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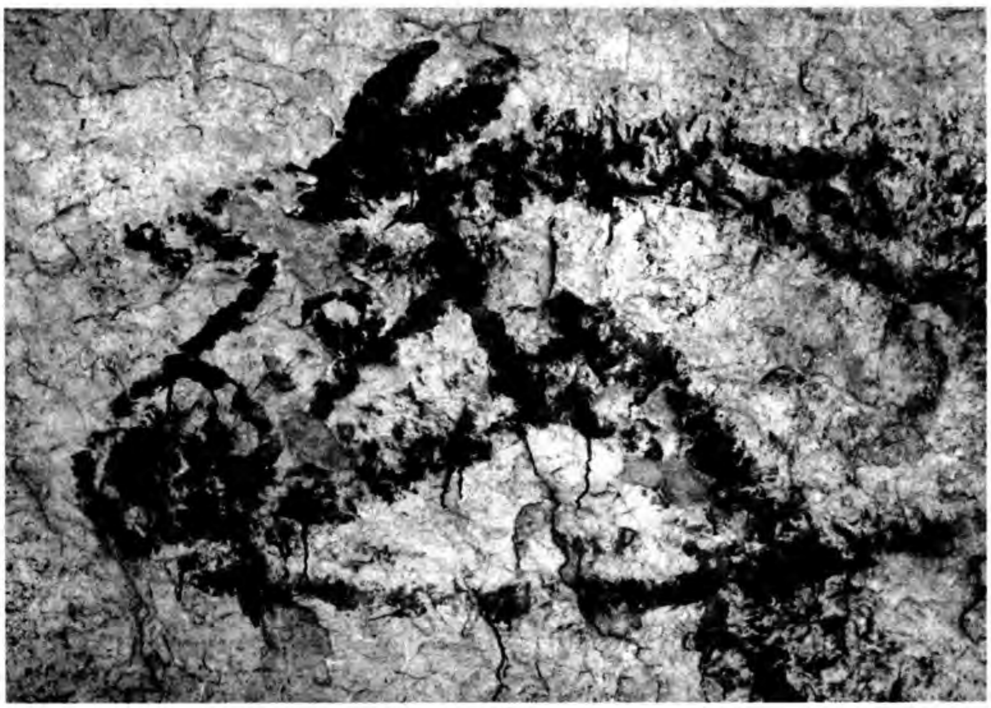

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LA TIERRA

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About the Cover: Photo of a pictograph in Seminole Canyon State Historical Park. See report by James B. Boyd, page 8. Drawing on page18 by Richard McReynolds.

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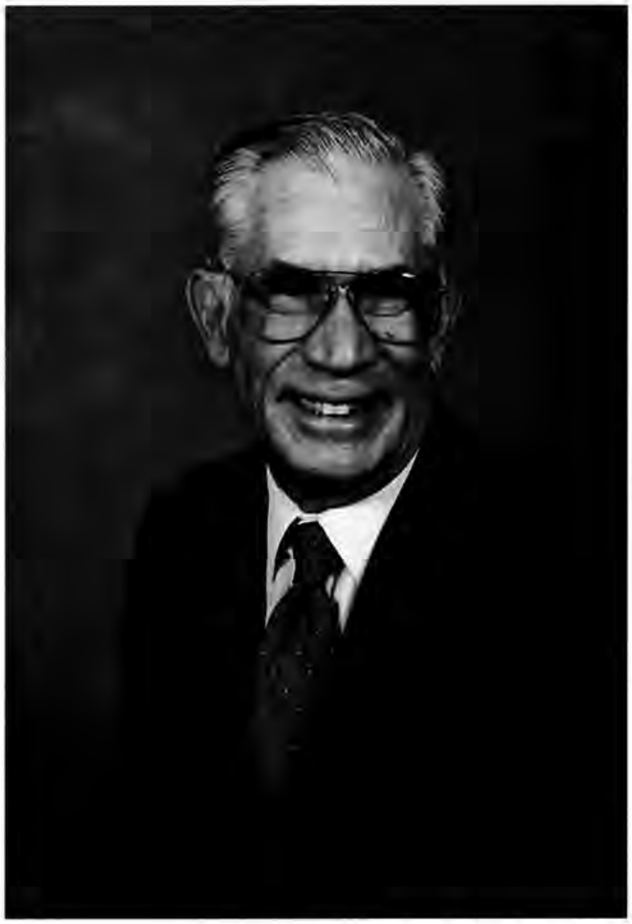
IN MEMORY



FRANCIS C. STICKNEY

Francis Stickney passed away in Midland on April 30, 1998. He was a 25-year member of the Southern Texas Archaeological Association, a member of the Midland Archeological Society, past president of the Texas Archeological Society and a Master Mason. He was born in Midland on December 23, 1927. He is survived by his wife Teddy Lou Stickney, two sons, Burt L. Stickney and James S. Stickney, two daughters, Beverly A. Gordon and Deborah L. Allard, and one brother, Billy Joe Stickney. He had seven grandchildren and one great-grandchild.

Francis was a patient and thoughtful man, always willing to help a newcomer to archaeology. His infectious enthusiasm inspired everyone around him. He worked with his wife, Teddy Lou, to lead the Texas Archeological Society's Rock Art Recording Task Force through numerous field expeditions in the lower Pecos. He also worked extensively in West Texas and New Mexico. Francis always had time to offer his full knowledge, resources, ideas and encouragement anytime someone needed help either in the field or on the phone.

Francis will be missed by all who knew or worked with him. He had the capacity to touch the lives of all those around him in a positive manner, from his impish grin to his famous buffalo burgers he prepared for the Rock Art Recorders at the pot luck suppers during the field trips.

NOTES ON SOUTH TEXAS ARCHAEOLOGY 1998:3
Closing a Chapter in the History of South Texas Archaeology: J. W. House, 1905-1998

Thomas R. Hester

Jessie Wade House was born in Kentucky on Jan. 18, 1905 and passed away in Carrizo Springs, Texas on February 3, 1998, at the age of 93. Mr. House moved to Texas in 1907 and attended school in Asherton and Carrizo Springs, graduating as valedictorian from Carrizo Springs High School in 1923. He went on to get his BA degree in Spanish and social science from Southwestern University in 1927. He held a number of teaching and coaching positions around South and southwest Texas, including Pleasanton, Big Wells, Langtry, Del Rio, and returned to Carrizo Springs where he taught from 1943 until his retirement in 1972 (Figure 1). After "retirement," he taught for several years in Crystal City.

Figure 1. J. W. House. Photo from early 1960s.

Most of his high school teaching was as a Spanish instructor, an endeavor at which he excelled. He was an extremely popular teacher at Carrizo Springs High School, both for his wit in class and his participation in school activities. But Wade House was best known around Carrizo Springs for his great interest in local prehistory, sharing his knowledge about artifacts with the community, and most of all, for encouraging his high school students in the pursuit of American Indian studies.

Indeed, it was his passion for archaeology that impacted many people. I am not sure when he began collecting Indian artifacts, though I know he was digging in some of the caves around Langtry when he taught there in the 1930s. Over the years, he accumulated a very large and important labeled collection, most of it from Dimmit County. For a number of years, it has been housed in his museum near his house, and he delighted in giving tours to school children and other visitors.

Mr. House was not a "joiner." He belonged to the Texas Archeological Society only through a membership to the high school and he never joined the Southern Texas Archaeological Association. However, he always shared the data from his collection. He interacted with a number of professional and avocational archaeologists, well known to E. Mott Davis, T.C. Hill, Jr., Frank A. Weir and many others. There is a 1954 letter in the Alex Krieger archives at TARL in which he wrote to Dr. Krieger with an illustration of a very peculiar artifact (what we now know to be a multi-notched Andice "eccentric"; Turner and Hester 1993), and Krieger responded that such an artifact "has never appeared before in the state of Texas, so far as I know, and I have seen many thousands of specimens." (letter to House, February 12, 1954).

Figure 2. CARRIZO SPRINGS HIGH SCHOOL ANTHROPOLOGY CLUB. A group of incoming members in the Fall, 1960, replete with costumes and artifact frames. The author is standing at the far left.

Where Mr. House was most effective was in generating enthusiasm about archaeology. To be sure, his archaeology did not, at times, match up with our modern techniques, and he would rather surface-collect eroded South Texas sites than do anything else (except deer-hunting in the winter). His legacy to South Texas archaeology, aside from his collection, which I will discuss later, was his founding of the Carrizo Springs High School Anthropology Club in 1953—the only such organization in Texas for many years. And he and his student members really had fun at this. The following charter, not politically correct these days, was written in 1953:

The Pow-Wow of Peña Creek

> We, the tribe of Peña Creek, were signaled together by chief Muddy Waters (Ricks Pluenneke) when Bald Eagle (Mr. House) rose from his squatum chair to pow-wow his braves about what the great spirits were saying as told to him by White Face (J.R. Hamilton). "Go brave ones, on rocky hills, along running water, beside still creeks and gather the many pointed and jagged demons that await you. Take them, guard them in secret prisons with clear faces and hang them along Bald Eagle's barricades. Should you not open your ears to the voice of the Great Spirit as talkum by Chief Muddy Water, White Face, and Bald Eagle, you shall no longer be a brave of the Peña Tribe."

And so the Anthropology Club, or the Peña Tribe (named after Peña Creek, a major drainage near Carrizo Springs), existed from 1953-1972, with many a high school boy (including the author) initiated into its ways by dressing in costumes, with our artifact frames (Figure 2; those "secret prisons with clear faces"), and running the gauntlet—or beltline—at noon in front of the whole student body. This was a terrifying, and painful, moment for incoming freshmen members! Of course, as members of the Peña Tribe, we had to have our Indian names, assigned by Mr. House. I have often wondered how Mr. House could have been so perceptive in naming me "Rain Eagle," when in later years I ran archaeological projects in Zavala County (10 inches, 1975), near Comstock (17 inches, 1976), or Hondo (21 inches, 1987).

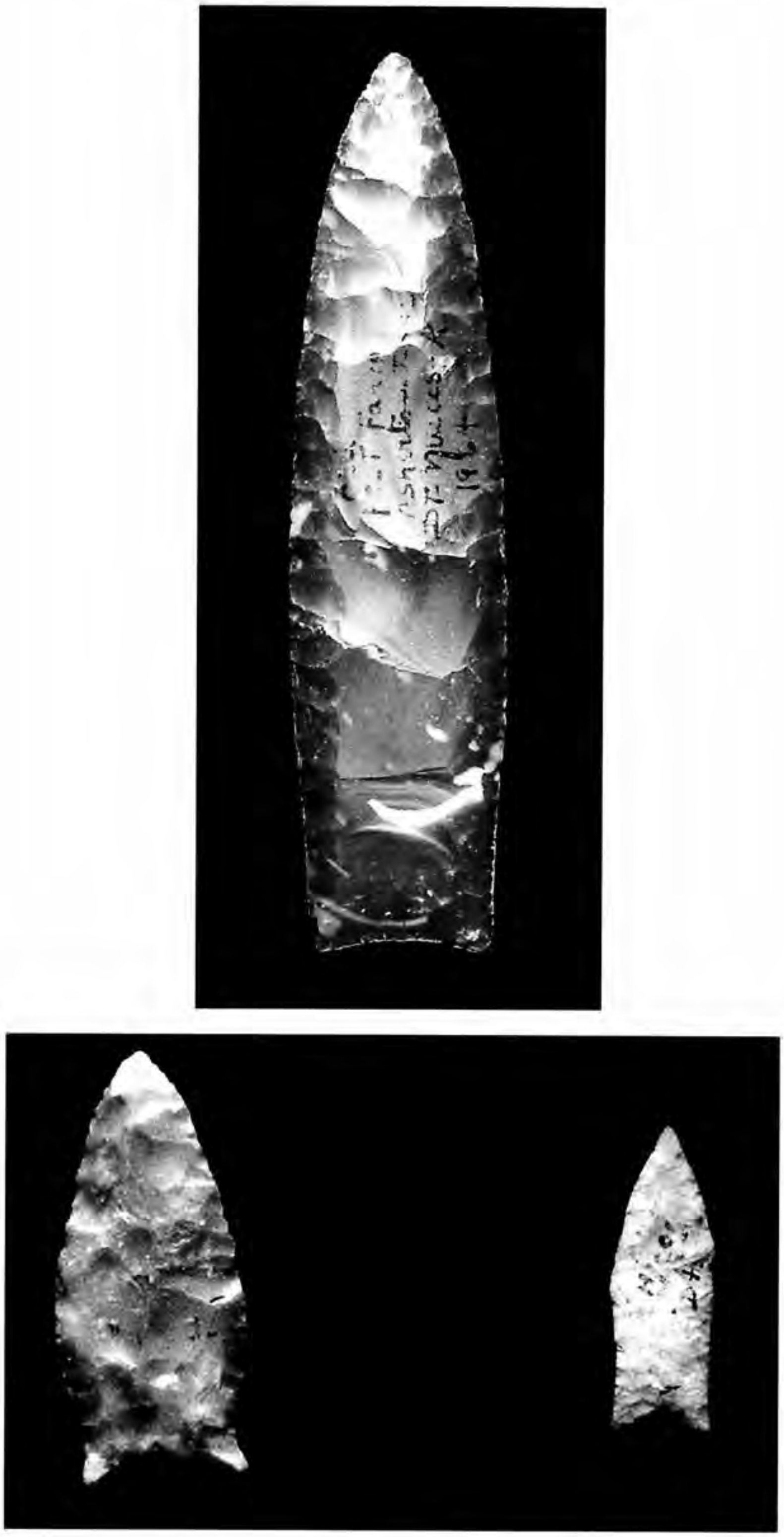


Figure 3. Some Paleoindian Artifacts in the House Collection. Top: Clovis (see drawing in Turner and Hester 1993); bottom, left to right, San Patrice; and, type unknown (observed by Michael Collins in south Plains collections). All from Dimmit County sites. Artifacts shown actual size. Photos by Milton Bell.

