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Vol. XXI

No. 3

ARCHAEOLOGICAL ISSUE

AND

West Texas Historical and Scientific Society

Publication Number Ten

PUBLISHED QUARTERLY AT THE SUL ROSS STATE
TEACHERS COLLEGE, ALPINE, TEXAS, SEPTEMBER 1, 1940

Entered as second class matter March 12, 1920, at Alpine, Texas,
under Act of August 24, 1912

ERRATA SHEET

PUBLICATION NUMBER TEN

The table below is a list of corrections of errors in the printing of this publication. The college and the authors are in no way responsible for these errors, nor for the omission of diacritical marks in the publication.

Page	Line	Correction
15	9	For <u>sowthwest</u> read <u>southwest</u> .
15	22	For <u>souhtward</u> read <u>southward</u> .
22	13	For <u>accumulation</u> read <u>accumulations</u> .
24	5	After <u>secondary</u> omit comma.
27	20	For <u>rock shelter</u> read <u>Rock Shelter</u> .
27	24	After <u>secondary</u> omit comma.
28	9	For <u>Shafts</u> read <u>Hafts</u> .
34	36	For <u>cermaics</u> read <u>ceramics</u> .
38	9 & 14	Omit <u>5</u> and <u>6</u> .
44	28	For <u>precence</u> read <u>presence</u> .
59	31	For <u>band</u> read <u>bank</u> .
60,	footnote 108:	For <u>Cleak Fork</u> read <u>Clear Fork</u>
103	a:	For <u>1</u> , <u>4</u> read <u>1-4</u> .
105	22	For <u>stream</u> read <u>stratum</u> .
118,	Insert heading:	<u>Artifacts from the Maravillas Complex</u> .
137	19	Close quotation after <u>top</u> .
137	29	Close quotation after <u>diameter</u> .
142	8 & 9	For (<u>Sayles and Gladwin (Brazos River II)</u>) read (<u>Sayles and Gladwin, Brazos River I</u>).
146	8	For (<u>Sayles, 1933</u>) read (<u>Sayles, 1935</u>).
146	14	For <u>Pate XII</u> read <u>Plato XII</u> .
147,	footnote 221, line 4:	For <u>taht</u> read <u>that</u> .
151,	footnote 321:	Should read <u>231</u> .
157	7	For <u>Llying</u> read <u>Lying</u> .
158,	footnote 253, line 3:	For <u>Sosiety</u> read <u>Society</u> .
158	31	After <u>reported</u> substitute comma for period.
160	16	For <u>near</u> read <u>nearer</u> .
164,	Antevs, 1925:	For <u>Plietocene</u> read <u>Pleistocene</u> .
166,	Campbell, et al:	For <u>Plestocene</u> read <u>Pleistocene</u> .
170,	Ray, 1930:	For <u>Alibene</u> read <u>Abilene</u> .
172,	Sayles, 1933:	For <u>1933</u> read <u>1935</u> .

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The courses offered at Sul Ross attempt to make the fullest possible use of the natural advantages of the area.

The department of art, in addition to the regular offerings, conducts an art colony each summer so that those interested in the beauty of the Big Bend may find an outlet for their talents and at the same time secure academic credit.

Biology courses, in addition to the usual study of basic principles and the usual survey of the plant and animal kingdoms, draw heavily upon the flora and fauna of the Big Bend for purposes of illustration.

Students are attracted to the study of anthropology and geology here because this region is one of the world's richest natural laboratories for such studies.

Folklore and Spanish-American relations are perpetuated in the school through organizations, such as the Pioneer Club and the Spanish Club, sponsored by the departments of physical education and Spanish.

Nearness to historic forts, watering places, and old trails make the study of Latin-American and Southwestern History doubly attractive at this institution.

There are three principal aims of graduate study in Sul Ross College. They are, first, the mastery of subject matter; second, the mastery of the methods and technique of research; and, third, the cultivation of the spirit of independent teaching ability.

FIELD AND GRADUATE STUDY

Major and minor work may be taken in most departments of the College, provided the courses which the student plans to take are approved in advance by his major professor and the Dean of the College. The major and minor work should be in closely related fields of study.

For additional announcements regarding courses and work offered at Sul Ross, the reader is referred to the current issue of the Annual Catalogue.



**Museum Building of the West Texas Historical and Scientific Society,
located on the Sul Ross College campus, Alpine.**

COLLEGE CALENDAR

Second Semester begins January 29, 1941

Summer Session begins June 5

The annual meeting of the West Texas Historical and Scientific Society will be held on the Sul Ross College Campus during February.

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FOREWORD

The West Texas Historical and Scientific Society was organized in the year 1926. Although the organization is incorporated and its membership is national in scope, it is sponsored by the Sul Ross State Teachers College, and the Museum Building and offices are on the campus of the college in Alpine. Its museum director, many members of its research staff, and a number of active members are also members of the Sul Ross College faculty. The purpose of the Society is to sponsor and encourage research, and to preserve scientific and historical facts and materials. In this respect the report which follows indicates the type of research in which the College and Society are interested, as well as the desire of both groups to co-operate with outside agencies who hold to similar objectives. An example of the co-operation between the college and residents of West Texas has been the construction of the Big Bend Memorial Museum. This building, a \$75,000 structure, is one of the most beautiful buildings on the college campus. Each phase of the museum's activities has its own room. Exhibits in Art, Archaeology, Geology, and History, also in Indian, Mexican and Pioneer lore are open daily to the public. Files and artifacts are available to advanced students for study and comparison.

Most of the Society Publications which have preceded the current number have included a variety of materials dealing with historical, scientific, and related topics. Beginning with Publication No. 8, however, this policy was altered to include only one theme. For this issue the Publications Committee is indebted to Charles Kelley and T. N. Campbell for their careful and energetic field work as well as the document which this publication contains. While the authors have included their acknowledgements elsewhere, the Committee feels that the assistance rendered in the field by Donald Lehmer, Paul Ezell, and Joseph Toulouse deserves complimentary approval here.

In the field work as well as in the local Museum activities, the College and Society have received most helpful co-operation from the Professional Projects Division of the W. P. A. Very little of the excavation work described in this Publication would have been possible without this help and the intelligent co-operation of Mrs. Loretto B. Rand, of the El Paso office of W. P. A., who has been invaluable to the local committee in arranging and maintaining this vital assistance.

Publications of the Society are not for sale. Members receive the Publications at no charge beyond the usual \$1.00 per year membership fee. One of the quarterly bulletins of the College is usually devoted to the co-operative findings of the College and the Society. The work of the Museum is not limited, however, to the members of the Society and to the College; outside educators

and investigators are invited to make it a center of research and activity. West Texas and the Big Bend area are rich in opportunities for the study of history, biology, archaeology, paleontology, and geology. The area has been a source of subject matter for research dissertations for the Masters' and Doctors' Degrees, and the Society and the College welcome interested scholars whether they wish to work toward an advanced degree in Sul Ross, carry on independently, or work with other institutions.

Much of the class work of the departments of the college is centered around the units of the museum. Public lectures of interest to science classes are scheduled; students in archaeology and geology have used the Museum exhibits as related classroom materials; art students use the art gallery for both local and traveling exhibits; and graduate students, in groups or working individually, have received help in their particular fields of investigation.

It is our desire that the available "field laboratories" in this area, and the Museum may become increasingly important to students and investigators working in co-operation with the Museum Staff.

In making possible the co-operative program represented in this Publication, the committee wishes to acknowledge the generous and continued assistance of the Peabody Museum, Harvard, represented by Donald Scott, Director.

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ACKNOWLEDGEMENTS

The intelligent interest and generous aid of a large number of people made this report possible. To all of these individuals, far too numerous to name here, the authors take this opportunity of expressing their gratitude. In particular our most sincere thanks go to Mr. Travis Roberts for his outstanding work in the discovery of the buried sites and for his continued interest and aid over a period of several months; to Mr. V. J. Shiner for his generosity in turning over his own sites to the Expedition; to Mr. Donald Scott of Peabody Museum and Mr. Victor Smith of Sul Ross College for their long suffering patience in supplying the needs of the Expedition and in expediting the preparation of this report; to Drs. Kirk Bryan and Claude Albritton for their excellent co-operation in the field and in the laboratory; to Mrs. Kate Neville for her generosity in allowing us not only the use of her land but of all the resources of her ranch as well; to Mr. Lee Kokernot, Mr. Denman Moody, and to the Bloys Camp-meeting Association for granting us permission to excavate on their land, and to Mr. Barry Scobee for his efforts in our behalf. Much of the routine of chart making fell to Mrs. Edith Salyer, and many of the plates were prepared by Lois Neville-Kelley. They have not only our thanks but our sympathy as well. We appreciate greatly the willingness of Mr. E. B. Sayles, Mr. Harold S. Gladwin, Dr. Ernest Antevs, Mr. A. T. Jackson, and Dr. Cyrus N. Ray to place their own experience in covered site excavation and study at our disposal. Finally, our greatest debt of gratitude is to Dr. Clyde Kluckhohn whose insight and constant interest made the Expedition possible, and to Donald Lehmer, Paul Ezell, and Joseph Toulouse, our field assistants, who found that deep site work is made up largely of perspiration and blisters, but who carried on nevertheless.

J. CHARLES KELLEY

T. N. CAMPBELL

**THE ASSOCIATION OF ARCHAEOLOGICAL MATERIALS
WITH GEOLOGICAL DEPOSITS IN THE
BIG BEND REGION OF TEXAS**

J. CHARLES KELLEY
T. N. CAMPBELL
DONALD J. LEHMER

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THE ASSOCIATION OF ARCHAEOLOGICAL MATERIALS WITH GEOLOGICAL DEPOSITS IN THE BIG BEND REGION OF TEXAS

PART I

INTRODUCTION

By

J. CHARLES KELLEY

The Texas "Big Bend region" as used in this paper is defined as approximately the areas of Jeff Davis, Presidio, and Brewster Counties.¹ It lies west of the Pecos River and within the "Big Bend" of the Rio Grande. The investigations here reported did not cover the entirety of the area, but were concentrated largely in the northern and central sections. There is, however, little doubt but that similar materials and associations occur throughout the Big Bend and beyond its boundaries.

The purpose of this paper is to present the findings of a co-operative expedition of the Peabody Museum of Archaeology and Ethnology of Harvard University, and the Sul Ross State College of Alpine, Texas, into the Big Bend region in 1938, and to correlate these findings with the previously known archaeology of the region. This expedition was in the field from January 1 to September 1, 1938, and was organized to investigate the occurrence of human skeletal remains and archaeological materials in association with geological deposits as previously reported by the archaeological staff of the Sul Ross State College. The geological aspects of the problem were studied by Drs. Kirk Bryan and Claude C. Albritton under a grant of the Geological Society of America and are reported in detail in the Bulletin of the Society.²

GEOGRAPHIC FACTORS

The Big Bend has an extremely varied topography and shows a considerable range in precipitation and in temperature, and also a wide variation in the distribution of animal and vegetable life zones. For convenience, the area can be divided into three major geographical sub-

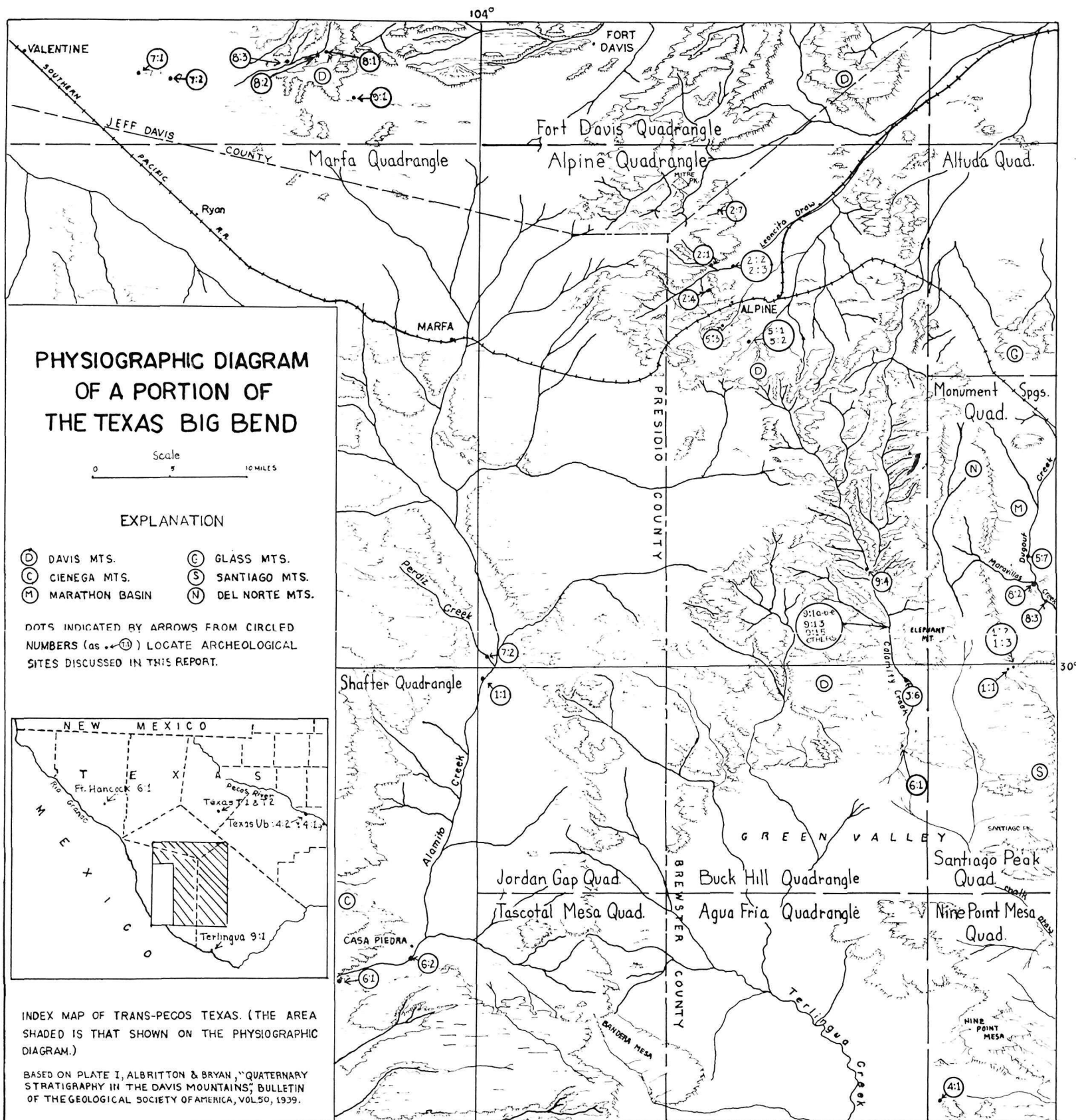
1.

This is an arbitrary usage, differing somewhat from the various published definitions of the term, which are also arbitrary.

2

Claude C. Albritton, Jr., and Kirk Bryan, "Quaternary Stratigraphy of the Davis Mountains, Trans-Pecos Texas, **Bulletin of the Geological Society of America**, Vol. 50, pp. 1423-1474, New York, 1939.

Map 1—PHYSIOGRAPHIC DIAGRAM OF A PORTION OF THE TEXAS
BIG BEND, showing archaeological sites. Based on Plate 1, Albritton
and Bryan, 1939.



divisions: 1. The high mountains and their associated canyons. 2. The high interior basins, valleys, and plains. 3. The Rio Grande Valley, and its immediate tributary valleys of relatively low elevation. The mean annual precipitation ranges from 18 inches in the Davis Mountains (Fort Davis: 17.03 inches) to about 9 inches in the Rio Grande Valley (El Paso 9.16 inches. There is no available data from Rio Grande stations within the defined area).³ The temperature varies from a mean of 60.8 degrees Fahrenheit (range: 3.0 to 111.0 degrees F.) at Fort Davis to a mean of 63.3 degrees Fahrenheit at El Paso (range 5.0 to 105.0 degrees F.). The region can best be classified under the **Bwh** division of the Koppen-Geiger system.

Vegetation runs from Pine-Pinon-Oak in the high mountains to Mesquite-Greasewood in the areas of lower elevation and lesser rainfall.⁴

Deer, antelope, bear, small mammals and birds still abound in the area. Lizards, snakes, and similar forms are numerous. Fish of several varieties are caught in the Rio Grande.

Geologically, the area is characteristically one of Cretaceous beds largely modified and covered by Tertiary volcanics with further modifications by later Tertiary and Pleistocene erosion. In the Marathon Basin, the Glass Mountains, and the Solitario Uplift are exposures of Mesozoic and Paleozoic rocks. Older rocks are similarly displayed in other minor outcrops. Near the Rio Grande fine grained alluvial beds of Pleistocene and Tertiary origin occur. These are often covered by the extensive and gently sloping gravel plains that are now cut by erosion into deep and steep-sided canyons and ravines.⁵

3.

Quoted from Carter, Beck, Smith, et. al., **Soil Survey (Reconnaissance) of the Trans-Pecos Area, Texas**. U.S.D.A. Bureau of Chemistry and Soils, Series 1928, Number 35, pp. 14 and 15 (Climate), n.d.

4.

"Alpine is located in the Aristidas-Boutelous Association of the desert plains or the Grassland Formation. To the south of Alpine we find the Bronze scrub (*Larrea-Flourensia*), the Mesquite (*Acacia-Prosopis*) and the Sotol (*Agave-Dasyliro*) associates of the Scrub-Climax Formation. In the Davis and Chisos Mountains, Petran Chaparral (*Cercocarpus-Quercus* Association), and the Petran Montane (*Pinus Ponderosa* Con-sociation) may be observed. Numerous canyons and isolated areas show evidences of developmental, pre- and post-climax conditions." Dr. Omer E. Sperry, published anonymously in **The Rossonian**, Vol. XVI, No. 5, Alpine, Texas, Feb., 1939.

5.

Best sources on the geology of the area are: 1. E. H. Sellards, W. S. Adkins, E. B. Plummer, and Charles Lawrence Baker, **The Geology of Texas**, Vols. I and II, Publications, Bureau of Economic Geology, University of Texas, Bulletins 3232 and 3401, Austin, 1932-1934. 2. Charles Lawrence Baker, **Exploratory Geology of a Part of Southwestern Trans-Pecos Texas**, U. of Texas Bulletin, No. 2745, Austin, 1927. 3. J. A. Udden, **A Sketch of the Chisos Country, Brewster County, Texas**, University of Texas Bulletin No. 93, Austin, 1907. 4. J. A. Udden, C. L. Baker, and Emil Bose, **Review of the Geology of Texas**, Bulletin of The University of Texas, No. 44, Austin, 1916.

Physiographically, the region is predominantly one of volcanic mountains, with the mesa type most often represented, separated by chains of interior basins and plains; the entire complex cut and modified by the Rio Grande, which has developed a series of deep gorges and canyons through the ranges. Fault and fold mountains are present, together with occasional laccolithic dome mountains, and many plugs and necks occur in the lower Big Bend. Mt. Livermore, in the Davis Mountains, has an altitude of 8,382 feet, while the Rio Grande in the Big Bend averages below 1,800 feet in elevation. The important drainage is into the Rio Grande through Alamito, Terlingua, and Maravillas Creeks, and into the Rio Pecos through Toyah, Limpia, and the Alpine-Comanche Creeks.

The present population of the Big Bend country is Anglo-American and Mexican. Within an area of approximately 12,000 square miles there are only 21,380 people; a ratio of 1.78 persons per square mile. The ratio is highest (3.2) along the Rio Grande in Presidio County, and lowest in Jeff Davis County (0.99). The great rugged expanse of Brewster County is intermediate with a ratio of 1.16 persons per square mile. Population centers are Marfa (4,200) and Presidio (1,500) in Presidio County; Fort Davis (1,000) in Jeff Davis County; Alpine (4,500) and Marathon (756) in Brewster County. There are several minor communities scattered throughout the region.⁶

The economy of the region is based largely on the livestock industry, with mining and agriculture as secondary industries. The tourist trade and certain specialized pursuits serve as supplementary sources of income.

Cattle are of primary importance, with sheep and goats secondary. In much of the area fine breeds of cattle are raised. There is some horse raising. Small ranches, as a group, are secondary in importance to the many very large ranches. Many of the Mexican peasants along the Rio Grande, however, maintain small flocks of sheep and goats in association with subsistence farms.

Agriculture is limited for the most part to fertile valleys along the Rio Grande. Alfalfa and cotton are the principal crops. The Presidio Valley is the principal farming area. There is some irrigation farming in the upland valleys, usually in connection with cattle raising.

Old established silver mines at Shafter and cinnabar mines at Terlingua and Study Butte, in southern Brewster County, add appreciably to

6.

All statistics quoted here are derived from the **Texas Almanac and State Industrial Guide**, for 1939-'40, published by the Dallas News, Dallas, Texas. Figures represent 1938 estimates. The 1930 census gives slightly lower figures.

the income of the area. The tourist trade, centering along the main east-west highway from San Antonio to El Paso, forms an ever growing industry. Commercial hunting and pleasure ranches contribute to the financial support of the population.

In addition to well maintained east-west and north-south highways, the area is crossed by two railroads; the Southern Pacific which connects the Big Bend directly with San Antonio and El Paso; and the Orient branch of the Santa Fe. The latter meanders through the area from northeast to southwest, following old Indian and Spanish routes, and serves as a link between San Angelo to the northeast and Chihuahua City, Mexico, to the southwest.

HISTORICAL AND ETHNOGRAPHIC FACTORS

First European contacts with the section came in 1535, when much of the Big Bend was traversed by Cabeza de Vaca.⁷ His description of the Rio Grande-Rio Conchos Valley⁸ below Presidio serves as one of the few good land marks on his route, and, incidentally, gives us our first ethnographical data for the area.⁹ In 1581 and 1582 the Rio Grande between La Junta and El Paso was followed by Rodriguez Expedition going to and from New Mexico.¹⁰ In 1583 the Espejo Expedition followed the same route as the Rodriguez Expedition en route to New Mexico but returned via the Rio Pecos to a point near Pecos, Texas, and from there swung southward through the Big Bend country, striking the Rio Grande near Candelaria and following it from that point down to La

7.

Fanny Bandelier, *The Journey of Alvar Nunez Cabeza de Vaca*, 1905, pp. 148-155.

Clifford B. Casey, "The Trans-Pecos in Texas History," *West Texas Scientific and Historical Society Publications*, No. 5, Alpine, 1933, p. 8.

8.

La Junta ("the Junction") is the term applied locally to that region of the junction of the Rio Conchos with the Rio Grande near Presidio, Texas, and Ojinaga, Chihuahua. This was likewise the term employed by the Spanish historians. It will be used to designate that locality throughout this paper.

9.

As this goes to press there has just appeared a new tracing of the route of Cabeza de Vaca (Cleve Hollenbeck, *Alvar Nunez de Cabeza de Vaca*, Glendale, 1940) based on known Indian trails. It takes de Vaca up the Pecos River, following the edge of the Trans-Pecos but missing the La Junta region entirely.

10.

George P. Hammond and Agapito Rey, "The Gallegos Relation of the Rodriguez Expedition to New Mexico," *Historical Society of New Mexico, Publications in History*, Vol. IV, Santa Fe, 1927, pp. 18, 22; 54, 55.

Junta.¹¹ In 1683 and 1684 the Mendoza Expedition marched down the Rio Grande from El Paso to La Junta, established Franciscan missions there and continued eastward into West Central Texas.¹² The La Junta missions were abandoned in 1686 and re-established in 1715. They were destroyed in an Indian uprising in 1725, but in the 1740's-1750's, when the valley of the Rio Conchos was better settled they were re-established. In 1760 the Presidio of Belen was built near La Junta.¹³ During the next century Mexican colonization of the more fertile and better protected portions of the Big Bend was completed.

Anglo-American occupation actually began in 1851 with the founding of a settlement at Presidio, Texas. Army posts were established at Fort Davis in 1854 and at Fort Pena Colorado in 1856. The Southern Pacific Railway was completed through the area in 1883 and the ranching industry began its growth. The majority of the warlike Indians were removed from the area about the same time, allowing complete settlement of the Big Bend, culminating in the cultural pattern of today.¹⁴

The ethnography of the Big Bend is badly confused and scantily studied, being derived mostly from accounts by Spanish historians. Indications are that there was a dual cultural division of the area. Along the Rio Grande and its immediate tributary valleys dwelt sedentary farmers. Historically, this was the physiographic area first colonized by Spaniards and Anglo-Americans. In the mountains, canyons and foothills semi-nomadic food-gatherers, hunters and raiders held sway. In high interior valleys, basins and plains both groups met; but this physiographic unit seems to have been largely dominated by nomads. This division into sedentary and semi-nomadic groups was naturally not a clear-cut one. The sedentary groups were addicted to hunting-trips into the mountains and probably even to the distant Texas plains. The semi-nomads seem to have practiced a certain amount of agriculture; and there seem to have been still other groups that cannot be classified as one or the other, for they spent much of the year in Rio Grande

11.

Diego Perez de Luxan, **Expedition into New Mexico Made by Antonio de Espejo, 1582-1583**, translation by G. P. Hammond and Agapito Rey, Quivira Society, Los Angeles, 1929; pp. 59-64; 125-126. J. Charles Kelley, "The Route of Antonio de Espejo Down the Pecos River and Across the Texas Trans-Pecos Region in 1583; Its Relation to West Texas Archeology," **West Texas Historical and Scientific Society Publications**, No. 7, pp. 7-25.

12.

H. E. Bolton, **Spanish Explorations in the Southwest, 1590-1706**, New York, 1916, "Itinerary of Mendoza," p. 325.

Victor J. Smith, "Early Spanish Explorations in the Big Bend of Texas," **West Texas Historical and Scientific Society Publications**, No. 2, Alpine, 1928, pp. 58-68.

13.

Charles F. Coan, **A Shorter History of New Mexico, Part I; Indian and Spanish New Mexico**, p. 99.

14.

Clifford B. Casey, **op. cit.**, pp. 10-15.

settlements and the remainder roaming and hunting throughout the area and beyond its bounds.

The accounts of Cabeza de Vaca,¹⁵ Gallegos,¹⁶ Espejo,¹⁷ Luxan,¹⁸ Mendoza,¹⁹ and Travasina²⁰ furnish a veritable treasure-house of information regarding the sedentary peoples living in the vicinity of La Junta and the neighboring portions of the Rio Grande and Conchos Valleys, as well as much data regarding nomadic peoples of the early historic period.

According to these accounts several towns of permanent houses and many small hamlets and scattered dwellings were found along the Rio Conchos from Cuchillo Parado to La Junta and both above and below La Junta for many leagues along the Rio Grande. Specific towns are named in the La Junta locality and the same names occur later in several of the accounts. Travasina in 1715 attributed, by actual census, a population of 1,405 to the Rio Grande and Conchos Valleys within a radius of 6 leagues of La Junta. One town alone was credited with 550 inhabitants.

The Spanish accounts speak of nomadic and warlike tribes residing in the mountains and backlands surrounding La Junta, but very little information of ethnographic value is given. We learn that many of these tribes lived by hunting; that they had only rude huts; that others planted small fields from time to time in the vicinity of springs. For the area within a radius of one hundred and fifty miles of La Junta, over a hundred tribal names are listed. Many obviously are duplications, many apply only to small bands, and others are merely different phonetic renditions of the same Indian name. Certain groups appear under the same name, however, in account after account.

When Anglo-American occupation began in the 1850's the outstanding nomadic Indians were the Mescalero Apache. Comanche raids and hunting excursions into the region were likewise common. By 1885 the last nomadic tribes had been either driven from the area or removed to reservations.²¹

15.

Fanny Bandelier, *op. cit.* (See footnote No. 9).

16.

George P. Hammond and Agapito Rey, 1927, *op. cit.*

17.

H. E. Bolton, 1916, *op. cit.*, "The Narrative of Espejo."

18.

Diego Perez de Luxan, *op. cit.*

19.

H. E. Bolton, *op. cit.*, "The Itinerary of Mendoza."

20.

Reginald C. Reinhold, (Translator) **The Founding of Missions at La Junta de Los Rios**, Supplementary Studies of The Texas Catholic Historical Society, Austin, 1938.

21.

Casey, *op. cit.*, p. 14.

HISTORY OF ARCHAEOLOGICAL RESEARCH

Archaeological studies were begun with Bartlett's description of pictographs at the Hueco Tanks near El Paso in 1854.²² About 1909 Peabody made a reconnaissance trip directly through the Big Bend.²³ During this same period collectors and amateur archaeologists were at work, but it was not until the establishment of the Sul Ross State Teachers College at Alpine in 1920 that any serious or valid research was undertaken. Victor J. Smith and a small group of other interested faculty members of the College, together with some local citizens, undertook to preserve and study items of scientific importance in West Texas. This effort materialized in 1925 with the organization of the West Texas Historical and Scientific Society at the College, followed by the establishment of a museum there.²⁴ Smith interested himself especially in rock shelter sites, and in 1927 called the attention of archaeologists to the existence in the area of a rock shelter culture having certain resemblances to the San Juan Basketmaker.²⁵ This was followed by other papers devoted to the culture, continuing to the present time. Smith's work in Big Bend rock shelters, when completely published and synthesized, will be the best obtainable source of information regarding the Big Bend Cave aspect.

In the vicinity of El Paso, rock shelters, showing human occupation, were visited by Roberts in 1921 but no excavation was attempted. Later in the 20's the El Paso Archaeological Society was organized, and in 1927 Mr. Robert P. Anderson and Mr. R. W. Stafford began a systematic exploration of shelters near El Paso. Roberts revisited the El Paso sites in the same year and in 1929 published a brief discussion of the finds.²⁶

The work of the Smithsonian was continued in the area by Stirling, who did reconnaissance surveys near Marfa in 1930,²⁷ and by Setzler

22.

J. R. Bartlett, **Personal Narrative of Explorations and Incidents in Texas, New Mexico, California, Sonora, and Chihuahua**, New York, 1854.

23.

C. Peabody, "Reconnaissance Trip in Western Texas," **American Anthropologist**, n. s., Vol. 11, pp. 20-22.

24.

Anna D. Linn, "The Society; Its History, Organization, and First Year's Activity," **West Texas Historical and Scientific Society Publications**, No. 1, Alpine, 1926, pp. 44-46.

25.

Victor Smith, "Some Notes on Dry Rock Shelters in West Texas," **American Anthropologist**, n.s., Vol. 29, p. 286.

26.

Frank H. H. Roberts, Jr., "Recent Archeological Developments in the Vicinity of El Paso, Texas," **Smithsonian Miscellaneous Collections**, Vol. 81, No. 7, Washington, 1929.

27.

M. W. Stirling, **Explorations and Field-Work of the Smithsonian Institution**, Publication No. 3111, p. 173.

with intensive rock shelter excavations near Marfa in 1931, near Alpine and the Chisos Mountains in 1932, on the Pecos River in 1933, and more recently in 1938. A summary of Setzler's findings, and the first good synthesis of the Cave Dweller Culture, was published in 1935.²⁸

Harrington in 1928 and Coffin in 1929 excavated a large rock shelter on Chalk Draw, south of Alpine, for the Museum of the American Indian, Heye Foundation.²⁹ Harrington's investigation also included certain rock shelter sites in the Chisos Mountains. In 1931 the Woolford-Martin Expedition of the Witte Museum of San Antonio did a reconnaissance survey in the Big Bend, excavating in numerous rock shelter sites during the course of their explorations.³⁰ In 1933 several rock shelter sites on the Rio Grande near Shumla, Texas, were excavated by the same institution.³¹ More recently the Witte Museum has excavated in a very large rock shelter near Langtry.

Jackson and Pearce, of The University of Texas, excavated a large cave in the Seminole Canyon in the lower Pecos River Country in 1932.³² And in 1934 Jackson explored several cave sites and midden sites in Culberson County, to the north and west of the Big Bend.³³ Jackson's numerous reconnaissance surveys through the area have been partially reported in a massive study of pictographs in Texas.³⁴

28.

F. M. Setzler, "A Prehistoric Cave Culture in Southwestern Texas," **American Anthropologist**, n. s., Vol. 37, pp. 104-110, 1935.

29.

Edwin F. Coffin, "Archaeological Exploration of a Rock Shelter in Brewster County, Texas," **Indian Notes and Monographs**, No. 48, Museum of the American Indian, Heye Foundation, New York, 1932.

30.

George C. Martin, **Big Bend Basket Maker Papers**, No. 1, Southwest Texas Archaeological Society of the Witte Museum, San Antonio, (n. d.)

31.

George C. Martin, **Big Bend Basket Maker Papers**, No. 3, Southwest Texas Archaeological Society of the Witte Museum, San Antonio, 1933.

32.

J. E. Pearce, and A. T. Jackson, "A Prehistoric Rock Shelter in Val Verde County, Texas," **Anthropological Papers**, Vol. 1, No. 3, University of Texas, Austin, 1933.

33.

A. T. Jackson, "Exploration of Certain Sites in Culberson County, Texas," **Bulletin of the Texas Archeological and Paleontological Society**, Vol. 1, Abilene, Texas, 1937.

34.

A. T. Jackson, "Picture Writing of Texas Indians," **Anthropological Papers**, Vol. II, University of Texas, Austin, Texas, 1936.

Holden, in 1937, dug a large cave on the Pecos River for the Texas Technological College.³⁵ Although not within the area, nor within the Trans-Pecos, his excavations at Blue Mountain Rock Shelter near Kermit, Texas, 1938³⁶ should be mentioned, since the Blue Mountain site is most certainly a component of one of the more important Big Bend cultural manifestations.

In the northern part of the greater area, in addition to the work of Jackson, Howard, of the University of Pennsylvania, investigated rock shelters in 1930, '31, and '32;³⁷ and Mera, for the Laboratory of Anthropology, excavated cave shelters and trenched middens in the Guadalupe Mountains in 1932.³⁸ Gould,³⁹ and Burnet⁴⁰ have also contributed to the archaeological picture of the Guadalupe and of the Pecos River Valley. Recently, the School of American Research in cooperation with the Carlsbad Archaeological Society has carried on field researches in the same area.

Returning to the El Paso country the all important work of Stallings in the pueblo sites near El Paso must be noted.⁴¹ Alves, Crimmins, and the Cosgroves have added much to El Paso archaeology, though not all of their work has been published. At the present time W. S. Strain, of the El Paso Museum, is digging in sites of the El Paso Phase (Sayles). Slightly to the north and west of El Paso, Conkling worked in very ancient cave sites.⁴²

35.

W. C. Holden, "Excavation of Murrah Cave," **Bulletin of the Texas Archeological and Paleontological Society**, Vol. 9, Abilene, Texas, 1937.

36.

W. C. Holden, "Blue Mountain Rock Shelter," **Bulletin of the Texas Archeological and Paleontological Society**, Vol. 10, Abilene, 1938.

37.

E. B. Howard, "Evidence of Early Man in North America," **The Museum Journal**, Vol. XXIV, University of Pennsylvania, Philadelphia, 1935.

38.

H. P. Mera, "Reconnaissance and Excavation in Southeastern New Mexico," **Memoirs of the American Anthropological Association**, Vol. 51, 1938.

39.

Lois Gould, "A Grooved Club and Other Artifacts from a Cave 70 Miles N. E. of El Paso, Texas," **Proceedings**, Oklahoma Academy of Science, Vol. 9, Norman, 1939.

40.

R. M. Burnet, "Antiquity of Man in the Pecos Valley of New Mexico," **New Mexico Magazine**, Vol. II, No. 7, pp. 24-26, 61, Santa Fe, 1933.

41.

W. S. Stallings, "Notes on the Pueblo Culture in South Central New Mexico and in the Vicinity of El Paso, Texas," **American Anthropologist**, n.s., Vol. 34, No. 1, 1932, p. 67.

42.

R. P. Conkling, "Discoveries in the Bone Cavern at Bishop's Gap, New Mexico," **West Texas Historical and Scientific Society Publications**, No. 4, Alpine, Texas, 1932.

Turning to the Big Bend region proper, the most outstanding piece of work to date is the Texas Archaeological Survey of the Gila Pueblo in 1931 and 1932. During the course of this survey E. B. Sayles covered the Big Bend rather thoroughly and presented the first synthesis of the general archaeology.⁴³ His researches included not only rock shelter work, which had monopolized the attention of most of the field workers up to that time, but a general reconnaissance. The archaeological survey of Chihuahua carried on by the same institution in 1933 supplemented the Texas survey.⁴⁴

Investigations of open sites and cave shelters in the Chisos Mountains and lower Big Bend were undertaken in 1936 and 1937 by Erik K. Reed for the U. S. National Park Service. In 1938 the writer did an archaeological survey of the Madera Valley just north of the Big Bend;⁴⁵ in 1936, and again in 1937 excavated in sites along the Rio Grande near Presidio, Texas, for the Sul Ross College.⁴⁶ Earlier in 1933 he had completely excavated three rock shelters near Alpine, Texas, under the supervision of Victor J. Smith, again for the Sul Ross College. In 1938 the writer directed the explorations here reported, and from the fall of 1938 until August of 1939 in collaboration with Donald J. Lehmer, he directed a co-operative project of Sul Ross College and the School of American Research, excavating in sites of the Bravo Valley aspect near Presidio, Texas.⁴⁷

At first glance one is impressed with the complexity of Big Bend archaeology. A general survey of the types of archaeological sites will be of aid in an understanding of the archaeological picture. Following this survey a summary of archaeological data by cultures and traits is presented.

SUPERFICIAL ARCHAEOLOGY

In the mountain canyons and mesas fronting on the interior valleys, as well as in rocky gorges and valley walls of the Rio Grande, occur

43.

E. B. Sayles, "An Archaeological Survey of Texas," **Medallion Papers**, No. XVII, Globe, 1935.

44.

E. B. Sayles, "An Archaeological Survey of Chihuahua, Mexico," **Medallion Papers**, No. XXII, Globe, 1936.

45

J. Charles Kelley, "Report on Archeological Field Work in the Madera Valley," **West Texas Historical and Scientific Society Publications**, No. 5, Alpine, 1938.

46.

J. Charles Kelley, "Archaeological Notes on the Excavation of a Pit House Near Presidio, Texas," **El Palacio**, Vol. XLVI, No. 10, Santa Fe, 1939

47

Anon., "Texas Sites Yields Many Flints," **El Palacio**, Vol. XLVI, No. 2, Santa Fe, 1939.

rock shelters and caves. The rock shelters often contain layers of cultural refuse lying upon the rock floor, or upon loess-like deposits filling the lower part of the shelter. Pictographs and petroglyphs occur on shelter walls, on adjoining canyon walls, and on boulders in the shelters. Mortar holes are found in boulders, in exposed portions of the shelter floors, and in talus boulders in front of the shelters. Outside the shelters, middens of fire-cracked rock, ash, charcoal, and cultural debris have accumulated. Scattered camp refuse likewise appears on the canyon floor below the talus middens. Rock shelters were occupied largely by people of the Big Bend Cave aspect, but other groups and cultures occasionally left evidences of their presence. True caves were seldom occupied, and never farther back than the cave mouth.

Midden accumulation, other than the talus middens mentioned, occur in the high interior valleys and canyons, and near springs in the mountains. There has been very little excavation in these sites; they seem to be largely the result of Big Bend Cave aspect occupation, although other cultures are represented. Specialized middens, in the form of mounds of fire-cracked stone, ash, charcoal, etc., with a depressed ashy center are numerous. These ring-middens are commonly known as 'Soto' or 'Mescal' pits, and are thought to have been used as pit ovens. They seem to be fairly late in the regional chronology.

Along the Rio Grande large middens covering several acres are found along first and second river terraces. Depressions at some sites indicate pithouse ruins. In general, middens of this sort above Lajitas are village-sites of the Bravo Valley aspect; those below Lajitas are of unknown cultural affiliation.

The most widespread and numerous of all types of sites are groupings of oval or circular fire-hearths, rings of fire-cracked stones with accumulations of ash and charcoal in the center. These occur in almost every conceivable topographic location; artifacts are rare at such places.

Aside from the main categories of sites, as listed, isolated burials, caches, fortifications, and mortar-hole groupings in solid rock are known.

Excavations and typologic studies to date make possible certain classifications and seriations of Big Bend archaeological cultures. Tentative classifications and trait lists are given below, compiled from the literature and from the writer's own notes.

BIG BEND CAVE ASPECT⁴⁸

Class of Site: Rock shelter occupation; open sites.

Economy: Primarily food-gathering, some hunting, fishing; primitive agriculture in Chisos focus.

Weapons: Atlatl and darts with foreshafts. Secondary usage of bow and arrow. Curved fencing or "rabbit stick" decorated with groups of parallel incised lines.

General Material Culture:

Broad similarities in: basketry
matting
netting
woven bags
sandals
wooden artifacts
bone and shell artifacts
other items of lithic complex

Mortuary Custom:

Flexed inhumation in rock-shelters and in open; offerings of grinding stones, etc.; often wrapped in matting, animal skins or woven bags.

Cremation; placing of calcined bones and ashes in woven bags.

Physical Type: In Pecos River focus, dolichocephalic, undeformed; skull relatively high; face and orbits low and broad; stature high relative to that of other prehistoric Southwestern groups.⁴⁹

Negative Traits: Pottery

Permanent houses
Polished stone tools
Arrow shaft abrader, straightener, and polisher
Finely chipped arrow points
Primary agriculture

48

The term "Big Bend Culture" was first applied to the aspect by Victor J. Smith ("The Relation of the Southwestern Basketmaker to the Dry Shelter Culture of the Big Bend," *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 4, September, 1932, Abilene, Texas). Setzler (1935, *op. cit.*) also used the term for the aspect, and recognized distinctions between remains in the vicinity of the Chisos and Davis Mountains and those on the Pecos River. Sayles (1935, *op. cit.*) used the term (Texas) "Cave Dwellers" for the aspect, and recognized three phases (Gladwin terminology): Pecos River, Big Bend, and Hueco. The Hueco does not occur in the area under consideration. In 1939 at the Chaco Conference of Anthropologists, Sayles, Setzler, and the writer at an informal meeting discussed cave dweller terminology. It was agreed that those present would henceforth use the terminology employed here, following the McKern system.

49.

Thomas Dale Stewart, "Skeletal Remains from Southwestern Texas," *American Journal of Physical Anthropology*, Vol. 20, July-September, 1935.

Foci:**PECOS RIVER FOCUS⁵⁰****Type Site:** Fate Bell Shelter, Val Verde County.⁵¹**Class of Site:** Rock shelter, open camps.**Economy:** Food gathering; secondary, hunting and fishing.**Material Culture:****a. Fibre:**

Basketry: coiled.

Dominant Types:⁵²

Single bundle foundation of grass or split
lechuguilla leaves:
Interlocking stitch
Non-interlocking stitch

Minor Types:

Split-stitch.

Wrapped twined: ("horizontal and vertical single
rod foundation, with all the
horizontal rods on the convex
surface, or outside of the bas-
ket, and sewn with a yucca
leaf.")⁵³

Plaited: Checker-weave and twilled weave.

Matting:

Yucca, lechuguilla and sotol leaves.

Checker weave and twilled weave.

Large and small elements.

Raised woven designs (?).

Painted designs.

Mats.

Burden bands.

Burial bags (?).

Twined and sewed mats of river tule.

Mats of twined, split, and whole cane or reeds.

⁵⁰

Name derived from Sayles, 1935, *op. cit.* Data compiled from Sayles, *ibid.*, Pearce and Jackson, 1935, *op. cit.*, Holden, 1937, *op. cit.*, Setzler, 1935, *op. cit.*, and from the writer's own studies. This is not an exhaustive list; only important traits are given; some traits need verification.

⁵¹

Pearce and Jackson, 1933, *op. cit.* Although other influences are discernible at this site, it is in every way typical of the focus.

⁵²

Pearce and Jackson, *ibid.*, quoting Thomas, p. 109, who did the analytical studies, list 39 specimens of these two types as opposed to only 5 specimens of the split-stitch type.

⁵³

Setzler, 1935, *op. cit.* This is distinctly a minor type.

Netting:

Woven of fibre (yucca, sotol, etc.) cord, and grass cord.
Techniques: Series of loops; series of slip-knot loops; larkhead knots.

Aprons:

Two-ply apocynum cord, with human hair ties (?).⁵⁴

Sandals:

Materials: Split and whole leaves of yucca, lechuguilla, and sotol.

Dominant Type:

Rectangular, square toe: made of two opposed warp leaves, or of one split warp leaf; occasionally other added for strength; weft of braided flat elements; occasionally longitudinal secondary elements braided in for reinforcement.

Rectangular, square toe: light construction of two opposed warps, with simple flat elements criss-crossed between.

Fur Cloth:

Made by wrapping strips of fur around fibre string, and weaving the composite yarn into a loose cloth.

Cradle:

"Wood frame, and slat twined with cord; 'V' shaped" (?).⁵⁵

Miscellaneous Fibre:

Cordage, knots, nooses, etc.; lengths of fibre cord with fish-hooks of cactus thorns and pebble sinker attached. Wrapped bundles of grass and yucca leaves.

b. Wood and Cane:

Wooden atlatl.

Wooden dart for atlatl; cup-shaped depression in proximal end of foreshaft, with stone points set in distal end.

Wooden foreshafts for atlatl darts; slit for attachment of stone points or bunt-point.

Pointed wooden foreshafts for atlatl darts.

Flat, curved, fending stick, or rabbit stick of wood; decorated with groups of parallel incised lines, place for attachment of weight at one end indicated by wrapping and gum.

Bow (?).

Composite cane arrow shafts; nocked at proximal end; pointed wooden foreshaft set in distal end; fibre or sinew wrapping at ends.

54.

Ibid. Setzler does not state frequency of this trait, nor whether it belongs to the Big Bend or the Pecos River sub-areas as recognized by him.

55.

Sayles, *op. cit.*, Table 8.

Fireboard of split yucca with scorched holes and side notches.

Fire drill of yucca or lechuguilla stalk.

Battered stakes; pointed sticks; painted sticks.

Cane flute (?); cane cigarette.

Fire-shaped wooden scoop (?).

Digging sticks (?).

c. Skin:

Sewed skins.

Painted skin.

Pouches.

Rabbit fur-cloth.

d. Bone and Shell:

Bone awls, spatulas, needles, gouges, scrapers, and flaking tools.

Antler flaking tools and gouges.

Snail shell beads.

Gorget and pendants of conch shell and fresh water mussel; occasionally with engraved design.

Olivella shell beads (?).

Bone tube beads.

e. Stone:

Oval bowl milling metates; flat thin slab metates.

Deep, circular, bedrock mortars (?)

Convex and flat surfaced manos; pitted manos; wedge-shaped manos.

Unshaped pestle.

Pecked and scratched pebbles.

Hand-axe made by chipping end of flattish pebble to rounded cutting edge.

Retouched, heavy blade.

Oval, round and lanceolate blades, chipped on both sides.

Stemmed and heavy pointed drill.

Side scraper made from large flake; rechipped along one straight or curving edge.

Heavy snub-nose scrapers (?).

Core scraper (?)

Flake knife, with finely retouched straight or curved edge.

Leaf blade with rechipped edge.

Hammerstones; discoidal and globular; made from nodules and discarded hand axes.

Tubular stone pipe (?).

Flattish river pebbles with painted designs in red and black.

Projectile points: Well-made from flakes or small nodules; chipped on both sides; some use of pressure retouch.

f. Miscellaneous:

Pictographs on shelter walls and on cliff near shelter in red, yellow, orange, and black (?).

