-like passage about 3,000 feet long. Side crawls have not been fully explored. Three to four thousand feet from the entrance a lake is reached which usually fills the passage from floor to ceiling. To reach the back parts of the cave the International Boundary and Water Commission pumped the lake dry, surveyed beyond the siphon, and sank calyx holes into the passage beyond. One of these entrances is equipped with a steel ladder and may be safely entered. Directions to this entrance should also be obtained at the office. This part of the cave is quite attractive and except in the lake regions, where some mud is to be found, a very enjoyable section.

FERN CAVE (VAL VERDE COUNTY)

The owner of Fern Cave, Martin Rose, lives in Del Rio and should be contacted before going to the ranch, which lies twenty miles north of Comstock. A gate is locked at the road leading from the highway to the cave and this must be unlocked by the ranch foreman. The distance from the road to the cave may have to be crossed on foot. The entrance to Fern Cave is a large 54 foot deep hole in which wooden ladders have recently been placed. At the bottom of this drop a 100-foot wide, 50-foot high passage extends in two directions. To the right it ends after several hundred feet, but to the left it extends for several thousand feet, through one large bat room, and eventually to a dome room with two small entrances in the ceiling. Probably the largest cave in the state volume-wise, it is interesting both biologically and speleologically.

CAVES OF LANGTRY (VAL VERDE COUNTY)

Six large caves are located within a few miles of the town of Langtry. An area of deep canyons and of beautiful scenery, it is worth the long drive scenically if for no other reason. Two deep, shelter pitted canyons empty into the Rio Grande, one on each side of Langtry. Two of the caves, Langtry Gypsum and Langtry East Gypsum Caves, are located on highway right-of-way one mile west of Langtry. The entrance to the former cave is quite obvious while that to the latter is a small inconspicuous hole on the north side of the pavement. Sixty feet of equipment is needed to enter these two caves. Both consist of five to twenty foot wide, ten to forty foot high passages with an abundance of delicate gypsum formations and large crystals. Some vandalism has occurred, but the vertical entrances have discouraged anything too serious. Three caves are located on the ranch of Arnem Humphries. Mr. Humphries should be contacted at his home in Del Rio before visiting the ranch. Should he not be at his home in Del Rio he may be at the ranch; to reach this, drive north from Langtry on the Pandale road. After about five miles a road to the right is marked with a sign as being the way to the Little Ingram Ranch. The house is

at the end of this road, about seven miles from the Pandale road. The three caves on Humphries land are Emerald Sink, Langtry Lead Cave, and Langtry Quarry Cave. Emerald Sink is 300 feet deep and contains a 140 foot deep pit, Langtry Lead Cave is 371 feet and the deepest known cave in the state, and Langtry Quarry Cave is 280 feet deep. A sixth cave in the Langtry area is Fisher's Fissure. It is owned by Mr. J. E. Fisher who lives about five miles west of Langtry at the first house on the right just after crossing Osman Canyon. Fisher's Fissure is 250 feet deep and is essentially a succession of fissure-like drops. All of these caves contain unclimbable drops and from 75 to 250 feet of equipment is needed to safely explore them. If anyone wishes to visit the caves it would be advisable to contact the author or other members of the Texas Speleological Survey about exact equipment needs and good directions to the caves.

CUEVA DE CARRIZAL (NUEVO LEÓN, MEXICO)

The Cueva de Carrizal is located at the base of El Candela, a jagged mountain peak rising over 3,000 feet above the surrounding plain. This peak was formed by an erosion-resistant plug of igneous material that was thrust through the older rocks, pushing them up and tilting them. The cave is developed in these tilted limestones, the limestones dipping about 32° away from the peak. To reach the cave drive east towards Sabinas Hidalgo from the Bustamante railroad station for about one mile; where the paved road to Sabinas Hidalgo turns south follow the gravel road to the north. Continue north on this road for about twenty-five miles to the first main road to the west. This road has a sign which reads "A Candela". Follow this road past the fort-like Candela railroad station. About three miles from the station there is a concrete bridge; just after this bridge turn left (south). In about half of a mile the main road turns west but continue south toward the mountain on the small road that goes to the cave. Follow this road through a gate and for about two miles to the clump of trees and brush surrounding the hacienda. Here keep right on the main road and head toward the mountain. Follow the road through a low pass and past a hut to the left. At the end of the road follow the stream about 300 feet. The entrance is behind this

spring. The cave consists of two main parts: the Cold River Passage, and a complex passage network connecting the two entrances. The Cold River Passage, about 1,000 feet long, averages about 30 feet by 30 feet for the first 500 feet to a high room. From this room the passage gets smaller, only four feet high and twenty feet wide toward the end. Near the lower entrance the cold "river" joins the hot "river" in a low room about four feet high above three feet of water. The lower entrance opens into this room, and a few feet from the entrance the combined flow of both "rivers", about 100 gallons per minute, emerges as a spring. Upstream from this low lake room is the largest room in the cave, about 100 feet long, 70 feet wide, and 50 feet high. From this room a 30-foot wide, 10-foot high passage leads back to the Cold River Passage; two walking passages lead south to the Baño Caliente, and 88° pool which is the source of the hot river. Also from the large room two passages slope steeply upward to the upper level, where a passage about 12 feet wide and from three to ten feet high leads to the upperentrance. Because of the ease with which this cave may be located and reached and its proximity to Gruta del Palmito , people visiting the latter cave should take this opportunity to visit what is one of the more unusual and interesting caves in northern Mexico.

