PAPERS ON THE PREHISTORY OF NORTHEASTERN MEXICO AND ADJACENT TEXAS

Edited by

Jeremiah F. Epstein, Thomas R. Hester,
and Carol Graves

Center for Archaeological Research
The University of Texas at San Antonio
Special Report, No. 9

1980

TABLE OF CONTENTS

PREFACE

With this volume, the Center for Archaeological Research at The University of Texas at San Antonio is pleased to publish a series of papers presented in the symposium "The Prehistory of Northeastern Mexico and Texas," held in Monterrey, Mexico, in April 1975. The symposium was part of the "Reunion Sobre Aspectos de Arqueología e Historia del Norte," held at the Casa de Cultura under the sponsorship of the State of Nuevo Leon (Dr. Pedro Zorrilla, Governor) and the Instituto Nacional de Antropología e Historia. Arq. Oscar Martinez Garza, then the Jefe del de Departamento de Antropología e Historia del Gobierno del Estado de Nuevo León, served as the General Coordinator for the conference.

The time between the presentation of these papers and their publication requires some explanation. Arq. Martinez Garza had originally planned to publish the proceedings of the symposium in Monterrey. However, this was not possible. Professor Jeremiah F. Epstein later submitted the symposia papers elsewhere, but lack of funding precluded the publication of the volume. In late 1978, it was decided that a selected group of papers would be published through the *Special Report* series of the Center for Archaeological Research. Because considerable time had elapsed since the presentation of the papers, many of the authors had extensive revisions which they wanted to make. We appreciate their cooperation (which later included the reading of page proofs for their papers) and we thank them for their patience. Since other publications of the Center had been planned in advance of this volume, it meant that the authors had to endure further delays before seeing their papers in print. The reader will note that some of the papers contain abstracts and others do not; this follows the author's particular preference.

The cover for this volume was designed by Kathy Bareiss of the Center; she also prepared Figure 1 of the Shafer paper. The manuscript was typed by Elizabeth Goode, Mary Lou Ellis, and Frieda Barefield. Lynda Folan proofread the paper by B. Braniff.

Thomas R. Hester
Carol Graves

October 1980

INTRODUCTION

Jeremiah F. Epstein

The papers bound in this volume are selected from a series of presentations given in the sessions on archaeology at the meeting held in Monterrey, May 23-26, 1975, to celebrate the opening of the northeastern Mexico regional branch of the Instituto Nacional de Anthropología e Historia.* The theme of that conference was "The Archaeology and History of Northeastern Mexico and Texas."

The contributions on both archaeology and history were given in the newly renovated and refurbished Monterrey Railroad Station, which now bears the name Casa de Cultura. The selection of this antique structure for INAH's regional museum symbolizes an awakened interest in the past of northeastern Mexico, and represents an effort to make that past relevant to the present as well as the future. This is as it should be, and is what unites anthropologists and historians in their efforts to make history and prehistory comprehensible.

****

This paper is a slightly modified version of the writer's introductory remarks given at that meeting. The session was dedicated to Richard S. MacNeish, whose research in Tamaulipas provided us with the first detailed publication on culture complexes and chronologies in northeastern Mexico.

This is, of course, not the first time that both historians and anthropologists have come together to discuss the northern frontier of Mexico. In 1943 the Sociedad Mexicana de Antropología (1944) held its third round table on the theme of "El Norte de México y el Sur de Estados Unidos." In contrast to our own papers, which focus on northeastern Mexico and Texas, those given at the Tercera Reunión de La Mesa Redonda were concerned with all of northern Mexico, and all of the southeastern and southwestern United States. A brief examination of those papers, and of the issues raised at that time, gives us some idea of the progress that has occurred, particularly in archaeology, in the intervening 32 years.

Most of the archaeological papers given in 1943 were characterized by a truncated time perspective. Sequences had been worked out for the southwest (Hohokam and Anasazi) and the southeast (Tchefuncte, Hopewell-Marksville, Early and Late Mississippi); and for Mesoamerica, the Teotihuacan chronology

---

*Several of the 1975 conference papers have already been published elsewhere, including Bryant (1975), Jelks (1978), Mallouf and Tunnell (1977), and Shiner (1976).

(as revised by the work at Kaminaljuyu) and the sequence at Panuco served as the basis for statements of Mesoamerican-North American relationships. The antiquity of man was just beginning to be appreciated, but the evidence was far from abundant. Matthew Stirling (1944:165) spoke briefly on the distribution of the Folsom finds, and suggested that the differences between Folsom and Sandia indicated the possibility of a multiple origin for early man in America. There were no long culture sequences and no radiocarbon dating, and the concept of Archaic as we now think of it was not generally in use. Jorge Vivo's chronological chart put early American hunters or Paleo-Indians in the southwestern United States just below the A.D. 400-500 time line. In the southwest, Paleo-Amerindians persisted to A.D. 1. In Mesoamerica, the terms Pre-Classic or Formative had not come into use, and Vivo's chart shows the Archaic ending about A.D. 200, where it was followed by Teotihuacan II-III and Tzakol. The earliest dates given for any area in Mesoamerica go back with appropriate question marks to 500 B.C. One has the uncomfortable feeling that in 1943 a slightly modified version of Bishop Ussher's chronology was being used in the New World.

The more important discussions dealt largely with connections between Mesoamerica and the American southwest, and in these the culture and prehistory of northwestern Mexico was obviously more relevant than that of Coahuila, Nuevo Leon, and Tamaulipas. Northeastern Mexico was thus given short shrift, but a good share of this stemmed not from a lack of interest, but rather from a lack of information. There was virtually no prehistoric data for all of northeastern Mexico. Both Paul Kirchoff and Ralph Beals tried to organize the ethnohistoric material in order to define the limits of the area under consideration. Kirchoff proposed the term "arid north america," while Beals suggested "the greater southwest." In remarkable anticipation of the Desert Culture concept, Beals (1944:194) saw a relatively homogeneous pre-agricultural culture, or culture succession, which probably applied to the states on both sides of the Mexico-American border, extending north to Utah and Nevada, and south perhaps as far as Durango, Hidalgo, and the state of Mexico. He thought such a concept would explain the parallels in ethnohistoric culture elements that are found in Coahuila, Tamaulipas, and Nuevo Leon, and among the peoples of the Great Basin and central California. While he cited the similarities between the mesquite gatherers of Nuevo Leon and the pinyon collectors of the Great Basin, at the same time he noted that our knowledge of the people of northeastern Mexico was very scanty (*ibid.*:195). Kirchoff (1944:257) speculated that the agriculture found among the Pames and those in southern Tamaulipas, as well as the pottery and stone bowls, came from Mesoamerica. He points out that the presence of pre-European agriculture in the Laguna of Coahuila is not well established. He lists various hunting/gathering culture traits found among the Laguneros and the People of Nuevo Leon. Jimenez Moreno (1944:131) added additional information, including the item that among the people of La Laguna were some that, according to missionary sources, may have spoken a language similar to Nahuatl.

Archaeological references to northeast Mexico were almost nil. Swanton (1944:275), speaking of the ethnographic relations between Mexico and the southeast United States, notes that, of various lines of research, what is very much needed "is a more intensive examination, largely of course archaeological, of the low culture areas of Texas and northeastern Mexico." Similarly, Ekholm (1944:280), in his effort to connect his Panuco material with the southeast, says: "Extensive exploration in the intervening coastal region will be necessary to find traces

of this early connection." About the only concrete references to northeast Mexico are Rubin de la Borbollas' reference to Coahuila cave skeletal material at the Peabody Museum, and Pablo Martinez del Rio's comment that Walter Taylor was working on caves in Coahuila, and that the manuscript in Austin would soon see the light of publication.

A lot has happened since that summer in 1943. MacNeish's extensive excavations in Tamaulipas produced a number of long culture chronologies and, among other things, have suggested that agriculture was quite ancient in parts of Tamaulipas. A portion of Taylor's work has been published in the form of a general synthesis of Coahuiltecan prehistory (Taylor 1966:59-94). The justly famous Cueva de la Candelaria material has been partially reported; and my students and I have carried out both surveys and excavations in Nuevo Leon and Coahuila that have, in part, been published, and, in part, are in the form of M.A. theses and Ph.D. dissertations. There are now a series of archaeological sites that have given us very detailed information on culture change and chronology for northeastern Mexico. And while this has been going on in Nuevo Leon, Tamaulipas, and Coahuila, much more has been done in Texas. Long, well-documented sequences are established for the Trans-Pecos and for central Texas, and the extensive surveys carried out in connection with the reservoir salvage projects in that state have provided a series of culture chronologies that have implications for prehistory that we are just beginning to fathom. An examination of the literature for both Texas and northeastern Mexico shows an abundance of culture complexes and a projectile point terminology that is truly impressive, but somewhat baffling. This is, I suspect, the inevitable result of active research. When there is no information, there is nothing about which to be confused. I would hope that the papers presented here help to some degree in clarification, but I suspect that, like all research, they will raise more questions than they answer. The more we study man and his past, the more complex that picture becomes. Our once naive faith that a simple picture of prehistory will emerge has yet to be vindicated. So, if these papers make the prehistory of northeastern Mexico and Texas appear somewhat fuzzier than it has been before, do not be surprised. In a world where research is healthy, if you are not confused, you simply do not understand the situation.

REFERENCES CITED

Beals, R. L.

1944 Northern Mexico and the Southwest. In *El Norte de Mexico y el Sur de Estados Unidos*:191-198. Castillo de Chapultepec, Mexico, D.F.

Bryant, V. M., Jr.

1975 Pollen as an Indicator of Prehistoric Diets in Coahuila, Mexico. *Bulletin of the Texas Archeological Society* 46:87-106.

Ekholm, G.

1944 Relations Between Middle America and the Southwest. In *El Norte de Mexico y el Sur de Estados Unidos*:276-283. Castillo de Chapultepec, Mexico, D.F.

Jelks, E. B.

1978 Diablo Range. In R. E. Taylor and C. W. Meighan, eds., *Chronologies in New World Archaeology*:71-111. Academic Press, New York.

Jiménez Moreno, W.

1944 Tribus e Idiomas del Norte de Mexico. In *El Norte de Mexico y el Sur de Estados Unidos*:121-133. Castillo de Chapultepec, Mexico, D.F.

Kirchhoff, P.

1944 Relaciones entre los Recolectores-Cazadores del Norte de Mexico y las Areas Circunvecinas. In *El Norte de Mexico y el Sur de Estados Unidos*:255-257. Castillo de Chapultepec, Mexico, D.F.

Mallouf, R. J. and C. Tunnell

1977 An Archeological Reconnaissance in the Lower Canyons of the Rio Grande. *Texas Historical Commission, Office of the State Archeologist, Archeological Survey Report* 22.

Shiner, J. L.

1976 Ethnic Persistence in Prehistoric Northeastern Mexico. *Current Anthropology* 17(3):502.

Sociedad Mexicana de Antropología

1944 *El Norte de Mexico y el Sur de Estados Unidos*. Tercera Reunión de Mesa Redonda sobre Problemas Antropológicos de Mexico y Centro América. 25 de Agosto a 2 de Septiembre de 1943. Castillo de Chapultepec, Mexico, D.F.

Stirling, M.

1944 On the Folsom Finds. In *El Norte de Mexico y el Sur de Estados Unidos*:165. Castillo de Chapultepec, Mexico, D.F.

Swanton, J. R.

1944 Relations Between Northern Mexico and the Southwest of the United States from the View of Ethnology and History. In *El Norte de Mexico y el Sur de Estados Unidos*:259-276. Castillo de Chapultepec, Mexico, D. F.

Taylor, W. W.

1966 Archaic Cultures Adjacent to the Northeastern Frontiers of Mesoamerica. In G. F. Ekholm and G. R. Willey, eds., Archaeological Frontiers and External Connections:59-94. *Handbook of Middle American Indians* 4. University of Texas Press, Austin.

THE PALEOENVIRONMENTAL RECORD FOR NORTHEASTERN MEXICO:

A REVIEW OF THE POLLEN EVIDENCE

Vaughn M. Bryant, Jr. and David H. Riskind

Abstract

Fossil pollen records from Nuevo Leon, Coahuila, and from adjacent areas of Texas are used as the basis for discussion of the late Quaternary environmental record of northeastern Mexico. Deposits from Cueva de la Zona de Derrumbes, located in Nuevo Leon, and deposits from the Cuatro Ciénegas Basin of Coahuila provide fossil pollen data from Mexico, while deposits from playa lakes in west Texas and archaeological sites in southwest Texas provide fossil pollen data for regions of adjacent Texas. Together these data suggest that areas of northeastern Mexico have undergone vegetational changes during the late Quaternary.

Introduction

The region of northeastern Mexico (composed of areas of Tamaulipas, Nuevo Leon, and Coahuila) can be divided into three major physiographic regions: (1) Coastal Plain, (2) Sierra Madre Oriental, and (3) Chihuahuan Desert (Fig. 1). In order to understand the types and degree of environmental changes which have occurred in these regions during the late Quaternary, it is essential that we first examine and understand the present vegetational distribution within each of these physiographic regions. This is not an easy task, since northeastern Mexico is characterized by a highly complex mosaic of vegetational communities which are subject to change, caused by local factors such as slope exposure, available moisture, elevation, temperature, and edaphic conditions.

As stated above, we feel that it is important for the reader to have a general outline of the vegetational patterns that exist in northeastern Mexico. However, it is neither the intent nor the function of this paper to produce a definitive statement relating to the vegetation of this area.

Present Vegetational Distribution

Gulf Coastal Plain

The Gulf Coastal Plain in northeastern Mexico extends in a wide band from the coast inland to the eastern foothills of the Sierra Madre Oriental (Fig. 1). To the north, in central Coahuila, the Serranías del Burro provide a structural boundary for the Coastal Plain, as does the Balcones Escarpment in Texas. In the southern part of the state of Tamaulipas, the Gulf Coastal Plain extends inland approximately 125 km to Ciudad Victoria. From the coast inland, there is a gradual increase in elevation from sea level to approximately 400 meters (Gonzales-Medrano 1972). In the southern portion of the Coastal Plain, the flat topography is interrupted by two elevated masses--the Sierra de San Carlos and the Sierra de Tamaulipas.

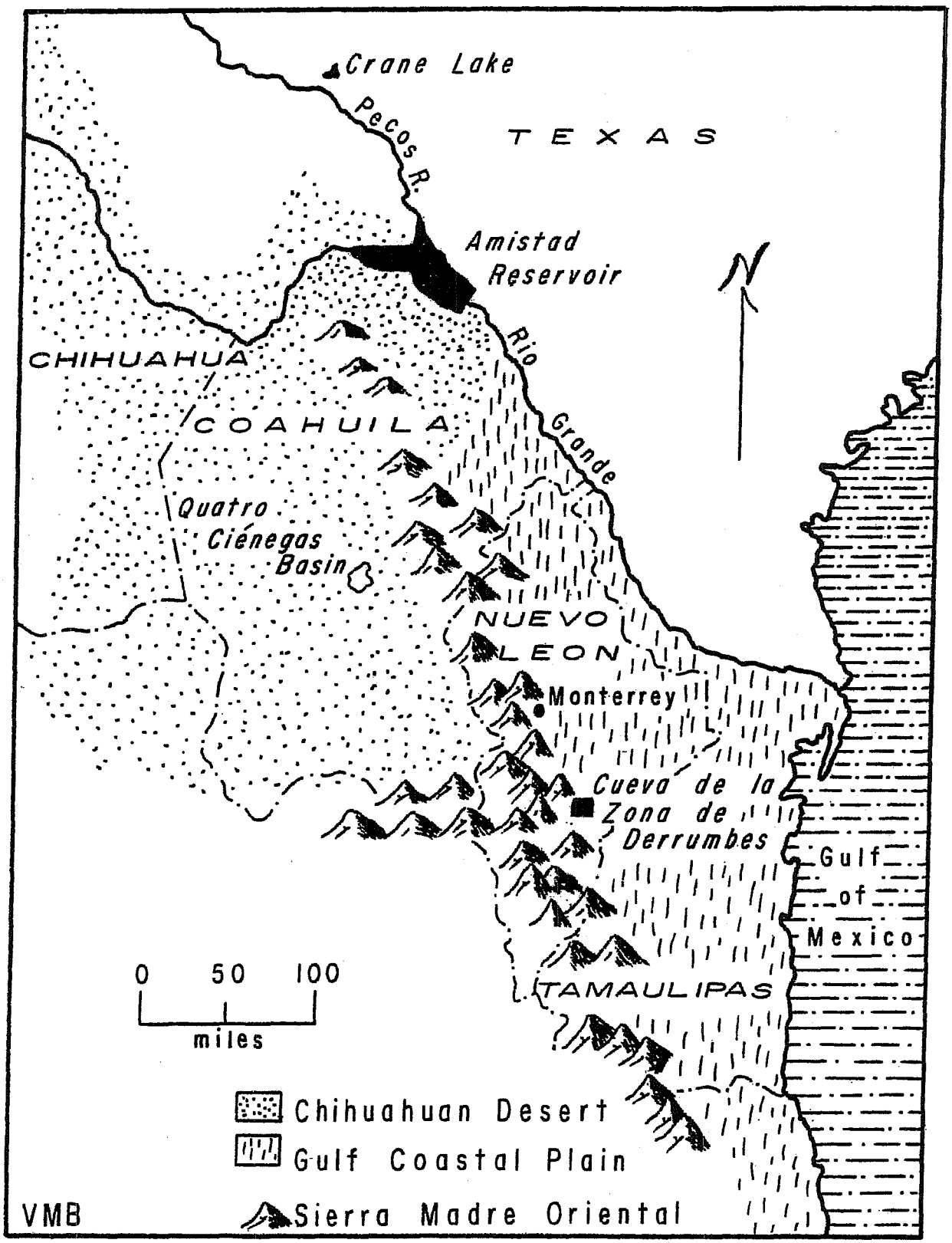


Figure 1. *Physiographic Regions of Northeastern Mexico.*

A number of published reports that discuss aspects of the Gulf Coastal Plain vegetation in northeastern Mexico are available (Muller 1939; Goldman 1951; Martin 1958; Johnston 1963; Gonzales-Medrano 1972). Each of these individuals discusses slightly different aspects of the Coastal Plain vegetation, yet most seem to be in agreement that there are at least three major types of plant communities represented in this coastal zone: (1) the halophyte vegetation along the coast, (2) the coastal dune vegetation, and (3) various aspects of a woodland, including types such as thorn-scrub and a low evergreen forest.

Along the margins of the shallow bays, lagoons, and inlets of the Coastal Plain grow a number of plant species which are able to tolerate the high salinity of this habitat. Grasses such as *Spartina* and *Distichlis* are common along the edges of lagoons and bays of the area and grow well even when salinity levels exceed 2% (Gonzales-Medrano 1972). Other plants common to the halophyte zone include *Allenrolfea, Atriplex, Cakile, Borrichia, Salicornia, Sesuvium,* and *Batis*. The vegetation found growing on the Tamaulipan coastal dunes is varied and is dependent upon factors such as latitude, rainfall, and temperature. Some of the more common plants growing on the coastal dunes include grasses such as *Spartina densiflora, Distichlis spicata, Uniola paniculata,* and *Panicum amarulum*, and other xerophytes such as *Cakile cakile, Ipomoea pes-caprae, Croton punctatus, Oenothera drummondii, Bacopa,* and *Coccoloba*.

In the coastal thorn-scrub woodland, the grasses are less salt tolerant and more mesophytic. Today in this region one finds a variety of grasses, yet the species are mostly dependent upon the extent of local grazing. In areas not overgrazed, one may still find grasses such as *Agropyron, Schizachyrium,* and *Andropogon*, whereas in overgrazed portions of the coastal thorn-scrub zone these grasses are generally replaced by such genera as *Bouteloua, Buchloe, Bothriochloa,* and *Trichloris*. Mixed in among the various grasses are a number of shrubs and other xerophytes, such as *Opuntia, Acanthocereus, Acacia, Helietta, Cordia, Celtis, Randia, Condalia, Karwinskia, Cercidium, Pithecellobium, Amyris, Castela, Yucca, Prosopis, Schaefferia,* and *Agave*.

Inland, the Coastal Plain woodlands grade into a "low forest," where moisture and edaphic conditions are favorable. Representative species generally include very nearly all of those mentioned previously; however, community physiognomy is decidedly changed.

The major variance in the vegetation of the Coastal Plain occurs in the low mountainous islands of pine-oak woodland. Representative examples of these islands can be found in the Sierra San Carlos mountains (Kellum 1937) and the Sierra de Tamaulipas mountains (Martin 1958; Puig 1970). In addition to the vegetational islands of pine-oak woodlands, more favorable habitats along the major drainages support majestic stands of Montezuma bald-cypress (*Taxodium mucronatum*), together with other typical riparian species.

Sierra Madre Oriental

West of the Coastal Plain one encounters the Sierra Madre Oriental physiographic zone where the vegetational patterns are complex and vary greatly from one locale to the next depending upon a variety of environmental factors. In addition, some of the most xeric sites in this area have stands of pine (*Pinus*), fir (*Abies*) and spruce (*Picea*), growing less than 20 km away. To try and give the reader a brief

generalized overview of such a varied pattern of vegetation is difficult and might be misrepresented, since each mountain range and valley contains its own pattern of vegetational communities. However, with these factors in mind, we feel that some generalized statements concerning the vegetation can still be made for this physiographic region.

Muller (1939, 1947), Edwards (1939), Rojas-Mendoza (1965), Marroquin (1968, 1977), Flores-Mata (1971), Beaman and Andresen (1966), and others have described and mapped the vegetation in portions of the Sierra Madre Oriental in our study area.

Succinctly, the "oriental" plant communities vary from fairly xeric stem and leaf succulent woodlands and grasslands (including *Yucca, Dasylirion, Agave*, etc.) to piedmont shrub (with *Quercus, Diospyros, Leucaena, Rhus, Bumelia, Bauhinia, Vauquelinia, Helieta, Cordia, Acacia, Ptelea, Eysenhardtia, Brahea, Colubrina*, etc.). Depending on exposure and elevation, the piedmont scrub grades into a montane low forest whose primary components are a variety of oaks (ca. 12 species), but it also includes other species such as *Juniperus, Pinus* (including pinyon), *Arbutus, Cercis, Fraxinus, Garrya, Prunus*, and *Agave* (on exposed sites). Facies of this community include both pine-oak and/or oak woodlands.

Montane chaparral, a relatively xeric community, occurs primarily on the western portions of the Sierra Madre Oriental in our study area; but this community may be found, though less well defined, on a number of the more massive outlier "Oriental" ranges. The chaparral is distributed from 2000 meters upward to areas higher than 3000 meters, depending on slope exposure. Dominant genera in this chaparral community are *Quercus* (both evergreen and deciduous), *Ceanothus, Cercocarpus, Garrya, Arctostaphylos, Arbutus, Rhus, Fraxinus, Amelanchier, Agave*, and *Cowania*. In addition, *Pinus*, including pinyon, and *Juniperus* may also occur. On occasion, a chaparral community may be found above the more mesic montane forest, whose characterization follows.

Montane mesic forests, which are essentially evergreen, may be found on favorable yet often widely distributed sites in the Sierra Madre Oriental. Anthropogenic factors have long influenced this community complex; thus distribution of these forests has been strongly modified by man's activity. At present, constituents of this community may be found at elevations of approximately 1700 meters and above. Community components include *Pinus, Quercus, Pseudotsuga, Cupressus, Carya, Populus*, and, on rare occasions, *Abies* and/or *Taxus*. Included also may be other genera, such as *Acer, Tilia, Ostrya, Cornus, Viburnum, Rhamnus, Prunus, Juniperus*, and *Arbutus*. Biogeographically, the most significant of these communities occurs in the Serranías del Burro mountains in north-central Coahuila, where fir (*Abies*) and Douglas fir (*Pseudotsuga*) occur locally in canyon woodlands at elevations as low as 1514 m, where they grow in mixed association with juniper, oak, and other temperate deciduous species. Also in this mountain range, Arizona pine (*Pinus arizonica*) currently grows well on the rather dry slopes at elevations as low as 900 m.

Aside from the riparian communities, the localized subalpine forest communities of the Sierra Madre Oriental are the most mesic. Today, this type of evergreen, mixed conifer community is known only from a limited number of widely scattered sites in our study area, including Cerro Potosi, a few localized sites west-southwest

of Monterrey, and on the high, mesic portions of the Sierra de la Madera and the Sierra Maderas del Carmen in northern Coahuila. This type of subalpine forest community is composed of a local *Abies* forest in the last two ranges, but realizes its greatest development above 2600 meters, and areas up to and above 3000 meters in a few localized sites west-southwest of Monterrey and in the area of Cerro Potosi. Dominant genera of the subalpine forest community include *Pinus*, *Abies*, and *Pseudotsuga*, with some *Quercus* very nearly always present. At one site in the Sierra Madre Oriental, there is a localized *Picea* forest (Riskind and Patterson 1975) at elevations above 3250 meters. In the contemporary landscape of the area we studied in the Sierra Madre Oriental, only on Cerro Potosi is there an alpine meadow and timberline. A detailed description of the communities therein may be obtained in Beaman and Andresen (1966).

Riparian montane woodlands in our area have not been extensively described; however, Marroquin (1968) has studied the canyon flora in the vicinity of Monterrey, as did White (1941). Briefly, the riparian community may be described as a temperate deciduous woodland whose primary components are *Quercus*, *Carya*, *Ulmus*, *Acer*, *Juglans* *Plantanus*, *Cornus*, *Cercis*, and *Arbutus*. Interspaced between the higher peaks one frequently finds high altitude (ca. 2000 meters and above) grasslands, but these do not appear to be significant from a paleobiogeographic standpoint.

Chihuahuan Desert

North and west of Monterrey lies the main body of a vast arid region known as the Chihuahuan Desert. Botanists have investigated this region in the past, yet the field work of the only contemporary floristic study of this region has only recently been completed (Johnston 1977). Rzedowski (1968) has published one of the few brief overviews of Chihuahuan Desert vegetation, yet Johnston describes the Chihuahuan Desert in terms of at least 16 intergrading and overlapping heterogeneous community "types." Some of the more detailed floristic and vegetation descriptions of the Chihuahuan Desert are in papers by Pinkava (1977) and Meyer (1975) for the area of the Cuatro Ciénegas Basin and Henrickson (1977) for the saline habitats scattered throughout the Chihuahuan Desert. The Cuatro Ciénegas studies clearly reveal some of the more oustanding examples of the limiting effects of edaphic factors upon the vegetation of the Chihuahuan Desert.

Johnston (1977) notes that, although many complexities exist in the expression of individual local vegetation communities, the single unifying characteristic of the region is the domination of a single desert scrub, *Larrea tridentata*. Rzedowski (1968), on the other hand, refers to a trilogy of characteristic microphylous shrubs as indicator types for the Chihuahuan Desert--*Larrea*, *Prosopis*, and *Flourensia*.

Depending upon the substrate, temperature, topography, and available moisture, a variety of different individual plant communities can exist in the Chihuahuan Desert region. As in the Sierra Madre Oriental physiographic region, the Chihuahuan Desert contains a mosaic of vegetational communities and thus makes a generalized vegetation description difficult. Examples of the complexities that are involved are clearly seen in the field and are described in some detail by Johnston (1977). In that article, Johnston mentions finding distinct plant communities as small as 100 meters in diameter surrounded by completely different plant communities, and

warns that any precise vegetational maps of the region will have to be drawn at a scale which can resolve elements as small as 100 meters in diameter.

In general terms, the low elevations of the Chihuahuan Desert contain extensive regions of low desert scrub containing plants (in addition to *Larrea*) such as *Agave, Yucca, Koerberlinia, Lycium, Acacia, Dasylirion, Prosopis, Flourensia, Fouquieria, Coldenia, Jatropha,* and a variety of cacti. At higher elevations one could encounter any of a number of woody plants, depending upon local topographic, climatic, and edaphic factors. In some isolated regions in the Chihuahuan Desert, one can find montane mesic forests composed of *Pinus ponderosa, P. strobiformis, Pseudotsuga menziesii, Abies coahuilensis,* and *Cupressus arizonica.* These mesic forests are outliers of the Sierra Madre Oriental biota which have been described previously. Other elevated areas in this region contained mixed woodlands (oak, pinyon, and juniper), oak woodlands, pine parklands, temperate deciduous woodlands, chaparral, or succulent desert grasslands.

Pollen Records

Unfortunately, limited fossil pollen records exist for the region of northeastern Mexico, and consist only of the studies of Meyer (1972, 1973) and our report of the pollen analysis of sediments from the archaeological site of Cueva de la Zona de Derrumbes reported in this article. Also of value are the fossil pollen records of sediments in areas adjacent to northeastern Mexico, such as the ones conducted in the Amistad Reservoir area near Del Rio, Texas (Bryant 1966, 1967, 1977; Bryant and Larson 1968; Bryant and Shafer 1977; Dering 1979).

Pollen Records of the Coastal Plain and Sierra Madre Oriental

The region which includes the Coastal Plain and the Sierra Madre Oriental remains poorly understood in terms of the fossil pollen record of changes that may have occurred during the past 20,000 to 30,000 years. Few palynologists have been willing to speculate upon what vegetational and climatic changes may have occurred in this region, since there is little pollen evidence available upon which to base any kind of reasonable hypothesis.

In 1967, one of us (Bryant) was asked by Dr. Jeremiah F. Epstein to examine pollen samples collected from strata at the archaeological site of Cueva de la Zona de Derrumbes, located in the Rio Santa Rosa Valley of southeastern Nuevo Leon (Fig. 1). The samples were processed in 1968, using accepted extraction techniques (Faegri and Iversen 1968), but were not immediately analyzed. The samples were later analyzed in 1975, and the data are listed in Table 1.

The pollen record recovered from the sediments of Cueva de la Zona de Derrumbes (Table 1) is of only limited value as a guide to aspects of the regional environment, other than to indicate a presence of these plant types in the local environment near the cave.

As indicated in Table 2, the upper five samples are younger in age than 2800 B.C. and contain primarily zoophilous (insect-pollinated) pollen types, such as *Opuntia* (cactus), *Agave* (maguey), *Dasylirion* (sotol), *Prosopis* (mesquite), and an unidentified pollen type referred to as "unknown Type A." Insect-pollinated types, such

TABLE 1. PERCENTAGES OF FOSSIL POLLEN RECOVERED FROM SOIL DEPOSITS AT CUEVA DE LA ZONA DE DERRUMBES

Pollen Type	Sample Number 1	2	3	4	5	6
Pinus	6.5%	3.5%	3.0%	1.5%	1.0%	20.0%
Celtis		1.0		1.0		
Quercus			1.0	0.5		4.5
Carya	0.5					4.5
Prosopis	2.5	4.5	3.0	4.5		
Ulmus						0.5
Leucaena		0.5				
Gramineae	23.5	13.5	19.0	16.0	7	11.5
Cheno-Am	4.0	0.5	6.0			3.0
Cyperaceae	1.0					
Onagraceae	0.5					
Agave	38.5	47.5	38.5	56.0	19	1.0
Dasylirion	6.5	17.0	19.0	7.0	5.5	37.0
Opuntia	5.0	1.0		4.5		
Dalea	2.0		0.5			1.0
Cruciferae						2.0
Solanum	0.5					0.5
Umbelliferae	1.5		0.5			
Compositae (high spine)	2.0	3.5	1.0	1.0	2.0	1.0
Compositae (low spine)	0.5	2.0	2.0	2.5		4.5
Ephedra		0.5		0.5		
Unknown Type A					59.0	
Unknown	5.0	5.0	6.5	5.0	6.5	9.0
Total Percent	100%	100%	100%	100%	100%	100%
Total Number of Pollen Grains Counted Per Level	229	228	213	203	109	208

TABLE 2. PROVENIENCE OF FOSSIL POLLEN SAMPLES ANALYZED FROM CUEVA DE LA ZONA DERRUMBES

Sample Number	Provenience	Depth below Surface	C-14 Date
1	N3-W35	0.46 feet	
2	N3-W35	1.5 feet	A.D. 785±75
3	N3-W35	2.4 feet	210±100 B.C.
4	N3-W35	3.5 feet	970±130 B.C.
5	N3-W35	4.64 feet	
6	N1-W35	5.20 feet	2890±220 B.C.

as the ones listed above, are not commonly found in the normal pollen rain of arid regions, since their pollen is produced in low numbers and is not dispersed into the atmosphere by wind currents. Since they were recovered from deposits associated with the activities of man, it must be assumed that prehistoric man was in some manner using the flowers of these plants while at this site.

High pollen percentages of insect-pollinated types, such as those encountered in these samples, are common in the prehistoric coprolites of sites found in other regions of northeastern Mexico (Bryant 1975) and adjacent areas of Texas (Bryant 1969, 1974; Riskind 1971; Williams-Dean 1978). Since defecating within the confines of rockshelters seems to have been a common practice of prehistoric man in other regions, it could be assumed that, if present, those fecal samples may have been partially destroyed by biological and chemical action within the deposits of the shelter. Since pollen is extremely resistant to decay, years later only the pollen might remain in the soil as evidence. An alternative possibility is that the insect-pollinated types may have entered the cave in flowers that were collected by the prehistoric aboriginal inhabitants and were then discarded on the floor, where the pollen became preserved in the soil.

The anemophilous (wind-pollinated) pollen types recovered in these five soil samples reflect plant types which occur within the regional vegetation composition of the area today. In these five samples, pine pollen is not present in high percentages and was undoubtedly transported to the site from trees located in some part of the regional vegetation. Had pines been growing at the site, the expected percentages of pine pollen should be higher. The grass pollen ranges from 7% to 23.5% in these samples and suggests that there were probably areas of grasslands near the site. This seems to be a reasonable assumption, since grass could have formed one of the major understory vegetational components in the past, as it does today in some regions of the Sierra Madre Oriental where excessive grazing has not yet occurred (Muller 1939). Other wind-pollinated types that were recovered in these samples include *Carya, Quercus, Cheno-Am* (Chenopodiceae and the genus *Amaranthus*), *Celtis, Ephedra,* and composites, all of which may have reflected minor components of the local or regional vegetation.

Pollen sample 6 came from soils recovered from the upper zones of the gravel deposits in the cave. Radiocarbon dates of these deposits range from 2805 to 3000 B.C. (Epstein 1972), and place them near the end of the time range generally assigned to the Altithermal (Antevs 1955). Pollen sample 6 is different from the other five in that it contains 20% pine pollen and 4.5% oak pollen. The higher percentages of these two wind-pollinated types could reflect any of a number of things. It might reflect that there were more pines and oaks present in the regional vegetation at that time period, or it might reflect a slightly different wind circulation pattern which allowed air currents to bring more airborne pollen types into the shelter. At this time, we feel it would be premature to speculate or draw any further conclusions as to which, if either, of these factors may have created the increased percentages of arboreal pollen types in pollen sample 6 recovered from Cueva de la Zona de Derrumbes.

Pollen Records of the Eastern Chihuahuan Desert Region

Available fossil pollen data for the state of Coahuila is meager, yet some records do exist. In the central portion of this state, pollen samples collected in the Cuatro Ciénegas Basin have yielded a paleoenvironmental record covering the last 30,000 years (Meyer 1972, 1973). Aside from Meyer's work, there are no other fossil pollen records available for sediments in the state of Coahuila. However, directly north in the Amistad Reservoir area of Texas (Fig. 1), fossil pollen records do exist (Bryant 1966, 1969; Bryant and Shafer 1977; Dering 1979) and can be used to infer suspected paleoenvironmental changes which may have occurred in areas of northeastern Mexico.

Fossil pollen records from lake sediments (Hafsten 1961; Oldfield and Schoenwetter 1975), archaeological deposits (Bryant 1977), and fossil pack rat middens (Wells 1966; van Devender *et al.* 1977) can be used to propose a four-stage vegetational sequence for west Texas, covering the last 35,000 years of the Quaternary. These include: (1) Wisconsin Interpluvial from 33,500-22,500 B.P.; (2) Fullglacial from 22,500-14,000 B.P.; (3) Lateglacial from 14,000-10,000 B.P.; and (4) Post-glacial from 10,000 B.P. to the present.

Wisconsin Interpluvial Period in West Texas

Hafsten (1961) states that the fossil pollen evidence recovered from playa lakes in west Texas is interpreted to indicate that, prior to the maximum spread of the advancing Wisconsin glaciation (ca. 30,000 B.P.), the vegetation in west Texas could be characterized as a cool-moist grassland with trees either being totally absent or very rare. Furthermore, he suggests that the fossil pollen data indicate conditions were fairly stable during most of the Wisconsin Interpluvial period (ca. 33,500-22,500 B.P.) and remained virtually unchanged until the beginning of the Fullglacial Period around 22,500 years ago.

Oldfield and Schoenwetter (1975) have also conducted fossil pollen analyses of west Texas lake sediments dating from the Wisconsin Interpluvial period. Their data led them to suggest that Hafsten's (1961) vegetational reconstruction for the Wisconsin Interpluvial period was basically correct, yet had failed to note a series of minor vegetational shifts. Oldfield and Schoenwetter (1975) interpreted their data to suggest that regions of west Texas may have been intermittently invaded by areas of scattered, discontinuous open parklands containing spruce, pine, and juniper. However, their fossil pollen record, like that of Hafsten's (1961), suggests that most of west Texas was probably covered by a mixed scrub and prairie vegetation during the Wisconsin Interpluvial period.

Other than the work by Hafsten (1961) and Oldfield and Schoenwetter (1975), there are no pollen analytical records of the Wisconsin Interpluvial period from west Texas.

Fullglacial Period in West Texas

With the onset of the Fullglacial period (22,500-14,000 B.P.), conifers and some deciduous trees probably began to invade the former grassland regions of

west Texas. This assumption is supported by the pollen records from Rich and Arch Lake (Hafsten 1961), located on the Llano Estacado where fossil pollen records show a steady and rapid rise in the percentages of both spruce and pine pollen and decreases in grass and herb pollen taxa. Pollen records from Crane Lake (Fig. 1) show that, by 15,000 B.P., conifer pollen completely dominates the fossil record, and that in some cases accounts for over 90% of all fossil pollen in some strata. Hafsten interprets this data to reflect evidence of an open woodland of mixed spruce and pines covering much of the region north of the Pecos River. Hafsten infers that the pines were primarily ponderosa pines, and that spruce was present but not abundant. However, he suggests that true fir (*Abies*) was not part of the regional vegetation.

Based upon the fossil pollen evidence of other lake deposits, Oldfield and Schoenwetter (1975) have suggested that the Fullglacial vegetation in west Texas probably consisted of a continuous forest containing a mixture of ponderosa pine and spruce (either *Picea engelmannii* or *P. pungens*). Noting that spruce pollen is generally underrepresented in fossil deposits, they propose a Fullglacial vegetational composition for west Texas, consisting of approximately 60% spruce trees in the areas of higher elevation and 25% spruce trees in the lower elevation forests. Furthermore, they agree with Hafsten (1961) that true fir (*Abies*) was probably not present in the forests of west Texas during this time period. It was originally believed that high conifer pollen counts, similar to the ones discovered in west Texas Fullglacial deposits, were reliable indicators of a widespread woodland type vegetation. Later, this interpretation was questioned by Martin (1964) and Martin and Mehringer (1965), who suggest that these Fullglacial pollen records may reflect widespread conifer parklands rather than woodlands.

In an extensive study of the modern pollen rain in grassland and conifer woodland areas of eastern Washington and western Idaho, Mack and Bryant (1974) noted that percentages of pine pollen as high as 50% could be recovered in grassland areas approximately 30 miles from the nearest forest. In general, however, the average percentage of pine pollen for most of the grassland areas near forested regions was only 30-40%. In other studies of the modern pollen rain in the Pacific Northwest, Mack and Bryant (1978) found that percentages of pine pollen could reach as high as 80% in surface samples collected in conifer parklands composed primarily of pines and grasses. They also noted that percentages of pine pollen could reach as high as 70% in surface samples collected in scrub grasslands where only a few isolated pine trees were present. It should be pointed out, however, that Mack and Bryant (1974,1978) were examining the modern pollen rain in and around the Columbia Basin region of Washington state, which is surrounded by extensive conifer forests composed of pines, spruce, Douglas fir, and fir. Thus, long distance transport of conifer pollen undoubtedly helped to elevate the percentages of these pollen types in the nearby grassland and parkland regions of the Columbia Basin. This phenomenon is easier to understand in light of some of their other data (Mack and Bryant 1974), which show that in locales more than 30 miles away from heavily forested areas the percentages of pine pollen in grassland areas begin to drop below the 30-40% mark recovered in locales closer to the forested regions. However, conifer parkland locales were able to maintain percentages of pine pollen as high as 70% even in areas located more than 30 miles away from heavily forested regions.

Using the above information as a possible corollary for the west Texas Fullglacial pollen records, we would like to suggest a modification to the interpretation proposed by Hafsten (1961) and Oldfield and Schoenwetter (1975). The high percentages of fossil pine pollen may, as Hafsten has suggested, represent a continuous conifer woodland covering much of west Texas including the Llano Estacado. On the other hand, we believe that the same pollen data could instead be interpreted to represent a Fullglacial period vegetation characterized by some large areas of conifer forests (primarily confined to elevated regions in west Texas) mixed with parklands, and even some large areas of grasslands and scrub glasslands on the Llano Estacado.

Fossil pollen records from Bonfire Shelter, located in the Amistad Reservoir area of southwest Texas, also can be used to help interpret the Fullglacial period vegetational record. Although no radiocarbon dates are yet available from the lowermost pollen bearing strata in Bonfire Shelter, we believe that those deposits (which are composed entirely of thick limestone spalls) were produced primarily by severe ice wedging that loosened spalls from the roof and walls of the shelter during the cold winters of the late Fullglacial period. Very high percentages (over 80%) of mostly haploxylon type (pinyon) pine pollen were recovered from these spall zone deposits and suggest that, during the late Fullglacial period, southwest Texas was probably covered by a mosaic of woodland, parkland, and scrub grassland vegetations composed primarily of grasses, pinyon pines, and perhaps some junipers. We believe that juniper was a component of the southwest Texas Fullglacial period vegetation, even though its pollen was not recovered at Bonfire Shelter. Juniper pollen, like the pollen of certain other conifers such as Douglas fir, is fragile and does not preserve well in akaline sediments similar to the ones found in Bonfire Shelter. Therefore, the absence of juniper pollen in the fossil record of this period does not necessarily mean that juniper trees were not in fact present.

We suspect that the proposed ponderosa pine and spruce woodlands of the higher elevations in west Texas did not invade the Amistad region but were instead confined to areas north and west of the region. In addition, the fossil pollen record from Bonfire Shelter also suggests that spruce trees were not present in the Amistad region during any portion of the Fullglacial period.

Van Devender *et al.* (1977) recovered macrofossil traces of spruce and Douglas fir (*Pseudotsuga*) in pack rat nests from the Guadalupe Mountains in deposits dating from the late Fullglacial period. The presence of Douglas fir macrofossil remains in pack rat nests of this time period, and the corresponding absence of its pollen grains in Fullglacial age deposits from all areas of west Texas, is not unexpected. Douglas fir trees produce relatively low quantities of pollen, and their pollen is often poorly represented in areas where these trees are found in association with heavy pollen producers such as spruce and pines (Baker 1976); this also seems to be true even when Douglas fir is dominant. Therefore, we suspect that Douglas fir trees were probably present in most areas of west Texas (including the Llano Estacado) during the Fullglacial, yet it is difficult to estimate how abundant they may have been.

In other studies of pack rat middens from the Big Bend region, Wells (1966) found macrofossil evidence that led him to suggest that areas of higher elevation, above 1200 to 1300 meters, had ponderosa pine and Douglas fir (*Psuedotsuga*)

forests, including a mixture of broadleaf, deciduous, and mesophytic trees during the Fullglacial period; while areas of lower elevation below 1200 feet may have had extensive xerophytic woodlands containing pinyons, junipers, and oaks. These assumptions correlate and are supported by the fossil pollen evidence from the Amistad Reservoir area.