Red and yellow pigment (?).

Petroglyphs on cave walls (?).

Abrading marks on boulders in or near cave.

Gourd vessels, often repaired by sewing.

Chewed cuds of sotol and lechuguilla fibre, showing teeth marks.

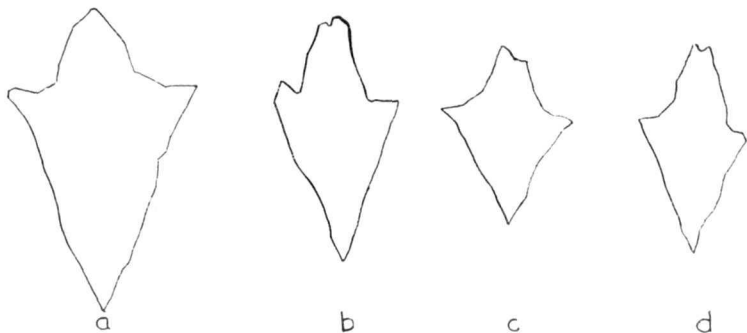


Fig 1-PECOS RIVER FOCUS-DOMINANT TYPE OF PROJECTILE POINTS
(a is ca 3 inches in length)

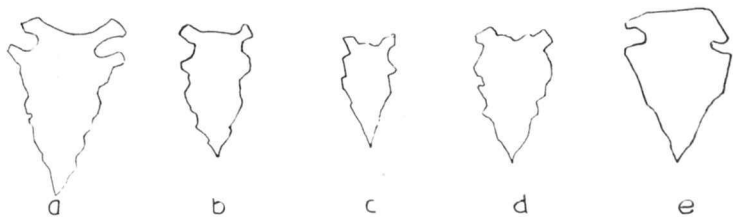


Fig 2-CHISOS FOCUS - PROJECTILE POINT TYPES
a,b&c--DOMINANT TYPES d&e - MINOR TYPES
(a is ca 2 inches in length)



Fig 3-LIVERMORE FOCUS-PROJECTILE POINT TYPES
(a is ca 1 inch in length)

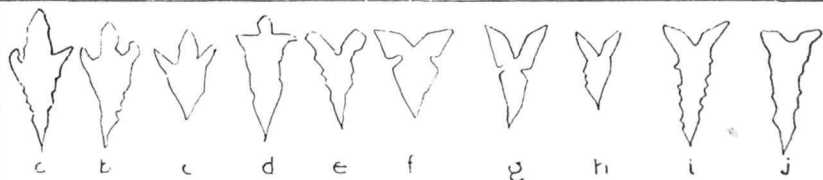


Fig 4-BRAVO VALLEY ASPECT - PROJECTILE POINT TYPES
(a is ca 1 inch in length)

Mortuary Custom:

Same as for the general group; probably greater percentage of cremation than in Chisos focus.

Intrusive Traits:**Stone Artifacts:**

Corner-tang knives and drills (Central Texas) Round Rock and Guadalupe River age (?).
Abilene Points (Sayles) (?). Abilene Culture (Sayles).
Hand-axe with finely shaped and carefully chipped blade; rounded cutting edge; butt unchipped. (Central Texas.)

Components:

Fate Bell Shelter.
Murrah Cave.
Alpine 2:7 (lower level)
Moorehead Cave.
Goat Cave.

CHISOS FOCUS⁵⁶**Type Site:**

Muller rock shelter.⁵⁷

Class of Site:

Rock shelter; open camp; midden.

Economy:

Food-gathering; secondary, hunting and agriculture (8-10 row corn, squash, beans).

Material Culture:

Similar to Pecos River focus except:

a. Fibre:**Basketry.**

coiled: split-stitch on single-bundle foundation predominates; other Pecos River focus types in minority.

Sandals:

Pecos River focus types in minority; dominant type is round-toed "fish-tail" shape; crossed toe and heel on yucca leaf frame with braided weft of same material.⁵⁸

Netting:

Rarely found.

56. Name applied by Setzler (personal communication, 1939). Data given here assembled from Sayles, (1935, *op. cit.*), Smith (1932, *op. cit.*), Setzler (1935, *op. cit.*); from various specimens and unpublished manuscripts of V. J. Smith in possession of the Big Bend Memorial Museum of the West Texas Historical and Scientific Society; and from personal studies and field work of the writer; namely sites: Alpine 2:4, Alpine 2:5; and Alpine 2:7 (Merriwether Cave C). Victor J. Smith has been a constant inspiration with his willingness to go over specimens and data with the writer.

57. Excavated by V. J. Smith in cooperation with Gila Pueblo, Globe, Arizona; data from manuscript.

58. This has been reported from Pecos River focus sites, but in every case there are other evidences of late influences present. In the Big Bend it undeniably occurs at certain Pecos River sites, but here again the evidence is that they are late surviving sites of the focus.

THE LIVERMORE FOCUS⁶⁷

Certain traits of this focus (projectile point type, scraper type, graver type, and arrow-shaft abrader type—see Stone) suggest that it should be included in the later Bravo Valley aspect. However, several of the determinants of the aspect (see Negative Traits below) do not occur in the Livermore focus components and for this reason the focus is not assigned to any aspect at present.

Type Site:

Alpine 2:7 and the Livermore cache.

Class of Site:

Rock shelter; open camps; caches on high mountain peaks.

Economy:

Primarily hunting. Secondary, food-gathering.

Material Culture:

a. Fibre: Unknown.

b. Wood and Cane:

Largely unknown. Perhaps wooden fire tongs. (See 59)

c. Skin: No data.

d. Bone and Shell: No data.

e. Stone:

Oval bowl metate.

Flat and convex-faced unshaped manos. (?).

Long fine, needle-pointed drill or awl.

Graver (disc-like, flake base, short needle point).

Arrow shaft abrader of malpais. (Stone not much larger than the single longitudinal groove.)

Small, finely made, snub-nose scrapers; pointed ends; made from flakes.

Double beveled "Plains" knives (?).

Finely chipped oval blades and triangular blades. (?)

Projectile points: Small, well made; flakes; percussion and pressure retouch. Elaborately formed.

Mortuary Custom: No data.

Physical Type: No data.

Negative Traits:

Pottery.

Agriculture (?).

Permanent houses (?).

Polished stone tools (?).

67.

The name is from Mt. Livermore, highest peak of the Davis Mountains. On this peak, in the 1890's, a cache of over 1,200 small finely made projectile points of the Livermore type were found. The data summarized is derived largely from the work of the writer and that of Victor J. Smith.

Intrusive Traits:

Artifacts of the Chisos focus.
Artifacts of the Pecos River focus.
El Paso Polychrome (late).⁶⁸

BRAVO VALLEY ASPECT⁶⁹

The data presented below were derived from the work of Donald J. Lehmer and the writer, through a cooperative project of the School of American Research, the Sul Ross College, and the Works Progress Administration. A report on this work is in preparation by the individuals named and all pottery types named here but as yet undescribed will be defined in that report.

(General characteristics common to the foci: At this stage of the studies it is not possible to assign all traits definitely to one or more of the foci. For that reason all items which can not yet be assigned with any assurance will be listed here.)

Class of Site:

Large midden accumulations along river terraces near mouths of small **arroyos**, marking house pits and house walls; house pits occasionally showing as surface depressions. Small cavate shelters in tuff cliffs. Campsites of hearths and scattered cultural debris. Rock shelters, sotol pits (ring-middens)?

Habitations:

(Aside from the above) Pithouses; houses built on pits; jacale superstructures.

Economy:

Agriculture, hunting, fishing, and food-gathering highly developed. Corn, beans, cucurbits.

Weapons: Bow and arrow.**General Material Culture:⁷⁰**

- a. Fibre: No data.
- b. Wood and Cane: No data.
- c. Skin: No data.
- d. Bone and Shell:

68.

Mera, 1938, *op. cit.*

69.

This name is derived from the Spanish term for the Rio Grande below El Paso—"El Rio Bravo del Norte."

70.

Starred items are thought to be possessed in common by all known foci of the Bravo Valley aspect.

*High development of work in shell and bone; awls and flaking tools of bone; bone needles and spatulas; tubular bone beads, often incised. Pendants, beads, gorgets, "buttons," discs, and problematical forms made of shell; fresh mussel; olivella, *Conus* busycon, and other Gulf of Mexico and Gulf of California shells were used.

e. Stone:

*Large basin-shaped oval bowl metates; shallow, trough-like oval bowl metates.

*One-hand manos, convex and plane grinding surfaces; rectangular in form, with rounded corners; carefully shaped. Also unshaped manos as above. **Pitted manos absent.**

Pestle; unshaped and shaped; cylindrical, rod-like.

*"Sinkerstone;" small or medium river pebble, oval, rectangular, or even round; notches pecked in ends; occasionally mark of wear on faces of pebbles between grooves.

Arrowshaft smoothers, abraders or straighteners.

Paint mortar (?). Small boulder with shallow rectangular grinding basin cut in one face; marks of red pigment.

Polishing stones. Hard, fine grained dark stones small to medium, with facets of usage, or scratches on one or more sides.

*Crudely chipped hand-axes as in Cave Dweller groups.

*Scrapers: small to medium, finely made flake snub-nose; side scrapers; flakes with carefully chipped edges. Small thumb-nail scrapers.

Gravers: As in the Livermore focus.

Awls: Roughly chipped flake or disc-like base, with short point.

Drills: Carefully chipped; no tang, or base; oval in cross section.

Knives: Double-bevelled; small flakes with edges carefully chipped to straight, convex or concave cutting edge. Carefully chipped blades, some in specialized forms.

Very small flakes or spalls with chipped saw-tooth edge, or sheared edge.

*Hammerstones: globular or discoidal; nodules and discarded implements, cores.

*Projectile points: fine, thin; made from flake; pressure retouch; numerous.

f Ceramics:

Present throughout but vary from one focus to another.

g. Miscellaneous: *Red pigment.

Mortuary Custom:

Flexed inhumation; types vary somewhat according to present knowledge; with and without offerings.

Physical Type:

Not studied as yet; apparently dolichocephalic and hypsicephalic. Crania undeformed.

Negative Traits:

Polished stone tools.
Cremation.

Foci:

Three identified; others suspected.

LA JUNTA FOCUS.⁷¹

Traits as in aspect, except:

Type Site:

Shafter 7:1 (Early Horizon).

House Type:

Small shallow, circular or oval pithouses.

Rectangular rooms in shallow pits with low adobe-base walls and jacale superstructure, built in series of two to five rooms.⁷²

Rectangular houses built in deep pits, with or without low adobe curb; jacale superstructure. Roof support plan varied from type to type. Wall pits unplastered; house walls definitely built inside pit.

71.

The name is derived from the Spanish name "La Junta," for the region of the junction of the Rios Conchos and Grande, near the present town of Presidio, Texas. In the trait list that follows, a trait is assigned to a focus when it has been found in sites of that focus. At the present time and stage of the work this does not necessarily mean that the trait is confined to that focus alone.

72.

Such structures are quite similar to those in the El Paso Phase (Sayles) near El Paso, Texas, as reported by W. S. Strain (paper delivered before the A.A.A.S., SW. Div., Alpine, 1939).

General Material Culture:**a. Stone:**

Small and medium bowls carved from volcanic tuff; round, oval, and irregular in shape; occasionally with curvilinear designs carved on exterior.

Modified Livermore points.**b. Ceramics:⁷³**

El Paso Polychrome.

Chihuahua Polychromes:

Ramos.

Babicora.

Villa Ahumada.

Others (?).

Tusayan Polychrome.

Playas Red.

Chupadero Black-on-white.

Unidentified wares of Southwestern origin.

Unnamed brown and red wares; polished and semi-polished (?).

Round and oval discs, pierced and unpierced; cut from potsherds.

Mortuary Custom:

Flexed inhumation of infants (most often) and adults, below house floors.

Miscellaneous:

Rectangular block of adobe set with long axis flush with south interior wall of rectangular houses; plastered, well-made, no signs of usage.⁷⁴

Negative Traits:

(ceramics)

Mimbres Black-on-white.

Medanos Red-on-brown.

Three Rivers Red-on-terracotta.

(The absence of these types is important in the dating of the complex.)

Intrusive Traits:

Ceramics of the Southwestern Complex; time: late Pueblo III and early Pueblo IV. (See list under ceramics.)

Series of rectangular houses in line, with low adobe foundation walls (see House Types), and rectangular blocks of adobe set against south walls of houses. (see Miscellaneous.)

Derivation: El Paso Phase (?).

⁷³.

Most of the ceramics listed are of Southwestern type. They occur in small numbers and appear to be actually trade pieces. Nevertheless, their relative percentages run high compared to the local wares, and they occur so consistently from site to site that they seem to be basic traits of the La Junta focus.

⁷⁴.

Reported from the El Paso Phase (Strain, 1939, *op. cit.*), and probably derived therefrom.

Components:

Shafter 7:1 (lower)
Shafter 7:6
Shafter 8:1
Shafter 8:3
Ruidosa 6:3
Ruidosa 6:2

CONCEPCION FOCUS.⁷⁵

Type Site: Shafter 7:3.

House Types:

Large (average size: 28 by 30 feet) rectangular pithouses, built in pits; no adobe used, with jacale walls and roof. Roof entrance (?). Row of wall posts along inside edges of pit; main roof supports forming rectangle in pit. Occur singly and in series of three to seven. Large circular pithouses (or houses built in pits) jacale walls and roofs (?). Roof support, pole arrangement, similar to Pawnee structures, with some variations. Latter type not definitely included in Concepcion focus.

Material Culture:**a. Stone:**

"Arrow" shaft straighteners or abraders; manos of lava or sandstone; transverse groove; (See Plate XXI, Sayles, 1935, *op. cit.*) occasionally very elaborately made. Projection at one end, possibly for hafting.

"Arrow" shaft straighteners or abraders; manos or unshaped pebbles of hard, fine grained stone, with one polished groove across the face.

"Arrow" shaft abraders of sandstone; small pieces of sandstone, with single groove, or double groove across flat surface.

Plain stone bowls (?).

Polishing stones (see trait list for aspect).

b. Ceramics:

Chinati Plain Ware.⁷⁶

Unnamed polished red and brown ware.

Unnamed gray wares.

Capote Red on Brown.

⁷⁵.

The derivation of this name is from that applied by Rodriguez in 1581 to the valley of La Junta at the time of its occupation by peoples possessing the closing stages of this focus. The term "Rio Bravo focus" has been previously used by the writer.

⁷⁶.

As yet undescribed.

Paloma Red-on-gray.⁷⁷

Round and oval discs; pierced and unpierced; cut from potsherds.

Mortuary Custom:

Flexed inhumation in refuse heaps.

Miscellaneous:

Storage pits with prepared clay floors; cut in alluvium near houses. Lined with bark (?); interior support of sapling poles around circumference.

Negative Traits:

Southwestern ceramics.

Intrusive Traits:

Pottery with engraved design. (Origin: Red River Caddo or Hasinai phases (Sayles) in East Texas.)

Components:

Shafter 7:3

Shafter 7:1

Shafter 7:6

Shafter 8:1

Ruidosa 6:2

CONCHOS FOCUS.⁷⁸

Traits as in aspect and as in the Concepcion focus, except:

Type Site:

Shafter 7:1—Late horizon.

House Type:

Surface houses of adobe and jacale construction (?); large rectangular houses built in pits as in Concepcion focus.

Material Culture:

a. Stone: Troughed metates of lava (?).

b. Metal:

Crude knives, fish-hooks, and other artifacts of copper and iron.

⁷⁷.

The types given here have not yet been described.

⁷⁸.

Sayles, 1936, *op. cit.* The name is derived from the Rio Conchos, which enters the Rio Grande at La Junta.

c. Ceramics:

Spanish or Mexican Majolica ware.

Associated Spanish utility wares.

Brown, red, orange, and gray wares, usually polished, and roughly finished. Thick, coarse paste.

Wares as above but often showing grayish-green slip or wash, often grading into bubbly green glaze on the same sherd; often wheel turned.

Conchos Red-on-brown. (Sayles, 1936.)

Pulicos Red-on-brown (late degenerate Conchos Red-on-brown).

Mortuary Custom:

No data.

Miscellaneous:

Refuse mounds at edge of village.

Intrusives:

Ceramics of European origin.

Metal of European origin.

Plants of European origin (?).

Spanish coin dated 1750.

Spanish missions of adobe.

Sherds of Mexican Indian (Valley of Mexico) origin.

Surface houses of adobe (?).

ALAMITO FOCUS.⁷⁹

This is the term applied to the Mexican peon occupation of the Big Bend, especially along the Rio Grande and its immediate tributaries. Indian towns of the Conchos focus, through acculturation and ethnic admixture, became Mexican towns surviving into the present time. This focus shows many traits derived from a Conchos ancestry. It exists today side by side with the more advanced Anglo-American occupation (Presidio focus) and the advanced modern Mexican culture.

Aside from its European overwash, the Alamito focus shows the following characteristics derived from a Bravo Valley ancestry.

Economy:

Primary dependence upon agriculture, but with fishing and utilization of wild plants highly developed.

House Type:

Rectangular houses of jacale construction, occasionally in long rows, and at times set in pits along the hillside.

⁷⁹.

Derived from Alamito Creek, a Texas tributary of the Rio Grande which joins the river a few miles below La Junta.

Ceramics:

Native red, brown, and gray wares; red-on-brown wares similar in type to those of the Conchos focus. Thick, with coarse paste.

Intrusives:

Abandoned sites of the Alamitos focus are easily identified by the presence of modern chinaware, glass beads, metal cartridge cases, buttons, etc.

5. PRESIDIO FOCUS.⁸⁰

This term has been coined to classify modern Anglo-American and Spanish-American archaeological remains and cultural expressions in the area. Archaeologically this includes certain ruined adobe and masonry watch-towers, fortifications, and ranch houses in the Big Bend.

6. LATE NOMADIC GROUPS

Although the Big Bend is known to have been occupied by many nomadic and semi-nomadic groups at the beginning of the historical period and until the late 1800's, few archaeological remains can be attributed to such groups with any assurance. The most important groups were the Lipan, Mescalero Apache, and Comanche.

Sayles identified a Lipan phase,⁸¹ but the writer has not been able to verify this identification. Sporadic sites of tipi rings, almost totally lacking in artifacts except for an occasional stone maul of Plains type, probably originated with these groups. This is undoubtedly the case with the occasional iron or copper spear or arrow point that is found, as with certain crudely made iron knives and glass trade beads seen in amateur collections. In a crevice in the Glass Mountains between Marathon and Fort Stockton, a local rancher found a cache containing these articles:

Several thousand small blue, red, and white glass beads.⁸²

Several long cylindrical pierced "hair ornaments" of the shell of the Bahama Conch.

80.

Derivation from Presidio, Texas, a small Anglo-American settlement near La Junta.

81.

Sayles, 1935, *op. cit.* See Table 5.

82.

Dated by Arthur Woodward, Los Angeles Museum, at 1835-1865. Letter, 1937.

Several copper bracelets.

A number of small metal tinklers and bridle snaps.

One elbow pipe of catlinite.

One incomplete wooden object, probably a box to be bound with rawhide.

At the present time not enough articles assignable to such groups are known to warrant setting up classificatory designations or trait lists.

Aside from the cultural manifestations which have been previously described, a large number of artifacts are known that cannot be classed at the moment. Sites showing strong Bravo Valley affiliations exist in the high mountain valleys; these lack criteria which would serve to classify them with any of the described Bravo Valley foci, and hence appear to represent still other foci of the aspect. Eventually it will be possible to clarify considerably the remaining problems by an understanding of these residual items.

SERIATION

By a combination of methods it is possible to place the various aspects and foci described in a chronological framework. With a few exceptions this is merely a relative chronology, and in many instances and at many points is in need of verification.

The Presidio and Alamitos foci are basically European and modern. The Conchos focus of the Bravo Valley aspect represents the period of Spanish acculturation of the Indian villages, and is amply documented. Cross finds of artifacts of European origin in Conchos focus sites, together with the technical changes of obvious European inspiration in Conchos material culture, check and confirm this documentation. There is also documentary evidence for the terminal portion of the Concepcion focus of the Bravo Valley aspect, and again sporadic finds of European artifacts as an archaeological check.

Sites of the La Junta focus, Bravo Valley aspect, consistently produce ceramics of Southwestern origin; a complex of wares dated by tree ring methods at about 1200-1400 A.D. in the Southwest. Stratigraphically debris of the Conchos focus overlay that of the Concepcion focus and the La Junta focus, and refuse of the Concepcion focus overlay that of the La Junta focus, at Shafter 7:1.⁸³ At Shafter 7:3 Concepcion focus refuse lay upon La Junta debris.⁸⁴

Prior to the work herein reported remains of the Bravo Valley aspect

83.

Kelley, 1939, *op. cit.*, Kelley and Lehmer, in preparation, 1939.

84.

Kelley and Lehmer, *Ibid.*

had not been found in direct superposition over those of the Livermore focus, or the Big Bend Cave aspect. The Livermore focus is the typological ancestor of the Bravo Valley aspect, and modified Livermore focus types of projectile points occasionally occur in La Junta focus sites; they have also been reported by Mera in association with El Paso Polychrome in southeastern New Mexico.⁸⁵ Haury found, and recognized as such, a Livermore type point at Mogollon Village in horizons dated by the dendrochronological methods at circa 900 A. D., and prior to that date.⁸⁶

The Livermore focus has been found in consistent association with the Chisos focus of the Big Bend Cave aspect. El Paso Polychrome and Chupadero Black-on-white have been similarly reported in association with certain sites of the latter culture, suggesting that the Chisos focus and the Livermore focus were contemporaneous in time, and that both were best developed in the period circa 900 A.D. to 1300 A.D.

Remains of both the Chisos focus and the Livermore focus have been discovered in superposition over those of the Pecos River focus of the Big Bend Cave aspect,⁸⁷ though there are some indications that the Pecos River focus actually overlapped both in time. No means of dating the Pecos River focus had been found prior to this report, other than broad guesses on the part of Setzler, Smith, Martin, and others. Setzler, by typological comparisons, implied that the aspect probably was contemporaneous with a Basket Maker III-Pueblo I horizon, say 700 A. D.⁸⁸

The association of intrusive Central Texas artifacts in Pecos River focus sites⁸⁹ indicates that the focus was roughly contemporaneous with broadly similar cultures to the east, especially the Abilene Culture (Sayles)⁹⁰ in its later phases.

Prior to the summer of 1937 no traces of earlier cultures than the Pecos River focus of the Big Bend Cave aspect had been found. The occurrence of Folsom and Yuma points in the area has not been established, though they have been found along the Pecos River and in

85.

Personal communication, 1937.

86.

Emil W. Haury, "The Mogollon Culture of Southwestern New Mexico," **Medallion Papers**, No. XX, Globe, 1936.

87.

Alpine 2:7, field notes of the writer; Chisos 6:2, midden in the Chisos Mountains trenched by Erik K. Reed in 1936, a project in which the writer assisted.

88.

Setzler, 1935, **op. cit.**

89.

See especially the Fate Bell Shelter (Pearce and Jackson, 1933, **op. cit.**) and the Murrah Rock Shelter (Holden, 1937, **op. cit.**) reports.

90.

Sayles, 1935, **op. cit.**

southern New Mexico, immediately to the east and north of the Big Bend.

To summarize, the sequence of cultures in the Big Bend in 1937 was postulated as follows, early to late in the ascending order:

Aspects	Foci
?	Presidio Alamitos
?	Conchos ("Jumano Phase") Concepcion La Junta
Bravo Valley	Livermore
?	Chisos ("Big Bend Cave Dwell- er")
Big Bend Cave ("Big Bend Basket Mak- er," "Big Bend Cave Dwell- er," "Texas Cave Dwell- er")	Pecos River ("Pecos River Cave Dwell- er")

The broader affiliations of the cultures described remain for the present largely in the realm of speculation.

The trait lists and other information regarding the Bravo Valley aspect have been supplemented by data derived from excavations subsequent to those reported in this paper. This has been done to clarify as much as possible the archaeological picture of the Big Bend area, since a knowledge of Big Bend archaeology is essential to an understanding of the data presented in this report. Other than this supplementary data the material given is essentially as it was known when the discoveries were made in 1937 which led to the organization of the Peabody Museum-Sul Ross College Big Bend Expedition.

PART II

ACTIVITIES AND FINDINGS OF THE EXPEDITION

THE DISCOVERY OF BURIED SITES IN THE BIG BEND REGION

By T. N. CAMPBELL

The discovery that cultural material lay buried at various depths in the alluvium of certain valleys in the Big Bend region of Texas is one of the by-products of recent channel trenching and **arroyo** washing, phenomena which have been widely observed in the Southwest during the past fifty years. Channel trenching in the Big Bend appears to have begun at about the same period as in southern Arizona, in the decade of 1880-1890,⁹¹ but it seems not to have assumed any remarkable proportions until after 1900.⁹² Some trenching, as in the valley of Sheep Creek, a medial tributary of Calamity Creek, began less than twenty-five years ago.

As channels were cut deeper and deeper into the valley fill, and as lateral cutting proceeded, ranchmen and cowboys in the Big Bend at various times may have noticed thin layers of human cultural material exposed in cross-section in the **arroyo** banks—hearths made up of angular fragments of stone, charcoal and ash, accompanied by stone flakes and possibly artifacts; but these observations were not passed on to the archaeologists until quite recently.

The first report of a buried archaeological site came from Mr. Travis Roberts, a ranchman living thirty miles southwest of Alpine. Strikingly enough, this report came at a time when J. Charles Kelley, then at the University of New Mexico, was outlining a program which had as its main objective a search for evidences of early man in the Big Bend region. In the spring of 1937, Roberts found a small hearth exposed in the bed of Dugout Creek just north of his ranch home. He notified Prof. Victor J. Smith of the Big Bend Museum, Sul Ross College, Alpine, and asked him to visit the site. Smith examined and photographed the exposed hearth, but expressed his doubt that the evidence was clear enough to prove the hearth had been deeply buried, since an open camp site was discovered on the bank above and a cave-in might have deposited the exposed charcoal fragments. In June, when Kelley joined the staff of the Big Bend Museum, Roberts asked him to visit the site. Kelley agreed with Smith that the evidence was in-

91.

Kirk Bryan, Date of Channel Trenching (Arroyo Cutting) in the Arid Southwest, *Science*, n.s., Vol. 62, No. 1607, October 16, 1925, p. 343.

92.

These dates for the Big Bend are derived from the recollections of cattlemen, county road commissioners, and other individuals who have been in the region since 1875.

conclusive. Roberts, however, was not satisfied with these opinions and continued to watch the locality as lateral cutting continued. In July he located a site⁹³ actually eroding from the vertical bank of Dugout Creek at a depth of 6½ to 7½ feet below the surface of the valley alluvium, and only a short distance from the hearth previously found in the **arroyo** bed. Exposed in cross-section was a thin layer of cultural refuse consisting of hearths **in situ** at various places, scattered hearthstones, ash and charcoal, stone flakes and a number of small animal bones showing traces of fire. Roberts made a special trip to Alpine to bring Kelley to the site, and this time Kelley agreed that here was unmistakable evidence of some earlier cultural horizon. It is distinctly to Roberts' credit that he realized the importance of his finds and understood their implications.

The second buried site was found late in 1936 or early in 1937⁹⁴ by Mr. V. J. Shiner, a United States Department of Agriculture entomologist then stationed at Presidio, and was reported to Kelley in the early summer of 1937. This site⁹⁵ is located on Alamito Creek five miles below the town of Casa Piedra, where the Marfa-Redford road crosses the stream, and is approximately eighteen miles above the junction of Alamito Creek with the Rio Grande. Shortly after the Roberts discovery, Kelley visited this site and noted in the south bank of a side **arroyo** two buried cultural horizons, one at 6 to 7 feet, the other at 10 to 12 feet below the surface. Both consisted of hearths made up of rather large hearthstones, charcoal and ash, chips and flakes, and a few artifacts. The top layer of the deposits at this site was composed of loose gray sand, which was being eroded over a considerable area, exposing hearths, fire-baked adobe and several types of pottery, among them El Paso and Chihuahua polychromes. On the uneroded surface at one place were remains of historical Mexican houses accompanied by pottery, china and glass. At the time Kelley recognized the importance of this site as providing a top date for the geological deposits, for the El Paso polychrome in the upper layer has been dated as 1100-1400 A. D.⁹⁶ This would give a point of departure for working back toward the two buried horizons.

The third buried site⁹⁷—and the most conclusive because it yielded two human burials—was discovered by Kelley and Mr. George Williams,

93.

Known as the Roberts Site or Monument Springs 5:1, it is referred to by the geologists as being near locality 9 (Albritton and Bryan, **op. cit.**, 1939, Plate 1 and pp. 1444-1445).

94.

Mr. Shiner was unable to recall just when he located the site.

95.

Shiner Site or Shafter 6:1; locality 12, Albritton and Bryan, **op. cit.** Plate 1, pp. 1449-1451, and p. 1462.

96.

See footnotes 117-121.

97.

Sheep Creek Site or Alpine 9:1a; locality 6, Albritton and Bryan, **op. cit.**, Plate 1, Figs. 1 and 3, pp. 1430-1442, 1459.

a Sul Ross anthropology student, in the east bank of Sheep Creek, twenty-eight miles south of Alpine at the point where the Alpine-Terlingua road crosses the **arroyo**. Kelley and Williams were making a trip to the Rio Grande Valley and stopped at the crossing to see if the most recent lateral cutting in the **arroyo** had exposed anything of archaeological interest. This was in August, 1937, during the late summer rainy season, and it was found that flood waters had removed a part of the upper alluvium at a bend in the **arroyo** and had formed a shelf four to five feet above the bed. Remembering the geological position of the site on the Roberts ranch, Kelley examined the corresponding level at this place and found hearthstones exposed in the vertical bank. Hearthstones were also eroding from the top of the recently formed shelf. Williams called Kelley to see a projectile point fragment protruding from the shelf at the southern end, and just beyond it Kelley sighted human bones in the bank at a depth of approximately ten feet. Immediate excavation was imperative, because the peak of the rainy season was at hand and clouds were likely to form over the headwaters of Sheep Creek at any time and bring the **arroyo** down in flood, removing the bones. Five days were spent in excavating two burials. On the fifth day the **arroyo** did come down in flood and removed the excavation dump, some of it still unscreened. Several days more were spent at the site in excavating and screening earth from the area around the two burials. Removal of the skeletal remains was witnessed by Professors Victor J. Smith and Clifford B. Casey of Sul Ross College, and also by Mr. E. E. Townsend, former sheriff of Brewster County and long-time student of the archaeology and history of the Big Bend.

The presence of these two burials at depths of ten to twelve feet below the present surface of the valley and below several undisturbed horizontal strata suggested considerable antiquity. The skeletal remains were sent to the Peabody Museum of Harvard University for study. These finds, combined with the evidence found at the Roberts and Shiner sites, led to the organization of a joint archaeological expedition by Sul Ross College and the Peabody Museum for the purpose of investigating the problem of early buried cultural horizons in the Big Bend region of Texas.

A fourth site was added to the list before the expedition was organized. This was the Jackson-Caldwell site,⁹⁸ named for its two discoverers, who found the site in the autumn of 1937 and later reported it to Kelley. It is located on Nine Point Draw at the foot of Red Bluff, which is just south of Nine Point Mesa and some sixty miles south of Alpine. Here **arroyo** cutting had washed cultural material from two places, from a shallowly buried midden, and from old stream gravels exposed in the banks of the present **arroyo**. Many artifacts were found in the bed of the **arroyo**, and these were eventually traced to their respective sources.

98.

Also known as the Nine Point Mesa 4:1; location 11, Albritton and Bryan, *op. cit.*, Plate 1, Fig. 8, and pp. 1446-1447.

WORK OF THE PEABODY MUSEUM-SUL ROSS COLLEGE

EXPEDITION

The Peabody Museum-Sul Ross College Expedition was organized in December, 1937, and placed under the direction of J. Charles Kelley of Sul Ross College. The writer was designated as the Peabody Museum representative. Plans were made for a geological study of the Big Bend region in the summer of 1938, this to be directed by Dr. Kirk Bryan, Professor of Physiography at Harvard University. In the spring of 1938, Dr. Claude C. Albritton, Jr., Assistant Professor of Geology at Southern Methodist University, received a grant from the Geological Society of America to make a two-months' study, under the direction of Dr. Bryan, of the Quaternary deposits in the vicinity of Alpine.⁹⁹

Formal expedition work began on January 1, 1938, with a survey of the Big Bend region by J. Charles Kelley for the purpose of locating additional buried sites. Survey work lasted until February 8, and the number of buried sites was increased from four to nineteen. A considerable body of material was collected from these sites during the course of the survey. These artifacts combined with those which accompanied the two burials on Sheep Creek, gave certain indications as to the nature of the cultures represented. At that time it seemed that at least some of the buried material antedated anything thus far found in the Big Bend region. The main objective was to isolate, through the excavation of at least two or three deep sites, any cultures which might be represented and thereby establish a sequence of cultures for the region. It was hoped that such a sequence might prove to be of value to those interested in building up a general chronology for the earliest horizons found in the Southwest. Almost certainly it would help fill in the hiatus which separates the earliest complexes from the later, well-established Southwestern sequences.

The agreement between the two institutions provided for brief visits to deep sites elsewhere in Texas and in Arizona, and an examination of the archaeological material from those sites. Upon the termination of the Big Bend survey, Kelley and the writer met in Austin, where an examination was made of the collections in the Anthropology Museum at the University of Texas that were pertinent to the problem. Prof. J. E. Pearce and Mr. A. T. Jackson conducted Kelley and the writer to a deep site near Round Rock which the University had excavated in 1935. A typical Central Texas burnt-rock midden was also visited. A brief conference was held with Dr. E. H. Sellards, Director of the Bureau of Economic Geology of the University of Texas, who had studied the geology of the Round Rock site. Dr. Sellards had recently excavated a Folsom site in the Panhandle region of Texas and allowed us to examine some of the material.

99.

The geological report, to which reference has already been made, appeared in the autumn of 1939.

Next some of the Big Bend sites near Alpine were inspected, and following that an examination was made of the Cochise artifacts at the Gila Pueblo, Globe, Arizona. The Cochise problem and its probable relation to that of the Big Bend was discussed with Mr. Harold S. Gladwin, Mr. E. B. Sayles, and Dr. Ernst Antevs. With Sayles as guide, a number of sites were visited in the San Pedro and Sulphur Springs valleys of southeastern Arizona, including the original Cochise site on Whitewater Draw, north of Douglas, Arizona.

Returning to Alpine, preparations were made for field work, and then a short trip was made to Abilene to see the well-known deep sites of Central West Texas. Through the courtesy of Dr. Cyrus N. Ray some of these sites were viewed, and an examination was made of artifacts from each of the local cultures which he has described.

This tour of widely scattered deep sites in the Southwest constituted an admirable introduction to the Big Bend deep site problem. The authors wish to express their deep appreciation for the co-operation and many courtesies extended to them by the individuals whose names appear in the preceding paragraphs. Through this kindness and interest in the project they became familiar not only with the type artifacts from the earlier cultural horizons but also more fully cognizant of the geological problems involved in the excavation and interpretation of buried sites.

Excavation began at the Sheep Creek site on March 1, and continued for six weeks, after which camp was moved several hundred yards to the east of the Calamity Creek site,¹⁰⁰ which was discovered during the course of excavation on Sheep Creek. Two months were spent in excavation at the Calamity Creek site. Interruptions were frequent during the second month because of rain, and work was finally abandoned near the peak of the rainy season in August.

Field assistants who participated in the expedition work were Donald J. Lehmer and Paul Ezell, both students of the University of Arizona; and Joseph Toulouse, Jr., from the University of New Mexico. In addition to regular duties at the two main sites in Calamity-Sheep Creek Valley, Lehmer directed a test excavation at the Kokernot Rock Shelter, and Ezell spent several weeks supervising the final stages of excavation at Rock Cave northwest of Alpine. Testing at the Jackson-Caldwell and Shiner sites was done on week-ends by Kelley and Campbell. In addition several days with a small crew were spent at the latter site, and Kelley worked several days at the McBride Site.

Labor was supplied in part by the Works Progress Administration, under projects 1050 and 10249. Without this labor the expedition as here reported would not have been possible.

100.

Alpine 9:1B; locality 5, Albritton and Bryan, *op. cit.*, Plate 1, Fig. 1, pp. 1427-1442.



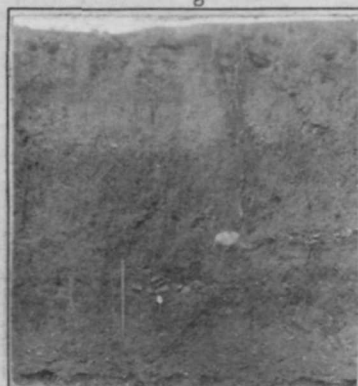
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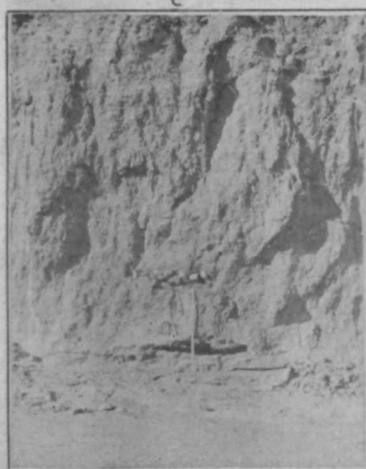
b



c



d



e



f

PLATE I—VARIOUS BURIED SITES IN THE BIG BEND REGION

- a. Texas-T:1. Archaeological zone at level of man's head, just below pronounced humic horizon in Calamity formation. Kokernot formation at top of bank.
- b. Monument Springs 5:1 (Roberts Site). The original discovery site. Archaeological horizon lies at foot of stadia rod, in Calamity formation.
- c. Valentine 7:1. Cultural zone runs from top bench to level of pick handle. Hearth shows in bench in right foreground, marked by trowel and whiskbroom.
- d. Hearth *in situ* (above trowel) in Calamity formation at Valentine 8:2.
- e. Hearth *in situ* in Calamity formation, Jordan Gap 1:1.
- f. Man points to lowest archaeological level in Calamity formation in Denman Draw, at Shafter 6:1 (Shiner Site). Upper buried horizon lies about two feet above man's head. Kokernot formation at top of section.

THE RECONNAISSANCE SURVEY AND MINOR EXCAVATIONS

By J. CHARLES KELLEY

When the Peabody Museum-Sul Ross College Expedition was inaugurated on January 1, 1938, four covered sites were known. Three had been reported by amateur archaeologists; the fourth was found by the writer. The first work of the expedition, therefore, was a reconnaissance survey of the Big Bend in the hope of locating other, and possibly richer sites. During the month of January and the first week of February a large area was searched and fifteen new sites discovered. After the beginning of excavations every opportunity was taken by the writer to extend the area surveyed. Even following the completion of actual field work the reconnaissance survey was continued at spare moments. Amateurs likewise continued their searches. Many new sites were discovered.

During the first week of the survey an intensive search of *arroyo* banks in the immediate vicinity of Alpine was made. Six sites were located. It became apparent that except for certain critical areas, intensive work would not repay the labor expended, and that geographic factors which were of use in locating surface sites were equally useful in finding buried ones. Following these leads potential site areas were mapped, and the reconnaissance restricted to them.

In all, the survey resulted in the discovery of thirty new sites within the Big Bend area, giving a total of thirty-four sites. In sections immediately adjoining the Big Bend five other sites were discovered, and five more have since been reported by Travis Roberts, discoverer of the original site, but have not been recorded. Thus at present a grand total of forty-four covered sites are known in the Big Bend and closely adjoining sections. The unexpectedly good results of the reconnaissance were indeed stimulating. At the very beginning of intensive work we were able to rule out the factor of chance inclusion of a site or so; we were dealing, not with an isolated occurrence, but with a series. Furthermore it was at once obvious that the culture or cultures represented were widespread and had existed through a considerable span of time, since we found sites at all levels, save the lowest, of geologic deposits. Even then we were able to observe apparent cultural differences between vaguely sensed geologic horizons.

Although excavations centered in the Elephant Mountain area, minor excavations were later undertaken at the Jackson-Caldwell site (Nine Point Mesa 4:1), the Rock House Site (Monument Springs 8:2), the McBride Site (Valentine 9:1), the Kokernot Rock Shelters (Buck Hill 6:1), and the Shiner Site (Shafter 6:1). Before and during the course of these excavations, Bryan and Albritton visited them and studied the geology in relation to the archaeological materials.

The following section is devoted to a presentation of the findings of the survey and minor excavations. For purposes of consistency sites of little importance will be presented as well as more valuable ones.

As a preface to consideration of these findings, a review of the Quaternary stratigraphy of the area as presented by Albritton and Bryan¹⁰¹ is in order.

"HISTORY OF THE VALLEY FLATS"
(SEQUENCE OF EVENTS)

"In the Davis Mountains and vicinity, lowlands developed as broad erosional valleys and partial pediments have been filled and channeled alternately during the Quaternary. Most of the valleys contain three bodies of alluvium of different ages. Some intramontane valleys south of Alpine appear to contain only two bodies of alluvium but these can be identified with two of the three formations with type localities in the Calamity-Sheep Creek Valley. Thus the major episodes in the physical history of the Quaternary consist of a long period of erosion in which the broad valleys were developed, three stages of alluviation, and three episodes of erosion by channeling.

"The earliest geological event assignable to the Quaternary is the development of the broad valley system, although this process probably began the deposition of the Neville formation. As the valleys were aggraded, the streams shifted their courses from time to time, spreading the alluvium so as to build broad flats. Grasses and shrubs took root in interstream areas, providing forage for species of elephants and horses now extinct.

"When the axial portions of the valleys had been filled to depths averaging about 20 feet, the streams ceased aggrading, and much of the Neville was rather deeply weathered, so that clay seams and caliche were developed. Hereafter the streams began cutting channels into the Neville alluvium. Channeling was widespread, and all except the more isolated highland meadows near divides were dissected. Flaring gullies, some a hundred yards across, were opened. Presumably at this time the wind eroded the bare banks and beds of these gullies and carried quantities of reddish clay and silt up from the valley floors into rock shelters and caves along the slopes of adjacent mountains. The mammoth seems to have disappeared from the Davis Mountains during this dusty time.

"Following this stage of dissection the streams once more began to aggrade. Deposition of the alluvium, here called the Calamity formation, took place, and the gullies developed in the Neville were filled. During pauses in this process of sedimentation plants grew in the gully bottoms, and dark humic residues stained the alluvial floors. During such pauses primitive man camped along the streamways, where he built his fires and occasionally buried his dead. Sediments recurrently brought down by floods covered hearths and burials, until finally the gullies were filled to the level of the surrounding alluvial flat. At this level a dark humic zone was generally

101.

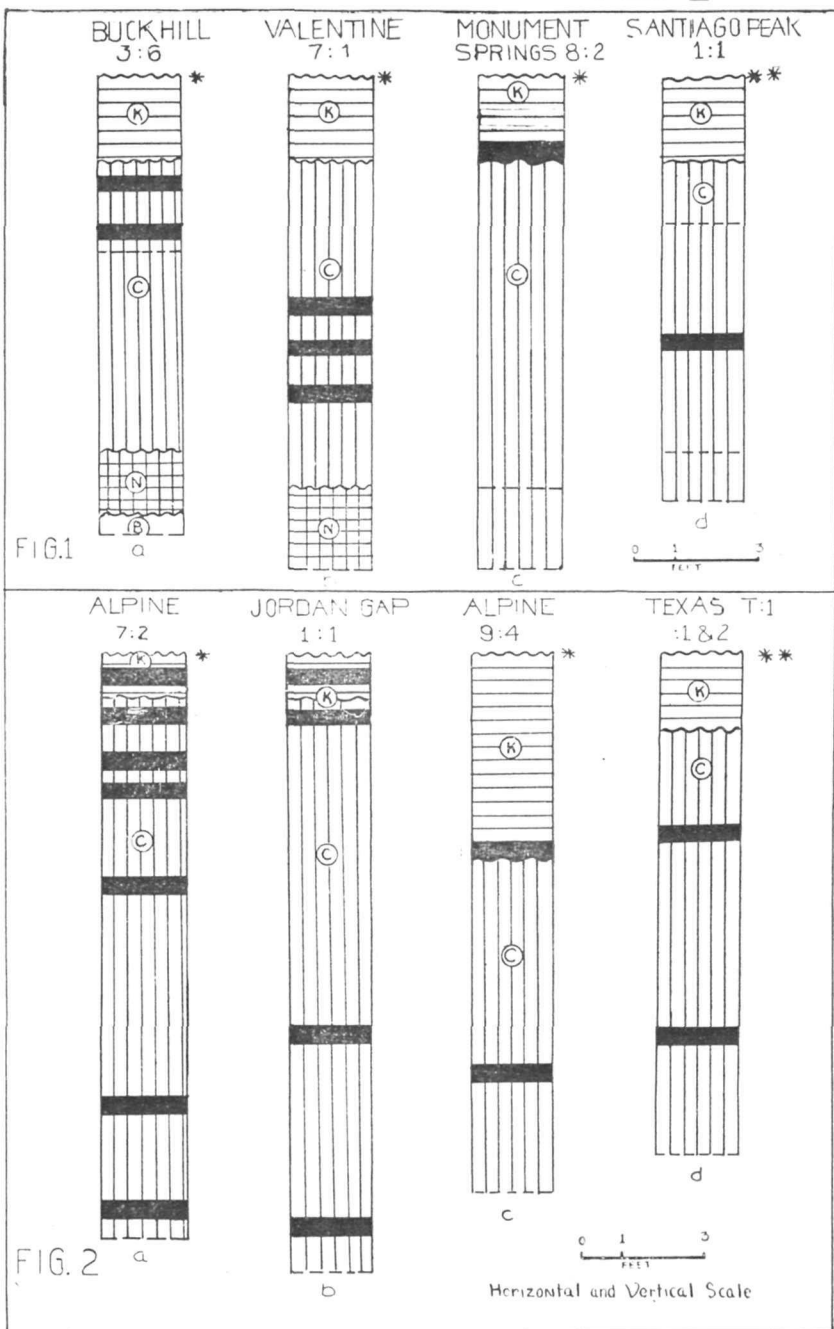
Albritton and Bryan, *op. cit.*

PLATE II—SECTIONS FROM VARIOUS SITES. Black bars indicate archaeological horizons. B—Bedrock. N—Neville formation. C—Calamity formation. K—Kokernot formation.

*Sections by Albritton.

**Sections by Kelley.

Plate II



developed, and cracks in the alluvium were filled with dark-gray silt clay.

"The process of filling was interrupted a second time by the incising of streams into both the Calamity and Neville alluvium. Steep-walled gullies of arroyos a few tens of feet across developed rapidly in the incoherent alluvium of the Calamity formation and less rapidly in the more resistant Neville, until in many places bedrock was exposed in the bottom of the arroyos. Before the flats had become maturely dissected, however, the streams began to deposit, filling the channels or arroyos with the Kokernot alluvium. Filling continued until the stream beds were brought to the level of the alluvial flats. Floodwaters escaping the channels spread sand and silt over the flats, which were built about a foot above their former grades. In places the sand and silt buried campsites and the foundations of shelters built by the contemporary occupants of the region.