[1] Description by William H. Russell

A P P E N D I X

CAVE AREAS OF MEXICO

by William H. Russell

Introduction - Mexico is one of the World's great cave areas, having both a large number of caves and an almost endless variety of types. The caving areas of Mexico range from the jungle-covered plains of Yucatán, northward through the rain-drenched mountains, to the northern deserts. The difference in climate and relief of these areas is reflected in their different types of caves. The dry northern mountains have large Carlsbad type rooms as typified by Gruta del Palmito; while the more humid southern mountains have numerous small shallow caves and deep sótanos. Some of these sótanos connect with long linear caves that are probably related to the resurgences at the base of the range. In flat Yucatán the caves are commonly irregular voids.

Nomenclature - The Mexicans use many names for various types of caves, and a knowledge of these is necessary to understand cave descriptions. Throughout much of Mexico pits and caves with vertical entrances are called sótanos. A place where a stream runs underground is called a sumidero or resumidero, and sima is sometimes used as another name for a sótano. Cueva is usually used to refer to small caves and shelters. A larger cave would be a gruta or a caverna. A l s o there are many Indian words that are used, such as the Mayan actun meaning cave. And as in English several words such as socavón (tunnel) and pozo (well) are used for caves.

Geology - Most Mexican caves are in the very thick lower Cretaceous limestones that outcrop in an almost continuous band of mountains from the United States south to Guatemala. These limestone mountains can be divided into several regions. North and west o f Monterrey they form long ranges, separated by desert valleys. Farther to the west much of the limestone is covered by more recent volcanic rocks. South o f Monterrey the mountains unite to form a group of ranges called the Sierra Madre Oriental. The limestone part of this range extends south almost to Mexico City, and

contains numerous caves both on its humid east side and dry west side. Near Mexico City a band of volcanic rocks crosses the country, but south of this the limestone mountains extend almost unbroken to Guatemala. These Cretaceous limestones also underlie much of southeast Mexico, but there they are mostly covered by younger rocks. The Yucatán caves are developed in flat-lying Eocene and Miocene limestones.

Biology - Although Mexican caves are famous for their cave life, such as the unusual blind fish from central Mexico and Yucatán, very little has been done with cave biology outside of Yucatán and a very few well-known caves. As a result almost every trip to Mexico brings back undescribed species of cave adapted animals. The caves seem to have an especially interesting and abundant milliped, isopod, and spider fauna.

Mexican caving areas - The discussion of individual caving areas that follows will perhaps tend to give a false impression of the number of caves in each area as the systematic cataloging of Mexican caves has only just been started, and the difficulty of locating caves in the relatively isolated areas of northern and western Mexico has caused this area to be under-represented. The wetter southern areas, however, do actually have a much higher density of large caves. Also little is known about the very promising cave areas in southern Mexico, especially the Chiapas highlands.

Nuevo León and western Tamaulipas-Going south from Laredo the first large caves are found in the mountains west of Sabinas Hidalgo. Beside the Grutas de Carrizal and Palmito which are described in this Guidebook, there is a large bat cave near Sabinas Hidalgo and just west of Monterrey there is the spectacular commercial cave, Grutas de García. There are also several other caves in this area, including the large cave by the Barranca de El Diente, near Estanzuela and ten kilometers from Monterrey. The mountains extend south from Monterrey in a band about fifty miles wide, and this rugged and seldom-visited area doubtless contains many caves. This mountainous area extends into Tamaulipas, passing just west of Ciudad Victoria.

North Central Mexico - This region, comprising the states of Coahuila, Chihuahua, and Durango, is a desert

area with scattered ranged of mountains separated by flat plains. The lack of people and roads in this area make cave hunting difficult, but several locally well-known caves are listed. Probably the most famous is the Gruta de Mapimí west of Torreón. Other interesting caves are near Monclova, San Vicente, and Boquilla. Southeast of the Big Bend region in northwest Coahuila is a large area of limestone that will probably contain many caves.