Lateglacial Period in West Texas

During the Lateglacial period (14,000-10,000 B.P.), suspected elevated summer temperatures may have caused a loss of most of the mesophytic mixed conifer woodlands of west Texas and left only isolated remnants of these woodlands in the higher elevation montane regions. This suspected vegetation change during the Lateglacial is reflected in the fossil pollen records (Hafsten 1961; Oldfield and Schoenwetter 1975), which show rapid declines in the percentages of pine pollen and the almost total loss of spruce pollen by 10,000 B.P. The Lateglacial replacement of the mesophytic mixed conifer forests by large regions of scrub grasslands is reflected by the declines of pine and spruce pollen, accompanied by rises in grass and herb pollen during the Lateglacial period.

The Amistad region also suffered a widespread loss of pinyon woodland areas during the Lateglacial period. Lateglacial deposits at Bonfire Shelter contain a fossil pollen record that suggests that some pinyon trees were still present and were probably found in sufficient numbers to form a parkland vegetational pattern with an understory of grasses and herbs. This proposed shift in vegetational composition in the Amistad region during the Lateglacial may have resulted from a variety of factors, including a suspected reduction in moisture and elevated summer temperatures.

Postglacial Period in West Texas

The Postglacial period in west Texas was not accompanied by any sudden or radical changes in the regional vegetation (Bryant 1969; Hafsten 1961; Oldfield and Schoenwetter 1975). In the southwest Texas area, the inferred mosaic vegetation of woodlands, parklands, and scrub grasslands of the previous Lateglacial period was now being gradually replaced by larger areas of scrub grasslands between 10,000 to 7000 years ago. This interpretation is based upon the fossil pollen record at Bonfire Shelter (Bryant 1969) and Hinds Cave (Dering 1979), which shows gradual reductions in the percentages of fossil pollen from trees such as the pinyon pine. Sufficient fossil pinyon pine was recovered from the deposits in this 3000-year interval to suggest that there were still some limited areas (perhaps in protected canyons and in some upland locales) where pinyons still flourished in the Amistad region.

Plant remains recovered from Hinds Cave and Baker Cave in the Amistad region (Dering 1979) demonstrate that, by 8500 B.P., local aboriginal groups were already exploiting plants such as agave, yucca, sotol, and cactus, which are generally associated with fairly xeric environments. Furthermore, Dering did not recover any plant macrofossil remains of pinyon nuts in those deposits, which further suggests that the pinyons had probably already retreated beyond the

limits of the aboriginal's food gathering range at these sites by 8500 B.P. An alternate hypothesis would be that for some reason the prehistoric peoples of the Amistad region did not collect or use pinyon nuts, even though they were available. This alternate hypothesis is possible, yet we feel it is highly unlikely that these early groups would have ignored such a valuable food source had it been available for exploitation.

There are only limited fossil pollen records available from areas of southwest Texas during the next 3000-year interval, from 7000 to 4000 B.P. The fossil pollen record from Centipede Cave (Johnson 1963) is incomplete and based largely upon inadequate pollen counts of less than 200 grains per sample. In spite of these shortcomings, it must at least be considered since it represents one of the few fossil pollen sequences yet available for any portion of this 3000-year time interval. During his analysis of these deposits Johnson (1963) noted that there did not appear to be any dramatic changes in either the vegetational composition or climate in the Amistad area but that his data did suggest a progressive degeneration of the previous mesic vegetation, and by inference, an elevation of moisture evaporation rates and/or reduction in rainfall. Johnson also noted the apparent increase in agave pollen around the end of this 3000-year period.

Since almost no pollen data are available for the time span between 7000 to 4000 B.P., our discussion for that period must rely upon what other evidence already exists. This other evidence consists primarily of data which suggest that areas of southwest Texas along the Rio Grande and lower Pecos Rivers were subjected to intervals of severe flooding during much of this 3000-year period (Patton 1977). These periods of erosion and flooding are clearly marked in the alluvial terraces and sediments of archaeological sites in this region, such as the Devil's Mouth site (Johnson 1964) located on the Rio Grande and Arenosa Shelter (Dibble 1967) located on the Pecos River. Of the 22 major floods identified by Patton (1977) in the deposits at Arenosa Shelter dating from 4500 B.P. to the present, almost one half of them (10) occurred between 3200 to 4500 B.P.

The cause of erosion and flooding during this 1300-year period is not fully understood. One possible explanation is that perhaps minor rises in summer temperatures or short periods of drought may have led to partial removal of the upland vegetation, thereby allowing increased rainfall runoff and increases in river discharge. Another possible explanation could be increased precipitation during the later portion of this period, as suggested by Haynes (1968). This possible increase in annual precipitation may have been caused by a series of active frontal systems moving further inland than usual. Although no actual climatological evidence exists for this type of frontal system phenomenon in the past, these storm systems do move through the area today and can release great amounts of moisture in a short period of time. In summer 1975, for example, we were in the lower Pecos River region when such a frontal system released over five inches of rainfall in less than eight hours. The resulting runoff filled many streams that were normally dry, and it also caused some major erosional activity along the alluvial banks of the lower Pecos River.

Still another possibility for the widespread alluvial erosion between 3200 to 4500 B.P. could be short periods of intense rainfall associated with the aftermath of a hurricane that may have moved unusually far inland from either the

Pacific or Gulf Coast areas. A recent example of that phenomenon occurred in 1954 when Hurricane Alice moved inland over the Rio Grande Valley and the resulting rainfall almost completely filled the Falcon Reservoir on the Rio Grande in the span of a few days. Based upon available records, Patton (1977) calculated that, at the height of that flood, Arenosa Shelter on the Pecos River was more than 30 feet under water, and the Pecos River reached a peak depth of over 80 feet. Since a person can easily wade across the Pecos River during low water periods, this estimate has increased significance.

The last 4000 years of the Postglacial period in southwest Texas are represented by fossil pollen types indicating a gradual and continual trend towards increased aridity. Only once, around 2500 years ago, was this apparent trend interrupted. At Bonfire Shelter and the Devil's Mouth site, fossil pollen records dating from around 2500 years ago show marked increases in the percentages of both pine and grass pollen, suggesting a brief return of somewhat cooler and more mesic conditions (Bryant 1969). This apparent mesic interval, however, was short-lived, and soon the trend toward increased aridity was resumed and has continued in southwest Texas until the present.

The analysis of fossil pollen from playa lakes (Hafsten 1961; Oldfield and Schoenwetter 1975) reveals a Postglacial trend towards increased aridity, as well as the establishment of large dry grassland areas lacking trees except along major drainages and in areas of higher elevation in areas of west Texas, including regions of the Llano Estacado. Hafsten's fossil pollen records from the several playa lakes on the Llano Estacado also show an apparent mesic interval occurring around 2500 years ago. Like the fossil pollen records of the Amistad region in southwest Texas, the playa lake fossil pollen records show that this brief interval was characterized by higher percentages of both grass and pine pollen, but that it too was short-lived. Soon after it ended, the warming and drying trend in both southwest and west Texas continued until the present.

Late Quaternary Period in Coahuila

As previously stated, the available fossil pollen data from Coahuila is meager, and the work by Meyer (1972, 1973) from the Cuatro Ciénegas Basin provides the only paleoenvironmental pollen data available for interpretation of vegetational climatic changes which may have occurred in that small area of the state of Coahuila. The fossil pollen evidence from Meyer's study suggests a great degree of vegetational stability on the floor of the Cuatro Ciénegas Basin from the mid-Wisconsin period to the present, a time span of more than 30,000 years. In addition, there seems to be no evidence of flooding, erosion, or vegetational and major climatic changes occurring in that region during the time span of the Altithermal period (7000-3400 B.P.). His data, however, may not be an accurate representation for the entire region, since we suspect that subsequent paleoenvironmental records may reflect more substantial indications of Altithermal age climatic changes in that region of northeastern Mexico.

However, in the montane regions surrounding the Cuatro Ciénegas Basin, both the mixed conifer and the oak woodlands may have been more extensive during mid-Wisconsin time, since the climate was probably somewhat moister and cooler than

it is in that region today (Meyer 1973). Meyer also notes that these woodland elements did not appear to have ever invaded the floor of the basin itself during any period of the last 30,000 years. However, the failure of the surrounding woodland elements to invade the basin floor may be primarily due to local edaphic factors rather than other environmental factors such as temperature or moisture.

Speculations and Hypotheses

Trying to speculate and draw hypotheses as to the precise paleoenvironmental changes which may have taken place in northeastern Mexico during the late Quaternary is difficult. In spite of this, we feel that a few logical assumptions can be made, based upon what is already known about the general trends of North American vegetational changes during the late Quaternary period, particularly in light of data from areas adjacent to northeastern Mexico.

In areas close to the front of the large Wisconsin continental glacier, there were severe disruptions in local and regional environments. Wisconsin-age fossil pollen data from numerous locales in the northeastern United States (Davis 1965), Great Lakes region of the United States (Cushing 1965), and southwestern United States (Martin and Mehringer 1965) present convincing evidence that major disruptions in vegetational composition were accompanied by still other vegetational changes during the following Postglacial period. Changes in some areas at more northerly latitudes, from an alpine tundra vegetation during the mid-Wisconsin period (Davis 1969) to the contemporary deciduous woodlands of those areas, represent significant vegetational community alterations.

In areas more distant from the glacial front, such as in regions of northeastern Mexico and adjacent Texas, the degree of temperature change during the late Quaternary may not have been as dramatic as it was for more northern regions. However, in the more southern areas of the North American continent, slight changes in temperatures combined with different weather patterns may have created rather significant alterations in local and regional vegetational community mosaics. Such an assumption is given added support since, at present, regions of northeastern Mexico have shown a delicate balance between local vegetation communities and the controlling factors of temperature, exposure, elevation, moisture availability, and edaphic conditions.

We feel that, someday, reasonable predictions concerning the late Quaternary vegetational changes in the region of northeastern Mexico will be possible. On the other hand, before this can occur, additional data pertaining to many aspects of the paleoenvironmental record for this region will have to be examined and resolved.

Summary

Studies of plant distributions in northeastern Mexico show that the region is characterized by an arrangement of vegetational communities which form a complex mosaic. These form interdigitating vegetational communities that range from xerophytic types in the lowland Coastal Plain and Chihuahuan Desert basins, to communities rigidly controlled by edaphic factors, or to cold loving xerophytes

and mesophytes of the treeless alpine meadows of the Sierra Madre Oriental. Furthermore, the key to contemporary vegetational communities and vegetational zones in this region appears to be strictly governed by the controlling effects of temperature, exposure, elevation, available moisture, and edaphic factors. The vegetational patterns and changes which occurred in the region during the last 30,000 years were undoubtedly also influenced by these same variables. Until we understand precisely how these variables may have influenced past vegetational expression, much of what anyone can say about the paleoenvironment of northeastern Mexico must remain speculative.

The limited available fossil pollen data now available from the region of northeastern Mexico is biased and cannot be used to adequately reconstruct the vegetational or climatic changes in northeastern Mexico during the last 30,000 years. A series of localized vegetational community changes and restructurings probably took place as a result of changes in temperature and available moisture, caused by regional climatic changes. It is suspected that, in some areas, even minor climatic changes may have triggered massive rearrangements of vegetational communities which normally exist within very narrow degrees of environmental tolerance.

Acknowledgments

The authors would like to thank Dr. Jeremiah F. Epstein and the Instituto Nacional de Antropología e Historia for the invitation to participate in the collective study of the area of northeastern Mexico. Special thanks is also given to Drs. Harry Shafer and Glendon H. Weir of Texas A&M University for their constructive criticisms of this manuscript.

Addendum

The original text of this article was written in 1975 and was scheduled for publication in early 1976. Publication delay and lack of funding delayed the report until 1980. During that five year delay new studies have been done, and thus some of our original assumptions are no longer as valid as they were in 1975.

The present draft has been updated to a degree. We have incorporated new data (Dering 1979) and interpretations from the fossil pollen record in southwest Texas and have changed some of the original descriptions related to the modern vegetational studies. However, we did not have time to do a thorough review of the new data related to present vegetational records in northeastern Mexico or of the recent paleoenvironmental records obtained from the study of pack rat middens.

Since 1975 additional paleoenvironmental studies in northern Mexico and adjacent areas have been initiated. Reconstruction of the paleoenvironmental record in this interim period has been principally through analysis of macrofossils preserved in subfossil, pack rat (*Neotoma*) middens. Recent summary papers by the principal workers in this field include those by van Devender and Spaulding (1979), van Devender (1977), Wells and Hunziker (1976), and Wells (1976). These

analyses refer to vegetation/climate dynamics during the past 30,000 years for the Chihuahuan, Sonoran, and to a lesser extent the Mojave deserts, and for the most part reflect only peripherally on our study area. However, recent work by van Devender (1978) reflects on vegetation changes in the core of the Chihuahuan desert in Mexico. This study, like most other pack rat analyses, reveals that the pluvial woodlands of west Texas and adjacent Mexico extended to much lower elevations up to approximately 8000 to 10,000 years ago. They also show that the desert was either displaced to even lower elevations and that edaphic "refugia" occurred as a mosaic component within the woodland, or that the identity of the desert biota was the result of a combination of these factors.

Nonetheless, approximately 8000 years ago, the pack rat midden records document a widespread, synchronous expansion of the desert biota at the expense of a retreating and fragmenting woodland biota. Furthermore, as shown by the studies documented by van Devender and Riskind (1979), special circumstances provided for persistence of woodlands components as relicts where edaphic conditions permitted.

Evidence which reflects on biotic changes during late pluvial and early Holocene times for the Sierra Madre Oriental and Coastal Plain portion of our area is still lacking. However, we can now speculate on these changes with perhaps a bit more confidence. Succinctly, we can safely say that montane and woodland forests expanded to lower elevations and into what are now less hospitable exposures.

Unfortunately, there is still precious little evidence for speculation of changes on the Coastal Plain in the Tamaulipan Biotic Province. Based upon fairly well-documented changes in adjacent areas, we can safely speculate that the desertification we now observe in the area is a fairly recent phenomenon and has been greatly accelerated since colonization of and modification of the area by Europeans. In all likelihood, many subtropical and tropical elements now extant further south were still present in the late portion of the Quaternary and early Holocene in more northern areas. Halophytic and saline environments in the Coastal Plain were very likely not much changed from the present. The peripheral Tamaulipan thorn scrub zone which now occurs in south Texas and northern Mexico (Tamaulipas, Nuevo Leon, and Coahuila) was most likely similar to that which now occurs much farther south in Mexico and was interspersed with a mosaic of more luxuriant grasslands and mesquite savannahs.

And finally, we must recall also that the landscape itself has changed dramatically during the past several thousand years. For example, the Rio Grande Delta, the Barrier Islands, and the South Texas Sand Plain (the Llano Musteño) did not occur as presently manifested. To be sure, the ambient environment in which the Amerindians interacted was different. For example, we firmly believe that the late Quaternary and/or the early Holocene environment in northern Mexico was somewhat more favorable for subsistence and cultural development than is today's landscape in that region.

REFERENCES CITED

Antevs, E.

1955 Geologic-Climatic Dating in the West. *American Antiquity* 20:317-335.

Baker, G.

1976 Late Quaternary Vegetation History of the Yellowstone Lake Basin, Wyoming. *U.S. Geological Survey Paper* 729 E. U.S. Government Printing Office.

Beaman, J. H. and J. W. Andresen

1966 The Vegetation, Floristics and Phytogeography of the Summit of Cerro Potosi, Mexico. *American Midland Naturalist* 75(1):1-33.

Bryant, V. M.

1966 Pollen Analysis: Its Environmental and Cultural Implications in the Amistad Reservoir Area. M.A. thesis on file at The University of Texas at Austin Library.

1967 Preliminary Pollen Analysis of Arenosa Shelter. In D. Dibble, Excavations at Arenosa Shelter 1965-1966:77-85. Mimeographed report submitted to the National Park Service by the Texas Archeological Salvage Project, Austin.

1969 Late Full-Glacial and Post-Glacial Pollen Analysis of Texas Sediments. Ph.D. dissertation on file at The University of Texas at Austin Library.

1974 Prehistoric Diet in Southwest Texas: The Coprolite Evidence. *American Antiquity* 39(3):407-420.

1975 Pollen as an Indicator of Prehistoric Diets in Coahuila, Mexico. *Bulletin of the Texas Archeological Society* 46:89-106.

1977 Late Quaternary Pollen Records from the East Central Periphery of the Chihuahuan Desert. In R. H. Wauer and D. H. Riskind, eds., Transactions of the Symposium on the Biological Resources of the Chihuahuan Desert Region, U.S. and Mexico. *U.S. Department of the Interior NPS Transactions and Proceedings Series* 3:3-22.

Bryant, V. M. and D. A. Larson

1968 Pollen Analysis of the Devil's Mouth Site, Val Verde County, Texas. *Papers of the Texas Archeological Salvage Project* 14: 57-70.

Bryant, V. M. and H. J. Shafer

1977 The Late Quaternary Paleoenvironment of Texas: A Model for the Archeologist. *Bulletin of the Texas Archeological Society* 48:1-25.

Cushing, E. J.

1965 Problems in the Quaternary Phytogeography of the Great Lakes Region. In H. E. Wright, Jr. and D. G. Frey, eds., *The Quaternary of the United States*:403-416. Princeton University Press, Princeton, New Jersey.

Davis, M. B.

1965 Phytogeography and Palynology of Northeastern United States. In H. E. Wright, Jr. and D. G. Frey, eds., *The Quaternary of the United States*:377-401. Princeton University Press, Princeton, New Jersey.

1969 Climatic Changes in Southern Connecticut Recorded by Pollen Deposition at Rogers Lake. *Ecology* 50(3):409-422.

Dering, J. P.

1979 Pollen and Plant Macrofossil Vegetation Record Recovered from Hinds Cave, Val Verde County, Texas. M.A. thesis on file at the Texas A&M University Library.

Dibble, D. S.

1967 Excavations at Arenosa Shelter, 1965-1966. Mimeographed report submitted to the National Park Service by the Texas Archeological Salvage Project, Austin.

Edwards, M. T.

1939 An Ecological and Vegetational Study of the Sierra Madre Oriental, Mexico. Ph.D. dissertation on file at The University of Texas at Austin Library.

Epstein, J. F.

1972 Some Implications of Recent Excavations and Surveys in Nuevo León and Coahuila. *Texas Journal of Science* 24(1):45-56.

Faegri, K. and J. Iversen

1968 *Textbook of Pollen Analysis*. Hafner Publishing Company, New York.

Flores-Mata, G.

1971 Tipos de Vegetatión de la República Mexicana, Dirección de Agrología, Secretaria de Recursos Hidraúlicos, Mexico.

Goldman, E. A.

1951 Biological Investigations in México. *Smithsonian Miscellaneous Collection Publication* 115. Washington, D.C.

Gonzáles-Medrano, F.

1972 La Vegetación del Noreste de Tamaulipas. *An. Inst. Biol. Univ. Nat. Auton. México* 43; *Ser. Botánica* 1:11-50.

Hafsten, U.

1961 Pleistocene Development of Vegetation and Climate in the Southern High Plains as Evidenced by Pollen Analysis. In F. Wendorf, assembler, *Fort Burgwin Research Center, Publication* 1:59-91.

Haynes, C. V.

1968 Geochronology of Late Quaternary Alluvium. In R. B. Morrison and H. E. Wright, Jr., eds., *Means of Correlation of Quaternary Succession*: 591-631. University of Utah Press, Salt Lake City.

Henrickson, J.

1977 Saline Habitats and Halophytic Vegetation of the Chihuahuan Desert Region. In R. H. Wauer and D. H. Riskind, eds., Transactions of the Symposium on the Biological Resources of the Chihuahuan Desert Region, U.S. and Mexico. *U.S. Department of the Interior NPS Transactions and Proceedings Series* 3:289-314.

Johnson, L.

1963 Pollen Analysis of Two Archeological Sites at Amistad Reservoir, Texas. *Texas Journal of Science* 15(2):225-230.

1964 The Devil's Mouth Site: A Stratified Campsite at Amistad Reservoir, Val Verde, County, Texas. *Department of Anthropology, The University of Texas at Austin, Archeology Series* 6.

Johnston, M. C.

1963 Past and Present Grasslands of Southern Texas and Northeastern Mexico. *Ecology* 44(3):456-466.

Johnston, M. C. (continued)

1977 Brief Resume of Botanical, Including Vegetational Features, of the Chihuahuan Desert Region with Special Emphasis on Their Uniqueness. In R. H. Wauer and D. H. Riskind, eds., Transactions of the Symposium on the Biological Resources of the Chihuahuan Desert, U.S. and Mexico. *U.S. Department of the Interior NPS Transactions and Proceedings Series* 3:335-362.

Kellum, L. B.

1937 The Geology and Biology of the San Carlos Mountains, Tamaulipas, Mexico. *University of Michigan Studies, Science Series* 12:1-98.

Mack, N. and V. M. Bryant, Jr.

1974 Modern Pollen Spectra from the Columbia Basin, Washington. *Northwest Science* 48(3):183-194.

1978 Modern Forest Pollen Spectra from Washington and Northern Idaho. *Botanical Gazette* 139(2):249-255.

Marroquin, J. S.

1968 Datos Botánicos de los Cánones de la Sierra de Anáhuac, Al Sur de Monterrey, Nuevo León, Mexico. *Cuads. Inst. Invs. Ciens. Univ. N. L. México* 14(3):1-79.

1977 Un Análisis Fisionomico de los Tipos de Vegetación Transicionales sobre Porciones Orientales del Desierto Chihuahuense en Coahuila. In R. H. Wauer and D. H. Riskind, eds., Transactions of the Symposium on the Biological Resources of the Chihuahuan Desert Region, U.S. and México. *U.S. Department of the Interior NPS Transactions and Proceedings Series* 3:249-272.

Martin, P. S.

1958 A Biogeography of Reptiles and Amphibians in the Gomez Farias Region, Tamaulipas, Mexico. *Museum of Zoology, University of Michigan, Miscellaneous Publications* 101.

1964 Pollen Analysis of the Fullglacial Landscape. Reconstruction of Past Environments. *Fort Burgwin Research Center Publication* 3: 64-74.

Martin, P. S. and P. J. Mehringer

1965 Pleistocene Pollen Analysis and Biogeography of the Southwest. In H. E. Wright, Jr. and D. G. Frey, eds., *Quaternary of the United States*:433-451. Princeton University Press, Princeton, New Jersey.

Meyer, E. R.

1972 Late Quaternary Paleoecology of the Cuatro Ciénegas Basin, Coahuila, Mexico. Dissertation on file at the Arizona State University Library, Tempe.

1973 Late Quaternary Paleoecology of the Cuatro Ciénegas Basin, Coahuila, Mexico. *Ecology* 54(5):982-995.

1975 Vegetation and Pollen Rain in the Cuatro Ciénegas Basin, Coahuila, Mexico. *Southwestern Naturalist* (1):22-36.

Muller, C. H.

1939 Relations of the Vegetations and Climatic Types in Nuevo León, Mexico. *American Midland Naturalist* 21(3):687-729.

1947 Vegetation and Climate in Coahuila, México. *Madrono* 9:33-57.

Oldfield, F. and J. Schoenwetter

1975 Discussion of the Pollen Analytical Evidence. In F. Wendorf and J. J. Hester, eds., Late Pleistocene Environments of the Southern High Plains. *Fort Burgwin Research Center, Publication* 9:149-178.

Patton, C.

1977 Geomorphic Criteria for Estimating the Magnitude and Frequency of Flooding in Central Texas. Ph.D. Dissertation, The University of Texas at Austin.

Pinkava, D. J.

1977 Flora and Vegetation of the Cuatro Ciénegas Basin, Coahuila, México. In R. H. Wauer and D. H. Riskind, eds., Transactions of the Symposium on the Biological Resources of the Chihuahuan Desert Region, U.S. and México. *U.S. Department of the Interior NPS Transactions and Proceedings Series* 3:327-334.

Puig, H.

1970 Notas Acerca de la Flora y la Vegetacion de la Sierrade Tamaulipas (Mexico). *Anales de la Escuela National de Ciencias Biologilas* 17:37-49.

Riskind, D. H.

1971 Pollen Analysis of Human Coprolites from Parida Cave. In R. K. Alexander, Archaeological Investigations at Parida Cave, Val Verde County, Texas. *Papers of the Texas Archeological Salvage Project* 19:89-97.

Riskind, D. H. and T. F. Patterson

1975 Distributional and Ecological Notes on *Pinus colminicola*. *Madrono* 23(3):159-161.

Rojas-Mendoza, P.

1965 Generalidades Sobre la Vegetación del Estado de Nuevo León y Datos Acerca de su Flora. Tesis Doctoral, Fac. de Ciencias, Universidad Nacional Autónoma de México.

Rzedowski, J.

1968 Las Principales Zonas Aridas de México y su Vegetación. Seminario de Bios. *Revista del Seminario de Estudias Biológicas* 1(1):4-24.

van Devender, T. R.

1977 Holocene Woodlands in the Southwestern Deserts. *Science* 198:189-192.

1978 Glaciopluvial Woodlands in the Bolson de Mapioni, Durango and Coahuila, Mexico. *American Quaternary Association Abstracts* 5:234.

van Devender, T. R. and D. H. Riskind

1979 Late Pleistocene and Early Holocene Plant Remains from Hueco Tanks State Historical Park: The Development of a Refugium. *Southwestern Naturalist* 24(1):127-140.

van Devender, T. R. and W. G. Spaulding

1979 Development of Vegetation and Climate in the Southwestern United States. *Science* 204:701-710.

van Devender, T. R., P. S. Martin, A. M. Phillips, III, and W. C. Spaulding

1977 Late Pleistocene Biotic Communities from the Guadalupe Mountains, Culberson County, Texas. In R. H. Wauer and D. H. Riskind, eds., Transactions of the Symposium on the Biological Resources of the Chihuahuan Desert Region, U.S. and México. *U.S. Department of the Interior NPS Transactions and Proceeding Series* 3:107-114.

Wells, P. V.

1966 Late Pleistocene Vegetation and Degree of Pluvial Climatic Change in the Chihuahuan Desert. *Science* 153(3739):970-975.

1976 Macrofossil Analysis of Wood Rat (*Neotoma*) Middens as a Key to the Quaternary Vegetational History of Arid America. *Quaternary Research* 6:223-248.

White, S. S.

1941 Flora of Hacienda Vista Hermosa, Nuevo Leon. *Papers of the Michigan Academy of Science, Arts, and Letters* 26:81-86.

Williams-Dean, G.

1978 Ethnobotany and Cultural Ecology of Prehistoric Man in Southwest Texas. *Texas A&M University, Anthropology Research Laboratory, Hinds Cave Series.*

Additional references not cited in the text which have been published since 1975 and relate to the vegetation of our study area.

Martinez y Ojeda, E. and F. Gonzales-Medrano

1977 Vegetacion del Sureste de Tamaulipas, Mexico. *Biotica* 2(2):1-45.

Puig, H.

1976 Vegetacion de la Huasteca, Mexico. *Estudes Mesoamericanes* 5. Mission Archeologique et Ethnologique Francaise au Mexique, Mexico.

Rzedowski, J.

1978 *Vegetacion de Mexico.* Editorial Limusa. Mexico D.F., Mexico.

LATE PLEISTOCENE AND HOLOCENE MAMMALS FROM NORTHERN MEXICO AND THEIR IMPLICATIONS FOR ARCHAEOLOGICAL RESEARCH

Ernest L. Lundelius, Jr.

Introduction

The use of animal and plant remains from archaeological sites as a source of environmental and cultural information has become increasingly important in recent years. These materials are indicators not only of regional climate and local environments but can also provide important information on the utilization of food animals, butchering practices, and the degree of seasonal occupation of a site. When a temporal sequence is available, it is possible to investigate the relationship between any changes in the environment and changes in the associated human culture.

This paper is a review of the current knowledge of the late Pleistocene and post-Pleistocene faunal history of northeastern Mexico. This area has particular significance because it contains the present transition between the temperate zone and the tropical zone. This raises interesting questions as to possible changes in the position and nature of the transition during the last glacial stage. Koopman and Martin (1959), on the basis of Recent faunal distributions, suggest a stepwise transition from 22° latitude to 26° latitude for the lowlands east of the Sierra Madre Oriental. It also provides an opportunity to study changes in three different physiographic areas--the Coastal Plain, the Sierra Madre Oriental, and the Central Plateau--all of which are geographically close and are at the same latitudinal zone.

Pleistocene Assemblages

Late Pleistocene vertebrates are known from many areas in northern Mexico; large assemblages are known from the following localities: San Josecito Cave, Nuevo Leon (Cushing 1945; Findley 1953; Miller 1941; Hall 1960; Russell 1960); Cueva del Abra, southern Tamaulipas (Dalquest and Roth 1970); and Gruta del Palmito (known also as Bustamente Cave), Nuevo Leon (Furlong 1925). Other occurrences of single specimens or small assemblages are reported from the area of Saltillo, State of Coahuila (Furlong 1925). Clearly, the best known of the late Pleistocene faunas are from the Sierra Madre Oriental or its foothills. The faunas from the lowlands to the east are less well known. The precise ages of the Pleistocene faunas are not known, but they are certainly late Pleistocene and are probably representative of the fauna encountered by the first humans that entered the area.

The assemblages from San Josecito Cave and Bustamente Cave have many elements in common with contemporary faunas to the north in Texas and New Mexico. Most of the extinct species from the Sierra Madre Oriental are known from late Pleistocene faunas in the United States. The fauna as a whole most closely resembles late Pleistocene faunas in the southwestern United States. Several taxa of mammals, such as *Nothrotheriops* (a small ground sloth), *Peptoceras*

(a goat-antelope), *Stockoceras conklingi* (an extinct antelope), and *Navahoceras fricki* (an extinct mountain deer), are confined to the Rocky Mountain region in the United States. A number of species of birds, such as Merriam's teratorn (*Teratornis merriami*), Daggett's eagle (*Wetmoregyps daggetti*), errant eagle (*Neogyps errans*), and Conkling's roadrunner (*Geococcyx conklingi*), are known from Ranch La Brea and other localities in the southwestern United States. The spectacled bear (*Tremarctos floridanus*) is found principally in the southeastern United States, but there are two records in Texas. One is from the Ingleside locality in San Patricio County on the Gulf Coast (Kurtén 1966; Lundelius 1972). The other is from Laubach Cave in Williamson County in central Texas (Lundelius and Davidson 1975).

Many of the extant animals, such as the masked shrew (*Sorex cinereus*), the bog lemming (*Synaptomys cooperi*), and the marmot (*Marmota*), are found in late Pleistocene deposits in many localities in the southern United States. The Mexican occurrences mark their southernmost known distribution. The southward shift of their ranges in the United States has been interpreted as an indication of cooler and/or wetter climates in the past. This interpretation is probably applicable to the Mexican occurrences of these species.

The assemblage at San Josecito Cave contains several species that do not occur together today. The Recent distributions of *Sorex cinereus* and *Synaptomys cooperi* do not overlap that of the Mexican vole (*Microtus mexicanus*), although those of *S. cinereus* and *M. mexicanus* approach one another in northern New Mexico (Hall and Kelson 1959).

The Pleistocene fauna of the Coastal Plain is less well known. Pleistocene vertebrates are known from scattered localities, but few extensive faunas are known. Many of the extinct forms, such as the mammoth (*Mammuthus*), are found in many parts of Mexico and are not restricted to the Coastal Plain. Remains of glyptodonts have also been reported from a number of areas in Mexico (Alvarez 1965). Unfortunately, the age and specific identification of this material is uncertain, and it is not yet possible to relate it to the material farther north in the United States.

Pleistocene faunas of the Coastal Plain, like those of the Sierra Madre Oriental, have extant species that occur today farther north. Dalquest and Roth (1970) report the pocket mouse (*Perognathus hispidus*) and the grasshopper mouse (*Onychomys leucogaster*) from a late Pleistocene fauna at Cueva del Abra in southern Tamaulipas. Neither species is known that far south today (Hall and Kelson 1959).

Farther north, in the Sierra de Tamaulipas, MacNeish (1958) has reported remains of the beaver (*Castor*) and the tropical deer (*Mazama*), radiocarbon dated to between 9000 and 10,000 B.P. This represents a southward extension of the range of the latter during the late Pleistocene. These two species do not overlap today (Hall and Kelson 1959).

Pleistocene mammals are known from the Central Plateau in Chihuahua, but no faunal assemblages are known. In addition, the dates and specific identifications of the known fossils are uncertain.

The environmental interpretation of the Late Pleistocene vertebrate faunas of northeastern Mexico is similar to that of late Pleistocene faunas of the southwestern United States given by Harris (1970) and Lundelius (1967). The southward shift of northern forms, such as *Sorex cinereus* and *Marmota* in the Sierra Madre Oriental and of *Castor* in Tamaulipas, indicates cooler and/or wetter conditions during the late Pleistocene, as is the case in the United States. Another point of resemblance is the association, both in the Sierra Madre Oriental and the Coastal Plain, of species that do not occur together.

The Pleistocene fauna from San Josecito Cave contains *Sorex cinereus* (masked shrew), *Synaptomys cooperi* (bog lemming), and *Microtus mexicanus* (Mexican vole). The distributions of the first two species do not overlap that of the last (Hall and Kelson 1959). The fauna from Cueva del Abra in southern Tamaulipas contains *Onychomys leucogaster* (grasshopper mouse), *Perognathus hispidus* (hispid pocket mouse), and *Balantiopteryx io* (Thomas' sac-winged bat) (Dalquest and Roth 1970). The present distributions of the first two species do not overlap that of the third (Hall and Kelson 1959). Another example mentioned above is the occurrence in the Sierra de Tamaulipas of *Mazama* (tropical deer) and *Castor* (beaver) between 9000 and 10,000 years ago. This phenomenon has been found to be widespread farther north (Hibbard 1960; Guilday, Martin, and McCrady 1964; Dalquest 1962; Lundelius 1967) and has been interpreted as an indication of a Pleistocene climate that lacked the seasonal extremes of the present and thus was more equable.

It was apparently this different climatic regime that supported the highly diverse Pleistocene fauna. This would have provided a correspondingly diverse food-resource base for the early human hunters.

A difference between the late Pleistocene faunas of Mexico and the United States that may have archaeological significance is the apparent scarcity of *Bison* in Mexico, particularly on the coastal plain. Most of the records of late Pleistocene bison are in southern Mexico, where much more archaeological work has been carried out (Armenta 1959; Hibbard 1955).

Post-Pleistocene Fauna

The major event of the Pleistocene-Recent transition was the extinction of the large mammals. Whether this was caused by human predation as claimed by Martin (1967,1973), or resulted from climatic change as claimed by Guilday (1967), the result was a narrowing of the faunal diversity, which lowered the food-resource diversity for the early hunters.

Animal remains from post-Pleistocene sites in northern Mexico show that climatic changes took place during this interval as they did in Texas and New Mexico. The principal change during this period was a drying and/or warming trend, as indicated by the disappearance of *Synaptomys cooperi* (bog lemming), *Sorex cinereus* (masked shrew), and *Marmota* (marmot) from the Sierra Madre Oriental and of the beaver (*Castor*) from Tamaulipas (MacNeish 1958). The disappearance of the pocket mouse (*Perognathus hispidus*) and the grasshopper mouse (*Onychomys leucogaster*) from southern Tamaulipas (Dalquest and Roth 1970) is difficult to explain in terms of climatic change.

The overlap of *Castor* and *Mazama* in the Sierra Tamaulipas between 9000 and 10,000 years ago has already been mentioned. Their subsequent separation is consistent with the hypothesis of increasing aridity or increasing seasonality of the rainfall. Beavers require a dependable stream discharge, and the brocket inhabits thick tropical forests (Hall and Kelson 1959); both would be affected by any climatic change that would reduce these two environmental factors.

The sequence established by MacNeish (1958) in the Sierra Tamaulipas suggests that the post-Pleistocene climates in that area fluctuated somewhat, based on the relative abundance of *Mazama* and the whitetail deer (*Odocoileus*). *Mazama* and *Castor* occur together in the Lerma phase (9000-10,000 years ago) at the end of the Pleistocene or early Recent. During the period 5000 to 7000 years ago, *Mazama* appears to be absent, probably indicating dryer conditions. From 5000 B.P. almost to the present *Mazama* occurs; but its frequency relative to *Odocoileus* fluctuates.

No comparable sequence is known for the Sierra Madre Oriental, although some information is available. Faunal remains recovered from Cueva de la Zona de Derrumbes (Epstein 1972) from the eastern edge of the Sierra Madre Oriental indicate that, by 5000 years B.P., the fauna of this region was completely modern. In addition, though the detailed analysis of the faunal remains is incomplete, there is no significant environmental change indicated through the sequence 7000 to 10,000 years B.P.

No sequence of post-Pleistocene faunas is known from the Central Plateau. The faunal remains from caves near Cuatrocienegas, Nuevo Leon, reported by Gilmore (1947), indicate a completely modern fauna. The exact age of this material is not known, but it is on the order of hundreds of years. The faunal list includes *Bison*, which appears to have been uncommon in northern Mexico, although Baker (1956) includes it in his list of living mammals of Coahuila.

The presence of bison in the Central Plateau, and its rarity in deposits on the Coastal Plain, suggests that the major route of bison dispersal into central Mexico (where it is known from several Pleistocene localities [Armenta 1959; Hibbard 1955]) has been the Central Plateau rather than the Coastal Plain. The reasons for its rarity on the Coastal Plain are not known. The modern bison (*Bison bison*) was rare in southernmost Texas and the coastal plain of Mexico (Roe 1970), and no records of fossil bison are known from the southernmost part of Texas.

Summary and Conclusions

Pleistocene and post-Pleistocene faunas from various areas of northeastern Mexico contribute to a faunal history of this region. The late Pleistocene faunas are clearly related to those in the western United States and are differentiated into Coastal Plain and mountainous assemblages. These assemblages have extant species that live today in cooler and/or wetter areas to the north. There are some associations of extant species whose distributions do not overlap today. This indicates cooler and/or wetter, and more equable, conditions during the late Pleistocene.

Post-Pleistocene faunal changes indicate a warming and/or drying trend and the appearance of greater seasonality in the climate. This trend was probably not constant but had several minor fluctuations. The current data suggest that the major southward dispersal route of *Bison* was through the Central Plateau rather than the Coastal Plain.

None of the samples of faunal remains analyzed to date indicate strong seasonal human occupation of a site. This might be expected at sites in areas that have become increasingly arid during post-Pleistocene times.

The preceding account is incomplete because of inadequate data. Clearly, a better chronology is needed for all three major physiographic areas of northeastern Mexico, but to judge from published data, the Central Plateau appears to be the most deficient in information. In addition, more data are needed regarding the small-sized elements of the faunas. These are the most sensitive indicators of environmental conditions. As mentioned earlier, the environmental implications of the changes in the fauna at Cueva del Abra are not understood. Additional faunas from more localities might lead to a better understanding of the environmental changes, which would have implications for the archaeologist.

Acknowledgments

The author thanks the following persons for their assistance: Dr. J. F. Epstein for information on various archaeological sites in Mexico; Kevin Grove for assistance in checking references; Glen L. Evans for information on the distribution of *Bison*; and Judith Lundelius and Victoria Hunter for preparation of the manuscript. Financial support was provided by the Geology Foundation, University of Texas, Austin.

REFERENCES CITED

Alvarez, T.

1965 Catálogo Paleomastozoológico Mexicano. *Departamento de Prehistoria Publicacion* 17:5-70.

Armenta, J.

1959 Hallazgo de un Artefacto Asociado con Mammut en el Valle de Puebla. *Publicacion Instituto Nacional de Antropología e Historia* 7:1-30.

Baker, R. H.

1956 Mammals of Coahuila, Mexico. *University of Kansas, Museum of Natural History, Publication* 9:125-335.

Cushing, J. E., Jr.

1945 Quaternary Rodents and Lagomorphs of San Josecito Cave, Nuevo Leon, Mexico. *Journal of Mammalogy* 26:182-185.

Dalquest, W. W.

1962 The Good Creek Formation, Pleistocene of Texas, and Its Fauna. *Journal of Paleontology* 36(3):568-582.

Dalquest, W. W. and E. Roth

1970 Late Pleistocene Mammals From a Cave in Tamaulipas, Mexico. *Southwestern Naturalist* 15:217-230.

Epstein, J.

1972 Some Implications of Recent Excavations and Surveys in Nuevo Leon and Coahuila. *Texas Journal of Science* 24(1):45-46.

Findley, J. S.

1953 Pleistocene *Soricidae* from San Josecito Cave, Nuevo Leon, Mexico. *University of Kansas, Museum of Natural History, Publication* 5: 633-639.

Furlong, E. L.

1925 Notes on the Occurrence of Mammalian Remains in the Pleistocene of Mexico, With a Description of a New Species, *Capromeryx mexicana*. *Bulletin, Department of Geology, University of California* 15:137-152.

Gilmore, R. M.

1947 Report on a Collection of Mammal Bones from Archeological Cave Sites in Coahuila, Mexico. *Journal of Mammalogy* 28:147-165.

Guilday, J.

1967 Differential Extinction During Late-Pleistocene and Recent Times. In P. S. Martin and H. E. Wright, Jr., eds., *Pleistocene Extinctions: The Search for a Cause*:121-140. Yale University Press, New Haven.

Guilday, J., P. S. Martin and A. McCrady

1964 New Paris No. 4: Pleistocene Cave Deposit in Bedford County, Pennsylvania. *Bulletin, National Speleological Society* 26(4): 121-194.

Hall, E. R.

1960 Small Carnivores from San Josecito Cave (Pleistocene), Nuevo Leon, Mexico. *University of Kansas, Museum of Natural History, Publication* 9:531-538.

Hall, E. R. and K. Kelson

1959 *The Mammals of North America*. Ronald Press, New York.

Harris, A. H.

1970 The Dry Cave Mammalian Fauna and Late Pluvial Conditions in Southeastern New Mexico. *Texas Journal of Science* 22(1):1-27.

Hibbard, C. W.

1955 Pleistocene Vertebrates From the Upper Becerra (Becerra Superior) Formation, Valley of Tequixquiac, Mexico, With Notes on Other Pleistocene Forms. *Museum of Paleontology, University of Michigan, Contribution* 12:47-96.

1960 An Interpretation of Pliocene and Pleistocene Climates in North America. In The President's Address. *Report, Michigan Academy of Arts, Sciences, and Letters*, 1960 (for 1959-1960):5-30.

Koopman, K. and P. S. Martin

1959 Subfossil Mammals From the Gomez Farias Region and the Tropical Gradient of Eastern Mexico. *Journal of Mammalogy* 40:1-12.

Kurtén, B.

1966 Pleistocene Bears of North America 1. Genus *Tremarctos*, Spectacled Bears. *Acta Zoological Fennica* 115:3-120.

Lundelius, E. L., Jr.

1967 Late-Pleistocene and Holocene Faunal History of Central Texas. In P. S. Martin and H. E. Wright, Jr., eds., *Pleistocene Extinctions: The Search for a Cause*:288-319. Yale University Press, New Haven.

1972 Fossil Vertebrates From the Late Pleistocene Ingleside Fauna, San Patricio County, Texas. *Bureau of Economic Geology, University of Texas at Austin, Report of Investigations* 77:1-74.

Lundelius, E. L., Jr. and B. Davidson

1975 Late Pleistocene Vertebrates from Laubach Cave, Texas. *Abstracts with Programs, South-Central Section, Geological Society of America, 9th Annual Meeting* 7(2):211-212.

MacNeish, R. S.

1958 Archaeology of Tamaulipas, Mexico. *Transactions, American Philosophical Society* 48(6).

Martin, P. S.

1967 Prehistoric Overkill. In P. S. Martin and H. E. Wright, Jr., eds., *Pleistocene Extinctions: The Search for a Cause*:75-120. Yale University Press, New Haven.