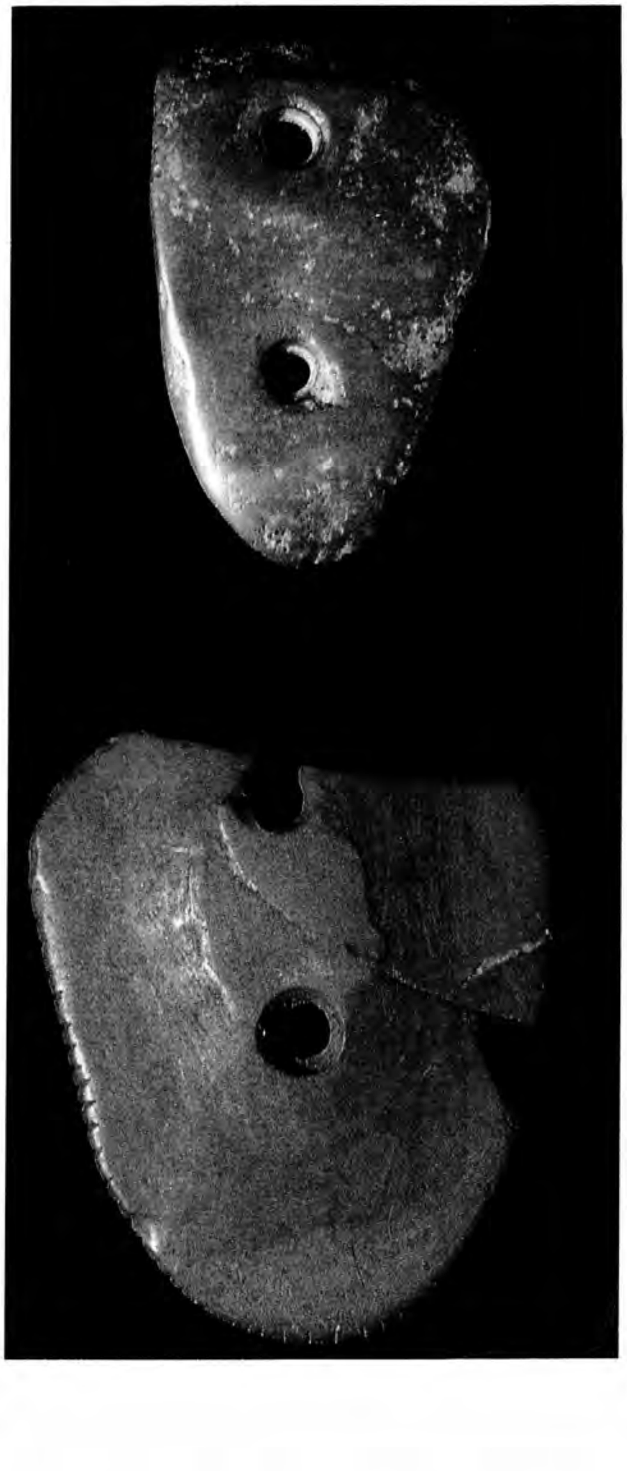


Figure 4. Some Ground Stone Artifacts in the House Collection. Left, two biconically drilled gorgets (Top, North Hill site, Bowman Ranch, Dimmit County; Bottom, 41DM27 [Guerra Site]);. Right, tubular sandstone pipe (41DM40). Artifacts shown actual size. Photos by Milton Bell.

At the end of each school year, Mr. House would gather up the Anthropology Club and take them to the Rio Grande and Pecos River areas to explore the rockshelters of that region. There were also weekend trips into Uvalde and Real counties. Mr. House drove everyone in a school bus, had some big canvas army tents to house us, and did all the cooking. He also put up with a lot of horseplay from the members, always with the reminder—"Boys, don't be crude." Prof. Claud Bramblett (UT-Austin Department of Anthropology, and member of the Anthropology Club in the late 1950s) reports that Mr. House's bus-driving in the Pecos River area "...took school buses where no bus should ever go...patching a hole in the gas tank with a bar of soap, and checking it nightly before turning in." Claud notes that these trips were very important to him—they were expeditions and adventures—"and we loved them and we loved Mr. House."

In 1961 or 1962, the Anthropology Club became the Carrizo Springs High School Archeological Society, and one young artifact-collector, Tommy Hester, worked with Mr. House to have the group be a bit more scientific. Here we were encouraged by Mott Davis, who came down and gave a lecture on Texas archaeology, accompanied by his film on this topic, to a packed auditorium at the high school (April 16, 1963). We put out a purple-ditto newsletter named, following the 1953 charter, the *Peña Pow-Wow*. It went to nearly 100 subscribers around Texas, the United States, and even to England, to the late Thomas C. Kelly (then at Mildenhall Air Force Base), who loved the newsletter and struck up a long-time friendship with the author.

We carried out excavations at the Lackey Site in Real County (41RE1), with excavations in squares and levels, and a descriptive report was prepared (on file, TARL). Also, several burials were excavated in Dimmit County and published (Hester 1964; 1965; see, for example, the burial from 41DM40 as illustrated in Hester 1980:71), and a number of archaeological sites were recorded. Mr. House was key in all these endeavors; landowners would contact him about burials or sites, and he would arrange for fieldwork as well as being very active in it. Mr. House and I mailed out a questionnaire-survey among South Texas collectors regarding a new point type, a number of which were in his collection. These were named Carrizo points (House and Hester 1963; see also Turner and Hester 1993). In 1964, J. Parker Nunley (who later got his doctorate at SMU and became a professor at Richland College) moved to Carrizo Springs and set out with Mr. House and myself to conduct an archaeological survey of Dimmit County. We recorded 26 sites and the results were published by Nunley and Hester (1966).

Lest the reader think that the scientific orientation sought by the High School Archeological Society had a sobering effect on the Peña Tribe's long tradition of having a good time, I can relate one story from one of our site-recording trips. Mr. House was leading a survey outing near Carrizo Springs, driving his stripped down Model A. A CSHSAS member, Thad McGehee, was standing on the back bumper as it rumbled down a ranch road. Ahead, he spotted an "arrowhead" [yes, a dart point] on the edge of the road. As soon as he jumped off to pick up the point Mr. House's foot came down on top of it and his hand snatched up the point. All the while, the Model A, now abandoned by driver and passenger, kept putting on down the ranch road.

Mr. House was a tremendous influence on many students, both through his teaching and especially through his Anthropology Club. He provided enthusiasm and support that encouraged both Claud Bramblett and me to pursue anthropology as careers, both getting our doctorates at the University of California, Berkeley, and ending up teaching at The University

Figure 5. Bone-Tempered Sherd in the House Collection. Large rim sherd of bone-tempered pottery, with lug handle (North Hill site; Bowman Ranch, Dimmit County). Photo by Milton Bell.

of Texas at Austin, though Claud did stray into primatology and physical anthropology! Claud remembers, as a high school student, presenting a paper to the Texas Archeological Society at its statewide meeting in Waco; he says that Mr. House had a lot to do with that paper and the scared kid who read it at the meeting.

Mr. House's great knowledge of the prehistory of Dimmit County and South Texas was of great inspiration to me. We published a number of papers together from the 1960s into the 1980s, and I still pull out files that have his notes, or notes I made on his collections, as well as his letters, often filled with information and carefully typed on Anthropology Club letterhead paper.

When Mr. House retired in 1972, we put out a little volume of papers in his honor (Hester 1972). Professor E. Mott Davis of UT-Austin, the most respected archaeologist in the state among amateurs and professionals, wrote a paper in that volume. He closed it by paying tribute to Mr. House. In writing about groups such as the Anthropology Club (unique in Texas high schools at the time), Dr. Davis praised those "few heroic souls, such as Mr. J. W. House... whose hard work and dedication made such activities possible." Other authors were myself, T. C. Hill, Jr., John B. Holdsworth (a naturalist from Crystal City), Parker Nunley, and William B. Fawcett, Jr. (who had also been active in high school archaeology in San Antonio).

When I told Claud Bramblett about Mr. House's death, he responded that "to me, Mr. House is not gone—he's still vivid in my memory." That holds true for all of us who knew and respected Bald Eagle. Indeed, Mr. House's legacy lives on. His family has put his extensive collection (some examples are shown in Figures 3, 4 and 5) on loan to the Texas Archeological Research Laboratory, where it is available for research, student projects, and where it is sure to enhance our knowledge of South Texas archaeology. The family has designated its eventual placement in the Dimmit County Library, and plans are underway for an interim exhibit to be installed in coming months.

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A REASSESSMENT OF 41VV226, CABALLO SHELTER, SEMINOLE CANYON STATE HISTORICAL PARK

James Bryan Boyd

ABSTRACT

The results of a brief survey conducted at a rockshelter in Seminole Canyon State Historical Park in January 1997 are presented. The shelter and its location is described, and the current state of pictographs within the shelter is presented. The pictographs, both prehistoric and historic in age, are described and illustrated. Other features, including bedrock mortars, an Historic period dry-laid stone wall, an apparent powder magazine dating from the late nineteenth century, are also discussed.

INTRODUCTION

On January 25, 1997, a survey was performed at a known rockshelter located near the northwestern boundary of Seminole Canyon State Historical Park, approximately 54 km northwest of Del Rio, Texas (see Figure 1). The site, 41VV226, is also known as Caballo Shelter, Running Horse Shelter, Kirkland's Camp, Seminole Canyon Shelter No. 2, etc. (Turpin 1982:96). The site names referring to the horse stem from a large Historic period pictograph depicting a running horse, painted in black, located on the rear wall of the shelter.

The survey, permitted by Texas Parks and Wildlife Department officials, namely Emmitt Brotherton, Superintendent of the Seminole Canyon State Historical Park (hereafter referred to as SCSHP), focused on several aspects of the site. These included photography of the site and features, documentation and photography of pictographs (both historic and prehistoric), assessment of the condition of the pictographs, documentation of Historic period graffiti in the shelter, and identification and examination of any other relevant feature(s). The overall purpose of the survey was to supplement information in previous brief passages in reference to the site in the published literature (cf. Kirkland and Newcomb 1967:85 [Plate 46]; Patterson 1980:13-17 [see Figures 4-7]; Turpin 1982:96-97; Silver 1985:42-43; Turpin 1995:16). No independent assumptions are made, but previous work conducted at the site is correlated with actual observations made in the field by the author.

THE SITE

The rockshelter is located near the upland edge of a small tributary which merges with a larger drainage known as the R12 tributary (see Turpin 1982:xiv [Figure 1]), just south of the site. The site is approximately 80 meters south of U. S. Highway 90 West, and approximately 0.6 km north-northwest of the SCSHP Visitor Center. The site is relatively accessible, but is off limits to casual visitors to the park. The rockshelter is located near the 1360ft. elevation contour, between the steep slopes of the Langtry-Rock outcrop association and the 1-8 percent slopes of the Zorra-Rock outcrop complex (Golden et al. 1982). Figure 2 illustrates the shelter.

The Caballo Shelter is an intermediate sized, crescentic-shaped and shallow rockshelter, oriented generally east to west (bearing 100°-280° [Boyd n.d.]). The rear wall of the cave is smooth limestone, generally tan in color, and the floor is bare limestone overlain by a moderate amount of sheep and rabbit droppings. The shelter dimensions were determined during the 1997 survey. The width of the perceptible portion of the overhang was measured, utilizing a *KESON* 200ft. fiberglass tape, at 110ft., and the extent of the overhang from the dripline to the rear wall was measured at several points utilizing a *SONIN* infrared/ultrasonic measuring unit. The area of greatest depth (16ft.) is near the central portion of the overhang. The floor is generally flat, but slopes moderately upwards near the rear wall, and is "polished" or "greasy" in appearance in several areas, most prominently at the western edge of the shelter. The roof height varies from approximately 10-12ft., and the overhang itself varies in thickness from about 1.0 ft.-2.5 ft. in thickness.

The Caballo Shelter was originally (formally)

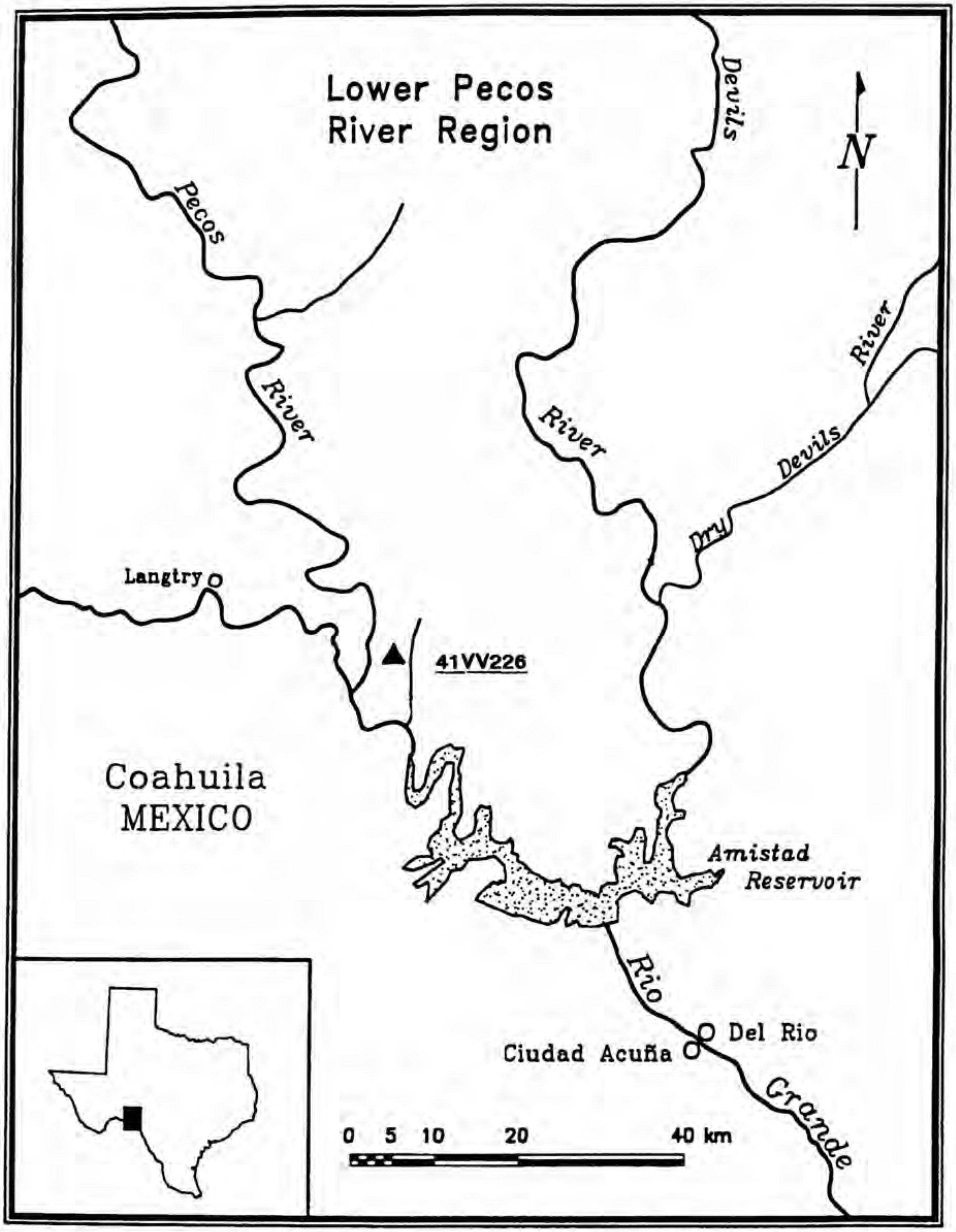

Figure 1. General area map, showing the location of 41VV226, Caballo Shelter. Tributary to the right (east) of site is Seminole Canyon. Note the location of Amistad Reservoir. Inset shows location of area in the state.

Figure 2. Wide view of the rockshelter, looking northwest (bearing 320°). Note the powder magazine at left, and the norse pictograph on the rear wall.

recorded by Mark Parsons on July 12, 1966 (see site form for 41VV226 on file at the Texas Archeological Research Laboratory [TARL], The University of Texas at Austin). Judging by the large amount of Historic period graffiti on the walls of the shelter, it was regularly visited by many people during the latter portion of the nineteenth century and well into the twentieth century. Prehistoric pictographs on the walls of the shelter were copied by Forrest Kirkland on July 9, 1936 (Kirkland and Newcomb 1967:85 [Plate 46]). The site was later reported by Patterson (1980:13-17), Turpin (1982:96-97; 1995:16), and assessed during a conservation survey by Silver 1985:42-43) of the then known rock art sites in SCSHP.