"A third cycle of channeling began after deposition of the Kokernot and continues until the present. These gullies are recent; as in other parts of the Southwest, many have been formed and all have been enlarged, since the settlement of the region (Bryan, 1925). Recent arroyos have followed lines of least resistance offered by channel-depressions filled with incoherent sand and gravel, so that now almost all of the Kokernot, except for thin floodplain phases, has been destroyed by erosion."¹⁰²

Elsewhere in their report Albritton and Bryan point out that the Neville formation was deposited during a relatively moist period, and that the erosional disconformities between the formations represent periods of relative aridity. The Neville formation contains mammoth teeth and bones, and horse teeth; the Calamity formation only modern types of fauna. Invertebrate fossils from the deposits are all of essentially modern types, and there is a progressive disappearance of species from Neville times to the present. The possibility of long-range correlation of the Neville formation with glacial sub-stages in the Rocky Mountains is pointed out.

In the pages that follow an attempt is made to correlate graphically the geologic sequences, largely furnished by Albritton, with the archaeological complexes revealed by excavation or erosion. Columnar sections are shown on a constant scale as indicated. The scale of the various artifacts varies according to available space. It is thus necessary to consult the text description of plates in every case. The symbol **B** indicates bedrock, usually of Tertiary or Cretaceous age; **N** indicates Neville formation, **C** the Calamity formation, **K** the Kokernot formation, and **M** modern or contemporary alluvium, such as silts accumulated in stock tanks. Heavy dark bands indicate the presence of cultural horizons in the sequence; disconformities are shown by wavy lines, intra-formational contacts with broken lines. Arrow-lines tie artifacts to their proper cultural horizons in the stratigraphy.

102.

Quoted from Albritton and Bryan, *Ibid.*, pp 1462-1463.

ELEPHANT MOUNTAIN AREA

In a later section T. N. Campbell covers intensive excavations and related sites in the area. Two sites south of the center of the area and one north of it are presented here. Above Elephant Mountain, Calamity Creek flows through narrow valleys bounded by volcanic mesas. South of the junction of Sheep Creek, Calamity Creek arroyo is deeply incised until near the southern end of Elephant Mountain, where it spreads into several distributaries. These in turn dump their contents in time of flood onto a gently sloping, aggrading alluvial flat, near the Kokernot ranch-house. South of this flat, Calamity is again a head-cutting **arroyo**. Here the valley is restricted between limestone hills of a pronounced **cuesta**. Just below a natural rock dam, the valley widens, and the ravine is forty feet in depth. At this point a gully intersecting the main **arroyo** has cut back almost to the western limestone cliffs, which it parallels for some distance. In this gully's upper reaches hearths and artifacts (Buck Hill 6:1) are exposed in both banks. In low rock shelters in the cliff are midden accumulations. The report of Mr. Donald J. Lehmer, who excavated this site for the Expedition, follows.

KOKERNOT ROCK SHELTERS

(Buck Hill 6:1)

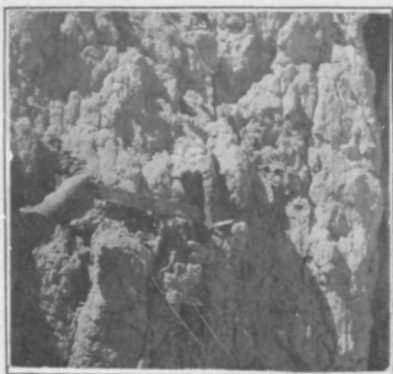
By DONALD J. LEHMER

The Kokernot Rock Shelter is located in the Kokernot ranch on the western side of the mile-wide Calamity Creek valley about three miles below the ranch house. The site is confined to the area between a small tributary **arroyo** and the base of the cliff of Cretaceous limestone which forms the western edge of the valley at that point. The cliff is broken occasionally by vegetation covered valleys, and several small shelter caves and overhangs occur at the base.

Only the Calamity and Kokernot formations were exposed in the vicinity. They were separated, as usual, by a marked disconformity. Remains of human occupation exposed at the site included two groups of hearths buried at different levels, surface hearths, the talus midden at cliff-base, a shallowly buried midden over which a small sotol ring was superimposed, mortar holes, and a few pictographs in one of the shelter caves.

The site was located by Mr. Kelley and Mr. George Williams; permission to excavate was granted by Mr. Lee Kokernot. Excavations consisted of two stratigraphic trenches, one through a buried hearth and the talus midden, and the other through the buried midden and sotol ring. Trenches were excavated as a series of adjoining four foot blocks which were taken out in one foot levels.

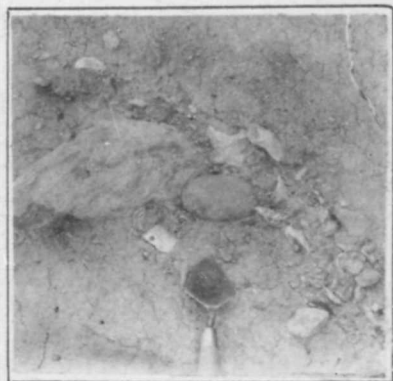
The oldest evidences of human occupation, the lower series of buried hearths, occur in the light band between two humic zones at the top of the Calamity formation. Unfortunately, no artifact material was found associated with them. Flakes and flecks of charcoal were found throughout upper sections of the formation.



a



b



c



d



e



f

PLATE III—SPECIMENS **IN SITU** AT VARIOUS SITES.

- a. Blade **in situ** at tip of rule. Upper buried zone. (Shafter 6:1).
- b. Deer bone in place in lower archaeological zone. Valentine 9:1.
- c. Mano or smoothing stone **in situ** at Calamity(?)—Kokernot contact. Nine Point Mesa 4:1.
- d. Mano in buried horizon in Calamity formation. Jordan Gap 1:1.
- e. Metate **in situ** in buried horizon. Alpine 2:2.
- f. Metate in place at Calamity—Kokernot contact. Alpine 9:4.

Resting directly upon the eroded surface of the Calamity formation was a second series of hearths. They were buried about eighteen inches below present land surface. Again no artifacts were found associated.

Also resting upon the eroded surface of Calamity formation was the lower layer of the talus-midden at the base of the cliff. This consisted of a fine, black, sandy silt containing a high concentration of charcoal and flakes, hearthstone, and artifacts. The cross section indicated that it had been partially shifted so as to make more room under the cliff overhang. The depression thus created was filled with a lens of soft, yellowish, sandy silt and fine sand from which heat fractured stones were absent, and whose color indicated a low charcoal content. However, the flake concentration was highest for any stratum at the site.

Superimposed over both the light colored lens and the lowest layer of the midden was a third stratum of refuse. It was very similar to the lowest layer, being a loosely compact fine silt with a high charcoal content. Heat fractured stones, flakes, and a few artifacts were also present.

The buried midden in the second trench also rested upon the eroded surface of the Calamity formation. It was composed of a light brown sandy silt containing occasional limestone fragments, charcoal, flecks, and a few artifacts.

Intruded into the top of the buried midden was the sotol ring. In cross section it appeared as a bowl-shaped depression with a maximum depth of over sixteen inches. The material in the bowl was a black mixture of coarse silt, charcoal, and ash, with the latter materials predominating. No artifacts were found in the fill.

In those places where one or both formations had not been replaced by deposition of human or semi-human origin, the Kokernot formation rested directly upon the eroded surface of the Calamity formation. Both the buried midden and the talus midden were covered with a thin layer of this same deposit. The Kokernot formation covering the lower part of the talus grew increasingly thicker away from the cliff; it contained an admixture of midden material washed down during its deposition. Normal sections of the deposit yielded a few flakes, an occasional bone fragment, and bits of charcoal. On the surface were a few hearths.

Artifact material from the site shows an interesting stratification. The lowest layer of the talus midden yielded two points of a type which Sayles¹⁰³ illustrates as belonging to the Pecos River Phase (focus) (Plate IV, c). The same stratum also contained two hand axes or choppers. Another point of a type which also occurs in Pecos River focus sites, was found in the buried midden of the second trench (Plate IV, d, left).

A broken point found in the upper stratum of the talus-midden

103.

E. B. Sayles, 1935, *op. cit.*

(Plate IV, a) belongs to one of the types common to the Bravo Valley aspect.¹⁰⁴ Lying a few inches below the surface of the circle of heat fractured stones forming the sotol ring was a point of modified Livermore type (Plate VI, b). This type also occurs in the Bravo Valley aspect.

The earliest occupation of the site was represented by the lowest group of buried hearths which are contained in upper levels of the Calamity formation. Lack of associated artifacts makes correlation with any archaeological horizons impossible. The upper series of buried hearths, the lowest level of the talus midden, and the buried midden in the second trench all rest upon the eroded surface of the Calamity formation. This places them in the erosional epoch which preceded the deposition of the Kokernot formation. The diagnostic points found in the last two mentioned deposits assign them to the Pecos River focus of the Big Bend aspect.

It is more difficult to determine the chronological position of the upper two layers of the talus-midden. It is possible that the thin layer covering them represents a form of the Kokernot formation modified by the overhanging of the cliff. On the other hand, it seems more likely that the midden accumulated during most of the deposition period, incorporating the deposits as they were laid down, and transforming them so that they are unrecognizable as Kokernot silts. The thin, overlying layer would, under this interpretation, represent only the terminal end of the depositional period which continued after abandonment of the site. This hypothesis is borne out by the presence of a projectile point of a type belonging to the Bravo Valley aspect, which was definitely in place in the upper stratum of the talus midden. Work at the Shiner Site placed the earliest focus of this aspect in the Kokernot depositional period.

The thin layer of Kokernot formation over the buried midden may also be accounted for by this same hypothesis. Hence, the midden must have accumulated from the erosional epoch into the Kokernot depositional period. The sotol ring was cut into the midden proper and obviously belongs to the closing stages of its accumulation. The modified Livermore point which was found in its edge places it as belonging to the same period as the Bravo Valley. The relation of the sotol rings to Bravo Valley aspect sites is not well known; possibly two or more groups occupied the site at the same time.

The history of the site may be summarized as follows:

1. An occupation falling in the closing stages of the Calamity deposition; characterized by hearths in the open, ignoring the possible protection of the cliff.
2. An occupation occurring during the succeeding erosional epoch, by a group belonging culturally to the Pecos River focus of the Big

104.

J. Charles Kelley, 1939, *op. cit.*, cf. pp. 28-34.

PLATE IV—KOKERNOT ROCK SHELTER (Buck Hill 6:1).

Fig. 1.—Artifacts and section. Specimen **c** (right) is approximately $1\frac{5}{8}$ inches in length. Other specimens are on same scale.

Fig. 2.—a. Hearths **in situ** in upper part of Calamity formation.
b. Hearth lying along Kokernot-Calamity contact in trench.
c. Cliff and rock shelters with small **arroyo** in foreground.
d. Eroded flats before rock shelter. Elephant Mt. in the background.

Fig 1

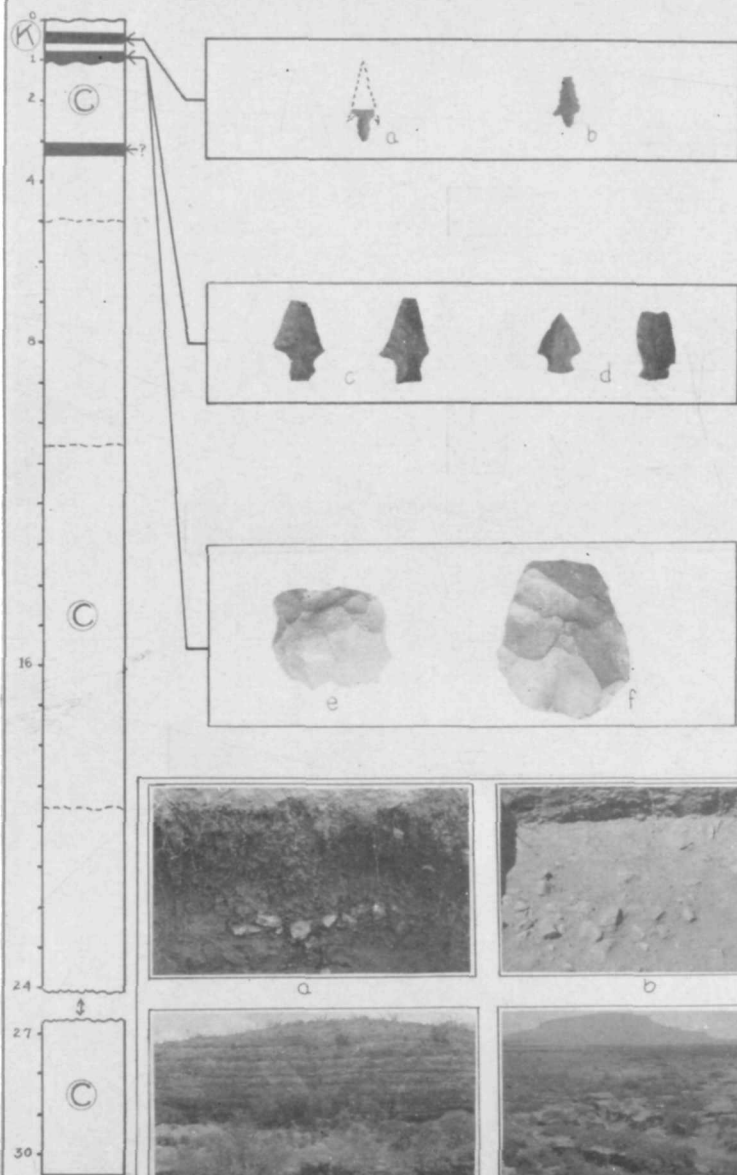


Fig. 2

Bend Cave aspect, leaving behind the upper group of buried hearths, the lowest stratum of the talus midden, and lower portions of the buried midden.

3. An occupation of two or more groups during the period of Kokernot deposition, with no geologic evidence of a perceptible lapse of time between this and the preceding occupation.
4. Final abandonment of the site.

The significance of the Kokernot Rock Shelter lies in the evidence that it indicates a duration of the "cave dweller" occupation, Pecos River focus, into the erosional epoch which separated the deposition of Calamity and Kokernot formations, and further that occupation continued without an appreciable time lapse, but the earlier groups were replaced by peoples of the Bravo Valley aspect. It also corroborates the evidence which at the Shiner Site placed this latter horizon in the period of deposition of the Kokernot formation.

BUCK HILL 3:6

By J. CHARLES KELLEY

Near the southern tip of Elephant Mountain, just above the point where Calamity Creek breaks into distributaries, hearths appear in the eastern bank of the *arroyo* at two levels.¹⁰⁵ Here the entire Quaternary sequence is present; the Neville formation, resting unconformably on Tertiary bedrock; next the Calamity formation trenched into the Neville, which in its turn is intersected by the Kokernot formation. Near the top of the Calamity formation is a pronounced humic zone. Many flint chips and hearthstones were observed eroding from this horizon, as well as several hearths *in situ*. No artifacts were found. A few feet below this humic horizon is an irregular intra-formational contact, separating two members of the Calamity. Just above this contact, at a point where it dips to form a pronounced hollow, another intact hearth was discovered. Near it Albritton found a *mano in situ*.

No excavations were made at Buck Hill 3:6. Only the one artifact was discovered. This is a one-hand muller of sandstone with two slightly convex working faces. The specimen is roughly oval in shape (Plate V, Fig. 4, i). This *mano* is highly generalized in type, and could belong in any part of the cultural sequence. Buck Hill 3:6, therefore, indicates that man was present in the lower Calamity Creek valley during the latter part of Calamity deposition, but has no further significance.

ALPINE 9:4

About five miles above the junction of Sheep Creek, Calamity Creek occupies a narrow valley, bounded by mesas of volcanic rocks. Where

105.

See Plate II, Fig. 1a, for the geological section as recorded by Albritton. This is locality 7 of the Bryan-Albritton account. (1939, *op. cit.*)

Ash Creek, coming from the northeast, joins Calamity Creek, the combined stream turns against the rocky westward boundary of the valley. Both streams carry water throughout the normal year at this point. Both have incised their channels into alluvial flats; just above their junction a wedge of stratified alluvium separates the two **arroyos**. Good exposures of Quaternary stratigraphy are, hence, available along both streams, and along the east bank below their junction. Albritton and Bryan's localities 1 and 2 are found here, and this is the location of Alpine 9:4. The site was located during reconnaissance, and, though no excavations were undertaken, several artifacts were found **in situ**.

Approximately one hundred yards below the stream junction, intact hearths were discovered in the Calamity formation, about six feet below the Kokernot contact. Calamity silts at this level were ashy, with numerous flecks of charcoal and occasional flint chips. Only one artifact was found, the tip and part of the shaft of a well made drill. This was of white chalcedony. It was almost rectangular in cross section and measured one and one-half inches in length and averaged one-fourth inch across.

After the Calamity formation had been built up several feet more, erosion set in. During the erosional period a camp-site existed on the valley flats above the present stratum junction. This site was later covered by four to six feet of silts, sands, and gravels of the ensuing Kokernot deposition. It is revealed in cross section in the banks of both creeks in the alluvial wedge above their junction over an area of several hundred feet. Two metates were found in place, embedded face down on the surface of the Calamity formation and covered by the Kokernot. One of these is shown **in situ** in Plate III, f. Both are water-worn flat slabs, roughly shaped into respectively oval and rectangular forms. On both, one flat side has been used as a grinding surface, with wear tending toward an oval bowl shape. No other artifacts were found **in situ** at this horizon.

The site demonstrates only that the upper Calamity Creek valley was inhabited during the period of Calamity deposition and in the following erosional epoch. Artifacts found are of such generalized types that identification of cultures represented is impossible.

ROCK HOUSE GAP AREA

This area may be defined as including the upper drainage of Maravillas Creek and its tributaries below Doubtful Canyon and above the mouth of Reynolds Creek in the Marathon Basin. Maravillas Creek rises in the mountains surrounding Chalk Valley to the northeast of Elephant Mountain and cuts sharply eastward through Doubtful Canyon across the Del Norte Mountains into the Marathon Basin. About five miles below the mouth of Doubtful Canyon it is joined by Dugout Creek, coming from the north. It then cuts across a steep hogback to form Rock House Gap, and flows southward through more open country. Some two miles below Rock House Gap a small tributary from Del Norte Gap to the west joins the main stream. The area can be located by reference to the Monument Springs and Santiago Peak Quadrangles of the U.S.G.S. topographic sheets. In this area are three sites of some importance and two minor sites.

ROCK HOUSE SITE (Monument Springs 8:2)

Just north of Rock House Gap and directly west of the junction of Maravillas and Dugout Creeks is a small alluvial flat, whose eroding surface lies over fourteen feet above the present stream beds. The western edge of Maravillas Creek at this point rises in an abrupt cliff of alluvium to form the eastern edge of this flat. Exposed by erosion of the flat are many intact fire hearths, thousands of flint chips and fire cracked stones, and occasional artifacts. This site was found and reported by Travis Roberts, who also made the first collections here.

In the west bank of Maravillas Creek is exposed the Quaternary stratigraphy of the flat (Fig. I, Plate II, section c). At the bottom of the section are residuals of the Neville formation. Above this are laminated silts of the Calamity formation dipping in places to form depositional synclines, marking the presence of former sloughs. The Calamity formation was badly eroded before deposition of the Kokernot. In one place a deep channel was incised, reaching nearly to present stream level. This was refilled by silts and sands of the Kokernot, which likewise spread out over the eroded valley flats. Recent erosion has removed most of the Kokernot formation from the flats and is cutting into the Calamity. Occasional patches of Kokernot silt still remain in the form of straight-sided columns.

Wherever the Calamity formation is exposed on the flats, intact fire hearths, scattered flint chips, fire cracked stones, and artifacts lie on its surface. Two of the intact hearths were trenched to determine the nature of the deposits underlying them. In both cases only laminated silts of the Calamity formation were exposed beneath them. Where the Calamity

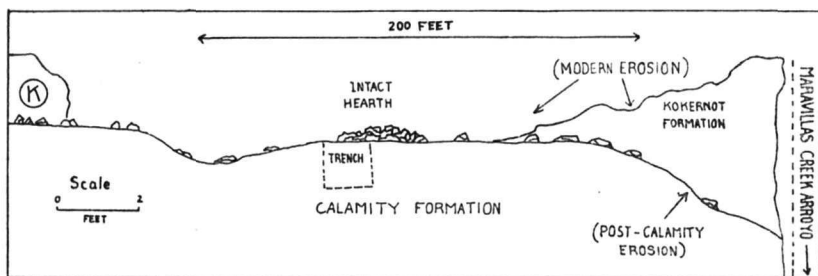


Fig. 5 Schematic section through upper part of alluvial flats at Monument Springs 8:2

has been cut by present erosion only scattered flint chips, hearthstones and artifacts are found, no intact hearths. In residual columns of the Kokernot formation, hearthstones, flint chips, and intact hearths occur at the base of the columns, lying directly upon the Calamity formation. In the west bank of the Maravillas Creek and Calamity-Kokernot disconformity was traced from the deep, ancient channel-bottom upstream to the valley flats. Here a narrow trench was started at the arroyo edge

and worked back into the flats. Within a short distance hearthstones and flint chips, washed from the site, were found at the contact line. Obviously, the site was occupied after the close of Calamity deposition and prior to Kokernot deposition, during the intervening erosional period.¹⁰⁶

Numerous artifacts were found on the eroded valley flats. None was found *in situ* in the deposits. Thus the artifact complex might conceivably represent an admixture of specimens derived by wash from several sites. No traces of other sites were found, however. Considering also the richness and size of the site, it seems probable that the collection, on the whole, does belong to Monument Springs 8:2, and that the culture represented existed during the post-Calamity pre-Kokernot erosional hiatus.

The artifact collection included projectile points, scrapers, blades, and knives. These are shown in Plate V., Fig. 1. Four of the projectile points are types diagnostic of the Pecos River focus (a). Others (b) are often found in Pecos River sites. Three (c) are types diagnostic of the Chisos focus. Blades (f), endscrapers (d), and sidescrapers (g) occur in both Pecos River and Chisos foci sites. The snub-nosed scraper (e), however, is unique. It is made of a fine grained igneous stone, highly patinated. It was chipped from a heavy flake, the reverse side, not shown, retaining nearly unmodified the original flake surface. The obverse face shown was formed by striking off long flakes lengthwise of the specimen from the lower end. Sides were then retouched to form utility edges. Other flakes formed the snub-nose forward end. Edges and flake scars are now dulled by wear and sand-blasting. No other specimens similar to this have been found from the Big Bend; it resembles fairly closely certain "gouges" or "core scrapers" reported from Central Texas, where they occur in the "Abilene Culture" (Sayles),¹⁰⁷ known also as the "Clear Fork" (Ray).¹⁰⁸ Jackson¹¹⁰ describes quite similar types from Fall Creek Site in Llano County. Central Texas specimens, however, generally seem to have the "base," or forward working edge, concave rather than straight, as in the present specimen. The material of the specimen is local, indicating it was made in the Big Bend area, even if the type of implement be in-

106.

Albritton and Bryan (*op. cit.*, page 1445) state that archaeological remains at this site occur in the Kokernot formation. The present writer is entirely to blame for this misapprehension in that he neglected to make his own detailed field notes available to the geologists, while their opinion was established by only superficial and hurried observation of the site's archaeology. Fortunately, the evidence still remains, and can be checked at any time by interested parties.

107.

Sayles, 1935, *op. cit.*

108.

Cyrus N. Ray, "The Clear Fork Culture Complex," *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 10, 1938.

110.

A. T. Jackson, "The Fall Creek Sites," in "Annual Report of WPA and The University of Texas Archaeological Research, Lake Buchanan, 1936-1937," *Anthropological Papers*, University of Texas Publications, 1938, p. 101.



Fig. 1

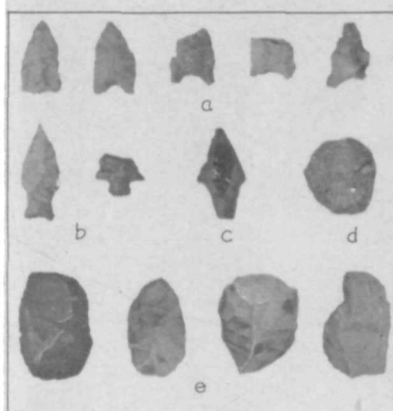


Fig. 2

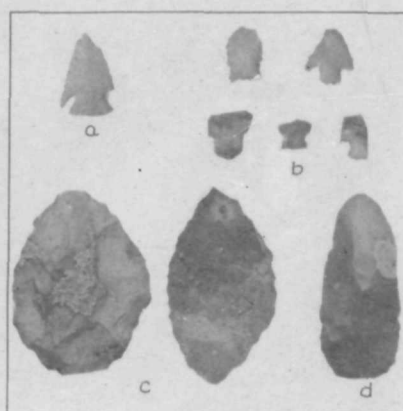


Fig. 3

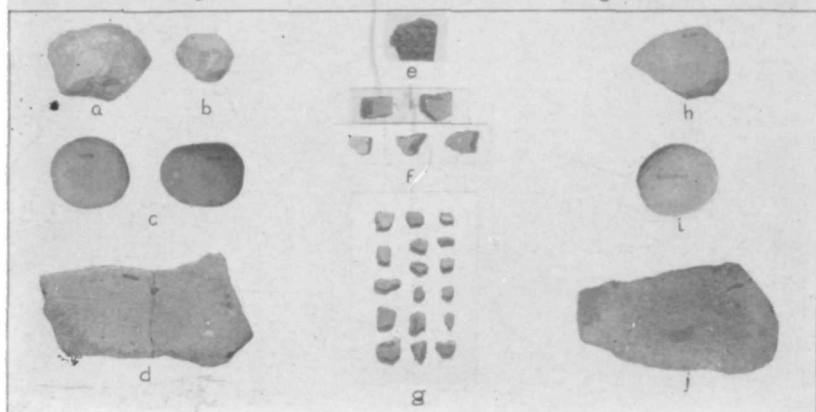


PLATE V—ARTIFACTS, VARIOUS SITES.

Fig. 1.—Artifacts from Monument Springs 8:2.

Fig. 2.—Artifacts from Santiago Peak 1:3.

Fig. 3.—Artifacts from Alpine 7:2.

Fig. 4.—Artifacts from Alpine 7:2, Alpine 2:2, Buck Hill 3:6.

Scale: Specimen **a**, second from left, in Fig. 2 is approximately $1\frac{3}{8}$ inches in length. All specimens in Figs. 1-2-3 are on same scale. Fig. 4, specimens **j** is approximately 20 inches in length; **d** is on same scale. Specimen **c**, left, is approximately $4\frac{7}{8}$ inches in diameter; **a-b**, **h-i**, are on same scale.

trusive. Its high patination suggests that there may be an age difference between it and the general lithic complex.

The stone complex exhibited is essentially that of the Pecos River focus of the Big Bend Cave aspect, with admixtures of Chisos focus traits of the same aspect. The former focus may be fairly certainly associated with the intact hearths, the latter may possibly represent accidental intrusions. Thus, the Pecos River focus, and possibly the Chisos focus as well, was in existence in the Rock House Gap area during the erosional period immediately following the Calamity deposition period, and immediately preceding that of the Kokernot formation. Thus the site gives good evidence of the survival of the Pecos River focus of the Big Bend Cave aspect to a time later than the Calamity deposition period.

MONUMENT SPRINGS 8:1

One-half mile below Rock House Gap, Travis Roberts found intact hearths *in situ* five feet beneath the surface in the northeast bank of Maravillas Creek. No artifacts were found nor were any excavations attempted. Stratigraphy of the site was not studied, but the hearths apparently are included in the Calamity formation.

MONUMENT SPRINGS 5:1

About three miles above Rock House Gap, near the Roberts Ranch House, Travis Roberts found hearths eroding from the stream bed. Conscious of the potential importance of this discovery he reported it to museum officials at Alpine. Intrusion of the hearth could not be ruled out so the discovery was discounted. Roberts continued his search of the arroyo, and in July, soon after a heavy rain, found hearths actually in place in the vertical bank of the east side of Dugout Creek, not far from the first hearth. He then took the writer to view his find. It was at once obvious that the hearths were actually in place beneath undisturbed strata and that significant changes in the flats had occurred since they had first been used.

Occasional hearths, silt with heavy ash content, and numerous flint chips composed the cultural stratum. Charred bird bones were uncovered in one hearth. Later geological work demonstrated that the archaeological stratum was embedded in the Calamity formation; below it are eroded remnants of the Neville clays, and above it the Kokernot formation (Plate I, b). No artifacts were found at this site, but it is second in importance to none, since it was responsible for the discovery of all those later found. It further demonstrated the presence of man in the Marathon Basin during deposition of the formation.

SANTIAGO PEAK 1:1

East of the southern tip of Elephant Mountain, the Del Norte Mountains, coming from the north, abut against the Santiago Mountains to the south. Between the two chains is a pass affording easy travel between Marathon Basin and Green Valley. This is Del Norte Gap. Through it

ran Indian trails in the past; today the Marathon-Terlingua county road follows it. A small tributary of Maravillas Creek drains the pass, beginning well on the Green Valley side of the mountains. Vertical **arroyo** banks are seen in places along the canyon. In one such bank near the head of Del Norte Gap, Travis Roberts found hearths and midden deposits of ash and fire cracked stones in place. No artifacts were found, no excavations were made. The archaeological stratum is included in the Calamity formation, which here as elsewhere is overlain by the Kokernot formation (Plate II, Fig 1, d; Plate IX, Fig. 2, b). Location of the site would seem to indicate that Del Norte Gap was utilized as a route of movement as early as Calamity times.

SANTIAGO PEAK 1:2; 1:3

Some two miles below Santiago Peak 1:1 the Gap is much wider, the alluvial flat is badly eroded and numerous small gullies appear. On the eroded surface of the upper end of the flat are numerous fire cracked stones, flint chips, and occasional hearths in various stages of dismantelement. In one spot there is very little erosion; here a ring midden, or "mescal pit," just shows at the surface, being largely buried by alluvium. Stratigraphy of the **arroyo** banks shows that these remains are included in the Kokernot formation, or between the latter and the Calamity formation.

A few hundred yards eastward hearths actually occur **in situ** in vertical banks. The stratigraphy seems to be essentially the same as that at Santiago Peak 1:1; the hearths are **in situ** in the Calamity formation. The eroding site is Santiago Peak 1:3, the eastward site Santiago Peak 1:2. Both were found by Travis Roberts, who collected artifacts from the eroded surface of Santiago Peak 1:3.

Although Roberts' collection may have some intrusives, owing to its exposed position on the eroded surface when discovered, it seems certain that most of the specimens belong with the site eroding from within or just below the Kokernot formation. Without excavation it is difficult to say which of the two possible positions the site actually occupies.

Artifacts in the collection include projectile points, blades, scrapers, and hammerstones (Plate V, Fig. 2). Five projectile points (**a**) are of types diagnostic of the Chisos focus of the Big Bend Cave aspect; one (**c**) is a diagnostic Pecos River focus type. Two others (**b**) could belong with either focus. Blades, side and end-scrapers, and hammerstones could belong with either focus. Essentially, however, the complex seems to be a Chisos focus association, with very slight Pecos River focus admixture. This is exactly the reverse of the situation at Monument Springs 8:2, only a few miles away. It seems probable that both sites belong to the pre-Kokernot, post-Calamity erosional epoch, and that the Pecos River and Chisos foci of the Big Bend aspect existed contemporaneously in the Rock House Gap area during this period. Certainly the Chisos is here demonstrated to be later than the Calamity formation. The hearths in the Calamity formation at Santiago Peak 1:2 produced no artifacts and hence serve only to reinforce previous conclusions as to the existence of man in the Marathon Basin and in Del Norte Gap during Calamity deposition.

RED BLUFF AREA

The Jackson-Caldwell Site (Nine Point Mesa 4:1)

Below Buck Hill 6:1, Calamity Creek runs into Green Valley. This wide valley is bounded on the south by a mass of limestone hills. Out of the southern portion of this mass rises bulky Nine Point Mesa, whose southern cliffs face on a narrow, east-west valley, drained by Nine Point Draw, a tributary of Maravillas Creek. This valley slopes gently from east to west along the drainage line, and from Nine Point Mesa southward to Red Bluff at its eastern end. Red Bluff is an igneous butte (Plate VI, Fig. 2, a) with a steep talus slope of jagged rock. The north-south slope of the valley forces Nine Point Draw to the edge of this talus slope, where it has incised itself into valley alluvium. Here, in the fall of 1937, two collectors of "Indian antiquities," Jackson and Caldwell, found an archaeological site of some importance.

The writer was informed of their discovery, and later was taken by them to the site. Subsequently, various trips were made to Red Bluff, both before and after the beginning of the Expedition. In July, Dr. Bryan and Dr. Albritton, together with the writers, also visited the site. Dr. Bryan was impressed with the complexity of the situation there, and advised that excavations be made. In August, therefore, with the consent of landowners, several days were spent in excavations at this location. After the close of the Expedition, in the fall of 1938, the writer again excavated here for several days on two successive occasions. In many ways the situation at Nine Point Mesa 4:1 remains an enigma. More specimens were recovered from this one site than from all the others combined, and with but a fraction of the effort expended in securing the others.

Archaeological remains occur at Nine Point Mesa 4:1 in four different situations:

1. Projectile points, grinding stones, and miscellaneous artifacts are found in large numbers in the present **arroyo** gravels.
2. Large numbers of artifacts appear **in situ** in gravel bars of the present **arroyo**, but above present channel bottom. Such bars occur also as pseudo-terraces along the ravine banks, and as residuals in the **arroyo** itself.
3. Flint chips and occasional artifacts appear **in situ** in old **arroyo**-gravels seen in lenticular cross section in the banks of the modern **arroyo**.
4. Sporadic artifacts and flint chips appear in a large midden of fire-cracked stones, ash, and charcoal, which lies parallel with the present surface of the valley flats, and is at one point exposed at their surface. This midden is now seen in cross section in the south **arroyo** bank. About one-third of it has been carried away by the recent erosional cycle (Plate VI, Fig. 2, c).

It is obvious that artifacts occurring in situation 1 have been washed from an upstream source. Similarly, those in situation 2 would seem to have been deposited in older channels, now abandoned, during an earlier stage of the modern erosional cycle; and hence are of the same origin

as those in the first instance. There is only one difficulty with this assumption: many of the gravel bars of this type are continuous with gravels exposed in cross section in the **arroyo** bank, and thus date to an older period of erosion and deposition than the present. To further complicate matters there are in places superimposed lenticular gravel beds in the ravine banks. Following up the **arroyo** two hundred yards or more from the point where artifacts first appear in channel gravels, the exposed midden section is reached.

A slight cove in the rocks of the talus slope, where the slope curves abruptly southward, then back again to the north and west, protects a small portion of the alluvial flat south of the stream from the **arroyo**. Here are circular mortar holes in talus rocks, while roughly circular alignments of rocks may indicate more recent nomadic structures. A few flint chips and fire-cracked stones appear on the surface. Scraping of the alluvium here reveals black midden soil and hearthstones at a few inches depth. In the vertical bank of the **arroyo**, black midden deposits show in profile against the yellow clays or silts on which they rest. In the vertical **arroyo** bank directly across the stream to the north no midden deposits appear. Apparently not over one-third of its area has been removed. At its greatest extent the midden can hardly have exceeded thirty-five feet in diameter or three feet in total thickness.

The yellow silts upon whose eroded surface the midden rests are tough and resistant. Caliche filaments and nodules are present. Lithologically, they are Neville formation, but no extinct fauna has been found. This stratum forms most of the **arroyo** banks at the site. Gravel bars of situation 2 rest directly upon its eroded surface. At the midden's west end, the yellow silts are cut by an ancient channel. Reworked refuse can be traced from the midden down into this channel in a continuous line. The old channel is refilled with incoherent silt and fine sand, typically Kokernot formation. Kokernot refill overlies the reworked midden refuse and blankets the surrounding flats. It overlaps the midden edges and extends a thin silt filament over the midden itself (Plate VI, Fig. 2, c). This midden, therefore, was deposited in the valley flats immediately prior to the pre-Kokernot erosional cycle, and was partially destroyed by that cycle. At that time an **arroyo** developed in the flats, roughly paralleling the course of modern Nine Point Draw. Lenticular sections of gravel in ravine banks would represent points where the modern channel departed somewhat from the course of the older cut, leaving Kokernot refill of the older channel exposed in cross section. Artifacts of all four situations were, therefore, from one source: the midden. Aside from the possibility of recent intrusion, artifacts recovered would belong to the pre-Kokernot erosional epoch.

The above conclusions were reached after rather intensive study of the site, but prior to any excavation. They seemed borne out by every bit of evidence available. True, it had been noted that unexplained lenticular gravel beds lay beneath the midden proper and, furthermore, that artifacts were present in situations 1, 2, and 3 upstream from the midden, as well as below it, but these seemed trivial items. With this

concept in mind we began excavations in the midden. At the end of the day's work, several facts became unpleasantly clear:

1. Artifacts were discouragingly few in the midden, so few that a quick calculation indicated several hundred square feet of midden deposits must have been destroyed and reworked by stream action to yield anything approaching the quantity of artifacts that we had previously found in the modern channel gravels alone. This midden, quite clearly, had at no time approached any such size, nor could we locate other middens farther upstream.
2. The few artifacts discovered did not resemble in the slightest those from the **arroyo**. They were small, finely chipped "arrow points;" those in the ravine were large, heavy "spear points."
3. Something was badly wrong with our previous conclusions.

A partial solution of the mystery came when gravels from an old gully section directly beneath the midden were screened. They were rich in flint chips, which resembled closely those from the **arroyo**. A few fragmentary projectile points were found; they seemed to be identical with the type most often found in the **arroyo** deposits. This gully had been eroded into the Neville (?) and refilled with gravels containing large quantities of flint chips and a high percentage of artifacts before the midden was deposited. After midden refuse accumulated on the renewed valley flats, pre-Kokernot erosion set in and partially destroyed it. Then the Kokernot formation was laid down, as previously described, covering both midden and older deposits below it. Thus, two erosional periods, rather than one, must be accounted for, and at least two cultures must be explained. Furthermore, only Neville and Kokernot formations appeared to be present; the Calamity was not observed, unless the gravels of the older gullies represented it.

Since two sets of refilled channels are involved in explanations of the provenience of artifacts in situations 1, 2, and 3, interpretation of the site is extremely difficult. Aside from one instance of direct superposition, previously mentioned, and the one case where midden refuse ran directly into an ancient channel it was impossible to determine in the field without large scale excavations, if a given set of gravels belonged to early or late **arroyo** channels. Determination of the age of the two erosional epochs was likewise difficult. The more recent period was certainly that which immediately preceded deposition of the Kokernot formation; the earlier channel may represent a preliminary stage of the same cycle. An alternative view is that the older channels belong to the major erosional cycle intervening between Neville and Calamity depositional periods. In the latter event, artifacts recovered from them are of the same general age as the Maravillas complex discovered in Alpine 9:1b, described by Campbell later in this paper.

Artifact studies help solve the problem; they also add still other puzzles. Material from several excavations in the midden at Nine Point Mesa (Plate VI, Fig. 1, a-k) is predominantly Livermore focus in affiliation. Projectile points shown at e are typical of that focus;

those at **f** may belong with it. The small arrow shaft abrader shown at **d** has been noted in Livermore. The broken gorget **a**, carefully chipped blade **b**, rolled iron concertions **c**, and sandstone slab metate and mano **k** are new traits. Oval bowl metates, not shown, were found also. Tangs of three Pecos River points were found **g**, as well as two Chisos focus points **h** and **j**. The two points to the left of **j** may be Chisos points also. Two were found which are similar to those from the older channels deposits; these are badly broken and show marks of rolling. These are probably accidental intrusions, since the edges of the other points, including Pecos River focus and Chisos focus types, were fresh and unrolled. Other Pecos River points were found *in situ* in gravel deposits in the vertical bank, but they were not associated with the older type points **n**, and probably belong with the recent channels. These are shown at **i**. Points shown at **p** resemble Chisos focus points, owing to accidental chipping of their bases, but actually are not of this type.

Specimen **s**, from one of the ancient channels (see Plate III, c), is a polishing stone, with both edges and ends carefully shaped and facets of usage with occasional striations developed near the center of each face. The channel in which this was found seemed to be filled only with Kokernot silts; hence, it has been assigned to the midden complex. Specimens **t** and **r** came from the modern arroyo bed. Specimen **r** is a hemisphere of yellow sandstone, oval in outline, with a groove worn across the convex side. It may be a shaft-abrader similar to **d**. Since no grooved stones have been found *in situ* in older channels this has been tentatively assigned to the midden complex. The pitted manos at **t** are commonly associated with both foci of the Big Bend Cave aspect. Since Pecos River and Chisos foci points found in the arroyo were assigned tentatively to the midden, these specimens probably belong there also. No manos of this type were found in the midden, however, so they may well belong with the older culture.

Specimens of type **n** were found *in situ* in the older channel deposits directly beneath the Livermore focus midden, and are, therefore, stratigraphically earlier than the Livermore focus. In projectile point collections from gravel beds of situations 1, 2, and 3, approximately seventy percent of the points are of this type. Minor types from similar associations are shown at **o**, **p**, and **q**. Those at **o** may belong actually to the midden since they are reported from Pecos River sites. Those at **q** are merely reworked broken points of type **n**.

Other artifacts occurring in great numbers in gravel beds of situations 1 and 2 are shown at **u** through **z**. Judging from large numbers present relative to the scarcity of such specimens in the middens they may be assigned to the early horizon. At **u** are blades, some carefully made, triangular and oval in form; others roughly chipped "quarry blades" or blanks. Better-made specimens may belong with the midden, where similar types were found. At **v** and **w** are shown heavy side and end-scrapers, ranging into small side-scrapers or knives. The two specimens at **w** are worthy of note. The reverse face is the

PLATE VI—THE JACKSON-CALDWELL SITE (Nine Point Mesa 4:1)

Fig. 1—Section and Artifacts. Scale: Specimen **d** is approximately $2\frac{5}{8}$ inches long; **a-c** are on same scale. Specimen **k**, mano, is approximately 7 inches in length. The metate is on the same scale. Specimen **j** is approximately 2 inches long; **e-q** (except **k**) are on same scale. Specimen **z** is approximately $4\frac{5}{8}$ inches in length; **r** and **t**; **y** and **z** are on same scale.

Fig. 2. a View of Red Bluff just above the site.

b View of Red Bluff Arroyo at the site.

c Composite section of the site, based on Albritton and Bryan, Fig. 8, p. 1448, 1939, *op. cit.*

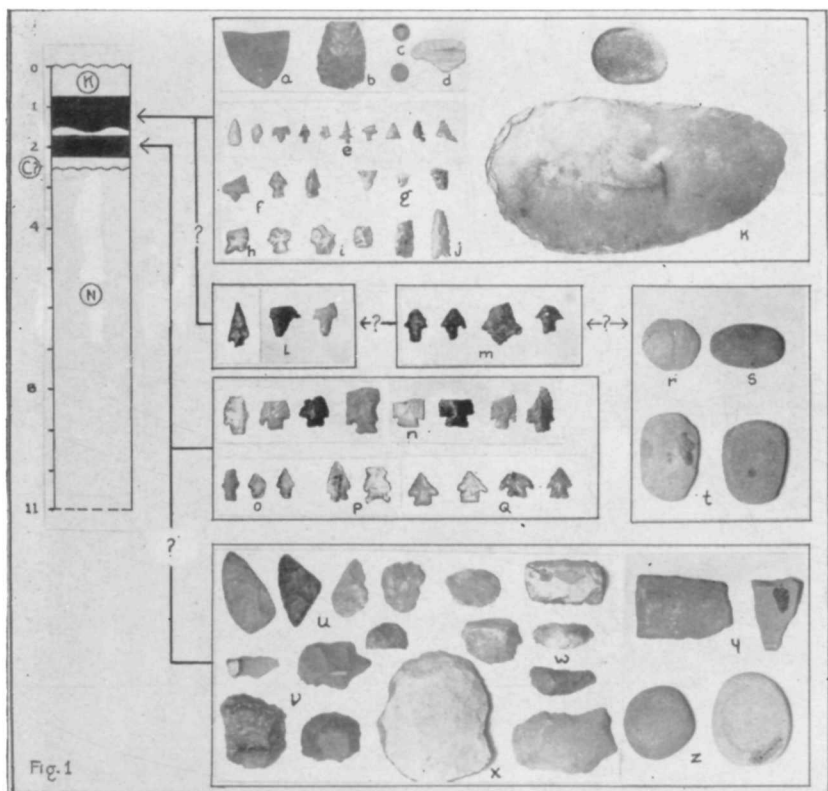


Fig. 1

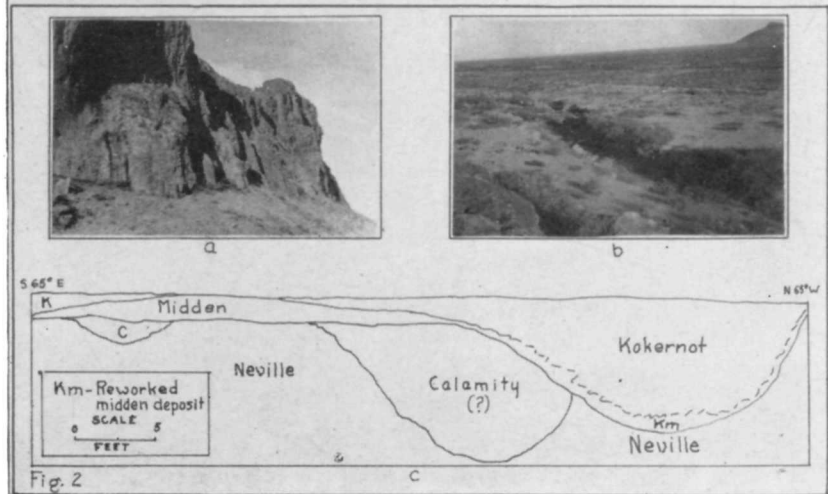


Fig. 2

smooth one of an unmodified flake. They are roughly pointed at both ends with one thick convex working edge, and one thin, slightly concave or straight, working edge. The bulb of percussion of the original flakes lies on the thick convex edge.

At **x** is a crude hand-axe, or "chopper," made of a thick heavy flake with crudely chipped working edges. This type occurs through all known Big Bend horizons, as do oval bowl metates, fragments of which, edges worn smooth by rolling in the **arroyo** gravels, are shown at **y**; and unshaped manos with single or double convex faces shown at **z**. Metates, with one or two grinding faces, and manos, as shown at **y** and **z** are very numerous at Nine Point Mesa 4:1, more so even than projectile points.

Specimens attributed here to older gravels form a homogeneous complex, hereafter termed the "Red Bluff Complex." This complex as a whole, has not been previously noted. It has many points in common with the Big Bend Cave aspect, and with several Central Texas cultures, but it does not approach identity with any of them. Projectile points and specialized knives provide diagnostic elements. Projectile points of somewhat similar types are present in Central Texas sites, where they apparently have a long time range.¹¹¹

Nearest approach to the specialized knives is the concave scraper from Lake Mohave.¹¹² Within the area the complex most nearly resembles the Maravillas Complex from Alpine 9:1b, but there are no definite ties. In general, closest ties are with Central Texas cultures.