1973 The Discovery of America. *Science* 179(4077):969-974.

Miller, L. H.

1941 Preliminary Report on the Birds From San Josecito Cave, Nuevo Leon, Mexico. *Bulletin, Geological Society of America* 52:1981.

Roe, F. G.

1970 *The North American Buffalo: A Critical Study of the Species in its Wild State*. 2nd edition. University of Toronto Press, Toronto, Ontario.

Russell, R. J.

1960 Pleistocene Pocket Gophers from San Josecito Cave, Nuevo Leon, Mexico. *University of Kansas, Museum of Natural History, Publication* 9:539-548.

LA CALSADA AND THE PREHISTORIC SEQUENCE IN NORTHEAST MEXICO

C. Roger Nance

Introduction

In 1965, the archaeological site of La Calsada was excavated as part of the Northeast Mexico Archaeological Project; the research results were reported in Nance (1971). The site is well-stratified and produced a sequence encompassing more than 10,000 years. This paper deals with the projectile point and radiocarbon date sequence from La Calsada; the site stratigraphy; and the results, in part, of a wear pattern attribute analysis of the artifacts.

The site of La Calsada is located not far from the city of Monterrey in the Municipio of Rayones and the Ejido of Casillas, Nuevo Leon. Well into the Sierra Madre Oriental, the site is on a high ridge overlooking the Río Pilón Valley at an elevation of nearly 2000 meters. The karst topography is rugged, with steep slopes interrupted both by cliffs and sink holes. The climate on the ridge tops is temperate; and the flora, varying from pine forests to open meadows, contrasts sharply with the desert vegetation of the Pilón Valley floor.

The site is in a large sink hole, a cliff-surrounded depression, approximately 100 meters long. At the base of an overhanging cliff, the actual area of occupation consists of sheltered, level ground, extending along the cliff for about 20 meters. Talus slopes at both ends of this cliff and colluvium from slopes above the cliff have merged to form the site's deposits.

Five stratified deposits were identified at the site, and these constituted the major excavation units. After excavation of an initial test pit and several exploratory trenches, the site was dug in 2-m^2 units. Each of the excavated units was dug in terms of the five major stratigraphic units and in 10-cm levels within each stratum.

Physical Stratigraphy

Each of the five strata varies horizontally from the protected rear of the shelter to the front. Deposits in the rear tend not to evidence weathering and to contain less talus than deposits beneath the drip line.

Unit 6. The lowest deposit at the site containing cultural material is roughly 220-320 cm below the ground surface. It contains 20 to 40% talus by volume, and the matrix varies from structureless silt to red-brown clay with a coarse, blocky structure. Several large, angular boulders also occur in the deposit.

Unit 5. Separated from Unit 6 by a sharp non-conformity, Unit 5 varies from silt loam to clay loam and by volume is 20 to 75% talus. It is situated 140 to 220 cm below the surface.

Unit 4. Unit 5 grades into Unit 4, and consistently contains less talus than the underlying deposit. Unit 4 is 100 to 150 cm below the surface and varies from clay loam to clay.

Unit 3. An abrupt boundary separates Unit 4 from Unit 3, which is a black loam-to-silt deposit with up to 90% talus by volume. The deposit is situated 80 to 130 cm below the surface.

Unit 1-2. The uppermost deposit, up to 90-cm thick, is a true midden deposit consisting of talus, much of it fire-broken, and ashey silt.

Radiocarbon Chronology

Twenty radiocarbon dates, processed from small samples of charcoal, make the site sequence one of the longest and best dated in North America. The dates, uncorrected and based on the 5568-year half life, are presented in Table 1.

The Cultural Sequence

The cultural remains at La Calsada are almost entirely of stone: tools, whole and fragmentary; flakes; and other debris from the manufacturing process. A total of 1041 lithic artifacts was analyzed, and the stone tool assemblage from each stratigraphic unit can be characterized briefly.

Unit 6. Half of the 217 artifacts from this early component are unifaces. These can be divided into flake unifaces and larger uniface tools. In the latter category, most are tabular chunks of shistose chert unifacially flaked on one or more edges. Similar artifacts are commonly called scraper planes in the western U.S. A few of these scraper plane-like unifaces are worked around their peripheries to produce domed or ridge-backed forms. Flake unifaces from Unit 6 tend to be amorphous; there is no evidence of a blade industry, nor of patterned flake tool forms.

Bifaces from this deposit are diverse and, with the exception of three thick, ovoid knives, all are interpreted to be projectile points. The 20 projectile points which are complete or nearly so are generally short (averaging 3.8 cm in length) and thick. Four points are quite small and leaf shaped; most of the others are diamond shaped or are shouldered with contracting stems. Graver spurs were found on Unit 6 artifacts; most are unifacially flaked and situated on unifacially flaked tool edges.

Unit 5. Consisting of 267 artifacts, the Unit 5 assemblage resembles that of Unit 6, although it is set apart by two diagnostic projectile point forms: *Lerma* type and indented-base, stemmed points. These comprise 13 of the unit's 22 projectile points. The diamond-shaped or contracting stem points of Unit 6 are absent. Uniface forms are much the same, although the overall uniface percentage decreases. One artifact category which shows a marked increase from Unit 6 consists of roughly discoidal biface cores. Finally, there is a marked increase in the relative frequency of graver spurs, and non-bifaces decrease in size relative to Unit 6.

Unit 4. The Unit 4 assemblage is more difficult to summarize than those discussed above. Only 107 artifacts were recovered, and a smaller proportion are of diagnostic forms. Of 11 projectile points, most are small with parallel-sided or contracting stems. A single *Lerma* point and a

TABLE 1. RADIOCARBON DATES FROM LA CALSADA*

Sample No.	Provenience	Years B.P.	Years A.D./B.C.
Tx-707	Unit 1-2, L2 **	580 ± 60	A.D. 1370
Tx-706	Unit 1-2, L3	1050 ± 80	A.D. 900
Tx-709	Unit 3, L8	4400 ± 90	2450 B.C.
Tx-710	Unit 3, L9	5400 ± 100	3450 B.C.
Tx-708	Unit 3, L9	4310 ± 90	2360 B.C.
Tx-711	Unit 4, L1	5710 ± 120	3760 B.C.
Tx-765	Unit 4, L2	4460 ± 120	2510 B.C.
Tx-768	Unit 4, L2	5940 ± 160	3990 B.C.
Tx-764	Unit 4, L3	4790 ± 90	2840 B.C.
Tx-767	Unit 4, L4	6520 ± 150	4570 B.C.
Tx-769	Unit 5, L2	7040 ± 180	5090 B.C.
Tx-766	Unit 5, L2	7990 ± 130	6040 B.C.
Tx-354	Unit 5, L2	7920 ± 190	5970 B.C.
Tx-770	Unit 5, L5	9310 ± 160	7360 B.C.
Tx-771	Unit 5, L7	8610 ± 100	6660 B.C.
Tx-353	Unit 5, L7	9270 ± 150	7320 B.C.
Tx-352	Unit 6, L2	9940 ± 150	7990 B.C.
Tx-772	Unit 6, L2	9670 ± 70	7720 B.C.
Tx-875	Unit 6, L5	10,640 ± 210	8690 B.C.
Tx-895	Unit 6, L12-13	9550 ± 130	7600 B.C.

* After Valastro and Davis 1970.

** L2 = Level 2, i.e., 10-20 cm level below surface of unit.

Palmillas type point were excavated. The percentages of unifaces and of graver spurs decrease from Unit 5; but beyond these few generalizations, little can be added. Most of the artifacts from Unit 4 are amorphous, consisting of irregularly shaped spalls or flakes with unifacially or bifacially flaked edges.

Unit 3. This component at La Calsada, like Unit 4, yielded roughly 100 lithic artifacts. Most tools and tool fragments are now bifaces, with uniface tools comprising only 19% of the unit total. Projectile point forms shift sharply, as for preceding components. Only three of the 20 points from Unit 3 are stemmed. Most are now ovoid or triangular, fitting descriptions of the *Tortugas*, *Abasolo*, *Catan*, and *Matamoros* types. Two side-notched points, the earliest from La Calsada, also came from Unit 3.

Unit 1-2. Almost all artifacts from Unit 1-2 are from the upper 30 cm of the stratum. Shifts in artifact forms between Unit 3 and Unit 1-2 represent the most radical culture change in the site sequence. Also, since radiocarbon dates suggest less than 1000 years for the Unit 1-2 occupation, the 351 recovered artifacts certainly make this the most intensively occupied period in the sequence. In terms of artifact morphology, artifacts in all categories decrease in average weight; and new, very small artifact forms are introduced, including side-notched arrow points and small biface crescents. Manos also appear initially during the Unit 1-2 period.

Unit 5 and Unit 6 Artifact Attribute Analysis

In addition to classifying the La Calsada artifacts, a number of attributes were described for individual artifacts (Nance 1971). Most attribute data for Unit 5 and Unit 6 artifacts are included in Table 2. Listed for each artifact are the form (artifact class) number, the artifact catalog number, the stratigraphic unit and 10-cm level within the unit (e.g., 6/15 = Unit 6, 150-160 cm below the surface of Unit 6), weight (to the nearest gram), and wear pattern data for tool edges and projections. Evidence for edge wear was recorded by observing each edge under a low power (10X to 30X), dissecting-type binocular microscope. Wear was recorded in terms of one or more of the following classes: minor (M), edge crushing (E), fine hinge flaking (H), polishing (P), grinding (G), and battering (B). These edge wear classes are defined as follows:

Minor (M)	May not be the result of edge use; refers to either small pressure flake scars extending unifacially from an edge or edge nicking; also, prepared edges showing no edge alteration are placed in this category.
Polishing (P)	Luster on or adjacent to an edge or projection.
Edge Crushing (E)	Refers to grinding and crushing in the immediate vicinity of the edge, at times producing a facet or "edge" surface up to 1 mm wide, at an angle to both adjacent surfaces.

TABLE 2. INDIVIDUAL ARTIFACT ATTRIBUTES, UNITS 5 AND 6

Form	Catalog No.	Unit/ Level	Wt.	Wear	Proj.
67	9	6/15	21	E	
67	144	6/14	95	H	
67	482	6/9	29	M	
67	611	6/6	35	EH	
67	1090	6/2	16	M	
67	1337	5/3	11	E	
68	448	5/8	1		E
68	673	6/5	7	P	
68	1112	5/7	8	E	
68	1208	5/4	9	P	P
68	1287	5/6	8		P
69	104	6/8	12	E	
69	106	6/8	9		M
69	158	5/3	9	H	
69	237	6/4	9	M	
69	434	5/7	7	E	
69	442	5/7	3		P
69	445	5/7	4		E
69	659	5/3	5	M	
69	787	6/3	12	E	
69	807	5/7	19	E	
69	958	5/7	2		P
69	1215	5/1	7		P
69	1289	5/6	10	E	
76	755	5/9	42	EP	P
					P
					E
77	846	5/1	15	P	
81	94	6/8	21	EP	
				EP	
82	485	6/9	10	EP	
				EP	
83	283	5/3	10	E	P
					M
83	628	6/6	11		G
					P
					P
83	753	5/9	12	E	
				E	
83	1352	6/2	14	P	
83	1360	6/3	7	E	
86	47	5/4	12	M	
86	277	6/3	19	M	
86	529	6/10	42	M	
86	596	6/2	22	M	
86	599	6/2	38	H	
86	610	6/6	38	H	
86	666	6/5	12	M	
86	681	6/3	44	PH	
86	693	6/1	19	B	
86	747	5/9	62	E	
86	749	5/9	7	M	
86	1021	6/4	26	M	
86	1088	6/2	14	PE	GP
86	1104	5/7	29	M	
86	1290	5/6	32	E	
86	1350	6/2	22	M	
87	52	5/4	49	E	E
87	329	5/8	37	H	EP
87	416	6/3	45	EH	EP
87	425	6/1	4	M	
87	514	6/2	44	M	EP
					EP
87	615	6/6	21	E	
87	710	6/2	62	B	B
87	737	6/5	17	E	
87	758	5/9	9	M	G
					G
					G

TABLE 2. (continued)

Form	Catalog No.	Unit/ Level	Wt.	Wear	Proj.
87	766	5/4	14	M	M
87	944	5/8	23	M	
87	1006	5/4	4	E	
87	1138	6/5	29	M	
87	1207	5/5	8	M	
87	1252	5/5	38	E	
87	1361	6/3	20	H	
88	274	6/3	87	M	
88	419	6/3	32	PE	
88	420	6/3	30	E	
88	440	5/7	19	PE	P
88	483	6/9	37	H	
88	616	6/6	24	H	
88	663	6/5	9	E	
88	738	6/5	27	M	
88	889	5/2	50	P	
88	1139	6/5	32	E	
89	271	6/3	47	M	
				M	
89	803	5/7	9	M	EP
90	245	6/4	11	E	
90	272	6/3	25	EH	
90	444	5/7	12	EH	
90	1349	6/2	18	H	
91	530	6/10	55	E	
91	662	6/5	12	E	M
91	1022	6/4	12	M	
91	1083	6/2	18	E	
91	1131	6/5	24	M	
91	1135	6/1	24	EH	
93	1097	5/7	7	E	
94	100	6/8	52	H	
				H	
94	221	6/7	40	M	
				E	
94	650	5/7	32	EH	
94	797	5/1	18	H	
				M	
94	1284	5/6	23	M	EP
				P	
95	417	6/3	52	H	
95	512	5/2	7	E	
95	564	6/2	10	E	
95	792	6/3	25	M	
95	929	5/5	25	E	
95	1084	6/2	16	EH	
95	1143	6/4	18	M	
95	1149	6/3	8	M	
95	1151	6/3	35	E	
95	1316	6/2	66	EH	
96	401	5/5	12	H	
96	741	6/5	23	M	
96	1024	6/4	49	E	
96	1351	6/2	9	M	
97	484	6/9	60	P	EP
97	609	6/6	39	H	
				H	
97	664	6/5	71	E	
97	667	6/5	20	E	
97	757	5/9	32	E	
98	1251	5/5	19	E	
				E	
99	16	5/5	9	M	
				E	
99	18	5/5	1	M	M
				M	

TABLE 2. (continued)

Form	Catalog No.	Unit/ Level	Wt.	Wear	Proj.
99	35	5/1	2	M	
99	75	5/6	11	M	P
				M	
99	78	5/6	1	P	
99	162	5/3	6	E	EP
99	223	6/7	9		EP
99	238	6/4	5	M	
99	408	6/4	9	M	
99	447	5/8	15	M	M
99	450	5/8	5	M	
99	479	5/4	6	P	
99	601	6/2	5	H	
99	618	6/6	8	M	P
99	648	5/7	14	E	
99	673	6/5	7	M	
99	692	6/14	14	E	
99	700	5/1	5	M	
				P	
99	745	5/2	9	E	E
99	769	5/1	12	E	
99	804	5/7	4	E	
99	808	5/7	7	M	
88	817	5/10	15	M	M
99	851	5/3	62	M	
				M	
99	904	5/6	41	M	P
99	906	5/6	14	M	
99	934	5/5	11	E	P
99	943	5/8	10	M	M
99	952	5/8	7	M	
99	953	5/8	6	P	
				M	
99	997	5/4	3	M	
99	1002	5/4	10	M	
99	1008	5/4	7	M	M
					M
					P

Form	Catalog No.	Unit/ Level	Wt.	Wear	Proj.
99	1014	5/4	4	M	
99	1016	6/4	16	E	
99	1017	6/4	8	M	
				M	
99	1048	6/6	8	M	
99	1050	6/6	1	M	E
				M	
99	1128	6/5	1	M	
				M	
99	1147	6/3	7	M	
99	1227	6/4	13	E	
99	1276	5/2	6	E	
99	1304	5/7	8	M	
99	1330	5/4	22	H	
99	1333	5/4	2	M	
100	1219	6/4	25	P	
101	217	6/7	21	E	
104	11	6/15	6	M	
104	424	6/1	3	M	
104	439	5/7	7	M	
104	592	6/2	16	M	
104	912	5/6	2	M	
105	103	6/8	12	E	
105	242	6/4	20	M	
105	315	5/4	7	M	
105	317	5/4	19	H	
105	1023	6/4	25	E	
105	1355	5/2	12	M	
106	13	5/5	7	P	P
				P	
106	15	5/5	9	M	E
106	50	5/4	2	P	
106	55	5/2	3	E	
106	76	5/6	1	M	
106	96	6/8	17	M	
106	103	6/8	12	E	
106	108	6/8	4	M	

TABLE 2. (continued)

Form	Catalog No.	Unit/ Level	Wt.	Wear	Proj.
106	154	6/1	15	H	
106	225	6/7	12	P	
106	231	6/4	3		PG
106	248	6/4	6	E	
				M	
106	249	6/4	5		M
106	285	5/3	7	M	P
106	286	5/3	9	E	
106	316	5/4	2	M	
106	399	5/5	10	P	EP
				P	
106	402	5/5	10	M	
				M	
106	422	6/1	31	HE	
106	532	6/10	3	M	
106	578	5/2	10	E	
106	580	6/2	5	H	
106	614	6/6	11	E	EP
106	624	6/6	7	P	
106	671	6/5	2	M	
106	705	5/5	12	EP	
106	708	6/2	6	M	
106	713	5/4	13	E	E
106	768	5/1	9	M	
106	778	5/5	5	M	
106	807	5/7	19		E
106	902	5/6	7	M	
106	905	5/6	8	M	
106	942	5/8	5	E	
106	1013	5/4	4		P
106	1026	6/4	21	M	
106	1122	6/5	17	E	E
106	1140	6/4	4	M	
106	1211	5/4	2	M	P
106	1255	5/5	19	M	EP
106	1320	6/1	73	E	
106	1322	5/8	10	M	
106	1331	5/4	17	M	
106	1335	5/3	5	M	P
				M	
106	1341	5/3	8	M	
106	1358	5/2	26	M	M
109	10	6/15	1	M	
109	38	5/1	1	M	
109	98	6/8	2	E	
109	220	6/7	6	M	
109	228	6/7	4	M	
109	619	6/6	6	M	
109	715	5/4	7	M	
109	744	5/2	13	M	
				M	
				M	
109	818	5/10	4		P
109	887	5/2	4	M	
109	957	5/8	2		P
110	37	5/1	7	M	
110	77	5/6	3	M	
110	224	6/7	14	E	
110	244	6/4	20	M	
110	406	5/5	1	M	
110	428	5/3	4	M	
110	452	5/8	6	M	
110	486	6/9	39	M	
110	510	5/2	14	E	
110	602	6/2	6	M	
110	620	6/6	11	H	
110	622	6/6	14	M	
110	743	6/5	2	M	
110	748	5/9	17	M	
110	910	5/6	8	M	
				M	

TABLE 2. (continued)

Form	Catalog No.	Unit/ Level	Wt.	Wear	Proj.
110	913	5/6	3	GP	
110	918	5/6	1	M	
110	919	5/6	11		EP
110	925	5/5	1	M	
110	1018	6/4	1	M	
110	1150	6/3	23		P
110	1153	6/3	15	M	
110	1256	5/5	13	E	
110	1357	5/2	5		P
111	903	5/6	46		E
112	917	5/6	4	E	
112	1334	5/3	7		E
113	153	6/1	25	E	EP
				HE	
113	276	6/3	37	E	H
				M	E
113	1096	5/7	28	H	E
				E	

Fine Hinge Flaking (H)	Consists of very fine stepped hinge fractures extending from an edge more than 1 mm up an adjacent surface; it seems indicative of repeated, light battering from one direction.
Battering (B)	Like fine hinge flaking, but hinge flake scars are deeper and extend farther from the edge.
Grinding (G)	Small ground surface on section of used or prepared edge or projection.

Wear is recorded for edges and projections (graver spurs) which are interpreted to be chipped to a desired tool bit morphology (prepared), or simply used and non-prepared.

Wear is described in terms of one or more of the above classes, and for each used or prepared edge and/or projection on each artifact. (In Table 2, each tool edge and projection is listed separately in respective columns.)

Table 2 includes 131 of the 267 artifacts from Unit 5 and 127 of the 217 from Unit 6. Excluded from this table and from the analysis described below are all thinned bifaces (knives, projectile points, unfinished bifaces) and thinned biface fragments; all other artifacts which are clearly tool fragments; and artifacts of forms which show only random, irregular flaking and no edge wear. Artifacts which are summarized are flakes; tabular pieces of chert and irregular spalls with bifacially flaked tool edges (Forms 67-69); unique bifaces (Forms 76-83); tabular plane unifaces (tabular scraper planes, Forms 86-94); non-tabular plane unifaces (other scraper plane forms including ridged and domed varieties, Forms 95-98); flake unifaces (Forms 99-101); irregular spall unifaces (Forms 104-106); used flakes (Form 109); used spalls (Form 110); and other chipped stone tools (Forms 111-113). The above categories are all described in detail in Nance 1971; all Unit 5 and 6 artifacts of the above-specified forms are included in Table 2.

In earlier portions of this paper, several summary statements were made which now can be supported statistically. Artifacts in Unit 5 tend to be lighter than those from Unit 6. The 131 artifacts from Unit 5 in Table 2 have an average weight of 12.23 grams; those from Unit 6 average 21.12 grams. The difference between these averages was assessed using the two-group pooled t test (Snedecor 1946:80-82), and was found to be significant ($t = 3.09$, for 256 d.f., $p = .005$). That is, the probability that the difference between the sample averages could be produced by drawing the samples at random from the same normal population is less than .005.

It was also noted above that projections (graver spurs) were more common in Unit 5 than in Unit 6. In Table 3, this difference is assessed using the Chi-square test. Artifacts with one or more projections are compared by unit to those with no projections. Again, the difference is highly significant.

TABLE 3. PROJECTIONS BY UNIT, UNIT 5 AND 6 ARTIFACTS

Frequency Expected F. Cell Chi 2	Artifacts with One or More Projections	Artifacts with No Projections	Total
Unit 5 Artifacts	44 31.48 4.98	87 99.52 1.58	131
Unit 6 Artifacts	18 30.52 5.14	109 96.48 1.62	127
Total	62	196	258

Table Chi-Square = 13.32, for 1 d.f., p = .001

TABLE 4. FINE HINGE FLAKING BY UNIT, UNIT 5 AND 6 ARTIFACTS

Frequency Expected F. Cell Chi 2	Artifacts with Fine Hinge Flaking	Artifacts without Fine Hinge Flaking	Total
Unit 5 Artifacts	9 16.76 3.59	122 114.24 .53	131
Unit 6 Artifacts	24 16.24 3.71	103 110.76 .54	127
Total	33	225	258

Table Chi-Square = 8.37, for 1 d.f., p = .01.

Wear pattern distributions also differ between units. Fine hinge flaking is present on a greater proportion of Unit 6 artifacts than those from Unit 5, and the difference is significant (Table 4). The reverse is true for polishing. Relatively more Unit 5 artifacts have polished edges and/or projections than those from Unit 6 (Table 5).

Other findings are consistent with the inter-unit differences described above. Polishing and projections are more common in Unit 5 and, combining artifacts from both units, polishing is relatively more frequent on worn projections than edges. The reverse holds for fine hinge flaking (Table 6). Unit 6 artifacts are heavier and show more fine hinge flaking; taking artifacts from both units together, artifacts manifesting fine hinge flaking are heavier than the rest, and the difference is significant ($\bar{x}$ weight for artifacts with fine hinge flaking = 29.88 grams; $\bar{x}$ weight for other artifacts = 14.66 grams; $t = 3.53$, for 256 d.f., $p = < .005$). Artifacts with polishing have a lower average weight than non-polished artifacts, but the difference is not significant (polished artifact $\bar{x}$ = 15.11 grams; non-polished $\bar{x}$ = 17.02 grams; $t = .54$, for 256 d.f., $p = < .50$).

The difference in average weights for artifacts with fine hinge flaking versus others also holds for each unit sample individually, although the difference is significant only for Unit 6 specimens ($\bar{x}$ weight for Unit 6 artifacts with fine hinge flaking = 33.21 grams; $\bar{x}$ weight for other Unit 6 artifacts = 18.30 grams; $t = 2.29$, for 125 d.f., $p = < .025$).

Extra-Site Relationships

La Calsada artifacts segregate into five temporally discrete components, with minimal inter-unit mixing, as confirmed by three independent indices: non-overlapping radiocarbon dates, the physical stratigraphy of the site, and pronounced unit-by-unit shifts in artifact form and attribute distributions.

It remains, then, to discuss the significance of this sequence, specifically to northeast Mexican prehistory and generally to that of North America.

Unit 6, radiocarbon dated between 8900 and 7500 B.C., is partially contemporary with both the Folsom complex and Eastern fluted-point complexes. The Unit 6 component does resemble these complexes, with a high percentage of uniface tools and graver spurs. Generally, however, it seems dissimilar; blade tools and fluted points are absent, and its small, thick contracting stem points seem without parallel. The Lake Mohave assemblage (Amsden 1937), possibly contemporary, may be remotely related to that of Unit 6. Both assemblages include contracting stem projectile points and thick unifaces. Beyond this, however, there are many points of contrast. With or without components which are both similar and contemporary, Unit 6 remains important. It indicates a prehistoric time depth for northeast Mexico comparable to that of other regions in the New World; and, generally for North America, suggests greater cultural heterogeneity before 8000 B.C. than established by previous research.

Data from Unit 5 are more easily comprehended. *Lerma* and stemmed, indented-base points are well-dated projectile point forms which, over much of North America, fall into the Unit 5 time range of 7500 to 5000 B.C. Contemporary

TABLE 5. POLISHING BY UNIT, UNIT 5 AND 6 ARTIFACTS

Frequency Expected F. Cell Chi 2	Artifacts with Polishing	Artifacts without Polishing	Total
Unit 5 Artifacts	36 28.43 2.02	95 102.57 .56	131
Unit 6 Artifacts	20 27.57 2.08	107 99.43 .58	127
Total	56	202	258

Table Chi-Square = 5.24, for 1 d.f., p = .05.

TABLE 6. POLISHING AND FINE HINGE FLAKING BY EDGE AND PROJECTION, UNIT 5 AND 6 ARTIFACTS

Frequency Expected F. Cell Chi 2	Edges	Projections	Total
Fine Hinge Flaking	34 21.13 7.84	1 13.87 11.94	35
Polishing	30 42.87 3.86	41 28.13 5.89	71
Total	64	42	106

Table Chi-Square = 29.53, for 1 d.f., p = .0001.

components in northern and eastern Mexico include those of the *Lerma* phase of the Sierra de Tamaulipas (MacNeish 1958); those of the Ajuereado and El Riego phases of the Tehuacan Valley, Puebla (MacNeish *et al.* 1967a,b); and the second occupation of the San Isidro site (Epstein 1969). This last-mentioned site is close to La Calsada, on the Gulf Coastal Plain, and is located 40 miles east of Monterrey. It is beyond the scope of this paper to present any detailed comparisons. Closest resemblances, however, are with the Tehuacan Valley phases, especially because of marked parallels in uniface tool and projectile point forms. Least comparable is the nearby San Isidro component, with its many *Plainview* points, *Clear Fork* gouges, and crude bifaces. While seemingly paradoxical, these data probably relate closely to the environmental diversity of northeast Mexico as it existed at the end of the Pleistocene. Unit 5, La Calsada, and the Tehuacan Valley components probably represent a single montane adaptation in terms of the local food quest and in terms of the manipulation of other local resources such as wood and available lithic materials.

The Unit 4 component cannot be linked to any published phase or component in Texas or Mexico, although the predominance of small stemmed projectile points is characteristic of contemporary phases of the Tehuacan Valley sequence and also of contemporary strata from Eagle Cave in the Amistad Reservoir (Ross 1965). Unit 4 is differentiated from Tehuacan Valley components by its apparent lack of agriculture and the absence of food grinding stones. Wherever its relations lie, the Unit 4 component may be unique, at least in the states of Nuevo Leon and Tamaulipas, in terms of radiocarbon dates, projectile point forms, and associated artifacts. This could reflect population decline during an arid Altithermal period (Nance 1972).

Unit 3 material might best be understood in terms of what MacNeish *et al.* (1967b:239-240) have named the Abasolo tradition, probably dating between 3700 and 1000 B.C. in northeast Mexico, and including the Nogales, La Perra, and Almagre phases of the Sierra de Tamaulipas sequence; components from Cueva de la Zona; many surface components from northern Nuevo Leon and Tamaulipas and the lower Rio Grande region of Texas; and the Unit 3 component of La Calsada. Typical are triangular and ovoid projectile points, biface disks, and gouges. Many details of the Abasolo tradition remain poorly understood, including inter-component differences which represent culture change through time and those which suggest geographical cultural diversity.

The Unit 1-2 component closely resembles the latest material from Cueva de la Zona de Derrumbes (McClurkan 1966), with arrow points which belong to the *Fresno*, *Starr*, and *Toyah* types. Thin biface crescents are also common to both components. At the same time, comparisons with other site components in northeast Mexico suggest considerable diversity, perhaps more so than for any other prehistoric period. Arrow point forms are the primary manifestation of this diversity, which can be seen when comparisons are made, for instance, with Cueva de Candelaria (Aveleyra, Maldonado-Koerdell, and Martínez 1956) to the west and Sierra de Tamaulipas material to the south.

Conclusions

Chronologically, La Calsada represents the entire known prehistoric sequence of Nuevo Leon. Its earliest component is unique, and may represent an initial adaptation which became traditional in much of the Sierra Madre Oriental, extending southward as far as the Tehuacan Valley, and persisting at La Calsada through Unit 5 occupation. Most characteristic of this tradition is a diversity of thick uniface tool forms--domed, ridged, and tabular--and small projectile points which are stemmed or leaf-shaped.

Culture change between Units 5 and 6 is manifested both through changing projectile point forms and in a general shift in artifact weights and graver spur and wear class proportions.

The wear pattern analysis was carried out in 1970, before recent widespread interest (e.g., Tringham *et al.* 1974; Keeley 1974), in order to ascertain if edge alteration classes could be found through microscopic observations which co-varied with large-scale morphologic attributes (Tringham *et al.* 1974:173). All artifact observations were made with specimens grouped only by form (morphological class); the author is aware of no biases which could have produced the inter-unit differences described above. This study supports the hypothesis that microscopic evidence of edge alteration can be studied as one index of culture change. Another question is whether or not these presumed wear pattern shifts represent changing artifact functions. One fact established through experimental studies since 1970 is that edge use can produce the edge alteration classes described in this paper (Tringham *et al.* 1974; Lawrence 1979).

It seems likely that different proportions of polishing and fine hinge flaking on edges and projections (Table 6) reflect different functions for the two tool bit forms. On the other hand, the higher proportions of fine hinge flaking (also described elsewhere as step flaking) on Unit 6 relative to Unit 5 edges, and on heavy as opposed to light tools, are not so easily explained. The greater tool weights might have caused more extensive edge damage, while tool functions remained constant. Tringham *et al.* (1974:191) found that steeper edge angles resulted in more step flaking. Another explanation, then, is that heavier artifacts, being thicker, in fact have steeper edge angles (the attribute was not recorded for La Calsada specimens), and that this alone produced the wear pattern differences. Finally, there is the matter of artifact weight itself. Weights could have been reduced by selection of smaller spalls in order to accommodate changing functions. On the other hand, the inter-unit weight shift could be due to a changing lithic technology, or even to a change in quarry location and/or raw material availability. A change in lithic technology does not appear to have been a factor. At least, through detailed typological comparisons, no evidence could be found of increased flaking reduction for Unit 5 artifacts (Nance 1971:353-354). While the question is complex, it can be said that, in all probability, one or more of these factors was operating, and that definite changes are represented in the lithic assemblages--beyond those associated with projectile point forms.

Viewing the Unit 5 assemblage from a regional perspective, differences among La Calsada, San Isidro, and Sierra de Tamaulipas components dating

between 7500 and 5000 B.C. indicate that cultures on this time level had already adapted to the environmental diversity of northeast Mexico. To recapitulate for later occupations: Unit 4 material represents a unique excavated component for the area, while Unit 3 artifacts fit the Abasolo tradition, a tradition which covered much of northeastern Mexico after 3700 B.C. Unit 1-2, with both a marked increase in artifact frequency and a sharp decrease in artifact size, signals profound culture change, a change also reflected in new cultural heterogeneity for this latest prehistoric period in northeast Mexico.

REFERENCES CITED

Amsden, C. A.

1937 The Lake Mohave Artifacts. In Archaeology of Pleistocene Lake Mohave: A Symposium. *Southwest Museum Papers* 11:51-98.

Aveleyra Arroyo de Anda, L., M. Maldonado-Koerdell, and P. Martinez del Rio

1956 Cueva de Candelaria. *Memorias del Instituto Nacional de Antropología e Historia* 5.

Epstein, J. F.

1969 The San Isidro Site, An Early Man Campsite in Nuevo Leon, Mexico. *Anthropological Series, Department of Anthropology, University of Texas at Austin* 7.

Keeley, L. H.

1974 Technique and Methodology in Microwear Studies: A Critical Review. *World Archaeology* 5(3):323-336.

Lawrence, R. A.

1979 Experimental Evidence for the Significance of Attributes Used in Edge-Damage Analysis. In B. Hayden, ed., *Lithic Use-Wear Analysis*:113-121. Academic Press, New York.

McClurkan, B. B.

1966 The Archaeology of Cueva de la Zona de Derrumbes, a Rockshelter in Nuevo Leon, Mexico. Unpublished M.A. thesis, University of Texas at Austin.

MacNeish, R. S.

1958 Preliminary Archaeological Investigations in the Sierra de Tamaulipas, Mexico. *Transactions, American Philosophical Society* 48, Part 6.

MacNeish, R. S., *et al.*

1967a *The Prehistory of the Tehuacan Valley; Vol. 1, Environment and Subsistence.* D. Byers, ed. University of Texas Press, Austin.

1967b *The Prehistory of the Tehuacan Valley; Vol. 2, The Non-Ceramic Artifacts.* D. Byers, ed. University of Texas Press, Austin.

Nance, C. R.

1971 The Archaeology of La Calsada: A Stratified Rock Shelter Site, Sierra Madre Oriental, Nuevo Leon, Mexico. Unpublished Ph.D. dissertation, University of Texas at Austin.

1972 Cultural Evidence for the Altithermal in Texas and Mexico. *Southwestern Journal of Anthropology* 28:169-192.

Ross, R. E.

1965 The Archeology of Eagle Cave. *Papers of the Texas Archeological Salvage Project* 7.

Snedecor, W. G.

1946 *Statistical Methods.* 4th ed. Iowa State College Press, Ames.

Tringham, R., G. Cooper, G. Odell, B. Voytek, and A. Whitman

1974 Experimentation in the Formation of Edge Damage: A New Approach to Lithic Analysis. *Journal of Field Archaeology* 1:171-196.

Valastro, S., Jr. and E. M. Davis

1970 University of Texas at Austin Radiocarbon Dates VIII. *Radiocarbon* 12:617-639.

THE ARCHAEOLOGY OF LA CUEVA DE LA ZONA DE DERRUMBES (NL 92): A BRIEF SUMMATION AND SUGGESTIONS FOR FUTURE RESEARCH

Burney B. McClurkan

Abstract

The artifact sequence from NL 92 represents an occupation spanning the last 5000 years. This sequence shows some similarities to areas to the north (Amistad Reservoir) and east (Tamaulipas). Future research should be directed toward establishing more concrete cultural ties between these areas and also demonstrating the possible cultural uniqueness of river valley and adjacent coastal plain occupation.

Introduction

This report presents a summary of the cultural data from La Cueva de la Zona de Derrumbes (University of Texas site number NL 92) and comparisons of that information with sequences from other areas. Possible future research projects are also discussed.

This site was excavated as part of the Northeast Mexico Archeological Project, funded by the National Science Foundation and directed by Dr. J. F. Epstein of the University of Texas. As part of this project, archaeological survey was undertaken in summer 1963 by Glen S. Greene and Burney B. McClurkan. This survey had as its primary goal the location of caves and/or rockshelters which would contain cultural deposits suitable for establishing a chronological cultural sequence for the area.

NL 92 was first located by Epstein in fall 1962 at the end of a brief survey period. In early summer 1963, Epstein, Greene, and McClurkan tested the site prior to the more extensive survey planned for the surrounding area. A 3 X 8 ft test trench was excavated, and the results were sufficient to recommend further work. The excavation was subsequently carried out from September to December 1963. Further work was done at the site by Epstein in 1964 and is reported elsewhere.

Due to limitations of time and space, the complete artifact sequence will not be described here. The material to be dealt with in this paper consists primarily of the major point types. These types formed the basis of the organization for cultural zoning in the initial thesis (McClurkan 1966) and consist of types previously described by Suhm, Krieger and Jelks (1954).

Location and Appearance

La Cueva de la Zona is located in the valley of Rio Santa Rosa in the southeastern part of Nuevo Leon, Mexico. The Linares-Galeana-San Roberto Highway runs through the valley and, at the 31 kilometer mark, west of Linares, the cave is visible to the south almost directly across the valley from the highway.

The terrain is precipitous in the vicinity of the site, broken occasionally by smooth upland terraces which are now used for grazing cattle. The rockshelter itself has been eroded from a cemented limestone talus of Upper Cretaceous age (Carta Geologia 1960), and is situated immediately beneath the uppermost of two terraces of the Rio Santa Rosa.

The shelter is about 175 feet wide and not more than 25 feet deep at its deepest point, being, for the most part, 10 to 20 feet in depth, and roofed by a gently arched overhang with a maximum height of about 50 feet. The floor of the shelter slopes downward slightly from front to back, the highest portion being in a line directly below the edge of the overhang. Large rocks, apparently roof fall, lay in the center front of the cave. A talus slope extends some 40 feet down from the crown of the floor at an angle of approximately 45°.

Two areas of the cave are affected by water drainage, but they dry quickly. Water drips directly onto the floor crown from the overhang, but does not drain into the interior of the cave. Seepage from the terrace above moistens the floor at the back wall in a strip two or three feet wide.

During the summer, fall, and early winter of 1963, the cave floor was covered with a fine, powdery dust to a depth of about six or eight inches. The following spring, however, the entire floor was damp. This seasonal dampness precluded the recovery of perishable materials.

Excavation and Internal Structure

Although various excavation tactics were involved in the 1963 season, the largest portion of the site examined was dug in a series of nine 5-ft^2 units, in three-inch levels. Once the relatively high artifact yield was seen, it was felt that excavation in three-inch units might better delineate and clarify the artifact sequence than using grosser units. This judgment was made in view of the lack of detectable, natural soil strata. This major block of the excavation was removed in 22 three-inch levels. All references in this paper will refer to this major block, unless otherwise stated.

The culture bearing soil rested on a bed of gravel. The gravel was sorted, which would indicate deposition by relatively slow moving water. The upper few inches were marked by interfingering, thin lenses of dark soil which had a clayey consistency. This zone of juncture between the gravel and the dark soil was carefully investigated, but was found to be devoid of cultural material or evidence of any faunal activity.

This gravel stratum was subsequently trenched by Epstein in 1964. It was some five feet thick, and underneath was a lower cultural deposit. The material from this lower deposit will be described by Epstein, but it should be noted that radiocarbon dates from the lower cultural stratum were essentially the same as those from the lower levels of the upper cultural zone. The lower zone apparently consisted of three occupations, which are dated as follows: Occupation I (the uppermost of the three), 4880 ± 120 B.P. (University of Texas Radiocarbon Laboratory Number, Tx 254); Occupation II, 4744 ± 120 B.P. (Tx 237); and Occupation III, 4950 ± 160 B.P. (Tx 235). The lowest levels in the upper cultural zone yielded a date of 4840 ± 220 B.P. (Tx 150).

Archaeological Zoning and Cultural Periods

By far the most predominant class of artifacts recovered throughout the occupation is that of projectile points, which denotes some emphasis on hunting as a means of livelihood (see Table 1). Grinding stones are also found throughout the deposit, which would signify preparation of plant foods.

NL 92 contains a series of five cultural periods. These are delineated as archaeological periods I through V (earliest to latest). Since there were no clear breaks in the cultural material in this site--such as sterile layers of dirt--the division of archaeological periods is, by necessity, arbitrary. In this case distinctions are determined not on the first and/or last appearance of artifact types, but on maximum occurrences of groups of items, and without specific regard to point types represented within those divisions. Examination of the division of artifact frequency displays a sequence of early lanceolate forms, with stemmed and notched forms later (Table 2). The five periods appear to represent three peaks (Periods II, III, V) of three different morphological occurrences. One (IV) constitutes a strong period of transition wherein no specific form shows marked dominance. The fifth period (I) marks the earliest of the cultural material and is unique in that it contains a very early occurrence of extremely small projectile points. It also represents a longer span of time, yet contains very few artifacts.

Only one grouping, the *Abasolo-Catan* types, does not display any specific temporal significance. The *Abasolo-Catan* do display a shift from smaller to larger, early to late, but this cannot be defined except in very gross terms. This configuration appears to be the reverse of size relationships of *Abasolo-Catan* in other areas.

Period I: 2800-1500 B.C. (Levels 19-22). This period is characterized by very small triangular and teardrop-shaped projectile points of *Catan* Varieties III and IV, *Tortugas* Variety II, and *Lerma*-like points. In connection with these dart points is the almost complete absence of any other artifacts. These projectile points are within the size range generally stated for arrow points, and although this could be an extremely early appearance of the bow and arrow, a comparably early appearance of this form of weaponry is not reported from other areas. In addition to projectile points, only two other artifacts are present: a Form C knife and an ovoid thick biface. Quartz crystal was present throughout the period, but not as abundantly as later.

Period II: 1500-700 B.C. (Levels 15-18). In this period, the introduction of the larger lanceolate dart points and the largest numerical occurrence of lanceolate forms is noted. Also included is a sample of all lanceolate types which were recovered from NL 92. The lanceolate types occur as follows:

TABLE 1. DIVISION OF NL 92 DEPOSIT INTO CULTURAL PERIODS

Period	Level	All Artifacts: Total No. Per Level	All Artifacts: Total No. Per Period	Projectile Points: Total No. Per Level	Projectile Points: Total No. Per Period
	1	77		60	
	2	77		68	
V	3	124	463	101	387
	4	113		97	
	5	72		61	
	6	54		41	
	7	46		30	
IV	8	29	163	14	108
	9	34		23	
	10	24		12	
	11	30		26	
III	12	46	155	39	115
	13	19		13	
	14	36		25	
	15	70		52	
	16	87		62	
II	17	21	201	13	135
	18	23		8	
	19	5		2	
	20	8		2	
I	21	7	24	2	9
	22	4		3	

TABLE 2. NUMERICAL DISTRIBUTION OF MORPHOLOGICAL SEQUENCE IN CULTURAL PERIODS

Form	Period I	II	III	IV	V
Lanceolate					
Arrow				2	157
Dart	8	127	59	48	53
Stemmed					
Arrow				0	0
Dart	0	10	50	22	4
Notched					
Arrow				4	143
Dart	0	0	6	32	30

Large Lanceolate		Small Lanceolate	
Tortugas	76	*Catan*	13
Abasolo	9	*Matamoros*	2
Kinney	6	*Lerma*-like	1
Pandora	8		
Refugio	1		
Miscellaneous Triangular I-III	5		
Miscellaneous Lanceolate	6		

Tortugas points are the largest numerical sample of the lanceolate forms (and also of all dart point types) recovered from NL 92. Period II marks the peak occurrence of the *Tortugas*, which disappears completely at the beginning of Period IV.

Stemmed points begin to occur in the mid levels of Period II, including all *Gary* points (3), all of Provisional Type VI (2), and the first *Shumla* points (3). The largest sample of all knife forms (30) is represented in Period II, as well as the largest sample of miscellaneous bifaces (19) recovered at NL 92. A piece of sharpened antler and a spatulate bone tool constitute the only non-lithic artifacts. Non-artifact material includes abundant quartz crystal, but little hematite. The marked increase in total artifacts over the preceding period, and the relatively large number of dart point types, indicate a great deal of activity in the site through this time.