Approximately 100 meters to the west of the site, in an upstream direction along the R12 tributary, the ruins of the old railroad grade built by workers for the Galveston, Harrisburg and San Antonio Railroad (GH&SA) in 1881-1882 are evident. A dry-laid stone wall in the shelter, discussed below, was apparently constructed by those workers.

Just downstream from the rockshelter there is a small spring, once utilized as a watering hole for livestock (Williams 1991), which may have heightened the importance of the location of the site in prehistoric times. Plant species in the vicinity include blackbrush acacia (*Acacia rigidula*), guayacan (*Porlieria angustifolia*), guajillo (*Acacia berlandieri*), Ashe juniper (*Juinperus ashei*), ocotillo (*Fouquieia spendens*), plains prickly pear (*Opuntia phaeacantha*), cenizo (*Leucophyllum frutescens*), resurrection plant *(selaginella*), Gregg's ash (*Fraxinus greggii*), plateau live oak (*Quercus fusiformus*), Texas mountain laurel (*Sophora secundiflora*), Texas black persimmon (*Diospyros texana*), agarita (*Berberis trifoliolata*), Torrey's yucca (*Yucca torreyi*), Vasey's oak (*Quercus pungens* var. *vaseyana*), tasajillo (*Opuntia leptocaulis*), and lichens (Williams 1991).

THE FEATURES

Various features were recorded in the rockshelter during the January 1997 survey. These features include the following classes: prehistoric pictographs, Historic period graffiti, Historic period pictograph, powder magazine, mortars, and a "greasy" in appearance limestone bedrock floor, indicative of much human traffic through the site during the prehistoric past. Each of the features is discussed at length below.

Prehistoric pictographs.

An array of prehistoric pictographs adorn the rear wall and roof of the cave. The pictographs are very faded and indistinct, and spalling of the panels is pronounced (Boyd n.d.). Kirkland and Newcomb illustrate an extensive panel of pictographs, copied by Kirkland on July 9, 1936 (1967:85 [Plate 46]). They refer to the site as Seminole Canyon Shelter 2, stating:

> This shelter is about thirty yards wide and fifteen yards deep. Water comes down a little draw and empties over the shelter and has caused the ceiling and wall to flake, damaging the pictographs on the ceiling and back wall. With the exception of one zig-zag line in ocher, the complete design is painted in dark purple red. Parts of it could not be certainly made out and were not copied. Five hand prints were made in a lighter red color and are probably not a part of the original design.

Kirkland's (1967:85 [Plate 46]) drawing of the pictographs in the Caballo Shelter depicts several shaman figures, hand prints, torch-like motifs, bold geometric designs, etc. The site is discussed under the assumption that it conforms to the Red Monochrome style, probably based on the fact that the only apparent color in the motifs evident at the time of Kirkland's recording of the site in 1936 was red. However, Turpin (1982:97) appropriately states that the shaman motif more closely conforms to the much earlier Pecos River Style [pictographs]. The now badly deteriorated hand prints present in the cave *are*, however, characteristic of the Red Monochrome Style.

The January 1997 survey revealed that the prehistoric pictographs in the shelter had apparently deteriorated very significantly since Kirkland's work in 1936. Parsons in his 1966 survey of the site, stated "Most of the rear wall was, at one time, painted, but the paintings are badly faded and, in some areas, overpainted by modern pictographs and graffiti." The large shaman illustrated by Kirkland and Newcomb (1967:85 Plate 46]), when examined during the 1997 survey, had deteriorated to the degree that the entire lower two-thirds of the figure had faded away entirely. Only the "head" and "upper chest" area of the shaman motif was still visible. Even these "preserved" areas were badly spalled. Other motifs, or portions of motifs, illustrated by Kirkland and Newcomb were evident, but they, too, were spalled to a significant degree. Other pictographs, not illustrated by Kirkland and Newcomb, were also recorded and photographed.

The pictographs, or remnants thereof, span the length of the shelter except the west end behind the powder magazine. Fading of the pictographs, especially on the lower wall areas of the shelter, is probably accentuated by the fact that the lower half of the rear wall is often subjected to direct and prolonged sunlight (Silver 1985:42).

Historic period graffiti.

A veritable register of past visitors to the site, in the form of graffiti scrawled onto the rear wall of the rockshelter, is evident. One aspect of the 1997 survey was to locate and record any and all graffiti within the confines of the shelter. The most apparent example, for which the site was named, is a large running horse painted in black. This motif is treated under a separate section below (Historic period pictograph). Historic period graffiti in this section primarily consists of various names and dates written (or painted) on the shelter's walls. Names include both first names (only) and last names (only), of both males and females, as well as initials. Dates recorded range from as early as 1872 to as late as 1981, with several examples from the 1930s and 1940s. A listing of all recorded graffiti is presented in Table 1. Figure 3 illustrates an example of the graffiti, the apparent signature of the artist who painted the running horse. Some of the ancient prehistoric pictographs are overlain by graffiti, some of which have nearly faded from view, presumably by some of the same processes which are acting to obliterate the prehistoric art.

The causative factor which undoubtedly contributed to the large amount of graffiti in the Caballo Shelter is its easy accessibility. The shelter is, as mentioned above, in close proximity to the highway. Additionally, the site is adjacent to the old GH&SA railroad grade [and former trestle which once crossed the R12 tributary], and was apparently used as a powder magazine, [with the construction of a dry-laid stone wall in the west end of the shelter] during the 1881-1882 time frame (Patterson 1980:13). Moreover, the general area was highly utilized during the railroad era, as evidenced by the number of Historic period sites located in this area of the park. These sites include 41VV396 (cf. Turpin 1982:143; Turpin 1995:17). 41VV414 (cf. Turpin 1982: 144; Turpin 1995:17-18), and 41VV544 (cf. Turpin 1982:145-

Table 1. Historic Period Graffiti - 41VV226*

J. OGDEN (very large black letters; horse artist 'signature')

JOAR (brown letters)

EMIL (black letters)

TIME 2.10 (large black letters/numbers)

Rachel (black letters)

Mary (black letters; cursive)

1981 (black numbers)

R H *Agosto* **28 1922** (black letters; month written in cursive)

11-17-1939 H.V.S. (black letters/numbers)

11-17-1940 (black numbers)

1922 RA (black letters/numbers)

AH 1932 (black letters/numbers)

HB...1872 (very large, faded black letters and numbers; characters between "HB" and "1872" unreadable)

ABARISTO (Letters in black; outlined)

* Recorded during the survey by the author. Upper and lower case lettering is shown as depicted on the rear wall of the rockshelter. Other graffiti which was too faint to be readable was omitted. The relative sizes of the graffiti varied considerably.

Figure 3. Historic period graffiti: "J. Ogden." This is the "signature" of the artist who painted the running horse in 1881 or 1882.

Figure 4. Wide view of the running horse, painted in 1881 or 1882. Note fading of the lower portion of motif. Length of horse is 15'2".

Figure 5. Detailed view of the head area of the horse painting. Area shown is approximately 50' in width.

147; Turpin 1995:18). The first two sites (41VV396, 41VV414) appear to represent a railroad construction worker camp and a railroad construction industrial camp, respectively, while the third site (41VV544) includes refuse and ruins of an old railroad-era saloon. Evidence of more recent [early twentieth century] utilization of the area in immediate proximity to the Caballo Shelter are the ruins of a windmill (41VV397), dating from the 1920s (Turpin 1982:143-144).

Historic period pictograph

The centerpiece of the Caballo Shelter, and the reason for which it was so named, is a large Historic period pictograph of a galloping horse, painted on the rear wall near the center of the rockshelter (see Figure 4). The painting, rendered in black, depicts the outline of a horse galloping at full stride, complete with bridle and reins. This comparatively recent pictograph was painted over a panel of prehistoric pictographs; these ancient pictographs were so faded and/or spalled as to be virtually invisible at the time of the January 1997 assessment of the site (Boyd n.d.).

To the left (west) of the horse, also painted in black, are the large characters "J. OGDEN," the apparent "signature" of the artist (Silver 1985:42). This is the only example of "anglo" Historic period art in SCSHP, the apparent work of a [possible] railroad worker (Silver 1985:42). Turpin (1995:16) notes that the same type of black paint used by the artist at Caballo Shelter was also used to write the names of railroad workers in two other nearby rockshelters, namely Seminole Spring (41VV72) and Parida Cave (41VV187).

The 1997 survey revealed that the horse painting is approximately six feet in height, as measured from the top of the ears to the lowest discernable point of the right hoof, and 15ft.2in. in length (from the nose to tail; Boyd n.d.). A close examination of the painting revealed that the head, ears, mane, and rear area of the upper back were dark black in color and well preserved. The frontal area of the upper back, as well as the neck and bridle are fairly well preserved. The lower areas, e.g., legs and abdominal area, are faded and the constituent paint has faded to gray (Boyd n.d.). Figure 5 is a detailed view of the head area of the horse.

Silver (1980:42) states:

> Although only a century old, these pictographs [the horse and signature] already manifest serious deterioration in their lower register, upon which an accretion has developed and surface flaking has commenced. This area of accelerated deterioration, located just above a discrete register of heavy dark gray accretion, receives full and prolonged contact with the sun and may, therefore, be indicative of a zone of rapid evaporation [brackets added].

Powder magazine

One very apparent feature of the Caballo Shelter is an imposing dry-laid stone wall, which effectively forms an enclosed room, located in the west end of the shelter (see Figure 6). Patterson attributes the construction of the wall to GH&SA railroad crews in 1881 or 1882 (1980:13). She states: "The wall creates a small room which was utilized as a storage area or magazine for the black powder used in the tunneling and rock work at the nearby Pecos and Rio Grande confluence and the cut in the hill to the northwest..."

The wall is constructed of a large number of limestone rocks, some naturally shaped and some roughly chiseled. The entrance into the "room" formed by the wall is located at the east end of the feature. A small number of constituent blocks have fallen, but overall the wall is extremely well preserved. Larger blocks in the wall are chinked with smaller stones. The west end of the wall is approximately three feet in height; the east end is approximately ten feet high (Boyd n.d.). The length of the wall was determined with the KESON 200-ft. fiberglass tape (L=22 feet 6 inches).

Mortars

Three possible shallow bedrock mortars were recorded in the site during the January 1997 survey. No mention of mortar features is made in any of the referenced literature on the site, and Parson's site form of 1966 also fails to mention the presence of such features. The mortars, which are located in the central portion of the rockshelter, are quite shallow (see Figure 7) and are located near the rear wall. The orientation of the mortars is from the northwest to the southeast, and they are located in an area approximately two feet in diameter. The diameter of each

Figure 6. View of west end of shelter, showing the powder magazine. View is to the north. Note the horse pictograph to the right of the wall.

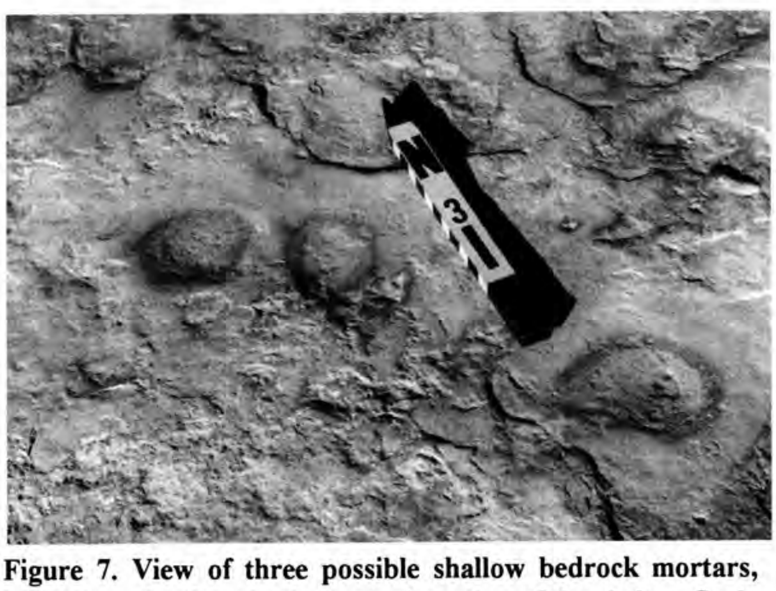

Figure 7. View of three possible shallow bedrock mortars, located on the floor in the central portion of the shelter. Scale on north arrow is in inches.

depression was measured (KESON); one of the features is 5.0 inches in diameter while the other two are 5.5 inches in diameter (Boyd n.d.). The features are located on the floor of the shelter and resemble shallow mortars observed in a newly recorded rockshelter in SCSHP (see site form for 41VV1819 on file at TARL).

"Polished" limestone floor

A recurring feature observed in rockshelter sites in this and other regions, usually in highly utilized sites [during prehistoric times], is a "polished" or "greasy" in appearance sheen on rock surfaces, in this case on the floor of the Caballo Shelter. This phenomenon is especially noticeable near the west end of the shelter, just outside the entrance to the powder magazine. The effect was probably created by countless numbers of human visitors to the site during prehistoric times; there is no actual evidence of occupation. The effect was probably achieved through heavy foot traffic, as well as seating on the limestone floor, as opposed to a similar gloss or sheen observed on large boulders in nearby rockshelters (e.g., 41VV74, Fate Bell rockshelter and 41VV55, Moorehead Cave, and many others), a probable effect of materials processing on the rocks.

CONCLUSIONS

Caballo Shelter is an important, albeit little studied, site which exhibits clear signs of human visitation spanning a great length of time. Its presence in Seminole Canyon State Historical Park is relevant for a number of reasons. First, preservation of the site has been effected by its incorporation into the State operated park system. Very apparent evidence, in the form of Historic period, [as well as modern], graffiti scrawled on the rear wall of the shelter, indicates that prior to the creation of the park, desecration of this haven for ancient human activities went unchecked. This occurred primarily due to the site's easy accessibility after the construction of the adjacent GH&SA railroad, as well as the construction of U.S. Hwy. 90 West. There is little evidence of vandalism having occurred at the site since its incorporation into the park some two decades ago. The vandalism which occurred in the site during the Historic period, namely the painting of a large running horse on the central rear wall, may in fact be looked at as a fortunate occurrence in that it provides researchers an opportu nity to study the adverse effects that affect pictographs of much greater antiquity in this and other rockshelters in the region. Furthermore, the rendering of the running horse provides a unique insight into one late nineteenth century railroad worker's artistic talent, and in fact enhances the character of the site with minimal impact on aboriginal pictograph murals which, for the most part, have faded to virtual obscurity. The site has received minimal attention in the past, and this is due obviously to the fact that, given its location in SCSHP, it is far overshadowed by numerous other visually spectacular rock art sites in the park. Nonetheless, the site is worthy of further consideration and study and has been previously recommended as an ideal site for pilot conservation studies on the effects and mitigation of rock art deterioration in other sites in the region. Thus, the site provides an opportunity to save an incalculably valuable resource, i.e., rock art in general in the Lower Pecos region, which is the artistic legacy of those who so long ago inhabited this now barren and inhospitable region, and left their mark in sacred recesses and rockshelters such as 41VV226, the Caballo Shelter.