In the Big Bend area, Livermore focus artifacts are consistently associated with Chisos focus types, and occasionally with Pecos River focus specimens. Typologically, Livermore is ancestral to the later Bravo Valley aspect. The Pecos River focus occurs without Livermore focus influence in many cases, and in at least two places has been found beneath the latter in stratified sites. Association of Livermore, Chisos, and Pecos River foci artifacts at Nine Point Mesa 4:1 is thus in keeping with the known data from the area, but serves to clarify somewhat that data. Elsewhere in this report the Pecos River focus is demonstrated to have been present during the latter portions of the Calamity deposition period (Alpine 9:1a, Valentine 9:1, Shafter 6:1), and to have survived into the succeeding erosional period (Buck Hill 6:1, Monument Springs 8:2, possibly Santiago Peak 1:3). In two of the latter sites Chisos focus artifacts were associated with Pecos River types. It would seem,

111.

See Jackson, *Ibid.*, Plate IV, No. 4, p. 27; Fig. 1, p. 28; Fig. 7, Nos. 2, 4, and 6, p. 34; Fig. 8, No. 1, p. 35; Plate XVI, No. 1, 5, No. 2., A-C-D-E, No. 4, A-B; p. 91.

112.

E. C. Campbell, and William H. Campbell et. al, "The Archaeology of Pleistocene Lake Mohave," *Southwest Museum Papers*, No. 11, Los Angeles, 1937. Plate XXXVIII, a, p. 75.

therefore, that the Pecos River focus, after having dominated the area during the latter portions of the Calamity period, encountered the Chisos focus and the Livermore focus for the first time during the ensuing erosional epoch. Livermore, appearing for the first time in that epoch as indicated here, continues in modified form into the Koker-not formation, where it becomes the Bravo Valley aspect. This reconstruction would explain perfectly the association in the Nine Point Mesa midden, as it has been described here.

The Red Bluff Complex cannot be placed in the geological sequence, other than as prior to the terminus of the post-Calamity erosional cycle and after the Neville deposition. Its cultural affiliations are unknown, other than certain vague ties with Central Texas cultures. Its position in the cultural sequence is pre-midden and, therefore, pre-Livermore but otherwise uncertain.

We can reconstruct the series of events at Nine Point Mesa 4:1 as follows:

1. During a long early period, represented by Neville deposits, there was no human occupation.
2. Sometime after the Neville deposition there was heavy or long-continued occupation of the site by the authors of the Red Bluff Complex.
3. Subsequent erosion cut a deep **arroyo** along the edge of Red Bluff talus slope, roughly paralleling the course of modern Nine Point Draw, and completely destroyed the site of Red Bluff Complex occupation. This erosion may have occurred during protracted drought conditions following Neville deposition, or during an early stage of the pre-Kokernot, post-Calamity dry period.
4. The **arroyo** cut during the preceding period was completely or partially refilled; the gravels which filled its deeper channels contained artifacts of the Red Bluff Complex site. These gravels may represent all that remains of the Calamity formation, or perhaps only a partial refill dating to a temporary cessation of the following erosional cycle.
5. After the channels described above had been at least partially refilled, peoples of the Livermore focus settled at the site and Livermore focus refuse accumulated on the flats. At about the same time, or soon thereafter, erosion again set in and the Livermore midden was partially destroyed. The Livermore focus at this site was under the influence of Pecos River and Chisos foci, or else peoples of these foci occupied the site during temporary periods of abandonment.
6. The Livermore site was abandoned, probably owing to increased erosion, and sometime thereafter erosion ceased and deposition, this time of the Kokernot formation, was resumed. Kokernot deposits refilled the old channels and spread out over the flats almost completely burying the remains of the midden.
7. Toward the beginning of this century, channel cutting was re-

sumed and modern Nine Point Draw was incised into the flats, again roughly retracing the routes of two previous channelings. In gravels of its bed artifacts derived directly from the midden and from both sets of ancient **arroyo** refills were included. Today this channel reveals the sequence of events as we have here outlined.

A few qualifications are necessary. It is possible that the summary presented departs slightly from actual fact, since much of it is purely hypothetical. The Pecos River points may belong with the Red Bluff Complex rather than with the midden. Much that we have assigned to the Red Bluff Complex is possibly of midden origin. Only projectile types shown at **n** were actually found in old gravels directly underlying the midden. Other artifacts have been assigned in the basis of less definite evidence. In general, however, our reconstruction seems fairly reliable.

A few other items should be mentioned. Mortar holes in surface boulders near the midden were noted. Pestles of elongated river stones, showing a conical wear on one end, were found on the modern **arroyo** bed. This combination probably belongs to the midden, though there is no trustworthy evidence. Where the talus slope rests against the cliffs of Red Bluff, numerous small rock shelters occur. Jackson and Caldwell screened the fill of one shelter and recovered a few small, finely made arrow points of Bravo Valley aspect types. No such points were found at Nine Point Mesa 4:1.

Choice of the alluvial flat at the base of Red Bluff by at least two groups requires comment. There is no observable reason based on availability of food, etc., since both food and water supply at Nine Point Mesa 4:1 is meager and untrustworthy. It was discovered, however, that the huge bulk of the cliff acts as a giant oven, absorbing the sun's heat in the daytime, radiating it at night over the flats below. The flats, partially in its shadow, are thus cooler in daytime and warmer at night than the immediately surrounding areas. This may have been an attraction. Again, the cliff has such echo properties as to give the uncanny effects of a whispering gallery. All sorts of sounds are picked up by it from miles around and reflected out over the flats. This may have appealed to the Indians.

In recapitulation, the importance of Nine Point Mesa 4:1 is that it demonstrates the presence of the Livermore focus in the Big Bend early in pre-Kokernot, post-Calamity (?) erosional period, probably with Pecos River and Chisos foci influences; and that it gives evidence of the presence of a previously unknown culture, the Red River Bluff Complex, in the area in Calamity times if not earlier.

TERLINGUA 9:1

This is a small and unimportant site in the Rio Grande Valley approximately forty-five miles south of Red Bluff. A dry wash joins

the Rio Grande just east of Castalon, Texas. For a half-mile or so above the river this wash has deposited extensive alluvial flats now badly dissected by the **arroyo**, in whose vertical banks intact hearths occur at several levels, apparently in both Kokernot and Calamity formations. No artifacts were recovered nor were excavations attempted. It should be noted that the flats face on the present Rio Grande with a vertical cliff of alluvium rising from the flood plain. Actually the flats form a second and higher flood plain of the Rio Grande at this point.

ALAMITO CREEK AREA

Alamito Creek originates in the Davis Mountains, north and east of Marfa. Near Marfa principal headwaters join to form one of the Big Bend's major streams. Below Marfa the creek drops into a narrow valley, and from there on flows between cliffs of igneous rock and conglomerate until it reaches the Rio Grande a few miles below Presidio, Texas. The valley ranges from a mere canyon to eight miles or more in width. Throughout its length Alamito Creek has built up an alluvial flat into which the creek is now incised. This flat slopes gently to talus slopes and cliffs of the valley edges. Tributary streams also have incised their channels into the flat, entering the main stream at its own level. Several of the tributaries for short distances above their mouths as well as the creek itself are permanent streams.

At several places along the Alamito Creek are small agricultural settlements maintained by irrigation from the creek. Ranch houses occur here and there along the valley, and archaeological sites are numerous. Mesquite, greasewood, cacti and grasses, with groups of cottonwoods, salcedas, and willows along the streams dominate the valley vegetation. On hills and mesas bordering the valley cactaceous plants prevail.

Alamito Creek valley is a natural line of movement through the Big Bend from southwest to northeast. The open valley flats afford easy movement from the Rio Grande to the highland plains and plateau near Marfa. Several of the creek's principal headwater tributaries begin in the Davis Mountains at low passes which provide easy access to the Pecos River drainage through open valleys and basins. A few miles above the mouth of Alamito Creek on the Rio Grande, the latter stream is joined by the Rio Conchos, one of its principal Mexican tributaries. The joined valleys of the two streams forms a rich agricultural area, a population center for both pre-historic and modern peoples. Alamito Creek taps this rich area from the north and east. Added to the purely topographic advantages of the route is the perennial water supply found throughout most of its length.

At present the Kansas City, Mexico and Orient Branch of the Santa Fe Railway system follows this route from San Angelo, Texas, to Presidio, and from there continues to Chihuahua City in Mexico. Until recent years this was also the principal vehicle road through the area, and will be again in the near future. In the latter half of the 19th Century

the Chihuahua Trail followed the valley and prior to that it was used by early Spanish explorers and by the Indians.

The Neville formation is present in the valley flats but is not conspicuous in **arroyo** cuts. Remains of the Imperial Mammoth have been found in the valley. Both Calamity and Kokernot formations are well developed throughout its length, except where alluvium has been completely scoured out in the narrower canyons. Archaeological sites eroding from upper portions of the Kokernot formation are numerous. At three such sites hearths and artifacts have been discovered **in situ** at several levels in the Calamity formation.

THE SHINER SITE

(Shafter 6:1)

Early in the summer of 1937, Mr. V. J. Shiner, then with the Department of Agriculture at Presidio, Texas, told the writer that he had seen ashes and flint chips in an **arroyo** bank on Alamito Creek. Since Mr. Shiner is an amateur archaeologist of ability, a serious but unsuccessful attempt was made by the writer to locate this site from his description. After discovery of the Roberts Site, Mr. Shiner personally conducted the writer to the site. On the first visit a projectile point was found **in situ** in the lowest level exposed. Other visits were made, and in the summer of 1938 several days were spent excavating there.

About five miles below Casa Piedra, Texas, Alamito Creek passes through a constricted portion of its valley. Just south of this pass a small side **arroyo**, Denman Draw, intersects the main **arroyo** on the south. Shafter 6:1 is located at the junction of the two **arroyos** (Plate VIII, Fig. 2). Other archaeological sites erode from alluvium on the north side of Alamito Creek at this point. Rock shelters occur beneath the conglomerate cap of the valley walls above and below the site.

The site occupies a roughly triangular area between Denman Draw, Alamito Creek and a mesa to the northeast; and a similar area on the southwest side of Denman Draw. Archaeological strata included in the alluvium appear in both banks of the latter, in the southeast bank of Alamito Creek, and in several gullies that cut the site. The surface of the site is a series of partially coalescent "blow-outs" or eroded areas. Fire-cracked stones, flint chips, occasional artifacts, and partially dismantled hearths appear in these denuded areas and are seen in the alluvium surrounding the blow-outs. In the southwest bank of Denman Draw intact hearths with many flint chips are exposed at two levels, six to twelve feet, and ten to seventeen feet below the surface, varying in depth with the location. Scattered hearthstones and artifacts of the surficial eroding site appear at the top of the section to add a third archaeologic level; all in direct superposition.

Albritton and Bryan's studies demonstrated the existence of the

Calamity and the Kokernot formations, but not of the Neville, at Shafter 6:1.¹¹³ If the latter formation be present it lies below the present level of **arroyo** cutting. In Alamito Creek's southeast bank near the site's northeast corner, a deep, wide channel in the Calamity formation is seen in cross section. This ancient channel is filled with cross-bedded sands and gravels of the Kokernot formation. Covering this refilled channel and extending out over the flats are horizontally bedded sands and silts of the Kokernot. Lower archaeological strata are in lower-middle and lower-upper Calamity formation, respectively. The upper eroding site is included in horizontal upper beds of the Kokernot formation.

Excavations at the Shiner Site included the exposing of two pit-houses, sinking of five test pits, and shaving away of small sections of the southwest bank of the Denman Draw. Mr. Denman Moody, of Houston, Texas, owner of the land, graciously granted permission to excavate.

The lower of the two cultural levels in the Calamity formation (Plate I, f) produced hundreds of chips and flakes of stone, but only two artifacts were found **in situ**. One specimen from this stratum is shown in Plate VIII, Fig. 1, o. This is a broken projectile point of a type found consistently associated with Pecos River focus sites in the Big Bend. It resembles rather closely spear points recovered by Harrington at Gypsum Cave¹¹⁴ and may be early in the Pecos River focus. It is essentially only a variation of the dominant type of Pecos River focus projectile point (Fig. 1). The other artifact found in this stratum was a tang from a similar type point. The culture represented is in all probability the Pecos River focus.

The only artifact found **in situ** in the upper buried level in the Calamity formation (Plate III, a) is shown at p, Plate VIII, Fig. 1. This is a blade, carefully chipped on both faces, and rather well patinated. No identification of the culture represented is possible.

Several pits were dug to establish the stratigraphic position of the debris of the uppermost eroding site. Test Trench No. IV (Plate VII, Fig. 2, Diagram A) was started at the eastern edge of the site, at a point where no archaeological materials appeared on the surface. At approximately fourteen inches beneath the surface, and covered by undisturbed silt and sand, an intact hearth was found. Other pits gave similar results.

113.

Albritton and Bryan, **op. cit.**, pp. 1449-1451, Fig. 10. This is their locality 12.

114.

M. R. Harrington, "Gypsum Cave, Nevada," **Southwest Museum Papers, No. 8.**, Los Angeles, 1933.

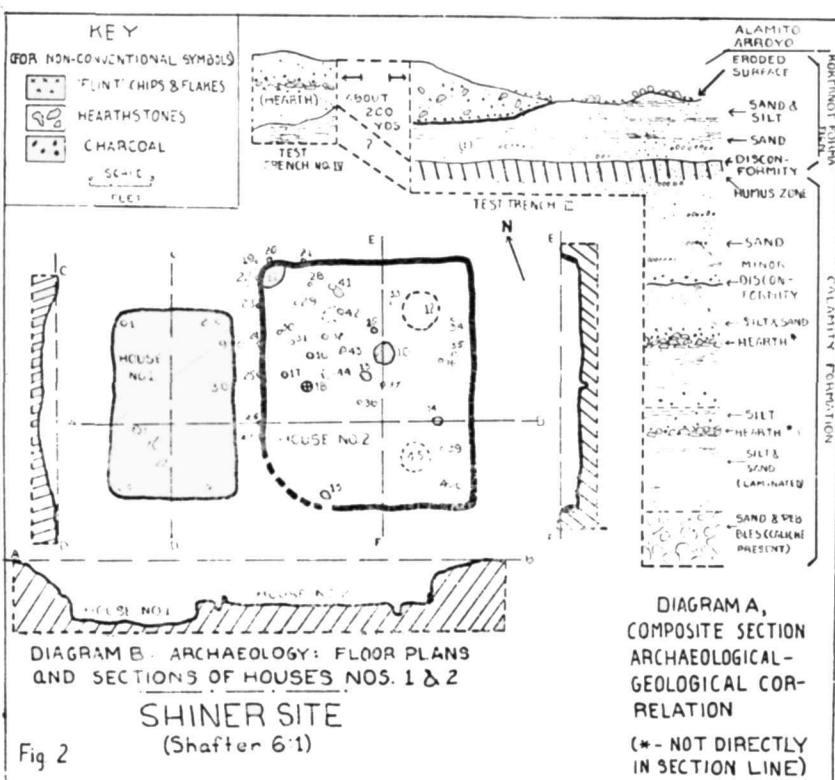


PLATE VII—HOUSE SITES AT SHAFTER 6:1 (Shiner Site)

Fig. 1.—House No. 2, excavated, from the south.

Fig. 2.—Houses No. 1 and 2, plan and sections; position in geologic deposits.

Code: 1-5, postholes; 6-7-8, stones on floor; 9, postholes; 10, shallow unlined firepit; 11, corner bin; 12, burial pit; 13-17, major support postholes; 18, charred post butt resting on floor; 19-42, small postholes; 43-44, irregular holes in floor; 45, pit dug in search of burials.

Near the edge of Alamito Creek house pits were discovered (Plate VII, Fig. 2). Two of these were completely excavated, a third only tested. House No. 1 was a rectangular, unlined pit. Usage and the burning which destroyed it had hardened the silts of its sides and bottom, but there was apparently no deliberate lining. Several small post molds were present in the corners and along the east wall. Charred reed and grass along the west wall and on the floor indicated that the walls and the roof had been of fragile "jacal" construction. No data on arrangement of superstructure beams was obtained. Though many flint chips and three unshaped stones lay on the floor, no artifacts were found.

House No. 2 (Plate VII, Fig. 2) lay just east of House No. 1. Erosion had reduced its west side floor level in places, and completely removed the southwest corner. In constructing the house a shallow rectangular pit was dug, floored with adobe, and lined with low walls or curbs of adobe. These curbs extended to the top of the pit and were there smoothed flat. They were then plastered. Above the adobe walls or curbs the walls were of jacal construction.

Small post holes were found at the outer edge of north and west walls, and distributed irregularly over the house area. Larger posts had been set in the floor at several places but their arrangement does not reveal the original superstructure. A charred post-butt rested upon the floor near the center of the west side. It may have been the base of a pole ladder or of a supplementary roof support.

A shallow, unlined firepit occurred near the house center, and a shallow depression in the northwest corner has been interpreted as a corner bin. In the northwest corner a roughly circular pit had been dug through the house floor, and in it an infant buried. The skeleton was badly decayed, but was apparently flexed, head to west, facing east. Olivella shell beads accompanied the burial.

On the house floor were found two stone pipes or cloud-blowers (Plate VIII, Fig 1, i); two worn tanged points or knives **I**; one mano **n**; two pieces of red pigment, one faceted by usage, in nipple-like forms **h**; and numerous flint chips and spalls. The tanged knives and pigment were close together on the floor above the burial, and may have had some connection with the latter.

This house, like House No. 1, had been destroyed by fire. On its floor lay a thin layer of fine sand covered by charred beams, reeds, and adobe of the fallen roof. Over this lay sand with some refuse intermixed. Included in the latter layer was a small fragment of brown pottery decorated with parallel incisions (Plate VIII, Fig. 1 c) and a sherd of crude brown ware decorated in red and black **a**. The latter sherd is El Paso Polychrome in type; the former is a ware often found associated with El Paso Polychrome and Chihuahua Polychromes.

House No. 3 (not shown) lay just to the east of House No. 2, utilizing part of the latter's east wall. It was not excavated.

Test Trench III was sunk through the floor of the House No. 1 and extended to the bank of Alamito Creek (Plate VII, Fig. 1, Diagram A). Approximately one and one-half feet below the house floor a sherd of El Paso Polychrome was found *in situ* in the Kokernot formation, into which Houses I and II had been dug. A few inches deeper the eroded surface of the Calamity formation was reached. Thus, both houses were cut into and both likewise overlay and underlay El Paso Polychrome strata; they can, therefore, be correlated with the Kokernot formation and with the period of El Paso Polychrome.

Other test trenches revealed the same situation as Trenches III and IV. Principal occupation of the site occurred after the pre-Kokernot *arroyos* had been refilled, but during a large portion of the time that the Kokernot formation was accumulating. At the site's eastern edge were remains of houses of adobe brick with stone foundations having associated artifacts of the Alamito focus. These appear to have been built on the uneroded final surface of the Kokernot formation. Local informants state that these houses were occupied some fifty years ago. Modern erosion at the site, therefore, has been inaugurated during the last fifty years.

In Plate VIII, Fig. 1, *a, e, j, k, m*, are shown artifacts found on the site's eroding surface, or *in situ* in the deposits. At *a* are sherds of El Paso Polychrome pots shown at *b*, and at *c* are striated brown sherds of unknown type; the sherds at *e* are Chihuahua Polychrome, that on the right probably Villa Ahumada Polychrome.¹¹⁵ This is a ceramic association derived from the Southwest, but in this region it is characteristic of the La Junta focus, Bravo Valley aspect.

Projectile point types *j, k* are also typically Bravo Valley aspect in affiliation. At *j* a modified Livermore focus point is shown, highly significant in this association. Compare projectile points shown here with those from upper levels at Buck Hill 6:1 (Plate VI, Fig. 1, *a, b*). Crude scrapers at *m* are found in many cultural manifestations in the Big Bend, and are not important. The carefully shaped mano *n* is a Bravo Valley aspect type. Several of these were found at Shafter 6:1, as at all Bravo Valley aspect sites.

House No. 2 is quite similar to houses of the La Junta focus excavated at Shafter 7:1. If an "altar" existed against the south side of this house, as in many La Junta focus houses, it may well have been destroyed by a heavy mass of mesquite roots which occupied the spot where it should have been. House No. 1 is not a familiar type but in general features is La Junta focus in affiliation. Flexed inhumation of infants below house floors is a Bravo Valley trait and is especially characteristic of the La Junta focus.

115.

See E. B. Sayles, "Some Southwestern Pottery Types, Series V," *Medallion Papers*, No. XXI, Globe, 1936, for a description of Chihuahua Polychromes.

PLATE VIII—THE SHINER SITE (Shafter 6:1)

Fig. 1.—Section and artifacts (includes pottery from Shafter 6:2 also). Specimen **l** (right) is approximately $2\frac{1}{4}$ inches in length. Specimens **h-mm** are shown on the same scale. Specimen **o** is approximately $1\frac{3}{8}$ inches in length; **p** is on same scale.

Fig. 2.—Panaroma view of Shafter 6:1 from the east. Main site occupies brushy area in midground; between Alamito Creek, right and back. Denman Draw, left, and the road in the foreground. Rock Shelters occur in cliffs in left foreground.

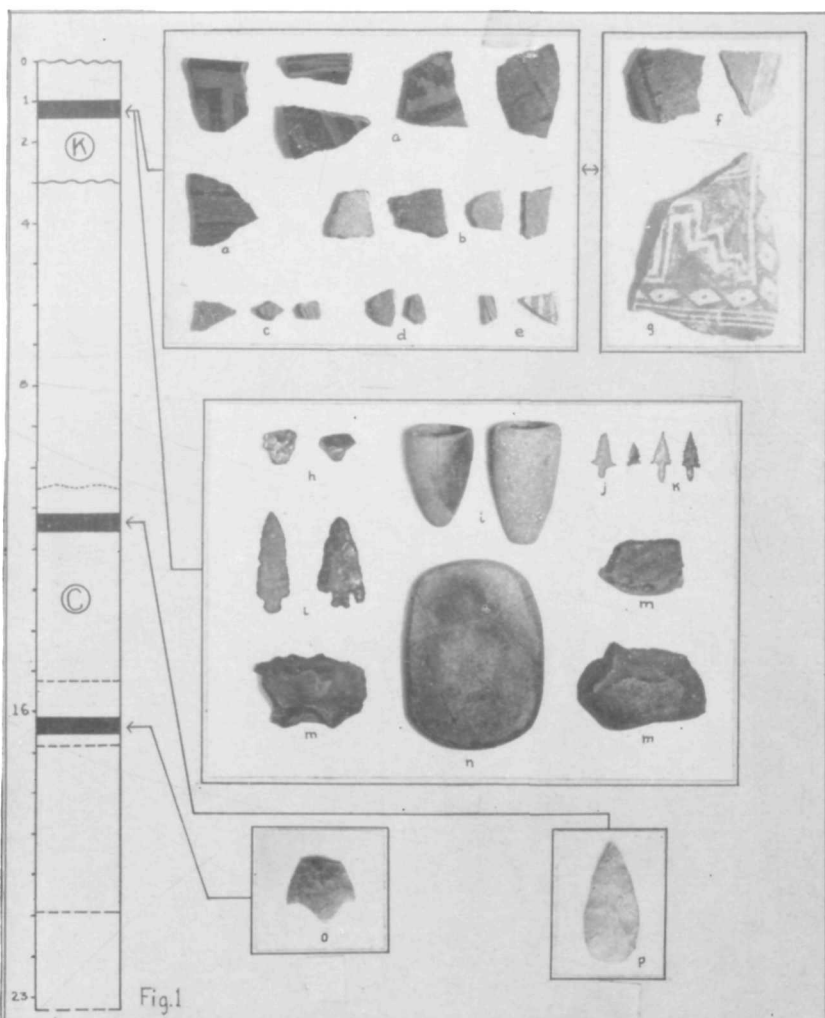


Fig.1

Fig.2



The cloud-blowers shown at j theoretically belong with the general complex found in the Bravo Valley aspect, but they have not previously been reported from sites of the aspect.

Association of fine, thin, well-made arrow points; rectangular shaped, double-faced manos; shallow rectangular pithouse with north-south orientation, low adobe curbs, and jacale superstructure and walls; flexed inhumation below house floors; and El Paso and Chihuahua Polychromes in association with striated and plain unnamed brown ware, indicate without doubt that the culture represented at Shafter 6:1 in the Koker-not formation is the Bravo Valley aspect. The last three traits named demonstrated that the complex belongs with the La Junta focus of that aspect.

El Paso Polychrome is intrusive into the Big Bend area. It centers in the region between El Paso and Alamogordo, New Mexico.¹¹⁶ Near El Paso it is associated with the El Paso Phase¹¹⁷ which influenced strongly the early Bravo Valley aspect. At Gila Pueblo it was found in rooms dated by dendrochronology at A. D. 1345, and at Arizona C:1:44 at A. D. 1310 to 1330.¹¹⁸ It is commonly found in association with Chihuahua and Gila Polychromes, and Chupadero Black-on-white, but occasionally occurs with earlier Mimbres Black-on-white, and with later Glaze I Red.¹¹⁹ The Gladwins place El Paso Polychrome in their "San Andres" and "Animas" Phases, which would give it a time range from about A. D. 1250 to 1450.¹²⁰ Stallings informed me,¹²¹ however, that circa 1100 to 1400 A. D. is the best El Paso Polychrome time estimate available at present. Since it is associated at Shafter 6:1 with Chihuahua Polychromes, the date may be further narrowed to circa 1200 to 1400 A. D.

116.

H. S. and C. B. Cosgrove, "The Swarts Ruins," **Papers of the Peabody Museum of American Archaeology and Ethnology**, Vol. XV, No. 1, Cambridge, 1932, p. 95.

117.

Sayles, 1935, *op. cit.*, p. 72-79, Table 7.

118.

Ibid, p. 78.

119.

W. S. Stallings, Jr., "El Paso Polychromes," **Technical Series Bulletin**, No. 3, Laboratory of Anthropology, Santa Fe, 1931, p. 10.

120.

Winifred and Harold S. Gladwin, "A Method for the Designation of Cultures and Their Variations," **Medallion papers**, No. XV, Globe, 1934, Fig. 9, and final chart.

121.

Personal communication, May, 1939.

The sequence of events at Shafter 6:1 may be summarized as follows:

1. Sometimes toward the middle of the Calamity deposition people of the Pecos River focus occupied the site.
2. It was then abandoned and Calamity deposition continued. Then a second occupation occurred, the cultural affiliations of which are not known, but which may be assumed tentatively from evidences elsewhere to have been of the Pecos River focus.
3. The locality was again abandoned and Calamity deposition continued. Then came a geologically static period followed by intensive erosion which cut a great **arroyo** through the site. Deposition again set in and the **arroyo** channel was refilled with Kokernot silts, gravels, and sands. When this channel was almost completely refilled, Alamito Creek flowed as a gentle surface stream, spreading in times of flood over the surrounding flat.
4. At this time, probably about 1300 A. D., people of La Junta focus, Bravo Valley aspect, settled at Shafter 6:1, built their houses on the flats, and farmed the valley. As these people continued to reside there, slack-water silts were spread over the flats in flood times, raising the level of the flats and incorporating debris of occupation in the growing Kokernot formation. Finally, sometime before the end of Kokernot deposition, probably about 1400 A. D., the site was again abandoned.
5. Kokernot deposition continued for some time and then temporary static conditions set in. At this time, probably about 1900 A. D., Mexican people of the Alamito focus built their houses on the uneroded flats, which now completely covered all signs of previous occupation. The period of modern erosion then set in; the houses were abandoned and the flats were deeply channeled and washed. The present alluvial canyon of Alamito Creek at this point was incised into the flats.

Importance of Shafter 6:1 lies in the following points:

- a. Lengthy human occupation of lower Alamito Creek Valley is evidenced.
- b. Direct superposition of the La Junta focus, Bravo Valley aspect, over the Pecos River focus, Big Bend Cave aspect, is established.
- c. Association of the La Junta focus with the latter portion of Kokernot deposition is demonstrated.
- d. Association of the Pecos River focus with the middle portion of the Calamity formation is indicated. (On the basis of only two projectile points.)
- e. Dating of the later part of the Kokernot deposition at circa 1200

to 1400 A. D. is deduced from cross association with dated El Paso Polychrome pottery.

WILLIAMS SITE

(Shafter 6:2)

At Casa Piedra, Alamito Creek flows through a fairly wide valley. A small farming settlement has grown up there depending on water from the creek for irrigation. In 1928 a group of local workers cut a new diversion ditch into the south bank of Alamito Creek about one mile south of Casa Piedra. This ditch exposed archaeological remains in its sides. George Williams, then teaching in the Casa Piedra school, discovered a human burial accompanied by portions of a black-on-white pot *in situ* in the ditch bank. Williams, who aided the writer in excavation of the human burials at Alpine 9:1a, reported his finds to the Expedition at the earliest possible moment. Several visits were made to the site but no excavations were attempted.

Exposed in both banks of the irrigation ditch are excellent cross sections of the valley alluvium. Uppermost is the Kokernot formation lying disconformably on the Calamity formation, several feet of the upper part of which are exposed. For over a hundred yards, hearthstones, ashes, charcoal, artifacts, and possibly house floors appear *in situ* in the Kokernot formation. El Paso Polychrome sherds (Plate VIII, Fig. 1, f), manos (similar to n), and projectile points (similar to k) were found *in situ*. The burial found by Mr. Williams was a flexed inhumation in a shallow grave, probably beneath a house floor. No measurements were possible on the badly disintegrated bones. The associated fragmentary pot (Plate VIII, Fig. 1, g) is an unidentified black-on-white ware. Paste, temper, and finish are suggestive of Chihuahua Polychrome; hence, it may be a rare duochrome Chihuahua specimen.

The culture represented at Shafter 6:2 is certainly the La Junta focus Bravo Valley aspect. The site thus checks and confirms conclusions reached at Shafter 6:1.

JORDAN GAP 1:1

Near Perdiz Stock Yard, about twenty miles north of Casa Piedra, a small intermittent stream enters Alamito Creek from the west. This stream has incised its channel deeply into the valley alluvium, exposing a great depth of Calamity formation topped by a thin layer of the Kokernot formation. In the arroyo's vertical north bank are four superimposed archaeological strata, the uppermost of which is also exposed in the eroding flat north of the arroyo (Plate II, Fig. 2, b). In Plate I, e, is shown a hearth *in situ* at this site, while in Plate III, d, appears a mano *in situ*, both in the second archaeological level from the bottom.

Projectile points typical of the Bravo Valley aspect were found in the upper eroding horizon (See Fig. 4). No artifacts were found in the next level below, while one mano was found in each of the two lowest levels. That found in the second horizon from the bottom is a plain, double-faced grinding mano of sandstone; that derived from the lowest level is a rough, unshaped, pitted mano of Big Bend aspect type. The upper level, which lies in the Kokernot formation, is hence of Bravo Valley affiliation; the lowest level may possibly belong to the Big Bend Cave aspect. There is no data regarding the affiliations of intermediate levels.

ALPINE 7:2

About one mile above Jordan Gap 1:1, Perdiz Creek **arroyo**, coming from the northwest, intersects Alamito Creek. Some three miles above its mouth, Albritton and Bryan found the entire Neville-Calamity-Kokernot sequence displayed (Locality 13); one mile above its mouth Perdiz Creek crosses a rocky outcrop above which are impounded pools of fresh water. This was an important station on old trails along Alamito Creek, and is today the location of Bishop's ranch house. Perdiz Creek **arroyo** and intersecting lateral **arroyos** have badly dissected the valley flats at this point, converting the section above the ranch house into veritable bad-lands. At various points in this bad-lands area archaeological sites erode from alluvium at various levels, or appear *in situ* in vertical **arroyo** banks. So vast is the eroded area, so complex the archaeological picture, that it is impossible clearly to reconstruct events at the site. No excavation was attempted (See Plate II, Fig. 2).

South of Perdiz **arroyo** appear small uneroded patches of alluvium representing surface topography at the initiation of the modern erosional period. Here were found potsherds of Alamito focus wares, probably dating within the last fifty years (Plate V, Fig. 4, *f*). at the same location hearths, flint chips, and artifacts are eroding from the Kokernot formation. In Plate V, Fig. 3, *d* is shown a long flake snub-nose scraper found here. It is suggestive of Bravo Valley aspect types.

Across a small intersecting **arroyo** to the north, but still south of Perdiz Creek, the flat is eroded to the top of the Calamity formation. A thick layer of fire-cracked stones, flint chips and occasional artifacts covers the surface. Partially dismantled hearths *in situ* on and in residual pillars of alluvium show that this material has been accumulated through erosion of artifact and hearth bearing levels of the Kokernot formation, and possibly of hearths in the erosional disconformity between Calamity and Kokernot formations. Projectile points shown in Plate V, Fig. 3, *b* come from this level, as do artifacts pictured at *b*, *c*, and *h* of Fig. 4 of the same plate. These projectile points slightly resemble Chisos focus types. Other artifacts shown are of little aid in identifying cultures represented.

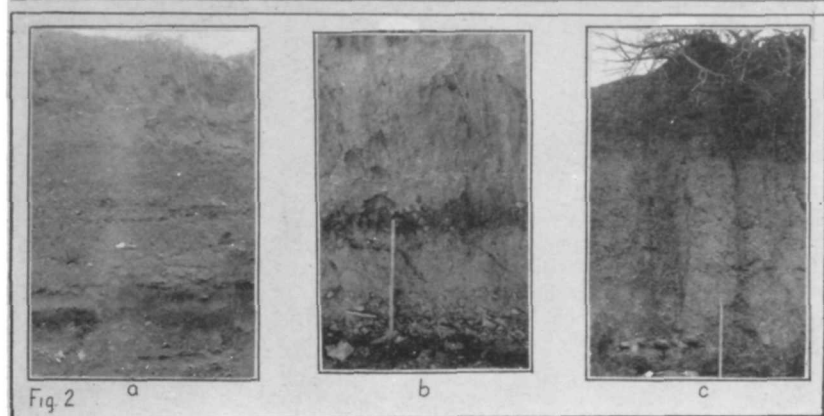
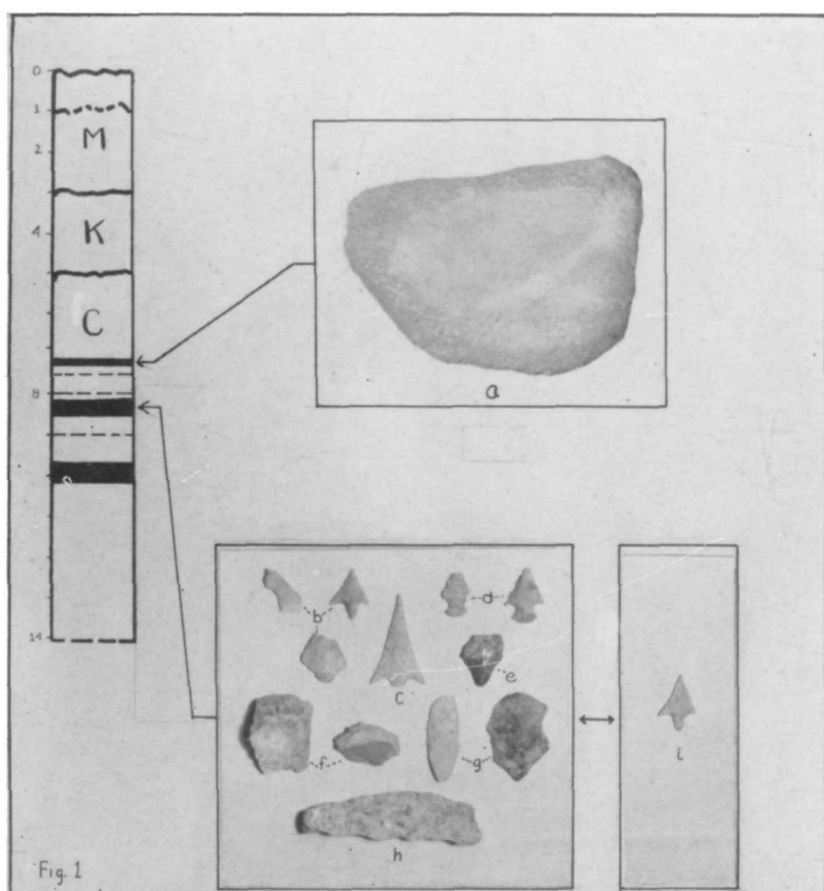


PLATE IX—VALENTINE 9:1 AND OTHER BURIED SITES

Fig. 1—Valentine 9:1, sections and artifacts. Fig. 2, **a**, Geological deposits at Valentine 9:1. Principal artifact horizon is indicated by trowel. Charcoal of lower archaeological zone shows below trowel, Fig. 2, **b**, Santiago Peak 1:1. Buried midden in Calamity formation at top of yardstick. Fig. 2, **c**, Alpine 7:2. Hearth **in situ** in lower Calamity formation at left of yardstick.

Scale: (in Fig. 1). Specimen **a** is approximately $14\frac{1}{2}$ inches in length. Specimen **c** is approximately $2\frac{5}{8}$ inches in length. Specimens **b-i** are on same scale as **c**.

A few hundred yards upstream the Kokernot formation is only slightly eroded. Here potsherds of plain brown ware were found *in situ* in an archaeological horizon included in the upper part of the Kokernot formation (Plate V, Fig. 4, g). A sherd of corrugated brown ware was found north of Perdiz Creek in similar circumstances (Plate V, Fig. 4, e). These sherds are similar to those found in sites of the Concepcion focus, Bravo Valley aspect, near Presidio, Texas.

In Plate V, Fig. 3, a is shown a well-made, barbed and tanged projectile point found eroding from the upper part of the Calamity formation. Blades shown at c in the same figure come from a level somewhat lower in the Calamity formation. They are made of nodules carefully chipped on both sides, but with patches of cortex remaining. Both are percussion chipped. At a, Fig. 4, of the same plate is a hand-axe discovered *in situ* in the upper Calamity, and at d a mano discovered at the same level as the blades previously mentioned. None of these items serves to identify cultures represented. The blade type is entirely unfamiliar.

Below the Bishop ranch house a ranch road crosses the *arroyo* on hard rock bottom. Just east of the crossing and on the north side of the creek are numerous circular mortar holes in bedrock. These must have been covered by a large part of the Calamity formation at one time, but it is impossible at the present to demonstrate objectively that this was so. No artifacts are found with them.

To summarize, at Alpine 7:2 there was lengthy occupation from the deepest exposed portions of the Calamity formation through the Kokernot formation into modern times. Prior to the present dissection of the flats Mexican peoples of the Alamito focus resided here. Earlier the site was occupied by peoples of the Bravo Valley aspect, Concepcion focus; and prior to that, during the Calamity depositional period, by peoples of unknown cultural affiliation.

THE FORT DAVIS-VALENTINE AREA

In high interior valleys of the Davis Mountains surrounding Mt. Livermore, and on grassy pediment slopes of the Valentine Basin between Ft. Davis and Valentine, channel trenching of the modern cycle has exposed archaeological sites in Quaternary alluvium at several localities.

McBRIDE SITE

(Valentine 9:1)

West of Ft. Davis rolling interior plains rise gently to meet the Davis Mountains. A series of foothills, erosional remnants now almost buried by outwash, divide the plains into several open valleys. At the foot of Mt. Livermore, highest peak in the Davis Mountains, lies the largest of these valleys. Here grassy plains alternate with

groves of oak, and foothills on the south give way to thickly forested mountain slopes and peaks on the north. Pinon and juniper grow on the foothills, while pine, pinon, and oak forests cover the mountain slopes. Deer and antelope are still plentiful, and smaller animals abound.

Rock shelters in the foothills and in the lower mountain areas show human occupation; occasional open camps appear. Against foothills at the southwestern end of the valley at an altitude of 6,000 feet is the Bloys Camp Meeting Ground, in a corner of the valley drained by a small upper tributary of Alamito Creek. At the lower end of the camp meeting ground an earthen dam was constructed some years ago, forming a small pond. Above this dam the stream, which runs only in time of rain or melting snow, has a channel whose bed is only a foot or so below the surface of the surrounding flats. Below the dam erosion has set in and a deep **arroyo** has cut its way up the stream channel. In very recent years the dam was partially washed out and the **arroyo** extended itself into the old pond bottom, where it terminates at present. Exposed in the vertical **arroyo** banks at this point are three archaeological strata. This is the site of Valentine 9:1 (Plate IX, Fig. 1 and Fig. 2 a).

Valentine 9:1 was discovered in January, 1938, by Myrl McBride, of Ft. Davis, and the writer, while completing the Expedition's reconnaissance survey in that section. Permission to excavate here was granted by officials of the Camp Meeting Association through Barry Scobee of Ft. Davis, Texas. Small excavations were made on two separate occasions.

Modern pond deposits, accumulated in still water behind the earthen dam, form the uppermost stratum at the McBride Site. Beneath these in proper order are the Kokernot and Calamity deposits. Eroded hummocks of the Neville formation appear below the Calamity at a few places. Near the bottom of the section are Calamity gravels containing occasional flint chips. These gravels give way at the top to red silts in which appear streaks of ash and charcoal, hearthstone, animal bones (Plate III, b, and flint chips. Lying upon the silts is a layer of sand with heavy ash and charcoal content, and with intact hearths *in situ*. This stratum is almost incredibly rich in flint chips, and has produced several artifacts (Plate IX, Fig. 1). It can be traced for several hundred feet down the **arroyo** before disappearing. In a layer of gravelly silt directly above this stratum one metate was found *in situ*.

The lowest archaeological horizon produced no artifacts, the uppermost only the metate shown at a, Fig. 1, Plate IX. The middle zone in the Calamity formation yielded several artifacts. Projectile points shown at b and c (Plate IX, Fig. 1) occur in Pecos River sites as minor types. The specimen at i, nearly identical with one shown at b, was found by Mrs. McBride of Ft. Davis *in situ* in the same horizon. At f are shown crudely chipped flake side scrapers; while at g are well chipped flake blades. At h is a fragment from the end of a heavy chopper or scraper. This complex seems to be the Pecos River focus, with artifacts modified slightly, probably toward a greater dependence on hunting than food-gathering.

Valentine 9:1 is thus important in that it evidences occupation of higher flanks of the the Davis Mountains during Calamity deposition, partially at least by peoples of the Pecos River focus, Big Bend Cave aspect.

VALENTINE 8:1, 8:2, 8:3

About five miles northwest of Valentine 9:1 the Valentine road drops into a narrow canyon which, a few miles lower, opens into the extensive Valentine Basin. A deep **arroyo** cut in Quaternary alluvium runs along the canyon floor. Near its head eroding hearths were discovered **in situ** in the upper portion of the Calamity formation; while other hearths were found deep in the Calamity formation several hundred yards down the ravine. The first site is Valentine 8:1, the second Valentine 8:2. Farther down the canyon, near Barrel Springs ranch house, there is an extensive eroding site and several buried horizons, Valentine 8:3. No excavations were attempted at any of these sites nor were any artifacts found **in situ**.

After emerging from Barrel Springs Canyon the Valentine road continues westward across the northeastern slopes of the Valentine Basin, crossing several **arroyos** incised into alluvium, two of which display evidences of human occupation in their banks.

At Valentine 7:1 (see Map 1) numerous hearths, with few flint chips and no artifacts, are eroding from deeper portions of the Calamity formation (Plate I, c. In an **arroyo** cut some two miles east of this site two shallow oval metates were found **in situ** apparently in the upper part of the Calamity formation. This is Valentine 7:2. No excavations were made, and identity of the groups responsible for these sites is unknown.

ALPINE AREA

The town of Alpine lies in the southern portion of a large highland valley. The valley itself has a gently rolling, grass and brush-covered floor, crossed by many small intermittent streams, most of which have incised their channels deeply into the alluvium. In **arroyo** cuts the Neville formation, rich in remains of the Imperial Mammoth, lies close to the surface, with only shallow overlying deposits of the Calamity and Kokernot formations. This valley is bounded on the north and west by vertical cliffs of igneous rock containing many rock shelters. Several large canyons extend back into the mesas. They too have rock shelters and extensive kitchen-midden sites as well. Almost all rock shelters were occupied by either Chisos focus or Pecos River focus groups, some by both. Mounds seem to be largely of Chisos focus origin, though other influences are evident. In **arroyo** banks in canyons and in the main valley archaeological sites have been discovered **in situ** in alluvial sections.

In 1933 the writer excavated three rock shelters on the Merriwether ranch north of Alpine for the West Texas Historical and Scientific Society. One of these shelters, Alpine 2:7, is worthy of note.

An admixture of Livermore focus and Chisos focus debris overlay refuse of the Pecos River focus at this site. Pecos River focus debris, in turn, rested upon a deposit of fine red-yellow "dust" which filled the lower part of the cave down to rock bottom. No artifacts were discovered in this dust layer.

While excavating Hord Rock Shelter near Alpine, Victor J. Smith discovered bones of the horse and a "musk-ox like animal (resembling) rather closely this bone in the **Preptoceros-Euceratherium** group."¹²² This musk-ox bone lay at the top of a "sterile layer" which rested on rock bottom.¹²³ Smith tells me ¹²⁴ that this was similar to the "dust" layer at Alpine 2:7, described above. At the same level as the "musk-ox" bone but several feet away and below the mass of cultural material in the shelter was found a projectile point of Pecos River focus type (Plate XX, Fig. 2, **b**) similar to that found in the lowest level at Shafter 6:1. Closely associated with the bone were several large tree limbs, apparently brought into the cave by human agency.

The writer has observed this sterile layer of red-yellow "dust" lying on rock bottom in several caves and rock shelters in the Big Bend. In Sunny Glen Canyon near Alpine excavations were conducted by the Expedition in a rock shelter known as Rock Cave (Alpine 2:4). Victor J. Smith and later Frank M. Setzler had conducted preliminary excavations at this cave, and had found the deposits to be quite deep with human occupation evidenced at considerable depths.

After excavation Alpine 2:4 showed a shallow upper cultural layer which can be identified with the Chisos focus. Below this was a stratum of angular rock fragments, derived from the roof, several feet thick. Flint chips were plentiful in this layer, and at one level within it several hearths of pinon branches were found. Paul Ezell, then with the Expedition, examined the wood specimens and found that they possessed readable rings, and that they cross-dated from piece to piece. Unfortunately no master calendar exists for the Big Bend, so that actual dates could not be determined. No artifacts were found. The layer of rock fragments rested on red-yellow "dust" similar to that found at other sites. Here the "dust" filled all the lower portions of the shelter, including several rooms which were not visible

122.

Charles L. Gazin, quoted in Victor J. Smith, "Hord Rock Shelter," **Bulletin of the Texas Archeological and Paleontological Society**, Vol. 6, Abilene, 1934, pp. 103-104.

123.

Ibid., p. 105.

124.

Personal communication, 1938.

from the surface, and rested directly and abruptly upon the cave floor. Albritton and Bryan were able to state that, here at least, this was actually "dust." It was their belief that it was wind-blown dust derived from the eroded surface of the Neville formation on valley flats beneath the cave, during the erosional period preceding Calamity deposition.¹²⁵ This opinion is strengthened by the fact that the Pecos River focus, which has been noted elsewhere in the Calamity formation, occurs stratigraphically above the wind-blown dust (Alpine 2:7) which would, therefore, be earlier than the Calamity formation. Association of musk-ox and horse bones with this formation in the Hord Rock Shelter also reinforces this theory.