Period III: 700 B.C.-A.D. 100 (Levels 10-14). The maximum popularity of stemmed dart points occurs in this period, primarily with the *Shumla* and *Carrollton* types. The *Abasolo-Catan* group shows a very slight numerical increase, but the *Tortugas* type diminishes greatly, and the upper part of this period shows the earliest appearance of notched dart points.

Stemmed		Lanceolate		Notched
Shumla	41	*Tortugas*	17	6
Carrollton	6	*Abasolo-Catan*	27	
Miscellaneous	2	*Refugio*	2	
		Others	10	

All knife forms are represented, but the number of specimens is greatly reduced (12), as is the number of miscellaneous bifaces (7). Four bone tools (needles,

spatulate tools, one bead) and a shell pendant constitute the non-lithic artifacts from Period III. Both quartz crystal and hematite are relatively abundant, and seven mussel shell fragments were recovered. The time represented by Period III saw no decrease in general activity, but the popularity of the *Tortugas* waned; and the numerical decrease of the *Tortugas* is coeval with a numerical increase in the *Shumla* type.

Period IV: A.D. 100-800 (Levels 6-9). This period may be characterized as a time of general transition. It displays a diminishing popularity of stemmed dart point forms, increasing popularity of notched forms, and the first appearance of arrow points (6 specimens) in the uppermost level. Period IV has more dart point types represented than any other, although not as many dart point specimens as Period II or III. The notched *Ensor* dart point (11) is introduced in the upper two levels. There is a marked increase compared to Period III in the number of knives (26), with all forms represented; the first hafted blades (3) appear in the upper levels. Miscellaneous bifaces show a slight numerical increase over Period III (9). Five bone artifacts (awls, beads, spatulate tools) and one shell bead are the non-lithic artifacts. A ground stone pestle was recovered from the upper level. Crystal and hematite are both abundant in Period IV.

Period V: A.D. 800-? (Levels 1-5). This is the arrow point horizon. In contrast to the six arrow points in the upper level of Period IV, the lowest level of Period V has 24 arrow points. The most popular dart point form is notched; but the overall number of dart points is much diminished, apparently as an effect of the advent of the bow and arrow. All crescentic blades are in this zone, and the hafted blades which appeared late in Period IV continue into Period V.

Arrow Points

Notched		Lanceolate	
Toyah	139	*Fresno*	127
Other	8	Other	32

Dart Points

Notched		Lanceolate	
Ensor	26	*Matamoros*	28
Prov. Types I and II	2	*Abasolo-Catan*	7
Miscellaneous	2	*Kinney*	1
Stemmed: 4		*Lerma*-like	1
		Pandora	1
		Other	12

All other bifacially flaked specimens practically disappear. Five bone tools (awl, spatulate tool, needles), two sharpened antler fragments, a drilled bear tooth, and two shell artifacts constitute the non-lithic tool inventory. Six shell fragments were recovered; and both crystal and hematite are present, but seem to be slightly less abundant than in Period IV.

Discussion of Cultural Periods

Period I contains very few artifacts, and most of them are very small dart points. This pattern of small dart points at a comparable time is not known by the author to occur in other areas.

Period II contains the largest number of dart points (135), and a large number of other chipped stone artifacts (49). Period III also has a large number of dart points (115), but the number of other chipped stone artifacts is strongly reduced (21). Period IV has almost the same number of dart points (108). The number of dart point types shifts, however: 17 types in Period V; 30 types in Period IV; 16 in Period III; 16 in Period II; and 5 in Period I.

The arrival of the bow and arrow very late in Period IV, or more likely near the beginning of Period V, makes the arrow point the dominant artifact class from NL 92--306 arrow points compared to 86 dart points and 30 miscellaneous bifaces. While there is no evidence that the basic hunting and gathering economy was altered, there is some shift in lithic forms through these periods.

The series presented here covers a time period which would equate with the Middle Archaic through the Neo-American in Texas, on the basis of radiocarbon dates and artifact sequence. Two factors suggest that the population which occupied NL 92 for an extended period of time was composed of closely related groups of people: (1) the tendency toward diminution in projectile point size, especially in Periods I through III, and to some degree throughout the deposit; and (2) the abundance of quartz crystal and hematite, substances not native to the immediate area, which appear throughout the deposit. It would appear that these two phenomena are localized patterns. In neighboring areas, dart points are of generally larger size. Quartz crystal is reported as being employed by man or occurring in his habitation sites very little, if at all, from nearby areas. In spite of a lack of artifacts of quartz at NL 92, this material evidently fulfilled some practical function, since innumerable flakes of crystal were found.

The large number of distinctive dart point types, whose occurrence and relationships are generally coeval in time with other areas, strongly argues for similar peoples living over a large area, or for the diffusion of ideas and material. Other patterns seen in the artifacts and their relationships at this site, however, would belie the idea of a population of closely related groups. An excellent example of this is the *Shumla* dart point sample. This is a distinctive dart point type because of its form and, also, at NL 92, because over half the specimens of this type are manufactured from white flint. The present inhabitants know of none of this material in the area of NL 92. It does occur west through the mountains. White flint is apparently the only type native to that area. This is the most likely source of the NL 92 material. Also at NL 92, at the time *Shumla* displaces the other types (Period III), other unique lithic and non-lithic artifacts

occur. Also during this period, knives and other large bifaces decrease. The artifact configuration before and after the maximum *Shumla* occurrence (that is, artifacts in Periods II and IV) is similar, except for the preponderance of the large lanceolate sample in Period II; the intervening Period III is quite different from them. The *Shumla* type is quite common to the north in the Amistad area, being most common around the Pecos-Rio Grande confluence. The type is also reported from Coahuila to the west of NL 92. It is not reported, however, in Tamaulipas to the east of NL 92. It should be remembered that there has been no archaeological investigation between the Sierra Madre in the NL 92 region and the Sierra de Tamaulipas, so it is entirely possible that the point type is present on the coastal plain to the east of the Sierra Madre. The nature of the occurrence of the *Shumla* type at NL 92 might suggest a period of eastward expansion of peoples, or a diffusion of ideas from the upland plateau into the Sierra Madres.

It may well be that there is more evidence for diffusion of ideas and/or the migration of peoples at NL 92, but until more work is done in the western part of Nuevo Leon and southern Coahuila, questions concerning this will have to go unanswered. Unfortunately, almost all questions of relationships with areas to the west will have to be left for further investigation.

The region to the east, Tamaulipas, is well documented in regard to artifact content and the relative internal occurrence of artifacts. The chronological sequence proposed by MacNeish (1958), however, does not appear to be on as firm ground as either the sequence of dates from NL 92 or what can be definitely stated in regard to the Amistad area. Although there are not many dart point types which are shared between NL 92 and Amistad, the well-documented relative occurrence of the *Shumla* and *Ensor* dart points and the arrow points would indicate that the rest of the sequence was probably chronologically comparable.

The sequence of artifacts from Tamaulipas shows a larger number of shared projectile point types and some correspondence of dates, but some of the shared types appear much earlier in MacNeish's (*ibid.*) sequence than at NL 92; further investigation is needed to clarify this disparity (see Tables 3 and 4).

Recommendations for Further Research

The current need is for further intensive archaeological survey in northeastern Mexico. Any number of problems may be formulated for this research, and the items included here are by no means all-inclusive.

Previous surveys in the area have been either of limited orientation or, as in the case of the 1963 survey, directed primarily toward the location of particular kinds of sites; i.e., rockshelters or other sites likely to contain a relatively long cultural sequence, in order to establish a tentative cultural chronology. Considering the nature of these surveys, it is likely that significant data was overlooked or by-passed which might be discovered by more intensive survey in the same areas.

TABLE 3. COMPARISON OF PROJECTILE POINT SEQUENCES, AMISTAD RESERVOIR AND NL 92

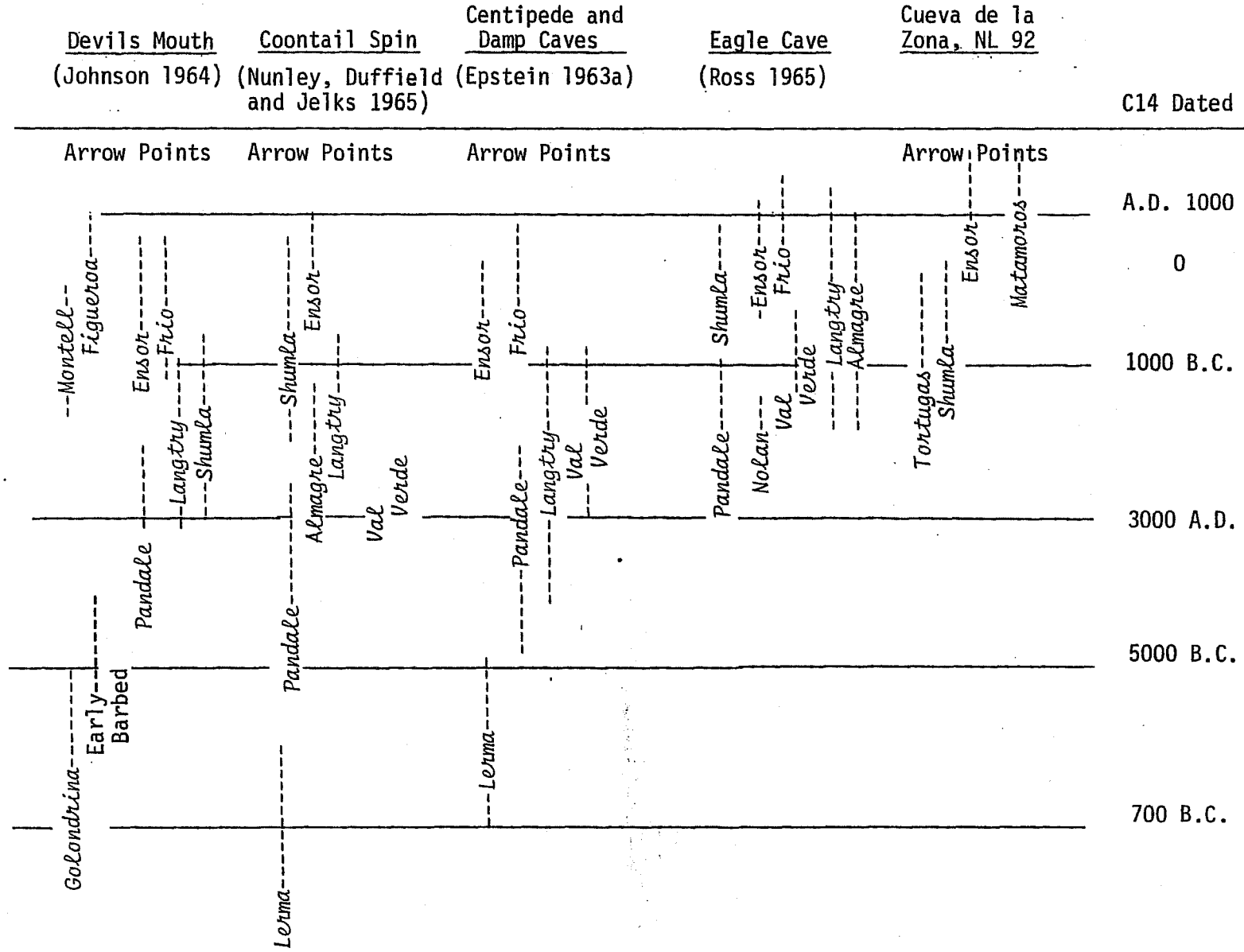


TABLE 4. CULTURAL SEQUENCES FROM TAMAULIPAS*

Dates	Phases of Sierra de Tamaulipas	Phases of Northern Tamaulipas			Phases of Southwestern Tamaulipas
-1957					
A.D. 1000	Los Angeles	Panuco Flores	Catan	Brnsvl Barril	San Antonio San Lorenzo
	La Salta				
0	Eslabones	Abasolo			Palmillas
1000 B.C.	Laguna				Mesa de Guaje
2000 B.C.	Almagre				Guerra
3000 B.C.	La Perra	Repelo			Flaco
4000 B.C.	Nogales	Nogales			Ocampo
5000 B.C.					
6000 B.C.					Infernillo
7000 B.C.	Lerma				
8000 B.C.					
9000 B.C.					
10,000 B.C.					
11,000 B.C.	Diablo				

* From MacNeish 1958:Table 30

Excavation at La Calsada (Nance 1971) indicates some differences in cultural sequences from adjacent river valleys. The significance of these differences needs explanation and clarification.

It is suggested that research be directed toward the location of non-shelter sites within previously examined areas, with more concentrated effort devoted to the more westerly portions of those drainages. Combined with this, intensive survey should also be done in the coastal plain areas of these same river drainages. Correlation of plains sites and valley deposits should be possible, and comparative information regarding adaptive processes to the differing environmental situations forthcoming. In addition to adaptive responses culturally, efforts should be made to recover adequate human osteological samples to determine population affinities.

Specific research should be directed toward the determination of agricultural practices on the coastal plain. Since there is an area here which has been virtually untouched archaeologically, the presence or absence of agriculture and other formative, Mesoamerican practices may extend into it. The vast range of questions regarding the relationship of the Mesoamerican and formative Mississippi Valley cultures is far from answered; and it is possible that continued research in this area of the Mexican Gulf Coastal Plain might help bring some of these questions into a different, hopefully better, perspective.

REFERENCES CITED

Carta Geologia de la Republica Mexicana

1960 Escala 1:2,000,000.

Epstein, J. F.

1963 Centipede and Damp Caves: Excavations in Val Verde County, Texas, 1958. *Bulletin of the Texas Archeological Society* 33(for 1962).

Johnson, L., Jr.

1964 The Devils Mouth Site; A Stratified Campsite at Amistad Reservoir, Val Verde County, Texas. *Department of Anthropology, The University of Texas, Archeology Series* 6.

McClurkan, B. B.

1966 The Archeology of Cueva de la Zona de Derrumbes, A Rockshelter in Nuevo Leon, Mexico. Unpublished M.A. thesis, University of Texas at Austin.

MacNeish, R. S.

1958 Preliminary Archeological Investigations in the Sierra de Tamaulipas, Mexico. *Transactions of American Philosophical Society* 48(6).

Nance, C. R.

1971 The Archeology of La Calsada: A Stratified Rockshelter Site, Sierra Madre Oriental, Nuevo Leon, Mexico. Unpublished Ph.D. dissertation, University of Texas at Austin.

Nunley, J. P., F. Duffield, and E. B. Jelks

1965 Excavations at Amistad Reservoir, 1962 Season. *Texas Archeological Salvage Project, Miscellaneous Papers* 3.

Ross, R.

1965 Archeology of Eagle Cave. *Papers of the Texas Archeological Salvage Project* 7.

Suhm, D. A., A. D. Krieger, and E. B. Jelks

1954 An Introductory Handbook of Texas Archeology. *Bulletin of the Texas Archeological Society* 25.

COMPARISONS OF ARTIFACT ASSEMBLAGES FROM SOUTHWESTERN COAHUILA, MEXICO

Lorraine Heartfield

Abstract

In 1966 and 1967, members of the Northeast Mexico Archeological Project conducted archaeological investigations in southwestern Coahuila, Mexico. Artifacts were recovered from the surfaces of open sites on the desert floor and excavated from shallow dune deposits in the Laguna Mayran and Desierto de Charcos de Risa. Although no deep, stratified deposits were found, spatial distributions among artifact forms indicate that artifact assemblages are geographically and temporally different. Materials found in the Desierto de Charcos de Risa are generally earlier than those recovered from the Laguna Mayran and may be culturally distinctive as well.

Introduction

During 1966 and 1967, members of the Northeast Mexico Archeological Project, directed by Dr. Jeremiah F. Epstein and funded by the National Science Foundation, conducted archaeological research in southwestern Coahuila, Mexico. Efforts to locate undisturbed cave deposits failed. However, many sites were found on the open desert floor in the Laguna Mayran and adjacent Desierto de Charcos de Risa. Six of these sites were excavated.

In this paper I will review the cultural sequence reflected by the artifacts found in the Laguna Mayran and the Desierto de Charcos de Risa. Comparison of the materials from the two areas shows temporal and possible cultural differences.

A lengthy cultural sequence is indicated. The sequence is based on comparison of artifact forms from the Laguna Mayran and Desierto de Charcos de Risa with dated materials from adjacent regions, notably northern Mexico and trans-Pecos Texas. Primary sources for northern Mexican comparisons are Epstein (1969,1972), MacNeish (1958), McClurkan (1966), Nance (1971,1972), and Taylor (1966). Among the sources relied upon for comparison with trans-Pecos Texas are Dibble (1967), Johnson (1967), Story and Bryant (1966), and many others. The projectile point scheme commonly used is that of Suhm and Jelks (1962). Taylor named several types of projectile points from the Cuatro Ciénegas Basin. These occasionally overlap with Texas types. In these instances, the names assigned by Taylor are placed in parentheses. I have also named several types or provisional types of projectile points from the Desierto de Charcos de Risa (Heartfield 1975). When these type names are applied, they are referenced.

Although a general cultural sequence has been established, the problems facing archaeological researchers in southwestern Coahuila are formidable. In the final sections of the paper, several problems are discussed and research objectives are formulated.

Laguna Mayran

The Laguna Mayran is a large bolson in the western end of the Parras Basin. Numerous streams, most intermittent, drain into the Laguna. The most notable are the Nazas and Aguanaval, which empty into the bolson near San Pedro de las Colonias. During early historic times, a lake filled the lower elevations of the Laguna Mayran and may have had a circumference of 120 miles (40 leagues) during flood (Griffen 1969:109). In recent years the Laguna Mayran has become increasingly arid. This appears to be due to natural factors and to damming of the Nazas.

Although Spanish intrusion was evident in the Laguna by the early 1590s, it was not until after 1598 that a mission was established at San Pedro de la Laguna, the site of modern San Pedro de las Colonias (Griffen 1969:6-7). Three chapels were founded. One of these, Santiago, was situated on the Laguna Mayran near the mouth of the Desierto de Charcos de Risa.

William L. Irwin found 31 sites in or near the Laguna Mayran. These include open sites on the desert floor, mortuary caves and vertical shafts, and pictograph and petroglyph sites. Most are open sites on the desert floor. The surfaces are littered with scattered hearthstones, lithic debris, and pottery. Extensive artifact collections were made from the surfaces of the open sites. Several are located near or adjacent to the Santiago chapel. Irwin excavated C-149 and C-150, open sites which appeared to contain stratified deposits. Analysis of Irwin's data is in progress, and a detailed report will be completed soon.

Irwin found hundreds of projectile points, but few are dart points. The earliest are Late Paleo-Indian types, *Lerma* and *Meserve*; all represent scattered surface finds. *Pandale* dart points may be indicative of the later part of the Early Archaic. The only recognized Middle Archaic forms are contracting stemmed *Duran* and *Jora* points. Both types are surface finds, and specific temporal placement is speculative. They may be earlier or later than similar types from adjacent Texas.

Corner-notched types, including *Frio, Palmillas, Shumla,* and *Vertiente,* are probably Late Archaic types. Most specimens are *Vertiente,* a provisional type proposed by Heartfield (1975). Perhaps the latest of the Archaic dart points is the side-notched *Ensor* type. Undoubtedly, the corner-notched and side-notched dart points represent an extensive time span, but no beginning or ending date has been established for these forms in southwestern Coahuila.

Most of the projectile points are post-Archaic. Irwin found hundreds of arrow points and fragments. These include a plethora of forms: corner notched, side notched, contracting stemmed, and stemless. Most, however, are stemless *Fresno* (*El Muerto*), *Garza* (*Cienegas*), *Starr* (*El Muerto*), and side-notched *Toyah* (*Sierra Madera*) types. They include a variety of sizes, and serrated blade edges are common. Other arrow points include stemless *Catan* and *Matamoros*, contracting stemmed *Perdiz*, and side-notched *Scallorn* types.

Among other chipped stone categories are bifacial and unifacial artifacts, cores, and unmodified flakes. Among the bifaces are triangular bifaces comparable to *Tortugas* dart points. Unifaces are more than twice as frequent as

bifaces in the sample. The most distinctive unifacial artifacts are symmetrical and sub-triangular implements. Similar specimens have been found in mortuary caves and vertical shafts (Aveleyra, Maldonado-Koerdell, and Martínez 1956) and Hester (1971).

Irwin's notes concerning pottery are general, and the collection is not available for examination. However, he remarks that most sherds are plain or red washed, and incised or punctated sherds are rare. He found perforated sherd discs and sherds that had been grooved, and grooved and snapped (broken), along the groove.

Smoothed pebbles (some perforated) and beads were found on the surfaces of the sites and within the excavated deposits of C-149 and C-150. These include tube-shaped bone beads, disc-shaped shell and stone beads, and *Marginella* and *Olivella* shell beads.

Historic majolica (tin-enameled ware) was found on the surfaces of several sites. C-149 and C-150 were chosen for excavation partially because of the high frequency of these historic remains.

Irwin removed two flexed burials from C-149. No artifacts were found with the skeletal remains. Although nine human burials were found at C-150, only eight were removed. Two were flexed inhumations. Bone beads, charcoal, and fish remains were associated with one of the flexed burials. Six individuals were buried extended and on their backs. A shaped stone was associated with the skeletal remains of one adult. Glass and shell beads strung on copper wire were found around the neck and chest of the remains of a small child.

In summary, artifacts spanning Late Paleo-Indian to early historic times were found in the Laguna Mayran. The few dart points among the sample probably indicate sparse settlement or use of the Laguna during the Late Paleo-Indian and Archaic periods. However, sometime after the close of the Archaic, the population in the Laguna Mayran must have increased dramatically in both numbers and complexity. Ethnographic materials compiled by Griffen (1969) clearly show that the Laguna Mayran was densely occupied by local and intrusive aboriginal groups until the early eighteenth century. Most of the arrow points recovered--*Fresno, Garza, Starr,* and *Toyah* types--may well reflect these late inhabitants.

Desierto de Charcos de Risa

The Desierto de Charcos de Risa is an elongate desert valley north and west of the Laguna Mayran. The channel of the Rio Charcos de Risa meanders through the valley and empties onto the Laguna near the Sierra de Santiago. The remains of the mission chapel, Santiago, are situated near the eastern slope of this small sierra.

The archaeological materials found in the Desierto de Charcos de Risa have been described in other reports (Greene 1971; Heartfield 1975). Four sites were excavated. All of the sites are situated along or near the channel of the Rio Charcos de Risa. The surfaces of the sites are littered with scattered hearthstones, lithic debris, and pottery. None of the deposits excavated was stratified.

The earliest specimens recovered are *Lerma*-type dart points. These are the only evidence of Late Paleo-Indian peoples. The next recognized projectile point types are probably associated with the Middle Archaic. Provisional type *Acatita* (Heartfield 1975) and *Duran, Gobernadora,* and *Jora* dart points were found.

Most of the dart points in the sample are corner-notched specimens. These include *Charcos* and provisional types *Finisterre* and *Vertiente* (*ibid.*). Although none of the types are directly comparable to Texas forms, similar corner-notched types in the Trans-Pecos are associated with the Late Archaic. Also, specimens comparable to *Finisterre* and *Vertiente* were found in the Cuatro Ciénegas Basin and are associated with a temporal scheme roughly comparable to the Late Archaic (Taylor 1966).

Side-notched *Ensor* dart points may be later than the corner-notched types. Few were found, and no definite associations can be made.

Arrow points are a small part of the projectile point sample. These include side-notched provisional type *Diaz* (Heartfield 1975) as well as *Harrell* (*Sierra Madera*), *Scallorn,* and *Toyah* (*Sierra Madera*). Unstemmed types are *Catan, Fresno* (*El Muerto*), *Garza* (*Cienegas*), and *Matamoros*.

Both bifacial and unifacial artifacts were found. Bifaces are more frequent than unifaces. The distinctively shaped unifaces common among the artifacts from the Laguna Mayran are conspicuously infrequent. Other lithic remains include modified flakes, cores, and unmodified flakes.

Several thousand potsherds were found. Most are *Arenal*, an indigenous provisional type (Heartfield 1975) that includes undecorated and red-washed, and incised and punctated varieties. *Santiago*, also an indigenous provisional type (*ibid.*), includes only plain and red-washed varieties. There are three categories of intrusive pottery. Perhaps the earliest are sherds similar to *Chalchihuites* wares. These ceramics may have reached the Charcos de Risa between A.D. 300 or 500 and A.D. 1350 (Kelley 1966:102,109). *El Paso Brown* and *El Paso Polychrome* sherds were also found. These probably date between A.D. 900 and 1400 (McGregor 1965: 359-360). Perhaps the latest intrusive pottery type is *Conchos*. This type dates between A.D. 1200 and 1800 (Shackelford 1955). The time periods of the intrusive ceramics overlap between A.D. 900 and 1350. It is conceivable that all of the intrusive ceramics reached the Desierto de Charcos de Risa within this brief period.

Cylindrical, anthropomorphic figurines were found. Similar specimens from southwestern Texas have been associated with the Middle Archaic (Shafer 1975). Other ceramic artifacts include biconical spindle whorls, clay balls and hemispheres, pipe fragments, perforated sherd discs, and grooved and grooved-and-snapped potsherds.

Beads were found on the surfaces of the four sites. Disc-shaped specimens include shell and bone examples. *Marginella* and *Olivella* shells were also found.

Only two sherds of historic tin-enameled ware were found. They may be examples of nineteenth century majolica (Tunnell 1966), but the late date is not confirmed.

Three burials were removed from C-189. The individuals were extended on their backs. No artifacts were associated with the inhumations.

The artifacts recovered from the four sites in the Desierto de Charcos de Risa indicate a lengthy sequence of human habitation. Although evidence of Late Paleo-Indian to late protohistoric or historic times was found, the bulk of the materials are typical of the Middle and Late Archaic periods. The few specimens of late arrow points and the doubtful association of historic Spanish artifacts (tin-enameled ware) indicate that the sites were abandoned or used only casually by historic times.

Summary and Internal Comparisons

Comparison of the artifact assemblages from the Laguna Mayran and the Desierto de Charcos de Risa shows a consistent pattern. However, several distinctions between the artifact assemblages are obvious.

1. Late Paleo-Indian occupation was scattered sparsely over both the Laguna Mayran and the Desierto de Charcos de Risa.

2. The only recognized evidence of the Early Archaic is in the Laguna Mayran. It is tenuous, based on two *Pandale* dart points.

3. Although the Middle Archaic is represented in both the Laguna Mayran and the Desierto de Charcos de Risa, there are notable differences. *Duran* and *Jora* points were recovered from both areas, but provisional type *Acatita* was found only in the Charcos de Risa. *Gobernadora* was found only in the Charcos de Risa, but the sample is too small to be significant. Cylindrical, anthropomorphic figurines may be part of the Middle Archaic assemblage in the Desierto de Charcos de Risa. It should also be noted that the Middle Archaic sample from the Laguna Mayran is small.

4. Although few Late Archaic corner-notched dart points were found in the Laguna Mayran, several types are represented. Three of the types, *Frio*, *Palmillas*, and *Shumla*, were not found in the Desierto de Charcos de Risa. Provisional type *Vertiente* was found in both areas, but provisional type *Finisterre* and type *Charcos* were found only in the Desierto de Charcos de Risa. In fact, *Charcos*, *Finisterre*, and *Vertiente* account for most of the projectile point assemblage from the Charcos de Risa. Side-notched *Ensor* points were found in both regions and probably represent the terminal Archaic.

5. Early post-Archaic (Neo-American) occupation may be represented among the artifact sample from the Laguna Mayran, but it is overshadowed by the vast numbers of protohistoric or historic arrow point types: *Fresno*, *Garza*, *Starr*, and *Toyah*. *Catan*, *Matamoros*, *Perdiz*, and *Scallorn* arrow points were also found in the Laguna. Their niche in the post-Archaic temporal scheme is uncertain. Unifacial artifacts are common among the Laguna Mayran artifact sample, and the distinctive sub-triangular-shaped specimens are numerous. Apparently unifacials increase in frequency in later times in the Laguna Mayran. Taylor (1966) noted a similar trend in the Cuatro Ciénegas Basin.

Among the few arrow points recovered from the Desierto de Charcos de Risa are *Catan, Fresno, Garza, Harrell, Scallorn,* and *Toyah,* and provisional type *Diaz.* The distinctive sub-triangular unifaces are rare, and bifaces are more frequent than unifaces. No historic associations have been confirmed, and it may be that the sites in the Desierto de Charcos de Risa were abandoned or used only intermittently by historic times.

6. Two indigenous pottery types were found in the Desierto de Charcos de Risa. These types are probably represented among the sample recovered from the Laguna Mayran. However, Irwin remarks that punctated and incised sherds are rare. Intrusive pottery recovered from the Desierto de Charcos de Risa includes *El Paso Brown* and *Polychrome, Conchos,* and *Chalchihuites*-like sherds. It is not known whether similar specimens were found in the Laguna Mayran.

   Other ceramic remains include clay balls, hemispheres, biconical spindle whorls, and pipe fragments. All were recovered from the Desierto de Charcos de Risa. None were found in the Laguna Mayran. This may be of temporal as well as cultural importance.

7. Although burials were recovered from both areas, burial practices are enigmatic. Extended burials were excavated from C-189 in the Desierto de Charcos de Risa, but no artifacts were associated with the inhumations. Both extended and flexed burials were excavated from the Laguna Mayran, but only one, an extended inhumation, can be dated. Historic glass beads strung on copper wire were associated with the skeleton.

8. Beads were recovered from the sites in the Laguna Mayran and the Desierto de Charcos de Risa. The temporal span of these artifacts is unknown, but shell beads were found with the historic burial in the Laguna Mayran.

Problems and Concluding Discussion

Although problems in southwestern Coahuila archaeology seem endless and are beyond the scope of this paper, the discussion of the materials from the Laguna Mayran and the Desierto de Charcos de Risa emphasizes several of the major or most obvious ones. These are briefly discussed.

1. The glaring lack of a recognized Early Archaic component is an obvious discontinuity in the cultural sequence in southwestern Coahuila. No Early Barbed forms have been found in the Laguna Mayran or the Desierto de Charcos de Risa. The two *Pandale* specimens are, at best, tenuous evidence of the later part of the Early Archaic. The lack of a recognized Early Archaic component is a widespread phenomenon in northern Mexico. This time period roughly corresponds to the Altithermal climatic period between 5500 and 2500 B.C. (Antevs 1955 and 1962). Not only are recognized artifact forms lacking, but no radiocarbon dates confirm occupation during this time period (Epstein 1972). Epstein considers the possibility that (1) diagnostic time markers have not been recognized; (2) evidence of occupation during the Early Archaic has been washed away; or (3) population density was low during the Early Archaic.

Only additional research will resolve this enigma. Stratified deposits must be excavated in order to determine the presence or absence of an Early Archaic component. The nature or validity of the Altithermal in northern Mexico is unconfirmed. Comments about Altithermal effects on the archaeological record in the Laguna Mayran and the Desierto de Charcos de Risa would be speculative.

2. The nature of the shift from the Late Archaic to post-Archaic or Neo-American artifact forms in the Desierto de Charcos de Risa is unknown. The presence of several thousand potsherds among an artifact assemblage that includes few arrow points is unsettling. Indigenous provisional pottery types can not be separated from, or definitely associated with, late dart point forms, particularly *Charcos* type. Early arrow point forms are probably *Diaz* and *Scallorn*. These may have evolved from earlier dart point forms such as *Ensor*.

3. The position of *Catan* and *Matamoros* points in the sequence is undetermined. Although Epstein (1972:55) points out that in eastern northern Mexico these forms appear to span the Archaic and Neo-American periods, most *Catan* and *Matamoros* points were recovered from the Laguna Mayran and are suspected to be contemporaneous with late arrow point forms.

   One problem may be the recognition of points commonly labeled *Catan* and *Matamoros*. We need to critically examine the triangular bifaces from sites throughout northern Mexico and southern Texas.

4. The distribution and origin of intrusive ceramic types, marine shells, and recognition of intrusive lithic forms should be considered. These artifacts indicate the nature and temporal framework of external contacts.

5. The relationship between the materials recovered from the Laguna Mayran and the Desierto de Charcos de Risa is puzzling. The areas are adjacent and not separated by any formidable, visible boundaries. However, the Desierto de Charcos de Risa appears to have been more densely occupied during Archaic times than the Laguna Mayran. In addition, late cultural developments in the small valley may have been different from those in the Laguna. In the Charcos de Risa, cultural development throughout the Middle to Late Archaic may have been fairly continuous. Pottery and other late artifact forms may have been introduced into a primarily Late Archaic-like culture. Typical Late Archaic artifact forms may have persisted late in time and may be contemporaneous with some of the Neo-American assemblage recovered from the Laguna Mayran.

In summary, the differences between the artifact assemblages in the Laguna Mayran and the Desierto de Charcos de Risa may be cultural, temporal, or a combination of cultural and temporal factors. Excavation of stratified deposits and isolation of single component open sites in both areas are desperately needed.

REFERENCES CITED

Antevs, E.

1955 Geologic-Climatic Dating in the West. *American Antiquity* 20:317-335.

1962 Late Quaternary Climates in Arizona. *American Antiquity* 28:193-198.

Aveleyra Arroyo de Anda, L., M. Maldonado-Koerdell, and P. Martínez del Río

1956 Cueva de la Candelaria. Volume 1. *Memorias del Instituto Nacional de Anthropología* 5.

Dibble, D. S.

1967 Excavations at Arenosa Shelter, 1965-1966. Report submitted to the National Park Service by the Texas Archeological Salvage Project, University of Texas at Austin.

Epstein, J. F.

1969 The San Isidro Site: An Early Man Campsite in Nuevo León, México. *Department of Anthropology, University of Texas at Austin, Anthropology Series 7.*

1972 Some Implications of Recent Excavations and Surveys in Nuevo Leon and Coahuila. *Texas Journal of Science* 24(1):46-56.

Greene, L. H.

1971 Archeological Investigations in the Desierto de Charcos de Risa, Coahuila, Mexico. M.A. thesis, University of Texas at Austin.

Griffen, W. B.

1969 Culture Change and Shifting Populations in Central Northern México. *Anthropological Papers of the University of Arizona* 13.

Heartfield, L.

1975 Archeological Investigations of Four Sites in Southwestern Coahuila, México. *Bulletin of the Texas Archeological Society* 46:127-177.

Hester, T. R.

1971 Hafted Unifaces from Southwestern Coahuila, Mexico. *Kiva* 36(4):36-41.

Johnson, L.

1967 Toward a Statistical Overview of the Archaic Cultures of Central and Southwestern Texas. *Bulletin, Texas Memorial Museum* 12.

Kelley, J. C.

1966 Mesoamerica and the Southwestern United States. *Handbook of Middle American Indians* 4:95-110. University of Texas Press, Austin.

McClurkan, B. B.

1966 The Archeology of Cueva de la Zona de Derrumbes: A Rockshelter in Nuevo León, México. M.A. thesis, University of Texas at Austin.

McGregor, J. C.

1965 *Southwestern Archeology*. University of Illinois Press, Urbana.

MacNeish, R. S.

1958 Preliminary Archeological Investigations in the Sierra de Tamaulipas, México. *Transactions, American Philosophical Society* 48(6).

Nance, C. R.

1971 The Archeology of La Calsada: A Stratified Rock Shelter Site, Sierra Madre Oriental, Nuevo León, México. Ph.D. dissertation, University of Texas at Austin.

1972 Cultural Evidence for the Altithermal in Texas and México. *Southwestern Journal of Anthropology* 28:169-192.

Shackelford, W. J.

1955 Excavations at the Polvo Site in Western Texas. *American Antiquity* 20(3):256-262.

Shafer, H. J.

1975 Clay Figurines from the Lower Pecos Region, Texas. *American Antiquity* 40(2):148-158.

Story, D. A. and V. M. Bryant

1966 A Preliminary Study of the Paleoecology of the Amistad Reservoir Area. National Science Foundation Research Report (GS-667).

Suhm, D. A. and E. B. Jelks

1962 Handbook of Texas Archeology: Type Descriptions. *Texas Archeological Society, Special Publication* 1 and *Bulletin, Texas Memorial Museum* 4.

Taylor, W. W.

1966 Archaic Cultures Adjacent to the Northeastern Frontiers of Mesoamerica. *Handbook of Middle American Indians* 4:59-94. University of Texas Press, Austin.

Tunnell, C.

1966 A Description of Enameled Earthenware from an Archeological Excavation at Mission San Antonio de Valero (The Alamo). *State Building Commission Archeological Program Report* 2.

SOME REFLECTIONS ON THE NATURE OF THE NORTHEAST MEXICO LITHIC TRADITION AND THE PROBLEM OF ITS ORIGIN

Jeremiah F. Epstein

Introduction

One of the problems that arise whenever one attempts a synthesis is that of reconciling one's own data with that of others. Similarities are seen; there are vague patterns in the data, but seldom is there a one-to-one correspondence between one site and another. There is a story, but it is a confused one; and one cannot help but wonder whether the confusion arises from the complicated nature of northeastern Mexico's own prehistory, or from the fact that our own excavation and survey methods and our analytical framework have wrecked havoc with what might have been an essentially uncomplicated past. To illustrate some of the difficulties encountered, I would like to discuss the problem of defining the archaeological culture of northeastern Mexico and the search for its possible origins. Since most of the material obtained in our own excavations and surveys* has consisted of chipped stone artifacts, this discussion will be confined to lithic traditions.

How separate or distinctive is the culture of northeastern Mexico?

When this conference began, we noted that our theme was to determine the relationship of northeastern Mexico prehistory to that of its neighbors both north and south. This suggests that there is something unique about the archaeology of this area. Yet, when we look at the various lithic assemblages that come from northeastern Mexico, the most obvious observation is that almost all of the artifacts are duplicated elsewhere; or if not duplicated, they have close parallels either in Texas, the American Southwest, the Plains, or Mexico. Yet, in spite of this sharing, there are two aspects of the northeastern Mexico lithic tradition which distinguish it from its neighbor to the north, and these appear in all of the time/culture periods that we have been able to define. They are as follows: (1) the presence of small projectile points within a general tradition of lanceolate and triangular bifaces; (2) the absence of burins. These features suggest to me that the culture of northeastern Mexico has derived from a different source than that of Texas.

The Small Projectile Point Tradition

One of the distinctive problems that is encountered in working with material from northeastern Mexico is typological. It arises from the fact that there is a long tradition of intergrading triangular and teardrop-shaped "projectile points" that differ from one another in size and proportion. Distinguishing one group from another is difficult on the basis of the morphological features of the artifacts

---

* See Background at end of this paper.

themselves, and poses problems regarding the nature of typology itself. In Tamaulipas, MacNeish used stratigraphic positions to distinguish the smaller from the larger rounded-base forms which he called *Abasolo* and *Catan*, and, similarly, he distinguished among the triangular assemblage, three types which he called *Nogales*, *Tortugas*, and *Matamoros*. He tells us:

> "in my initial study, many of the larger varieties of Catan Round base points in the early ceramic levels were considered to be Abasolo points. However, study of the stratigraphic remains from Romero's Cave in the Sierra Madre revealed that round base points under 39 mm. in length appear suddenly in Guerra times. This temporal significance justified my defining them as a distinct type . . ." (MacNeish 1958:69)

MacNeish (*ibid.*:68) considers the triangular *Matamoros* apparently late too, for he notes that it begins with the earliest pottery in the Sierra de Tamaulipas (though it is with a pre-pottery horizon in the Sierra Madre). There is a question in my own mind as to whether stratigraphic position should be used in typology. It is a non-morphological feature which is external to the artifact itself. By using stratigraphy as a feature in typology, we put ourselves in the position of defining and identifying types by their vertical position. This might work in a world where there is never any mixing of archaeological deposits or no cultural continuity whatsoever, but reality seldom conforms to this ideal. If a small, rounded-base point were found in Tamaulipas, in levels earlier than Guerra, would MacNeish call it a *Catan*? How would such a point be classified in a surface collection?

As a result of our work in Nuevo Leon, we have discovered that the small triangular and lanceolate points have a long history, going as far back in time as 10,600 years ago. We first became aware of the fact that these smaller points were not just late forms as a result of our excavations of the site of Cueva de la Zona de Derrumbes, 30 kilometers west of the town of Linares, N.L. Here, in a culturally stratified deposit, five feet thick, which rested over a gravel deposit, we found small triangular and rounded-base points from top to bottom. In fact, the smallest of the rounded-base forms (*Catan*) were confined to the lowest levels of the excavations (McClurkan 1966). Later, when I returned to excavate the gravels, and the deposit underlying the gravels at Cueva de la Zona, I found a few specimens of both *Matamoros* and *Catan* types in the lower zone, thus confirming the early placement of these types that was noted above. It should be noted that projectile points of typical *Tortugas* form were also obtained at Cueva de la Zona de Derrumbes; these were confined to levels 9-17, and cover a period radiocarbon dated from 1170 B.C. to A.D. 540. The earliest *Catan* and *Matamoros* points from this site, obtained from the zone below the gravels, dated at 3000 ± 160 B.C.

At this juncture it serves no useful function to argue the niceties of typology and to wonder whether the early specimens are truly *Catan* and *Matamoros*. What is important is that there are small triangular and teardrop-shaped points at Cueva de la Zona that go back to as early as 3000 B.C. That this is no isolated example is indicated from Nance's (1971; this report) careful excavations at La Calsada, where he obtained small lanceolate, triangular, and oval points in Unit 5 (7500-5000 B.C.) and Unit 6 (8600-7500 B.C.). These small points range from 2.3 to 4.0 cm in length.

It appears, then, that small projectile points are part of a long tradition in Nuevo Leon which began as early as 8600 B.C. This is apparently not the case in parts of Coahuila (Taylor 1966) and, as far as I can gather, it does not seem to apply for Texas as well.

Granting that there is this long tradition of small lanceolate, teardrop-shaped, and triangular projectile points in parts of northeastern Mexico, what does it mean? I do not believe that this reflects the availability of flint or chert, for, both at La Calsada and Cueva de la Zona de Derrumbes, larger projectile points were found in overlying layers. So it seems we are dealing more with cultural norms than dimensions imposed simply by the nature of the source material. McClurkan argued for a greater antiquity for the bow and arrow than has hitherto been held, on the assumption that these small points may be arrow points, but I know no way of demonstrating this assertion. Frankly, I am confused. The small size of many of these pieces argues for arrow points, but their barbless form argues for another function. Arrow points, like dart points, work best when they cannot be easily removed, and the movement of a running animal can easily result in continued bleeding with eventual death if the point is retained. A barb is the best assurance that the point will not fall out easily. Since barbs or at least very pronounced shoulders occur on stemmed projectile points in Units 5 and 6 at La Calsada, it cannot be argued that barbs were unknown among the early inhabitants of Nuevo Leon.

This brings us to the often-stated alternative that, if these triangular and teardrop-shaped bifaces are not points, they are knives. This view, while perhaps logically sound, is hard to demonstrate (Nance's study of wear patterns, for example, proved inconclusive). Yet, it does seem to offer some explanation as to why we find these lanceolate and triangular forms associated with what are clearly either arrow or dart points. Although I know of no example of *Catan* or *Matamoros* being hafted to any projectile, it is worth noting that their larger counterparts seem to have functioned as knives at Cueva de la Candelaria (Aveleyra, Maldonado-Koerdell, and Martinez del Rio 1956, Lams XII-XVI). Should this suggestion prove correct, we may have to talk about northeastern Mexico as having a long history of small knives. But, while this may sharpen our perception of function, it does not basically alter the typological differences between northeastern Mexico and its neighbors. That is, the small pointed biface, of essentially triangular or teardrop shape, whatever its function, is seemingly part of an ancient tradition in northeastern Mexico, whereas it is not in Texas. It would be interesting to know if this same situation is present in Chihuahua, Durango, Sonora, and Baja California as well.