Sierra del Abra - The Sierra del Abra lies just to the east of the valley between Ciudad Valles and Antiguo Morelos. This area receives about forty seven inches of rain, mostly in winter and fall. Surface drainage is very poorly developed on the gentle west slope of the mountain and what few streams occur soon plunge into caves. Several of the largest caves are located where these streams run underground. Some of the more accessible are; Sótano de El Tigre, Sótano de La Tinaja, and Sótano del Arroyo, all within a few miles of the highway and about ten miles north-northeast of Ciudad Valles. About five miles north of Ciudad Valles are the Sótano and Sótanito de Montecillos, and much farther north is the Sótano del Venadito. Though exploration of these caves is quite incomplete, their average length is over one mile. There are other large caves near El Pujal, Los Sabinos, and Pachón. Of special interest is Gruta de Quintero and Cueva del Abra. They are eight miles south of Ciudad Mante to the Village of Quintero. Also easy of access are several caves near the Taninul Hotel east of Ciudad Valles.

San Luis Potosi - Mountainous eastern San Luis Potosi is one of Mexico's leading cave areas. The dry western part of this area extends south from the Cedral region through Matehuala and Custadio to south of Ciudad de Maíz. This area is characterized by numerous normally dry arroyos that run into resumideros and sótanos, the best-known is the Pozo de Tepetate near Ciudad de Maíz. Along the wetter eastern front of the mountains many caves and deep pits are known, especially in the Xilitla area where much speleological work has been done. Sótano de Huitzmolotitla was only recently explored to its end some 750 feet below the entrance. This cave, over 10,000 feet long, is entered by a 350-foot deep, 100-foot diameter pit. Other nearby pits measure 369, 386, and 500 feet deep. A

large number of biologically interesting smaller caves are in the area also. The jungle covered limestone mountains geologically similar to this area extend north as far as southern Tamaulipas, and an enormous number of caves and pits will probably be found in this area.

Veracruz - There is a relatively small area of limestone outcropping in northern Veracruz west of Tuxpan, but from this area south to just north of Orizaba the limestones are mostly covered by volcanics. From Orizaba south, however, the mountains are composed almost entirely of limestone, and there are numerous caves. Some 15 miles south of Orizaba there is a concentration of caves and sótanos, several being over 300 feet deep. (One ten feet from the road has a free drop of 365 feet, and the deepest in the area tops 700 feet) South from this area the mountains become much higher, and in extreme northwest Oaxaca the summits of the limestone mountains are almost 10,000 feet above the plains below. This is a promising and almost totally uninvestigated area.

Cacahuamilpa area - This area is located in a submountainous area near the junction of the states of México, Guerrero, and Morelos. It contains some of the largest and most famous Mexican caves. One of these caves, Grutas de Cacahuamilpa, is a Mexican park and tourist attraction. The commercial part of the cave is a passage 1.4 kilometers long, 100 meters wide, and 60 meters high, with large formations. About 100 meters below the entrance to Cacahuamilpa are the Dos Bocas (two mouths) from which flow the rivers Chontalcoatlan and San Geronimo, uniting in a few feet to form the Rio Amacuzac. These entrances, about 200 feet wide and 100 feet high, are quite impressive and the cave passages upstream from the entrances are about 75 feet in diameter. The underground course of these rivers is respectively three and six kilometers, and during flood boulders over a meter in diameter are carried through the caves. There are also several large sinks above the stream channels that lead to caves that may connect with the rivers. This area is surrounded by volcanic rocks that have covered the limestone, but throughout western Mexico there are isolated limestone outcrops that should prove to have large and interesting caves. Grutas de Juxtlahuaca, a famous cave west of Chil-

pancingo, is located in one of these limestone areas.

Chiapas - Most of the known caves of Chiapas are located in the 200 meter thick cretaceous limestones that form the Chiapas highlands. These highlands, with elevations from 1,500 to 2,000 meters, extend from the Guatemalan border southeast of Comitán de Domingues, to where they cross into Oaxaca and Veracruz west of Tuxtla Gutierrez. Through this area, almost sixty miles wide at the Guatemalan border and narrowing to the northwest, there are widespread development of karst features with numerous caves. Little is known of this promising area.

Yucatán - This area has long been famous for its caves and cenotes and much speleological work has been done. Though the caves are comparatively well known, they are not large by the standards of the rest of Mexico, as might be expected in caves formed in quite recent limestone in areas of low elevation. Most of the caves are in North and Central Yucatán, near Merida, Chichen Itza, Oxkutzcab, and Tekax.

Conclusion - It becomes apparent from a study of the body of this report that there has been little systematic work on the caves of Mexico. The absence of any organization of the size and scope of the National Speleological Society in the United States has meant little systematic study and exploration of Mexican caves. Known caves, almost without exception, are easy of access and entry, and there seems to be an almost complete ignorance among Mexican speleologists of modern caving techniques. It is hoped that recent work by F. Bonet and an increased interest in cave biology and hydrology will result in more comprehensive studies of Mexican caves and caving areas.

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