ALPINE 2:1

Near the northern edge of Sunny Glen Canyon, hearthstones and one mano were discovered by the writer *in situ* in alluvium (Plate X). They lay in a deposit of exceedingly compact yellow-red silts which had a high caliche content. The mano is a large, double-faced pitted specimen covered with a heavy caliche coating, similar to that found in the silts. To all outward appearances the artifact-bearing stratum was the Neville formation. Only one other formation overlay it, however. This was a stratum of loose sand and gravel, obviously the Kokernot formation. Because of this, and because of the inclusion of archaeological remains in the lower formation, Albritton and Bryan concluded that its resemblance to the Neville formation was only superficial, and that actually it was the Calamity formation. The artifact resembles those of the Cave aspect in that it is pitted and unshaped, but does not have quite the appearance of known Cave aspect manos. This interpretation may be purely subjective.

Since no other artifacts were found, the site must, at present, be listed as doubtful. A few items, however, are worth noting. The formation in which the specimen occurred is present at shallow depths throughout Sunny Glen. Remains of Imperial Mammoth occur in a similar formation in Toronto Canyon directly to the east. Traced across the divide from Toronto Canyon into the headwaters of Sunny Glen Canyon the two formations are identical. It has not been traced from upper Sunny Glen to the site since the section there is not connected by continuous exposures with the upper canyon. Albritton and Bryan, though declaring the formation not to be Neville at this site, state that deep deposits in Rock Cave, less than a mile from Alpine 2:1, represent wind-blown dust derived from exposed Neville silts in Sunny Glen and neighboring canyons in the immediately pre-Calamity erosional period.¹²⁶ The "Neville formation" in Sunny Glen, to which they refer, is that in which Alpine 2:1 occurred.

125.

Albritton and Bryan, *op. cit.*, pp. 1457-1458.

126.

Loc. cit.

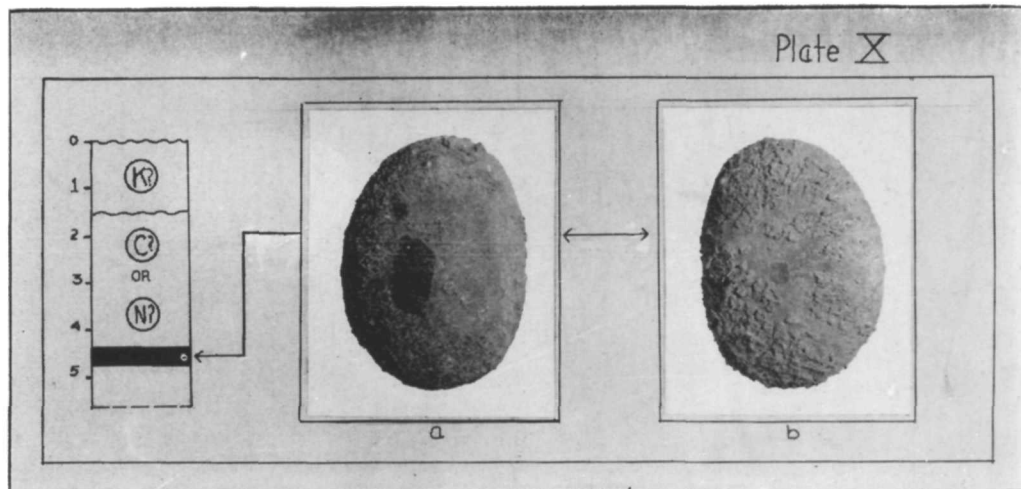


PLATE X—ALPINE 2:1. Section. Obverse and reverse faces of mano found in place as indicated. Specimen is approximately $7\frac{1}{4}$ inches in length.

ALPINE 2:2, 2:3

At the mouth of Sunny Glen are small fields operated by dry-farming. Near the edge of these fields a small **arroyo**, tributary to the main Sunny Glen ravine, has exposed a buried midden, hearths, flint chips, and artifacts (Alpine 2:2). Geology of the site is not conclusive, but it would appear that it lies on an ancient eroded surface and is covered only by the Kokernot formation. Two manos and one metate (Plate III, e) were found **in situ**. Both manos are pitted specimens of Cave aspect types. Slab metates with shallow oval bowls similar to that found here (Plate V, Fig. 4, j) have also been noted in the Cave aspect. Since a large rock shelter with thick cave dweller debris occurs in the nearest canyon wall, less than half a mile away, it seems fairly certain that the Big Bend Cave aspect, focus unknown, is represented at Alpine 2:2, probably in the erosional epoch immediately preceding Kokernot deposition.

Opposite the mouth of this small tributary in the main ravine bank hearths and charcoal (Alpine 2:3) were found **in situ** apparently in the same stratigraphic position as Alpine 2:2. No specimens were found, nor were any excavations attempted.

ALPINE 5:3

This is a small group of hearths eroding from the Kokernot formation in Paradise Canyon, about five miles southwest of Alpine. No artifacts were found.

ALPINE 5:1, 5:2

These sites are found in eroding areas near the mouth of Ranger Canyon, about six miles southwest of Alpine. Alpine 5:1 consists of one hearth **in situ** in the Calamity formation in Ranger Canyon **arroyo**. Alpine 5:2 is a site of many intact hearths and scattered hearthstones eroding from the Kokernot formation a short distance from 5:1. No artifacts were found at either site.

PERIPHERAL SITES

Five sites were found outside the limits of the Big Bend Region as described in this paper. They are discussed briefly here.

FT. HANCOCK 6:1

Some twenty miles west of Sierra Blanca the El Paso highway swings close to a deeply incised channel of a small tributary of the Rio Grande. At this point hearths, flint chips, and charcoal lenses occur in the **arroyo** bank, apparently in the Kokernot formation, over a considerable area. No artifacts were found.

TEXAS T:1, T:2

Limpia Creek, a perennial stream in its upper stretches, starts on the flanks of Mt. Livermore, north and west of Ft. Davis. Passing Ft. Davis and continuing through the Davis Mountains via Limpia Canyon, it enters the Borilla Hills between Balmorhea and Ft. Stockton, where it becomes known as Borilla Creek. After leaving the Borilla Hills it flows for some distance northeastward into the Pecos Valley, and there normally spreads out on the flats without ever reaching the Pecos River. From the canyon mouth at the edge of the Borilla Hills to its spread-out on the Pecos Plain it has built up a large alluvial fan. Modern Borilla Creek **arroyo** exposes this fan in cross section. Only preliminary reconnaissance was made but it was established that Neville, Calamity, and Kokernot formations are all present in typical form. Probiscidean remains were found **in situ** in the Neville formation. Just above Borilla Creek bridge on the Balmorhea-Ft. Stockton highway two archaeological sites were found **in situ** in the main **arroyo's** east bank.

Texas T:1 consists of a heavy midden deposit of ashes, charcoal, hearthstone, and flint chips, in the upper Calamity formation. Texas T:2 included hearthstone and charcoal in the lower part of the Calamity formation a short distance above Texas T:1 (Plate I, a). No. artifacts were found at either site.

TEXAS Ub 4:1

On the west bank of the Pecos River south of the McCamey-Iraan highway bridge a large archaeological site is eroding from alluvium identical in appearance and stratigraphic position with the Kokernot formation. Many small projectile points similar to those of the Bravo Valley aspect, finely chipped knives and blades, snub-nosed scrapers, and sherds of plain brown, shell tempered pottery were found in eroded areas at this site. The complex is suggestive of the Wichita Phase¹²⁷ of Central Texas, contemporary with, and closely related to the late Bravo Valley aspect. In a deeply channeled area near the present Pecos River ravine, Pecos River type projectile points were found. They may belong with hearths noted **in situ** in the main river channel bank in a formation comparable in position to the Calamity formation, but differing from it somewhat in lithology.

TEXAS Ub 4:2

About one mile below Girvin, Texas, an archaeological site is eroding from a Kokernot equivalent on the west bank of the Pecos River, and is seen in cross section in the channel bank. The only specimen found there was a double-bevelled, four-edged, "plains" knife. This is a type diagnostic of the Wichita Phase (Sayles) and occasionally occurring in the Bravo Valley aspect.

127

Sayles, 1935, *op. cit.*, p. 85, Table 7.

From a consideration of the two sites described above it will be seen that the Kokernot formation, as identified by nature of sediments, by stratigraphic position, and by archaeological content, extends as far as the Pecos River on the east, and that possibly the Calamity formation in a modified form likewise extends to that point, if not far beyond.

CONCLUSIONS DERIVED FROM THE RECONNAISSANCE SURVEY AND MINOR EXCAVATIONS

In summary, the Pecos River focus, Big Bend aspect, was found *in situ* in the lower or middle Calamity formation at Shafter 6:1, and Valentine 9:1. It was found associated with the erosional period following Calamity deposition at Buck Hill 6:1, Monument Springs 8:2, and possibly Nine Point Mesa 4:1. The Chisos focus of that aspect appeared in the same horizon at Monument Springs 8:2, Santiago Peak 1:3, and possibly Nine Point Mesa 4:1. The Livermore focus was associated with this erosional period at Nine Point Mesa 4:1, and evidenced in modified form in its putative cultural descendant, the Bravo Valley aspect, at Buck Hill 6:1 and Shafter 6:1 in the Kokernot formation. In the same erosional period Pecos River and Chisos foci artifacts were intermingled at Monument Springs 8:2, Santiago Peak 1:3, and possibly in company with the Livermore focus as well as Nine Point Mesa 4:1. The Bravo Valley aspect appeared *in situ* in the Kokernot formation at Shafter 6:1. Shafter 6:2, Jordan Gap 1:1, Alpine 7:2, and Buck Hill 6:1. At the first and last sites mentioned it overlay the Pecos River focus. Complexes closely related to the Bravo Valley aspect appeared in strata comparable to the Kokernot formation as far east as the Pecos River at Texas Ub 4:1, 4:2.

Sites of unknown cultural affiliation appear in the Calamity formation at various locations, especially in the Alamito Creek valley. At Nine Point Mesa 4:1, the Red Bluff Complex, an important cultural manifestation of unknown affiliations, occurred stratigraphically below the Livermore focus, in association with an ancient erosional epoch either immediately following or immediately preceding Calamity deposition. At Alpine 2:1 an archaeological site appeared *in situ* in a geological horizon having many points in common with the Neville formation, but identified by the geologists as the Calamity formation. In rock shelters of the Alpine area, Pecos River focus debris, as well as that of later cultural horizons, overlies "loess" deposits postulated by Albritton and Bryan to have been derived from the Neville valley flats in the erosional period preceding Calamity deposition. Associated with this "loess" in one instance were bones of musk-ox (?) and horse.

From the data presented above the following conclusions are made:

1. Throughout the Big Bend region there was human occupation through the deposition of the Calamity formation to modern times and possibly as far back as the Neville depositional period.

2. The Pecos River focus, Big Bend Cave aspect, first appeared in the Big Bend early in the Calamity period and survived into the erosional period preceeding Kokernot deposition. It was by far the longest lived of all Big Bend cultures so far known.
3. The Chisos focus, Big Bend Cave aspect, apparently arrives, full fledged, in the area for the first time during the pre-Kokernot erosional epoch where it mingled with the Pecos River and Livermore foci.
4. The Livermore focus first appears in the same erosional period, where it mingled with Pecos River and Chisos foci, and survived into the Kokernot formation where it became, or was absorbed into, the Bravo Valley aspect.
5. The Bravo Valley aspect appeared early in the Kokernot depositional period, and lasted throughout that period, its last stage, the Conchos focus, giving way to the Alamito focus, of European origin, at its close.
6. Archaeologic cultures of unknown affiliation appearing in the Calamity formation may represent previously unknown groups present in the Big Bend Region at an early period.
7. The Red Bluff Complex represents an important new cultural manifestation which may be quite early in Big Bend pre-history. It is to be referred to pre-Kokernot times and possibly to pre-Calamity times.
8. Wind-blown dust deposits in Big Bend rock shelters antedate the Pecos River focus, and were probably derived from erosion of the Neville formation during pre-Calamity depositional times.
9. Association of El Paso Polychrome with Bravo Valley aspect sites *in situ* in the Kokernot formation indicates that deposition of the latter was well under way by 1400 A. D. and probably before 1200 A. D.
10. Emil W. Haury found a typical Livermore type projectile point at Mogollon Village, New Mexico, in an archaeological horizon dated by dendrochronology at and before 900 A. D. Since the Livermore focus appears *in situ* in the erosional horizon preceding Kokernot deposition, probably at its very beginning, the erosional horizon may be tentatively dated at 900-1200 A. D.
11. Following conclusions listed above, the Chisos focus of the Big Bend Cave aspect was probably in existence by 1000 A. D. and may have lasted into the 1300's or later.
12. The Pecos River focus of the Big Bend Cave aspect appeared considerably earlier than circa 900 A. D. and probably disappeared by 1200 A. D.

13. Chisos and Livermore foci were contemporaneous with the closing days of the Pecos River focus, and may have been responsible for the disappearance of that culture.
14. Appearance of the Chisos and Livermore foci in the Big Bend region during an erosional epoch following a moist period (the Calamity depositional period) suggests that those cultures were forced into the relatively moist Davis Mountains by drought conditions of that erosional epoch.
15. Association of archaeologic cultures with geologic strata in the Big Bend verifies and clarifies data and conclusions derived from purely archaeological sources.

EXCAVATIONS IN CALAMITY-SHEEP CREEK VALLEY

By

T. N. CAMPBELL

The scene of the most intensive excavation by the Peabody Museum-Sul Ross College Expedition lies in Calamity-Sheep Creek Valley¹²⁸ just west of Elephant Mountain. In his section on the reconnaissance survey, Kelley has already referred to some of the main features of this valley. A more detailed description appears in the geological report of Albritton and Bryan,¹²⁹ from which we quote the following:

Along their southern front the Davis Mountains are essentially a group of mesas and cuerdas formed by dissection of stratified volcanic and sedimentary rocks. Among the more imposing landmarks is Elephant Mountain, which stands at the southeastern corner of the Davis Mountain upland. A few miles south of the thirtieth parallel this upland ends along an escarpment which trends in an easterly direction. To the south lies Green Valley, a lowland about 30 miles square. Relief along the boundary between Green Valley and the Davis Mountain ranges to slightly more than 2,000 feet.

Lowland wedges indent the Davis Mountain front wherever mountain streams enter Green Valley. One of the larger valley reentrants, lying east and south of Elephant Mountain, is drained by Calamity Creek and its tributaries, chief among which is Sheep Creek. Hereafter this will be called the Calamity-Sheep Creek Valley.

South of Neville's ranch-house this valley lies between Elephant Mountain and Crossen Mesa. Its width near the southern end of Elephant Mountain approximates 3 miles. Southward the valley spreads laterally to include lowland slopes along the southern mar-

128.

See Map I, southeast corner of the Alpine quadrangle.

129.

Op. cit., pp. 1427-1429.

gins of its bounding mesa. These flats are separated from Green Valley by a low southward-facing cuesta breached by the alluvial flat of Calamity Creek.

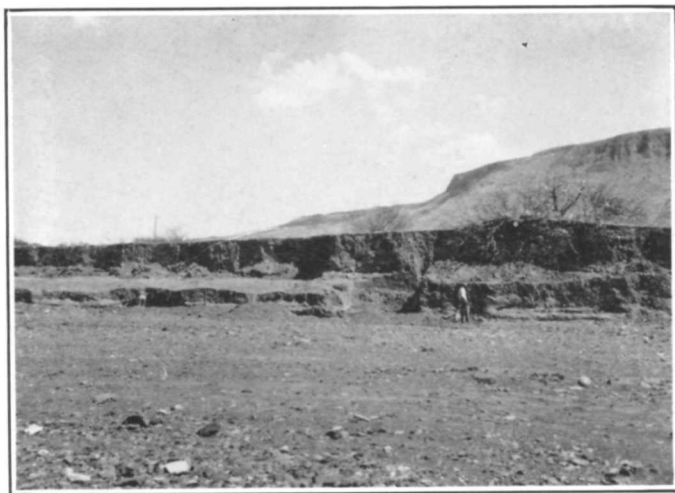
From the side of Elephant Mountain or Crossen Mesa the Calamity-Sheep Creek Valley appears to be an almost featureless brush-covered plain whose margins merge with talus slopes of the bordering mountains. In detail, however, the flat is diversified by arroyo trenches, by low gravel ridges bordering the arroyos, and by gravel-capped spurs slanting down toward Calamity Creek along the base of Crossen Mesa. These spurs preserve remnants of a pediment which was dissected before the present valley flat was formed.

The flat is drained by Calamity Creek, an ephemeral stream named in commemoration of its sudden and destructive floods. Its course is discontinuous, consisting of three segments. The upper or northern segment, about 20 miles long, ends near the southern slopes of Elephant Mountain. Here the arroyo banks disappear, so that unconfined flood-waters spread over an area of several square miles. During exceptionally high floods the distributed water flows southward into headwater tributaries of an intermediate channel segment. The latter is the shortest of the three, extending only a mile beyond the cuesta at the northern margin of Green Valley. At the end of this segment flood-waters again spread over the flats, a portion of the runoff entering the Terlingua drainage of the west, the remainder following a third section of the Calamity channel into the Maravillas system. The intermediate and lower divisions of Calamity are extending their courses headward, tending to form a continuous channelway.

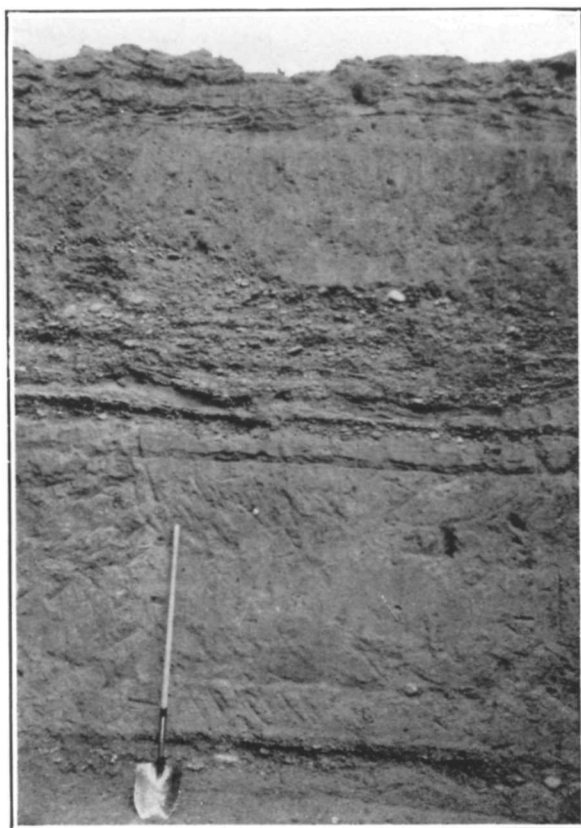
Two deeply buried campsites are located near the southern end of the upper or northern segment of Calamity Creek, lying in the V-shaped area just above the junction of Sheep Creek with Calamity Creek. These two sites are known as the Sheep Creek site (Alpine 9:1a) and the Calamity Creek site (Alpine 9:1b).

SHEEP CREEK SITE

The Sheep Creek site (Alpine 9:1a) lies in the east bank of Sheep Creek just south and east of the Alpine-Terlingua road crossing, from which it is clearly visible. This is the type locality for the Calamity formation as described by Albritton and Bryan. The oldest Quaternary formation, the Neville, is not represented at this site, but the youngest formation, the Kokernot, is represented by a thin covering of loose silt and sand which varies in thickness from 12 to 18 inches (Plate 11, b). The remainder of the deposits comprise the intermediate Calamity formation, which contained all of the human cultural material found at this site. The Calamity deposits extended downward as far as excavation was continued—one to two feet below the present pebble-strewn bed of Sheep



b



a

PLATE XI

PLATE XI

- a. View of Sheep Creek from **arroyo**. The northern end of Elephant Mountain is visible in the background. Workmen are clearing away stream bed gravels preparatory to beginning excavation. In center, the original excavation of Kelley and Williams bisects the shelf.
- b. North-south section at Sheep Creek site. At top the thin deposit of the Kokernot formation is clearly distinguishable from the underlying Calamity formation, which is divided into two duplicating parts, each topped by a broad humic zone. The upper humic zone lies just below the Calamity-Kokernot contact, the lower at top of shovel handle.

Creek. This gave an average exposure of 13 feet of Calamity deposits. However, mention should be made of the fact that in one place a test pit six feet square was sunk to a depth four feet lower than the general limit of excavation. Thus 17 feet of Calamity deposits were exposed in section at this place, giving a total of a little more than 18 feet of deposits from the surface of the Kokernot formation to the lowest level reached in the test pit.

In removing the burials from this site in August, 1937, Kelley and Williams excavated a small rectangular area, roughly $3\frac{1}{2}$ by $6\frac{1}{2}$ feet, which lay in the shelf formed by the **arroyo** flood-waters (Plate 11, a). The expedition continued this original excavation backward 16 feet into the **arroyo** bank and to both sides along the shelf, 28 feet to the north, 12 feet to the south, the extent of excavation being governed largely by the amount of cultural material that was found. Carrying the excavation into the **arroyo** bank gave a complete picture of the natural stratigraphy and made it possible to assign the burials to their proper stratum in the full column of deposits.

A few remarks should be made about excavation procedure. The excavation of such a site as this is rather tedious work and requires considerable patience. Here the cultural remains were widely scattered both horizontally and vertically, and this called for constant vigilance in order to avoid overlooking anything. Nearly all of the earth moved during excavation was sifted through screens. The method of control consisted of a grid system of four-foot squares, each square column being carried downward by arbitrary levels, either one foot or six inches as circumstances dictated. Sections were drawn showing the natural strata along each line of the grid in both directions, and on these sections were plotted all the individual artifacts. Occurrences of hearths, hearth-stones, charcoal, chips and flakes, seeds, bones, shell, etc., were also charted in this way. Care was taken to see that everything was tied into the sequence of natural layers in the deposits.

No cultural remains appeared in the Kokernot formation; careful screening of sample sections failed to yield even so much as a chip or flake. A horse phalanx was found in the lower part of the formation, but it appeared to have fallen into a rodent burrow which was subsequently filled with sand. However, a short distance south of the excavation several vertebrae of a cow were embedded in the Kokernot formation, from which they were eroding. It may be assumed that the silts and sands of the Kokernot formation are of very recent origin in this immediate locality, for ranching in the Big Bend did not begin until 1851 and became widespread only after 1870.¹³⁰

As already stated, the geologists used the Sheep Creek site as the type locality for the Calamity formation, which they have described in detail in their report.¹³¹ They point out that this formation is divided

130.

Casey, Clifford B., *op. cit.*, pp. 12-14.

131.

Albritton and Bryan, *op. cit.*, pp. 1434-1441.

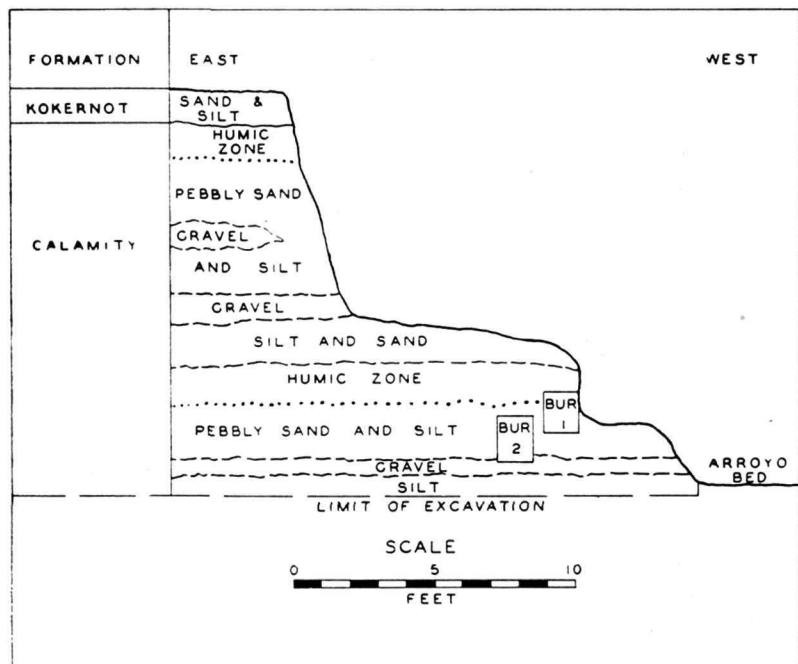


FIG 6
SECTION AT SHEEP CREEK SITE

into two parts, an upper and a lower, whose strata duplicate each other. Each of these parts has a dark humic zone at the top, below which is a layer of pebbly, clayey silt and sand, and this in turn is underlain by gravel. This succession of layers may be seen in Plate XI, **b**, where the Calamity formation is shown divided into two approximately equal parts. By comparing this plate with Fig. 6, the stratigraphic elements in the Calamity formation at this site will become clear.

Some general remarks may be made concerning the distribution of human cultural remains in the Calamity formation at the Sheep Creek site. In the upper part only a few artifacts occurred. There were no hearths *in situ* and only an occasional hearthstone here and there. Chips and flakes, so numerous in the lower part, were very rare in the upper. It was the lower division of the Calamity which yielded the bulk of the archaeological material, specifically the lower humic zone and the layer of pebbly, clayey silt and sand just below the humic zone. Here were found 54 artifacts, two burials, one hearth *in situ*, numerous scattered hearthstones, bits of charcoal, and quantities of chips and flakes. Gastropod shells, hackberry seed, bones and old burrows of rodents were plentiful. Very little was found in the gravel layer below, and most of this was in the very top part. It should also be noted that the greatest horizontal concentration of material occurred in the area nearest the burials, decreasing in quantity as one proceeded outward in all directions through the excavation.

Burials. Of the two burials which occurred in the lower part of the Calamity formation at the Sheep Creek site, Burial 1 was uppermost in position and lay at a depth of 10 feet and 9 inches below the general level of the valley alluvium. Approximately three feet of the Calamity deposits—a shelf formed by **arroyo** washing—remained directly above the burial at the time of excavation by Kelley and Williams. All the evidence points toward the former complete coverage of the burial by the 10 to 11 feet of deposits. In the soil immediately above the burial was a large cluster of hearthstones (Plate XII, **a**) which seemed to be connected with the burial. These stones did not form a hearth, but appear to have been collected and placed above the skeleton. No indications of the original grave pit could be detected. The surface from which it must have been dug can only be inferred, and it is suggested that the upper limit of the hearthstones might indicate such a surface. Burial 1 lay from 14 to 18 inches below the top of the lower humic zone, which showed no evidences of having been disturbed. From this one can infer that the interment was made during the formation of this humic zone.

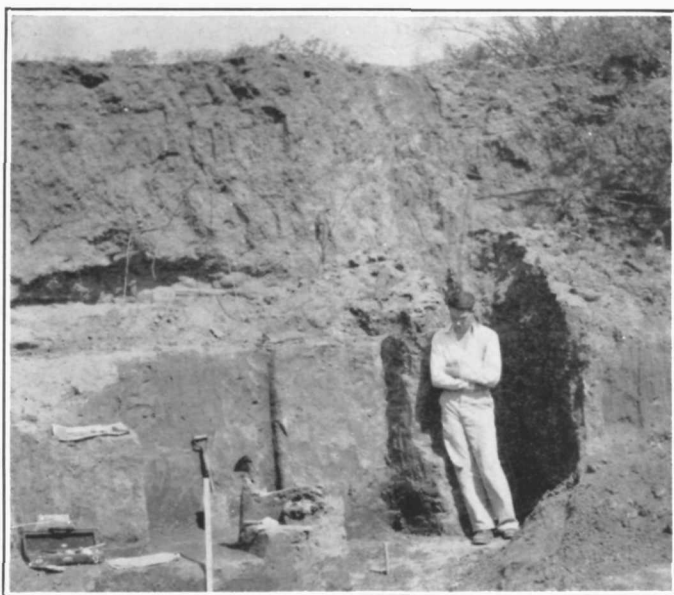
Some of the bones were missing, among them the right tibia, all arm, hand, and foot bones, the scapulae, and some of the cervical vertebrae. **Arroyo** washing probably removed some of the missing bones, though the foot bones, which the flood waters could hardly have touched, may have been disturbed by rodents, abundant traces of which were noted all through the deposits at this site. The bones were in a rather poor state of preservation; they were fragile, chalky, and non-mineralized. The skull was considerably flattened by the weight of the superimposed earth.

PLATE XII

- a. Hearthstones above Burial 1. In lower center, the lighter area represents the original **arroyo** bank, from which protrudes the mental process of the mandible and several cervical vertebrae. The exposure of these bones by **arroyo** washing led to discovery of the two burials.
- b. View of Burial 1 from west. The position of the burial in the Calamity deposits is clearly indicated. The Kokernot formation is visible at the top. The amount of Calamity alluvium still overlying the burial at the time of discovery is indicated by the shelf which is in line with the man's shoulders. The stake to right of the burial shows the position of Burial 2, which has already been removed.



a



b

PLATE XII

The epiphyses of the long bones were badly disintegrated and the shafts, though in fair condition, were cleanly fractured across in some instances.

The position of the skeletal remains was unusual and not a little puzzling (Plate XII, b). The orientation was in a northeast-southwest direction. The bones were compactly placed and showed considerable distortion. The legs were closely flexed, with the knees resting on the chest. The skeleton lay on its right side, but the skull had been pulled downward and backward so that it lay under the knees and alongside the ribs and pointed toward the pelvis, the cervical vertebrae forming a broad arc. Thus the skull pointed north and faced west, which, when considered in relation to the remainder of the body, is different from the position commonly found in flexed burials.

No artifacts were directly associated with Burial 1, but included among the hearthstones and fill above the bones were two metate fragments, two crudely worked choppers, two rejects or cores, and many chert, jasper and chalcedony flakes which were clearly the by-products of human flint working.

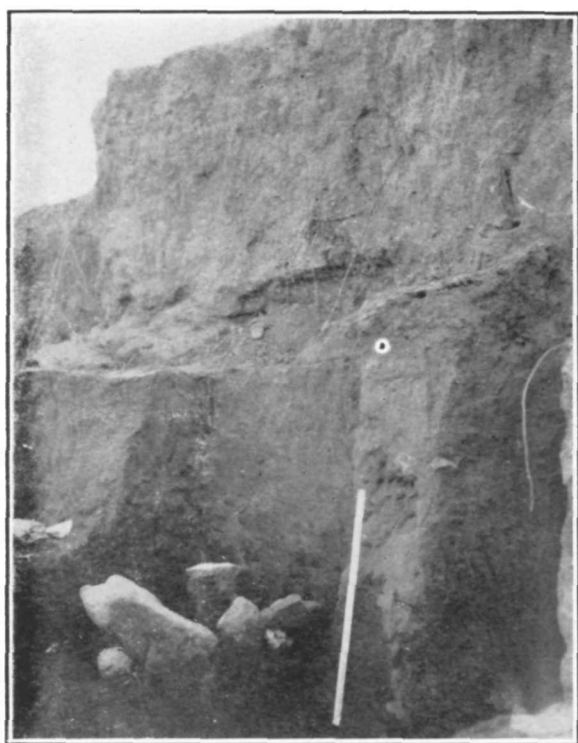
It is difficult to explain some features of Burial 1, particularly the position of the bones. Some distortion is present, but the burial can hardly be referred to as a bundle burial because the amount of disarticulation is not great enough. The head may possibly have been severed from the body and placed in the position in which it was found, though the cervical vertebrae appeared to be in a continuous succession at the time of excavation. If the arm bones had been present, a clearer idea of the original placement of the body might be had. The burial had best be classified as a variant of the flexed type.

In a brief preliminary report, Dr. George Woodbury of the Peabody Museum states that the individual from Burial 1 is a middle-aged female (?). The skull shows no traces of artificial deformation. It is mesocephalic and scaphoid, being somewhat reminiscent of Basket Maker skulls. The teeth are poor, badly worn, and lower molars 1 and 2 were lost. The long bones indicate short stature.

Burial 2 was approximately one foot lower than Burial 1 and lay 1 foot and 10 inches to the south. The orientation was east-west, contrasting with the northeast-southwest placement of Burial 1. The body lay on its back (Plate XIII, b) with the legs semi-flexed and lying on their right sides, the arms loosely folded across the chest, and the head tilted upward so as to be almost in the eye-ear plane. Stone slabs and metates (Plate XIII, a), the latter three in number, had been set on edge and tiled outward from the body, forming a rough oval around but somewhat above the bones. Directly over the body, in the central part of the oval and in line with the upper edges of the slabs and metates, a large metate fragment was horizontally placed. This metate might possibly be regarded as indicative of the original surface from which the grave was dug. As in the case of Burial 1, no evidence of the grave pit was dis-

PLATE XIII

- a. Burial 2, showing arrangement of slabs and metates. The skull is exposed at lower left, just below one of the large metates. A hearth shows at top of yardstick.
- b. Burial 2, after removal of slabs and metates.



a



b

PLATE XIII

cernible at the time of excavation. The humic zone above was intact.

As Plate XIII, b, indicates, the bones were in a fairly poor state of preservation, being even more friable than those of Burial 1. They too were chalky and showed no mineral replacement. The burial had been slightly disturbed, evidently by rodents, for a few distal phalanges and the distal end of the left humerus were later found a short distance from the burial.

Dr. Woodbury reports that the skeleton from Burial 2 is that of a middle-aged male, the muscular markings being quite strong. The skull was warped by post-mortem earth pressure, so that the cephalic index indicates doubtful mesocephaly. The long bones are represented by shaft fragments and these give no reliable information as to stature.

The fact that Burial 1 was different from Burial 2 and that it occurred at a higher level adds to the probability that the two burials were separated temporally and culturally. It will be necessary to consider the evidence to be drawn from a distributional and typological study of the artifacts in the lower Calamity formation before theorizing further concerning the burials.

Before the discovery and excavation of the two burials in the east bank of Sheep Creek by Kelley and Williams, there had been at least three reports of skeletal material having been found in the vicinity. Mr. George McSpadden of Alpine reported that shortly after the steel bridge across Sheep Creek had washed out, his automobile became mired at the road crossing. He walked downstream a few hundred yards to get a bar of steel from the bridge wreckage and saw, at a certain spot in the **arroyo** bank which he pointed out to members of the expedition, human bones partially exposed. Using his pocket knife, he dug out a few of the bones, which he placed near a fence post on the road nearby. No trace of these bones remains, but it is perhaps significant that Mr. McSpadden pointed to the Calamity formation when giving the approximate location of the burial.

We received two other reports of human bones having been found exposed in the banks of Sheep Creek. One report came from a casual visitor at camp. This find appears to have been made at about the same place as that of McSpadden. Donald J. Lehmer did some exploratory excavation at the spot indicated, but no traces of human bones or cultural material came to light. The second report was furnished by an Alpine merchant, who recalled that a cowboy once told him of finding a human bone in the bank of Sheep Creek just above the Alpine-Terlingua road crossing.

Of a more tangible nature was the excavation of what appeared to be part of a human burial in the west bank of Calamity Creek about 200 yards upstream from the Calamity Creek site. Here, in the Calamity formation at a depth of 8 to 9 feet below the surface, **arroyo** washing had exposed a curved row of stone slabs, including one large oval slab metate, whose arrangement was strikingly suggestive of Burial 2 on

Sheep Creek. No trace of skeletal material was present, however. It appeared that **arroyo** washing had recently removed the bones, leaving in the wall some of the slabs which had been placed around and above them. This may or may not have been the remains of a burial, but its depth in the Calamity formation and its similarity to Burial 2 on Sheep Creek are quite suggestive. The Calamity formation at this spot is complicated by the presence of five distinct humic zones which alternate with bands of light silt. The slabs lay between the fourth and fifth humic zones, counting from the top downward.

The Artifacts. These may be considered in three groups based upon their stratigraphic distribution in the deposits. Since the Neville is not represented and the Kokernot contains no artifacts, this means that the grouping of the artifacts is really based on their distribution in the Calamity formation. The first group consists of the few artifacts found in the upper part of the Calamity, that is, above the lower humic zone; the second and third groups come from the lower part of the formation. The artifacts from the lower Calamity are subdivided on a stratigraphic basis; the second group consists of those which come from the lower humic zone, the third, those which come from below this humic zone.

(1) Upper Calamity. The artifacts from this horizon are too few in number to be considered seriously. Only four artifacts appeared, one in the upper humic zone, the remainder in the layer immediately below. The list includes a hammerstone-chopper and flake knife, both of chert; a turtleback or circular scraper of jasper; and a thin, roughly rectangular slab metate of greenish-gray tuff. The metate has a long oval abraded area on one face; the other face was not utilized. The scraper is the only specimen among the four which cannot be duplicated either in the excavations or in surface collections from Calamity and Sheep Creek valleys. It is thus impossible to link this scant series with any known complex. One can only point out that these artifacts occupy a high stratigraphic position in the Calamity formation.

(2) Lower Calamity: Humic Zone.

Projectile Points. Eight specimens appeared in this zone, only one of which was undamaged, and two specimens were represented by stems only. However, these projectile points fall rather easily into three types, two of which are referable to the Big Bend Cave aspect. The first type is represented by three examples (Plate XIV, a, 4), all made of chert. This type has a contracting or tapering stem, a concave base, and slight barbs. It is illustrated by Sayles¹³² as a distinctive type in his Pecos River Cave Dweller Phase (Pecos River focus); and it is also one of the less common types which Pearce and Jackson¹³³ show from the Fate Bell Shelter in the lower Pecos River valley. The second type (Plate XIV, a, 1 and 3) is not greatly different from the first, the chief difference being in the treatment of the base. The stem tapers to a

132.

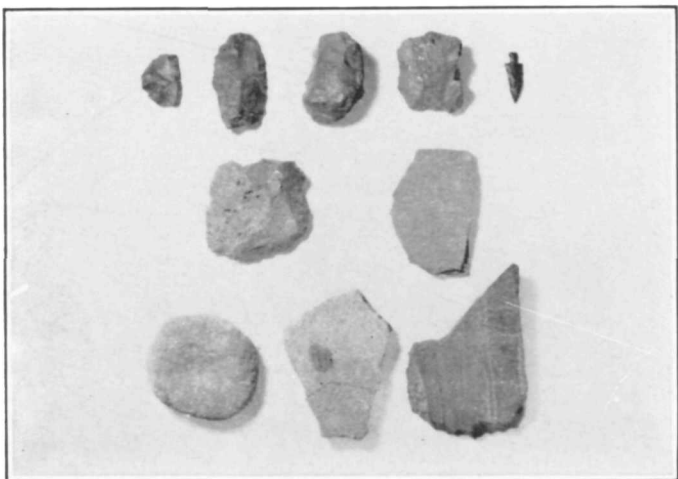
Sayles, *op. cit.*, 1935, Plate VIII, e, p. 69.

133.

Pearce and Jackson, *op. cit.*, Plate XII, (a), 6, pp. 74-75.



a



b

PLATE XIV

PLATE XIV**Artifacts from Sheep Creek Site**

- a. 1, 4, projectile points; 5, chopper; 6, mano fragments (?).
Length of Specimen 4 is $1\frac{1}{2}$ inches.
- b. 1, fragment of blade; 2, side scraper; 3 hammerstone; 4 reject;
5, projectile point; 6 and 10, choppers; 7 and 9, metate fragments; 8, pitted mano. Length of Specimen 5 is $1\frac{3}{4}$ inches.

point and shoulders are present instead of barbs. Sayles¹³⁴ pictures one specimen in his Pecos River Cave Dweller Phase (focus) which is similar, but hardly identical with it. It does not appear in the Pearce and Jackson Fate Bell series. All four specimens representing this type are made of chert; they are rather thin and well made.

The third type is different from the other two (Plate XIV, a, 2), but is represented by only two specimens, only one of which is complete enough to indicate its full outline. The stem has parallel sides, the base is straight to slightly convex, and there is a pronounced barb. Because of the inadequate representation, little can be said of this type and its possible affinities.

Knives and Blades. Only two artifacts fall into this group. One is a blunt end fragment of what appears to be a thick, leaf-shaped blade. The material is jasper and the flaking has been done entirely by the percussion technique. The second specimen is a medial fragment of a thin triangular knife. The edges are thin and sharp, having been formed by skillful pressure flaking.

Perforators. A single specimen falls into this category, a small triangular chert flake with one apex flaked from opposing sides, bevel fashion, to give a sharp point for perforation purposes.

Scrapers. Only one scraper occurred in this zone, a small triangular jasper flake with two long edges chipped from the bulbar face to give sharp edges, one convex, the other concave.

Choppers. Several artifacts may be classified as choppers or crude handaxes. Four came from the area above Burial 1, a fifth from a short distance away at the same level. These implements are crude and have no general uniformity of shape; their one common characteristic is having at least one edge that may have been used for heavy cutting. It is possible that some of these were never used at all. The fifth specimen referred to above is shown in Plate XIV, a, 5; it is the largest and heaviest of the group. Made of lithified fine-grained tuff, it is very roughly flaked and may also have served as a hammerstone, for one edge shows considerable battering.

Pestles. One doubtful specimen of fine-grained dioritic rock was found in this zone. One end is rounded and appears to show signs of wear, but it is also much eroded. The other end is pointed.

Manos. One example (Plate XIV, a, 6), represented by an end fragment, was found. It shows no abrasion on its faces, but the edges appear to have been pecked to give a rounded rectangular outline. One face is flat, the other markedly convex.

134.

Sayles, *op. cit.*, Plate XVIII, d, p. 69.

Metates. Two metate fragments came from the area above Burial 1. The first shows wear on one side only; the second was made from a thicker slab and considerable wear was indicated on both sides. Judging from the amount of wear on this second fragment, both sides of the complete metate had fairly deep basin-like depressions.

Miscellaneous. A few flakes show fine chipping on one edge. One core and a reject also appeared in this zone.

(3) Lower Calamity: Below the Humic Zone.

Projectile Points. Only two projectile points appeared in this horizon, and one of these is only a fragment of the distal end and hence of no typological value. The other point (Plate XIV, b, 5) is complete. It is a small, finely worked point of reddish brown jasper, with a slightly expanding stem, a straight base, and a long, slightly twisted blade. It bears some similarity to the specimen shown in Plate XIV, a, 2, though it has no barbs. This solitary point is of no great help, for it does not occur elsewhere in the region as a type in a known complex.

Knives and Blades. Two fragments may be noted. One is the rounded end of a fairly thin blade or knife of jasper (Plate XIV, b, 1), apparently made from a flake. The other fragment is the broad base of a knife made from a thin flake. No chipping appears on the bulbar face, which suggests that it may also have served as a scraper.

Scrapers. Two scrapers occur in this stream. One (Plate XIV, b, 2) is made from a large, rather heavy jasper flake which shows a striking platform at an obtuse angle with the bulbar face. It is chipped by percussion along one side and at the end, forming a combination side and end-scraper. The second scraper is a small triangular flake with one scraping edge produced by percussion.

Choppers. Two objects, both illustrated in Plate XIV, b (6 and 10), may be so classified. The first is made from a heavy porphyry flake, one edge of which shows signs of having been used for chopping. The second consists of a triangular slab of banded tuff, pointed at one end due to natural fracture, the other end chipped from one side to give an axe-like cutting edge.

Hammerstones. One hammerstone (Plate XIV, b, 3) came from this horizon, a thick core of jasper battered on three edges. One end is fairly thin and may have served as a chopping edge.

Manos. One pitted mano (Plate XIV, b, 8) was found. It is rounded in outline, with both sides showing some wear, but only one side is pitted. The edges show evidences of having been pecked to give the specimen its present shape. The pitted side is straight, the opposing side or face slightly convex. Pitted manos, it may be noted, are diagnostic of the Pecos River focus.

Metates. Aside from the metates associated with Burial 2, only two fragments of thin slab metates (Plate XIV, b, 7 and 9) appeared in this layer. Both fragments show wear on one side only.

With Burial 2 were three complete metates and six fragments (Plate XIII, a). The first complete metate is a slab of dense gray igneous rock, averaging four inches in thickness, both faces showing well worn oval basins. The second metate is a thinner slab of brownish scoria; both sides show some wear, and one side shows clear evidence of preliminary pecking before being used for grinding purposes. The third metate is also made of a slab of scoria, three to four inches thick and pitted on both sides due to weathering of phenocrysts. Only one side shows signs of wear, and this consists of an elongated depression along one edge. The various fragments are all of gray tuff; some are large chips from the original metate and show only one abraded surface, others are angular fragments of varying thicknesses and show varying amounts of wear. It may be noted that all metates are made from slabs selected for their suitability and that there is no attempt to give them a definite shape.

Miscellaneous. Four rejects (Plate XIV, b, 4) were present. Each shows some flaw in the stone which rendered further flaking difficult.

CONCLUSIONS

The most significant points about the Sheep Creek site may be stated as follows:

(1) All of the cultural remains are assignable to the period when the Calamity formation was being deposited. The vertical distribution of camp debris, artifacts and skeletal material shows that the Calamity-Sheep Creek valley was occupied by man during the greater part of this depositional period—in fact, all but the very earliest part.

(2) The artifacts from the upper member of the Calamity formation are too few in number and too general in character to be identified as to culture. They do indicate human occupation of the valley during the latter part of the Calamity depositional period.

(3) Of the three sets of artifacts described, that which is intermediate in position is the most clearly established. This is the Pecos River focus material, which is associated with the humic zone of the lower member of the Calamity formation, indicating occupation during a climatologically favorable period. It is thus possible to say that the people responsible for the Pecos River focus were present in this locality by at least middle Calamity times. This confirms the evidence presented by the reconnaissance survey sites of Shafter 6:1 and Valentine 9:1. The combined evidence from these three sites throws some light on the antiquity of the Pecos River culture.

(4) The status of the material from the lowest cultural horizon is not altogether clear. The paucity of artifacts is the greatest difficulty. This may represent an earlier phase of the Pecos River, or it may represent another cultural manifestation in the valley which preceded the Pecos River. The presence of a pitted mano would suggest the former. Obviously more data are needed.

(5) The question of how the two burials fit into the picture has not been answered with any degree of assurance. Since no clear traces of the original grave shafts remain, it is assumed that the burials were placed at no great depth below the land surface at the time of interment. On this basis we have tentatively assigned Burial 1 to the Pecos River focus and Burial 2 to the cultural horizon just below. Inasmuch as these are the only deep burials known from the region they cannot be compared with any early non-cave burials. Further excavation will probably throw light on this problem. The evidence at this site merely indicates the presence of two groups who had different burial customs. No great lapse of time seems to separate the two. A thorough study of the skeletal material may also be helpful, but preliminary observations do not refer to any marked differences between the two individuals. It should be pointed out that both burials are flexed and that the lower burial is accompanied by metates, both of which traits are found in the Big Bend Cave aspect and particularly in the Pecos River focus. However, flexed burials also occur in the Bravo Valley aspect, though not in stone-protected graves.