ACKNOWLEDGMENTS

Emmitt Brotherton, Park Superintendent at Seminole Canyon State Historical Park, is thanked for allowing the author to conduct the survey of the Caballo Shelter. This cooperation resulted in the production of this report, and it is hoped that information and interpretations which were gleaned will be helpful to future researchers with an interest in the site. Dr. Thomas R. Hester, Director of the Texas Archeological Research Laboratory, The University of Texas at Austin, as well as Dr. Timothy K. Perttula of Frontera Archeology in Austin, and the Texas Department of Transportation (TxDOT) Archeology Studies Program, supplied copies of references important to the completion of this report.

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A MIDLAND POINT FROM PECOS COUNTY

C. K. Chandler

ABSTRACT

This brief paper reports and illustrates a basically complete Midland point. Midland points are relatively rare and their time frame is not well defined.

INTRODUCTION

This artifact is basically a complete Midland point from Big Canyon in Pecos County near the Terrell County line (Site 41PC459). It is a surface fine by James Fallon who collected a number of other lithic artifacts from the floor of this canyon and helped this author record several archaeological sites in the canyon.

ARTIFACT DESCRIPTION

This specimen (Figure 1 A, A') is 32.4 mm in length, 18.7 mm maximum width, 4.2 mm maximum thickness at 12 mm above the base and it weighs 2.9 grams. The basal concavity is 1.4 mm. Both basal corners have small breaks. The base and lateral edges are carefully trimmed and the edges are lightly ground. Flaking is irregular to parallel. There are impact fractures on both faces at the distal end. The obverse face has remnants of the original flake scar of the flake this artifact was made from. It is not a flute but could easily be mistaken for one. It is made of light gray ish tan good quality chert with evidence of heat treatment.

Midland points strongly resemble Folsom in shape and size and are very thin and unfluted (Turner and Hester 1993).

ACKNOWLEDGMENTS

Sincere thanks are extended to James Fallon for the loan of this artifact for documentation and to Richard McReynolds who prepared the illustration.

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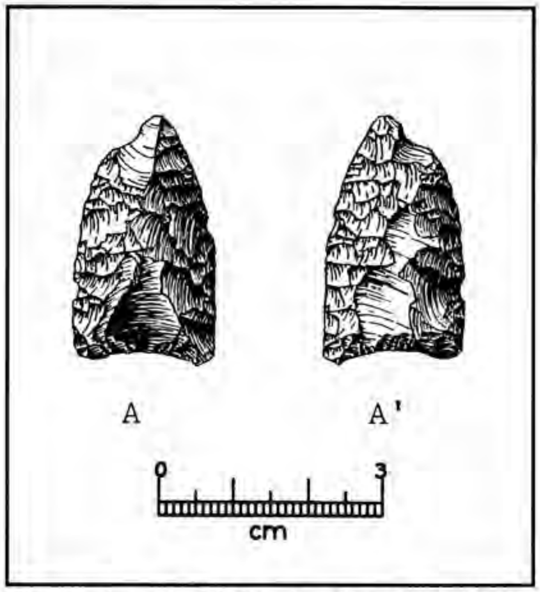
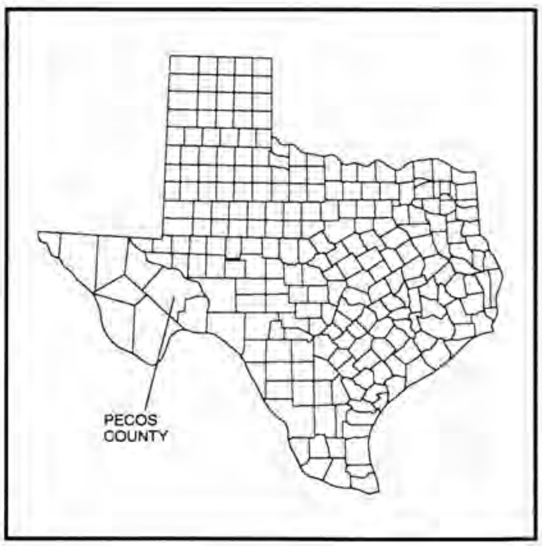


Figure 1. A Midland point from Pecos County.



A GUADALUPE TOOL FROM NORTHWESTERN TRAVIS COUNTY

Andrew F. Malof

ABSTRACT

A Guadalupe tool recovered from the south shore of Lake Travis during a period of low water is described. This tool is normally associated with the San Antonio and Guadalupe River basins, an area well to the south of where this specimen was found.

THE ARTIFACT

The Guadalupe tool is an artifact typically found in the San Antonio and Guadalupe River basins (Turner and Hester 1993:256). In the summer of 1996, during a survey of 41TV209, a specimen (Figure 1) was recovered from a normally inundated portion of Lake Travis shoreline. Metric dimensions follow Brown (1985). Dorsal (overall) length is 117 mm, while ventral length (from proximal end to proximal portion of bit) is between 98 and 109 mm (explained below). Maximum width is 53 mm and maximum thickness is 36 mm. Bit measurements are problematic as the bit exhibits two distinct facets, reminiscent of the first figure in Turner and Hester (1993: 256), as opposed to those pictured throughout Brown (1985), which are primarily single faceted. The longitudinal measurement of the bit (bit thickness) is 17 mm. If the second facet is added, it becomes 36mm. This same multi-faceting makes the next dimension, ventral to bit angle, ambiguous as well. The closest approximation approaches 210 degrees, depending on which facet is made the vertex of the angle. The dorsal to bit angle is clear though, and is 62 degrees. The most distal bit facet is convex, while the secondary, or more proximal facet, is concave, with a maximum depth of approximately one mm. The artifact weighs 225 grams. Most flake scars are large, ranging up to 35 x 80 mm. The tool was produced from a piece of fine-grained tabular chert, which has developed an orangish patina.

This specimen is keel-shaped in cross section. Cortex is visible on both the ventral and dorsal surfaces. The bit end is dull, and at least eight micro-flake scars are evident on the dorsal face. The ventral side of the bit has been thinned transversely (across the long axis). This was accomplished by removing two relatively large flakes. One flake removal produced the first facet of the bit surface, while the other further thinned the distal end, which resulted in the second, more proximal facet. At least two smaller flakes were removed to complete the process. No use wear is visible on this side, although low-power microscopy (8x), suggests a possible sheen or polish at the bit end.

DISCUSSION

Guadalupe tools are crudely made (Hester, personal communication), and this specimen is no exception. Black and McGraw (1985), described two forms of this tool. The first, Model 1, was fashioned in a manner reminiscent of the Levallois technique, wherein a prepared core is struck with a hard hammer, thus removing a large flake. The dorsal face is basically complete, while the ventral side becomes planar, and might be considered a uniface, if not for additional thinning and bit shaping. Model 2 is made on a thick biface. In both cases, it appears the bit end is formed with a single (or double?) blow made transversely across the longitudinal axis (Black and McGraw

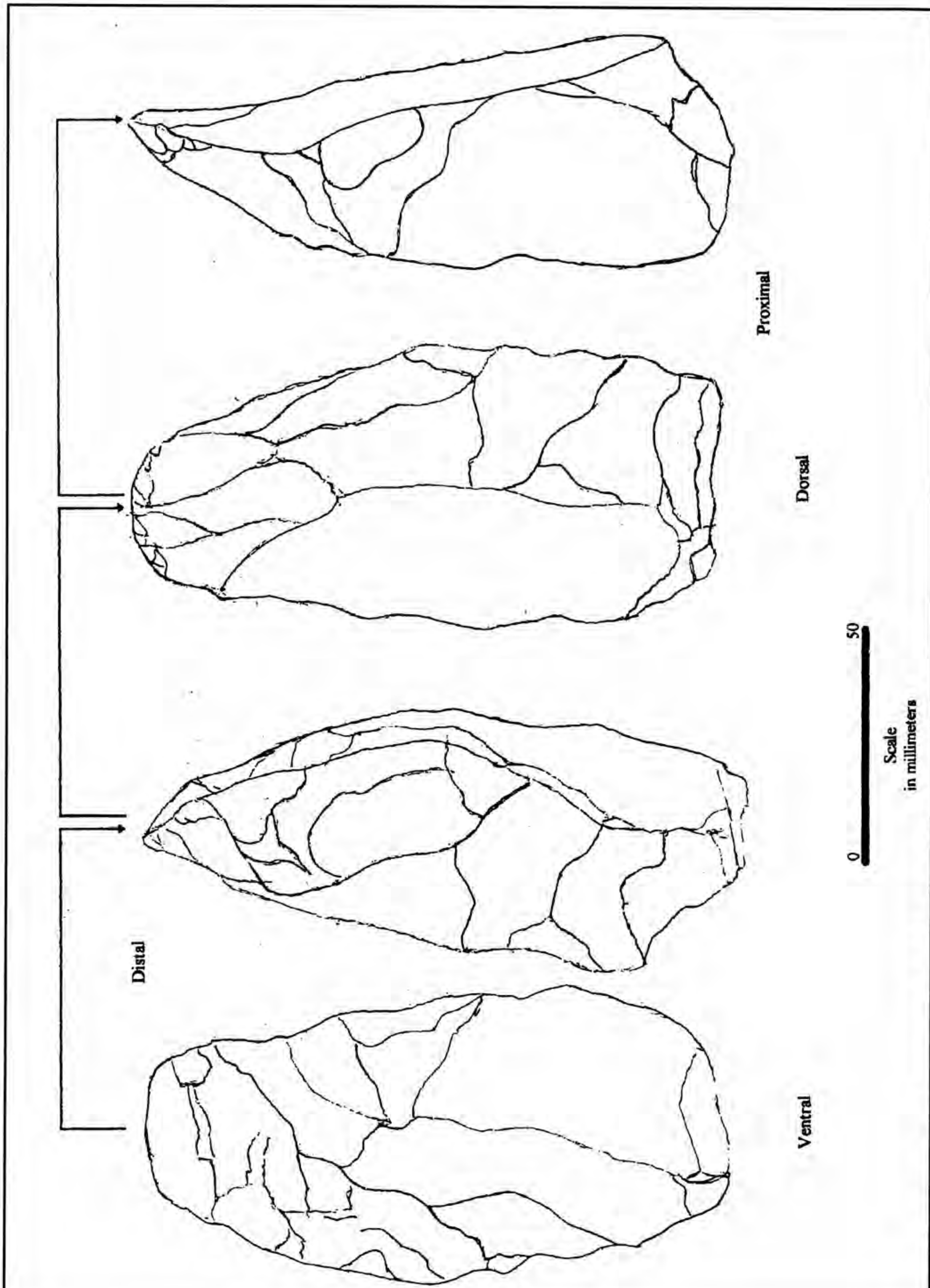


Figure 1. Guadalupe Tool recovered at 41TAV209. Artifact sketch by the author.

1985:148, 150). This specimen clearly belongs to the Model 2 form. The proximal end is extremely thick, and has an unfinished appearance. Cortex remains on all faces but the distal end, which precludes the possibility of the removal of a prepared flake.

The Guadalupe tool has been inferred to have had two distinctly different possible uses (Black and McGraw 1985:149). One possibility was that it was hafted and used as a woodworking tool. It may also have been hand-held and used as a hide-working implement. This particular specimen lends support to the second theory, as the thick proximal end makes it difficult to envision hafting.

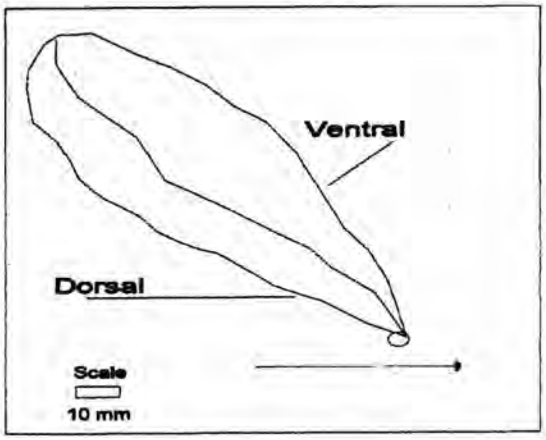


Figure 2. Proposed angle and direction of tool use. Circle represents area of visually apparent use-wear.

Use-wear is visible on the dorsal face indicating that the ventral, flat portion of the bit was the working edge (Figure 2). Intuitively, the tool would have been used most efficiently by cupping the proximal end in the palm with the bit end pointing downwards, and drawing the implement towards the body. It could also have been held in a "hand-shake" grasp, and pushed away from the body. In either case it is easy to envision a combination of scooping and slicing movements designed to remove fatty tissues from the interior surface of an animal skin. No definitive conclusions of use can be drawn, however, without comparative and experimental microwear studies.

Site 41TV209

This tool (Figure 3) was found during a re-examination of 41TV209, a site first documented by A. T. Jackson in 1938 (Texas Archeological Research Laboratory [TARL] files). He described a small burned rock midden and mentioned evidence of historic picnicking. Shortly after, Lake Travis was impounded and the site was submerged. In the summer

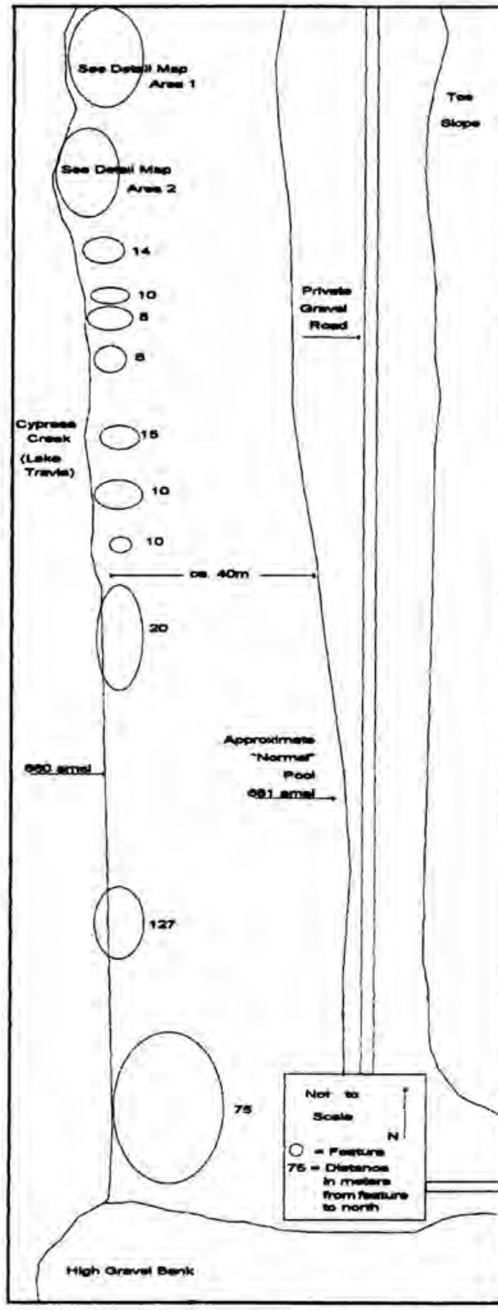


Figure 3. Overview of 41TV209. Site dimensions preclude scale map.

of 1996, near record low water levels re-exposed the site. It became evident that it was much more extensive than first surmised (Malof 1996).