Burins

We now have enough information from Texas to determine that burins are part of a great number of early assemblages in Texas, extending from the Rio Grande both north, west, and east. Now that they have been recognized, they are spotted in most excavations and surveys; and it appears that, at least for most of the Trans-Pecos, south Texas, and central Texas, burins occur throughout the Archaic and even into Neo-American periods. Burins also have been found in the early periods in Tehuacan (MacNeish 1967:44), Valsequillo (Irwin-Williams n.d.), and from a recently excavated fluted-point site in Guatemala (Gruhn 1973). Given this

distribution, one would expect to find them in northeastern Mexico; yet, at present, the only indications of burins are a burin-faceted point picked up in a survey in Nuevo Leon and one long, worked burin spall obtained from the Early Man, Plainview site of San Isidro (Epstein 1969). None were found at La Calsada, Cueva de la Zona, or any of the 300 sites that were discovered by me or my students. Burins are just not part of the northeastern Mexico lithic tradition. The absence is puzzling, and I do not think it can be explained on functional grounds alone. When we put the absence of burins and the presence of a small point tradition together, it is apparent that much of northeastern Mexico has a lithic tradition which is different from Texas, and presumably other parts of Mexico. This difference must certainly reflect a separate origin for the cultures of northeastern Mexico. What this origin is, I do not know; but I think it would be premature at this early time to classify it into the heading of Desert Culture, for the latter means too many things to too many people. By seeing the lithic material in this light, I am clearly in opposition to Taylor (1966) and Jelks (1978), who both see the cultures of northeastern Mexico and Texas as essentially minor variants of the same basic tradition.

Early Man in Northeastern Mexico

In searching for the origin of the small point, non-burin culture of northeastern Mexico, we commit ourselves to the problem of Early Man, and trying to locate his presence and define his culture. We have some reason for believing that we should eventually find human material associated with mammoth, for MacNeish's field notes on file in Mexico indicate he saw fossil mammoth bones in Chorreras Arroyo, Tamaulipas associated with the remains of an ancient hearth containing charcoal, burned bone, and other vestiges of human activity (Aveleyra 1964:393). Aveleyra (1951:42-44) himself found a crude nucleiform implement associated with mammoth in the Falcon flood pool area in Salininillas Arroyo. When I was surveying in Monclova in 1960, I was told of a mammoth tooth excavated many years previous to my visit that had a large projectile point associated with it. Unfortunately, none of these examples are particularly informative; either they were not excavated, or the precise context is not defined. In 1962, I excavated what proved to be the partial remains of a mammoth, east of the town of Los Ramones, but there were no indications of human activity with the animal.

It seems significant that we have remains of elephant and various species of Pleistocene horses reported for Nuevo Leon (*Equus Linnaeus*, *Equus conversidens* Leoni Stock [Alvarez 1965:47,49; Silva-Barcenas 1969]) but none of bison. While it is probable that a few bison of late Pleistocene and modern species were in northeastern Mexico (Gilmore 1947), it appears that they were never here in enough numbers to play a significant role in Man's food quest. We know that bison reached the Rio Grande (Rio Bravo) in the area near Langtry, but we do not know whether they reached farther south into northeast Mexico. The work near Langtry is reported by David Dibble, who found bison kills at two distinct periods at Bonfire Shelter. The earliest, dated between 2500 and 2700 years ago, is associated with a series of Archaic dart points. Dibble (1968:176) interprets this as indicating that ". . . large herds of animals were in the area for only a very brief ecologically significant period--perhaps in response to particularly harsh winter or winters--and were effectively trapped at Bonfire shelter by hunters who had followed them from the north." Building on this information, as

well as the vast data from the southern Plains, Dillehay (1974) has suggested that bison were absent during two periods, the first from 5000-6000 to 2500 B.C., the second from A.D. 500 to 1200-1300. Putting both sources together, it seems reasonable to suppose that if bison were indeed rare in Texas, they must have been even more uncommon in northeastern Mexico.

The absence of both fossil and modern forms of bison correlates with the absence of a fluted point tradition in northeastern Mexico. Offhand it may seem unreasonable to expect a fluted point tradition in the first place, but it should be remembered that fluted points occur in western Mexico in Sonora, Baja California, Chihuahua, and Durango, and in Costa Rica and Guatemala. Until recently all of these points were surface finds, and the lack of context in which they were found made them hard to interpret. However, two fluted point sites have now been excavated. One in Sonora appears to be the remains of a Clovis hunters' camp (Braniff, personal communication). The other, in Guatemala, is complete with gravers, burins, scrapers, a blade, and a channel flake (Gruhn 1973). These two sites are especially important because they demonstrate that the scattered finds of fluted points from western Mexico and Central America are no accidents, but the remains of a true Paleo-Indian fluted point culture similar to what we know of in the Plains.

If a fluted point tradition existed in western Mexico, Central America, and Texas, one should expect to find it in northeastern Mexico as well. At this writing, the two surface specimens known are not too helpful. One eccentric piece came from Villa Acuña, near the Texas border (Aveleyra 1966:Fig. 3i), and only signifies that paleo-hunters were "just crossing the border." The other specimen, found by Marie Antonieta Cervantes near Los Ramones, N.L. (Epstein 1961; Aveleyra 1966: Fig. 3c), is a point-tip and is not sufficiently diagnostic to assert a claim for the presence of fluted points in Nuevo Leon. Yet these two specimens represent all we have out of almost 10,000 projectile points that I have personally seen in private collections, as well as our own survey materials, from northeastern Mexico. It would certainly seem that if there was a fluted point tradition here, more evidence of it would have shown up by this time.

We are thus faced with a seeming absence of both fossil bison and fluted points, and the correlation is so obvious that it would seem that one is the cause of the other. I therefore suggest that the late Pleistocene paleo-bison hunters with their fluted point traditions never entered northeastern Mexico, simply because there were no bison for them to hunt. Perhaps the movement of bison and bison hunters was down the western side of the Sierra Madre, following a route very similar to that occupied by the agricultural peoples of Chihuahua, Zacatecas, and Durango in prehistoric times.

This seems to shed some light on the early material that Nance obtained from Unit 6 at La Calsada. This material, which goes back as far as 10,600 years ago, is at a time plane in which we would expect to find some indications of a fluted point tradition if it were here. If we grant that, perhaps because of the absence of bison, the Paleo-Indian lithic tradition with its fluted points and burins (such as occurred at Los Tapiales, Guatemala [Gruhn 1973], and the Levi Rockshelter in Texas [Alexander 1963]) never moved into northeastern Mexico, we would have

an explanation for the few distinctive features of the northeastern Mexico lithic tradition that I have noted earlier.*

The fact that the earliest materials we have from northeastern Mexico have a distinctly "Archaic" flavor, and are not at all Paleo-Indian in nature, suggests that we are dealing with something almost identical to the Desert Culture concept as it was originally defined by Jennings and Norbeck (1955), and then elaborated by Jennings (1957) on the basis of his material from Danger Cave. This is a concept of a basically unchanging culture adapted to a basically unchanging desert environment in which the food quest was almost continuous. Certainly, the fact that there is a long continuum of small triangular and teardrop-shaped points, together with the absence of burins (while their neighbors to the north were using burins continuously), indicates that the culture has not changed radically But there is also a marked change in other parts of the system. New projectile point types occur; trends are seen in the relationship of bifaces to unifaces; and finally, somewhere around 500 A.D., we have the introduction of arrow points and hafted crescentic and notched scrapers. Our lithic tradition indicates a slow but continuous transition; it is not the same culture from beginning to end. Then too, we have evidence of significant climatic change, particularly as marked by the indications of the Altithermal (Nance 1972; Epstein 1972). And finally, while I do not doubt that our northeastern Chichimecs utilized the environment to the fullest, the large numbers of deer, rabbit, and squirrel bones in our deposits do not argue for the marginal kind of existence that seems implied by the Desert Culture concept.

The Problem of the *Lerma* Projectile Point

As long as we are speculating on Early Man, and we have noted the possibility of finding artifacts with mammoth in northeastern Mexico, it seems appropriate to wonder what kind of projectile we might find along with that animal once it is discovered. I have preempted the fluted point tradition already, and logic forces me to stick within some variant of the triangular or teardrop-shaped forms which we have emphasized is part of the basic lithic tradition of our area. The point that immediately comes to mind is *Lerma*, for this type has been found with the second mammoth of Ixtapan. However, I believe that what applies to the basin of Mexico need not apply to Nuevo Leon or Tamaulipas.

The term "Lerma" is generally applied to a lanceolate bifacial that is pointed at both ends (MacNeish 1958:62, Fig. 23; Suhm, Krieger and Jelks 1954:440, Pl. 99). They have a fair range in length and width, depending upon where found; but the

---

* It should be noted at this time that we do have *Plainview* points in Nuevo Leon (Epstein 1969), and a *Meserve* has been obtained in Tamaulipas (Espejo, personal communication); but there is nothing to indicate that these go back as far as 10,000 years ago. What makes this material so interesting is that it is associated with a complex of heavy pebble tools and bifacials; this suggests that when some late paleo-hunters moved into northeastern Mexico, they had to modify their way of life extensively, for these heavy tools are usually associated with rooting and gathering. Thus this artifact complex reinforces the view that bison were absent.

usual range is between 5.5 to 8.0 cm in length, and they average around 5.6 to 6.5 cm in width. The diagnostic feature of the *Lerma* point is its double pointedness, although even this feature is highly variable, ranging from a true point to one end that is tapered and slightly rounded. In earlier papers (Epstein 1966, 1969), I called attention to the fact that a discussion of what is (or should be called) a *Lerma* and what is not is very much in order, and I also tried to establish the dating of the type.

For a long time now the view has been developing as a result of MacNeish's research that the *Lerma* is one of the earliest projectile point types in the New World. His charts show it as the earliest in such far flung places as the Arctic (MacNeish 1956), the southern Yukon (MacNeish 1964), Tamaulipas (MacNeish 1958), and Tehuacan (MacNeish 1967). While the *Lerma* point may have been the earliest point he found, the real question is, is it the earliest thing around? There is abundant evidence to demonstrate that the *Lerma* persisted into middle Archaic times; the problem is to date its earliest occurrence.

MacNeish's date* for the Lerma phase at Diablo Cave (7320 ± 500 B.C.) probably gives us the earliest date we will find, particularly if we consider the one sigma range of error. Confirmation of this placement comes from La Calsada, where the earliest *Lerma* points occur in Unit 5 (the three earliest dates of this unit being [7360 ± 160 B.C., 7320 ± 150 B.C., and 6660 ± 100 B.C.]). These dates are in line with Taylor's (1966) earliest dates from Frightful Cave in Coahuila (7585 ± 550 B.C.), which unfortunately come from the middle levels of his deposit where the associations are dubious. But since Taylor (*ibid.*) reports *Lerma* points from that site, it is not unreasonable to suggest that some of his points may go back that far in time. Elsewhere in Mexico, *Lerma* points have been found at Tehuacan and at Ixtapan. At Tehuacan, they occur in the earliest phase called Ajuerrado (MacNeish 1967:Fig. 34), which has been radiocarbon dated as early as 6675 ± 340 B.C. Although MacNeish (1972:16-18) rejects these dates as being too recent, I feel that they are very much in line with the dates for the following El Riego phase, and for what we know about the dating of the *Lerma* points elsewhere. The most intriguing association and dating of the *Lerma* point is at the second mammoth kill site at Ixtapan (Aveleyra 1956). This single point fits traditional conceptions of *Lerma* typology, so there is no argument regarding classification. The problem lies in the area of associations and the real or implied dating of the kill. The radiocarbon dates come from carbon in the sediment underlying the mammoth, which yielded an age of 7300 ± 250 B.C. While Kulp, who processed this material, considers this date with some skepticism (Aveleyra 1964:404), the date is perfectly in line with what has been noted already for the age of *Lerma* points. Those who reject the dates do so, I suspect, because mammoth became extinct about 2,000 years earlier in the United States; and so the Ixtapan mammoth is assumed to be older than the 7300 B.C. age arrived at by radiocarbon. One of the difficulties with extinction is that we tend to think of it as a function of time more than of ecology. I suspect that the high altitude and resulting cool climate of the basin of Mexico, together with its lake system, made it an ideal refuge area, where many Pleistocene forms survived a bit longer than their counterparts elsewhere. This relatively recent dating for mammoth seems to be

---

* All dates are calculated by subtracting the base year 1950 from the laboratory date; no corrections have been applied.

confirmed by the dating of the San Bartolo Atepehuacan mammoth, which was dated at 7720 ± 400 B.C. (sample M-776, Crane and Griffin 1960:43-44). Given this evidence for the survival of mammoth into relatively recent times, I see nothing which conflicts with the same dating for the *Lerma* point associated with the second mammoth of Ixtapan.

In short, our data indicates that *Lerma* points occur no earlier than about 7500 B.C. in Mexico. Since there is nothing presently known about Nuevo Leon, Coahuila, and Tamaulipas to suggest that this region was once a refuge for post-Pleistocene mammoths, it seems reasonable to suppose that mammoths became extinct in northeastern Mexico, as in the American southwest, somewhere around 10,000 B.C. Thus, in northeastern Mexico, the demise of the mammoth preceded the appearance of the *Lerma* point by about 2500 years. I would expect, therefore, that if we are ever lucky enough to find a mammoth in Nuevo Leon replete with the projectile points that caused his end, those points will not be *Lerma* but some other type . . . perhaps even the small triangular or teardrop forms that resemble those from La Calsada or Cueva de la Zona de Derrumbes.

Summary

In this frankly speculative paper, I have tried to characterize the distinctive features of the lithic tradition of northeastern Mexico. These are: (1) a small projectile point tradition, and this "tradition" goes back as far as 10,500 years ago; and (2) the absence of burins. Since burins have been shown to be part of the fluted point traditions in Texas and in Guatemala, and the fluted point tradition is seemingly absent in northeastern Mexico, it would appear that the lithic tradition of northeastern Mexico originates from something other than the traditional Paleo-Indian culture as we know it from, say, the southern Plains. In discussing the apparent absence of a fluted point tradition, it was noted that this correlates with the absence of fossil bison. It is therefore assumed that the bison hunters of North America did not come into northeastern Mexico simply because there were not enough bison around for them to hunt. The wide distribution of fluted points in western Mexico, and the recent discovery of a fluted point site in Guatemala, all suggest that the paleo-hunters moved into Mexico and farther south along the western edge of the Sierra Madre and the Pacific slope, apparently avoiding Nuevo Leon, Tamaulipas, and Coahuila. How long northeastern Mexico has been inhabited is not known. Our earliest dates from La Calsada place Man in the Pilón River valley about 10,500 years ago. Scattered finds made by Aveleyra and MacNeish of mammoth possibly associated with artifacts suggest that Man may have been here earlier. Should we eventually find Man and mammoth associations, I suggest that the projectile points found with that mammal will probably be triangular or teardrop shaped, rather than double pointed like the *Lerma* type as it is now defined.

Background

This paper is based on research that my students and I have done in northeastern Mexico between summer 1960 and spring 1967. Entitled "The Northeast Mexico Project," the program was funded initially by the Department of Anthropology,

the University Research Institute, and the Institute of Latin American Studies of The University of Texas. The remaining four years of work were supported by two separate grants from the National Science Foundation (GS-200 and GS-636) and the Fulbright-Hays Committee (F.H. 4-99). Permission to work in northeastern Mexico was granted to us by Instituto Nacional de Antropología e Historia (INAH) through Dr. Roman Pina Chan. Without this funding, and without the generous help of the Instituto Tecnológico de Estudios Superiores de Monterrey and its faculty (as well as the aid given to us by the citizens of Nuevo Leon and Coahuila), this work would not have been possible.

The project was initiated with a survey of Nuevo Leon and parts of Coahuila, conducted by myself in summer 1960. In summer 1962, I returned with a Department of Anthropology field school and excavated and made surface collections from the San Isidro site, an Early Man campsite near Los Ramones, and carried out an archaeological survey near Linares, N.L. At that time, I discovered the site called Cueva de la Zona de Derrumbes. This site, as well as a series of others in the valley of the Rio Santa Rosa between Linares and Galeana, was then tested by Burney B. McClurkan and Glen Greene the following summer. They also explored southeastern Coahuila and parts of the Pilón River valley, between Cassillas and Montemorelos. In fall 1964, I went back to Cueva de la Zona de Derrumbes with McClurkan and John Alford. This site, which contained a culturally stratified five-foot thick deposit of soil, lying over gravels, was excavated to the gravel layer (McClurkan 1966). In fall 1964, I returned alone to continue excavations of Cueva de la Zona de Derrumbes, and in the process discovered a culture zone underlying the gravel deposit which turned out to be culturally and temporally the same as the earliest culture zone immediately above the gravel (Epstein 1972). The following summer of 1965, Dudley Varner, a graduate student at The University of Texas, carried out a survey of sites containing separate hearths that could be distinguished from each other, a project that took him from the lowlands east of the Sierra Madre to the area around Torreon, Coahuila. In the fall of the same year, the rockshelter named Cueva Ahumada, near Rinconada, Nuevo Leon (originally pointed out to me by Professor Eugenio del Hoyo of the Instituto Tecnológico) was excavated by Harald Jensen, another graduate student of The University of Texas. At the same time that I was excavating Cueva de la Zona de Derrumbes, C. R. Nance was making a detailed survey of the Rio Pilón area, and in the process discovered the very early site of La Calsada, which he excavated in 1965. In summer 1966, Lorraine Heartfield and Ron Ralph made a survey of central Coahuila and the area around Lake Mayran. Some of the important open sites they found were later excavated by William Irwim and Heartfield in fall 1966 and spring 1967. Heartfield's excavations near Charco de Risa constituted the last field work carried out by the Northeast Mexico Archeological Project.

With all this field work, it should be possible to enumerate a long list of accomplishments; but at this point in time I am more impressed by our failures. On the positive side of the ledger is the fact that we have been able to excavate two well-stratified sites in Nuevo Leon--La Calsada and Cueva de la Zona de Derrumbes (possibly three if we include Cueva Ahumada)--and have a fairly detailed idea of cultural chronology in Nuevo Leon. Of these sites, La Calsada, excavated by Nance, is by far the most important, for it provides a long lithic sequence starting from a period radiocarbon dated at 10,600 years ago. From our work at San Isidro, we also know something about Early Man's occupation of

the lowlands east of the Sierra Madre. Insofar as more recent periods are concerned, not only do we have good documentation of arrow point horizons in our excavated components, but we also have Heartfield's work on the ceramic sites located near Torreon. This data, coupled with our extensive survey information and the excavation data of MacNeish and Taylor, should provide us with a solid basis for understanding the prehistory of northeastern Mexico.

The trouble is that too much of what has been done has not been analyzed; and the synthesis, which is clearly my responsibility, is far from completion. Master's and doctoral dissertations have not been sent to the publishers (indeed we have no funds for publication), and some of our excavations have never been written up because those who were conducting those excavations have either left The University, or anthropology. I keep looking for a big block of time (which implies a freedom from administrative and teaching responsibilities) that will somehow allow me to finish what I have started. When it will arrive, I do not know.

REFERENCES CITED

Alexander, H. L.

1963 The Levi Site: A Paleo-Indian Campsite in Central Texas. *American Antiquity* 28(4):510-28.

Alvarez, T.

1965 Catalogo Paleomastozoologico Mexicano. *Departamento de Prehistoria, Instituto Nacional de Antropología e Historia, Publicaciones* 17.

Aveleyra Arroyo de Anda, L.

1951 Reconocimiento Arqueológico en la Zona de la Presa Internacuibal Falcon, Tamaulipas y Texas. *Rev. Mex. Estud. Antropológico* 12:31-59.

1957 The Second Mammoth and Associated Artifacts at Santa Isable Ixtapan, Mexico. *American Antiquity* 22(1):12-28.

1964 Primitive Hunters. In *Handbook of Middle American Indians*, Volume 1: 384-412. University of Texas Press, Austin.

Aveleyra Arroyo de Anda, L., M. Maldonado-Koerdell, and P. Martinez del Rio

1956 Cueva de la Candelaria. *Memorias del Instituto Nacional de Antropología e Historia* 5.

Crane, H. R. and J. B. Griffin

1960 University of Michigan Radiocarbon Dates V. *Radiocarbon* 2:31-48.

Dibble, D. S. and D. Lorrain

1968 Bonfire Shelter: A Stratified Bison Kill Site, Val Verde County, Texas. *Texas Memorial Museum, University of Texas at Austin, Miscellaneous Papers* 1.

Dillehay, T. D.

1974 Late Quaternary Bison Population Changes on the Southern Plains. *Plains Anthropologist* 19(65):180-196.

Epstein, J. F.

1961 The San Isidro and Puntita Negra Sites: Evidence of Early Man Horizons in Nuevo Leon, Mexico. In *Homenaje a Pablo Martinez del Rio*:71-74.

1966 Terminal Pleistocene Cultures in Texas and Northeast Mexico. *Quaternaria* 8:115-123.

1969 The San Isidro Site: An Early Man Campsite in Nuevo Leon, Mexico. *Department of Anthropology, University of Texas at Austin, Anthropology Series* 7.

1972 Some Implications of Recent Excavations and Surveys in Nuevo Leon and Coahuila. *Texas Journal of Science* 24(1):45-56.

Gilmore, R. M.

1947 Report on a Collection of Mammal Bones from Archeologic Cave Sites in Coahuila, Mexico. *Journal of Mammalogy* 28:147-165.

Gruhn, R.

1973 A Preliminary Report on the Finds at Los Tapiales, A Paleo-Indian Site in the Mountains of Totonicapan, Guatemala. Mimeographed copy, Edmonton, Alberta, Canada.

Irwin-Williams, C.

n.d. Summary of Archaeological Evidence from the Valsequillo Region, Puebla, Mexico. Paper given at the Geologic Society of America meeting in Mexico City, November 1968.

Jelks, E. B.

1978 Diablo Range. In R. E. Taylor and C. W. Meighan, eds., *Chronologies in New World Archaeology*:71-111. Academic Press, New York.

Jennings, J. D. and E. Norbeck

1955 Great Basin Prehistory: A Review. *American Antiquity* 31(1):1-11.

MacNeish, R. S.

1956 The Engigstciak Site on the Yukon Arctic Coast. *University of Alaska Anthropological Papers* 2:91-111.

1958 Preliminary Archeological Investigations in the Sierra de Tamaulipas. *Transactions of the American Philosophical Society* 48, Pt. 6.

1964 Investigations in Southwest Yukon. *Papers of the Robert S. Peabody Foundation for Archeology* 6(2).

1972 *The Prehistory of the Tehuacan Valley; Vol. 4, Chronology and Irrigation.* D. Byers, ed. University of Texas Press, Austin.

MacNeish, R. S., A. Nelken-Terner, and I. W. Johnson

1967 *The Prehistory of the Tehuacan Valley; Vol. 2, Non-Ceramic Artifacts.* D. Byers, ed. University of Texas Press, Austin.

McClurkan, B. B.

1966 The Archaeology of Cueva de la Zona de Derrumbes, a Rockshelter in Nuevo Leon, Mexico. M.A. thesis, Department of Anthropology, University of Texas at Austin.

Nance, C. R.

1971 The Archaeology of La Calsada: A Stratified Rock Shelter Site, Sierra Madre Oriental, Nuevo Leon, Mexico. Ph.D. dissertation, Department of Anthropology, University of Texas at Austin.

1972 Cultural Evidence for the Altithermal in Texas and Mexico. *Southwestern Journal of Anthropology* 28(2):169-192.

Silva-Barcenas, A.

1969 Localidades de Vertebrados Fosiles en la Republica Mexicana. *Universidad Nacional, Inst. Geol. Paleontol. Mex.* 28.

Suhm, D. A., A. D. Krieger, and E. B. Jelks

1954 An Introductory Handbook of Texas Archeology. *Bulletin of the Texas Archeological Society* 25.

THE EVOLUTION OF BASKETRY MANUFACTURE IN NORTHEASTERN MEXICO, LOWER AND TRANS-PECOS TEXAS

J. M. Adovasio

Introduction

In the present context, the geographical boundaries of northeastern Mexico, lower and trans-Pecos Texas are essentially those set forth by Taylor (1966). Specifically, this vast area includes three major physiographic provinces: the coastal plain of the Gulf of Mexico, the Sierra Madre Oriental and its outliers, and the central Mexican plateau.

As Taylor (*ibid.*) notes, all these provinces extend across the Rio Grande into Texas, subsuming all of the lower and trans-Pecos sections of that state. Except for the specified parts of Texas, the area under discussion lies roughly south of the Rio Conchos in Chihuahua, north of the city of San Luis Potosi, and between the Gulf of Mexico and the eastern skirts of the Sierra Madre Oriental. The majority of this area lies in the modern states of Coahuila, Nuevo Leon, and Tamaulipas. Also included is a section of Chihuahua.

Basketry herein encompasses several distinct kinds of items, including rigid and semi-rigid containers or baskets proper, matting, and bags.

Matting includes items which are essentially two dimensional or flat, while baskets are three dimensional. Bags may be viewed as intermediate forms because they are two dimensional when empty and three dimensional when filled. As Driver (1961:159) points out, these artifacts can be treated as a unit because the overall technique of manufacture is the same in all instances. Specifically, all forms of basketry are manually woven without any frame or loom. Since all basketry is woven, it is technically a class or variety of textiles, although that term is sometimes restricted to cloth fabrics.

There are three major kinds or subclasses of basketry, which are generally mutually exclusive: twining, coiling, and plaiting.

Twining denotes a subclass of basket weaves manufactured by passing moving (active) horizontal elements, called wefts, around stationary (passive) vertical elements called warps. Twining techniques may be employed to produce containers, mats, and bags, as well as fish traps, cradles, hats, clothing, and other "atypical" basketry forms.

Coiling denotes a subclass of basket weaves manufactured by sewing stationary, horizontal elements (the foundation) with moving vertical elements (stitches). Coiling techniques are used almost exclusively in the production of containers, hats, and very rarely, bags. Mats and other forms are seldom, if ever, produced by coiling.

Plaiting denotes a subclass of basket weaves in which all elements pass over and under each other without any engagement. For this reason, plaited basketry is technically described as woven, not sewn. Plaiting may be used to make containers, bags, and mats, as well as a wide range of other non-standard forms.

Within the vast area circumscribed above, a reasonably large quantity of prehistoric basketry remains have been recovered. However, the number of examples differs drastically from region to region This differential recovery is, of course, directly proportional to the amount of archaeological research conducted within these regions, as well as to factors of preservation. Excellent chronological controls exist in some portions of the area under discussion, while in others temporal placement of basketry remains is tenuous at best.

From 1970 to 1975, this writer analyzed and systematically classified virtually all of the basketry materials recovered to date from the study area, using standardized procedures and descriptive terminology following Adovasio (1974, 1977). (For those unfamiliar with this terminology, a glossary is appended to this report.) The final reports on this research (Adovasio n.d.a; Adovasio, Andrews and Carlisle n.d.) are currently in press, and it is from these works that the following comments and observations are abstracted.

The Basketry Industry of Northeastern Mexico

While this region includes, as noted above, portions of Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas, only two of these districts have yielded prehistoric basketry in significant amounts and under good chronological controls. These are Coahuila and Tamaulipas.

COAHUILA

The basketry sequence from Coahuila is perhaps the longest and most complete of any area outside the Great Basin of the United States; its evolution may, with caution, be viewed as generally reflective of developments in the arid deserts of northeastern Mexico. The sequence presented below is based principally on materials recovered by W. W. Taylor (1948,1966) from a series of rocksheters and caves in the Cuatro Ciénegas Basin of north-central Coahuila. Fortunately, a large number of radiocarbon dates are available on the basketry from these sites and on directly associated materials. While a detailed account of the prehistoric basketry of Coahuila (Adovasio n.d.b) is currently in press, the following abbreviated summary indicates basic developments in that area.

Stage I: 7500-4000 B.C. Twining, plaiting, and coiling are represented, although coiling is very rare and is restricted to single rod types. The frequency of twining suggests that this subclass precedes coiling in this area. The earliest coiling type present is whole rod with an intentionally split stitch on the non-work surface. This is soon followed by the appearance of other whole and half rod variations. Rims are of the self type,

and work direction tends to be right to left. Twining includes both simple and diagonal varieties, with the former predominant, while simple plaiting is outnumbered by twill plaiting. Significantly, *all* of the early coiling is in the form of parching trays.

Stage II: 4000-2000 B.C. Nine varieties of coiling are produced, including six single rod variants and three bundle foundation types. Bundle foundation coiling appears at the beginning of this stage in small amounts and does *not* appear to be a local invention. Throughout this and the following stage, single rod types are considerably more popular than bundle foundation varieties. Self rims persist, while both work directions are present. Twining diminishes considerably in popularity, although it continues to be present in the form of bags and mats. Twill plaiting continues to predominate over simple plaiting. At the end of this stage, whole rod coiling varieties abruptly disappear, and only half rod types remain, along with bundle foundations. In this, as in all stages, split stiches, either on the non-work surface or both sides, predominate.

Stage III: 2000 B.C.-A.D. 500. Twining regains favor, at least in comparison to the preceding period, while the amounts of twill and simple plaiting are now equal. A notable proliferation in types and forms occurs in this stage. Coiling, which is extremely common, is of 12 different types, including five bundle varieties and seven single rod types. False braid rims appear, although self types are still more common. Work direction tends to be left to right, although the reverse technique is not uncommon. Simple geometric decorations appear on the coiled pieces toward the end of this stage. Bundle foundation coiling begins to outnumber single rod types in various parts of this region.

Stage IV: A.D. 500-Contact. Elaborate twilled and simple plaited mats are common, as are decorated coiled baskets with either a bundle or single rod foundation. False braid rims are relatively common in some areas, while work direction again includes examples of both right to left and left to right. Twining is present but scarce. In some areas only bundle foundation coiling is being produced, while in others single rod types continue to be made.

TAMAULIPAS

The basketry sequence from Tamaulipas is considerably less precise than that from Coahuila. It is based on rather less material (most very fragmentary) and considerably fewer dates. Again, twined, plaited, and coiled materials are known, although the great variety of coiled types represented in Coahuila would appear to be lacking in this region.

It is not possible, at present, to summarize basketry developments in Tamaulipas in terms of stages, but the following observations can be made.

Twining in the form of rigid baskets, soft bags, and matting is present in the Sierra Madre of Tamaulipas by 7000 B.C. Also present are plaited mats, both simple and twilled. By 5000 B.C., if not earlier, coiled basketry appears in the Sierra de Tamaulipas, constructed on a one rod foundation. Coiling is very shortly thereafter reported in other areas of Tamaulipas and includes both bundle and single rod varieties. From 4000 B.C. to late pre-contact times, twilled matting remains highly developed and includes many elaborate decorated varieties. Likewise, coiling is present and includes decorated forms, while twining is a very minor component of the basketry assemblage.

Despite the paucity of data, it is nonetheless obvious that the evolution of basketry in Tamaulipas more clearly parallels developments in north-eastern Mexico than it does developments to the south (see Adovasio 1974, n.d.b).

The Basketry Industry of Lower and Trans-Pecos Texas

The arid reaches of southwestern or lower and trans-Pecos Texas have yielded literally thousands of basketry fragments spanning almost 9,000 years of occupation. These include twined, coiled, and plaited materials which are in most respects similar to materials from northern and north-central Coahuila (see Adovasio, Andrews and Carlisle n.d). While the basketry sequences of the lower and trans-Pecos regions are not exact duplicates of one another, for the purposes of this paper they are treated as a unitary development. A summary of developments in this region is presented below.

Stage I: 7500-4000 B.C. Twining, coiling, and plaiting are represented, but all are relatively scarce. Twining is the earliest technique represented, while coiling appears sometime between 7000 and 6000 B.C. The first occurrence of plaiting is difficult to establish with precision. The earliest coiling is of the single rod type, with stitches split on the non-work surface. Again, *all* early coiled specimens are portions of parching trays. Rims are invariably self rims, and work direction includes examples of both right to left and left to right. By the middle to the end of this stage, bundle foundation coiling with predominantly split stitches on the non-work surface or both sides is established in this area. This bundle foundation ware does not appear to be of local origin. By 4000 B.C., there appear to be quite well-defined subregional specializations in coiling, with single rod types dominant in certain drainages and bundle types in others. Twining remains relatively minor throughout this period.

Stage II: 4000-1000 B.C. Plaiting in the form of mats becomes extremely common, as does bundle foundation coiling, although single rod types are still produced, notably in the Big Bend area. Split stitches continue to predominate in most parts of southwestern Texas, although interlocking types are also known. Work direction is now primarily left to right. The plaited mats, both simple and twilled, are very elaborate by the end of this period. Twined items continue to be produced in minor quantities.

Toward the latter centuries of this stage, a proliferation in types and vessel forms is apparent over most of this area.

Stage III: 1000 B.C.-A.D. 1000. Bundle foundation coiling is the dominant coiling variety, while single rod types are exceedingly rare. False braid rims occur sporadically, and left to right work direction is the norm. Plaiting, especially of the twilled variety, is very plentiful and is occasionally decorated with painted geometric designs. Some Mogollon items appear in the El Paso district of trans-Pecos Texas during the latter centuries of this period, including the highly diagnostic two rod and bundle bunched foundation coiled wares. Twining continues as a minor component of the basketry industry.

Stage IV: A.D. 1000-Contact. Plaiting continues, but the elaborate forms noted in the last stage diminish in frequency, then disappear entirely before contact. Coiling is exclusively bundle foundation in most areas, although Puebloid influences are still notable along the New Mexico boundary until ca. A.D. 1350. Twining persists but is scarce.

Summary and Conclusions

The data presented above indicate that the evolution of basketry manufacture in lower and trans-Pecos Texas parallels, with a certain "time lag," developments in adjacent northeastern Mexico. Both areas have the same mid-eighth millennium B.C. basal industry of twining, supplemented rapidly by single rod coiling and plaiting. Significantly, the early coiling in both areas is in the form of parching trays, a functional necessity in subsistence regimes predicated around small seed processing (see Adovasio 1970; 1974; 1980; n.d.a; n.d.c).

Throughout the remaining developmental sequence in both areas, the same basic trends are apparent. These specifically include: the introduction (i.e., from central Mexico) and gradual ascendancy of bundle foundation coiling at the expense of single rod types; the progressive elaboration of simple and twill plaiting; the standardization of basic construction and finishing techniques, as well as the proliferation of types and forms during the second and third millennia B.C. Similarly, twining is notably depauperate in the later history of both basketry industries.

While space prohibits a detailed discussion of such highly diagnostic attributes as coiled and twined splices, centers, methods of foundation preparation, mending patterns, and specific decorative mechanics, these elements are also consistently shared in the areas under discussion.

Despite the "time lag" in the case of certain changes in the basketry complexes north of the Rio Grande, the degree of affinity between the basketry industries of lower and trans-Pecos Texas and northeastern Mexico is so great as to suggest that the former are in fact *directly* derived out of, or rather *are* an integral part of, the latter.

In short, the results of the comparative basketry analyses presented above support the proposition of Taylor (1966) and others that the "northward extension (i.e., into lower and trans-Pecos Texas) of topographical forms and biological resources primarily Mexican in relationships and character" is replicated in cultural matters as well.

While it is assumed that future research may require partial revision of the developmental sequences presented above, notably in terms of chronology, it is unlikely that same will necessitate any basic modification of the "genetic" relationships posited here.

Glossary

The following glossary is not complete and is not intended as a guide to basketry analysis. Its sole purpose is to acquaint the reader with terms used in this paper. Portions of this glossary are adapted from Mason (1904), Morris and Burgh (1941), Cressman *et al.* (1942), and Adovasio (1974).

BUNCHED FOUNDATION. A coiling foundation composed of two or more elements placed side by side or in triangular arrangement so that the basket wall has a double thickness of elements in each coil. Synonym: multiple foundation.

BUNDLE. A flexible foundation element of plant material used alone or in combination with rods in coiled basketry. It may consist of loose fibers, a mass of stems or twigs, a single shredded leaf or, rarely, cordage. The function of the bundle is to engage the stitches by which one coil is fastened to another, as well as to provide a framework for the coil itself. Synonyms: grass foundation, fiber foundation, multiple reed foundation. See: stacked foundation, bunched foundation, rod.

CENTER. The point at which the production of a coiled or twined basket or bag is initiated. Mats possess no center. There are several types of coiled centers, including the so-called normal or continuous coil type, the oval or flattened continuous coil type, the plaited center, and the overhand knot center. Similarly, there are many types of twined centers based on the initial arrangement of the warps (see Mason 1904; Cressman *et al.* 1942; Adovasio 1977). Synonym: start.

CLOSE COILING. A variety of coiled basketry in which successive circuits of the coil are bound closely together by the stitches. The stitches in this variety of coiling may be interlocking, non-interlocking, or intentionally split on the non-work surface, the work surface, or on both surfaces. See: non-interlocking stitch, interlocking stitch, split stitch, work surface, non-work surface.

CLOSE TWINING. A form of twined basketry in which the weft rows are so tightly spaced as to conceal the warp. Both simple and diagonal twining may employ this weft pattern, although it is more commonly used with simple twining for aesthetic effect. See: open twining, simple twining, diagonal twining.

COIL. The structural unit of coiled basketry. It consists of a foundation enclosed by a sheath formed by successive stitches. See: stitch.

DIAGONAL TWINING. A common variety of twined basketry in which paired warps are alternately engaged at each weft crossing. Each successive weft row engages alternate warps of each pair, producing a diagonal effect on the surface of the finished item. The stitch slant may be down to the left (S) or down to the right (Z), and the weft rows may be closely spaced or spaced at intervals. Synonym: twill twining. See: stitch slant, open twining, close twining.

FALSE BRAID. An ornamental finish on the rim of a coiled basket. False braid is produced by manipulating a single stitch in various figure eight patterns to produce a herringbone design. See: self rim.

INTERLOCKING STITCH. A type of stitch in coiled basketry which passes diagonally through the top of the stitch immediately below. In so doing, it may pierce the foundation element or simply encircle it. See: stitch, non-interlocking stitch, split stitch.

INTRICATE STITCH. A type of stitch used only in open coiling. It is produced by a manipulation of the sewing element so that it engages adjacent foundation units one or more times and is wrapped in a false knot around its standing portion to accomplish the spacing of the coils. See: open coiling.

NON-INTERLOCKING STITCH. A type of stitch in coiled basketry which engages the foundation of the coil below without passing through another stitch. In so doing, it may pierce the foundation or simply encircle it.

NON-WORK SURFACE. The surface of a coiled basket upon which the sewing awl emerges. Synonyms: back, left side, reverse surface. See: work surface.

OPEN COILING. A variety of coiled basketry in which the coils are not bound closely together but rather are separated by the use of an intricate stitch. At the middle of each intricate stitch is a false knot of varying complexity. The intricate stitch may be used alone or in combination with wrapping stitches, and the resultant fabric is open in texture with gaps exposed along the coil. Synonyms: spaced coiling, sifter coiling, Fuegian coiling. See: intricate stitch.

OPEN TWINING. A form of twined basketry in which the weft rows are spaced at intervals and regularly expose the warp. Both simple and diagonal twining may employ this weft pattern. See: diagonal twining, simple twining.

ROD. A rigid or semi-rigid foundation element used alone or in combination with other rods, bundles, or welts. It may consist of a stick, twig, or reed, whether complete (whole) or split lengthwise (halved), with or without bark or cortex. See: bundle, bunched foundation, stacked foundation.

SELF RIM. The rim of a coiled basket sewn in the same technique as the rest of the basket. See: false braid.

SELVAGE. The edge finish of a twined or plaited mat or bag, or the rim of a twined or plaited container.

SIMPLE PLAITING. A variety of plaited basketry in which the weaving elements pass over each other in single intervals (1/1). Synonyms: checker weaving, plain weaving. See: twill plaiting.

SIMPLE TWINING. A common variety of twined basketry in which "single" warps are engaged between each weft crossing. Each succeeding weft row engages the same warps at the same interval. In this type of twining, warps may actually number more than one, but whatever their number they function as a single unit. The stitch slant may be down to the left (S) or down to the right (Z) and the weft rows may be closely spaced or spaced at intervals. Synonym: plain twining. See: stitch slant, open twining, close twining.

SPLICE. A point along a coil where one stitch ends and a new one is introduced. It is marked by the presence of the fag end on the work surface and the moving end on the non-work surface. In twined basketry, splice refers to the method of insertion of new warp and weft elements during the construction process.

SPLIT STITCH. A type of stitch in coiled basketry which is bifurcated to receive a stitch from the coil immediately above it. Stitches may be regularly, that is, intentionally, split on the work, non-work, and both surfaces. Accidental, that is non-intentional, splitting may also occur on one or both surfaces due to carelessness. Synonym: bifurcated stitch. See: stitch, non-interlocking stitch, interlocking stitch.

STACKED FOUNDATION. A coiling foundation in which elements are arranged one above the other like logs in a cabin wall. Synonym: vertical foundation.

STITCH. The element that is sewn over the foundation in coiled baskets. It may be a strip of wood, bark, leaf, or plant fiber. Synonym: splint. See: interlocking stitch, split stitch, non-interlocking stitch.

STITCH SLANT. A term used to denote the pitch or lean of the wefts in twined basketry. The stitch slant may be down to the left or down to the right. When the stitch slant is down to the left it is commonly called S, since the paired wefts have in fact been S-twisted when viewed in a vertical position. Conversely, the down to the right slant is called Z for the same reason. Occasionally stitch slant is altered in the same specimen for decorative effect. See: diagonal twining, simple twining.

TWILL PLAITING. A variety of plaited basketry in which the weaving elements pass over each other in intervals of two or more (2/3, 2/2, etc.). Synonyms: twilling, chevron weave, herringbone weave, diagonal plaiting, twilled twos. See: simple plaiting.

WEFT. The moving horizontal element in twined basketry which engages the warps. Wefts are usually paired, although trebled and even quadrupled wefts are not unknown.

WELT. A foundation element in coiled basketry used in conjunction with one or more rods. A welt is a small flattened stick, twig, or strip of fiber which is stacked vertically on a single rod or employed as the apex element in a bunched foundation. Synonym: splint. See: rod, bunched foundation, stacked foundation.

WORK DIRECTION. The direction in which a stitch is sewn along the foundation of a coiled basket.

WORK SURFACE. The surface of a coiled basket on which the sewing awl is inserted to make a path for the stitch. Synonyms: front, right side. See: non-work surface.

REFERENCES CITED

Adovasio, J. M.

1970 The Origin, Development and Distribution of Western Archaic Textiles. *Tebiwa* 13(2):1-40.

1974 Prehistoric North American Basketry. *Nevada State Museum Anthropological and Ethnological Papers* 16:100-148.

1977 *Basketry Technology.* Aldine, Chicago.

1980 Prehistoric Basketry of Western North America and Mexico. In D. L. Browman, ed., *Early Native Americans: Prehistoric Demography, Economy and Technology*:341-362. Mouton, The Hague.

n.d.a. Prehistoric Great Basin Textiles. In W. d'Azevedo, ed., *Handbook of North American Indians* 10, Great Basin. Smithsonian Institution, Washington, D.C. (in press).

n.d.b. Coahuila Coiled Basketry. In R. C. Carlisle and J. M. Adovasio, eds., Contributions to Coahuila Prehistory. *Ethnology Monographs* (in press).

n.d.c. Basketry. In W. C. Sturtevant, ed., *Handbook of North American Indians* 16, Technology and Visual Arts. Smithsonian Institution, Washington, D.C. (in press).

Adovasio, J. M., R. L. Andrews and R. C. Carlisle

n.d. Basketry of the Lower and Trans-Pecos Regions of Texas. *Ethnology Monographs* (in preparation).

Cressman, L. D. *et al.*

1942 Archaeological Researches in the Northern Great Basin. *Carnegie Institution of Washington Publication* 538:1-158.

Driver, H. E.

1961 *Indians of North America.* University of Chicago Press, Chicago.