CALAMITY CREEK SITE

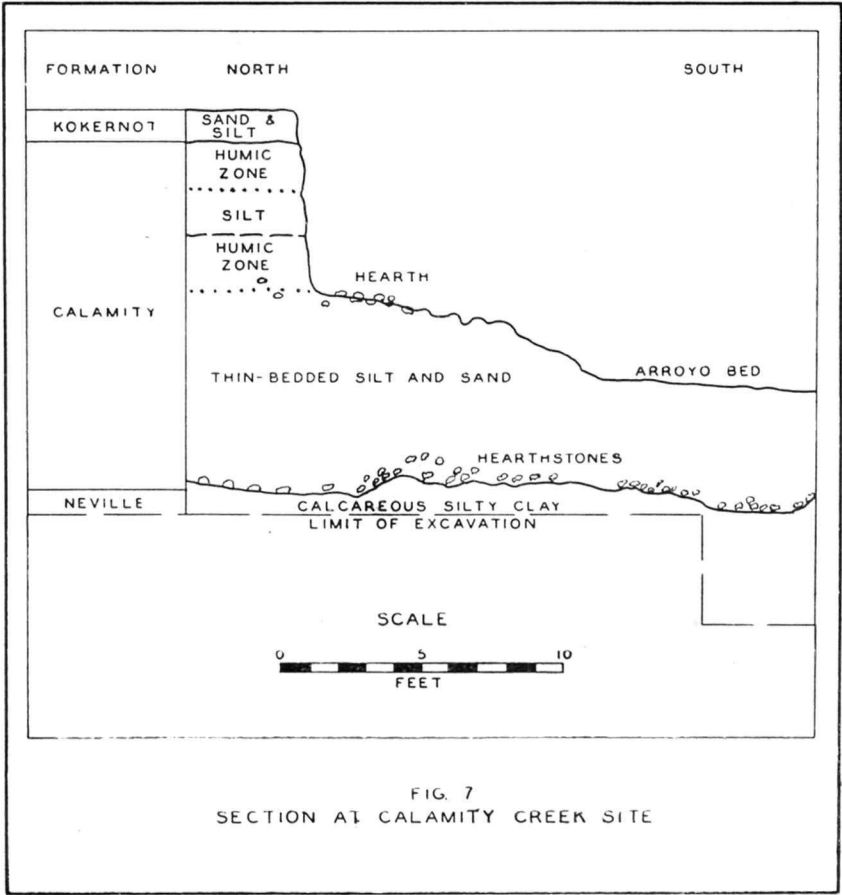
The Calamity Creek site (Alpine 9:1b) was discovered during the course of excavation on Sheep Creek. Two hundred yards north of the junction of Sheep Creek with Calamity, a small side **arroyo** less than 100 feet in length enters Calamity **arroyo** from the west. In searching the banks of Calamity Creek for exposures of human cultural remains, the narrow opening of this side **arroyo** was noted and the search extended up it as well. Head cutting was proceeding rather rapidly in its two branches, northern and western, and in the northern branch a hearth was partially exposed on a shelf at a depth of $7\frac{1}{2}$ feet below the surface. The discovery of this hearth and its associated artifacts led to excavation.

A composite north-south cross-section of the deposits at the Calamity Creek site is shown in Fig. 7. It will be noted that all three Quaternary formations are represented. Plate XV, a, gives a view of the site as it appeared before excavation; only the Kokernot and Calamity formations are exposed. The hearth lies near the **arroyo** wall at right center (see also Plate XVI, a), being obscured in this picture by the grass growing on the shelf. Artifacts from the same horizon as the hearth were found on the **arroyo** floor, having been washed there only a short time before. The shelf, when first noted, lay at a level of three to four feet above the irregular floor of the **arroyo**.

As soon as work was finished at the Sheep Creek site, camp was moved to the new site and two months were spent in excavation. The hearth which led to the discovery had been left intact. In order to get a clearer idea of the stratigraphy in this locality, a pit eight feet square was sunk in the bottom of the **arroyo** (Plate XV, b, end of trench in foreground). A few artifacts that had been washed from the hearth layer were found in the loose earth on the floor, some of them in refilled shallow potholes. Continuing downward, hearthstones and artifacts were encountered at depths ranging from $4\frac{1}{2}$ to 7 feet below the bed of the **arroyo**. This had not been anticipated and at first the situation did not appear very clear. This material was far below the lower humic zone of the Calamity formation, in the bottom of which the hearth lay. A correlation of the humic zones at this site with those of Sheep Creek indicated that this deepest cultural refuse was referable to a much earlier occupation than anything found up to that time.

The initial test pit in the floor of the **arroyo** was extended and a trench eight feet wide was extended from the pit into the north wall of the **arroyo** in order to get the complete stratigraphic picture. At first, due to the dampness of the earth, which obscured differences in color and to some extent differences in texture, the lower stratigraphic elements could not be defined. It was not until considerable drying out had taken place that the situation became clear. It then became evident that the lowest material—hearthstones, charcoal, artifacts, flakes, etc.—lay along the contact between the Neville and Calamity formations. Thus at the Calamity Creek site two distinct cultural horizons were present, one in the lower part of the lower humic zone in the Calamity formation, the other at the very base of the Calamity. The two horizons were separated by a zone which showed only slight evidences of human occupation.

Our task was to remove as much of the deposits as possible and obtain a representative series of artifacts from each of the two cultural horizons. After connecting the pit in the bottom of the **arroyo** with the north wall, two lateral trenches were extended to the west and carried as far as the **arroyo** bank in that direction. The shelf to the east of the north-south trench was cleared and excavated down to the Neville-Calamity contact zone, in some places a few feet below the contact. In addition, the original pit was carried downward still further, penetrating the Neville formation a little more than four feet. Near the close of excavation at the site a test pit was dug 25 feet to the northwest of the northern branch of the **arroyo** in order to ascertain the extent of the lower campsite material and the amount of slope in the surface of the eroded Neville formation. It was found that the Neville continued to slope upward in that direction and that hearthstones and artifacts lay along the contact with the Calamity formation. Thus there was no doubt about the position of the two cultural horizons in the Quaternary sequence established by Albritton and Bryan.





a



b

PLATE 15

PLATE XV

- a. Calamity Creek site before excavation. This is one of several branches of a small side **arroyo** to Calamity Creek. Kokernot and Calamity formations are visible.
- b. Same view, taken after a trench had been sunk into the bed of the **arroyo**. Hearthstones and artifacts are located in the contact zone between the Neville and Calamity formations.

As at the Sheep Creek site, the Kokernot formation contained no evidences of human occupation. The site was in a flat which drained into Calamity Creek and consequently would not have been a suitable place for a recent campsite. The Calamity formation, represented by deposits ranging in thickness from 12 to 16 feet, contained all of the cultural remains at this site. This was the same situation as found at the Sheep Creek site, but the location of the material in the Calamity formation was not the same. By comparing Figures 6 and 7 it will be seen that the two humic zones are somewhat telescoped at the Calamity Creek site as compared with the Sheep Creek site, and also that the gravels are missing at the former site. The hearth in the lower humic zone at Calamity Creek occupies a position essentially the same as the lower material at Sheep Creek; but the dismantled camp refuse at Calamity has no counterpart on Sheep Creek, where the Neville-Calamity contact was not exposed.

Artifacts from the Calamity Creek Site. In view of the fact that the cultural remains from this site lay in two rather widely separated horizons in the Calamity formation, the artifacts will be discussed as two complexes. Their isolation in the strata amply justifies this procedure. It is possible, of course, that one or both horizons may contain mixed cultures. Despite this possibility, tentative names are being assigned to these artifact groups, pending further excavation and collection from deeply buried sites in the region. The greatest handicap is the scanty representation of artifacts. Here, as in the Sheep Creek site, the total assemblage of artifacts is not imposing, although the series from the Neville-Calamity contact zone is larger than any of the others. It is to be hoped that further work will fill in the outlines of the culture which here appear so sketchy.

The artifacts from the upper horizon at the Calamity Creek site will be referred to as the Santiago complex, and those from the lower horizon the Maravillas complex.¹³⁵

(1) **Santiago Complex.** The artifacts in this series were not all found *in situ*. Some came from the hearth, some were in place in the same horizon as the hearth; but the remainder came from the eroded surface of the shelf and the floor of the **arroyo**. Since there was no evidence to indicate that the loose material came from any other source, it is being considered as a part of the Santiago complex. The total number of specimens is less than thirty. Two manos were included in the hearth, and the remainder of the artifacts were about equally divided as to their source: on the eroded surface of the shelf and **arroyo** floor or in the same layer as the hearth.

Projectile Points. The total number of projectile points found was four, and these fall into two types. All four points have one trait in

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These names are derived from local geographic features: Santiago Peak and Maravillas Creek.

common: the blades are serrated on one or both edges. In general the craftsmanship is very competent. The first type of point is shown in Plate XVII, a, 1. Made of dark grayish-brown chert, this specimen is thin and very well fashioned. It is a triangular point with a concave base. Triangular points appear in the surface sites in Calamity-Sheep Creek valley, but they lack the thinness, serration and general appearance of this type of point. The second type (Plate XVII, a, 4) has a convex base and shallow lateral notches. As yet neither of these types can be associated with any other known complex in the Big Bend region.

Scrapers. These vary considerably, but they are not plentiful. All are made from flakes. The scraper illustrated in Plate XVII, a, 2, is a fine end- and side-scraper of translucent gray chert, made entirely by percussion flaking. In the same plate, specimen 3 is a concave scraper or spokeshave made from a flake of purplish chert. The concave scraping edge (left) has been formed by very fine retouching. Specimen 6 is a side scraper made from a long and rather thick flake; one long edge is slightly concave and shows more retouching than the other, which is straight. This scraper is very similar to one from Sheep Creek site (Plate XIV, b, 2).

Hammerstones. Two hammerstones are represented; both made from cores, one of chert, the other of jasper. They show battering on all prominences.

Manos. Four specimens appear in this category, two of them coming from the hearth. All are made of gray tuff stream-bed pebbles (Plate XVII, a, 8). Three show use on both sides, the surfaces being slightly convex to straight, depending upon the amount of wear. The fourth mano is large and thick and has a flat grinding face on one side only.

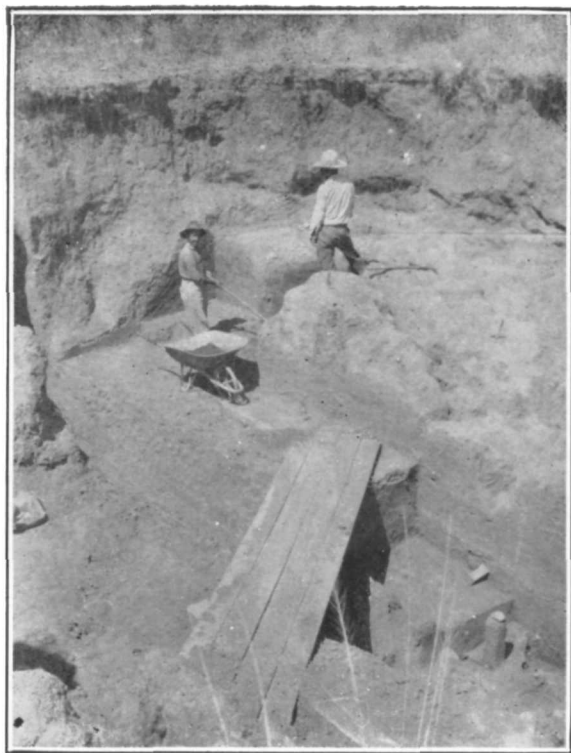
Metates. Two metate fragments (Plate XVII, a, 5 and 7) were present in this horizon, both made of slabs of coarse-grained tuff and showing evidence of use on both sides. One is very thin, less than one inch in thickness; the other is nearly two inches thick.

Miscellaneous. Several small flakes show precise retouching along one edge and may be classified as either scrapers or knives. This precise retouching is characteristic of some of the surface material in the valley and also occurs as a trait in the Maravillas complex. Other flakes seem to show traces of use but no definite retouching. Several cores and rejects are included in the assemblage.

(2) Maravillas Complex. All of this material, as indicated above, was *in situ* along the Neville-Calamity contact, which the geologists interpret as indicating an erosional interval. The Maravillas camp debris had apparently been washed into its position in the excavated area, but its concentrated nature suggests that the source was not far away, apparently on the upper slopes of the valley which had been cut into the Neville formation during the period of erosion. The stratum in which the hearthstones, charcoal, artifacts, and flakes appeared had a reddish cast, indicating that it was basically reworked Neville material.

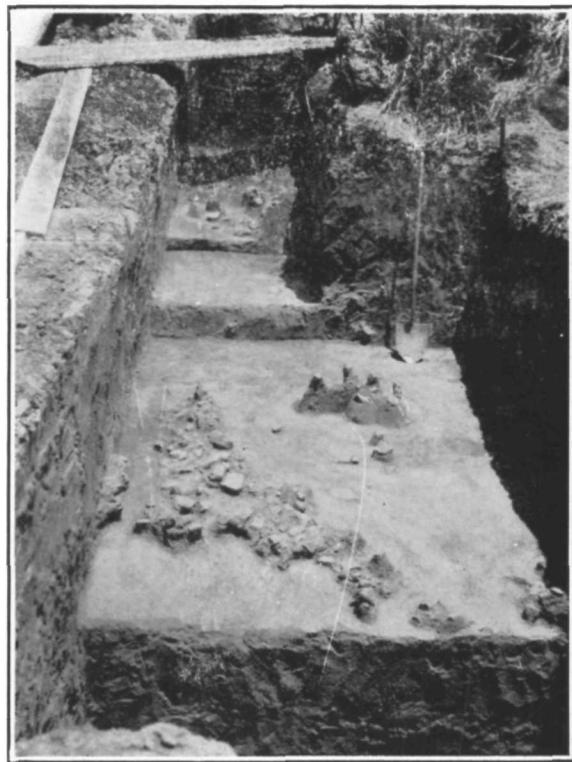
PLATE XVI

- a. View of the shelf at the Calamity Creek site, showing hearth **in situ** (between the workmen) and the highly eroded surface of the shelf. The Santiago artifacts come from the same horizon as the hearth.
- b. Hearthstones and artifacts along the Neville-Calamity contact zone. In lower center, near edge of pit, a mano is visible.



a

PLATE XVI



b

Projectile Points. It was very disappointing to find only two projectile points in this horizon. Inasmuch as projectile points must, for lack of anything better, serve as the main diagnostic feature, we are here considerably handicapped by an inadequate series. These two points (Plate XVII, b, 9 and 10) are unlike any other points found in the valley, either in the excavations or on the surface. They resemble each other in a number of ways. Whether they represent a type, or variations of a type, is naturally indeterminable at present. Both have stems with parallel sides and bases which vary somewhat from straight, wedging out to a thin sharp edge. The first point illustrated has an asymmetric concavity in the base, which may have been either accidental or purposeful, though the latter seems more likely in view of the chipping. If purposeful, it is somewhat reminiscent of the Pecos River focus point from the Sheep Creek site. This, however, is about all that it specifically has in common with that type.

The only striking difference between these two projectile points from the Maravillas complex is to be seen in the shoulder treatment. One has a strongly jutting shoulder which meets the stem at right angles; the other has no shoulders, though there are traces of slight ones that have been broken off. The blades of both are similar, though there is a noticeable tendency toward a leaf shape in the latter. Both blades are flatly triangular in cross-section, due to the fact that one side of each blade has a marked ridge. This suggests manufacture from a flake, the flat side representing the bulbar face of the original flake. A tendency toward serration is to be noted in one edge of the blade in the first point. This is something which has been pointed to as characteristic of the four points occurring in the Santiago complex.

Knives and Blades. Only two specimens are represented in this group. One is a well-made, oval knife of gray chert, illustrated in Plate XVIII, a, 2; it is made entirely by percussion technique. The other is a long, thin, crescentic flake of jasper (Plate XVII, b, 4), retouched on both sides to give a continuous cutting edge.

Scrapers. Scrapers are fairly common, but no well defined type based on shape stands out among them. One excellent specimen of dark gray flint is shown in Plate XVIII, a, 3; it is made from a thick flake and all retouching has been done from the bulbar face. The two concave parts of the upper edge seem to have been used for spokeshave purposes. The upper convex edge and both sides are also well adapted to effective scraping. It is a very unusual scraper, thus far being unreported as a type which occurs in the Big Bend region.

The most common type of scraper consists of an irregularly shaped flake or fragment of chert or jasper, one of whose edges has been retouched to give a convex or straight scraping edge, though chiefly the latter (Plate XVII, b; 2, 3, and 7). Ten scrapers of this type appear in the series. Some are fragments of such scrapers, but others are clearly the complete implement.

Under the heading of scrapers we may also place quite a number of small, fairly thin flakes which have been retouched by fine, precise pressure flaking (Plate XVII, b, 6). This fine retouch is found in the Santiago complex and in three of the valley surface sites.

One scraper of whitish chert (Plate XVII, b, 8) appears to show a combination of functions. Its point is formed by the classic European graver stroke, giving a strong, chisel-like edge. Minute chipping at places on this point suggests use as an engraving tool. The implement is made from a flake whose edges are steeply retouched.

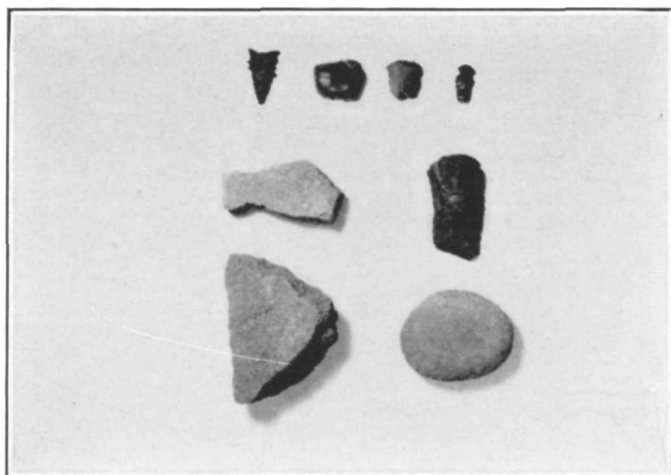
Only one definite concave scraper appeared (Plate XVII, b, 1). This is made from a medium-sized but thin flake and has very fine retouching in the small concave part (lower right).

Choppers. Two definite implements of this description are represented, both illustrated in Plate XVIII, a (5 and 6). The first, made of light gray chert, is a utilized core. Evidence of use may be seen on the upper edge. The second is made of jasper and as viewed in Plate XVIII bears a certain resemblance to an Acheulean *coup de poing*; but its nether side shows no chipping, being the irregular surface of the original nodule. This chopper is large and heavy; the pointed end is battered, as if used for hammering purposes, and the opposing broad edge also shows evidence of considerable usage.

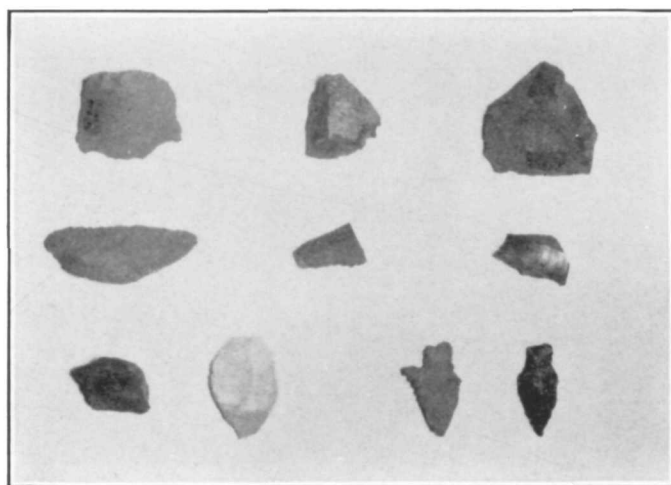
Hammerstones. The three hammerstones from the Maravillas series are all made from cores. Except for one specimen, battering appears on all of the prominences. The specimen shown in Plate XVIII, a (4), is made of yellowish-brown chert; the other hammerstones are of similar material, but different in color.

Manos. Manos are better represented, thirteen specimens having been found, only two of which are so fragmentary as to preclude detailed observation. These manos fall into two groups, those which have been purposefully shaped by pecking around the edges, and those which represent selection and use of conveniently shaped stream bed pebbles. All save two belong to the latter group. In general shape these are broadly oval in outline and flatly oval in cross-section (Plate XVIII, b). Nine in this group show use on one side only, and in a few cases this is clearly because the opposing side is unsuited for the development of a broad grinding surface. The grinding facet tends to be flat, depending upon the amount of use. One mano shows parallel striations on its grinding face, indicating that abrasion occurred along one axis only. This same feature is to be noted in one of the metate fragments.

The two manos that fall into the shaped class have nothing in common except that they are purposefully shaped. One (Plate XVIII, b, 2) is part of a wedged-shaped mano, the other is a pitted mano. Both have been pecked around the edges to give the present outline. The pitted mano shows use on both sides, but only one side carries the pit. It may be noted that a pitted mano occurred in the lower horizon at the Sheep Creek site.



a



b

PLATE XVII

PLATE XVII

- a. Artifacts from the Santiago complex. 1 and 4, projectile points; 2, side-and-end-scraper; 2 concave scraper; 5 and 7, metate fragments; 6, side scraper; 8 mano. Length of specimen 1 is $1\frac{3}{4}$ inches.
- b. Artifacts from Maravillas complex. 1, concave scraper; 2, 3 and 7, scrapers made from flakes; 4 knife; 5 and 6, retouched flakes; 8, scraper-graver; 9 and 10, projectile points. Length of specimen 10 is $1\frac{7}{8}$ inches.

All manos in this complex are made of the same material—gray tuff, fine- to medium-grained.

Metates. These are represented by four rather small fragments (Plate XVIII, b, 8), so that little can be ascertained concerning size and shape. Three of these fragments exhibit a portion of the edge of the original slab and indicate that no shaping took place. Slabs of stone were merely selected for suitable size and shape, which appears to be a trait common to all early cultures in the valley. All four metate fragments show abrasion on one side only, but the nature of their fractures makes it impossible to be sure that in some cases the opposite side was not also used for grinding. One fragment shows that the grinding surface was shallow in depth and oval in shape. The fragment shown in Plate XVIII, b (8) is notable for a peculiar feature of its grinding surface. Abrasion evidently proceeded along one axis, not in a rotary fashion, for the facet shows parallel striations. This is matched by one of the manos, referred to above, which also shows such striations. The metates, like the manos, were also made from gray tuff.

Miscellaneous. Five or six small cores appeared among the other artifacts of this complex, as did also a number of crude blades or blanks. Chert and jasper were the most common materials. In addition, there were a few flakes, large and small, which showed slight evidences of use without any purposeful chipping to give an edge or definite shape.

ALPINE 9:1e

Brief mention should be made of this deeply buried site, which is located in the east bank of Calamity Creek just below the juncture with Sheep Creek (see Figure 8). Artifacts are eroding from the same stratigraphic level as that of the Maravillas complex at the Calamity Creek site, that is, just above the Neville-Calamity contact. A metate fragment was collected, but no excavation was done at the site. This may be another site of the Maravillas complex. It certainly confirms the position of the Maravillas complex in the geological sequence.

CONCLUSIONS

The salient facts regarding the Calamity Creek site may be set forth as follows:

- (1) All of the cultural remains are associated with the Calamity formation, but are restricted to the lower member. There are no evidences of occupation during Calamity times later than the time of the formation of the lower humic zone.

- (2) The earliest cultural remains represented, the Maravillas complex, lie at the very base of the Calamity formation, revealing the presence of man in the Calamity-Sheep Creek valley at or just before

the beginning of the Calamity depositional period. This is the earliest culture thus far definitely established for the Big Bend region. It would appear that the Maravillas complex is associated with the period of erosion which preceded Calamity deposition.

The Maravillas complex appears to be something new in the Big Bend. Its geological position is clear enough, but because of an inadequate series of artifacts its outlines are none too clear. It cannot be linked with any known culture in the region. The nearest to it, as Kelley has pointed out, is the Red Bluff complex at Nine Point Mesa 4:1 (Jackson-Caldwell site), in which certain projectile points show some general similarities to the two specimens from the Maravillas complex. Too little is known of the range of types in all classes of artifacts in the Maravillas to permit satisfactory comparisons with other cultures in the Big Bend or in contiguous areas, as Central Texas. For the present, we must await the collection of a more representative series of artifacts.

(3) The Santiago complex occupies much the same stratigraphic position as the majority of the artifacts from the Sheep Creek site. Yet it has few specific similarities with that material. It too seems to represent something different from anything known thus far in the Big Bend. As in the case of the Maravillas complex, more material is needed.

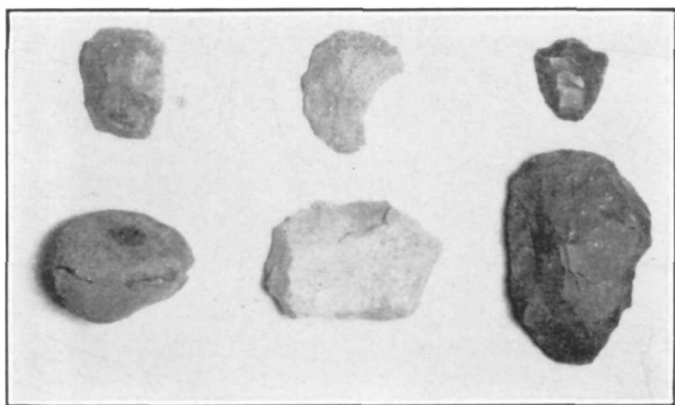
SURFACE SITES IN CALAMITY-SHEEP CREEK VALLEY

Surface sites in Calamity Valley within a radius of two miles of the scene of excavations are confined entirely to ridges. This is to be expected, inasmuch as the valley was subject to extensive flooding before the present channels were trenched, and hence ridges would furnish the only favorable spots for camping. These ridges are of two types. Those out in the valley flats are rather low and represent natural levees along former stream beds; those on the edges of the valley are much higher and consist of the lower portions of talus slopes. The valley ridges vary from four or five feet to perhaps fifteen feet in height, while the talus slopes which yield cultural material may be thirty or forty feet above the general valley level.

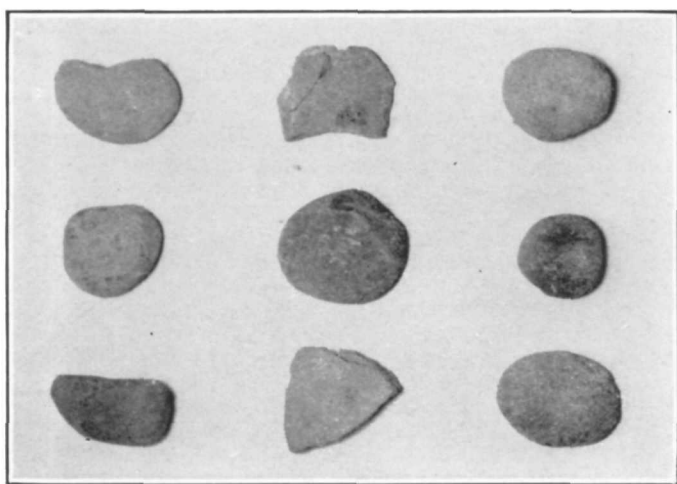
The valley surface sites are not surface sites in the accepted sense of the term. It is true that they now rest on the surface, but they have not been surface sites until quite recently. They have eroded or are now being eroded from the Kokernot formation. This was established in three ridges by test pits, which revealed hearths extending down nearly a foot into the Kokernot deposits. In places hearthstones and some artifacts could be seen resting on small pedestals of silt, indicating how much the surface had been cut down since they were first exposed. Another instance gives clear proof of this erosion. Our camp at the Alpine 9:1b site was located on a five-foot ridge which ended in a series of lobes, leading the geologists to conclude that the ridge was probably a sluiceway bar which had been built up before channel cutting in the valley began. We saw no clear indications of cultural material on this ridge;

PLATE XVIII

- a. 1 and 3, scrapers; 2, knife; 4, hammerstone; 5 and 6 choppers.
Length of Specimen 2 is $3\frac{7}{8}$ inches.
- b. Manos and one metate fragment (8). Length of Specimen 1 is $4\frac{1}{2}$ inches.



a



b

PLATE XVIII

there were a few flakes and crudely chipped stones of doubtful human production in the gravels which covered the ridge. Consequently we regarded this ridge as probably quite recent in origin, and at least later than Indian occupation of the valley. But in July heavy rains exposed a large hearth less than fifty feet south of the camp. This represents what has happened in the case of all the surface sites on ridges out in the valley. It also indicates that the Kokernot deposition continued after the last of the Indian groups inhabited the valley, a fact which is also borne out by the presence of cow and horse bones in the upper part of the Kokernot formation at various places.

The talus ridge sites are less easy of interpretation geologically, because they are on slopes and thus subject to continual movement. However, only three sites of this nature were located, and these produced small numbers of artifacts.

VALLEY SITES

Alpine 9:2. This site (for location of surface sites see Figure 8), located on the west side of Calamity Creek nearly two miles south of the Sheep Creek site, consists of camp debris which is now being eroded from the Kokernot formation. The artifact inventory shows a considerable variety of projectile points, side scrapers, snub-nose scrapers, and miscellaneous stone fragments showing workmanship or use. Most of the material belongs to the Bravo Valley aspect, but there is an admixture with other cultures, the Chisos focus almost certainly, and possibly later nomadic cultures.

Alpine 9:3. This site is almost identical with Alpine 9:2 and is only a few hundred yards to the southwest. It is also eroding from the Kokernot formation. Artifacts collected consist of the following classes: projectile points; side and circular scrapers; oval and circular blades; large flake choppers; metates of two types, one made from thin slabs, the other from thicker slabs and having bowl-shaped depressions; manos, some rectangular with flat grinding surfaces, others utilized stream bed pebbles, and a few are pitted manos. This site, like Alpine 9:2, seems to show clear Bravo Valley affiliations, as well as some Chisos and late nomadic features.

Alpine 9:12 and 13. These two sites may be parts of the same original site, for they are not far apart and contain the same kinds of cultural remains. Both are eroding from the Kokernot formation on low ridges just across Calamity Creek from Alpine 9:1b (Calamity Creek site).

Alpine 9:12 yielded several types of projectile points, among them the fine, thin points so highly characteristic of the Bravo Valley aspect; fine end- and side-scrapers, snub-nose scrapers; flakes showing fine pressure retouching; flat hammerstones; thin slab metates; and manos made from selected stream bed pebbles. Some shell accompanied the general camp debris.

Alpine 9:13 was the scene of some test excavation to check the Neville-Calamity and Calamity-Kokernot contacts in this locality (see Albritton and Bryan, Fig. 6, p. 1439). This excavation showed quite clearly that this eroding surface site was *in situ* in the Kokernot formation. The material collected included a few small sherds of brown pottery; projectile points as in Alpine 9:12; side- and end-scrapers; flakes showing fine retouching; pebble and core hammerstones; heavy choppers; wedge-shaped and pebble manos; and slab metates.

Both of these sites are identified as components of the Bravo Valley aspect.

Alpine 9:15. This lies on a low ridge in the valley flats a few hundred yards north and west of the Calamity Creek site. A test pit extending down into the Calamity deposits showed that hearths and artifacts were eroding from the Kokernot formation, a fact observed and noted by Albritton. The artifacts are principally Bravo Valley types and include the typical small, finely worked projectile points; oval knives; end, side, and concave scrapers; hammerstones of all varieties; heavy choppers; slab metates; manos, some pitted, some pecked to give shape, and some utilized pebbles.

Alpine 9:10. This is another site which is eroding from a ridge in the valley flats. Test pits were dug here which showed the material to be eroding from the Kokernot deposits. As yet the assemblage of artifacts at this site cannot be assigned to any definite horizon.

TALUS SITES

Alpine 9:6 and 7. Both of these sites occur on high gravel-covered ridges on the west side of Calamity-Sheep Creek valley. A few projectile points, some knives and scrapers make up the scant inventory of artifacts from these two sites. This material is scattered over the surface and there are no other evidences of human occupation. Little can be said concerning the cultural affiliations of these sites.

Alpine 9:16. This third talus site lies on a slope near the western mesa. The projectile points are chiefly Chisos in type, but other artifacts indicate Bravo Valley affinities. Since the site does not permit of geological correlation, it is of little value other than to show the presence of at least two sets of cultural material in Calamity-Sheep Creek valley.

CONCLUSIONS

The talus sites, since they have no geological status, do not throw much light on the general sequence of cultures in the Calamity-Sheep Creek valley. The sites on the ridges out in the valley flats are much more helpful. The data gathered from these sites confirm the picture which emerges from Kelley's reconnaissance survey. All of these sites are

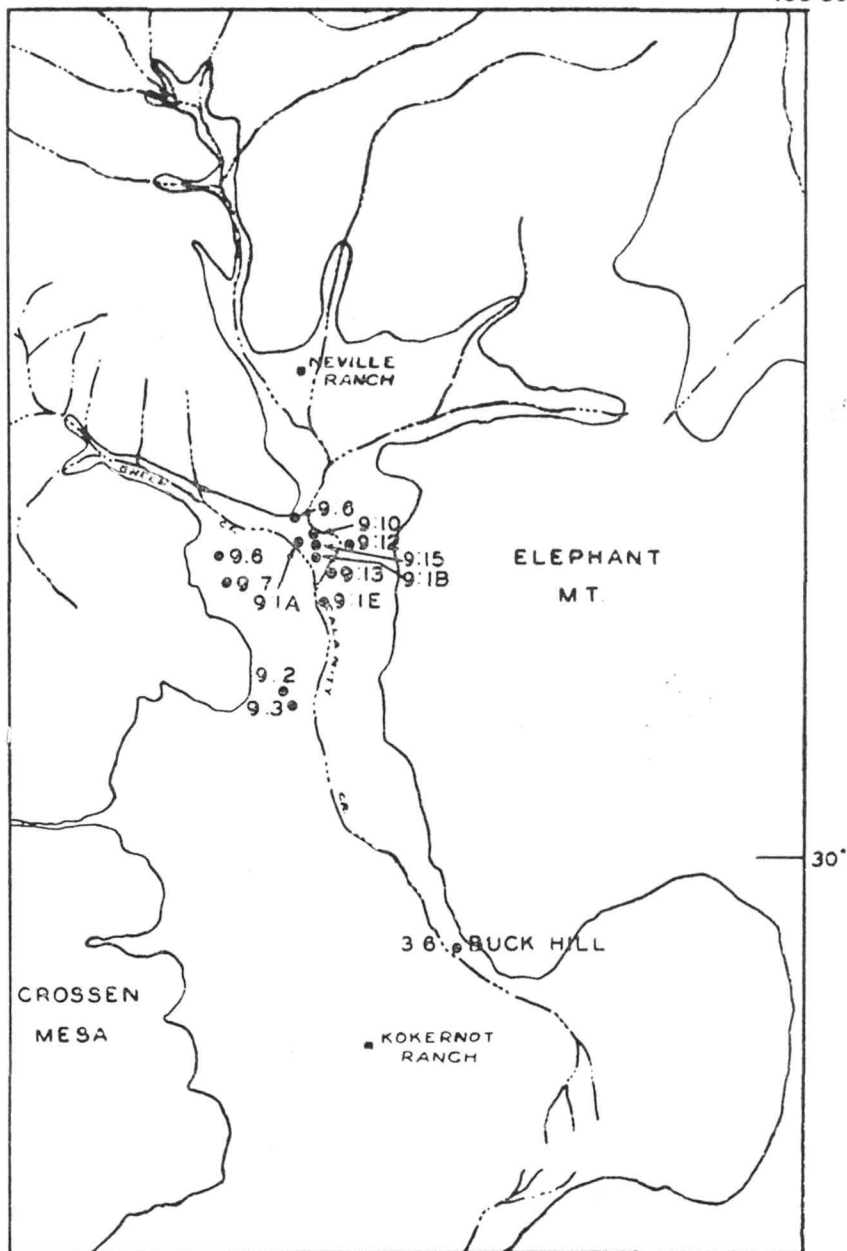


FIG. 8
SURFACE SITES IN CALAMITY VALLEY
(AFTER ALBRITTON AND BRYAN)
9 1A B AND E ARE BURIED SITES

definitely linked with the Kokernot depositional period and hence are late in date. The Bravo Valley aspect seems to be dominant in the valley during this period, but the admixture of Chisos focus material in at least two sites is worth noting, since it suggests a late survival in the area under consideration. The absence of Livermore types should also be noted. Other cultures, as yet not clearly defined, are represented in the valley during this period. Further work must be done before they can be fitted into the picture.

CALAMITY-SHEEP CREEK VALLEY: SUMMARY AND CONCLUSIONS

The results of the excavations in Calamity-Sheep Creek valley may be summarized as follows:

(1) Excavation revealed the first evidences of the Maravillas culture, thus far the earliest culture known in the Big Bend area. This is clearly as old as the beginning of the Calamity depositional period, if not older, and represents another pre-ceramic, pre-horticultural group in the Southwest.

(2) The excavations presented the first definite association of the Big Bend Cave aspect with a geological formation. The Pecos River focus of this aspect appeared in the upper part of the lower member of the Calamity formation. Skeletal material was also present in the same horizon.

(3) The Santiago complex, apparently another new cultural manifestation in the area, came to light during the excavations. This appears to be approximately contemporaneous with the earliest Pecos River focus material found in the valley.

(4) Surface sites in the valley indicate the presence of the Chisos focus, and a late dominance of the Bravo Valley aspect.

(5) On the basis of geological and archaeological investigations, the history of the valley may be summarized:

Man seems not to have occupied the valley during the period when the Neville formation was being laid down. The dry period following the Neville deposition, represented by the Neville-Calamity contact, seems to have been the time when the people responsible for the Maravillas complex came into the valley. The Maravillas people may have occupied the valley for at least a part of the early Calamity period.

Later, but still fairly early in the Calamity period, other peoples lived in the valley, among them those responsible for the Santiago complex, the Pecos River focus, and perhaps others. The relationships of these groups is not yet clear. This occupation, so far as evidence from the major excavations is concerned, continued throughout the deposition of the lower member of the Calamity formation. The Sheep Creek site indicates occupation during the time of the deposition of the upper

member of the Calamity, but it does not reveal what cultures were present. However, evidence from the survey shows that the valley continued to be occupied by the Pecos River focus group until the close of the Calamity deposition. The survey work also shows that the Chisos focus enters into valley history during the erosional interval that followed Calamity deposition, and surface sites in the valley indicate that Chisos occupation continued during the earlier part of the Kokernot deposition. Later in the Kokernot period the Bravo Valley aspect became dominant in the Calamity-Sheep Creek valley. Certain nomadic groups played a part during this time, but their identity is not yet clear. European occupation followed.

It thus appears that during the Calamity period the valley was occupied by groups having an economy based on hunting and food-gathering. In the succeeding Kokernot period at least one group, the Bravo Valley, may be referred to as agricultural. It is possible, however, that the Bravo Valley campsite material may represent hunting camps of an agricultural people who raised their crops in the Rio Grande Valley and hunted to the north.



PART III

SUMMARY, COMPARISONS, DISCUSSIONS AND CONCLUSIONS

By

J. CHARLES KELLEY AND T. N. CAMPBELL

The findings of the Expedition may be summarized in a few paragraphs. Albritton and Bryan were able to identify three mutually disconformable alluvial formations in valleys and canyons of the Big Bend region. Alternation of deposition and erosion was assumed to be related to climatic fluctuations. Artifacts, hearths, burials, and other residue of human occupation were found *in situ* in the geologic deposits or eroding from them.

At Alpine 2:1 a grinding stone was found in a deposit that may possibly be the Neville formation. Since there is some doubt as to the identification of the deposits at this site, the association cannot be considered as established, and we therefore have no proof that man occupied the Big Bend region contemporaneously with the extinct mammoth and bison.

At Alpine 9:1b artifacts and other occupational debris were found associated with the disconformity between the Neville and Calamity formations. The culture represented, here termed the Maravillas complex, cannot be correlated with any known Big Bend cultural manifestation, nor can it be specifically placed in time. The complex cannot be later than the beginning of Calamity deposition and is probably earlier. At Alpine 9:1e specimens are eroding from alluvium at the same stratigraphic level; this is presumably another site of the Maravillas complex.

At Alpine 9:1b, stratigraphically higher in the Calamity formation than the underlying Maravillas complex artifacts, are hearths *in situ* with associated artifacts. The cultural complex has been termed the Santiago complex. Its affiliations are unknown, although there is a remote possibility that an early stage of the Chisos focus of the Big Bend aspect is represented. Other artifacts and possibly a burial in the lower Calamity formation at Alpine 9:1a may indicate another new culture.

Artifacts found in the lower or middle Calamity formation at Alpine 9:1a, Shafter 6:1, and Valentine 9:1 have been identified with the Pecos River focus of the Big Bend aspect. Artifacts identified with this focus have also been found at sites *in situ* in the disconformity between the Calamity and Kokernot formations at Buck Hill 6:1, Monument Springs 8:2 and intrusive into other cultures on the same stratigraphic level at Santiago Peak 1:3 and Nine Point Mesa 4:1. It is assumed that unexcavated sites in the upper Calamity formation are likewise to be classed with the Pecos River focus which therefore appeared near the middle of the Calamity formation and survived into the erosional epoch following Calamity deposition.

Artifacts found at a site *in situ* on the same disconformity, or very low in the Kokernot formation, at Santiago Peak 1:3 have been identified with the Chisos focus of the Big Bend aspect. Intrusive Pecos River focus projectile points appear at this site. Chisos focus artifacts also appear as intrusives in the Pecos River focus at Monument Springs 8:2 in the post-Calamity erosional level, and in the same level in the Livermore focus midden at Nine Point Mesa 4:1, where Pecos River focus artifacts also appear as intrusive. Chisos focus artifacts also occur as intrusives in sites of the Bravo Valley aspect eroding from the Kokernot formation at Alpine 9:2 and 9:3. Although the Santiago complex of the Calamity depositional period may possibly be ancestral to the Chisos focus, the focus itself appears for the first time in the post-Calamity erosional period, where it was contemporaneous with the final stages of the Pecos River focus and with the Livermore focus, and survived into the Kokernot depositional period where it was a contemporary of the Bravo Valley aspect.

At Nine Point Mesa 4:1 an occupation site with artifacts identified with the Livermore focus appeared *in situ* in the post-Calamity erosional level, with intrusive Pecos River and Chisos foci artifacts. It is thought that the Livermore focus, which here appears for the first time in the sequence, is ancestral to the Bravo Valley aspect and contemporaneous with the terminal Pecos River focus and with the Chisos focus. This hypothesis is borne out by the situation at Nine Point Mesa 4:1.

At Shafter 6:1 pithouses and artifacts of the La Junta focus of the Bravo Valley aspect were found *in situ* in the Kokernot formation in direct superposition over a site of the Pecos River focus in the underlying Calamity formation. At Shafter 6:3 artifacts of the same focus of the Bravo Valley aspect appeared *in situ* in the Kokernot formation. Intrusive Southwestern ceramics at these sites provide a dating of approximately 1200 to 1400 A. D. for the focus and for the portion of the Kokernot formation in which they are included. Artifacts identified with the Concepcion focus of the Bravo Valley aspect occurred in the Kokernot formation at Alpine 7:2, and sites of the aspect, focus undetermined, appeared in the Kokernot formation at Jordan Gap 1:1, Alpine 9:2, 9:3, 9:12, 9:13, 9:15, and Buck Hill 6:1. The duration of the Bravo Valley aspect is therefore approximately the period of Kokernot deposition.

At Nine Point Mesa 4:1 artifacts of a new cultural manifestation, termed the Red Bluff complex, appeared *in situ* in ancient *arroyo* deposits underlying the Livermore focus midden and the post-Calamity erosional level at that site. The age of this complex is probably that of the late Calamity depositional period, although it may possibly be much older. Other sites of unknown affiliation appeared at various levels in the Calamity formation and in the Kokernot formation at several sites, with an impressive concentration in the Alamito Creek valley.

Thus man seems to have appeared in the Big Bend during or near the close of the great erosional epoch following the termination of Neville deposition. The area was occupied throughout subsequent periods. The first concentration already familiar to Big Bend archaeology was that

of the Pecos River focus, which seems to have dominated the area during most of the Calamity depositional period. The focus seems to have disappeared during the following erosional period, possibly under pressure of invading peoples of the Chisos and Livermore foci, who appear in the area at that time. The Chisos focus apparently survived into the following Kokernot depositional period, and may have been represented in historical times by some of the nomadic groups of the area. The Bravo Valley aspect, probably the lineal descendant of the Livermore focus, appears during the Kokernot depositional period and lasts through that period into the historical era. The correlation of archaeological cultures with geologic deposits is summarized in Plate XIX.

THEORY OF CORRELATION

The various Big Bend cultures discussed in this paper have been determined on the basis of artifact complexes present in numerous sites. In the case of the Big Bend aspect, the components are largely rock shelter sites and complexes are based to a large extent upon basketry, matting, sandals, and other perishable artifacts. In this paper we have correlated open sites containing no perishable artifacts with rock shelter sites by comparing their lithic complexes. The use of lithic complexes as keys for the identification of cultures is thus the theoretical basis of our entire thesis. If the lithic complexes are truly diagnostic of their mother cultures, this theory of correlation is sound. The point requires some discussion.

The lithic complex of the Pecos River focus is fairly well established. Projectile points form the principal diagnostic items. Sayles pictured points of the diagnostic type as distinctive of the "Pecos River Cave Dweller."¹³⁶

Pearce and Jackson illustrated and described points from the Fate Bell Shelter.¹³⁷ Their Types 1 and 6 (447 specimens, 30% of all projectile points) and possibly Type 7 (251 specimens, 17%) as well as sub-types which together form our "diagnostic Pecos River focus type."¹³⁸ This type thus totalled 698 specimens and 47% of all such specimens, as opposed to 13% for the next most frequent type. Holden illustrates and describes similar projectile points from Murrah Cave on the Pecos River.¹³⁹ His Types 4 (5, and 6, Plate 8) and 7 (11, Plate 8, A) are similar to our diagnostic type. Together they total 289 specimens, 38% of all projectile points. His Type 1 (1 and 2, Plate 8, A) represents a very slight variation of the principal type and should probably be classed with it.

136.

Sayles, *op. cit.*, 1935, Plate XVIII, d, e, f, and g.

137.

Pearce and Jackson, *op. cit.*, pp. 73-77, Plate XII.

138.