A series of surface hearths which expanded in size and intensity in a southern progression towards either very large burned rock concentrations or small burned rock middens were documented. It is unknown whether Jackson's midden was specifically relocated. The smaller, more organized hearths were found on two low point bars (Area 1, Area 2) at the northern portion of the site. Each of these bars contained 10-12 hearths, some obviously intact, while others showed evidence of downslope and cross-slope redistribution, most probably due to inundation processes. The Guadalupe tool was found at Area 1, on the edge of a 3-meter centrally open circular concentration of burned and cracked limestone (Figure 4). A fairly well-made large (91 mm) bifacial Clear Fork tool was found within 30 cm of the Guadalupe tool. Clear Fork and Guadalupe tool forms have been closely associated at 41BX271 in Bexar County (Hester and Kohnitz 1975:23). Sollberger and Carroll (1985) speculated that Guadalupe and Clear Fork tools were part of a tool kit designed for the defleshing of animal hides (Sollberger and Carroll 1985:18). Guadalupe tools have not had exhaustive use-wear analyses performed yet, as far as this author knows (but see Brown 1985, for a good start). The most authoritative study of Clear Fork tools to date has left open the possibility that Clear Fork tools were at times used for hide processing (Hudler 1997:39). This is consistent with Black and McGraw's (1985) conclusions that the Clear Fork tool was a "general tool form," used for many different purposes (Black and McGraw 1985:139).

Any such associations at 41TV209 must be approached with caution, however, as the site has been subject to periodic drawdowns, as well as initial reservoir filling. These events introduce a substantial margin of error to any conclusions. For example, although some hearths appear to be intact, it is entirely possible that portions of the site have deflated to a common exposed surface, thus creating "new" features and new associations.

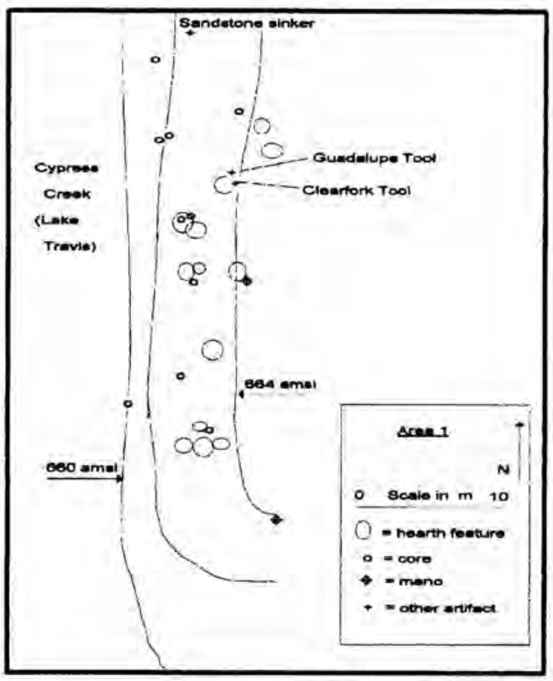


Figure 4. Area 1 at 41TV209. Note close association of the Guadalupe and Clear Fork tools.

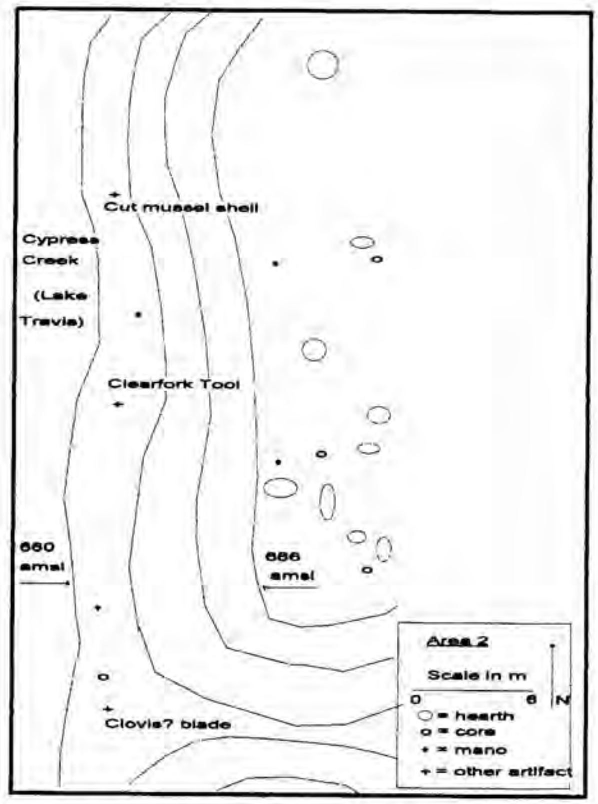


Figure 5. Area 2 at 41TV209. Clear Fork Tool at this site was similar to Paleoindian types, and note possible Clovis blade.

Other artifactual remains found at the site, although not directly associated with the Guadalupe tool, include cut mussel shell, a side-notched sandstone sinker, manos, metate fragments, numerous cores, and large flakes. Another large (110 mm) bifacial Clear Fork tool was found somewhat to the south, on the next point bar (Figure 5). Also found was a long (153 mm) curved blade, with macroscopic evidence of utilization along one lateral edge. This item bears a striking resemblance to blades of Clovis age, as pictured in Turner and Hester (1993:38). Large bifacial Clear Fork tools are also associated with the Paleoindian period (Turner and Hester 1993: 246). The smaller (91 mm) Clear Fork tool (associated with the Guadalupe tool in question) is morphologically quite similar to the larger specimen, so they may be contemporaneous. The Guadalupe tool itself has been dated to the Early Archaic period (Turner and Hester 1993:256, Black and McGraw 1985:146, Hester and Kohnitz 1975:23). Site 41TV209 can therefore be said to have been occupied in the Early Archaic period, with a possible Paleoindian component as well.

CONCLUSIONS

The Guadalupe tool is typically found in regions south and west of Lake Travis. This specimen helps further expand its range. Its occurrence at 41TV209 helps define activity at this site and provides a means of relatively dating a portion of its occupation. Its crude appearance combined with evidence of use indicates a hand-held tool. Its surface association with a Clear Fork tool may lend support to a prehistoric tool kit incorporating both implements, as well as indicating multiple periods (Paleoindian and Early Archaic) of bifacial Clear Fork tool use. Additional work on submerged site dynamics may help clarify its manner of deposition.

ACKNOWLEDGMENTS

The author wishes to thank Dr. Thomas Hester for reviewing an early version of this paper. He also wishes to thank the late Bruce A. Nightengale for untold support and encouragement, as well as access to many of the sources cited above.

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UNIFACIAL CORNER-TANG ARTIFACT REPORT:
An Investigation of an Unusual and Rarely Reported Lithic Tool

Bryant Saner, Jr. and Steve A. Tomka

ABSTRACT

Unifacial corner-tang artifacts are rarely reported in the literature. The limited information available suggests that there is a need to document and study this distinct artifact. Unifacial corner-tang artifacts may be associated with the more widely reported bifacial corner-tang artifacts found with Late to Transitional Archaic dart points. This paper has two goals: (1) report and describe this artifact type; and (2) establish the tool's functional category through the use of low-power use-wear analysis.

INTRODUCTION

In view of their more widely known bifacial counterparts (Patterson 1936, 1937), unifacial corner-tang artifacts are atypical and seldom reported in the archaeological literature. The term, unifacial corner-tang artifact, is used because it provides continuity with Patterson's (1936) earlier work with these artifacts.

Previously reported corner-tang artifacts are bifacially flaked (Patterson 1936, 1937). The distinguishing characteristics of the unifacial corner-tang tool are that they are unifacially flaked and have a stem morphology similar to the bifacial corner-tang artifact (Figure 1). Unifacial corner-tang artifacts have moderate flaking on their dorsal surfaces and minimal to no flaking on their ventral faces (Figures 2-5).

Unifacial corner-tang artifacts were first noted in the literature by Patterson (1936). Three specimens were described as typical scrapers in form, with a beveled edge and a flat or concave side. The only difference between these and the bifacial corner-tang artifacts described in his paper is the flat or unflaked ventral face. Patterson (ibid.) pictures only the flaked side of these specimens. He reports them from Bastrop, Hamilton and Travis Counties (ibid.), but does not mention whether they were found at sites that also contained bifacial corner-tang artifacts. However, all three counties have high numbers of bifacial corner-tang artifacts reported.

A unifacial stemmed tool is also mentioned in A. T. Jackson's (1936-37) report on The Fall Creek Sites in the Buchanan Lake area. It was recovered in San Saba County near the Llano County line. He identifies a specimen, found in Midden No. 1, Site No. 2, San Saba, County, as a "corner-tang of the diagonal type." It is made from a flake, has one flat side and is crudely chipped with secondary chipping around the edge. The tang is fairly well worked (ibid). He does not mention if this artifact is a knife or a scraper. He also reports the recovery of one complete corner-tang knife from Midden No. 1, Site No. 2.

In 1951 Sollberger mentioned a "stemmed scraper" in a report on three sites in Atascosa County, Texas. However, no description of this artifact is provided. The illustration shows this artifact to be a base-tang tool (Sollberger 1978: Figure 4). A broken bifacial corner-tang artifact was also recovered at the same site. Both artifacts are surface finds.

An additional unifacial tanged tool was found in Backhoe Trench 10 at the Panther Creek Springs site (41BX228, Black and McGraw 1985). It is the proximal one-third of a back-tang unifacial tool. The workmanship is crude by comparison to some of the specimens discussed in this report, although it is within the range of variation noted in this small collection. Also found in Backhoe Trench 10 was the proximal one-third of a bifacial back-tang artifact (ibid.).

The next mention of these artifacts is that of two mid-back tang scrapers recovered in Kerr County, Texas in the 1960s and reported in the literature in 1996 (Saner 1996). One each was found at 41KR71 and 41KR521. The artifacts are described as scrapers. Some may compare them to preforms, but the authors argue against this comparison. The stem is said to possibly be used to tie cordage, of some type, to the artifacts. Hafting the scrapers on a handle may not be feasible, due to the thickness at the base of both stems (3 mm). Bifacial corner-tang artifacts were also found in the sites mentioned above. It is implied that these tools may be associated with corner-tang knives (Saner 1996).

METHODOLOGY

As evident from the above discussion, in this report the location of the stem on the artifact is used to name the variations of the tool. This nomenclature follows Patterson (1936). The base-tang has the stem on a corner of the base opposite the long working edge. The diagonal-tang has the stem on the corner of the widest end of the artifact next to the lateral edge opposite the long working edge. The back-tang has the stem on the lateral edge opposite the long working edge and off center. The mid-back tang has the stem located in the center of the lateral edge opposite the long working edge. These names are used in order to give recognition and continuity to the artifacts in the archaeological record.

In discussing these artifacts a description must be given of the morphology of the original flake/blade blank on which the tool was made as well as the morphology of the tool. The terms used in describing flake morphology are shown in Figure 1, A. They serve to describe the manner in which the blank is used in tool manufacture. Figure 1, B shows the terms used to describe tool morphology.

Wear analysis was done with an Olympus binocular microscope at 80X under a Bausch and Lomb Illuminator. Included were the ten specimens described below and two specimens described in Saner's (1996) report. No wear analysis was conducted on the later two artifacts at the time of Saner's original report. The following section describes the morphological and use-wear characteristics of the twelve unifacial tanged artifacts. Metric and working edge characteristics are provided only for the ten newly reported artifacts. The discussion of the metric characteristics of the last two artifacts can be found in Saner (1996).

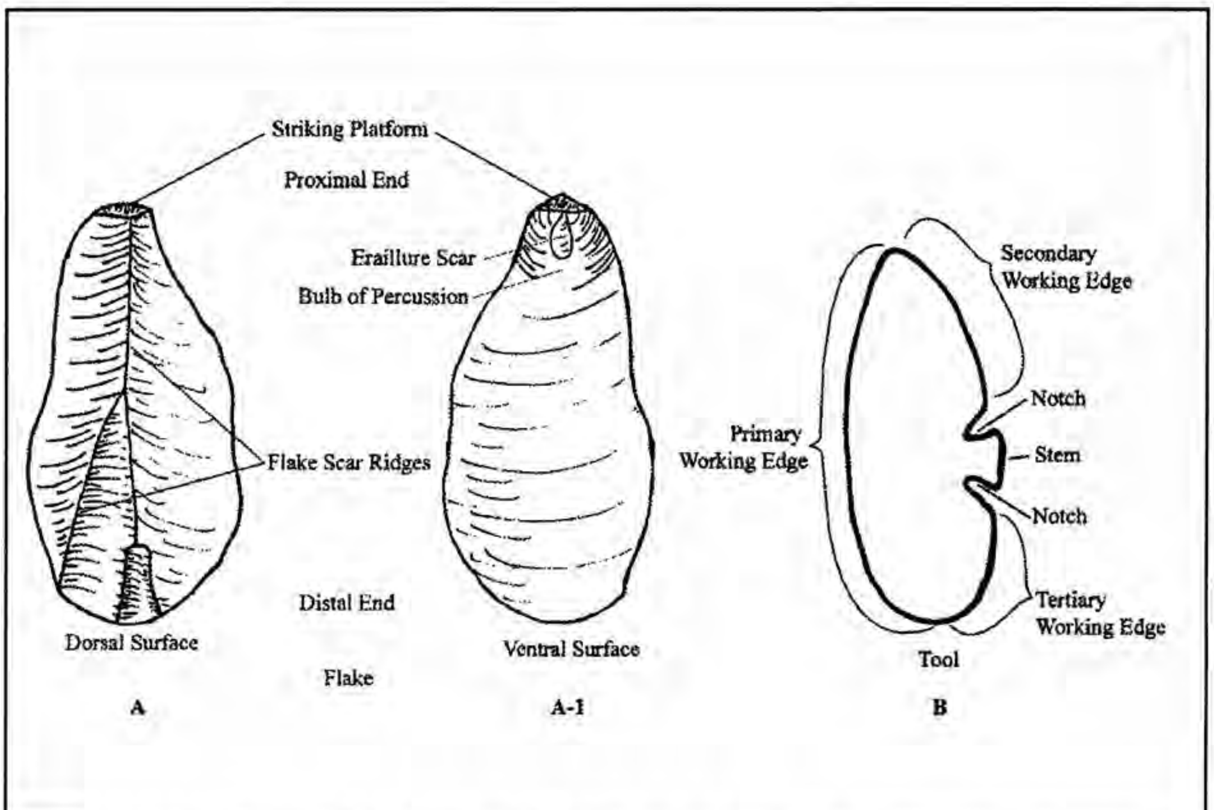

Figure 1. A, A-1, Flake/blade; B, tool terminology. Drawn by the author.