Mason, O. T.

1904 Aboriginal American Basketry: Studies in a Textile Art Without Machinery. *Report of the U.S. National Museum 1902*:171-548.

Morris, E. H. and R. F. Burgh

1941 Anasazi Basketry: Basket Maker II Through Pueblo III. *Carnegie Institution of Washington Publication* 533:1-66.

Taylor, W. W.

1948 A Study of Archaeology. *Memoirs of the American Anthropological Association* 69.

1966 Archaic Cultures Adjacent to the Northeastern Frontiers of Meso America. In G. Willey and G. Eckholm, eds., *Handbook of Middle American Indians* 4, Archaeological Frontiers and External Connections. University of Texas Press, Austin.

ALGUNAS SUGERENCIAS MESOAMERICANAS PARA LA ARQUEOLOGÍA DEL NORESTE DE MEXICO

B. Braniff

Es de elemental estrategia en esto de presentar ideas a un público, el no iniciar el Tema con apologías, pues inmediatamente el interés decae y la argumentación se debilita.

Sin embargo debo de ser honesta e informar desde un principio que el trabajo que ahora presento no puede considerarse verdaderamente como una contribución al conocimiento del Noreste de México, ya que mis estudios nunca han sido especialmente enfocados a esta región de México. Por el contrario, trato en adelante, de una serie de dudas y cavilaciones que han surgido al estudiar las zonas áridas del Norte de Mexico, enfocadas desde el punto de vista mesoamericano, con la idea de hacer una autocrítica que nos permita quizás encontrar un camino más fructífero que el que yo he recorrido. En concreto, deseo presentar una descripción de una serie de problemas que van desde aquellos que son relativamente objetivos y sencillos, hasta problemas de índole que casi podrían considerarse filosoficos. Al final presento una pequeña relación de posibilidades que servirán quizas para poder salir de este impasse en el que me encuentro, y en el cual quiero también comprometer a ustedes.

Hace muchos años, cuando yo era estudiante de antropología en la lejana Mesoamérica, mis maestros me enseñaron y yo aprendí sencillas fórmulas de evolución social y cultural: en las profundidades de la prehistoria el hombre cazaba y se especializaba en el uso de hacer artefactos de piedra. Luego se murieron sus animales de caza preferidos y tuvo el hombre que dedicarse a la recolección inventando el metate para moler sus granos. A través del tiempo descubrió la agricultura y con ello no tuvo más la necesidad de caminar y pudo hacer su casa y crear la cerámica.

Luego inventó otros sistemas de control de la naturaleza con lo cual se hizo más rico y aparecieron los grandes señores, lujos y adelantos entre ellos la guerra y el imperialismo, la religión y sus grandes pirámides, dioses y sacrificios. Finalmente llegaron los españoles y como desde 1525 quedó todo bien organizado, descrito y conocido historicamente, el interés de nosotros los arqueólogos terminaba en ese momento.

Ante ese panorama claro y definido y por supuesto muy de acuerdo con la personalidad y seducción del maestro respectivo, uno se convertía en "prehistoriador" experto en lítica; o se volvía estilista de las grandes producciones artísticas o intelectuales; se podía uno convertir en experto en cerámica, determinando con gran prestancia desgrasante, época y relaciones. También podía uno unirse al estudio de los grandes imperios; y todo interés terminaba con el Arbol de la Noche Triste.

Desaparecida Mesoamérica en el siglo XVI, entran en escena todo un grupo de extraños especialistas, maestros y estudiantes muy ajenos a los arqueólogos que se dedican a la descripción de los indios, y tambien aparecen los modernos e

izquierdistas chicos del cambio social; también hay estudiantes semiporfirianos dedicados a la Colonia, expertos en el barroco y el Churriguera. Ninguno de estos era de especial interés a nuestra ciencia y por supuesto nuestro campo tampoco tenía el más mínimo interés a estas personas tan alejadas de la verdadera y científica forma de conocimiento histórico, que es la arqueología.

Así, en aquellas épocas, definimos dominios y señorios, y la cosa corría bastante bien, solo conmovida por alguna que otra idea extravagante o alguna nueva fecha de C14 que hacia resquebrajarse un poquito nuestros esquemas de referencia.

Debo aclarar que estos señorios y guias espirituales siguen sobreviviendo a la fecha.

Kirchhoff definió en 1943 y en forma muy clara, hasta donde se extendía la gran cultura mesoamericana en el siglo XVI y tuvo la desgracia (como él mismo lo confiesa) de demarcar esa frontera con una línea gruesa y contundente. Abajo de esa línea se distribuyen los señoríos antes descritos.

Por ciertas circunstancias que a la fecha no sé si fueron afortunadas o desgraciadas, se me ocurrio traspasar aquella nítida línea y penetrar en tierras de los bárbaros del norte.

Al principio no fué muy difícil entender la situación pues estaba yo en el Noreste, en tierras de la antitésis mesoamericana; ni pirámides, no cerámica, ni problemas estilísticos; y como no quedaban indios, pues el problems se soslayaba, Las obras de la Colonia eran, como en Mesoamérica, algo que no presentaba ninguna relación al conocimiento arqueologico. Habían problemas claro está, pero entendiendo a Suhm, Krieger y Jelks, la cosa estaba controlada.

He de confesar que me impresionó bastante la falta de precisión de los estudios sobre la arqueología del Norte de México y Sur de los Estados Unidos, pues ellos se referían a fases de 1000 a 4000 años; cosa muy distinta a nuestros problemas mesoamericanos que son del órden de 52, 104 y 208 años a lo máximo.

Sin embargo al leer a los Dres. Taylor y Jennings en sus descripciones sobre la Cultura del Desierto se explicaba uno claramente esta lentitud de cambio. También leí a MacNeish y me quedaron dudas molestas: Cómo era que en Tamaulipas encontraba puntas Teotihuacanas, si nunca había sido estudiada la lítica de Teotihuacán?

De todas formas, el desierto, los libros y la lítica eran demasiado áridos para mí y decidí regresar a Mesoamérica, pero no a su núcleo puesto que allí los señoríos estaban bien establecidos y había grandes y peligrosos rivales. Escogí regresar a las porciones intermedias; a aquellas zonas que alguna vez fueron Mesoamericanas y que durante la Conquista eran tierras de Chichimecas.

Mi primer gran probleme fué tratar de comprobar que realmente estas áreas habían sido mesoamericanas: Cómo hacerlo si ni hay pirámides, ni menos jade, ni columnas serpetinas, no códices...ni chinampas?

Así tuve que tratar de entender en otra forma el concepto de Mesoamérica, lo cual a su vez me llevó a dudar del concepto de Formativo, Clásico y Post Clásico, que de ninguna manera se pueden aplicar así como así en estas zonas marginales.

Como no tenía yo ni juego de pelota, ni dioses, ni plazas, tuve en pleno Clásico, que dedicarme al estudio de la cerámica doméstica y para la peor de mis desgracias, tambien tuve que estudiar lítica. Más como mis compañeros mesoamericanos habían dejado de estudiar la lítica desde el fin del Pleistoceno; y la cerámica doméstica no ha sido tocada desde que apareció la primera pirámide; me encontré totalmente aislada, tratando a fuezas de salvar la situación apoyándome en trabajos come el de Tehuacán. Tambien para mis desgracias me encontré que allí y desde el Preclásico ya no se puede hacer distinción alguna en cuestión de lítica en vista de que todas las técnicas, artefactos y formas habían sido heredadas e integrados a los complejos agrícolas (cosa que dudo mucho que asi sea, pues deben de existir diferencias sutiles que marquen tradiciones antiguas y recientes).

Tambien intenté apoyarme en los estudios especializados en lítica de las zonas norteñas, especialmente en las secuencias elaboradas para Arizona y Texas, encontrándome que los especialistas en cada una de estas áreas constituyen también castillos feudales, donde la impresión se recalca al leer a diferentes autores.

Mientras tanto ya se ha desplomado el concepto de "Cultura del Desierto" y me siento más que nunca huerfana de padre y madre.

Para completar el cuadro de la confunsión descubrí que a veces en estas porciones norteñas ciertos desarrollos pueden presentarse antes que en el centro de México situación totalmenta opuesta a la versión que el Centro de México tiene de sí mismo el cual se siente como el Sol de Galileo, núcleo de irradación de la luz y calor cultural. La cronología en el Norte es por consiguiente bastante insegura, y las cosas pueden suceder antes o después de.

Y para completar el resquebrajamiento de todos los cánones establecidos con tanto esfuerzo y tiempo, me encuentro con que en el Norte hay Prehistoria, no solo del Pleistoceno sino del siglo pasado; que hay culturas arqueológicas hispano-coloniales; y que existen un sin fin de otros anacronismos y componendas culturales que exigen de mí un enfoque totalmente diferente al que se maneja en Mesoamérica. Para yo entender lo que es el Norte se requiere que yo sea especialista en lítica, en cerámica, en patrones de asentamiento; que maneje igualmente el saber histórico, que conozca de la Colonia y de la etnografía--en resumidas cuentas que sea yo muy culta.

Como esto no puede ser posible, la alternativa que resta, es que los especialistas de cada ramo salgan de su castillo fuedal, autocritiquen su postura intelectual y participemos en equipos multidisciplinarios para visualizar estas porciones nortenas tan interesantes y tan difíciles. En otras palabras, es necesario que el especialista en lítica prehistórica revise la lítica de los contextos agrícolas y civilizados; es necesario que el arqueólogo del Clásico y Postclásico reconozca la importancia de sus hallazgos menos espectaculares; que el prehistoriador texano vea lo que pasa en el desierto del poniente y que aprenda español. Es necesario que los antropólogos e historiadores mesoamericanos reconozcamos que nuestros esquemas son bastante incompletos e incultos, y que la historia de México no puede entenderse sólo en base a las grandes luminarias culturales; el arqueólogo debe de extender sus conocimientos a la realidad etnográfica y moderna así como etnólogos historiadores y colonealests deben de conocer la raiz arqueologica basica de su conocimiento, respetando las posibilidades y limitaciones de cada especiacilidad.

Como un mero principio de lo que ahora indíco, he comenzado a jugar en forma todavía muy subjetiva con algunos enfoques para tratar de comprender mejor lo que pasa en Sonora, que es la zona donde ahora trabajo. Es sólo un principio, pero quisiera presentarlo ahora gráficamente pues creo que un sistema parecido podría ser mucho mas valioso no solo para comprender el norte de México y Sur de los Estados Unidos que en muchas formas han estado ligadads desde epocas prehistóricas.

FUNCTIONAL INTERPRETATIONS OF THE LOWER PECOS ARCHAIC ART

Harry J. Shafer

Introduction

I am using the art forms in the lower Pecos area of Texas and the adjacent portion of Mexico in this paper as a means to explore the function of art in hunting-gathering cultures. I have selected this area for study because, among other reasons, I have observed all forms of the art--pictographs, petroglyphs, painted pebbles, and clay figurines--and have more than a cursory knowledge of the archaeological context. The objective of this paper, then, is to explore the functional aspects of the art forms that occur in the Lower Pecos Archaic.

Before I present a resume of the Lower Pecos Archaic, several basic premises and assumptions must be stated. First, I am using the term "function" in the Malinowskian sense by assuming that every customary pattern of behavior, every patterned belief and attitude that is observable in a particular culture, serves some basic function within that culture.

Second, art is considered as an indirect form of communication of the culture which produced it (Service 1966:77).

Third, cultural values and world view reach expression in art (Levine 1957:951). Included in this assumption is the notion that the artist projects the values and symbols in his art which evoke emotional and aesthetic responses from other members of that society (cf. Stout 1971; Fischer 1971).

Fourth, in primitive art, maintaining traditional forms and techniques is considered more important than creativity (Service 1966:77). Supporting this assumption is the observation that the Lower Pecos Archaic art is geographically restricted in style and was long-lasting.

Lower Pecos Archaic

Beginning approximately 7000 B.C., populations having extractive technologies settled in the deeply entrenched canyons where the Pecos and Devil's Rivers enter the Rio Grande (Fig. 1). These populations established a persistent cultural adaptation to a semi-arid to arid environment that may have lasted virtually into historic times. The bow and arrow appear in the hunting technology about A.D. 800 to 1000 and may have marked an end to the conservative Archaic lifeway. Since there appear to have been other cultural changes taking place about this time (such as changes in pictographic style, possible increase in the use of upland resources, among others), I will use the introduction of the bow and arrow as a terminal date for the Lower Pecos Archaic.

I am assuming that the Lower Pecos Archaic was once a viable cultural system. I feel that, in order to analyze it as a cultural system, it must be isolated in time and space. Once this is done, then the interrelationship of the components within the context of the cultural system can be investigated.

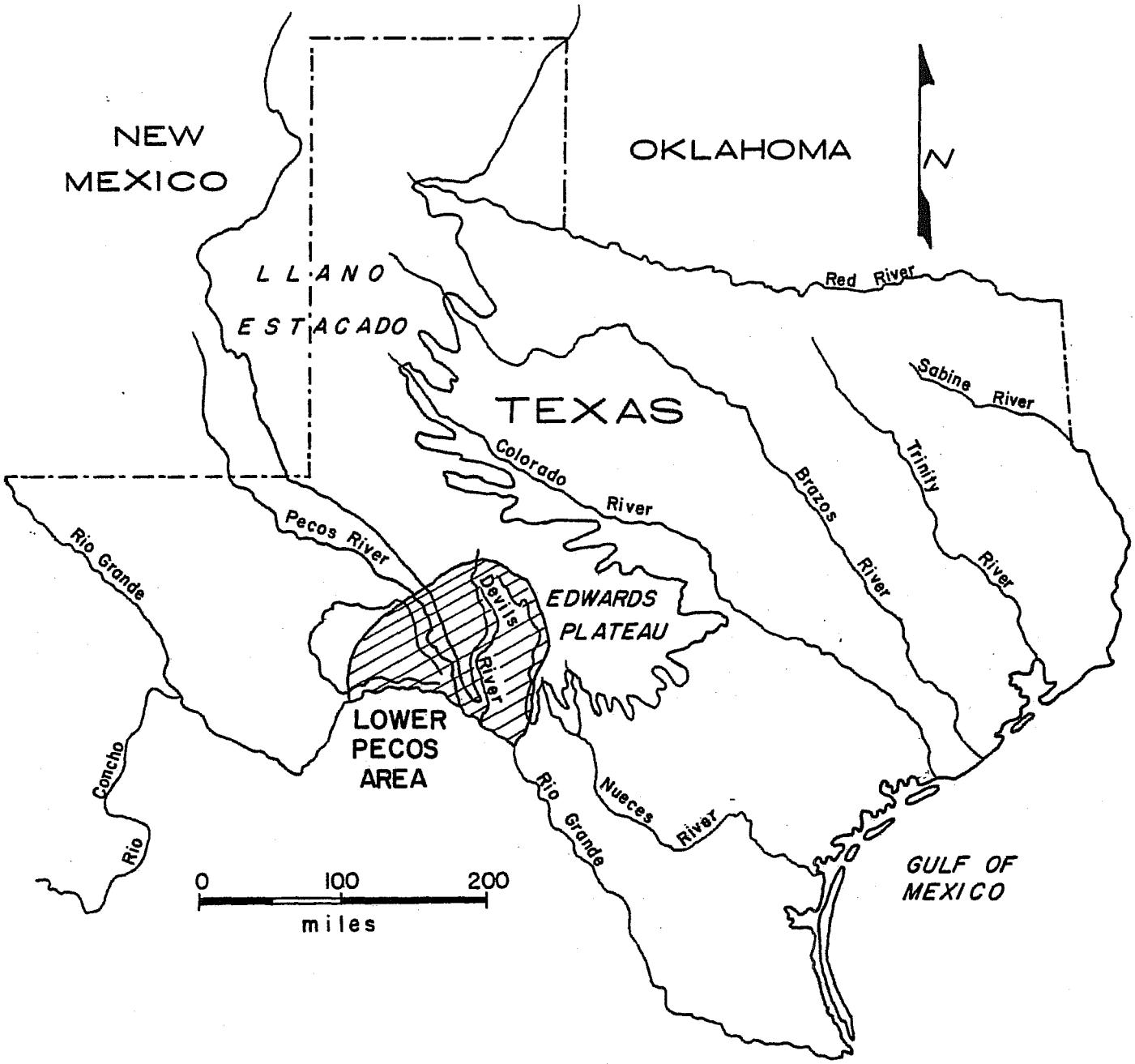


Figure 1. *Map Showing Location of the Lower Pecos Area.*

The temporal span of the Archaic continuum in the lower Pecos area has already been mentioned and is based on a securely dated chronology. This chronology emphasizes changes in projectile point styles, but is not altogether restricted to this kind of change. Other subtle chronological changes have been noted regarding minor shifts in certain aspects of the lithic technology (Epstein 1963; Collins 1974) and subsistence (Alexander 1970;1974). Despite these apparently minor changes, one is indeed impressed with the persistent adaptation over several thousand years. We are challenged to explain the uniformity rather than the fluctuations in the adaptation. That is certainly one of the major areas of concern in our research.

Lower Pecos Archaic Art

The lower Pecos region is one of the wealthiest in North America in terms of preserved art of the Archaic period. Most common and characteristic are the pictographic murals in the cave and rockshelter galleries (Jackson 1938; Kirkland 1938,1939; Gebhard 1960; Grieder 1966; Kirkland and Newcomb 1967:37-110; Shafer 1977).

The most frequent pictographic style has been termed by Newcomb (in Kirkland and Newcomb 1967:37) as the Pecos River style. Although Newcomb also describes a later Red Monochrome style, I will limit my discussion to the Pecos River style, since it is demonstrably pre-bow and arrow and therefore falls in the temporal range of the lower Pecos Archaic as I am using the term.

The most outstanding motif of the Pecos River style pictograph is that of costumed anthropomorphic figures (Kirkland and Newcomb 1967:43). Newcomb (*ibid.*:Fig. 1) suggests that there is an evolution in this motif. Using superposition, stylistic comparison, and association with other motifs, he defines four periods within the Pecos River style.

One question always asked about the Pecos style is: how far back in time does it range? Newcomb (in Kirkland and Newcomb 1967:41) addresses this question, but fails to arrive at a satisfactory estimate. Grieder (1966), in his interpretation, hints that the Pecos River style (which he calls Pecos style) is older than 4500 B.C. Kelley (1974) guesses that it dates between 500 B.C. and A.D. 600. Kirkland (in Kirkland and Newcomb 1967:41) notes in a shelter in Mile Canyon that approximately four feet of midden fill had accumulated since the painting of Period 1 pictographs. Although the shelter has since been virtually destroyed, the relative antiquity of the paintings is clear. Another site reported to me in the Devil's River area has an undisturbed cultural deposit obliterating portions of Pecos style pictographs (Hayden Whitsett, personal communication).

Although I think Grieder's estimate is too old, the Pecos style pictographs *could* date back to about 4000 B.C., when there is apparently a widespread and intensive use of the lower Pecos area.

Previous Interpretations

A discussion of various interpretations regarding the purpose and function of the Pecos River style pictograph has been presented by Newcomb (in Kirkland and Newcomb 1967:65-80). Therefore, a lengthy discussion need not be presented here. In brief, these interpretations include, among others:

1. god-of-the-chase surrounded by animals pierced with arrows (Kirkland 1938:24);

2. depictions of ordinary men masked and robed as gods or mythical beings (Newcomb, in Kirkland and Newcomb 1967:65);

3. "shamans or perhaps members of medicine or dance societies" (*ibid.*);

4. hunting cult (Kelley 1950,1974; Taylor 1949);

5. the pictographs were part of the activities carried out during rituals of an hypothesized "Mescal Bean Cult" (Campbell 1958; Newcomb, in Kirkland and Newcomb 1967:65-80);

6. "shamans" were merely standard Pecos River style figures representing fishermen and deer hunters (Grieder 1966);

7. the shamans were deities (Kelley 1974).

Newcomb favored shamanistic society hypothesis, whereby the paintings were mechanisms used by shamans to visualize hallucinations or dreams possibly induced by mescal beans. Whatever the interpretations, he feels that their basic function was to influence and gain assistance from supernatural powers.

Interpreting the meaning of primitive art, particularly where the artists were members of an extinct cultural tradition, is virtually a hopeless task. The meaning of the symbols depicted in what we regard as either realistic or abstract forms is lost; we can only hope that there were basic and underlying similarities in art in non-literate cultures and that art served ends common, though not necessarily universal, to all primitive societies. Assuming that common functions or purposes of art existed, I will advance some of my own thoughts regarding the Pecos River style pictographs.

The motifs represent abstractions of things that existed in the artists' world, either real or imagined. Even in imagined things, ghosts, gods, and demons are often characterized as having anthropomorphic or zoomorphic shapes (Muensterberger 1971). The anthropomorphic figures could be either real or imagined, but, like Newcomb, I suspect that they were real. The activities indicated in the Pecos River style are clearly those associated with masculine activities, particularly the acts of hunting and even warfare.

Arahaeologists who have experienced the job of removing and sorting the materials from dry caves of the area are usually impressed with the sheer amount of plant materials utilized by the lower Pecos Archaic populations. Animal and fish

remains, though present, do not seem to represent a major portion of the peoples' diet, although the actual amount is certainly difficult to quantify. I would guess that hunting may have provided 15%, at most, of the caloric intake. Gathering provided the major portion of the foods and probably some of the meat supply as well. On the basis of archaeological findings from the dry caves, I think we can predict that hunting was a high-risk, low-return activity and that gathering was a low-risk, high-return activity (cf. Lee 1968:40). If this were indeed found to be true, then predictably the rituals and beliefs of the Archaic people would tend to emphasize the activities which had a higher risk and over which they had the least control. Hunting magic then would expectedly be emphasized in their mythology and folklore and other means of aesthetic expression.

The apparent depiction of warfare is unexpected (Kirkland and Newcomb 1967: Plate 28, No. 1), given the assumption that the people were grouped in fluid bands whose affinities were determined by kinship. Extensive warfare between groups having extractive technologies would not be expected. That the pictographs actually represent warfare is something we will of course never know. Warfare in primitive societies is carried out for several reasons--revenge, resource competition, and regulating psychological variables (Vayda 1968). Lesser (1968) emphasizes that common patterns of warfare in primitive, stateless societies are forms of armed agression--fighting, homicide, feud--in which involvement is deeply personal. Wars of annihilation between primitive groups do, however, occur when one population encroaches upon the territory of another for the purpose of expansion or migration. Such a condition may have prevailed in the lower Pecos area about 750 B.C., when there was a noticeable climatic reversal to a cooler, more moist condition (Bryant 1969; Bryant and Shafer 1977), and when bison herds extended into the area (Dibble and Lorrain 1967). Dibble has observed the similarity of the projectile point styles and material found in Bone Bed 3 at Bonfire Shelter with certain forms in central Texas. The bison may have brought with them human predators, whose interaction with the indigenous populations may not have been altogether peaceful.

I certainly disagree with J. Charles Kelley's (1974) recent interpretation that the Pecos River style represents an artistic cult developed in response to cultural emanations originating in Mesoamerica. He believed that the lower Pecos area was an "island enclave" of dilute Mesoamerican culture, "developed by Chichimecs far out in the Chichimec sea under influence from the great civilization to the south" (*ibid.*:51,52).

The similarities, if they do exist, between the lower Pecos shaman figures and iconographic motifs in Mesoamerica, may be merely the fortuitious result of different adaptive responses resulting from a common desert culture base. I cannot see how so many separate pictographs could be primitive attempts to copy ceremonial art elsewhere, as Kelley (1974) contends because of the sheer number. My contention is that the Pecos River style art was the visual representations of ideological concepts present in the lower Pecos Archaic cultural system. And, like Newcomb, I believe that its function was to influence and gain assistance from supernatural powers. Call them hunting cults, if you like; but I think the pictographs represent attempts to secure power for the benefit of a group, perhaps lineage bands, and not for a person or a particular family. That the paintings were used only once I think is demonstrated by the extensive overpainting.

Petroglyphs

Petroglyphs do occur in the lower Pecos area--Fate Bell and Lewis Canyon are examples--but the motifs are notably different from those on other forms of rock art. Little is known about this form of art in the area, and I will not expand on it here, but only mention that it exists.

Painted Pebbles

Painted pebbles have been reported from many sites in the area. These are second only to pictographs in frequency and, since preservation is a factor, they may have been the most common art form.

The objects are usually stream-worn limestone pebbles painted with abstract linear designs, but sometimes anthropomorphic symbols can be recognized. The designs are usually in black, but red also occurs. Rarely are stylistic parallels seen between the pictographs and the painted pebbles. Painted pebbles have been studied by Davenport and Chelf (1941), who carried out a stylistic analysis, and Parsons (1965;n.d.), who has presented an interesting stylistic, chronological, and functional study.

Parsons (n.d.) observed that the painted pebbles possess certain basic attributes, which he calls the Core Motif. He observed three basic components in the Core Motif. Six painted pebble styles were described by Parsons on the basis of variations in the three components. He was able to seriate these styles and to construct a tentative painted pebble chronology beginning ca. 6500 B.C. (4110-6810 B.C.) and extending to at least ca. A.D. 1300. One is struck by the marked continuity in the designs through time.

Parsons also observed that several examples have been found which have the lower portions covered by bound leaves or other pieces of fibrous material. He contends that these represent menstrual pads, and hence the design elements that they covered represent female sexual organs. He adds that "painted pebbles were intended to represent either the torso or the head and torso of female human beings" (*ibid.*:39). In terms of function, Parsons goes on to say that if they indeed represent female figures, "then the placing of a 'menstrual pad' upon some specimens would suggest some association with menstrual taboo." He believes too that the painted pebbles were discarded ritually.

The archaeological context of an artifact is most important in any functional study. Painted pebbles are found in midden fill, apparently discarded along with other items considered no longer functional. I am only aware of one instance where painted pebbles were found in what may be considered "ritual context"; this was in Bonfire Shelter (Dibble and Lorrain 1967). The seeming frequent occurrence of these items in middens of small shelters as well as large suggests that they were used by members of the smallest residential group. Although I do not believe there are enough to explain the menstrual cycles of all the women who ever lived in the sites, they are frequent enough to suggest that many family groups used them from time to time. That they have

no observable similarity to the pictographs may hint that different people in the society were painting the pebbles and that they functioned in an entirely different segment of their belief system. One function which may explain their frequency is that they were merely toys used by the children. However, the notion that they were used to restore or preserve health is a plausible one, although I would not limit it to women and their menstrual cycle. Like the pictographs, they may have been used only once and, when the ritual was over, they were discarded. That they occur in sites of all sizes and are evidently not limited to shelter and cave sites (Johnson 1964) may be explained by the hypotheses that they were part of immediate family ritual. Their contemporaneous occurrence with the pictographic art is, I believe, assured. I think it is also quite clear that the pictographs and painted pebbles represent aesthetic expression in two separate ideological components of the cultural system.

Clay Figurines

I recently synthesized the published information on clay figurines from the lower Pecos area (Shafer 1975). Here again, there is a notable similarity in style, despite the variation in the overall sample. A total of 26 figurines was included in the analysis. I understand that a good number of figurines were recovered from Arenosa Shelter by David S. Dibble, but my analysis excluded this sample.

The figurines are all made of untempered clay. The torso is emphasized, and in only two instances were heads even discernible. A bipointed, cigar-like shape predominated; and protrusions or appendages, presumably emphasizing female breasts, were present on several examples. Two of the "female" specimens were decorated with incised lines, and one was decorated with painted lines. Three other figurines bore decorations. One, reported by Greer (personal communication) from the Mexican side, was painted much like painted pebbles; two fragments from Eagle Cave had punctated decorations.

The figurines, like the painted pebbles, were often recovered from stratigraphically datable contexts. Dating on the basis of association, the figurines occur in Middle and Late Archaic deposits dating from about 2000 to 200 B.C.

So far as I am able to determine, all figurine examples, with one exception, came from midden fill. The exception was a cache of four figurines at Hinds Cave (Shafer and Speck 1974).

Functional studies of clay figurines are few (e.g., Morss 1954); and even then, the most common function attributed to them is that they served in increase cults, either for the population itself or for horticultural reproduction. I have argued against this interpretation for the lower Pecos specimens in another paper (Shafer 1975), emphasizing that hunters and gatherers characteristically used various means of culturally instigated forms of demographic control in order to maintain population equilibrium. The need for human increase cults is doubted. Horticulture can be ruled out simply because there was none. As an alternative, I suggested that the figurines were used in curing rituals. Use of figurines in curing rituals is well documented (e.g., Reichel-Dolmatoff

1964; Norman Thomas, personal communication). Among the Cuna and Choco Indians in Colombia, for example, diseases were thought to be caused by malevolent spirits conceived as having anthropomorphic or zoomorphic shapes. Wooden figurines were used by shamans in curing ceremonies and were usually discarded once the ritual was over (Reichel-Dolmatoff 1964). The interpretation that the clay figurines served in curing ceremonies is a plausible one. This does not explain the Hinds Cave cache; but, as Reichel-Dolmatoff notes, the Cuna would sometimes store certain examples for reuse.

I am, of course, suggesting that painted pebbles and clay figurines were used in much the same way. The sheer frequency of painted pebbles compared to clay figurines may by itself suggest different uses for the two kinds of art; or it may suggest that they were used in different rituals if they were used for curing.

This brief resume of the various functional considerations of lower Pecos Archaic art forms underscores the potential that lies in more complete studies of this kind. The art of the lower Pecos Archaic provides a unique opportunity to study not only the role and function of art in cultures having extractive technologies, but also provides a rare opportunity to examine the ideological components of an extinct cultural system--something that is usually assumed to be unapproachable due to the nature of the archaeological record. Furthermore, the long lasting but geographically limited distribution of the Pecos River style pictographs may provide an unusually well-documented territorial map of Archaic culture (Shafer 1977), thereby providing still another excellent opportunity to examine something that is most difficult to discern elsewhere--the workings of a prehistoric cultural system within its own geographic boundaries.

REFERENCES CITED

Alexander, R. K.

1970 Archeological Investigations at Parida Cave, Val Verde County, Texas. *Texas Archeological Salvage Project Papers* 19.

1974 Conejo Shelter, 41 VV 162. Ph.D. Dissertation, The University of Texas at Austin.

Bryant, V. M., Jr.

1969 Late Full-Glacial and Postglacial Pollen Analysis of Texas Sediments. Ph.D. Dissertation, The University of Texas at Austin.

Bryant, V. M. and H. J. Shafer

1977 The Late Quaternary Paleoenvironment of Texas: A Model for the Archaeologist. *Bulletin of the Texas Archeological Society* 48: 1-25.

Campbell, T. N.

1958 Origin of the Mescal Bean Cult. *American Anthropologist* 60:156-160.

Collins, M. B.

1974 A Functional Analysis of Lithic Technology Among Prehistoric Hunter-Gatherers of Southwestern France and Western Texas. Ph.D. Dissertation, University of Arizona.

Davenport, J. and C. Chelf

1941 Painted Pebbles from the Lower Pecos and Big Bend Regions of Texas. *Witte Memorial Museum, Bulletin* 5.

Dibble, D. S. and D. Lorrain

1967 Bonfire Shelter: A Stratified Bison Kill Site, Val Verde County, Texas, 1958. *Texas Memorial Museum, Miscellaneous Papers* 1.

Epstein, J. F.

1963 Centipede and Damp Caves: Excavations in Val Verde County, Texas, 1958. *Bulletin of the Texas Archeological Society* 33: 1-129.

Fischer, J. L.

1971 Art Styles as Cultural Cognitive Maps. In C. F. Jopling, ed., *Aesthetics in Primitive Societies*:171-192. E. P. Dutton, New York.

Gebhard, D.

1960 Prehistoric Paintings of the Diablo Region: A Preliminary Report. *Roswell Museum and Art Center, Publications in Art and Science* 3.

Grieder, T.

1966 Periods in Pecos Style Pictographs. *American Antiquity* 31:710-720.

Jackson, A. T.

1938 Picture Writing of Texas Indians. *University of Texas, Publication* 3809.

Johnson, L., Jr.

1964 The Devil's Mouth Site, A Stratified Campsite at Amistad Reservoir, Val Verde County, Texas. *Department of Anthropology, University of Texas at Austin, Archeology Series* 6.

Kelley, J. C.

1950 Atlatls, Bows and Arrows, Pictographs and the Pecos River Focus. *American Antiquity* 16:71-74.

1974 Pictoral and Ceramic Art in the Mexican Cultural Littoral of the Chichimec Sea. In M. E. King and I. R. Taylor, Jr., eds., *Art and Environment in Native America.* Special Publications, The Museum, Texas Tech University.

Kirkland, F.

1938 A Description of Texas Pictographs. *Bulletin of the Texas Archeological and Paleontological Society* 10:11-39.

1939 Indian Pictures in the Dry Caves of Val Verde County, Texas. *Bulletin of the Texas Archeological and Paleontological Society* 11:47-76.

Kirkland, F., and W. W. Newcomb, Jr.

1967 *The Rock Art of Texas Indians.* University of Texas Press, Austin.

Lee, R. B.

1968 What Hunters Do for a Living, or, How to Make Out on Scarce Resources. In R. B. Lee and I. DeVore, eds., *Man the Hunter:* 30-48. Aldine, Chicago.

Lesser, A.

1968 War and the State. In M. H. Fried, M. Harris, and R. F. Murphy, *War; The Anthropology of Armed Conflict and Aggression.* Natural History Press, Garden City, New York.

Levine, M. H.

1957 Prehistoric Art and Ideology. *American Anthropologist* 59:949-964.

Morss, N.

1954 Clay Figurines of the American Southwest. *Peabody Museum of American Archaeology and Ethnology, Harvard University, Papers* 49(1).

Muensterberger, W.

1971 Some Elements of Artistic Creativity Among Primitive Peoples. In C. F. Jopling, ed., *Art and Aesthetics in Primitive Societies:* 3-10. E. P. Dutton, New York.

Parsons, M. L.

1965 Painted and Engraved Pebbles. In R. E. Ross, The Archeology of Eagle Cave. *Texas Archeological Salvage Project, Papers* 7:146-159.

n.d. Painted Pebbles: A Stylistic and Chronological Analysis. Unpublished manuscript.

Reichel-Dolmatoff, G.

1964 Anthropomorphic Figurines from Columbia, Their Magic and Art. In S. K. Lathrop *et al.*, eds., *Essays in Pre-Columbian Art and Archaeology*:229-241. Harvard University Press, Cambridge, Ma.

Service, E. R.

1966 *The Hunters*. Prentice-Hall, Englewood Cliffs, NJ.

Shafer, H. J.

1975 Clay Figurines from the Lower Pecos Region, Texas. *American Antiquity* 40(2):148-158.

1977 Art and Territoriality in the Lower Pecos Archaic. *Plains Anthropologist* 22:13-21.

Shafer, H. J. and F. Speck, Jr.

1974 A Clay Figurine Cache from the Lower Pecos Region, Texas. *Plains Anthropologist* 19:228-230.

Stout, D. B.

1971 Aesthetics in "Primitive Societies." In C. F. Jopling, ed., *Art and Aesthetics in Primitive Societies*:30-34. E. P. Dutton, New York.

Taylor, H. C., Jr.

1949 A Tentative Cultural Sequence for the Area About the Mouth of the Pecos. *Bulletin of the Texas Archeological Society* 20:73-99.

Vayda, Andrew P.

1968 Hypotheses About Functions of War. In M. H. Fried, M. Harris, and R. F. Murphy, *War; The Anthropology of Armed Conflict and Aggression*:85-91. Natural History Press, Garden City, NY.

A CHRONOLOGICAL OVERVIEW OF PREHISTORIC SOUTHERN AND SOUTH-CENTRAL TEXAS

Thomas R. Hester

Over the past several years, a variety of new data have been obtained on the prehistoric cultural sequence in south-central and southern Texas. This region (Fig. 1) lies to the south of the Edwards Plateau (to the northwest) and the Guadalupe River drainage (to the northeast). It is today largely characterized by a semi-arid environment, with the vegetation pattern dominated by mesquite, cactus, and thorny brush. However, historical and archaeological research has indicated that much of the region was a savanna grassland in the prehistoric period (cf. Hester 1976).

Compared to most other areas of Texas, there has been relatively little archaeological work in most parts of southern Texas. Most investigations have been done in the past decade, and practically all of the major excavations within the past five years. A bibliography of published works on south Texas archaeology has recently been published by Hester (1974b), and an earlier version was prepared by Campbell (1959). Because of the lack of earlier, basic research, archaeological interpretations in southern Texas have suffered from the lack of a sound chronological base (cf. Suhm, Krieger and Jelks 1954). Although studies of settlement, subsistence, and technological systems have been initiated, it is clear that it will be difficult to pursue these inquiries with sophistication until we know more about the chronology.

The paucity of archaeological and ethnohistorical data for southern Texas has helped perpetuate many misconceptions about the regional archaeology and its aboriginal population. The native Indian peoples have been lumped into the generalized "Coahuiltecan" category (see the discussion by Nunley 1971), although more intensive ethnohistoric research has revealed their linguistic and cultural diversity (Campbell 1974). Similarly, archaeological studies such as those at Falcon Reservoir (Suhm, Krieger and Jelks 1954:134-143), brief statements by Kelley (1959), and comparative discussions utilizing materials from northeastern Mexico (MacNeish 1958; Taylor 1966) have tended to portray the region's prehistory as one of homogeneity and monotonous conservatism. Recent research has shown that nothing could be farther from the truth. The prehistoric record in southern Texas is extremely diverse. Tool kits, settlement patterns, site contents, and other cultural manifestations often vary distinctly from one stream drainage to another. There has already been enough work to indicate that there will be no single "southern Texas sequence," but, rather, numerous temporal entities that will have to eventually be integrated into a regional chronological framework. Thus, the present paper does not offer a comprehensive chronological model. I have chosen instead to examine those fragments of the regional chronology that can be presently discerned.

Early Lithic Traditions

The regional literature has documented the presence of *Clovis* and *Folsom* fluted points (cf. Hester 1974a) and various Late Paleo-Indian forms (Hester 1968)

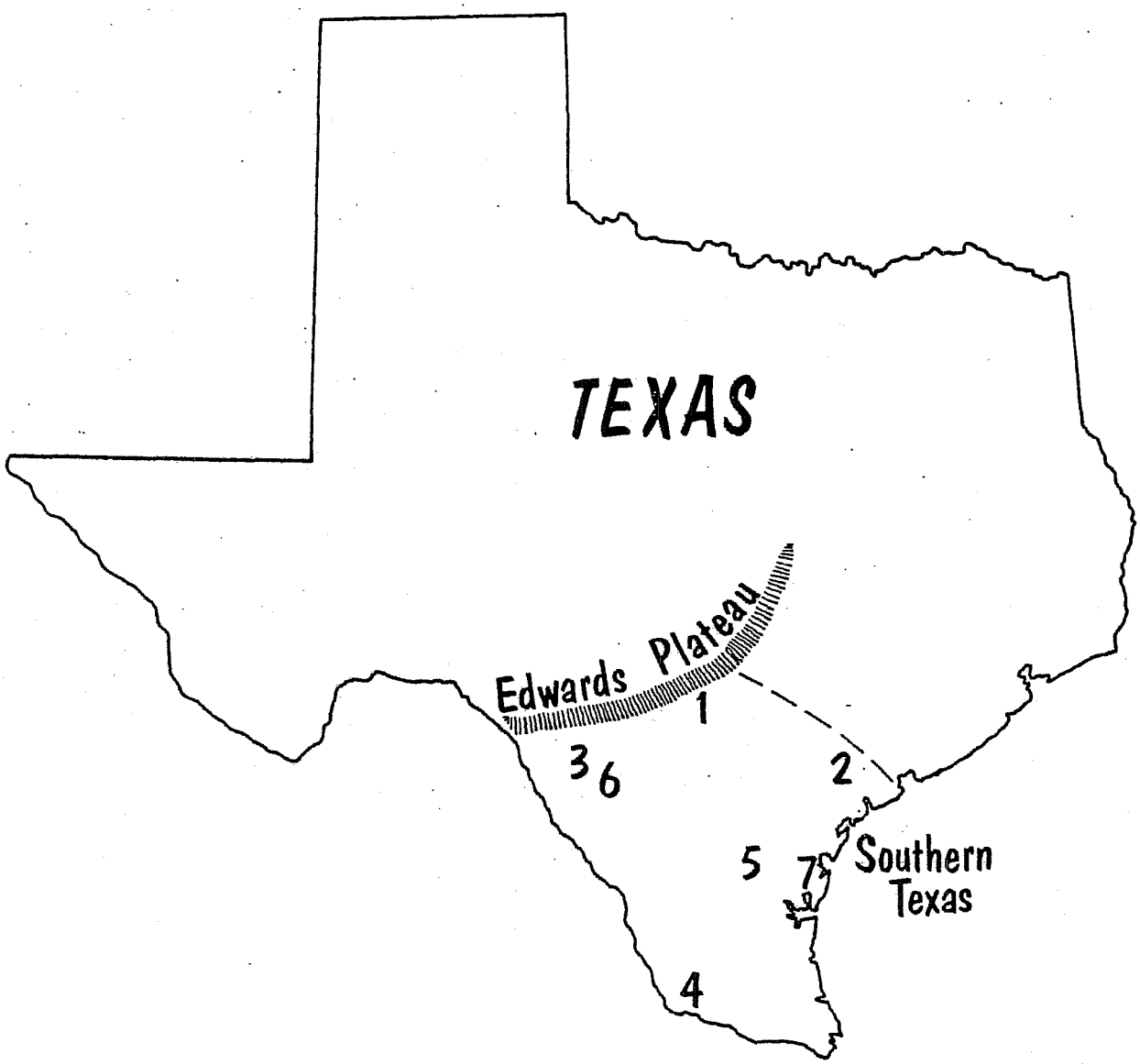


Figure 1. *Locations of Sites Mentioned in Text.* 1, 41 BX 229 and 41 BX 271; 2, Johnston and Willeke sites; 3, Chaparrosa Ranch sites; 4, Falcon District and Starr County; 5, 41 JW 8; 6, Tortugas Creek sites; 7, 41 NV 11.

throughout southern Texas. The possible association of artifacts and late Pleistocene fauna has been noted by Sellards (1940) and Cason (1952). However, until recently, there were no documented occupation sites attributable to this early period.

Excavations in Bexar County at 41 BX 229, the St. Mary's Hall site, have revealed occupational debris dating from the Paleo-Indian period, and the continuing exploration of the site promises to yield much additional information. The upper part of the site can be clearly linked to Archaic and Late Prehistoric times. However, in underlying alluvial gravels, *Folsom* and *Plainview* artifacts have been discovered in association with bone tools, faunal remains (mainly deer-sized mammals), lithic debris, and fragmentary preforms (Fig. 2). The site lies on a high terrace (750 feet msl) of Salado Creek, one of the major drainages in south-central Texas (Fig. 2). A unit opened in a lower part of the terrace yielded the *Folsom* specimen (Fig. 2,a) in alluvial gravels, beneath a compressed Archaic deposit. In the main area of the site, higher on the terrace, a Late Prehistoric and Archaic sequence is found to a depth of approximately 60 cm (Strata I-II in Fig. 3; Stratum II is a burned rock midden). In Stratum III, there is an alluvial deposit of small gravels in a reddish brown clay matrix. In this occur lithic materials, with most of the specimens highly patinated. To date this stratum has been exposed in only four five-foot square units, but already one *Plainview* specimen (Fig. 2,b) and the mid-section of another Paleo-Indian point, probably *Plainview* (Fig. 2,c), have been found. These same units have also produced bone flaking tools, several bifacial preforms (Fig. 2,d-f), percussion and pressure flakes, biface thinning flakes, and bone refuse. Stratum III is present over a wide area, and we expect to uncover further evidence of this early occupation. Stratum IV is a sandy unit, and Stratum V is a conglomerate (Fig. 3); both are culturally sterile. Plans are also underway to expand the excavations in the lower part of the terrace, in the area of the *Folsom* discovery.*

Nearer the coast, in the Guadalupe River drainage, another site is yielding data on Late Paleo-Indian occupations. The site is 41 VT 15 (Johnston site; Fig. 1), and a preliminary note on materials from the locality has been prepared by Birmingham and Hester (1976). Archaeological remains are buried in alluvial deposits on an old channel of the Guadalupe River. Test pits in the upper one meter of deposits revealed an Archaic occupation characterized by a series of stemmed point types. Although the excavations have not yet penetrated any deeper, a buried cultural horizon is present in the walls of a gully cutting through the site at depths ranging from two to three meters. A number of bifacially worked *Clear Fork* tools, cores or choppers, and ovate bifaces, have been found *in situ* in this zone (Fig. 5,a-d). Other *Clear Fork* implements have been found on the gully floor immediately below the zone. Also found in this context, eroded from the zone above, are a series of *Plainview* and *Golondrina* points (Fig. 4) and a *Clovis* fluted point (Birmingham and Hester 1976)**. Excavations are required to shed more light on this deeply buried occupation.