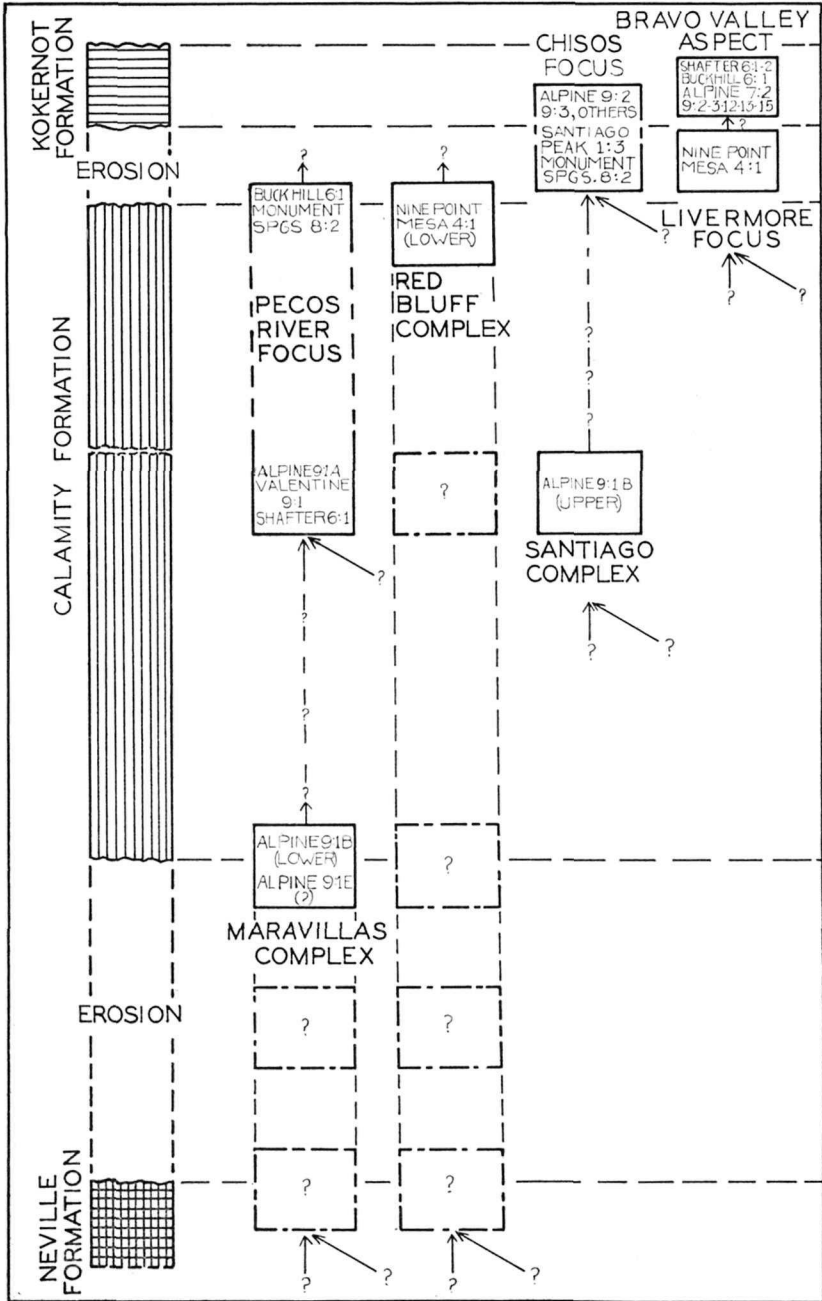
Ibid., p. 74, Plate XII.

139.

Holden, *op. cit.*, 1937, pp. 53-54, Plate 8, A.

PLATE XIX—CORRELATION OF ARCHAEOLOGIC AND GEOLOGIC HORIZONS IN THE TEXAS BIG BEND REGION. Sites listed in each block indicate the approximate stratigraphic level of the culture indicated. Blanks without titles but with marks indicate alternative stratigraphic positions of the culture noted. Slanting arrows ending in question marks designate the possible origin of that culture or cultures outside of the area.

PLATE XIX



This would bring the total number of projectile points up to 484, a percentage of 64.5%.¹⁴⁰ In the Big Bend region proper, Pecos River focus components are fewer and poorer in specimens than in the hearth area on the Pecos River. At Alpine 2:7 (Merriwether Cave C) the diagnostic type was represented by 16 specimens, exactly 50% of all projectile points. The type (or types if we follow Pearce and Jackson, and Holden) therefore seems consistently diagnostic of the focus. If our identification of projectile points found in buried sites is accurate, and if other items of the complex agree, we may feel fairly secure in our cultural identification of the components.

In Plate XX, Figs. 1 and 2 illustrate the type specimens. In Fig. 1, *a* is from the lower or middle Calamity formation at Valentine 9:1. Compare it with the two points at *b*, which are from the Pecos River component at Alpine 2:7 (Merriwether Cave C). The specimen at *c* is from the lower or middle Calamity formation at Alpine 9:1a. Compare it with the specimens at *d* from the Pecos River focus caves in the Big Bend. Also compare *a* with specimen 11, Plate 8, A, from Murrah Cave in Holden's report.¹⁴¹ In Fig. 2, Plate XX, *c* is from the lower or middle Calamity formation at Shafter 6:1. Compare this with specimen *b* and with the specimens at *d*. Specimen *b* was found by Victor J. Smith in Hord Shelter in Sunny Glen.¹⁴² It was one of three flints lying near the top of an underlying sterile layer (dust of Neville derivation in post-Neville erosional times) containing a "musk-ox-like" bone, horse and antelope bones, and directly underlying cave deposits containing fish-tail sandals (Chisos focus). As Smith points out, this type of projectile point is almost identical with early atlatl dart points from Gypsum Cave, Nevada. At *d* in Fig. 2, Plate XX, are shown comparable points from the Pecos River focus component at Alpine 2:7 (Merriwether Cave C), while *a* is from the Calamity formation at Valentine 9:1.

Other items attributed to the Pecos River focus in buried sites described here check the identification. There is one conspicuous exception to this. The skeletal remains from Alpine 9:1a differed somewhat in physical type from those of the Pecos River focus as previously known. The Alpine 9:1a skeletons were mesocephals; the Pecos River focus peoples were dolichocephals or hyperdolichocephals. The burial custom on the other hand blends quite well with that of the Pecos River focus. At Alpine 9:1a we are therefore faced with the problem of approximate cultural identity and noteworthy physical differences, both based on

140.

Ibid., table, p. 54, and Plate 8, A.

141.

Holden, *op. cit.*, 1937.

142.

Smith, *op. cit.*, 1934, pp. 101, 105-106, Plate 17, 60.

small samples.¹⁴³ Despite this contradiction, it nevertheless seems that the identity of buried sites at several localities with the Pecos River focus is established.

In Fig. 3, Plate XX, **a**, **b**, and **c** are projectile point types from Santiago Peak 1:3 which may be compared with **d** and **e** from Alpine 2:5, and **f** from the Bear Creek shelters excavated by Victor J. Smith. Typologically there is no question but that all the points shown in this figure belong to the same complex. Alpine 2:7 alone produced 19 projectile points (53%) of this type.¹⁴⁴ In general, however, the Chisos focus lithic complex is not so well established as that of the Pecos River focus. The rock shelter components of the Chisos focus rarely contain more than a handful of projectile points and these vary widely in type, even within the same shelter. The type which we list as diagnostic is found more frequently than others. It is the dominant type in many open sites and middens of the area. These same open sites and middens contain in fairly large numbers all the varieties of projectile points which appear sporadically in shelter sites of the Chisos focus. Santiago 1:3 is certainly identical with the cultures represented by the open sites and middens mentioned. The evidence for associating the latter sites with the Chisos focus is consistent, but is not so strong as in other cases, simply because the series is so small.

Sayles described the type which we believe to be diagnostic of the Chisos focus as one of the "Pecos River Cave Dweller" types. He states that the "Big Bend Cave Dweller" (Chisos focus) projectile point types were similar to those of the "Pecos River Cave Dweller," but were of infrequent occurrence.¹⁴⁵ Sayles, however, was apparently working on the theory that cave sites on the Pecos River were invariably Pecos River focus sites, those in the Big Bend invariably Chisos focus components. Significantly enough, neither Pearce and Jackson, nor Holden describe our diagnostic Chisos focus type in their very large projectile point series from the Pecos River focus type sites of Fate Bell shelter and Murrah Rock Shelter. Of equal significance is the fact that this type,

143.

George Woodbury has advanced an hypothesis which is diametrically opposed to this. He finds the origin of the Big Bend (Pecos River focus) people and culture in the Oso culture and physical type on the Texas coast in comparatively recent times. This theory is based on the close resemblance in physical type of the two groups, in contrast to their widely separate cultural types (Woodbury, "Notes on Skeletal Remains of Texas," pp. 5-16, **Anthropological Papers**, Vol. 1, No. 5, University of Texas, September 8, 1937, Austin, Texas).

144.

There is sufficient variation within the type to allow of subdivision into at least three sub-types. These sub-types, however, are not distinct and the series is small. Since no distributional or chronological significance has been established for them, these smaller variations are thought to be unimportant and are here disregarded. Actually, Alpine 2:5 and other sites have produced specimens, not accessible to the authors at this time, which are almost exact duplicates of all those figured.

145.

Sayles, *op. cit.*, 1935, Table. 6.

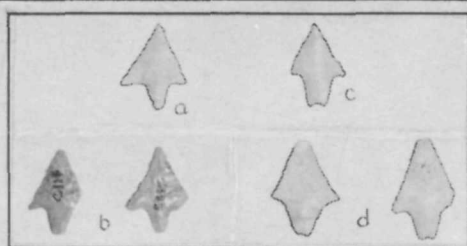


Fig. 1

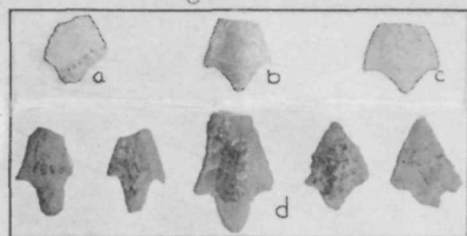


Fig. 2



Fig. 3



Fig. 4

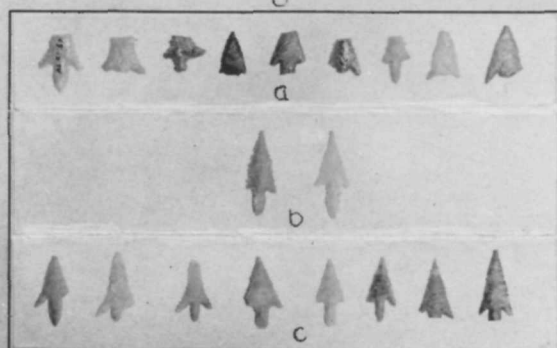


Fig. 5

PLATE XX—PROJECTILE POINT TYPES. SPECIMENS FROM BURIED LEVELS COMPARED WITH DIAGNOSTIC TYPE SPECIMENS FROM SITES OF KNOWN CULTURAL AFFILIATION.

Fig. 1—**a** is from the Calamity formation at Valentine 9:1; **c** is from the same level at Alpine 9:1 **a**; **b** from the Merriwether Cave C (Alpine 2:7). **d** from other rock shelter sites in the area.

Fig. 2.—**a** Calamity formation, Valentine 9:1. **b**, specimen from Hord Rock Shelter, Sunny Glen. **d** specimens from lower levels of Alpine 2:7.

Fig. 3—**a**, **b**, **c**, from post-Calamity disconformity at Santiago Peak 1:3; **d** and **e** are from Alpine 2:5 in Sunny Glen. **f** is from Bear Creek Shelter (Victor J. Smith).

Fig. 4—**a**, specimens from midden at Nine Point Mesa 4:1.
b, specimens from Bear Creek Shelter (Victor J. Smith).
c, specimens from upper level at Alpine 2:7.

Figs. 1 and 2—Pecos River focus. Fig. 3, Chisos focus.

Fig. 4—Livermore focus. Fig. 5, Bravo Valley aspect.

Fig. 5—**a**. Points from Kokernot formation sites in Calamity Creek Valley. **b**, from Shafter 6:1. **c**, from Shafter 7:1.

when it occurs in stratified sites in the Big Bend, is higher in the deposits than Pecos River focus types.

At present the Livermore focus is known only as a complex of stone artifacts. In Fig. 4, Plate XX, typical Livermore projectile points from rock shelter sites in the Big Bend are compared with projectile points of putative Livermore focus types from the midden at Nine Point Mesa 4:1. The Nine Point Mesa specimens are seen at **a**. At **b** are Livermore focus types from Bear Creek Shelter, excavated by Victor J. Smith, and at **c** similar types from the Livermore focus component at Alpine 2:7. The Livermore point proper is on the left half of the figure in all three cases, while on the right are side-notched and indented-base points. These two types of projectile points, with a third type (thin triangular points, sporadically represented), form a characteristic complex which is the basis for the creation of a Livermore focus. The presence of all the elements of this complex in the midden at Nine Point Mesa 4:1 leaves little doubt as to the identification of the site as a component of the Livermore focus.

In Fig. 5, Plate XX, projectile points of the Bravo Valley aspect are illustrated. Those shown at **a** are from sites *in situ* in the Kokernot formation in the Calamity-Sheep Creek valley. Those at **b** came from the Kokernot formation at Shafter 6:1 (Shiner site). At **c** are shown projectile points from Shafter 7:1 (Millington site), a large village site of the Bravo Valley aspect near Presidio, Texas. In addition to the close approximation in projectile point types of buried sites in the Kokernot formation to type sites of the Bravo Valley aspect, we have close resemblance or identity in houses, pottery, and other artifacts of the lithic complex.

This brief review of some of the evidences for the correlation of buried sites with previously determined cultures of the region indicates that the probability of any important error is small. On the other hand, in practically every individual case the series of specimens that we were able to collect for comparative purposes was so small that we cannot completely rule out the possibility of error from this quarter. In addition to the typological evidences for correlation, the sequences of cultures so determined agrees with the sequence previously developed by archaeological means alone. That our correlation of cultures and geologic deposits is essentially correct is also indicated by negative evidence. No Pecos River type projectile points have been found *in situ* in the Kokernot formation, no Bravo Valley aspect or Livermore focus points have been found in the Calamity formation. Unless some of the Santiago complex points prove to be more closely related to Chisos focus types than we now believe, we can also say that no Chisos focus types have been found in the Calamity formation. As a final proof, we have successfully subjected our correlation in part to the test of prophecy. Sites in the Kokernot formation which produced no artifacts were nevertheless tentatively classed as components of the Bravo Valley aspect; later, heavy rains washed Bravo Valley aspect artifacts from these sites.

CORRELATION OF THE ARCHAEOLOGICAL EVIDENCE WITH CLIMATIC FLUCTUATIONS

Albritton and Bryan explained the alternation of sedimentation and erosion in the Quaternary deposits of the valley flats of the Davis Mountains (Big Bend) in terms of climatic changes. Sedimentation was thought to indicate periods of relatively humid conditions; erosion was interpreted as indicating times of relative aridity.¹⁴⁶ The geologists also pointed out that the cycles of sedimentation and erosion grew progressively shorter from the beginning of Neville sedimentation to the present.¹⁴⁷ The correlated sequences can be summarized as follows:

1. A long and relatively humid period, during which the local fauna was characterized by the mammoth and the horse, with man apparently absent from the region (Neville formation).
2. A long period of relative aridity, characterized by the disappearance of the mammoth and horse and the first appearance of man (Maravillas complex) (post-Neville erosion).
3. Relatively humid period of considerably shorter duration than (1). The fauna of this period seems to have been essentially that of modern times, dominated by man (Calamity formation).
4. A short period of relative aridity, with continued dominance of man (post-Calamity erosion).
5. A short period of relative humidity, with man continuing dominant, lasting into the present. Since the area now has an arid to semi-arid climate, the comparative climatic value of the changes can be estimated (Kokernot formation).

Examined in greater detail, the correlation of climatic fluctuations in the Big Bend with cultural factors brings to light some interesting features. The earliest demonstrated culture, the Maravillas complex, seems to have arrived in the Big Bend during a period of aridity. In the second or post-Calamity period of aridity two new cultures appear, the Chisos focus and the Livermore focus. Although differing in detail, the various cultures found in the Calamity formation, namely the Pecos River focus, the Santiago complex, and probably the Red Bluff complex, have much in common with the Maravillas complex. Similarly, the Livermore focus has many points of resemblance with the subsequent Bravo Valley aspect, so many in fact that we believe the latter to be a lineal descendant of the former. The Maravillas complex, the Santiago complex, the Red Bluff complex, and the Pecos focus form a block of related cultures, as opposed to the Livermore focus-Bravo Valley aspect group. The Chisos focus is in many ways transitional between the two

146.

Albritton and Bryan, *op. cit.*, 1938, pp. 1466-1467, 1472.

147.

Ibid. p., 1465.

groups; its closest relationships is certainly with the older block of cultures.

The older cultural block thus appeared in the Big Bend region during a period of aridity, probably toward its close, and dominated the area through the succeeding Calamity period of sedimentation. It survived into the post-Calamity erosional period, but there vanished, though the tradition was carried on by the newly arrived Chisos focus.¹⁴⁸ The second block of cultures appeared in the area in this same post-Calamity period of aridity and dominated the Big Bend through the Kokernot depositional period into historical times.

Two cultural horizons are thus represented in the Big Bend. Both of these appeared in the region during periods of aridity and expanded and evolved during subsequent periods of more humid conditions. Whence came these cultural invasions, and why? Are they merely minor movements within a restricted area, or are they reflections of widespread movements inspired by far reaching climatic or cultural changes? Before attempting to answer such questions we must consider the stratigraphic, climatic and archaeologic sequences of the Big Bend in relation to comparable ones in adjoining regions.

148.

If we could demonstrate the evolution of the Chisos focus from the Santiago complex *in situ*, many of our difficulties would disappear. Unfortunately, sites in the extreme upper Calamity formation which might evidence this development were not excavated. At present the resemblance of the Chisos focus to certain cultures in west-central Texas is much greater than its very generalized resemblances to the Santiago complex.

EXTRA-AREAL CORRELATIONS

Long before the first buried archaeological site had been discovered in the Big Bend, many such sites had been found in Central Texas. In May, 1925, Harold J. Cook found projectile points in association with horse, camel, and an extinct type of bison¹⁴⁹ in deep alluvial deposits on Lone Wolf Creek near Colorado, Texas. In 1929, Cyrus N. Ray of Abilene, Texas, found a human skeleton in a stone cist buried beneath several feet of alluvium in a high bank of the Clear Fork of the Brazos River near Albany, Texas.¹⁵⁰ Later in the same year Ray found occupational levels at various depths in the banks of the Clear Fork.¹⁵¹ Since that time he has found many similar sites along several streams of the Abilene region. Following Ray's original discoveries in 1929, E. B. Sayles also found buried sites in the Abilene country. In 1930 Frank Bryan reported the discovery of "eoliths" in deep gravel beds in McLennan County.¹⁵² Farther south, Pearce reported projectile points buried to depths of 18 feet in an old terrace of Brushy Creek, near Round Rock, Texas, in 1935.¹⁵³ A somewhat similar site was found by Jack Hughes and excavated by the Department of Anthropology of The University of Texas in 1938.¹⁵⁴

In the summer of 1934, Ernst Antevs and Edgar B. Howard visited the sites near Abilene. Antevs' report was so favorable that M. M. Leighton was sent to Abilene by Gila Pueblo of Globe, Arizona.¹⁵⁵ Although he spent only three days in the field, Leighton was able to establish a sequence of two geologic formation, plus one unnamed one, with which Sayles correlated the archaeological material. Kirk Bryan of Harvard University visited the sites in 1938 and confirmed Leighton's

149.

Harold J. Cook, "Evidence of Human Artifacts in the American Pleistocene," *Science*, n. s., Vol. LXII, No. 1612, pp. 459-460, 1925.

150.

Cyrus N. Ray, "New Evidence of Ancient Man in America," *Scientific American*, May, 1929a.

151.

Cyrus N. Ray, "Traces of Ancient Man Reported," *Science News Letter*, December 21, 1929b.

152.

Frank Bryan, "Archeological Remains in the Black and Grand Prairies of Texas," *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 2, September, 1930.

153.

"Ancient Man in Texas," *Science*, n. s., Supplement, Vol. 81, No. 209, January 25, 1935, p. 6.

154.

A. T. Jackson, "A Deep Archeological Site in Travis County, Texas," *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 11, 1939, pp. 203-225.

155.

E. B. Sayles, in "Geological Aspects of the Findings of Primitive Man Near Abilene, Texas," by M. M. Leighton (Foreword by Sayles), *Medallion Papers*, No. XXIV, Globe, 1936.

descriptions.¹⁵⁶ Early in 1938 the writers were shown several of the Abilene sites by Ray, and in the fall of the same year, after completion of the Expedition's work in the Big Bend, Kelley and Paul Ezell returned to Central Texas to make an inspection of alluvial deposits lying between Abilene and the Big Bend. As a result, it is believed that a correlation of both alluvial and archaeological sequences of the two regions is feasible.

Leighton described "Durst Silts" overlain by "Elm Creek Silts," which in their turn were intersected by unnamed flood plain silts. The Durst Silts rest unconformably upon bedrock. The three alluvial formations are mutually disconformable. The development of a mature profile of weathering in the upper portions of the Durst Silts suggested to Leighton that they had been subjected to a long period of weathering prior to the deposition of the overlying Elm Creek Silts.¹⁵⁷ The association of mammoth with the Durst Silts has been demonstrated¹⁵⁸ and a similar association has been reported for the Elm Creek Silts.¹⁵⁹

Albritton and Bryan tentatively correlated Leighton's sequence with their own,¹⁶⁰ but they were forced to rely primarily on the archaeological evidence for such a correlation. It is possible that they did not fully utilize the geologic evidence. It is the opinion of the present writers that neither geologic nor archaeological evidence taken separately can demonstrate such a correlation, but that taken together they offer evidence in its favor. A review of the geologic evidence is first in order.

Both the Neville formation and the Durst Silts lie unconformably on the older rocks of the valley floors. Both consist of compact pebbly silts and gravels with a high caliche content. Bones of the Imperial Mammoth have been reported from both. Kelley noted that the contact of the Durst and Elm Creek silts rose rapidly away from the present arroyo cuts, even as does the contact of the Neville and Calamity formations in the Big Bend. Both Neville and Durst were subjected to long exposure and erosion following their deposition.

The Elm Creek Silts are characteristically thick, horizontal beds of silt and sandy silt topped by humic horizons, which are however not true soils. The same description would characterize the Calamity formation.

156.

Kirk Bryan, "Deep Sites Near Abilene, Texas," **Bulletin of the Texas Archeological and Paleontological Society**, Vol. 10, 1938, pp. 273-274.

157.

Leighton, *op. cit.*, 1936.

158.

Kirk and Bryan, *op. cit.*, 1938a.

Harold S. Gladwin, "Excavations at Snaketown, II, "Comparisons and Theories," **Medallion Papers**, No. XXVI, Globe, 1837, p. 32.

159.

Leighton, *op. cit.*, 1936, pp. 27, 31.

160.

Albritton and Bryan, *op. cit.*, 1939, pp. 1467-1468, Table I.

The only observable difference in the nature of the deposits is the reddish color of the Elm Creek Silts as opposed to more subdued colors in the Calamity formation.¹⁶¹ The relation of the two formations to overlying and underlying formations is the same. Leighton reports the presence of deer, bison, antelope, beaver, opossum, rabbit, turtle, etc., in the Elm Creek silts.¹⁶² Jackson reports the presence of numerous bones of **Bison bison** in similar deposits on the Colorado River in Travis County.¹⁶³ Mammoth remains are, however, likewise reported from the Elm Creek Silts.¹⁶⁴ In the Big Bend bones of deer (species undetermined) have been found in the Calamity formation. In cave sites correlated by archaeological and geologic evidence with the Calamity formation, bones of deer, buffalo, coyote, rabbit, squirrel, raccoon, antelope, wolf, turkey, and many others have been identified.¹⁶⁵ Mammoth remains have not been found in the Calamity formation, although they were reported from it by untrained observers in the early days of Big Bend studies. In every instance where such remains reported in the Calamity formation were observed *in situ*, they proved to be included in the Neville formation. Both the Calamity formation and the Elm Creek Silts were somewhat eroded before deposition of the overlying sands and silts.

As indicated above, the relation of the unnamed flood plain silts and sands of Leighton¹⁶⁶ and the Kokernot formation of Albritton and Bryan to underlying formations is the same. In both areas these beds are largely incoherent sand and silt, plus gravels in old channels in the Big Bend. In both areas they are identified as of very recent age. Faunal relations are not known.

Thus in both the Abilene and the Big Bend regions the valley flats are made up of three mutually disconformable formations, lying unconformably on bed rock. In the Big Bend region periods of deposition were interpreted as relatively moist periods; the intervals represented by their disconformable contacts as times of relative aridity. The same interpretation would seem to apply to the identical sequence in the Abilene region.

161.

This distinction applies also to the Durst-Neville and the Kokernot-
"flood plain" sediments.

162.

Leighton, *op. cit.*, 1936, pp. 18.

163.

Jackson, *op. cit.*, 1939, p. 204.

164.

Leighton, *op. cit.*, 1936, pp. 27, 31.

165.

Pearce and Jackson, *op. cit.*, 1933, p. 129.

Holden, *op. cit.*, p. 69.

166.

Leighton, *op. cit.*, 1936, Fig. 3, p. 9, (3). Compare Plate III, a, right half of panorama with Plate I, f, in this report. The light colored silts lying upon a pronounced dark horizon in the panorama are identical in position and nature with the Kokernot formation seen in Plate I, f, at the top of the section.

That this is so is inferred by Leighton when he states that the Elm Creek Silts were laid down under humid conditions.¹⁶⁷

One other factor should be noted. Leighton listed invertebrates found at several localities in the Elm Creek Silts.¹⁶⁸ Albritton and Bryan listed invertebrate types in the Neville formation found at numerous localities.¹⁶⁹ *Heliosoma tenue* (Phillipsi) is found in the Elm Creek Silts. In the Big Bend it is reported only from the Calamity formation. *Succinea grosvenori* Lea occurs in both the Neville and Calamity formations, and in the Elm Creek Silts. *Gastrocopta procera duplicata* (Sterk) is found in the Neville formation in the Big Bend; *Gastrocopta procera* (Gould) is noted in the Elm Creek Silts. Since we lack comparable data from the Durst Silts, the meaning of this is not clear. Under any circumstances, as Albritton and Bryan have pointed out, "any inferences that might be drawn from this would be unreliable, for molluscs of the region, living or embedded in alluvium, have not been sufficiently studied to warrant generalizations on their stratigraphical ranges or geographical distributions."¹⁷⁰

In summary, the late Quaternary stratigraphy of the two adjoining regions is characterized by close similarity in sequence of deposition and erosion (and by inference in sequence of climatic fluctuations), in lithology of strata in similar stratigraphic positions, in physiographic relationship, and, with one exception, in the faunas of stratigraphically equivalent beds. The lower formation in both regions lies on bedrock; the upper formation in both regions seems to have been deposited up to very recent times, possibly to the present day. The exception noted is the reported occurrence of mammoth remains in the Elm Creek Silts as opposed to a complete absence of mammoth remains in the corresponding level in the Big Bend. Were it not for this exception there would be little objection to correlation of the sequences on geologic evidence alone. This exception, therefore, requires a thorough review.

A careful check of the literature reveals only two instances of reported association of mammoth remains with the Elm Creek Silts. Cyrus N. Ray reported discovering three teeth of a mammoth "In **about** the middle of the section above the midline."¹⁷¹ Leighton correlates the stratum in which Ray reports having found the teeth with the Elm Creek Silts, apparently on the basis of the resemblance of one humus layer there to those in the Elm Creek Silts, and from its position in the stratigraphy. A close examination of the site photographs and sections

167.

Ibid., pp. 30, 34-35.

168.

Ibid., pp. 21, 31.

169.

Albritton and Bryan, *op. cit.*, 1939, pp. 1432, 1438, 1444, 1447, 1449-50.

170.

Ibid., p. 1432.

171.

Leighton, *op. cit.*, 1936, p. 27; also see Plate V, p. 15, and description, p. 14. The italics are the present writer's.

reveals that the stratum is certainly not a typical exposure of the Elm Creek Silts. Only one humus zone is noted in the mammoth-bearing layer. The material itself is a **pebbly silt with a heavy charge of caliche**. Leighton remarks, in comparing another site with this one (Station 12), "At Station 13 . . . the south wall exposes horizontal thick beds of Elm Creek Silts with dark humus tops like those along Elm Creek. . . . **These silts differ strikingly from those at Station 12** (the mammoth sites) **in having no caliche** and also in being finer with sparse small pebbles; yet the prominent humus band is at the same horizon" (the italics are the present writers').¹⁷² He then attempts to explain this "striking difference" by an especial hypothesis. Under the circumstances, evidence that the mammoth was associated with the Elm Creek Silts at this site is certainly not conclusive; possibly as good a case could be made for the identification of the deposits as Durst Silts, especially in view of the known association of the mammoth with the latter formation.

The second reported association of mammoth remains with the Elm Creek Silts is as follows: "An articulated mammoth is reported by Mr. Sayles to have been found in a silt horizon about 60 feet from the north end of the exposure and about 12 feet to 15 feet below the top."¹⁷³ The deposits here form a terrace remnant. The description, as in the previous case, is certainly not that of the typical Elm Creek Silts. Leighton, indeed, qualifies his identification of them as such with a question mark, and further remarks in the text that they are "**provisionally** correlated" with the Elm Creek Silts. The materials consist of "horizontally inter-bedded gravels and silts, overlying 14 feet of sandstone at the base. The silts are pinkish and pebbly. The silt layers contain sand lenses. The pebbles in the gravel are rather poorly rounded. Some of the gravel is cross-bedded and contains some limestone boulders up to two feet in diameter."¹⁷⁴ Since no other formations are represented in this isolated terrace fragment, the correlation of it with the Elm Creek Silts obviously depends on lithological resemblance alone, yet from the descriptions there is very little similarity. As before, the presence of mammoth remains in a doubtful deposit of this nature might better indicate that the deposit is of Durst age because of the faunal correlation, rather than prove that the mammoth is of Elm Creek age.¹⁷⁵

172.

Loc. cit.

173.

Ibid., p. 31.

174.

Ibid., p. 30. Compare this description with that of the Elm Creek at the type locality (p. 17). The italics are the present writers'.

175.

It was from this site that *Gastrocopta procera* and *Succinea grosvenori* were reported. It will be recalled that the former species occurred **only** in the Neville formation in the Big Bend, and that the latter was found in both Neville and Calamity formations.

That Gladwin is in doubt as to the association of mammoth and Elm Creek Silts is indicated in his discussion of the Abilene finds in Volume II of "Excavations at Snaketown."¹⁷⁶ He mentions that the Imperial Mammoth has been associated with the Durst Silts, but pointedly refrains from discussing the problem of Elm Creek Silts faunal associations, though such an association would have been distinctly to his advantage.¹⁷⁷

In summary, there are only two doubtful associations of mammoth and Elm Creek Silts recorded in the literature. In neither case were the bones viewed *in situ* by a trained geologist, nor are detailed reports of the finds available. In both cases there was considerable doubt as to whether the deposits themselves were Elm Creek in age. Conversely, no extinct types have been found in definite Elm Creek Silts, but instead a commonplace assortment of modern types of fauna. To anticipate somewhat, Sayles correlates his Abilene Culture with the Elm Creek Silts.¹⁷⁸ Large midden sites of related cultures have been excavated and produced only modern fauna. Significantly, where mammoth remains have been viewed *in situ* by trained geologists they were found to be in the Durst Silts.¹⁷⁹ The evidence is against, rather than for, the association of the mammoth or other extinct fauna with the Elm Creek Silts. Certainly the burden of proof lies with those who maintain that the association exists, and until such time as proof is produced, the mammoth may be regarded as associated with the Durst Silts, and with them alone, in the Abilene region.

There is thus little if any geological evidence against the correlation of the Big Bend and Abilene sequences, and much evidence for it. Kelley and Ezell, starting near Albany, Texas, in the fall of 1939, examined numerous *arroyos* between there and Alpine in the Big Bend. The Abilene alluvial stratigraphy could be easily traced from *arroyo* to *arroyo* over short exposures as the party journeyed southwestward. Near Barnhart, Texas, on the upper tributaries of the Concho River, deep *arroyo* cuts and thick alluvial deposits ceased to occur. The only difference in sediments between this point and the type localities near Abilene was that their reddish color became less pronounced and they grew progressively thinner. The last deep site, apparently of the Abilene Culture (Sayles), though no diagnostic artifacts were located *in situ*, was found near San Angelo. From Barnhart to the Pecos River, a distance of some eighty miles, no *arroyo* cuts were found. Deposits exposed in deep cuts of the Pecos River will need considerable study. In part at

176.

Op. cit., 1937.

177.

Ibid., p. 31.

178.

In Leighton, *op. cit.*, 1936, pp. 36-39, Figures 4 and 5.

179.

Kirk Bryan, *op. cit.*, 1938a.

least, however, they continue the Abilene sequence and are closely related to that of the Big Bend. Archaeological sites (Texas Ub 4:1, Ub 4:2) eroding from this alluvium have already been described. West of the Pecos River deep sites of typical Big Bend stratigraphy and archaeologic cultures are almost immediately encountered and continue westward into the heart of the region.

Thus similarity in lithology, stratigraphy, faunal associations, and physiographic relationships evidence a close geological correlation between the Quaternary stratigraphy of West Central Texas and the Big Bend region. Actual tracing of deposits across much of the intervening area seems to indicate that this close resemblance is more than coincidence. However, the most outstanding factor in both areas is the occurrence of archaeologic remains with the geologic deposits. There remains to be considered the archaeological evidence for and against this correlation.

The first division of this problem is obviously a survey of Central Texas archaeology. Despite numerous published descriptions and discussions, there is a dearth of detailed reports, much confusion in terminology and classifications, and a general lack of integration in Texas archaeology. Nevertheless by carefully studying the literature, it is possible to arrange the facts into a fairly consistent picture.

A grouping of the various cultures into three basic blocks or horizons seems possible. These major classes are:

1. The Folsom-Yuma (Great Plains Pattern?) block.
2. The Central Texas block.
3. The South Plains block (affiliations with Mississippi Pattern?).

The Folsom-Yuma block needs no further characterization. The Central Texas block is essentially the "Central Texas Stem" of Sayles,¹⁸⁰ and the Texas Kitchen Midden Culture, lower and middle levels of Pearce.¹⁸¹ This block can be characterized as a "heavy" flint culture, in which percussion chipped artifacts predominate. Large, relatively heavy projectile points, scrapers, "gouges" and first axes are typical artifacts. Flexed burials in mounds or stone cist graves seem to be characteristic. The hyperdolichocephals described by Hooton¹⁸² and others possibly represent the dominant physical type. Cultural sub-divisions of this block have been made by several workers. Since their terminology is somewhat different, an approximate correlation is given below.

180.

Op. cit., p. 124, Table 13.

181.

J. E. Pearce, "The Present Status of Texas Archeology," *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 4, September, 1932.

182.

Earnest A. Hooton, "Notes on Five Texas Crania," *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 5, September, 1933.

Ray ¹⁸³	Sayles ¹⁸⁴	Gladwin ¹⁸⁵	Pearce ¹⁸⁶
?	Edwards Plateau—?	?	
	?	Menard (?)	Upper Level
	Brazos River 1	Brazos River	
?	Round Rock	Guadalupe River	
	Guadalupe River	Round Rock	Middle Level
Clear Fork			Bottom Level
Abilene	Abilene	Abilene	?

It is possible that the Abilene Branch of Sayles and Gladwin is sufficiently broad to include the Abilene Culture of Ray.¹⁸⁷ This may also apply to the Bottom Level Culture of Pearce. According to Sayles (1935), Pearce's Bottom Level is a late stage of his Abilene Branch and an early stage of his Edwards Plateau Culture, while Pearce's Middle Level includes his Round Rock and Guadalupe River groups.¹⁸⁸ Judging from illustrations, the Menard Stage of Gladwin is also included in

183.

Cyrus N. Ray, "A Differentiation of the Prehistoric Cultures of the Abilene Section," **Bulletin of the Texas Archeological and Paleontological Society**, Vol. 1, September, 1929c.

—"Flint Cultures of Ancient Man in Texas," **Ibid.**, Vol. 6, 1934a.

—"New Evidences of Ancient Man in Texas," **Ibid.**, Vol. 10, 1938b.

—**Op. cit.**, 1938a.

184.

E. B. Sayles, **op. cit.**, 1935, pp. 41-53, Plates IX-XIV; Tables 4, 9, 13; Maps A, B, C, D.

185.

Gladwin, **op. cit.**, 1937, pp. 31-37; Plates II, V, VI-IX; Map 2.

186.

Pearce, **op. cit.**, 1932.

187.

Ray does not actually use the term "Abilene Culture," since he has only a few projectile points and miscellaneous chipped artifacts; he does call the projectile points "Abilene points" and implies that this is to be considered the "Abilene Culture."

188.

Sayles, **op. cit.**, p. 53, footnote.

this level. In his Brazos River Branch, Sayles illustrated two radically different types of projectile points.¹⁸⁹ In the Gladwin revision only one of these point complexes is retained (here termed Brazos River I) as the Brazos River Stage.¹⁹⁰ The second complex (Brazos River II), which is apparently the "Sand Dune Culture Complex" of Ray,¹⁹¹ is not noted in the revision. The late Edwards Plateau culture of the 1935 classification is likewise not mentioned. Both of the latter groups may be included in Pearce's Upper Level.

The South Plains block has been classified as follows:

Ray ¹⁹²	Sayles ¹⁹³	Pearce ¹⁹⁴
Small Scraper Culture (Pottery Complex Artifacts)	Wichita Phase	Upper Level
Sand Dune Culture Complex	Brazos River (II)	Upper Level

Characteristic artifacts of this block are finely made flake projectile points; triangular points with side and base notches, elongated thin blades with carefully worked stems, finely chipped barbs, often serrated edges. Pressure chipping is the general rule. The Wichita Phase, at least, includes carefully worked blades, snub-nosed scrapers, side scrapers, and flake knives, double-bevel diamond-shaped knives, and pottery.

189.

Ibid., Plate XI, p. 44. Brazos River I-A, a-c; Brazos River II-A, f-k.

190.

Gladwin, *loc. cit.*, 1937.

191.

Cyrus N. Ray, "Some Comments on Sayles Survey," (Reviews, Reports, and Editorials) *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 8, 1936b, pp. 180-184.

192.

Cyrus N. Ray, *op. cit.*, 1929c, "The Pottery Complex Artifacts of the Abilene Region," *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 7, 1935a.

—*Op. cit.*, 1936b, "Some Unusual Cremated Burials Found Near Colorado, Texas," *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 8, 1936a.

—"Some Unusual Abilene Region Burials," *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 2, 1939b.

193.

Op. cit., 1935, pp. 47-52, 85-90; Tables 7, 9, 12; Plates XI, (A, f-k is Brazos River II of this isolation, Ray's "Sand Dune Culture"), XXII, XXIV, and Map E.

194.

Pearce, *op. cit.*, 1932.

Grinding stones, predominantly single-handed manos and oval bowl metates, are apparently found throughout the Central Texas and South Plains blocks, with the possible exception of the Abilene Culture (Ray) and the Clear Fork Culture.

Out of the classifications listed above we have selected, by purely arbitrary means, the following for use hereafter in this report: Abilene Culture (Ray), Clear Fork Culture (Ray); Round Rock, Guadalupe River, Edwards Plateau (Sayles); Brazos River (Sayles and Gladwin (Brazos River II); Sand Dune Culture (Ray) and Wichita Phase (Sayles). The two last-named terms are used under protest.¹⁹⁵ This classification and selection is not proposed for general adoption, though it could be fitted rather well into either the McKern or Gladwin taxonomic system. It is simply a device here adopted to clarify the data and terminology to the extent that it can be utilized for the following discussions.¹⁹⁶

The general chronology of the "blocks" or horizons listed above, as well as that of the more detailed subdivisions, is somewhat disputed by the workers in the field. Practically all agree that the Wichita Phase, at least, is quite recent. Both Ray and Sayles have felt that the Sand Dune Culture was fairly ancient, but Ray has revised his opinion upon discovering an iron button with a cremated burial of that culture.¹⁹⁷ Both Ray¹⁹⁸ and Sayles¹⁹⁹ are of the opinion that certain phases of the Central Texas block, the Abilene and Clear Fork Cultures, are as old as or older than Folsom-Yuma. Ray's recent finds seem to show, as will be pointed out below, that his Abilene Culture may have overlapped Folsom-Yuma. E. H. Sellards has recently found Folsom-Yuma material

195.

The use of the term "Sand Dune" in Ray's designation is undesirable. Many of the Texas collectors have their own local "sand dune" cultures, and much confusion must of a necessity result. The use of "Wichita" in Sayles' terminology is equally undesirable. It is highly probable that some of the artifacts described under this classification were left by the Wichita Indians, but certainly not all of them. Until definite associations are demonstrated, ethnological terms should not be applied to archaeological cultures. Designation of a culture by one of its artifacts, as in Ray's "Small Scraper Culture," is also to be avoided. The shorter term of the two, the "Wichita Phase," is here used with reservations.

196.

The writers here wish to state clearly that they do not in any way desire to leave the impression that they are utilizing their own field researches in the above classifications. The material used is derived from the literature alone, and all credit and responsibility remains with the original workers. We are responsible for the present classification alone, with the qualifications listed in the preceding footnote.

197.

Ray, *op. cit.*, 1936a, pp. 12-15.

198.

Cyrus N. Ray, "Folsom Sites" (Editorial), *Bulletin of the Texas Archaeological and Paleontological Society*, Vol. 7, 1935b, pp. 127-128.

199.

Sayles, *op. cit.*, 1935, Table 13. Also see Gladwin, *op. cit.*, 1937, pp. 34-37, Plates VIII, IX.

associated with heavy stemmed projectile points, suggesting a similar overlap. Since other finds show that this block overlapped the South Plains block at the upper end of the scale, we apparently have the sequence of Folsom-Yuma (?), Folsom-Yuma-Central Texas block (?), Central Texas block, Central Texas block-South Plains block, and South Plains block. (?)

There is a marked similarity in the archaeological cultures of the Big Bend region and those of Central Texas. In the Big Bend the earlier cultures, Maravillas complex, Santiago complex, and Red Bluff complex, Pecos River focus, and probably the Chisos focus, were thought to form a broad block of related cultures. The gross characteristics of this block are practically identical with those of the Central Texas block. If we make a comparison on the basis of cultural items available in the latter block, there is no important reason why the two should not be grouped together. If the comparison is made on the basis of Big Bend trait-lists, the correlation is more difficult, since the Big Bend lists include many artifacts of a perishable nature for which there is no comparable material in Central Texas. Aside from the gross resemblance between the blocks, there are detailed resemblances.

There is no good equivalent in the Big Bend of the Abilene and Clear Fork Cultures of Central Texas. Similarly, there are no apparent equivalents in Central Texas of the Maravillas and Santiago complexes, principally because of the handicap of a small series from those complexes for comparison. The relation of the Red Bluff complex to Central Texas cultures was discussed in detail in the description of that complex. Basically, until we learn more about it, its relations are too nebulous to be of much aid here. In the Pecos River focus, however, we find good typological affinities with the Round Rock-Guadalupe River cultures of Sayles, and possibly with the latter part of the Clear Fork complex. Not only is the diagnostic projectile point type of the Pecos River focus typologically similar to that of the Round Rock-Guadalupe River group, but the minor types present in both groups are very nearly identical.²⁰⁰ Certain other artifacts show less detailed resemblances, for example, mano and metate types. In discussing the relation of the Pecos River focus to the Central Texas group, Jackson and Pearce quote Sidney J. Thomas, who made the detailed studies:

"... The abundance of fine work of the flint artifacts at Fate Bell Shelter (Pecos River focus) parallel the corresponding finds of Central Texas. A majority of the types at this shelter are similar to what is found in the Central Texas area, but there is not as much identity as we had expected.

"... Projectile points similar to types Nos. 7 and 8 in Plate XIIa are found in the bottom levels (Clear Fork Culture ?); points like

²⁰⁰.

Compare illustrations of projectile points in Pearce and Jackson, 1933 (*op. cit.*, Plate XII), Holden, 1937 (*op. cit.*, Plate 8, A, 1-12), with Pearce (*op. cit.*, 1932, Plate 10), and numerous illustrations in A. T. Jackson, *op. cit.*, 1938; 1939 *op. cit.*, Plates 44, 47, and 48.

type 6 in the middle levels (Round Rock, Guadalupe River); and other points similar to type 2 and 5 in the top levels (Upper Level) (Edwards Plateau Culture ?) of the burnt rock mounds of Central Texas.

". . . Fist axes of both regions are very much alike but show finer workmanship in Central Texas.

". . . Although the inhabitants of Fate Bell Shelter may not have been closely related culturally to the early Indians of Central Texas, there is considerable evidence of culture contact."²⁰¹

Pearce and Jackson summarize this in their own conclusions:

"Of particular interest is an unmistakable resemblance of certain culture traits of Val Verde County with traits in the burnt rock mound (Central Texas block) region of Central Texas."²⁰²

Sayles points out that Clear Fork gouges (given as concave base core scrapers) occur in the Pecos River Cave Dweller (focus)²⁰³

In addition to typological affinities, there seem to be actual Round Rock-Guadalupe River intrusives in Pecos River focus sites. Patterson has described a highly specialized artifact, the corner-tang knife, which is found in Central Texas.²⁰⁴ Although distributional figures indicate the presence of sub-centers in regions to the north and east of Texas, the high concentration of the artifact in Central Texas,²⁰⁵ approximately in the Round Rock-Guadalupe River area as shown by Sayles,²⁰⁶ indicates that as far as Texas is concerned the hearth area is there. Patterson noted that corner-tangs occurred in the "middle level" (Round Rock-Guadalupe River) of the burnt rock mounds (Central Texas block).²⁰⁷ Judging from the associated projectile point complexes, Jackson found corner-tang knives in the same cultural complex at Sites 2 and 3, San Saba and Llano counties.²⁰⁸ In his recent work in a deeply buried site in Travis County, Jackson found corner-tang knives at depths of 14 and 15 feet.²⁰⁹ The

201.

Thomas, in Pearce and Jackson, *op. cit.*, 1933, pp. 140, 141.

202.

Ibid., p. 141.

203.

Sayles, *op. cit.*, 1935, Table 6.

204.

J. T. Patterson, "The Corner-Tang Flint Artifacts of Texas," *Anthropological Papers*, Vol. I, No. 4, The University of Texas, Austin, 1936.

205.

J. T. Patterson, "Supplementary Notes on the Corner-Tang Artifacts," *Anthropological Papers*, Vol. I, No. 5, (3), The University of Texas, Austin, 1937. See map on Page 38.

206.

Sayles, *op. cit.*, 1935, Map D.

207.

Patterson, *op. cit.*, 1936, p. 25.

208.

Jackson, *op. cit.*, 1938. See Plate XVII, 3, discussion on pp. 93, 97. Compare Fig. 21, p. 94, with Figs. 11 and 13.

209.

Jackson, *op. cit.*, 1939, p. 211, Plate 47, 2. These finds are exceedingly important, since we believe the deposits to be susceptible of correlation with the Abilene geological sequence.

projectile point complex again is that of the Round Rock-Guadalupe River cultures. This artifact does not seem especially plentiful in individual sites, but the evidence for its assignment to the Round Rock-Guadalupe River complexes, probably the latter, seems conclusive.

In the Big Bend region corner-tang knives are rare. Patterson lists only two in his last distribution map. In the Pecos River focus hearth area Patterson shows no occurrences of the artifacts except in Val Verde County, where a high total of ten specimens is noted.²¹⁰ Since Val Verde County immediately adjoins the postulated hearth area of the artifacts, this is not unexpected. Numbered among the ten are four specimens, two of them corner-tang awls reworked from knives, found in the Pecos River focus deposits of Fate Bell Shelter.²¹¹ Thomas comments on these finds as follows:

"... The limits of the use of the corner-tang awls and knives have been fairly well established in the Central Texas Region; and it was a surprise to find four such specimens in the deposits of Fate Bell Shelter, over two hundred miles to the west of the region of greatest prevalence. The corner-tang awls of both regions clearly show reworking from flint knife blades having a corner-tang."²¹²

Holden reports, however, that no corner-tangs were found at Murrah Cave, another large Pecos River focus component, although 190 whole knives and many broken ones were recovered.²¹³ None of the Pecos River focus components in the Big Bend has yielded corner-tangs. These facts, taken into consideration with the negative evidence of the distribution, may indicate rather conclusively that the corner-tang knife is not a trait of the Pecos River focus and that the Fate Bell Shelter specimens are actually intrusive from the Round Rock-Guadalupe River cultures in Central Texas.