ARTIFACTS

Specimen 1 (Figure 2, top): This back-tang tool is made on a light gray tertiary soft hammer Georgetown flint blade. The tool has a plano-convex cross-section and is slightly curved along the longitudinal cross-section resulting in a somewhat curved working edge. The blade has a single faceted lipped striking platform. The unifacially retouched working edge runs along one lateral edge, while the small slightly expanding stem is on the opposite edge approximately one-third the length from the striking platform. The narrow expanding stem is bifacially flaked. Approximately one-third of the length from the distal end of the blade a second, even shorter, parallel stem has been manufactured. It is also bifacially flaked but it is less well formed than the slightly expanding tang immediately adjacent to it. The ventral surface of the working edge exhibits (1-1.5 mm long) macroscopic flake scars derived from use.

The dorsal surface of the long edge shows light polish that extends along the entire length. The dorsal surface of the well-formed stem shows light polish on the flake scar ridges, but no substantial evidence of hafting at 80X magnification. The smaller stem does not show any polish, ridge rounding, or evidence of hafting at 80X magnification.

The ventral surface of the long edge exhibits resharpening flakes mainly on the distal end. Retouch only penetrates 2-3 mm from the edge. The proximal portion shows very light polish along the working edge, but no retouch is present. The ventral surface of the well-formed stem exhibits light polish on the flat surface. The smaller stem also has light polish. This specimen was probably hafted, but the method of use did not generate much haft-wear.

Specimen 2 (Figure 2, middle): This back-tang tool is made on a light gray tertiary Georgetown flint flake. The flake is complete and has a hinged distal end and a striking platform that has been entirely removed in the process of shaping and resharpening the flake's main working edge. The tool has a plano-convex cross-section and a straight working edge. The short but slightly expanding stem is near the junction of the shorter distal edge and one lateral margin. The stem is bifacially retouched. No other flaking is present on the ventral face of the artifact. The longer unifacially retouched working edge runs the entire length of the tool. Portions of the edge opposite the heavily retouched one exhibit use-wear, in the form of irregular microflakes, but no retouch.

Specimen 3 (Figure 2, bottom): This diagonal-tang specimen is made on a tertiary blade. The diffuse bulb of percussion suggests that the blade was removed by a soft hammer percussor. The tool has a plano-convex cross-section and is severely curved along the longitudinal axis resulting in a curved working edge. The bifacially flaked expanding stem is located at the junction of one lateral margin and the distal end of the blank. The former platform of the blade has been obliterated by unifacial retouch at the pointed distal end of the tool. The longer edge of the tool, located opposite the expanding stem, is unifacially retouched and has a slightly concave to recurved outline. The ventral face of this edge also exhibits systematic retouch along its entire length. This retouch also represents the resharpening of worn portions of the working edge. The distal portion of this edge exhibits two overlapping burin scars that removed small portions of the working edge. Subsequent retouch on the ventral face of the edge has removed the proximal portions of these burin scars. It is impossible to determine whether these burin scars represent incidental use-wear generated during normal tool use, or the use of the tool's pointed distal end as a graver and the subsequent resharpening of the graver tip.

Specimen 4 (Figure 3, top): This back-tang tool is made on a medium-size tertiary blade. The tool has a plano-convex cross-section and is straight along most of its length except near the stem. Most of the working edge is straight along its longitudinal axis, with the curved portion occurring immediately adjacent the stem. The short, bifacially flaked, slightly expanding stem is located along one lateral edge of the blade adjacent to its former striking platform. The striking platform has been entirely obliterated through unifacial retouch. Both lateral margins of the tool exhibit unifacial retouch on the dorsal surface of the tool. The retouch extends from the former platform of the blade to the pointed distal end of the specimen, along the longer of the working edges. The shorter working edge found on the same side as the stem has been retouched primarily along the distal portion of the tool. Both edges also exhibit remnants of the ventral face retouch; however, large portions of these flake

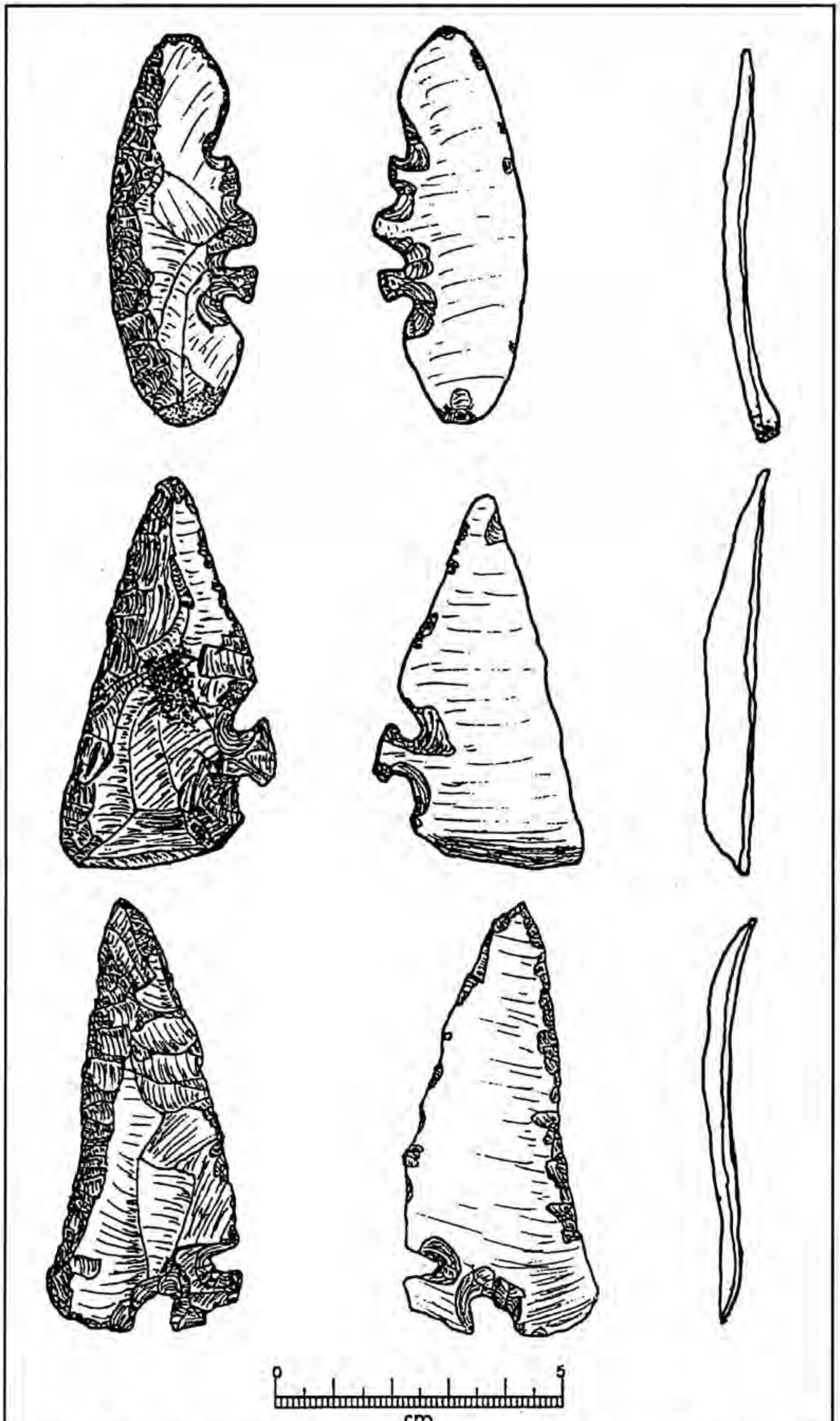

Figure 2. Dorsal, ventral and lateral views of unifacial corner-tang artifacts. Specimen 1, top; Specimen 2, middle; and Specimen 3, bottom. Author illustration.

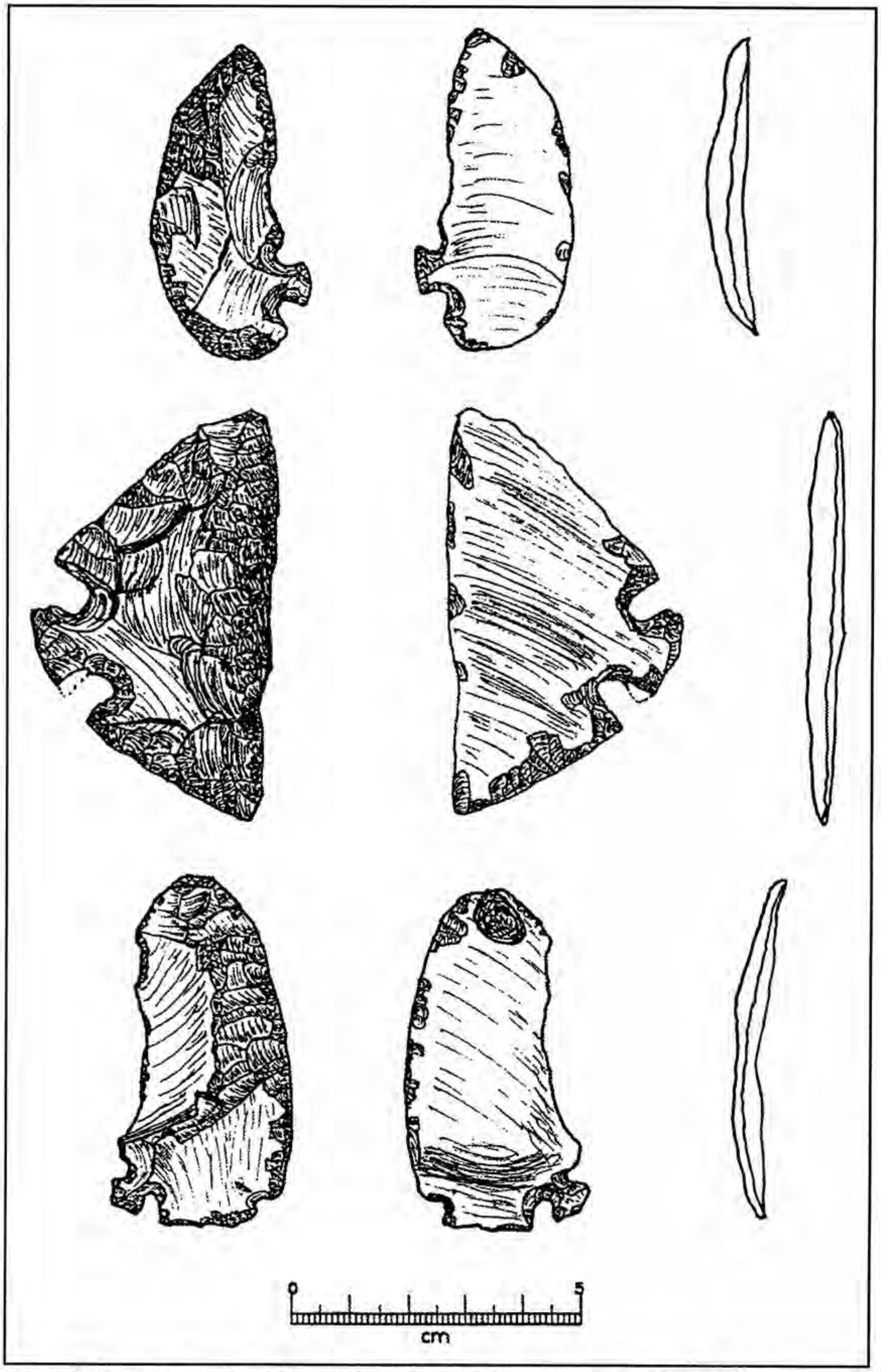

Figure 3. Dorsal, ventral and lateral views of unifacial corner-tang artifacts. Specimen 4, top; Specimen 5, middle; and Specimen 6, bottom. Author illustration.

scars have been obliterated by subsequent resharpening along the dorsal face of the tool.

Specimen 5 (Figure 3, middle): This is a back-tang tool made on the distal end of a very large tertiary flake. The tool has a plano-convex cross-section and is straight in longitudinal cross-section. The former striking platform of the flake blank is no longer visible. It may have been removed during manufacture of the blank or the blank used in making the artifact might have been a distal flake fragment. The notched expanding stem is at the juncture of the distal end and one lateral margin. The unifacially flaked working edge is opposite the stem and runs tangentially across the length of the flake. The longest edge of the specimen opposite the stem exhibits the heaviest retouch, although light retouch is found on the two shorter edges as well. While the great majority of the retouch is from the dorsal face of the blank, the shorter edge found at the bottom of the specimen, exhibits invasive retouch off the ventral surface of the flake. The notches that form the expanding stem were bifacially flaked. One corner of the stem has a burin-like flake removal scar which initiated from the base. This removal may have occurred as a result of the haft element being jammed forward or the blade being jammed back against the haft while the tool was in use.

Specimen 6 (Figure 3, bottom): This is a diagonal-tang tool made on a tertiary blade. It has a plano-convex cross-section and is slightly longitudinally curved resulting in a curved working edge. The former striking platform of the blade blank has been removed during the unifacial retouch of the working edge. The very small diagonal stem is located on the distal end of the blade, at the junction of one lateral and the distal edge. The notches are bifacially flaked. The juncture of the working edge and distal flake edge, opposite the diagonal stem already has a shallow notch and distal edge retouch suggesting that in an earlier phase the knapper might have wanted to make the other long edge the working edge of the tool. The working edge exhibits numerous unifacial flake removals on the dorsal face, used to shape and resharpen the edge. The ventral face of this edge also exhibits 1- to 5- mm-long flake scars which represent a combination of use-wear and intentional pressure retouch. These flake scars are longest in the vicinity of the bulb of percussion, although they were not intended to thin the relatively diffuse bulb. The second long edge of the tool, opposite the heavily retouched working edge, also shows use-wear in the form of 1- to 2- mm- long shallow flake scars.

Specimen 7 (Figure 4, top): This diagonal-tang tool is made on a secondary soft hammer blade with a lipped single faceted striking platform. The tool has a plano-convex cross-section and is severely curved along the longitudinal cross-section resulting in a curved working edge. The shorter diagonal stem is found at the distal end of the blank opposite the striking platform. One notch is bifacially flaked while the other exhibits only unifacial flaking. The unifacially retouched working edge is on the left side of the flake, opposite the diagonal stem. Contrary to other specimens, ventral face retouch is entirely absent on this tool.

Specimen 8 (Figure 4, middle): This back-tang tool is the largest of the specimens described in this report. It is made on a large secondary flake with only a very small portion of cortex retained in the vicinity of the striking platform. The tool has a plano-convex cross-section and a slight longitudinal curvature resulting in a curved working edge. The somewhat wider but nearly parallel stem edges are found on the left side of the blank and are made adjacent to the bulb of percussion. Both lateral edges exhibit unifacial retouch as well as use-wear. In addition, the short edge of the tool, immediately adjacent to the stem is heavily flaked from the ventral face. This flaking appears to have been directed towards the thinning of the former striking platform and bulb of percussion. The only additional ventral face retouch was carried out in conjunction with the manufacture of the stem.