---

* Since this paper was written, additional investigations have been conducted (see Hester 1978b,1979).

** The term *Plainview* has been widely applied to a variety of Late Paleo-Indian points in Texas. One form has been labeled as the "golondrina" variant of

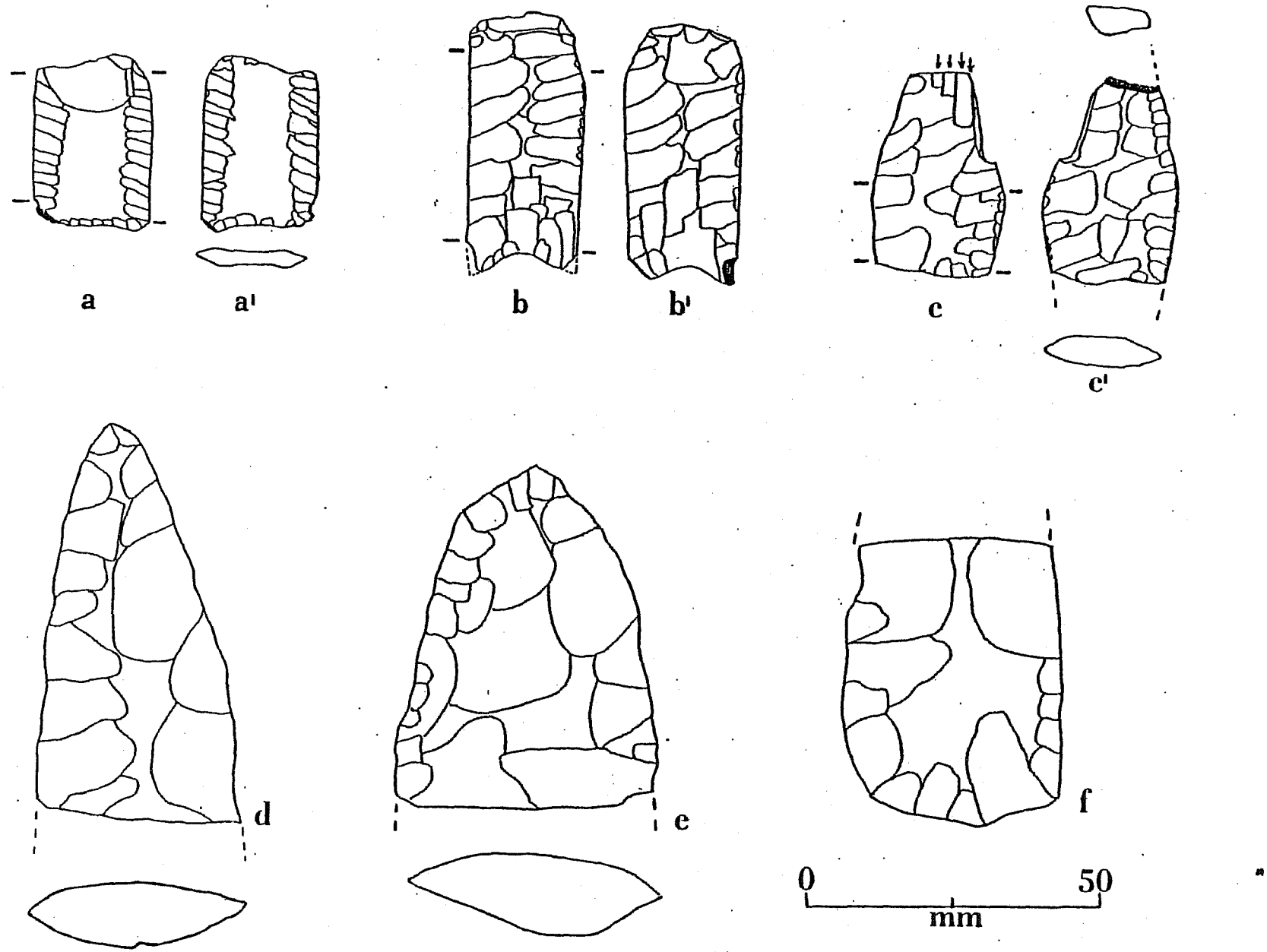
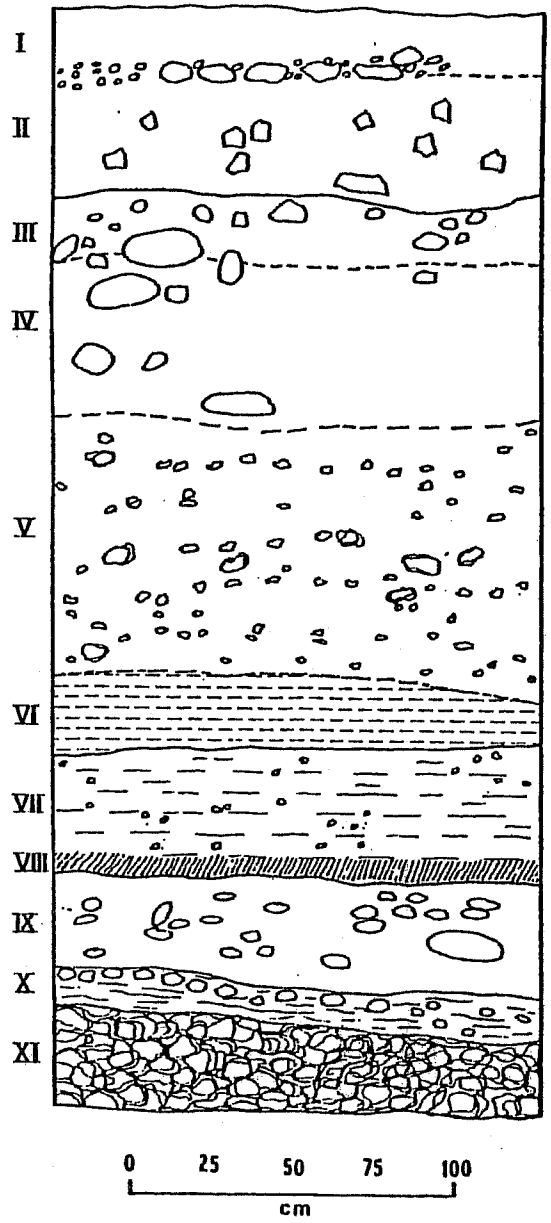


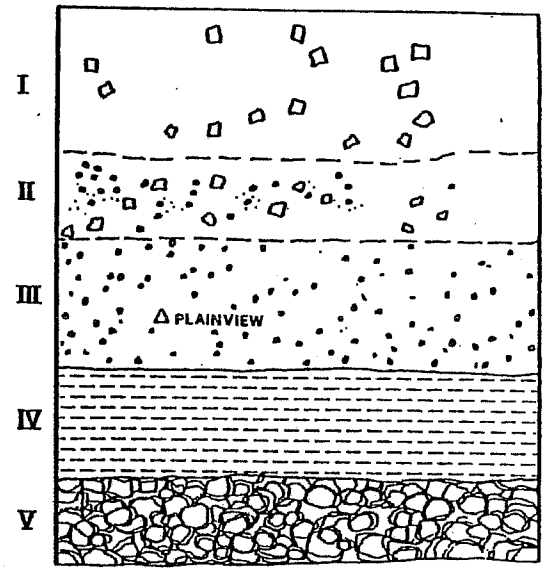
Figure 2. *Artifacts from Zone III, 41 BX 229, Bexar County, Texas.* More repeated burin blows on c. Dashed lines indicate extent of lateral smoothing.



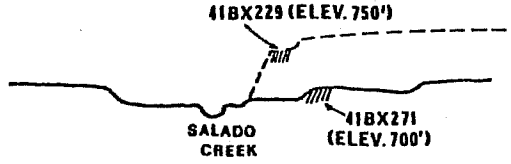
41 BX271

UNIT S4

PROFILE
OF
THE
EAST WALL



41 BX229
UNIT 27
PROFILE OF THE WEST WALL



IDEALIZED VIEW OF SALADO
CREEK VALLEY, LOOKING NORTH

Figure 3. *Profiles at 41 BX 271 and 41 BX 229, Bexar County, Texas.* Descriptions of strata are provided in the text.

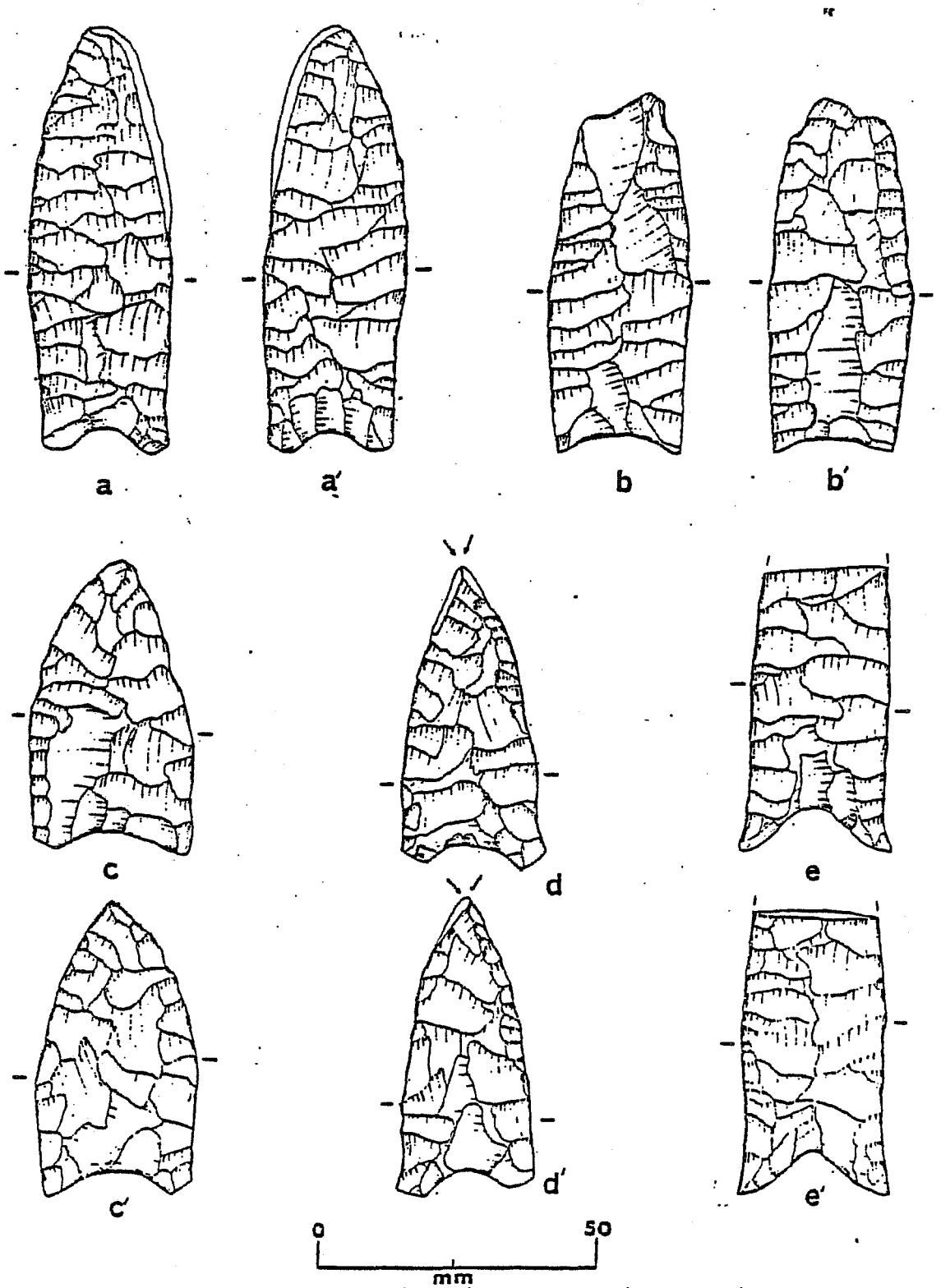


Figure 4. *Projectile Points from the Johnston Site (41 VT 15), Texas.* Note burins on d, d'. Dashed lines indicate extent of lateral smoothing.

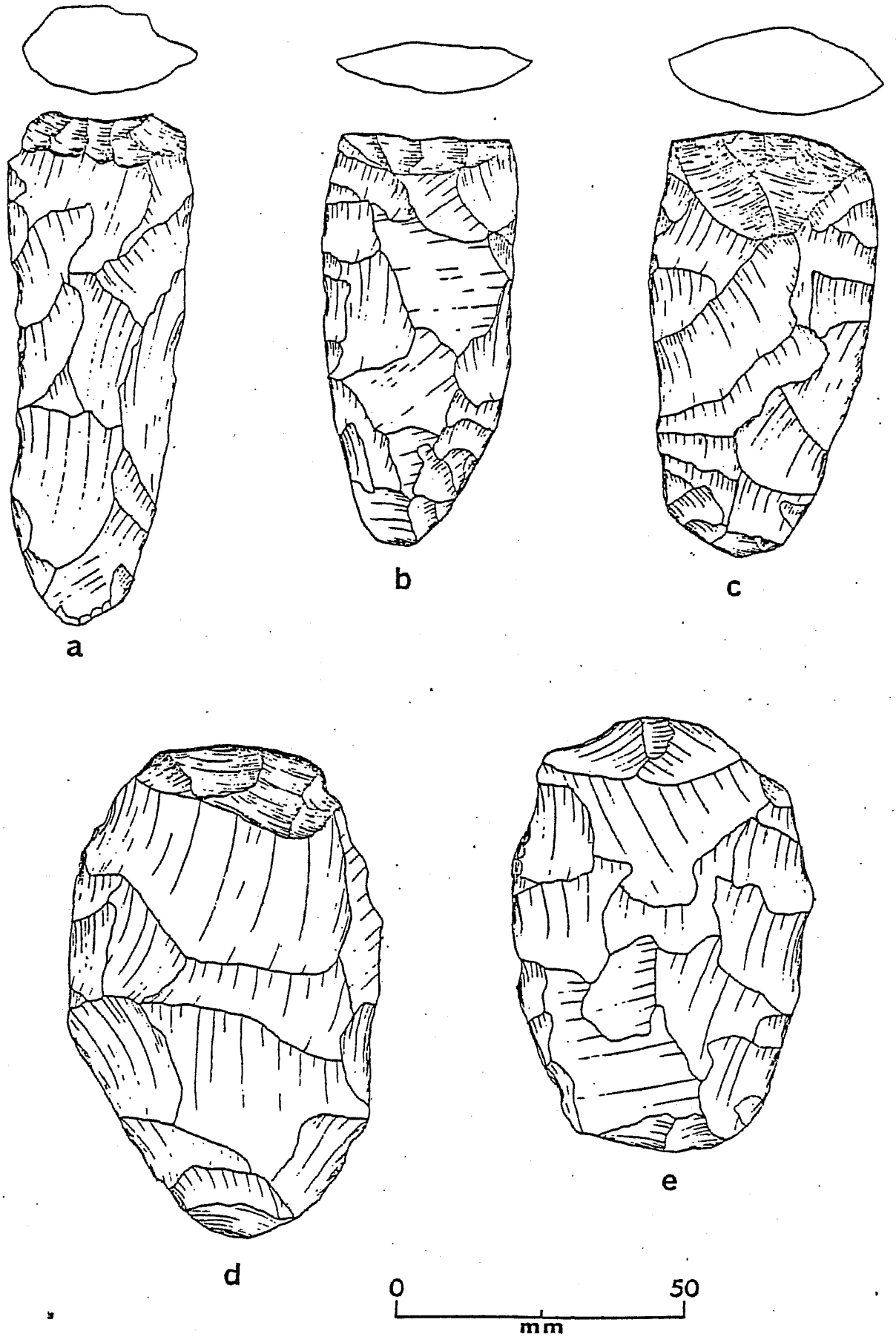


Figure 5. *Clear Fork Tools and Bifaces from the Johnston Site (41 VT 15), Texas.*

There is increasing evidence in south-central and central Texas of a transitional phase following the end of the Paleo-Indian era and preceding the presently-defined Early Archaic (cf. Johnson, Suhm and Tunnell 1962). The data on this transition, tentatively labeled the "Pre-Archaic," comes from a series of sites, including Devil's Mouth (Word and Douglas 1970), La Jita (Hester 1971), Jetta Court (Wesolowsky, Hester and Brown 1976), Stillhouse Hollow (Sorrow, Shafer and Ross 1967), Strohacker (Sollberger and Hester 1972), and others. Lithic traits include corner notched and triangular dart points, large barbed points (the *Bell* type of Sorrow, Shafer and Ross 1967), and stemmed points termed *Gower* (Shafer 1963).

A component of this early manifestation was found in 1973 on Salado Creek (Fig. 1), only 1.35 km downstream from St. Mary's Hall (see Fig. 3). This is site 41 BX 271 (Granburg II), part of a much larger Archaic site reported by Schuetz (1966); that portion of the site has since been destroyed by highway construction. The site is on a terrace (700 feet msl), and excavations have exposed a stratigraphic section over 3.5 m in depth (Fig. 3). A number of units were dug, and the following brief resume of the stratification can be presented.

The top 55 cm of deposit (Stratum II; Stratum I is recent fill) can be described as a "burned rock midden" (gray-black ashy midden soil with an abundance of burned rock and occupational debris). Diagnostic artifacts from this upper unit date from the Late and Middle Archaic periods of the central Texas sequence (Fig. 6). At a depth of 55-60 cm, Stratum III occurs at a 10-15 cm "transitional" zone, with burned rock and ash-stained midden soil grading into gravel. *Pedernales* dart points were found at the top of the zone, lying on the contact with the overlying burned rock midden. Beginning at approximately 60 cm and continuing to a depth of 3.6 m, there is an alluvial gravel deposit in which the following strata were recognized.

Stratum IV. Small gravels in yellow-red clay matrix; burned rocks and lithic materials were found. This stratum produced most of the diagnostic tools. These included several styles of dart points (several examples are shown in Fig. 6) such as *Bell*, the "Early Corner Notched" and "Early Triangular" of Hester (1971), *Gower*-like, several corner-notched points, numerous large unifacial *Clear Fork* tools (see Fig. 7,a-c), a number of *Guadalupe* tools (Fig. 7,d), preforms, cores, and much lithic refuse.

Stratum V. Distinguished by coarse gravels and 75 cm thick.

Stratum VI. Composed of fine sand and mixed small gravels; it is about 25 cm thick.

Plainview by Johnson (1964). However, UTSA staff archaeologist, Thomas C. Kelly, has recognized a series of metric and technological attributes which permit a clear separation of the two types. Thus, the appellation *Golondrina* is used here and refers to a projectile point form occurring widely in Trans-Pecos and southern Texas, and radiocarbon-dated in the Trans-Pecos to roughly 7000 B.C. (Sorrow 1968: 48; Word and Douglas 1970:34).

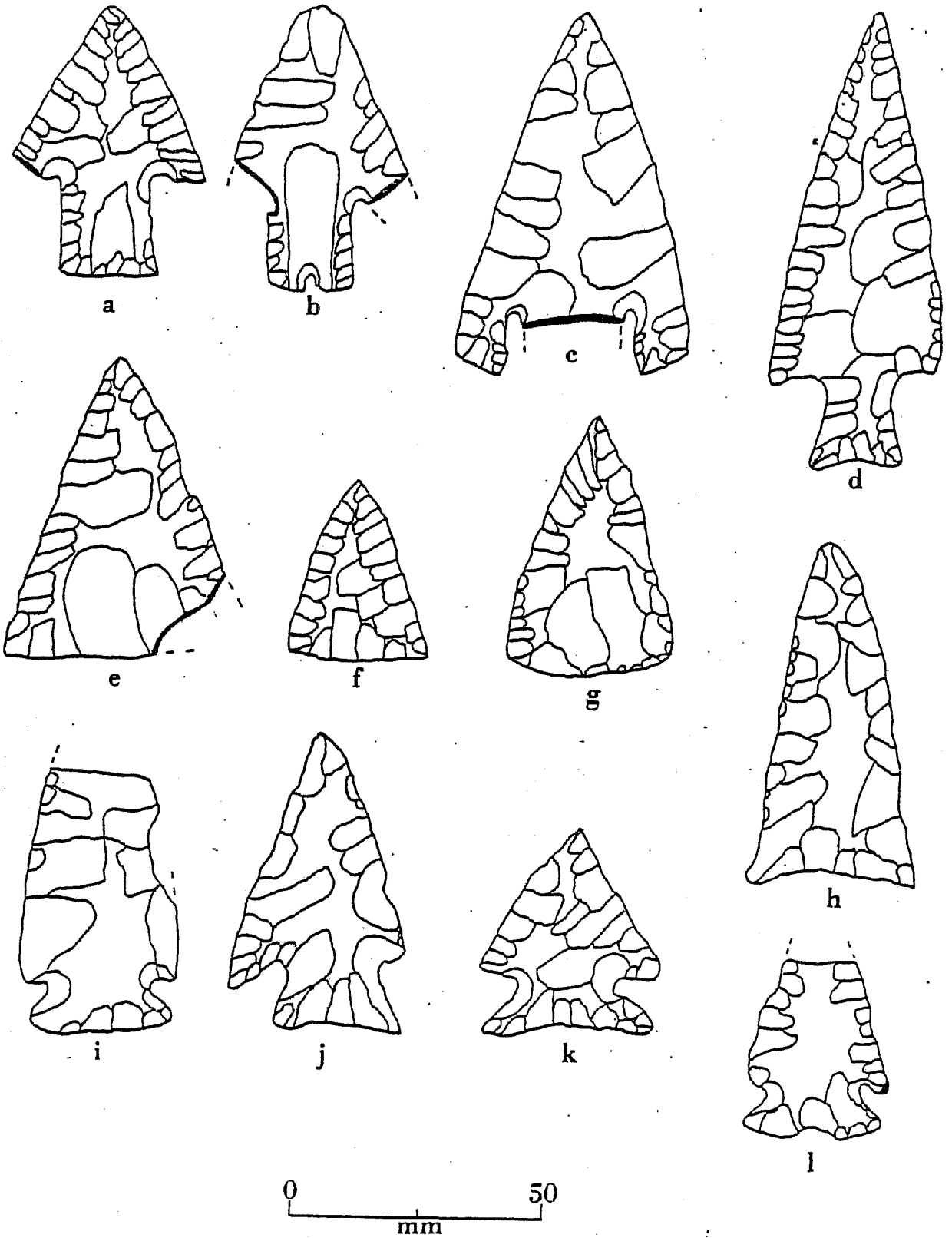


Figure 6. *Projectile Points from 41 BX 271, Bexar County, Texas.*

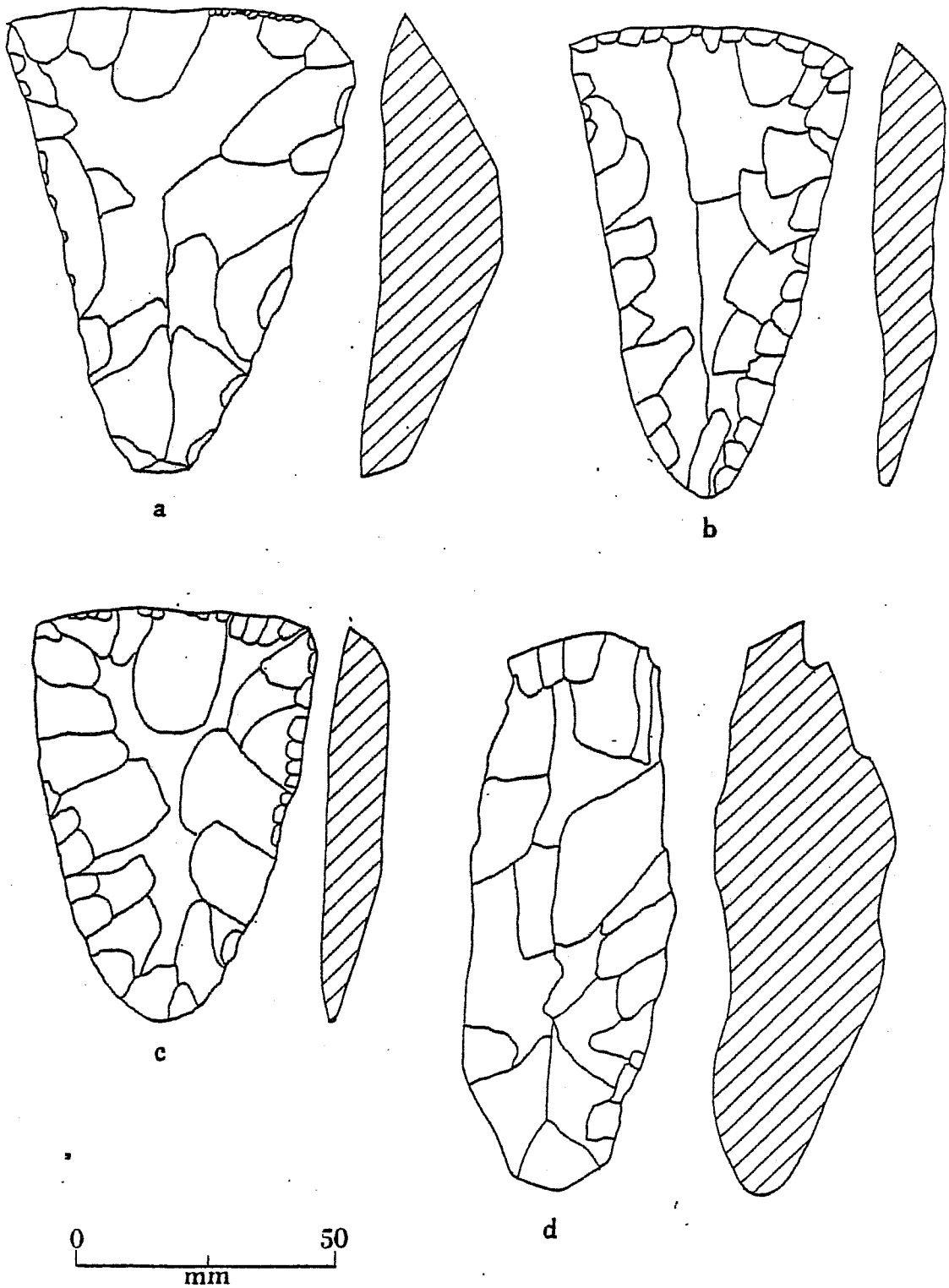


Figure 7. *Clear Fork Tools and Guadalupe Tool from 41 BX 271, Bexar County, Texas.* a-c, *Clear Fork*; d, *Guadalupe.*

Stratum VII. Also marked by fine sand, but with small gravels, many of which appear crushed.

Stratum VIII. A very compact charcoal-stained zone about 10-cm thick. Part of a distinct living floor was exposed, beginning at ca. 2.45 m in the illustrated profile, and sloping upward to roughly 2.30 m in adjacent units. On this floor were lithic materials, snail shells, some burned rocks, and several *Guadalupe* tools, four found in an apparent cache. Some of the flakes found here seem to be related to the Guadalupe manufacturing process.

Stratum IX. Composed of fine sorted gravels, 0.5 to 3.0 cm in diameter.

Stratum X. Sandy clay with some gravels.

Stratum XI. This was the deepest stratigraphic unit that was revealed and is composed of large, heavy gravels. In this stratum, a chert core was found. It exhibited sharp edges and showed no evidence of having been stream-rolled. This specimen was the deepest object of definite human manufacture.

The Archaic Period

Most of the prehistoric period in southern and south-central Texas can be included in what is called, for lack of a better term, the Archaic. In south-central Texas, the Archaic chronology mirrors that of adjacent central Texas (Johnson, Suhm and Tunnell 1962; Sorrow, Shafer and Ross 1967). However, the internal structuring of the Archaic in the rest of southern Texas remains nebulous. Toward the coast, in Victoria County (Fig. 1), deep sites like Johnston (41 VT 15) and Willeke (41 VT 16) yield a mixture of central Texas diagnostics and local forms (such as *Morhiss*). Although a stratigraphic cut 5 cm in depth has been made at Willeke, the sequence has not yet been made available for study. The Archaic of the southern Texas coast, represented principally by the Aransas phase, has recently been summarized by Corbin (1974) and will not be discussed here.

In south Texas, some generalized chronological schemes have been offered for the Archaic in the Falcon Reservoir district of the lower Rio Grande (Suhm, Krieger and Jelks 1954; Newton 1968). These may or may not be accurate reflections of the *local* Archaic framework. However, they are not based on extensive subsurface exploration, and they certainly cannot be summarily applied to any other region of southern Texas, a fact alluded to earlier in this paper.

Another local sequence is emerging from intensive research at Chaparrosa Ranch at Zavala County (Fig. 1). Field seasons in 1970 and 1974 (a third is planned for summer, 1975) have provided excavated data on the Archaic and Late Prehistoric.* There is in this area a mixture of central and southern Texas diagnostics

---

* Data from the 1975 field season, as well as the earlier work, are presented in Hester (1968a) and Montgomery (1978).

(cf. Nunley and Hester 1966), and we are still a long way from the full periodization of the area's Archaic. However, triangular (*Tortugas*) dart points appear to fall in what might be a "Middle Archaic" niche, followed by smaller, notched forms (*Ensor, Frio*) in a "Late Archaic" position. Radiocarbon dates of A.D. 550 (UCLA - 1821b) from 41 ZV 83 (Chaparrosa 28) and of A.D. 415 (UCLA - 1821c) and A.D. 770 (TX-1525) from 41 ZV 11 may be linked with the Late Archaic. A small, stubby, stemmed form (*Zavala*) appears at the end of the Archaic and continues into the Late Prehistoric. These specimens probably functioned as arrow points, and they are similar to the *Figueroa* of Johnson (1964), found in an equivalent temporal slot in the Trans-Pecos. We presently have little data on associated tool forms for the Archaic, although there are a variety of unifacial and bifacial implements in the region which certainly fall into this period. Unifacial variants of the *Clear Fork* form (cf. Hester, Gilbow and Albee 1973) may date from the "Middle Archaic," based on a meager number of excavated occurrences.

The Late Prehistoric Period

This period is the best known in south-central and southern Texas in terms of the number of excavated sites (some of which are single component sites) and radiocarbon dates. A detailed synthesis of the Late Prehistoric has recently been prepared by Hester and Hill (1975). Especially significant are sites in the Chaparrosa Ranch area (Hester 1978a; Montgomery 1978), the Tortugas Creek drainage (Hester and Hill 1973), and 41 JW 8 in Jim Wells County (Hester 1977; see Fig. 1). Another important published Late Prehistoric site, on the coastal fringe, is Berclair (Hester and Parker 1970).

The Late Prehistoric sites are usually rich middens located in riparian environs immediately adjacent to present stream channels. Average site size is something on the order of 3600 m^2. Excavations at several sites have produced quantities of lithic tools and refuse, animal bone remains (see Gilbow 1973), land snails, charcoal, intrasite features, and so forth. The Late Prehistoric tool kit includes several forms of arrow points (*Perdiz, Scallorn,* various corner-notched styles, triangular; see Figs. 8,9), often found in situations suggesting their contemporaneity (Hill and Hester 1973; Hester 1978a). However, at other sites, such as Berclair and 41 JW 8, there is but a single point style, in these instances, *Perdiz*. It would appear that the Austin-to-Toyah phase sequence defined for the central Texas Late Prehistoric is not applicable in most parts of southern Texas. Associated with the arrow points are diamond-shaped, four-beveled knives (Fig. 9,r), end scrapers (Fig. 8,i;9,p), perforators, pointed bone tools, and bone-tempered pottery (the equivalent of *Leon Plain* ware of central Texas). Radiocarbon dates suggest a span from ca. A.D. 1400 to ca. 1650 (see Hester and Hill 1975). The latter date would put some of these occupations in the "protohistoric" era. Such a label is appropriate, since not a single bit of evidence of historic contact has been found at these sites, despite the fact that part or all of the deposits have been subjected to fine screening.

Of interest to subsistence studies and paleoenvironmental reconstructions during the Late Prehistoric are the large samples of fauna recovered from the sites (see a brief summary in Table 1).

The Late Prehistoric in most other areas of southern Texas is less precisely known. Along the coast, it is incorporated in the Rockport and Brownsville

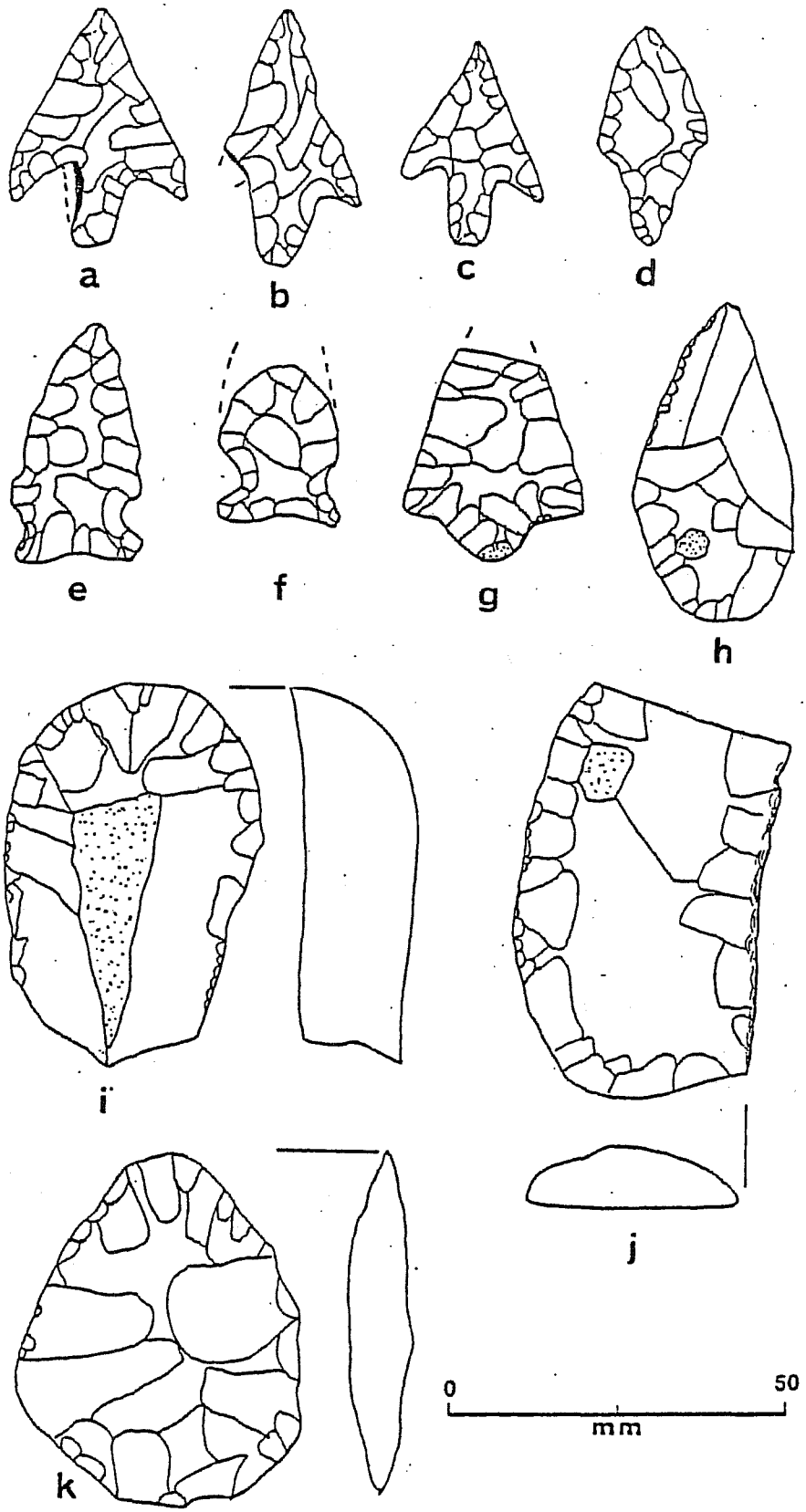


Figure 8. *Late Prehistoric Artifacts from Tortugas Creek Sites, Zavala County, Texas.*

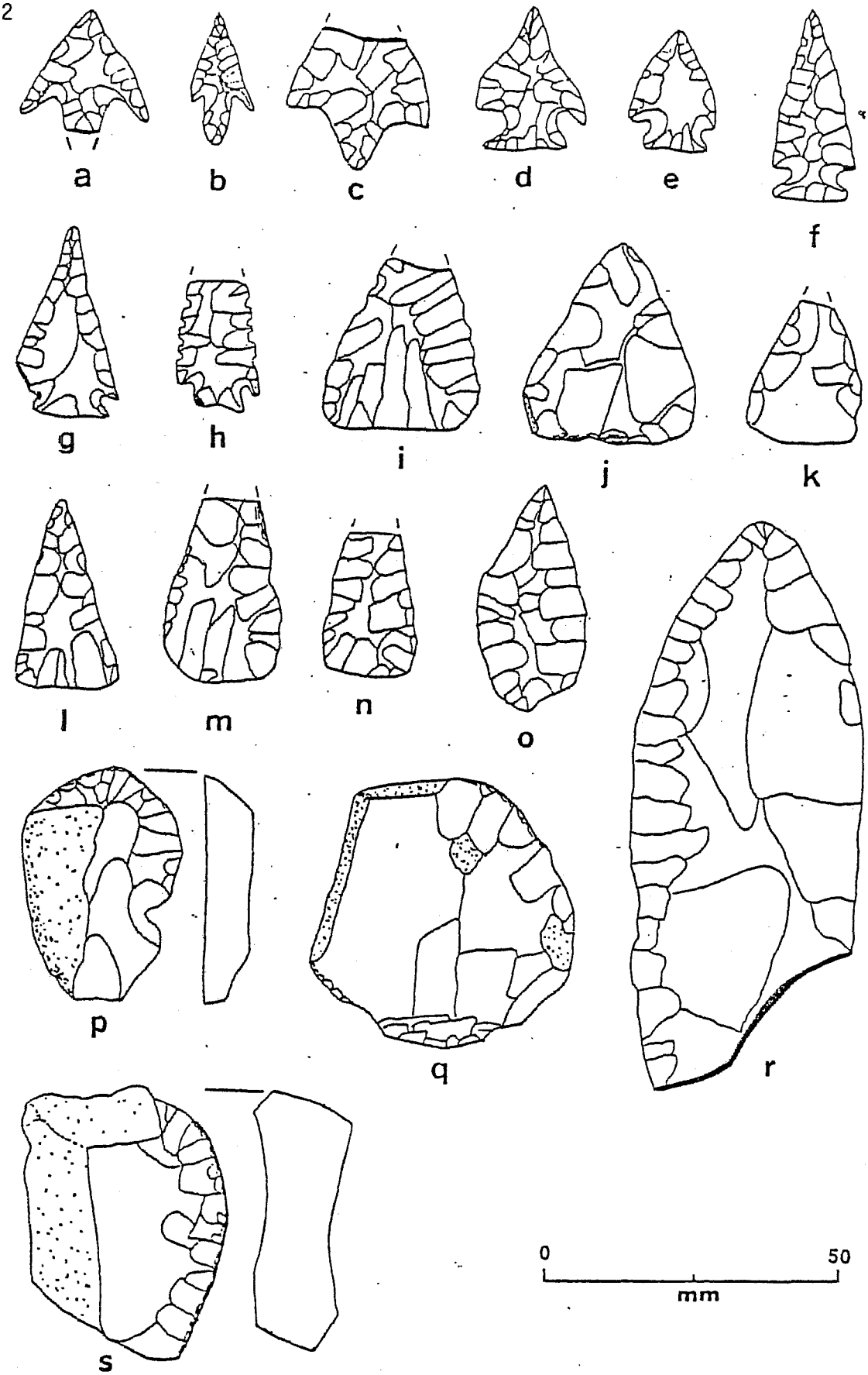


Figure 9. *Late Prehistoric Artifacts from Tortugas Creek Sites, Zavala County, Texas.*

phases (see Campbell 1960 and Corbin 1974 for details). Diagnostic arrow points and bone-tempered ceramics are known from a wide range of surface sites in the interior (cf. Hester and Hill 1971). In some areas, however, and Starr County along the lower Rio Grande is a good example (Nunley and Hester 1975), recognizable Late Prehistoric materials are practically absent.

The Historic Period

If we exclude the Mission Indian occupations at the several Spanish Colonial missions in southern Texas, we find that few archaeological sites representing Historic Indian groups have yet been recognized.

At a handful of sites in the interior of southern Texas, scattered Historic materials have been collected; these include glass trade beads and metal projectile points (cf. Mitchell 1974). On the south Texas coast, however, there are two minor sites with Historic components. One of these is Live Oak Point, published by Campbell (1958). Another is Kirchmeyer (41 NU 11), located on a clay dune near Corpus Christi (Fig. 1). The site is multicomponent, but a discrete aboriginal occupation dating from Historic times has been recorded in one area (cf. Calhoun 1964). Artifacts include a polychrome vessel of native manufacture, a small bronze bell, glass beads, flint flakes, marine shells, and animal bones. The fauna include black bear, whitetail deer, alligator, several species of fish (including sheephead, black drum, and sea trout), slider turtle, box turtle, and rattlesnake (numerous other species, including bison, are found at the site, dating largely from the Late Prehistoric). The Historic utilization of Live Oak Point and Kirchmeyer is attributed to the last part of the Rockport Phase.

Summary

Until a few years ago, almost nothing was known about the cultural chronology of south-central and southern Texas. While a comprehensive chronological framework comparable to that of the Trans-Pecos and central Texas still remains to be achieved, some portions of the sequence are beginning to be better understood. Late Pleistocene occupations have finally been found in sealed contexts at the St. Mary's Hall site (41 BX 229), and we are at long last obtaining crucial data on the late phases of the Paleo-Indian period. We have less control on the assemblage at the Johnston site (41 VT 15), but present data indicate the association of *Plainview*, *Golondrina*, and bifacial *Clear Fork* tools. Epstein (1969) has reported the association of bifacial *Clear Fork* tools and points of the *Plainview* and *Golondrina* forms at the San Isidro site in northeastern Mexico. Transitional phase (Pre-Archaic) artifacts are known from 41 BX 271 and can be correlated with other sites in central Texas. More importantly, this site has permitted the temporal placement of large unifacial *Clear Fork* tools and the *Guadalupe* tool forms, both of which are commonly found in surface contexts in the San Antonio and Guadalupe River systems. Excavations in the San Antonio area have indicated that the central Texas Archaic sequence is largely applicable in south-central Texas (cf. also Fox *et al.* 1974). On the other hand, the Archaic sequence on the coastal plain and in southern Texas remains poorly understood. Only portions of the Archaic sequence can now be dimly discerned, but enough has

been learned to indicate the existence of various localized Archaic developments. The late survival of the Archaic in the region is suggested by radiocarbon dates from Chaparrosa Ranch and from the Ingleside site in San Patricio County on the coast (Story 1968). The Late Prehistoric era is the best known chronological unit, beginning quite late, probably around A.D. 1200-1300. Because of the chronological grasp that we now have on the Late Prehistoric, it has been possible to initiate a series of problem-oriented studies in the areas of settlement, subsistence, intrasite structure, and technology (cf. Hester and Hill 1975).