Among projectile points listed by Pearce and Jackson as eccentric specimens are several which may likewise be Central Texas intrusives into the Pecos River focus.²¹⁴ They illustrate what appears to be a very good example of one of the Clear Fork complex diagnostic points, Ray's type I.²¹⁵ Another specimen resembles closely the typical Sand Dune Culture projectile points, though it lacks the serrations of many such specimens. In Murrah Cave Holden found five projectile points that

210.

Patterson, *op. cit.*, 1937, Map, p. 38.

211.

Pearce and Jackson, *op. cit.*, 1933, Plate X. Also see pp. 47, 77, 140.

212.

Ibid., p. 140.

213.

Holden, *op. cit.*, 1937, p. 54.

214.

Pearce and Jackson, *op. cit.*, 1933, Plate XII, extreme right.

215.

Ray, *op. cit.*, 1938a. Plate 25, 1, third from right, top row.

resemble Ray's Clear Fork Culture type I rather closely.²¹⁶ Holden's types 13, 14, and 16, Plate 8, belong either to the Livermore-Bravo Valley block in the Big Bend, or to the South Plains block in Central Texas. These specimens, however, represented less than .04% of all whole projectile points. Their occurrence may indicate that the Pecos River focus at Murrah Cave overlapped the later culture horizon represented by these types.²¹⁷

The late Edwards Plateau Culture (Sayles, 1933) shows close relationship with the Chisos focus in the Big Bend. Sayles has demonstrated the outstanding resemblances in Plate XIX of his survey report.²¹⁸ However, the point at h which he identifies as a Pecos River focus type is a close approach to our diagnostic Chisos focus (Sayles' "Big Bend Cave Dweller"). This can be seen very clearly by comparing the late Edwards Plateau projectile points which he illustrates in Plate XII of his report with those shown in text Figure 2 of this report. Likewise, the hand axe type which he shows at e as typical of the Big Bend Cave Dweller (Chisos focus) is actually very rare in the Big Bend. The only specimen known to the writers (the specimen shown by Sayles) was found by Victor J. Smith at Carved Rock Shelter near Alpine, associated with the projectile points of the late Pecos River focus, rather than the Chisos focus.²¹⁹ We are inclined to consider it as an intrusive specimen from the Central Texas block. Similarly, the pitted mano which

216.

Holden, *op. cit.*, 1937, Plate 8, A 7 and 8; Page 54. table.

217.

Holden notes that he found no stratigraphic distribution of types, but rather a geographic distribution, some 50 percent of all projectile points coming from within two feet of the walls (*Ibid.*, p. 54). As Sayles has pointed out (review, *American Antiquity*, Vol. IV, No. 2, October, 1938, p. 177), Holden worked the cave in three stratigraphic levels running over the entire surface of the debris, and thus probably cross-cut his cultural strata. At Alpine 2:7 stratigraphic methods allowing for both vertical and horizontal distribution of specimens revealed two occupations of the cave. Pecos River focus debris, representing the original occupation, had either accumulated against the walls and back of the cave or had been thrown there during cleaning of the cave by the second inhabitants. In the center and toward the mouth of the cave the deposits were of the Livermore and Chisos foci complexes, representing a later occupation. Where artifacts of the two occupations occurred in the same area the latter overlay the former. Stratigraphic methods similar to those employed by Holden at Murrah Cave would give results approaching closely Holden's if applied to Alpine 2:7, as can be demonstrated by a regrouping of the artifacts from that site. I am inclined to believe that the situation at Murrah Cave was similar to that at Alpine 2:7 and that the small fine points found by Holden represent a later occupation than the Pecos River focus.—J. C. Kelley.

218.

Sayles, *op. cit.*, 1933.

219.

Victor J. Smith, "Carved Rock Shelter," *Bulletin of the Texas Archaeological and Paleontological Society*, Vol. 10, 1938; see Plate 30, 2, specimen 179. A Livermore point is seen at second from left in top row; Pecos River points in bottom row.

Sayles illustrates at g in the same plate occurs with the Chisos focus as well as the Pecos River focus.²²⁰

Summarizing, there seems to be very good evidence for the more or less contemporary existence of the Pecos River focus and the Round Rock-Guadalupe River cultures. There is less trustworthy evidence that the Pecos River focus overlapped the Clear Fork Culture²²¹ at the other end. There is, however, good evidence for the close relationship of the late Edwards Plateau Culture and the Chisos focus.

The relationship of the South Plains block in Central Texas and the Livermore-Bravo Valley block in the Big Bend is so close that there can be little reason for separating them. Resemblances are only superficial between the Livermore focus and the Sand Dune Culture as far as our present data extends, but there exist detailed similarities between the Wichita Phase of Central Texas and the Bravo Valley aspect of the Big Bend.

The variation in projectile point types between the Wichita Phase and the Bravo Valley aspect is so slight as to render exceedingly difficult any attempt at separating mixed lots of the two complexes. Both major and minor types of one group are present in the other. Finely made snub-nose scrapers are typical of both complexes. The double-bevel four-edged knife is characteristic of the Wichita Phase; it occasionally occurs in Bravo Valley aspect sites. Both are pottery-making cultures. Shell-tempered (?) red wares of Wichita origin and engraved black and gray wares of Caddo or Hasinai origin have been found as intrusives in a site of the Concepcion focus, Bravo Valley aspect, near Presidio, Texas.²²² As a matter of fact, the current theory of the origin of the Bravo Valley aspect is that it was evolved by certain Plains groups (ancestral Wichita ?) under strong Southwestern influence (Anasazi-Mogollon). Added to the strong archaeological evidence for close relationship

220.

We wish to make it clear that we are not attempting to discredit Sayles' data, in which we have the greatest faith, but only that we are adding supplementary data.

221.

A comparison of Ray's type 2 Clear Fork Culture projectile point (Ray, *op. cit.*, 1938a, Plate 25, 1, third and fourth rows from left) with the type illustrated by Gladwin as diagnostic of the Round Rock stage (Gladwin, *op. cit.*, Plate V) indicates that Ray's Clear Fork Culture may actually include the Round Rock culture, Jackson (*op. cit.*, 1938, Plate XVI, 1) also illustrates points of this type. It is entirely possible that Ray's Clear Fork Culture dart type 1, and his Abilene points are one and the same type; that his Abilene culture and Sayles' Abilene culture are identical; and that Ray's Clear Fork Culture proper is the Round Rock stage of Gladwin (and Sayles).

222.

Shafter 7:3, excavated by Kelley, 1939. Reported in Kelley and Lehmer, report in preparation, 1939. The identification of Wichita pottery mentioned was by Sayles; of Caddo-Hasinai ware by Sayles and by F. M. Setzler of the U. S. National Museum.

and contemporaneous existence of the two groups, there is ample documentary evidence for their historical contemporaneity.

The Folsom-Yuma block has not been reported from the Big Bend area. Folsom points have been noted by Kelley in collections from Toyah Creek west of the Pecos River and at the northern end of the Big Bend, but none have been found in the Big Bend proper.

In addition to detailed typological relationship and specific cross associations of artifacts, there is an identity of sequences between the two areas. In the Big Bend the block of cultures corresponding to the Central Texas block overlaps at its top the block corresponding to the South Plains block, even as the Central Texas block overlaps at its top the South Plains block in Central Texas. In Central Texas the Central Texas block is overlapped at the bottom by the apparently older Folsom-Yuma block; in the Big Bend there is no culture older than the Central Texas block, although mammoth remains, which in Central Texas are associated with the earlier Folsom-Yuma complexes, occur stratigraphically just below the former block in the general stratigraphy.

Summarizing the above discussions, we have the table given below, though not all the correlations are well established. Most recent complexes are at the top.

Central Texas	Big Bend
Wichita Phase	Bravo Valley aspect
Sand Dune Culture	Livermore focus
Edward Plateau Culture (late)	Chisos focus
Guadalupe River-Round Rock ?	Pecos River focus
Round Rock-Guadalupe River	Pecos River focus
Clear Fork complex	Pecos River focus ?
Clear Fork complex	Maravillas, Santiago, etc. ?
Abilene-Folsom	(None ?)

A re-statement of our problem and objectives is necessary at this point. We have correlated Big Bend archaeology with Big Bend geological stratigraphy. We have tentatively correlated the Big Bend geological stratigraphy with that of Central Texas. We have tentatively correlated the Big Bend and Central Texas archaeological sequences by archaeological methods. We have used essentially different lines of evidence in each correlation. Our immediate problem is now to correlate Central Texas archaeology with Central Texas geological stratigraphy. The extent to which the archaeological and geological correlations then agree will reflect on the accuracy or inaccuracy of the inter-areal geological and archaeological correlations derived independently by the methods of the

two sciences. The correlation of the geological and archaeological sequences of the two areas is our objective.

Interpreting our conclusions to the present we may examine Central Texas archaeological-geological correlations with the expectation of finding the following association:

(Unnamed flood plain silts)	Wichita Phase and late Edwards Plateau (?)
(Erosional disconformity)	Sand Dune Culture (?), late Edwards Plateau, late Round Rock-Guadalupe River
Upper Elm Creek Silts	Round Rock-Guadalupe River
Lower Elm Creek Silts	Clear Fork Culture
(Erosional disconformity)	?
Durst Silts	Abilene Culture-Folsom-Yuma Culture

Unfortunately the correlation of the Central Texas archaeological sequence with the geologic sequence is beset with difficulties. A small series of actual inclusions of artifacts in alluvial deposits is available. From the literature we deduce that artifacts of the Folsom-Yuma, Abilene, Clear Fork, Wichita, and Sand Dune complexes have been found *in situ* in alluvium in the vicinity of Abilene.

In 1925, Harold J. Cook reported the discovery of finely chipped spear points associated with extinct bison, horse, and camel in alluvial deposits near Colorado, Texas, in the Abilene region. According to Cook²²³ the artifacts and associated fauna were included in cemented gravels covered by 5 to 7 feet of cemented gravels and sands. The cementing material was caliche, which was highly developed in this formation. Above this lay a "disturbed bed," and over that several feet of sands, silts, and soils. This stratification could be traced for long distances along Wolf Creek.

With the knowledge which we possess today, identification of the various strata represented is quite simple. In the Abilene area, as we have previously seen, gravel and sands with high caliche content and containing extinct fauna of this type are included in the Durst Silts. The disturbed layer lying above this is probably the erosional disconformity separating the Durst Silts from the overlying "reworked sands, silts and soils," which obviously represent the Elm Creek formation, probably the unnamed flood plain silts as well.

²²³.

Cook, *op. cit.*, 1925.

The artifacts have been classed as Type 1 Yuma points by Renaud,²²⁴ an identification apparently borne out by Cook's first description of the points. We thus have in the Abilene region an authentic association of Yuma points with the Durst Silts, or their equivalent.

In 1938, Kirk Bryan and Cyrus N. Ray reported the discovery of a Folsomoid (long channeled) point associated with bones of *Elephas columbi* in alluvial deposits near Abilene, and nearby a Yuma point in the same alluvium.²²⁵ Albritton and Bryan have tentatively correlated this alluvium with the Durst Silts.²²⁶ From Bryan and Ray's (Cyrus N.) description of the alluvium, "... gravel ... fine-grained red alluvium ... hard and compact with limey concretions ... overlies bedrock. ..." this correlation certainly seems justified. Here again we have evidence of the association of Folsom-Yuma culture with Durst Silts.

In 1930, Ray discovered buried hearths at a depth of 24½ feet in alluvium and beneath a calichified gravel layer. Here were found projectile points which he later named "Abilene points."²²⁷ In 1938, Bryan identified the stratum in which the artifacts were found as the Durst Silts; about 1500 yards upstream Bryan confirmed the presence of mammoth remains in the same formation. At another of Ray's sites an Abilene point was found *in situ* in the Durst Silts, identified as such by Bryan.²²⁸ There is thus good evidence for the inclusion of Ray's Abilene Culture in the Durst Silts. In the Abilene region, therefore, both the Abilene Culture of the Central Texas block and the Folsom-Yuma block may be correlated with the Durst Silts.

As Ray pointed out,²²⁹ correlation of the Clear Fork Culture with the alluvial stratigraphy is difficult. Most of Ray's sites occur in mountain valleys where he finds them mixed with other complexes, including Folsom-Yuma, on old eroded surfaces. It was at one such site that Bryan and Ray (Cyrus N.) noted the presence of a Folsomoid point *in situ* with mammoth bones in the lowest stratum, which has been correlated by Albritton and Bryan and by the present writers with

224.

E. B. Renaud, **The First Thousand Yuma-Folsom Artifacts**, University of Denver, 1934, p. 1, and Plate 1.

225.

Kirk Bryan and Cyrus N. Ray, "Long Channeled Point Found in Alluvium Besides Bones of *Elephas Columbi*," **Bulletin of the Texas Archeological and Paleontological Society**, Vol. 10, 1938.

226.

Albritton and Bryan, *op. cit.*, 1939, p. 1468.

227.

Cyrus N. Ray, "Report on Some Recent Archeological Researches in the Abilene Section," **Bulletin of the Texas Archeological and Paleontological Society**, Vol. 2, 1930, pp. 50-52, Plate 14, 2, 3, 5, 6, 7, and 10.

228.

Bryan, *op. cit.*, 1938, pp. 273-274, Plate 37.

229.

Ray, *op. cit.*, 1938a, p. 194.

the Durst Silts. Bryan and Ray were of the opinion that the Clear Fork complex here was eroding from a younger alluvium in the same locality.²³⁰ In describing this site in 1930,²³¹ Ray stated that ten to twelve feet of reddish silts and sands overlay gravels into which the gully had just cut. He noted that hearths and flint chips occurred in the bank at a depth of several feet from the original surface. Since it was in the underlying gravel beds that the Folsomoid point was later found, it would appear that these hearths were stratigraphically higher than the Folsom layer and in the younger alluvium described by Bryan and Ray in 1938. The Clear Fork complex on the eroded surfaces was probably derived from these hearths, and the younger alluvium overlying Durst Silts in which they occur would seem to be the Elm Creek Silts, judging from its stratigraphic position.

Sayles states definitely that his Abilene Culture (Ray's Clear Fork gouges and Type 1 Projectile points) occur *in situ* in the Elm Creek Silts.²³² The projectile point type appears to be merely a more sophisticated form of the Abilene points (Ray) from the underlying Durst Silts; typological evidence is thus in accord with stratigraphic. Gladwin, following Sayles, likewise places the Abilene Culture (early Clear Fork Culture) in the Elm Creek Silts.²³³ Since Sayles presents no actual associational details for specific sites, it is impossible to evaluate his statements. In general, the evidence seems to point fairly consistently to the association of the Clear Fork Culture (Abilene, of Sayles) with the Elm Creek Silts, level unknown.

Ray has not described the Round Rock-Guadalupe cultures in the Abilene area, but as previously pointed out, he includes typical Round Rock projectile points (type 2) in his Clear Fork Complex. Manos occur in the Round Rock-Guadalupe stages and Ray has recently noted the occurrence of manos at various depths in the Elm Creek Silts,²³⁴ though they have not been noted in Clear Fork sites. He believes, however, that they also occur in the Abilene Culture (Ray) site in the Durst Silts. Sayles apparently places the "Edwards Plateau Culture" in the upper portion of the Elm Creek Silts.²³⁵ By Edwards Plateau Culture he is re-

230.

Bryan and Ray (Cyrus N.), *op. cit.*, 1938.

231.

Ray, *op. cit.*, 1930a, pp. 45-46.

232.

Sayles in Leighton, *op. cit.*, 1936, pp. 38 and 39, Fig. 5.

233.

Gladwin, *op. cit.*, 1937, p. 31, also Plates VIII, IX.

234.

Cyrus N. Ray, "Is the American Mano of Pleistocene Age?" *Bulletin of the Texas Archeological and Paleontological Society*, Vol 1, 1938c, pp. 251-252, Plate 55.

—"Was the American Mano and Metate an Invention Made During Pleistocene Time?" *Science*, Vol. 91, No. 2356, February 23, 1940, pp. 190-191.

235.

See Fig. 5 in Leighton, *op. cit.*, 1936, p. 39.

ferring to the general culture including Round Rock-Guadalupe River-Menard Stage as used by Gladwin,²³⁶ rather than to the "late Edwards Plateau Culture" of the Texas survey. There is thus some slight evidence for the inclusion of the Round Rock-Guadalupe River cultures in the Elm Creek Silts, probably in the upper part. This evidence is certainly not conclusive; to find more convincing data we will have to move farther south to the work of Jackson in Travis County. It is necessary to continue our survey of the associations in the immediate vicinity of Abilene, however, before turning to Jackson's site.

In 1929, Ray found a finely chipped projectile point at a depth of four feet in alluvium, overlying lower buried cultural levels. This point, as well as another one of somewhat similar type found with burials at a depth of six feet in the alluvium, was classified by Ray as a Sand Dune Culture type.²³⁷ This is our only evidence²³⁸ of the locus of the Sand Dune Culture in the alluvium. Since Ray apparently did not recognize until recently the existence of different formations in the alluvial deposits near Abilene, he has given us no data as to the formation in which his Sand Dune points were found. The relative depth of the post-Elm Creek flood plain silts in the Abilene region appears to average about four to eight feet, judging from the photographs in Leighton's report, and from the writers' own superficial examination of the area. This would place the Sand Dune Culture either in the post-Elm Creek disconformity or in the overlying flood plain silts (supposed Kokernot equivalent). Since Ray reports one instance of the association of historical material with the Sand Dune Culture,²³⁹ the culture apparently lasted into very recent times as well. We conclude on very tenuous evidence that the Sand Dune Culture was probably in existence from the beginning of the post-Elm Creek deposition into modern times.

The place of the Wichita Phase and its typological relatives in the alluvial stratigraphy is easily established. In the fall of 1938, Kelley noted small fine arrow points of Wichita type eroding from surficial gray sand in a site near Albany, Texas. The gray sands rested disconformably on reddish silts with pronounced humic zones. The underlying silts are probably Elm Creek; the sands are post-Elm Creek. In 1932, Ray described a stratified site in western Taylor County. A deeply buried site in valley alluvium contained large, crude, patinated artifacts. Superimposed upon this site and under only a few inches of soil was

236.

Gladwin, *op. cit.*, 1937. See Plates V and I.

237.

Ray, *op. cit.*, 1930a, p. 49, and Plate 14, p. 55, Nos. 11 and 12.

238.

Sayles (*op. cit.*, 1935, p. 47) stated that Brazos River branch sites occurred in alluvial deposits to depths of eight feet. His Brazos River Branch included Ray's Sand Dune Culture. However, he later (Gladwin, *op. cit.*, 1937, Plate VII) omitted the latter culture from his Brazos River Stage, so that it is impossible to determine which division of his old designation it is that occurs to depths of eight feet.

239.

Ray, *op. cit.*, 1936a, pp. 12-15.

another site containing "small bird points, fine drills, thin brown pottery sherds, abundant blue flint keel-backed scrapers . . . flint knives . . . three large shell beads."²⁴⁰ The culture represented is obviously the Wichita Phase; the shallow alluvial covering of the site relative to the deeply covered site below indicates that the site in the post-Elm Creek formation. Elsewhere Ray²⁴¹ notes that sites of this type are either found on the "soil surface" or in plowed fields, hence in the upper portion of the post-Elm Creek formation. That the Wichita Phase was in existence early in the post-Elm Creek deposition is illustrated by an account given by Ray of potsherds found in a hearth several feet deep in a creek bank. Intrusive Pueblo potsherds found by Ray in a Wichita Phase (Pottery Complex) site were dated by Mera at between 1400 to 1700 A. D.²⁴² Kelley and Lehmer found a typical complex of Wichita Phase artifacts; brown pottery, double-bevel knives, fine "bird points," snub-nose scrapers, etc., eroding from a surficial sand layer, certainly the Kokernot formation, at two sites on the Pecos River near Girvin and Iraan, near the edge of the Big Bend area. All of this indicates without a doubt that the unnamed flood plain silts and sands of the Abilene region contain the Wichita Phase and related cultures; that the same phase occurs in at least two sites to the west in the true Kokernot formation; and that the Bravo Valley aspect which occupies the Kokernot formation in the west is geologically as well as archaeologically contemporary with the Wichita Phase in Central Texas. It is important to emphasize at this point that the evidence is therefore fairly conclusive that the flood plain silts and sands of Central Texas which overlie the Elm Creek Silts are the equivalent of the Kokernot formation in the Big Bend and were deposited over the same period of time as that formation.

Having established the above points, we may turn to Jackson's deep site in Travis County.²⁴³ This site is located in a terrace of the Colorado River near Austin, Texas, some 200 miles southwest of Abilene. Artifacts were found practically throughout the deposits, from a depth of about 29 feet upward. A layer of white sand some two feet thick at the very top of the section was culturally sterile. As a sherd of European pottery was found at the top of the stratum immediately below the white sand, the latter may be labelled a contemporary deposit and dismissed. In a broad view the remaining strata may be divided into three groups. Uppermost, from four feet to twelve feet beneath datum, is a stratum of dark gray sand topped by a black humus layer. This stratum is interrupted by a burnt rock midden from about

240.

Ray, "Archeological Research in Central West Texas," **Bulletin of the Texas Archeological and Paleontological Society**, Vol. 4, 1932, p. 70.

241.

Ray, *op. cit.*, 1935a, p. 75; also see pp. 82-84.

242.

Ibid., p. 85.

243.

Jackson, *op. cit.*, 1939.

eight to ten feet beneath the surface. Judging from the artifact distribution, another small site existed in the humus zone at the top of the gray sand. Beneath the gray sand, from approximately twelve feet to seventeen feet below datum, are alternating strata of gravel and reddish yellow sand. The gravel is culturally sterile, but artifacts, probably washed specimens from an earlier and lower site, were found in the sand layers. Below this, eighteen feet beneath datum, to the bottom of the cut as illustrated, are sand deposits, ranging from massive brown sand at the bottom to gray sand at the top. In the gray sand at the top of this part of the whole and near the top of the brown sand, hearths were found *in situ*, indicating that these were actual occupation levels. As the alluvial deposits of the Colorado River in the Abilene region appear to be similar to those in the Brazos River Valley, we would expect that deposits farther down the Colorado River would also be subject to correlation with the Abilene sequence. Before attempting such a correlation, the archaeological data from the site must be reviewed.

Jackson's illustration of the depth range of projectile points at the site (Plate 44, p. 209) does not fully bring out the archaeological picture. The information is all present, however. A graph constructed from Plate 43 (Composite Cross-Section of Site), Plate 44 (Depth Range of Projectile Points), and his table on page 212 (Distribution of Projectile Points by Types and Strata) clarifies the sequence of events. Projectile point types are seen to cluster about the hearth levels, furnishing further evidence that they are occupational levels. Two cultural groups seem to be present. That represented in pure form in the two lower occupation layers and in mixed form in the overlying burnt rock midden seems to be the Guadalupe River culture with Round Rock admixtures. Projectile point types fit perfectly with this identification; and as previously noted, corner-tang knives correlated with the Round Rock-Guadalupe River stages occur *in situ*. In addition, notched stones, "net sinkers," were found, one at a depth of 27 feet. Sayles listed this type of artifact as one of the distinctive traits of the Guadalupe River stage,²⁴⁴ Jackson's discussion of the relations of the site and its various levels seem to agree in general with this analysis.

In addition to the complex just discussed, artifacts of a culture approximating the Wichita Phase occur in the burnt rock midden in the upper horizon and from there upward to the humus zone at the top of gray sands. In the humus zone was found pottery, including one fragment of European origin. Thus, the Wichita Phase, or an equivalent, occurs throughout the gray sand, mixing with the Guadalupe River culture in the burnt rock midden.

We now have a basis for correlation of the geologic materials. An eight foot layer of gray sand containing Wichita Phase artifacts throughout, culminating in historical materials at its top, and overlying thick

244.

Sayles, *op. cit.*, 1935, Table 9, p. 110. A somewhat similar type is also reported in the Round Rock stage. From Jackson's description the exact type cannot be determined.

alluvial deposits, which themselves contain artifacts and sites of the Central Texas block, must certainly represent the supposed Kokernot formation equivalent of the Abilene region. The alternating layers of sand and gravel lying below this stratum are then in all probability representative of the period of erosion following the Elm Creek deposition; the underlying gray and brown sands accordingly represent the Elm Creek Silts. This technique of correlation savors somewhat of lifting one's self by one's own boot straps, and cannot be conclusive; nevertheless, the steps involved are legitimate ones and the broader correlations thus obtained are in harmony with other conclusions.

Thus, the Guadalupe River culture, and probably the Round Rock are to a certain extent included in the upper Elm Creek Silts and in an equivalent of the Kokernot formation, where they are overlapped by the Wichita Phase. Using our previous conclusions regarding the seriation of the various Central Texas cultures, the older Clear Fork Culture would therefore belong in the lower Elm Creek formation. The late Edwards Plateau Culture and the Brazos River Culture remain unplaced in the geological sequence, nor do we have data regarding them.

A review of our findings to date will indicate that the correlation of the archaeological with the geological stratigraphy of Central Texas is essentially that which our previous correlations along other lines had led us to expect. There are two exceptions to this. The Guadalupe River culture continues into the upper flood plain silts (Kokernot formation), as does the Sand Dune Culture, according to our very slight evidence for its position. Our archaeological correlation led us to believe that they did not survive past the post-Elm Creek disconformity. In general, however, the correlation adds to the strength of our previous conclusions. Although the proof is not complete, it is a fair decision that the geological and archaeological correlations of corresponding sequences in Central Texas and in the Big Bend are sufficiently near proven to serve as acceptable working outlines for further investigation.

Kirk Bryan has recently made a tentative correlation of the Big Bend and Abilene sequences with alluvial sequences in the Zuni River, and in the Rito de los Encinos, New Mexico. In these areas a sequence of deposition and erosion comparable to that of the Big Bend is found. In both areas, in common with the Big Bend, the uppermost formation contains Puebloan remains, the lowest formation Proboscidean bones. Sequences in the Chaco Canyon and on the Galisteo River, New Mexico, are also tentatively correlated. Here the correlation is not so perfect, since the series of events in those two areas is more complicated than in previously mentioned examples.²⁴⁵ The clayey alluvium with lenses of gravel and small limey concretions in which Folsom artifacts were first found at Folsom, New Mexico,²⁴⁶ seems similar to the Neville and Durst

245.

Kirk Bryan, "Stone Cultures Near Cerro Pedernal and Their Geological Antiquity," *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 11, 1939, pp. 37-41, and Table 1.

246.

Kirk Bryan, "Geology of the Folsom Deposits in New Mexico and Colorado," *Early Man*, 1937, p. 141.

formations, in which related artifacts, in the latter case, and similar fauna in both cases, have been found. The other members of the sequence are apparently lacking, however.

Near Grants, New Mexico, Joseph Toulouse and others are studying sites eroding from alluvial sections which are probably comparable to those of the Big Bend. Since artifacts are plentifully represented, this correlation, when it materializes, may be of some value in clarifying the broad archaeological and geological picture of the Southwest.

More recently, Kelley and Herbert Dick, a student in the University of New Mexico, have found in several small tributaries of the Rio Grande near Albuquerque, a sequence which seems to be identical with that of the Big Bend. The series of three mutually disconformable formations is generally present, although highly calcareous compacted clays similar to the Neville formation have been noted only in the upper Coyote Canyon drainage. The sediments in each case have the type characteristics for the comparable formations to the south. This is not unexpected, since both areas lie in the same river drainage and have approximately similar physiographic and climatic conditions. The late alluvium, which is presumably equivalent to the Kokernot formation, in lower Tijeras Canyon, and near San Antonio, New Mexico, east of Albuquerque, incloses Pueblo IV ruins and artifacts, with probably some late Pueblo III materials.²⁴⁷ Kelley found deep, non-pottery sites in an alluvial deposit, presumably equivalent to the Calamity formation, on the Rio Grande near Isleta Pueblo, New Mexico, and Dick has found non-pottery buried sites at several levels in a similar deposit in Coyote Canyon. No artifacts have yet been found in the Coyote Canyon sites, but a crude percussion chipped blade was found in the Isleta site. No mammoth remains have yet been found in the oldest alluvium, which is presumably equivalent to the Neville formation.

Albritton and Bryan have tentatively correlated the Big Bend sequence with the alluvial sequence in Jeddito Valley in Northern Arizona, reported by Hack.²⁴⁸ As in previous examples, the northern Arizona sections included three mutually disconformable formations, indicating a climatic history like that postulated for the Big Bend. The No. 3 fill, presumably equivalent to the Kokernot formation, contained Pueblo pottery dating between 1300 and 1700 A. D. The No. 2 fill, presumed to be the equivalent of the Calamity formation, contains hearths, cultural relationship unknown, and the No. 1 fill, presumably equivalent to the Neville formation, has Proboscidean remains.

247.

Wares collected *in situ* include Rio Grande glaze wares, associated utility wares, Arenal Glaze-polychrome (?), Galisteo Black-on-white, and unidentified Black-on-white and utility wares. The sites probably date between 1200 and 1500 A. D.

248.

Albritton and Bryan, *op. cit.*, 1939, pp. 1469-1473. Also see J. T. Hack, "The Late Quaternary History of Several Valleys of Northern Arizona," *Museum Notes*, Museum of Northern Arizona, Vol. 11, No. 11, pp. 67-73.

In Southern Arizona the staff of Gila Pueblo have been studying a large series of sites included in alluvium. Sayles and Haury have worked out the archaeology, while Ernst Antevs has studied the geology. Antevs has summarized the stratigraphy of the principal site of the Cochise culture, located at Double Adobe in the Sulphur Springs Valley. At the top of a fifteen-foot section are locally laminated yellow silts containing bones of domestic cattle. Lying disconformably below this is a stratum of brown cienega clay, which in its turn rests disconformably on massive and laminated marls. Below the marls are sands lying on the eroded surface of red clays. Mammoth remains occur in the marls, and horse bones mingle with hickory charcoal and artifacts of the Cochise culture in the sands below the marls. Elsewhere in the region artifacts occur in practically every portion of the sequence with the exception of the basal red clays. Antevs interprets the disconformities as periods of erosion resulting from a climatic shift to relatively dry conditions. The basal red clay is thought to indicate a moist or wet period, the marls a wet period, the cienega clays a moist period, and the top silts a slightly moist period. The marls are attributed to the last pluvial period, or to its final stages, dated from 10,000 to 30,000 years ago. Pottery lying between the cienega clay and the laminated yellow silts has been dated by Haury at **circa** 900 to 1100 A. D.²⁴⁹

Provisionally, the Double Adobe section may be correlated with the Big Bend stratigraphy on the basis of similarity in sequence of events, and by included fauna and artifacts. The laminated yellow silts would correspond to the Kokernot formation, the brown cienega clay to the Calamity formation, the mammoth-bearing marls to the Neville formation.²⁵⁰ There is no formation comparable to the basal red clay of the Double Adobe site in the Big Bend stratigraphy. The Cochise post-cienega erosion is dated by included pottery at 900 to 1100 A. D.; the corresponding post-Calamity erosion in the Big Bend included the Livermore focus, thought to have been in existence by 900 A. D.

One other comparison should be made. In Nevada the Southwest Museum excavated Gypsum Cave in 1930. In addition to more recent cultures, an ancient cultural horizon associated with remains of extinct

249.

Summarized from Ernst Antevs, "Climate and Early Man in North America," **Early Man**, 1937, pp. 129-132, Plate VIII and Fig. 17, supplemented by personal knowledge of the writers.

250.

In response to a paper on the Big Bend sequence by Kelley at the last Southwestern Anthropological Conference at Chaco Canyon, New Mexico, in August, 1939, Antevs correlated the Big Bend sequence with the Cochise sequence and with his general climatic history of the Southwest. His correlation was precisely as we have given it here. In May, 1939, E. B. Sayles examined the Maravillas complex artifacts from the post-Neville disconformity, here correlated with the post-marl erosion in the Cochise, and noted typological affinities with the Chiricahua Stage of the Cochise culture. The Chiricahua Stage is associated with the marls, the cienega clays and the intervening erosional epoch.

fauna, including sloth, horse, and camel, was found.²⁵¹ Victor J. Smith has called attention to the similarity of a sub-type of the Pecos River focus dominant projectile point type to dart heads found by Harrington in his oldest cultural horizon.²⁵² Setzler noted that a peculiar type of wrapped-twined basketry found in the Big Bend Cave Dweller culture (Pecos River focus) had been previously reported only from Gypsum Cave.²⁵³ There is thus some resemblance between the two cultures. Harrington interpreted water-washed deposits lying beneath the layer of cultural material and extinct fauna as indicating a moist period, which he identified as the last pluvial period. The ancient cultural material, described in part above, was assigned to a dry period following the pluvial. The ancient culture was tentatively dated by this means at about 10,000 to 13,000 B. C.²⁵⁴

GENERAL CORRELATIONS AND CHRONOLOGY

One conclusion is outstanding from our discussions—there is a striking similarity in the late Quaternary history of widely separated areas in Texas, New Mexico, and Arizona. Although exceptions have been noted, the alternation of three periods of sedimentation with two intervening periods of erosion, and inferentially a corresponding climatic fluctuation of three relatively moist periods separated by two dry intervals seems to prevail throughout. As extinct fauna are associated with beds attributed to the earliest moist period, these deposits may represent the closing phase of the last glaciation, the Pluvial period. Similarly the presence of modern fauna and definitely historic cultural remains in the deposits of the last relatively moist period indicates that it continues into our own time, or has been only recently terminated. As archaeological remains were associated with the last two moist periods, and presumably the intervening dry period, in practically all the areas; and with the oldest period, and probably with the subsequent dry interval in several of the areas, we may utilize this broad correlation for archaeological purposes.

First the archaeological cultures themselves can be correlated. In the Neville equivalent three cultures have been reported. Folsom-Yuma and Abilene in Central Texas, possibly Folsom at the original Folsom

251.

M. R. Harrington, *op. cit.*, 1933.

252.

Smith, *op. cit.*, 1934, p. 101. Compare also the specimens in Plate XX, Fig. 2, especially a, b, and c, of this report with those shown by Harrington (*op. cit.*, 1933) in Figure 19, p. 2.

253.

F. M. Setzler, *op. cit.*, 1935. Victor J. Smith ("The Split Stitch Basket, a Distinguishing Culture Trait of the Big Bend in Texas," *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 7, 1935, pp. 102-103, and Plate 13, No. 158) has also noted this resemblance. Compare Plate 13, No. 158, in Smith's paper with Figs. 22 and 23 in Harrington's report.

254.

Harrington, *op. cit.*, 1933, pp. 166-171.

site, though there is little evidence of geologic correlation there, and the Cochise culture in southern Arizona. The Maravillas complex in the Big Bend and the Chiricahua Stage in southern Arizona have been noted in the dry period following the Neville. Presumably the Abilene Culture continued in existence in Central Texas. In the lower part of the Calamity and its supposed equivalents, the Santiago complex, and possibly the beginnings of the Pecos River focus as well as the Red Bluff complex, occur in the Big Bend; the Chiricahua Stage in southern Arizona, the Clear Fork in Central Texas (?), the Los Encinos Culture in northern New Mexico, and undefined complexes in central New Mexico and northern Arizona. The same comparison holds true for supposed equivalents of the upper Calamity if the Pecos River focus is substituted for the Santiago complex in the Big Bend, and the Round Rock-Guadalupe River (?) cultures for the Clear Fork Complex in Central Texas. All of these cultures seem to be in the same general cultural horizon. In the succeeding dry period in the Big Bend we have the Pecos River focus, the Livermore focus, and the Chisos focus; in Central Texas the Round Rock-Guadalupe River cultures, and probably the Sand Dune and late Edwards Plateau cultures as well. Other cultures appeared in the same interval in southern Arizona, including those of pottery using groups. In general this seems to have been the period when the horizon of fine pressure chipped "arrow points" and other similar stone forms, pottery, and permanent houses first appeared. Unfortunately we have no data in New Mexico as to the place in our sections of the early Basket Maker and Pueblo cultures. They may appear at this time, or in the underlying equivalents of the Calamity; at present there is no evidence of their appearance prior to this dry interval. In the Kokernot formation and its equivalent are found the Bravo Valley aspect, and possibly the Chisos focus, in the Big Bend; the Wichita Phase, the terminal Guadalupe River (Menard Stage?), and probably the Sand Dune and late Edwards Plateau cultures in Texas; and in New Mexico and Arizona the late Anasazi and Hohokam (?) cultures.

Turning to the Big Bend cultural development, the evidence therefore, would seem to explain the appearance of new groups in the area during times of prolonged drouth as local phases of wide-spread movements, probably in themselves inspired by climatic change. This may likewise suggest that the last dry period, immediately preceding the Kokernot moist period, was a longer interval than other factors have indicated.

Thus we are able to associate the Big Bend archaeological sequence with widespread fluctuations in climate and in culture. It is possible to add to our knowledge of the chronology of Big Bend cultures by considering the latter in terms of this major scheme. Here, as in the previous regional comparisons and correlations, it must be borne in mind constantly that any and all conclusions based upon these correlations in the present state of our knowledge are tentative, and that further work will be necessary before any of them attain the status of proven fact.

The apparent occurrence of Folsom and mammoth in the Neville-Durst Silts formation and its equivalent, a deposition interpreted as indicating

relatively moist conditions, gives a basis for dating that formation in Central Texas. Such an association at Clovis, New Mexico, has been dated by Antevs at 12,000 to 13,000 years ago, the terminal date of the period itself at 10,000 years ago.²⁵⁵ This date was obtained by a correlation of the deposits with Pluvial Lake Estancia to the west, and through it with the broad North American glacial chronology. A similar association at the Lindenmeier Site in Colorado was associated with the Kersey terrace of the principal Colorado rivers, and with the Corral Creek sub-stage of the Wisconsin glaciation, by Kirk Bryan and Louis L. Ray. The age of the Corral Creek sub-stage was estimated at 25,000 years ago. As the Folsom remains occurred in or on the upper part of the terrace, the time of occupation was probably somewhat more recent than 25,000 years, though older than the age of the lower Kuner terrace and the related Long Draw sub-stage of the Wisconsin, estimated at 10,000 years in age. Bryan and Ray state, however, that the age of Folsom culture is probably near the 25,000 years than 10,000 years.²⁵⁶ Albritton and Bryan noted that the Neville formation was probably to be correlated with the Kersey terrace and Corral Creek substage, or the Kuner terrace and the Long Draw substage, and hence to have an age of 10,000 to 25,000 years.²⁵⁷ Antevs has postulated a terminal date of 10,000 years for the Cochise marls,²⁵⁸ equated with the Neville formation. The various conclusions seem to suggest that the Neville and its equivalents occupy a place in the closing stages of the Ice Age, but our knowledge is as yet too inadequate for us to be specific as to just where and what that place may be. The various estimates of the age of this group of formations vary from 10,000 to 25,000 years. Certainly, therefore, the age of the Neville is to be measured in terms of thousands rather than hundreds of years.

Ignoring for a moment the Calamity formation and its putative equivalents, the age of the Kokernot formation may be considered. El Paso Polychrome pottery included in this formation gives a possible dating of 1100 to 1400 A. D. Since no Mimbres Black-on-white pottery was found in the formation, the date may be further narrowed to 1200 to 1400 A. D. The association of Ramos, Babicora, and Villa Ahumada Polychromes of the Chihuahua Polychrome complex with the La Junta focus of the Bravo Valley aspect suggests that the focus covers the entire period 1200-1400 A. D. The La Junta focus, it will be recalled, was

255.

Ernst Antevs, "Age of the Clovis Lake Clays," in "The Occurrence of Flints and Extinct Animals in Fluvial Deposits Near Clovis, New Mexico," **Proceedings of the Academy of Natural Sciences of Philadelphia**, Vol. LXXXVII, 1935, p. 311.

256.

Kirk Bryan and Louis L. Ray, "Geologic Antiquity of the Lindenmeier Site in Colorado," **Smithsonian Miscellaneous Collections**, Vol. 99, No. 2, Washington, 1940.

257.

Albritton and Bryan, **op. cit.**, 1939, pp. 1470-1471.

258.

Antevs, **op. cit.**, 1937, pp. 131-132.

that noted in the **upper** strata of the Kokernot formation at the Shiner Site, hence the beginning of Kokernot deposition was probably before 1200 A. D. Confirming this somewhat is the fact that no signs of the Bravo Valley aspect have been discovered in lower strata of the Kokernot formation or in the underlying formations or the immediately underlying erosional contact, which instead shows cultures thought to be ancestral to the Bravo Valley aspect. Near Albuquerque, New Mexico, pottery included in the supposed equivalent of the Kokernot formation was dated at about 1200 to 1500 A. D., while potsherds in a similar formation in northern Arizona are thought to indicate a dating of 1300 to 1700 A. D. All of these factors would seem to indicate that deposition of the Kokernot formation and its equivalents was underway prior to 1200 A. D. There is a somewhat remote possibility, however, as discussed below, that its deposition may have begun as late as 1400 A. D.

Pottery deposited along the disconformity between the cienega clays and the overlying formation thought to be the equivalent of the Kokernot formation was dated by Haury at 900 to 1100 A. D.²⁵⁹ In the Big Bend a tentative date was obtained for the Livermore focus, which is associated with this same arid period. This date (circa 900 A. D.) was based on the discovery of one typical Livermore focus type of projectile point in the Mogollon Village, New Mexico, in an archaeological horizon dated by tree rings as ending about A. D. 900. On this tenuous evidence the focus, and accordingly the erosional period, is thought to have been in existence by 900 A. D., if not earlier. Thus, the dry period preceding Kokernot deposition appears to have been under way as early as 900 A. D. and possibly as late as 1100 A. D. From the available evidence it may have started earlier, but there is also a possibility that it is to be associated with a still later period. It was noted that the Kokernot formation and its equivalents were apparently being deposited as early as 1200 A. D. and probably earlier. This evidence was not entirely conclusive, however, and we must consider the possibility that the closing date of the La Junta focus, say 1400 A. D., was actually the date of the Shiner Site included in the upper layers of the Kokernot formation. In that case the Kokernot formation may have been deposited, beginning only a short time prior to 1400 A. D., and the preceding erosional epoch may have been correspondingly late. This would suggest that the post-Calamity erosional period may represent the great drought of the late 13th century and that the Livermore focus as well as the Chisos focus and the closing stages of the Pecos River focus would be dated in that century. Such a dating, however, conflicts with most of the archaeological evidence and it is the opinion of the authors that the earlier date is probably nearer correct.

Summarizing our discussion to this point we note that various estimates of the age of the Neville and its putative equivalents would place it at about 10,000 years ago, or at about 25,000 years ago, while similar estimates of the age of the Kokernot formation and its equivalents

259.

Antevs, *op. cit.*, 1937, p. 130.

would date it as late as 1400 A. D. and as early as 1100 A. D. Thus, we have a gap of from about 10,000 to about 25,000 years between the youngest and oldest of our known alluvial formations. Apparently occupying this gap we have the post-Neville erosion, the Calamity deposition, and the post-Calamity erosion. While it would be possible to fit this sequence into tentative schemes of post-Glacial chronology and climatic fluctuations, there is little satisfactory evidence for doing so, while the schemes themselves are erected on such perilous theoretical bases and are so fiercely disputed at present that it is thought best at this time to make no attempt at correlation with them.

Archaeologically, the chances of placing the Calamity formation and its cultural inclusions in a definite chronology are likewise unsatisfactory. The only approach to a satisfactory dating of the Big Bend aspect is Setzler's comparison of the entire aspect with certain Basket Maker III-Pueblo I discoveries in the Southwest.²⁶⁰ As the Big Bend Cave aspect as a unit existed from about the middle of the Calamity period until well into the Kokernot, this is not particularly helpful in dating its earliest and most important division, the Pecos River focus. Furthermore, a Basket Maker III-Pueblo I dating may be interpreted as meaning practically any time between 300 A. D. and 900 A. D. Although the comparison is suggestive it means little in this analysis. For the present, therefore, no definite dating of the Calamity formation and its equivalents, or the immediately preceding and following erosional periods, or the included cultural remains is practicable.

SUMMARY

The Maravillas complex at present represents the earliest known Big Bend culture. It appeared in the area during a period of relative aridity, possibly several thousands of years ago. The Santiago complex and the Pecos River focus may represent a development out of the Maravillas focus, since the general cultural horizon is the same. They were presumably present in the Big Bend by the beginning of the Christian era; they may have appeared somewhat earlier. The Pecos River focus dominated the area during the remainder of the moist period during which it had appeared, and survived into subsequent dry times, possibly during the last half of the first millennium A. D. During this dry period earlier nomadic, open-site dwellers of this focus may have retreated to hidden and easily defended cave habitations. The culture was probably absorbed or replaced by about 900 A. D., though the date may be closer to 1300 A. D. During this same interval of drought two new groups came into the Big Bend. One of these, represented by the Chisos focus, was closely related to the late Edward Plateau people of the east, and may represent a movement of some such group into the comparatively well watered Davis Mountains under pressure of drought conditions. The exact time of this group's arrival is not known; since

^{260.}

Setzler, *op. cit.*, 1935.

it seems to have come into contact with the last of the Pecos River focus people, the date was probably just prior to A. D. 900. There is some evidence that this group survived into the following period of relatively greater moisture. In it may lie the ancestry of many of the nomadic groups that occupied the Big Bend during the early historical period. The Livermore focus, which came into the Big Bend at about the same time as the Chisos focus, seems to represent the first appearance in the region of an advanced horizon of culture, radically different from that of previous groups. Seemingly this culture gave rise to the Bravo Valley aspect during the ensuing moist period. The Bravo Valley aspect, possessing permanent houses and villages, agriculture, pottery, and a high development of shell, bone, and stone work, represents the highest cultural level attained by Big Bend aborigines. Many of its traits have been incorporated by absorption and acculturation into the present Mexican peon culture of the area. The Chisos focus may be tentatively dated 800 to 1400 A. D., the Livermore focus at circa A. D. 800-1200; the Bravo Valley aspect at circa A. D. 1200 to 1800. These are round figures only and are to a large extent estimates.

By association of archaeological materials with geological deposits previous hypotheses as to the seriation and chronology of cultures in the Big Bend region of Texas have been largely confirmed and elaborated. A method has been developed whereby correlation of Texas cultures with dated cultures of the Southwestern United States and even farther afield is now possible. Not only does this aid in the understanding of the broad archaeological picture, but it will eventually enable fairly close dating of cultures in areas where the specialized dating techniques of the Southwest cannot be applied. The method furthermore allows a closer correlation of cultural development with environmental changes.

As a result of the application of this method and its techniques to Big Bend prehistory, it is now known that at two intervals new cultures or cultural influences appeared in the Big Bend in times of widespread environmental change, periods of relatively low precipitation and probably of higher temperatures as well. These periods were in all probability the occasion of protracted "dust bowl" conditions similar to those of the last decade in the regions bordering on the area, if not actually within it. In both instances groups who had arrived during critical climatic periods apparently remained in the region and an evolution of their cultures resulted. This process appears to have been still in operation when interrupted by the appearance of European peoples and culture. No ancient cultures have been added to our list; indeed some evidence has been presented that certain reputedly ancient cultures were really quite recent. But if no new ancient cultures have been added, a sequence has been developed that points the way to the eventual linking of recent cultures with their ancient forebears. The task now is to apply the method widely and critically.

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