Specimen 9 (Figure 4, bottom): This is a proximal fragment of a diagonal-tang tool made on a secondary light gray Georgetown flint flake. The tool has a plano-convex cross-section and is slightly curved along the longitudinal cross-section resulting in a slightly curved working edge. With the exception of the bifacially flaked slightly expanding stem, no other retouch is noted on the specimen The stem is located along the distal end of the flake blank at the junction of the longer lateral edge and the shorter distal margin. The longer lateral edge opposite the stem exhibits macroscopic use-wear, in the form of small (1- to 1.5-mm-long) flake scars distributed primarily on the dorsal face of the flake. Similar but much fewer flake scars are also found on the ventral face of the same

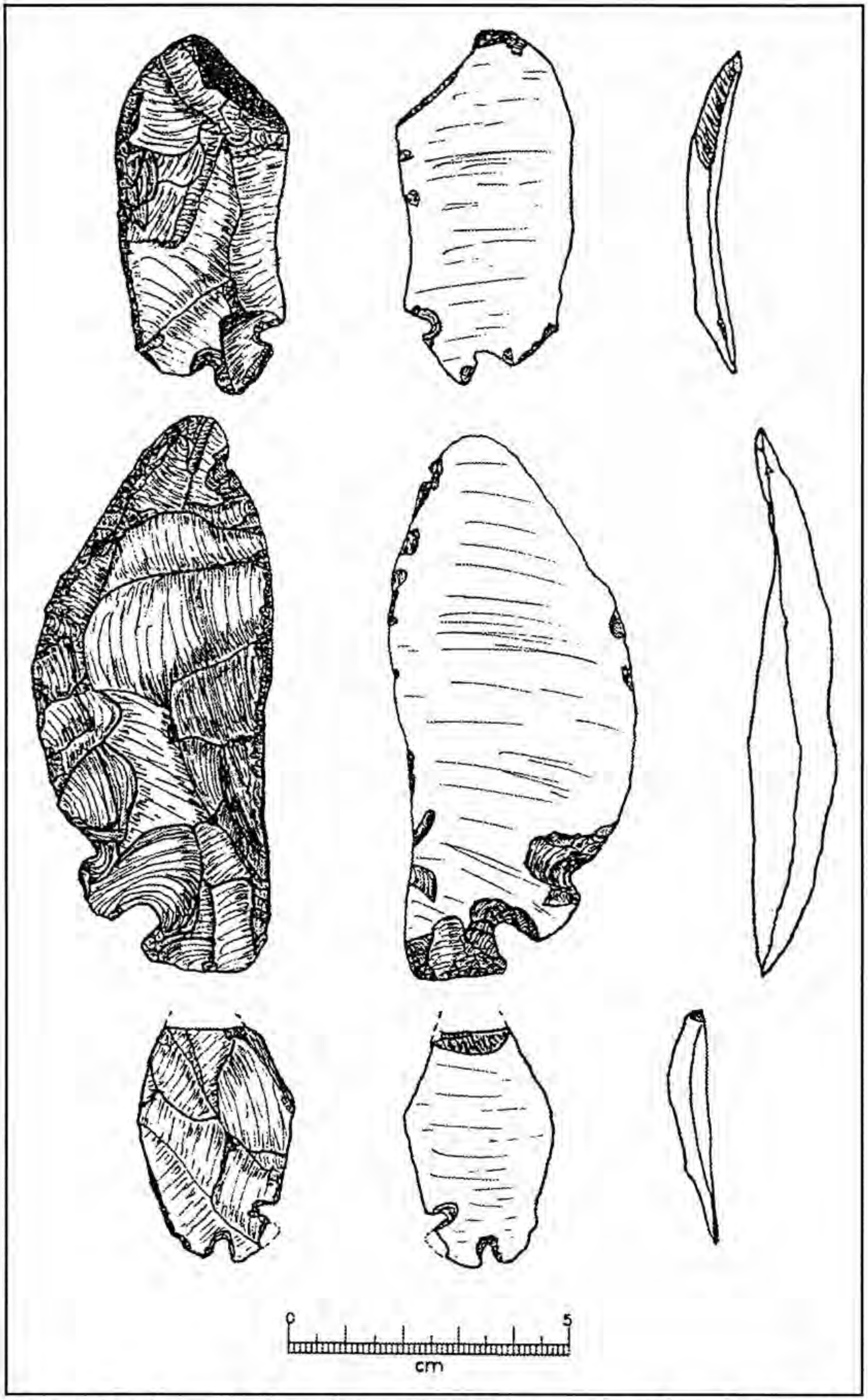

Figure 4. Dorsal, ventral and lateral views of unifacial corner-tang artifacts. Specimen 7, top; Specimen 8, middle; and Specimen 9, bottom. Author illustration.

edge. The shorter opposite edge has similar macroscopic traces although the degree of wear is significantly less along this edge. The cause of breakage could not be determined based on the morphology of the break found at the distal portion of the tool. A small imbedded fracture plane immediately adjacent one edge suggests that the breakage may have been precipitated by this weakness in the flake blank. Although use-wear is present along both lateral edges of this specimen, it is unclear whether it derives from the use of the flake as an expedient cutting tool prior to the construction of the stem or whether the tool was used and broken in use along the imbedded fracture plane. The absence of retouch to shape the working edges suggests that at least in some cases the working edges of these tools did not need to be prepared prior to use.

Specimen 10 (Figure 5): This mid back-tang tool is a longitudinally broken fragment. The flake blank has a plano-convex transverse cross-section and is straight along its longitudinal axis. It is made on a light-gray secondary flake of Georgetown flint. The relatively wide expanding stem is located at the proximal end of the flake blank and its manufacture has obliterated any signs of the platform. This stem is bifacially flaked. The distal end of the tool, which is also the distal end of the flake blank, exhibits some unifacial flaking intended to shape the distal cutting edge by thinning a relatively thick fracture face. A longitudinal break, generated in the process of flaking the right notch of the stem, split the flake blank along its longitudinal axis. Some unifacial retouch is evident on the ventral face of the edge opposite this broken edge. A single, unifacially flaked notch in the center of this edge may have been intended to form a second stem on the tool. No use-wear or haft-wear are noted on this specimen.

Specimen 41KR71 (not illustrated): The dorsal surface edge opposite the stem has light edge grinding of the flake scar ridges. Significant localized polish on both high spots and deeper set negative flake scars is noted. Most rounding and polish stops at the edges of the flake scar terminations. The dorsal stem shows

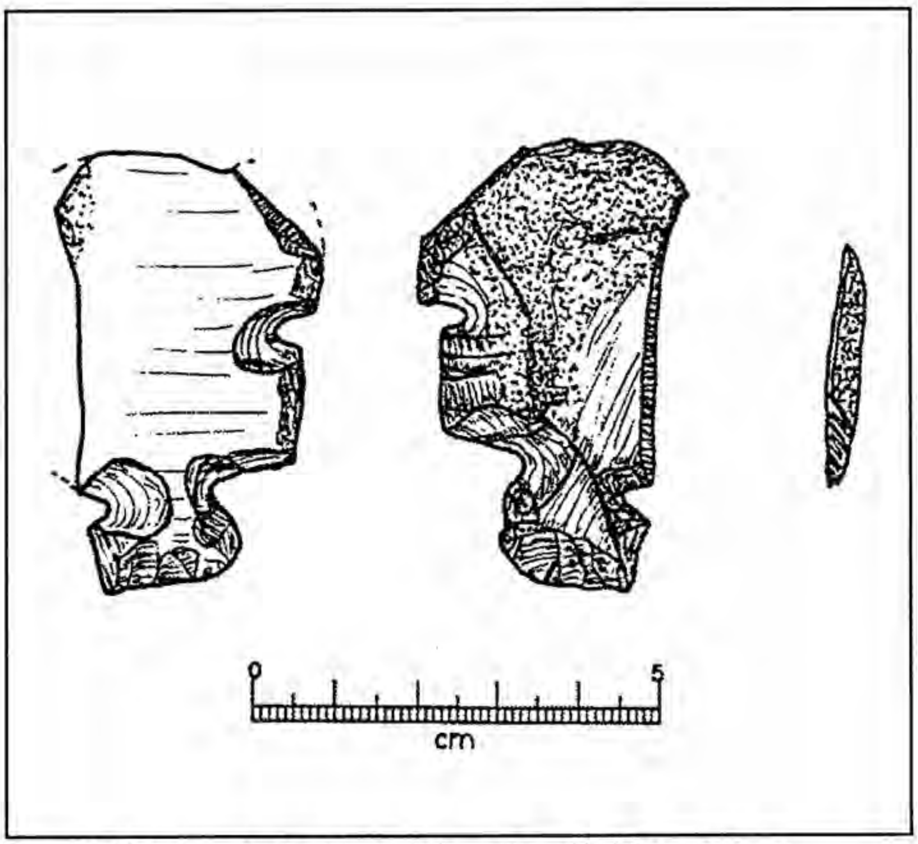

Figure 5. Dorsal, ventral and lateral views of a unifacial corner-tang artifact–Specimen 10. Drawn by the author.

significant rounding and moderate polish on the flake scar ridges. Rounding and polish is limited to the high spots. Shallow flake scars along the entire ventral surface of the working edge penetrate between 2-5 mm from the edge. Most of these flake scars are the result of purposeful retouch. A significant amount of light polish on the ventral surface adjacent to the working edge is noted. Light polish is evident on the flat ventral surfaces of the stem, but no ridge rounding is present. Asphaltum-like residue is seen on the edge of the stem.

Specimen from 41KR521 (not illustrated): The dorsal surface shows moderate grinding and substantial polish along localized portions of the remaining working edge. Flake scar ridge-rounding and polish extends to the intersection with the dorsal cortex. The dorsal face of the stem, for the most part, is covered by cortex. Ridge-rounding and polish is evident on the few flake scars present on this side of the stem. Moderate polish is seen at the narrow portion of the neck. The ventral surface exhibits some shallow and some moderately deep flake scars along the working edge. Flake scar ridges are only slightly rounded. Light to moderate polish is seen in both flake scars and unretouched ventral surfaces approximately 10-15 mm from the edge. There is light to moderate polish on the flat ventral surfaces. Asphaltum-like residue is present on the stem.

The dimensions and other quantifiable characteristics of the first ten artifacts described above are shown in Table 1. Working edge angles, as well as the lengths of the primary, secondary, and tertiary working edges are presented in Table 2.

DISCUSSION

The unifacial corner-tang artifacts described above are found primarily in Central Texas (Figure 6). Of the ten specimens in this report, four are from Bell County (Specimens 1, 2, 9 & 10), two are from Lampasas County (Specimens 3 & 4) and four are from Llano County (Specimens 5, 6, 7 & 8). The distribution of the other tools mentioned in this report consists of: one each recovered in Atascosa (Sollberger 1978), Bastrop (Patterson 1936), Bexar (Black and McGraw 1985), Hamilton (Patterson 1936), San Saba (Jackson 1936-37) and Travis Counties (Patterson 1936), and two recovered in Kerr County (Saner 1996). Bifacial corner-tang artifacts have also been reported from all of these counties, and the area is located in the midst of a region with high densities of corner-tang artifacts (see Patterson 1936, 1937).

The tools found in Bell County were recovered in association with bifacial corner-tang artifacts and Ensor dart points (Mike McGuire personal communication 1996). Those from Lampasas County were associated with bifacial corner-tang artifacts, Ensor and Marcos dart points and bison bones. The artifacts recovered in Llano County were associated with bifacial corner-tang artifacts, Ensor, Frio, Marcos and Montell dart points (Billy Ellett personal communication, 1996). The diagnostic dart points found with the unifacial corner-tang artifacts are also found with bifacial corner-tang artifacts. The Rudy Haiduk Site in Karnes County reveals a human burial with Marcos dart points associated with bifacial corner-tang artifacts (Mitchell, Chandler and Kelly 1984). The McCann Site located in Lampasas County yielded four bifacial corner-tang artifacts recovered in levels with high numbers of Ensor, Montell and Frio dart points (Preston 1969). Hall (1981) reports two bifacial corner-tang artifacts recovered from a burial in Austin County, Texas. Radiocarbon dates on bone samples from the same zone as the burial yielded median ages 520 B. C. and 360 A. D. These diagnostic artifacts and dates fall in the Late Archaic (1000 B. C.-300 B. C.) and the Transitional Archaic (300 B. C.-700 A. D.), while bifacial corner-tang artifacts are Late Archaic (Turner and Hester 1993). Figure 7 shows the relationship of the time periods for diagnostic artifacts found associated with unifacial corner-tang artifacts.

The wear analysis described here indicates that the unifacial corner-tang artifacts were used for cutting soft and perhaps fibrous materials. There is no indication that these tools were used to cut hard materials such as wood or bone. This pattern is very similar to the indicated uses of the bifacial counterpart as a cutting tool. It is suggested that bifacial corner-tang artifacts are used for cutting meat, skinning, working hides and cutting vegetable material. Both types of tools are probably used for cutting by push-pull method (Kraft 1994).

Hafting and/or the attachment of cordage is indicated in all of the tools in this report, with the exception of Specimen 10. This tool was broken during manufacture and never used as an implement. Specimens from 41KR71 and 41KR521 have

Table 1. Unifacial Corner-Tang Artifact Dimensions: Gross Dimensions (mm)

Spec. No.	Max. length	Max. width	Max. thickness	Stem length	Stem base width	Stem neck width	Stem neck thickness
1	66	26	6	6	6	5	4
2	68	35	9	6	9	7	5
3	78	38	6	9	15	9	5
4	63	27	6	5	8	7	4
5	70	41	7	10	17 Est.	11	5
6	59	30	7	7	7	5	3
7	62	30	8	7	11	9	3
8	97	42	12	9	12	14	5
9	45 broken	29	7	4	9	8	3
10	55	31	6	15	18	13	6

Table 2. Unifacial Corner-Tang Artifact Dimensions: Blade dimensions.

Spec. No.	3 angles on primary working edge	3 angles on secondary working edge	2 angles on tertiary working edge	Length of primary working edge	Length of secondary working edge	Length of tertiary working edge
1	46, 47, 44			64		
2	46, 58, 71	32, 35, 44		65	37	
3	62, 46, 42	29, 24, 30		63	38	
4	38, 35, 61	54, 41, 36		62	31	
5	33, 51, 44	40, 32	33, 35	68	22	44
6	34, 31, 28	19, 21, 20		55	33	
7	29, 26, 27	28, 30, 35		58	22	
8	28, 43, 62	40, 42, 51		81	69	
9	29, 31, 34	54, 21, 20		32	30	
10	Has no working edges					

Note: All angles are measured in degrees. Lengths are in millimeters.