Any detailed comparisons with northeast Mexican sequences are difficult at this time. There seem to be few, if any, valid correlations which can be made between southern Texas and western Coahuila, southwestern Nuevo Leon, and southern Tamaulipas. The cultural assemblages are obviously too divergent. Similarly, the chronological comparisons made by MacNeish (1958) between his Tamaulipas sequence and southern Texas are precarious at best. Taylor (1966:92) has noted the "highly tentative" nature of his own generalized comparison of Texas-northeast Mexican cultural traditions. That area of northeastern Mexico paralleling the Rio Grande is almost completely unknown, making any comparisons impossible at this time. Given the diversity of southern Texas assemblages, I seriously doubt that any far-ranging correlations with northeastern Mexico will ever be realistic. Our knowledge of these two regions, although still severely limited, has progressed to the point that we can no longer think of a broad, simple, and long-persisting cultural pattern extending over the whole south Texas-northeast Mexico region.

REFERENCES CITED

Birmingham, W. W. and T. R. Hester

1976 Late Pleistocene Archaeological Remains from the Johnston-Heller Site, Texas Coastal Plain. In Papers on Paleo-Indian Archaeology in Texas: 1:15-33. *Center for Archaeological Research, The University of Texas at San Antonio, Special Report* 3.

Campbell, T. N.

1958 Archeological Remains from the Live Oak Point Site, Aransas County, Texas. *Texas Journal of Science* 10(4):423-442.

1959 Archeology of Southern Texas and Northeastern Mexico: A Selected Bibliography. Mimeographed.

1960 Archeology of the Central and South Sections of the Texas Coast. *Bulletin of the Texas Archeological Society* 29:145-176.

1974 The American Indian in South Texas: 1527-1850. Paper presented at the quarterly meeting of the Southern Texas Archaeological Association, Corpus Christi, December 7.

Calhoun, C. A.

1964 A Polychrome Vessel from the Texas Coastal Bend. *Bulletin of the Texas Archeological Society* 35:205-211.

Cason, J. F.

1952 Report on Archaeological Salvage in Falcon Reservoir, Season of 1952. *Bulletin of the Texas Archeological Society* 23:218-259.

Corbin, J. E.

1974 A Model for Cultural Succession for the Coastal Bend Area of Texas. *Bulletin of The Texas Archeological Society* 45:29-54.

Epstein, J. F.

1969 The San Isidro Site: An Early Man Campsite in Nuevo Leon, Mexico. *Department of Anthropology, University of Texas at Austin, Anthropology Series* 7.

Fox, D., R. Mallouf, N. O'Malley and W. M. Sorrow

1974 Archeological Resources of the Proposed Cuero I Reservoir, DeWitt and Gonzales Counties, Texas. *Texas Historical Commission* and *Texas Water Development Board, Archeological Survey Report* 12.

Gilbow, D.

1973 Preliminary Identification of Faunal Remains from the Holdsworth Site (41 ZV 14). Appendix II, In (T. Hester and T. Hill, Jr.) Prehistoric Occupation at the Holdsworth and Stewart Sites on the Rio Grande Plain of Texas. *Bulletin of the Texas Archeological Society* 43:73-75.

Hester, T. R.

1968 Paleo-Indian Artifacts from Sites Along San Miguel Creek: Atascosa, Frio, and McMullen Counties, Texas. *Bulletin of the Texas Archeological Society* 39:147-161.

1971 Archeological Investigations at the La Jita Site, Uvalde County, Texas. *Bulletin of the Texas Archeological Society* 42:51-148.

1974a On Fluted Points and South Texas Archeology. *Texas Archeology* 18(2):11-14.

1974b A Bibliographic Guide to the Archaeology of Southern Texas. *Journal of South Texas* 1:18-36.

1976 *Hunters and Gatherers of the Rio Grande Plain and the Lower Coast of Texas.* Center for Archaeological Research, The University of Texas at San Antonio.

1977 Archaeological Research at the Hinojosa Site (41 JW 8), Jim Wells County, Southern Texas. *Center for Archaeological Research, The University of Texas at San Antonio, Archaeological Survey Report* 42.

1978a Some Observations on Archaeology at Chaparrosa Ranch, 1974. In Background to the Archaeology of Chaparrosa Ranch, Southern Texas. Volume 1, Studies in the Archaeology of Chaparrosa Ranch:33-36. *Center for Archaeological Research, The University of Texas at San Antonio, Special Report* 6(1).

1978b *Early Human Occupations in South Central and Southwestern Texas: Preliminary Papers on the Baker Cave and St. Mary's Hall Sites.* Center for Archaeological Research, The University of Texas at San Antonio.

1979 Early Populations in Prehistoric Texas. *Archaeology* 32(6):26-33.

Hester, T. R. and T. C. Hill, Jr.

1971 An Initial Study of a Prehistoric Ceramic Tradition in Southern Texas. *Plains Anthropologist* 16(52):195-203.

1973 Prehistoric Occupation at the Holdsworth and Stewart Sites on the Rio Grande Plain of Texas. *Bulletin of the Texas Archeological Society* 43:33-65.

1975 Some Aspects of Late Prehistoric and Protohistoric Archaeology in Southern Texas. *Center for Archaeological Research, The University of Texas at San Antonio, Special Report* 1.

Hester, T. R. and H. Kohnitz

1975 The Chronological Placement of "Guadalupe" Tools. *La Tierra* 2(2):22-25.

Hester, T. R. and R. C. Parker

1970 The Berclair Site: A Late Prehistoric Component in Goliad County, Southern Texas. *Bulletin of the Texas Archeological Society* 41:1-24.

Hester, T. R., D. Gilbow and A. Albee

1973 A Functional Analysis of Clear Fork Artifacts from the Rio Grande Plain of Texas. *American Antiquity* 38(1):90-96.

Hill, T. C., Jr. and T. R. Hester

1973 A Preliminary Report on the Tortuga Flat Site: A Protohistoric Campsite in Southern Texas. *Texas Archeology* 17(2):10-14.

Johnson, L., Jr.

1964 The Devil's Mouth Site, A Stratified Campsite at Amistad Reservoir. *Department of Anthropology, University of Texas at Austin, Archaeology Series* 6.

Johnson, L., Jr., D. A. Suhm and C. D. Tunnell

1962 Salvage Archeology of Canyon Reservoir: The Wunderlich, Footbridge and Oblate Sites. *Texas Memorial Museum Bulletin* 5.

Kelley, J. C.

1959 The Desert Culture and the Balcones Phase; Archaic Manifestations in the Southwest and Texas. *American Antiquity* 24(3):276-288.

MacNeish, R. S.

1958 Preliminary Archaeological Investigations in the Sierra de Tamaulipas, Mexico. *Transactions, American Philosophical Society* 48(6).

Mitchell, J. L.

1974 Notes on Metal Projectile Points from Southern Texas. *Journal of South Texas* 1:47-51.

Montgomery, J.

1978 The Mariposa Site: A Late Prehistoric Site on the Rio Grande Plain of Texas; Volume 2, Studies in the Archaeology of Chaparrosa Ranch. *Center for Archaeological Research, The University of Texas at San Antonio, Special Report* 6(2).

Newton, M. B.

1968 The Distribution and Character of Sites, Arroyo Los Olmos, Starr County, Texas. *Bulletin of the Texas Archeological Society* 38:18-24.

Nunley, J. P.

1971 Archaeological Interpretation and the Particularistic Model: The Coahuiltecan Case. *Plains Anthropologist* 16(54):302-310.

Nunley, J. P. and T. R. Hester

1966 Preliminary Archeological Investigations in Dimmit County, Texas. *Texas Journal of Science* 18(3):233-253.

1975 Assessment of Archaeological Resources in Portions of Starr County, Texas. *Center for Archaeological Research, The University of Texas at San Antonio, Archaeological Survey Report* 7.

Schuetz, M.

1966 The Granberg Site: An Archaic Indian Habitation Site in Bexar County, Texas. *Witte Museum Studies* 1.

Sellards, E. H.

1940 Pleistocene Artifacts and Associated Fossils from Bee County, Texas. *Bulletin, Geological Society of America* 51:1627-1657.

Shafer, H. J.

1963 Test Excavations at the Youngsport Site: A Stratified Terrace Site in Bell County, Texas. *Bulletin of the Texas Archeological Society* 34:57-81.

Sollberger, J. B. and T. R. Hester

1972 The Strohacker Site: A Review of Pre-Archaic Manifestations in Texas. *Plains Anthropologist* 17(58):326-344.

Sorrow, W. M.

1968 The Devil's Mouth Site: The Third Season 1967. *Papers, Texas Archeological Salvage Project* 14.

Sorrow, W. M., H. J. Shafer and R. Ross

1967 Excavations at Stillhouse Hollow Reservoir. *Papers, Texas Archeological Salvage Project* 11.

Story, D. A.

1968 Archeological Investigations at Two Central Texas Gulf Coast Sites. *State Building Commission, Report* 13.

Suhm, D. A., A. D. Krieger and E. B. Jelks

1954 An Introductory Handbook of Texas Archeology. *Bulletin of the Texas Archeological Society* 25.

Taylor, W. W.

1966 Archaic Cultures Adjacent to the Northeastern Frontiers of Mesoamerica. In *Handbook of Middle American Indians* 4:59-94. University of Texas Press, Austin.

Wesolowsky, A. B., T. R. Hester, and D. R. Brown

1976 Archeological Investigations at the Jetta Court Site (41 TV 151), Travis County, Texas. *Bulletin of the Texas Archeological Society* 47:25-88.

Word, J. H. and C. Douglas

1970 Excavations at Baker Cave. *Bulletin, Texas Memorial Museum* 16.

THE GATEWAY PROJECT: STUDY OF THE SPANISH MISSIONS AT GUERRERO, COAHUILA

R. E. W. Adams

The Gateway Project is a joint archaeological and ethnohistorical effort at understanding the 18th century mission complex of San Juan Bautista at what is now known as Guerrero, Coahuila, Mexico. Major funding for the project was obtained from the National Endowment for the Humanities, with supplementary grants from the Kathryn Stoner O'Connor and Sid Richardson Foundations. The University of Texas at San Antonio provided considerable logistical support, purchased a Chevrolet truck for the Center for Archaeological Research which could be used on the project, and performed various other services, ranging from film processing to providing spacious laboratory facilities. We are most grateful to Dr. Peter T. Flawn, former president of UTSA, for his continuing interest and support.

The project worked in Mexico under a contract with the Instituto Nacional de Antropología e Historia, Monumentos Coloniales. Arquitecto Sergio Zaldivar, director of Monumentos Coloniales at that time, aided us in many ways, and obtained substantial funding from the Secretaria de Obras Publicas for stabilization work at the major standing ruin of San Bernardo. As always, we received continued and cheerful aid from the townspeople of Guerrero itself. The two mayors of the town during our period of field work were unfailingly helpful, and Sr. Treviño has persisted in his help with our efforts to bring the Guerrero collections to San Antonio for a temporary exhibit.

Two citizens of Guerrero who deserve special thanks are Dr. Farias de los Santos and Srta. Jesuseña Flores Rodriguez who provided rent-free housing for the project. Both houses are good specimens of colonial architecture, and at least one appears on the 1767 Urrutia map of the town. Many others have helped us, and we offer our thanks to them all. Boone Powell, San Antonio architect, talked us into this project; and we owe him gratitude for involving us in what has been an absorbing intellectual as well as gratifying personal experience for us all.

Field work by the project was accomplished in 1975 and 1976. Archival, comparative, and laboratory work and writing have occupied the project members during 1977, 1978 and 1979. A volume of papers synthesizing the results of the project is being prepared We will issue several volumes of supplementary materials, which will consist of the tabulated data of various sorts, additional illustrations, descriptive and narrative material, and technical, detailed information which backs up the conclusions and formulations drawn in the summary papers. Two of these have recently been published, and a third should appear in 1980.

The goals of the project as stated in the proposal to NEH were:

1. An investigation of the structure and nature of the early mission network around the major centers of San Juan Bautista, San Francisco Solano, and San Bernardo.

2. An archaeological and ethnohistorical analysis of the prehistoric cultural status and the early Colonial acculturation process of the native cultures of southern Texas and northeastern Mexico.

In order to fulfill these goals, the project has undertaken two years of archaeological excavation and survey on both sides of the Rio Grande. Survey has been done from above Eagle Pass, Texas, approximately 30 miles southeast along the River by Parker Nunley and Chris Nunley. The Nunleys also surveyed a triangular zone around Guerrero, on the Mexican side. Jack D. Eaton and Thomas R. Hester dug in two of the three principal mission location sites and their vicinities. Archival search has taken Felix Almaraz and his students from the Archivo General de la Nacion, Mexico City, to Washington D. C. and the Academy of Franciscan History. The following is a summary of the results of the project's work, including some information previously known.

The missions of the San Juan Bautista complex were located in order to give access to various pasos, or fords, of the Rio Grande. The specific location was chosen because of the fresh water springs which create an oasis in the generally arid north Coahuilan desert. These springs carry a high charge of travertine in solution, and one of the deposits of travertine formed a natural dam in the remote past, creating a large lake and at least one smaller lake behind it. These natural advantages attracted the first missionaries who arrived in 1699. The larger lake no longer exists because of the dynamiting of the dam in the early 20th century by a downstream rancher who wanted more water flow. Three principal mission locations are those of San Bernardo, San Juan Bautista, and San Francisco Solano. The latter was soon removed in the form of its personnel to what is now the San Antonio, Texas region. A presidio was also established for the soldiers and their families attached to the mission; and the present town of Guerrero is in many ways architecturally reflective of the colonial town, as shown by The University of Texas at Austin School of Architecture surveys.

Eaton began excavations at San Bernardo mission in 1975, rapidly proceeding to locate and dig out the remains of six long buildings. These were arranged in two rows of three each along a street, which has been called a "calle de los indios" in the colonial documents. Certain features of a nearby acequia system were found. In 1976 Eaton continued excavations in the zone to the north of San Bernardo mission, but to the east of the Indian housing found the year before. A set of parallel structures was found and, upon excavation, proved to be the remains of the primitive church, founded in 1702, and the workshops and living quarters of the priests. These buildings were made of adobe laid on travertine footings. The standing remains of San Bernardo church, begun in the 1760s and never finished, are entirely of travertine. The travertine quarry used both in the 18th century and at present is located next to the natural dam. The San Bernardo church ruins have been completely stabilized by Monumentos Coloniales of Mexico, working with resources provided by the Secretaria de Obras Publicas. The work was directed by Arquitecto Sergio Zaldivar of Monumentos Coloniales.

The San Juan Bautista mission dating from the 1740s is west of town, near the springs, next to the head of the irrigation works and on the highest ground in the immediate vicinity. Eaton worked here in 1976 and partially excavated the church, priest's quarters, workshops, Indian quarters, and a fortification feature. Other features were mapped. Padre Morfi, in his famous 18th century report on the missions of Coahuila, mentions riding by the high walls of San Juan Bautista. At present, the site looks more like a Middle Eastern mound

than a historic mission center. San Francisco Solano, the third mission, was located nearer the large lake; and we believe that we found the site on the former western shore, but were unable to do any digging to confirm it.

Large amounts of lithic and ceramic artifacts have been recovered, classified, and otherwise analyzed. Implications are only beginning to be drawn from the elicited patterns. A great deal of subsistence data has been found in the form of animal bones: over 50 species at San Bernardo, and more than 25 at San Juan Bautista. Except for black bear and the grey wolf, all identified species are still found within 20 km of Guerrero.

Ethnohistorical work done by Drs. Almaraz and T. N. Campbell has yielded a large amount of information to add to the archaeological framework. The basic structure of the chronology has been revised, and a much finer chronological division made possible. The missions were occupied until 1820, much longer than had been previously thought, for a total time span of 121 years. The historical divisions into approximately 20-year, or one-generation, phases are a challenge to the archaeological chronology because the latter probably cannot be sub-divided into more than three ceramically defined phases. Campbell's work has yielded many names of groups, individuals, and families, principally of the Indian residents at the missions.

The specific achievements of the project have to a great extent met the goals set forth in the proposal. The study of the mission network has been more successful and is more complete than the achievement of an understanding of the acculturation process occurring at the missions. This is, to some degree, a product of the still unfinished state of the analysis; and our conclusions will no doubt be more satisfactory when we complete studies in the near future.

In summary:

1. A definition has been made of the prehistoric archaeological regional cultures along the Rio Grande for about a 30-mile segment.

2. A tentative chronology for the two archaeological regions has been developed.

3. A definition of the faunal inventories and changes taking place during the 18th century has shown, among other things, that much more wild animal protein was used in the mission diet than had been thought. Another point of special interest was that javelina (native American wild pigs) were moving north by the time of the early 1700s, earlier than had been reported before.

4. Lithic, ceramic, and metal artifacts characteristic of the missions have been described, allowing us to define functional and tool complexes within these material categories. Comparative studies are beginning to indicate the trading and supply networks of the missions. These, not surprisingly, relate mainly to Mexico; but there were also links to Europe and China through the flotillas and the Manila galleon.

5. Population identification by named Indian groups and specification of the places of origin of some of these groups has been possible. These native groups came as refugees from the Chihuahua missions to the west, and as more or less forcibly congregated peoples from south Texas.

6. A thorough examination is under way of the colonial policies toward the Indians of south Texas and Coahuila through historical materials.

Thus, the first goal has been or is rapidly being accomplished. The second goal of dealing with culture process is less well advanced at the moment, but permits me some observations.

Obviously, the elicitation of patterns is not the same as explanation of those patterns, but elicitation certainly precedes explanation. It seems to me at this time that standard acculturation theory is unlikely to explain the basic cultural forms and changes reflected in our archaeological and ethnohistorical data. It may be that the continual confusion and turnover of Indians in the mission compounds led to the imposition of the European patterns in a more rapid manner than in central Mexico, where a strong and more unitary cultural tradition participated in by tens of thousands of people was the contrasting situation. In the northern frontier area, the prehistoric cultural scene was one in which patterns of civilization were lacking in the sense of pre-industrial urban life and complex trading patterns in craft specialty goods. Even the Archaic patterns of life in these northern regions were fairly diverse, it seems. The Indian groups in the San Juan Bautista zone were brought together from the missions to the west in Chihuahua and from the quite different Texas groups. What I am arguing here, perhaps to be refuted by my colleagues, is that lack of cultural coherence among the mission Indians may have led to an easier situation for the European and Mexican missionaries in that they themselves *did* present an alternative cultural pattern of coherence. In addition, the native peoples were under other pressures from Lipan Apache groups, leading to stress on their cultural forms from more than one source. In any case, the complete and rapid acculturation on the frontier is a fact, whatever the explanation.

SOME EARLY AND NORTHERLY OCCURRENCES OF THE *CLEAR FORK* GOUGE

Jack T. Hughes

Introduction

The *Clear Fork* gouge is a tool form found commonly in parts of northeastern Mexico and adjacent southern Texas. The purpose of this paper is to provide additional distributional information. I will describe some occurrences of the *Clear Fork* gouge northward from the type locality on the Clear Fork of the Brazos River in north-central Texas, where frequent finds of these implements were reported in various papers by Dr. Cyrus N. Ray during the 1930s and 1940s. The type locality is in the vicinity of Abilene, Texas, at the southern end of the Rolling Plains, or Osage Plains, just north of the Callahan Divide, which forms the northern escarpment of the Edwards Plateau. The Permian redbeds of the Rolling Plains present a terrain and a vegetative cover which are in sharp contrast with those of the higher Cretaceous limestones of the Edwards Plateau to the south.

The present remarks provide some additional information about occurrences of the artifact type in northwestern Texas, and call attention to some occurrences northward into the western Great Plains of Oklahoma and New Mexico, Kansas and Colorado, Nebraska and South Dakota.

Northwestern Texas

Clear Fork gouges are abundant at many sites in the upper Red River drainage immediately to the north and northwest of the Clear Fork drainage (Hughes 1972, 1973). The sites with gouges are located along the Wichita, Pease, Little Red, Prairie Dog Town Fork, and Salt Fork tributaries of the Red River. Like the Clear Fork drainage, these tributaries drain the southern portion of the Rolling Plains. The terrain consists of deeply and extensively eroded Permian redbeds so full of gypsum and salt that sweet water is rare. The semi-arid climate is very hot in summer and cold in winter. Mesquite is the dominant vegetation, with juniper in the breaks; and in many respects the country is reminiscent of the Coastal Plains of southern Texas and northeastern Mexico. Bison bones are rarely seen in the stream banks or on the sites.

The gouge sites are located on the valley rims and slopes, or on the older, higher stream terraces. These locations are often strewn with residual gravels. The sites are marked by quantities of hearthstones and chipping debris. The gouges are accompanied by many hammers, choppers, and crude bifaces. Milling stones are rare, as are projectile points. The points occur in a variety of forms, suggesting mainly Early and Middle Archaic affiliations.

The gouges of the upper Red River drainage assume a wide variety of forms, including some made by chipping a concave bit at one end of a small block of silicified wood, and a few that are reminiscent of the semi-lunate form common in southern Texas and northeastern Mexico.

To the west and northwest of this country is the lofty piedmont plateau known as the Llano Estacado, Staked Plains (more properly Stockaded Plains?), or Southern High Plains. The Llano Estacado is bordered on the east by a tall rugged escarpment resulting from the headward erosion of the Colorado, Brazos, and Red Rivers; on the north by the breaks of the Canadian River, which has cut a broad deep trench entirely across the High Plains; and on the west by the valley of the Pecos River, which has carved its way northward between the piedmont and the Rockies, threatening to pirate the headwaters of the Canadian River.

The eastern, northern, and western edges of the Llano Estacado constitute an attractive environment, rich in mineral, floral, and faunal resources, and possessing many fine springs of sweet water from the Pliocene Ogallala aquifer which forms the Caprock of the Llano Estacado. The edge-breaks environment also provides easy access to the vast level summit of the elevated piedmont, which has its own special resources in the form of countless migratory waterfowl on the thousands of playa lakes, and until recently, great bison herds on the treeless expanse of grassland.

Despite the obvious attractions of the edge-breaks environment today and in the recent past, gouges occur only rarely along the eastern and northern edges of the Llano Estacado, and the same may be said for sites of probable Early and Middle Archaic age. On the other hand, Paleo-Indian sites, and especially sites of Late Archaic and Neo-Indian age, are numerous. One wonders if the Llano Estacado during Altithermal times, from about 7000 to 4000 B.P., had too little rainfall, thus too little grass, thus too few bison to be attractive to people of the Early and Middle Archaic stages. Dillehay (1974) has presented evidence for a period of bison "absence" on the Southern Plains from about 8000 or 7000 B.P. to about 4500 B.P.

Elsewhere Along the High Plains

In southwestern Oklahoma, in the Rolling Plains along the Salt and North Forks of the Red River, gouges are included in the Summers complex as defined by Leonhardy (1966). In addition to gouges, the Summers complex possesses a variety of projectile points, and certain kinds of knives, scrapers, choppers, gravers, milling stones, and rock hearths. The point types indicate a Late Archaic age for the complex; a radiocarbon date is 2770 B.P.

In northeastern New Mexico, I have seen gouges in private collections from sites in the upper Canadian River drainage, between the High Plains to the east and the Rockies to the west. The gouges tend to be small and usually are made of hornfels.

With regard to Kansas, a search of Dr. Waldo R. Wedel's *Introduction to Kansas Archeology* (1959) failed to reveal any mention of gouges. In a telephone conversation, Dr. Wedel indicated that he was not aware of the presence of any gouges in Kansas. One can only conclude that if they are present, they must be scarce.

With regard to Colorado, I have had no opportunity to search the literature nor to confer with anyone familiar with the archaeology of the state.

In southwestern Nebraska, on Medicine Creek in the upper Republican River drainage at the eastern edge of the High Plains, gouges were reported as characteristic of the Frontier culture complex at the Allen site by Holder and Wike (1949). Although Holder and Wike classify the artifacts as "trapezoidal scrapers," they note a "striking resemblance" to *Clear Fork* gouges. My own examination of the specimens gave the same impression. Associated with the gouges were large lanceolate projectile points resembling those at the Long site in southwestern South Dakota, and small lanceolate projectile points resembling those at Signal Butte I in western Nebraska. The Frontier culture complex also includes knives, drills, bola weights, abrading stones, hematite pigment, and hammerstones; bone needles, awls, and fishhooks; and bison remains and unprepared hearths. Three radiocarbon dates of 5256, 8274, and 10,493 B.P. from the Allen site (Wormington 1957:138) leave some doubt about the true age of the Frontier culture complex.

In southwestern South Dakota, an incomplete artifact closely resembling a *Clear Fork* gouge was found at the Long site and reported as such by Hughes (1949). The Long site is in the Cheyenne River valley at the southern end of the Black Hills, nor far north of Pine Ridge, which forms the northern edge of the High Plains. Associated with the gouge were lanceolate projectile points which were originally labeled *Long* points (too descriptive) and later re-named *Angostura* points (meaning narrow). The Long site also produced a variety of knives, scrapers, and drills; a hammerstone, a mano, and small fragments of worn rock; and surface fireplaces without rocks. The age of the Long site, like that of the Allen site, remains in some doubt; three radiocarbon dates are 7073, 7715, and 9380 B.P. (Wormington 1957:140).

To quote from Hughes (1949:271), "[Gouge-like] artifacts were not found elsewhere during the two preceding seasons of field work by the Missouri Valley Project in Wyoming and Montana, nor do they seem to have been reported anywhere else in the northern and western Great Plains. That they are extremely rare or altogether absent in late horizons of this region seems clear. Their occurrence at the Long and Allen sites suggests that they may have some value as early horizon markers, at least in the region under discussion; their similarity to the *Clear Fork* gouges of north and central Texas opens some intriguing questions."

Conclusions

Although the need for a much more thorough study of the northerly distribution of *Clear Fork* gouges is obvious, the casual observations reported above clearly indicate that gouges are virtually non-existent on the High Plains; that they occur rarely around the northern edges of the High Plains, where they are associated with *Angostura* or similar Paleo-Indian points; and that they occur much more frequently around the southern borders of the High Plains, where they are characteristic of Early and Middle and possibly some Late Archaic complexes.

The Paleo-Indian groups with gouges at the Long and Allen sites around the northern fringes of the High Plains clearly were beginning to supplement big-game hunting with utilization of other food resources; the Archaic groups with gouges around the margins of the southern High Plains appear to have been at least as dependent on gathering as on hunting.

One of the "intriguing questions" referred to above is: Did groups of Paleo-Indian big-game hunters, possessing *Angostura* points and *Clear Fork* gouges, and ranging widely down the Plains to the east of the Rockies from the Black Hills to the Gulf of Mexico, abandon the grassy High Plains from which the bison herds were disappearing at the onset of the Altithermal, and develop an "Archaic efficiency" at hunting and gathering in the brushy Rolling Plains of northwestern Texas and the Coastal Plains of southern Texas and northeastern Mexico?

Another of the "intriguing questions" is: Does the *Clear Fork* gouge of Archaic groups in the Plains brush country represent a wood-working tool equivalent to the ground stone adze of Archaic groups in the eastern Woodlands?

REFERENCES CITED

Dillehay, T. D.

1974 Late Quaternary Bison Population Changes on the Southern Plains. *Plains Anthropologist* (65):180-196.

Holder, P., and J. Wike

1949 The Frontier Culture Complex, A Preliminary Report on a Prehistoric Hunters' Camp in Southwestern Nebraska. *American Antiquity* 14(4), Pt. 1:260-266.

Hughes, J. T.

1949 Investigations in Western South Dakota and Northeastern Wyoming. *American Antiquity* 14(4), Pt. 1:266-277.

1972 Archeology. In Ark-Red Chloride Control Part 1, Areas VII, VIII, and X, Texas:2-30 to 2-45. Report submitted to the U.S. Army Corps of Engineers by West Texas State University.

1973 Archeology. In Environmental Inventory and Assessment of Areas VI, IX, XIII, XIV, and XV, Red River Chloride Control Project, Oklahoma and Texas:2-26 to 2-86. Report submitted to the U.S. Army Corps of Engineers by West Texas State University.

Leonhardy, F. C.

1966 Test Excavations in the Mangum Reservoir Area of Southwestern Oklahoma. *Contributions of the Museum of the Great Plains* 2.

Wedel, W. R.

1959 An Introduction to Kansas Archeology. *Bureau of American Ethnology Bulletin* 174.

Wormington, H. M.

1957 Ancient Man in North America. 4th ed., rev. *Denver Museum of Natural History, Popular Series* 4.

SUMMARY: WHERE DO WE GO FROM HERE?

Jeremiah F. Epstein

The papers given in this symposium are of such varied content and character that they cannot easily be synthesized. We have studies dealing with purely lithic materials, others with perishables, and still others with rock art. Chronology has been of great concern. Sequences dealing not only with artifacts, but also with diet and climate, are offered. While methodological considerations are implied in all of the presentations, two papers deal with them explicitly, one from the viewpoint of an Americanist hoping to construct a model, the other from the perspective of a Mesoamericanist looking at a Chichimec world that fits no Mesoamericanist's conceptual framework. The implicit assumption behind these presentations is that somehow and in some way a larger sense can be made out of the separate contributions, if not now, then at least some day.

While I would like to able to discuss each of the papers and tie them all together, it is clearly impossible to do so. There are just too many problem areas that deserve extended discussion. At this time, I will comment on only two subjects, both of which are of particular interest to me, and will end with a discussion of some rather obvious areas where future research is needed.

Environment and Adaptation

In our quest for understanding prehistory, we have long subscribed to the view that reconstructing a culture is more or less impossible without knowing the environment in which that culture existed. That relationship is usually phrased as "adaptation." While it may be comforting to know that culture is adaptive, this is only the starting point. What is at issue is the nature of the adaptation. If that relationship were obvious we could determine the function of tools once we knew the environment, or reconstruct the environment once the specific functions of tools were determined. Clearly, if man lives in an environment, he has adapted to it. He has selected from that environment what he has appraised as useful, and this appraisal is the product, inter alia, of his own culture history. The significant question, as I would see it, is how successful were the choices? Were people using the environment as best they could? Were they using the tools they had to best advantage? Could they have done significantly better with a different culture inventory? Were these people availing themselves of all that the environment had to offer?

It is in this connection that the studies of Bryant, Fry, and Riskind are especially useful, for their data permits reconstruction of both climate and diet. With information of this kind, we should be able to distinguish between what was available to eat and what was actually consumed. Although they do not concern themselves specifically with this problem, the potential is implicit in their work.

Bryant and Riskind give us a sketch of the paleo-environmental history for northeastern Mexico as it is known from the pollen record. Not unexpectedly, the data is far from complete, and not at all consistent. They are reluctant to make broad generalizations for a number of reasons. One concern is that temperature changes in northeastern Mexico may not have been as dramatic as those close to the glaciers; another is that significant changes in vegetation could have been created by even slight changes in temperature and weather patterns. It is apparent from the information now at hand that there were many local ecological niches, each with its own separate environmental history.

Bryant and Fry's coprolite analysis paper* is especially important, for it brings together the material from MacNeish's Tamaulipas excavations which were analyzed by Eric Callen, Fry's study of Taylor's material from Frightful Cave, and Bryant's data taken from various areas in Texas.

Callen's data is disturbing, for it indicates that there is no one-to-one relationship between the plant materials found in the archaeological deposits and what is represented in the coprolites. Thus, while MacNeish notes that Zea maize occurs in both Flacco and Guerra phases, no evidence of this extraordinarily important plant was found in the coprolites attributed to the same phases! The same kind of discrepancy was pointed out by Callen (1967) in his analysis of the coprolites from Tehuacan. Is this lack of correspondence between the two kinds of data perhaps the reflection of a deposit more scrambled than we had supposed, or does it indicate that people were bringing corn into the caves long before they thought of eating it? Whatever the explanation, and there must be many that are much more plausible, we have a problem that begs for resolution.

In this connection, it should be noted that at Frightful Cave the coprolites themselves were radiocarbon dated, and thus we have chronological information on diet that has to be more valid than that obtained by dated materials associated with them. In the case of Frightful Cave, this is especially important, for the radiocarbon dates published earlier (Taylor 1956) indicated that the deposit was very mixed. In terms of method, dating the coprolites themselves is methodologically an innovation, and certainly the soundest way to approach the problem of chronological changes in diet.

There are a number of differences between the Tamaulipan and Coahuiltecan coprolite samples. Perhaps the most interesting is that the Coahuiltecans had a much more varied diet, eating an amazing number of different seeds and flowers. In both areas the major dependence was on the agaves and opuntia, but in the Ocampo Caves, we find that beans (*Phaseolus*), squash (*Cucurbita*), and chili peppers (*Capsicum*) occur in all periods, whereas these plants do not in Coahuila. One would somehow expect to see in the latest deposits in Ocampo a significant shift in diet towards the direction of domesticated crops. Strangely, this is not the case; the proportions of identified plants remain strikingly unchanged from Ocampo times (4000 B.C.) onward, and both agave and opuntia constitute major dietary items. I find it of particular interest that, after 2000 B.C., the

---

*This paper is not reproduced here. See Bryant 1975.

number of seeds in the diet at Frightful Cave increase markedly, a trend which Bryant and Fry point out also occurs in Utah at both Danger and Hogup Caves. Even though there were no cultigens in the diet of Frightful Cave inhabitants, I cannot help but wonder whether this increase in seed gathering does not mirror in some distant way the activities of the agricultural seed gatherers in Tamaulipas and elsewhere. Both farmers and gatherers collect seed, but the farmers plant a portion of those they gather; presumably nomadic hunter-gatherers do not. The Ocampo population also had available to them the Mesoamerican diet of squash, beans, and chili peppers--plants which somehow never seem to have intruded into the area around Frightful Cave.

Not being a botanist, I do not feel the same constraints as those of which Bryant, Riskind, and Fry are most surely aware. They are reluctant to generalize about the climate of northeastern Mexico because they believe that too many individual environmental niches exist, and the information is much too limited from which to extrapolate. For my part, I am impressed with the fact that, at both Frightful Cave in Coahuila and in the Ocampo Caves of Tamaulipas, the diet seems to have been remarkably uniform since about 7000 B.C. Granting shifts in reliance upon opuntia as opposed to maguey, and a slight increase in the dependence upon cultigens in Tamaulipas, there does not seem to be a major shift in diet--no new plants are being eaten. I would suspect that this suggests a relatively stable environment or, if you wish, one that did not change enough to introduce a new series of edible plants in the diet. It can be argued, of course, that coprolites show us what people chose to eat, not what was available--yet if something new and edible were to have appeared as a result of climatic changes, I am sure they would have eaten that too.

Was There a Common Culture in Texas and Northern Mexico?

Perhaps one of the most interesting problems we have is defining the nature of our geographical focus. For political reasons, we find ourselves members of two nations, working in contiguous regions. Was the Rio Grande, or Rio Bravo, which divides us today, ever a barrier in the past? In short, was there a common culture that existed in the past?

Clearly, the papers given here are not in substantial agreement. Jelks* offers a series of projectile point sequences for both Texas and northeastern Mexico. He claims that "A distinctive, relatively uniform archaeological culture existed prehistorically in Northeastern Mexico and South Central Texas," and he views this as "a discrete culture area" which he calls the "Diablo Range." Jelk's statements, and his chronology, are based only on parallel changes in projectile point styles; and the similarities he sees in the overall culture are obtained by abstracting the basic features of various named and unnamed point types into a larger category called "series."

In somewhat the same way, Adovasio sees a unity in basketry complexes, and in fact considers that the basketry technology of the lower and trans-Pecos of Texas derives from northeastern Mexico--a view earlier stated by Walter W. Taylor

---

*This paper has been published elsewhere; see Jelks 1978.

(1966). Adovasio's distinctions, like those of Jelks, are useful and important. They tell us that there was enough interchange between northeastern Mexico and central Texas to permit the sharing of technological forms and procedures, but clearly there is more to "culture," even archaeological culture, than just form and procedure.

The issue becomes more confused as we become more concrete. While I do not contest Jelks' general picture, I am impressed with the fact that there is a long tradition of small lanceolate and triangular projectile points in northeastern Mexico that does not seem to occur in Texas. Furthermore, burins are relatively common in Texas, and rare in northeastern Mexico. Thus, I see the lithic culture of the two areas as arising from different well springs. Hester, working in south Texas, and paying particular attention to the details of total artifact complexes and environmental adaptations, sees few valid correlations and too many divergent cultural assemblages to warrant lumping anything together.*

What all of us are dealing with is a difference in our perception of what is important and the methods we use to demonstrate it. We seem to be saying, if you look at culture superficially, that you can see broad patterns emerging. But if you complicate the picture by introducing lots of data, the picture becomes fuzzy, if not downright confusing. Obviously, if we deal at a high enough level of abstraction, we can see similarities between the cultures of any two areas. I leave it to all of you to choose that level of abstraction (or concretization) which is most useful or meaningful to yourselves.

Directions for Future Research

It is just about *pro forma* today to end any research paper or symposium with a statement that future research is needed to answer the questions we now ask and to clear up the confusion in which we find ourselves. In view of the extensive work that has been done in Texas, and the relatively limited research in northeastern Mexico, it follows that, for a relatively balanced assessment of the prehistory of both areas, much more work has to be accomplished in Tamaulipas, Nuevo Leon, and Coahuila. I would like to end this discussion with some comments on how or in what directions this research should go.

At the most obvious level, we should try to answer the kinds of questions that have been posed in the individual papers given in this symposium. A critical question is how long northeastern Mexico has been occupied. Nance's data from La Calsada give us the earliest dates so far for northeastern Mexico, going back to about 8900 B.C. Somewhat more recent dates have been obtained at Frightful Cave. Have we reached the bottom of the barrel? In view of the still earlier materials that are being reported from Mexico and South America, it would hardly seem so. Yet it is just possible that the major movements to the south were through northwestern rather than northeastern Mexico.

---

*It is exactly these kinds of details that cause problems for someone schooled in Mesoamerican categories, as Braniff notes so passionately. Is there a Mesoamericanist who would hypothecate a cultural tradition just on the basis of projectile points, baskets, or burins?

A major problem will be to identify these early materials as such, once they are found. At this writing, the desert has given us no diagnostic time marker for early man. Nance's work at La Calsada indicates that the earliest points in northeastern Mexico are not *Lerma* or the well-known Paleo-Indian types, but rather small lanceolate, triangular, or diamond-shaped forms. Because these small points are easily confused with later types, their intrinsic "earliness" is only recognizable when they occur in excavations along with adequate geological, palynological, and radiochronological associations. Thus most surface survey material will not prove too helpful in searching for early man.

Chronology will always be a problem area. We have to maintain our concern with reconciling archaeological sequences until we are sure the discrepancies that exist do indeed reflect local situations, and not the artifact mixing that is inevitable in any archaeological site. At this writing we have a rough enough level of correspondence in site sequences for Jelks to propose a broad chronology for all of northeastern Mexico and south-central Texas. But here we are talking in very crude terms, for the most part in units that exceed a thousand years. While for most archaeological purposes these divisions pose no problem, for the "new archaeologist," who is more concerned with horizontal relationships, these crude temporal distinctions can be of little use. So, in spite of its tedious aspect, chronological refinements are necessary--not as the end, but as the initial part of our understanding of prehistory. The need for this kind of precision is most obvious, for example, in working out the dating and associations of the surface complexes in western Coahuila that Heartfield discusses in her paper. Why is it that the Laguna Mayran pottery is associated with arrow points, while at Charco de Risa these same arrow points are very scarce? Is this the result of a functional-ecological situation, or time, or both? If we ever find the answer to these questions and the source of these ceramic traditions, time is going to be an important consideration. Usually we date arrow points by their ceramic associations. Here, in Coahuila, we seem to be in the anomalous situation of knowing more about the dates of the projectile points than of the ceramics.

The questions raised by Bryant and Fry, and by Bryant and Riskind, have been discussed already. It should, however, be apparent that if they are correct in believing that there are many ecological niches, each with a separate climatic history, then we will have to work out each one before we can talk about human adaptation in a significant way. The fortunate thing about pollen (and faunal) analysis is that it does not depend upon dry cave deposits for its data. The dietary picture, with its dependence on coprolites, is another thing, for only the dry caves preserve human excrement. Then why not dig in dry caves for more coprolites? The trouble is that there are few areas left where such deposits exist. Not only has artifact looting taken its toll in those areas of Nuevo Leon and Coahuila where I have been, but the caves and shelters have also been systematically looted for their guano, or pack rat dung. On two occasions I have seen shelters that had been stripped clean by laborers, who sold the cave deposit to local farmers as fertilizer. In short, I am not sanguine about finding many untouched dry caves in the future; and unless the Instituto Nacional de Antropología e Historia and the Mexican government enforce strict rules for their preservation, most of this archaeological material will be lost.

Our concern with dry caves is not just with the plant foods and the coprolites that happen to be preserved, but also with all the rest of the perishable artifacts--baskets, cordage, matting, netting, bows, arrows, atlatls, sandals, medicine kits, and blankets. Fry has shown chronological differences in basketry technology, and I imagine that detailed studies of the other items would also show revealing changes. What is most important is that these objects tell us so much more than the chipped stone assemblages with which we usually work. The function of perishable materials is usually obvious, and they lend themselves more to historic interpretation than lithics. It is rare, for example, to find ethnohistoric reports that discuss projectile points, scrapers, or pebble choppers; but descriptions of clothing, arrows, bows, and headdresses do occur.

We can, therefore, identify our perishable materials by a careful utilization of the historic sources, and in many instances recognize the ritual paraphenalia associated with specific ceremonies. With this kind of information at hand, we can then move, with suitable caution, to the identification of specific late protohistoric or historic tribes who were known to inhabit a region.

Whatever our ultimate aim in archaeology may be, part of it certainly involves an effort to reconstruct the past. Today there are so many of us, each with our separate burning question to answer, that I can envision no time in the future when all of our disparate efforts will be coordinated. Yet it seems to me that if we are ever going to put meaning into those stones of ours, there has to be some work done on the historic and protohistoric periods of northeastern Mexico, with archaeologists and ethnohistorians working together. I am suggesting the most obvious kind of thing, going from the known to the unknown. If we start with a sound knowledge of ethnohistory, excavate historic sites (as, for example, missions with their Indian compounds such as outlined by R.E.W. Adams for Guerrero), and then slowly work back to protohistoric localities, we can gradually build a sound structure of the past which will incorporate the meaning systems of the Indians as they existed in the sixteenth century. From here we can work backwards slowly and cautiously, incorporating as well what we have learned from linguistics and the other social-behavioral sciences, to reconstruct still earlier periods. If we do not do this, we are doomed to discussions of fossilized meanings rather than of culture.

REFERENCES CITED

Bryant, V. M., Jr.

1975 Pollen as an Indicator of Prehistoric Diets in Coahuila, Mexico. *Bulletin of the Texas Archeological Society* 46:87-106.

Callen, E. O.

1967 Analysis of the Tehuacan Coprolites. In *The Prehistory of the Tehuacan Valley: Vol. 1, Environment and Subsistence*:261-289. University of Texas Press, Austin.

Jelks, E. B.

1978 Diablo Range. In R. E. Taylor and C. W. Meighan, eds., *Chronologies in New World Archaeology*:71-111. Academic Press, New York.

Taylor, W. W.

1956 Some Implications of the Carbon-14 Dates from a Cave in Coahuila, Mexico. *Bulletin of the Texas Archeological Society* 27:215-234.

1966 Archaic Cultures Adjacent to the Northeastern Frontiers of Mesoamerica. In G. F. Ekholm and G. R. Willey, eds., *Handbook of Middle American Indians* 4:59-94. University of Texas Press, Austin.