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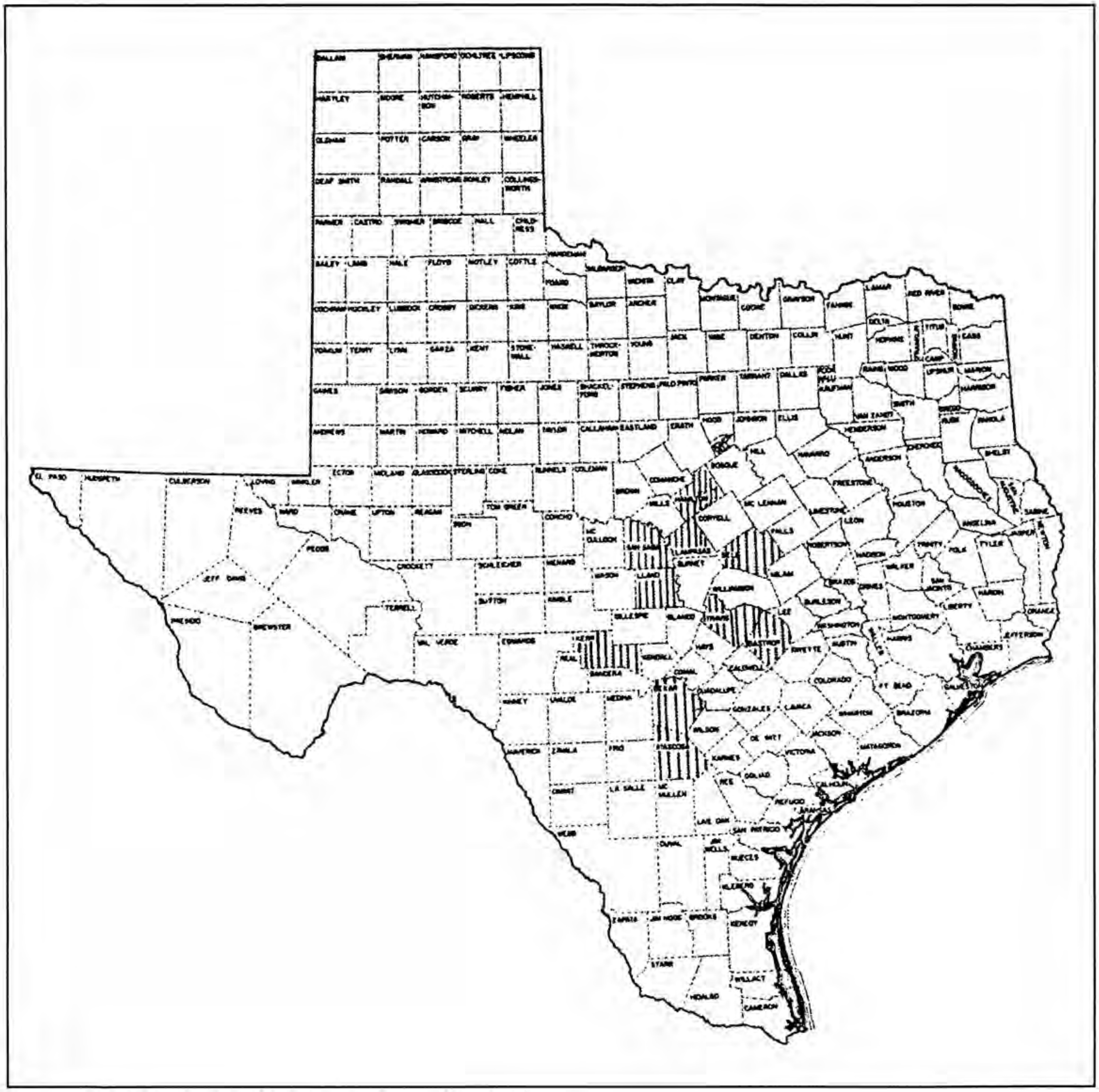

Figure 6. Distribution of unifacial corner-tang artifacts in Texas.

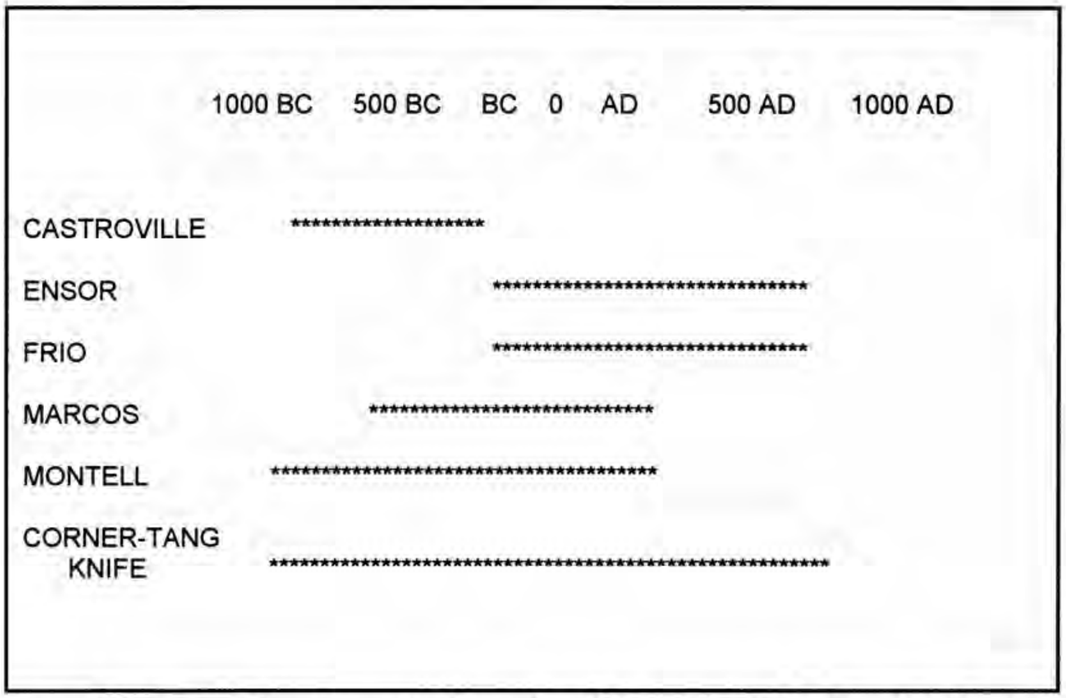

Figure 7. Age range of most common diagnostic artifacts associated with unifacial corner-tang artifacts.

asphaltum-like residue on the stem edges indicating its use as a glue for hafting. Hafting is also indicated in many of the bifacial artifacts, but not all. McReynolds (1984) for instance, notes that three out of four bifacial corner-tang artifacts (Val Verde County) examined by him showed indications of hafting, while a fourth did not. It is possible that some of the non-hafted artifacts were used by hand or had cordage secured to the stems. Hafted tools are best suited for use with a push-pull action rather than a side action for scraping. A side action may put undue pressure on the stem causing it to break (Saner 1996). All stems on unifacial corner-tang artifacts used and referenced in this report are intact. Specimen 5 has a small fragment missing from one corner of the stem; however, this should not have prevented it from being hafted and used.

CONCLUSION

Unifacial corner-tang artifacts are used in conjunction with bifacial corner-tang artifacts. They are found associated with one another and they are associated with many of the same type of diagnostic artifacts. The small number of artifacts described in this report are all from counties with previously reported bifacial corner-tang artifacts. Several of the Central Texas counties have high numbers of bifacial corner-tang artifacts reported. It is the opinion of the authors that unifacial corner-tang artifacts represent "expedient" and "minimally retouched" variants of the more common bifacial corner-tang implements. The amount of effort used in manufacturing these unifacial tools was significantly less than what went into making the bifacial tool. Nevertheless, the evidence of hafting on most specimens suggest that these unifacial variants were curated to some degree.

Unifacial corner-tang artifacts are found associated with Late to Transitional Archaic artifacts (Figure 7). It is likely therefore that the artifacts date to the Late to Transitional Archaic time period or between 1000 B. C. to 700 A. D. The tools were used for cutting soft and/or fibrous material such as animal and plant tissue. This was done with a push-pull action. All specimens used in this study, except specimen 10, were hafted for use. This is not the case with the bifacial artifacts as not all have indications of hafting. All unifacial corner-tang artifacts may not have been hafted either despite the evidence in this report. Some may have been used by hand or had cordage secured to the stem. There is no use-wear evidence indicating their use as hafted scrapers. Such use would apply lateral pressure increasing the likelihood of snapping the stem. No broken stems are present in this assemblage.

Specimen numbers 1, 2, 9, 10 and both artifacts from Kerr County (41KR71 and 41KR521) have been donated to the Texas Archeological Research Laboratory in Austin, Texas. This will provide an opportunity for further study of these unusual artifacts.

ACKNOWLEDGMENTS

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PREHISTORIC FLINTKNAPPING SPECIALISTS IN TEXAS

Leland W. Patterson

ABSTRACT

The manufacture of wide, thin bifaces in Texas is discussed as possibly indicative of the presence of craft specialists in mobile hunter-gatherer groups. The Bell-Andice dart point, the Folsom fluted point, the Gahagan biface, and the corner-tang knife are used as examples.

INTRODUCTION

There is much evidence for flintknapping specialists in sedentary societies, such as the Maya in Belize (Hester 1976). A question can be asked if there were also flintknapping specialists in mobile hunter-gatherer societies. This article considers some examples in Texas that indicate that flintknapping specialists may have been present in mobile hunter-gatherer groups.

Comments made here are based on my experience in experimental flintknapping, and observation of the skills of other modern knappers. Flintknapping skill for the manufacture of chipped stone bifaces, such as knives and projectile points, is based on a good knowledge of fracture mechanics and good coordination in being able to apply the appropriate amount of force at the desired spot on the piece being worked. Results are enhanced by selection of good quality raw materials, the use of relatively thin flake blanks, and the heat treatment of chert to lower tensile strength. Even skilled flintknappers can produce crude results if good quality raw material is not used. J.B. Sollberger (personal communication) emphasized that good striking platform prepartion is one of the most important steps in the manufacture of bifaces.

The basic steps in the manufacture of chipped stone bifaces are well known to modern knappers (Callahan 1979; Whittaker 1994). These steps are: (1) manufacture of a flake blank by primary reduction of raw material, (2) heat-treatment of chert is often desirable to lower the tensile strength of the material (Patterson 1981; Purdy and Brooks 1971), (3) percussive flaking to produce a bifacial preform, and (4) pressure flaking of edges to produce the finished biface.

This article considers examples in Texas for two types of bifacial stone artifacts where flintknapping specialists may have been present: dart points and large, thin bifaces. It is concluded that flintknapping specialists were present in some mobile hunter-gatherer groups, but that many individuals in most groups could produce serviceable bifacial tools and projectile points without the need of craft specialists.

DART POINTS

Dart points are the most common type of prehistoric bifacial artifacts in Texas and much of North America. My observation of large numbers of flintknappers at 'knap-ins' in Texas is that most dedicated individuals can learn to produce serviceable bifacial dart points in one to two years. There are wide variations in the skills of individual knappers, however, with only a small proportion of really skilled individuals.

One attribute for judging the skill of a flintknapper is the width-to-thickness (W/T) ratio of the finished biface. Callahan (1979) has discussed the skills involved in producing thin bifaces with W/T ratios of over 5.0. As an average flintknapper, I usually produce dart points with a W/T ratio of 3 to 4. I have known several individuals who could consistently produce dart points with W/T ratios of 5.0 or greater.

Hunting was a basic subsistence need of prehistoric hunter-gatherers. It seems likely that many individuals in hunter-gatherer groups could have manufactured serviceable dart points without the need to produce masterpieces. Many modern flintknappers with average skill can replicate most dart point types found in Texas. There are two types of dart points that require special manufacturing skills, however.

The Folsom fluted point (Turner and Hester 1993: 120) requires special skill for removing channel flakes to produce flutes on each face of the point. Most modern flintknappers cannot make Folsom replicates. Sollberger (1988) has discussed the special steps needed to make long flutes by use of pressure force. Very thin Folsom points are easily broken during the removal of channel flakes. Based on the observation that there are wide variations in the skills of modern flintknappers, it seems reasonable to propose that each Folsom social group had knapping specialists to make Folsom fluted points. Some Folsom groups may even have traded with other groups for points, if no individuals were present with sufficient skills to make Folsom fluted points.

Bell points with deep basal slots are sometimes classified as Andice (Turner and Hester 1993:71), although studies of attributes have shown that there is probably not a true dichotomy between Bell and Andice point types (Weber and Patterson 1985; Weber 1986). It appears that the same people were making Bell and Bell-Andice points, without sharp cutoff points for discriminant analysis of the thicknesses and slot lengths of Bell and Andice points.

I have a cast of a Bell-Andice point from Bell County, Texas that can be used as an example of special manufacturing skills needed. This specimen (Figure 1A) has a length of 86.0 mm, a maximum width of 49.6 mm, a maximum thickness of 7.1 mm, and a W/T ratio of 7.0. The two basal slots have lengths of 28.8 mm and 28.5 mm. A very skilled flintkapper would have been needed to produce this thin, wide biface, with the high W/T ratio.

I have observed only one person, Carey Weber, who could consistently produce Bell-Andice points with very long slots. Slots were made by Weber using a thin, flat piece of antler as a punch for indirect percussion (Weber 1994) It would be easy to break the long, narrow barbs during slot formation. It is concluded that Bell points of the Andice variety may have been made by craft specialists in many cases. On the other hand, average Bell points with shorter slots and lower W/T ratios were probably made by many Indians who had average knapping skills.

LARGE BIFACES

There are two types of large, thin bifaces in Texas that may have been made by craft specialists: the Gahagan biface (Turner and Hester 1993:255) and the corner-tang knife (Turner and Hester 1993: 250). The manufacture of large, thin bifaces requires extra skills because longer thinning flakes are needed. Callahan (1979:152) has discussed the special care in platform preparation to remove long thinning flakes for the manufacture of Solutrean laurel leaf biface replicates with W/T ratios of 8.0 to 10.0.

I have a cast of a Gahagan biface from the George C. Davis Caddo Indian site near Alto, Texas (Nunley 1989:116). This specimen has a length of 217.0 mm, a maximum width of 52.8 mm, a maximum thickness of 7.5 mm, and a W/T ration of 7.0. The original specimen was made of Central Texas chert. This wide, thin biface would have required special knapping skill. This appears to be an example of a very well-made biface manufactured in Central Texas for external trade.

Only very skilled flintknappers can make wide, thin bifaces. I have a biface made by master flintknapper J.B. Sollberger that has similar dimensions to the Gahagan biface from the Davis site. This specimen has a length of 196.0 mm, a maximum width of 49.0 mm, a maximum thickness of 8.0 mm, and a W/T ratio of 6.1. A smaller Gahagan biface (Figure 1B) made by Sollberger has a length of 112 mm, a maximum width of 40.2 mm, a maximum thickness of 6.5 mm, and a W/T ratio of 6.2.

Another type of large, thin bifaces made in Central Texas is the corner-tang knife. Patterson (1936: Table 1) shows that Bell County and surrounding counties have the largest number of corner-tang knives, which indicates this area to be the manufac-

Table 1. Corner-Tang Knife Dimensions

	Dimensions, cm				
Site	**L**	**W**	**T**	**W/T**	**Reference**
41FB3	17.1	5.1	1.0	5.1	Patterson et al. 1998
41AU36	28.8	5.1	0.9	5.7	Hall 1981;153
41AU36	22.1	7.3	1.2	6.1	Hall 1981:153

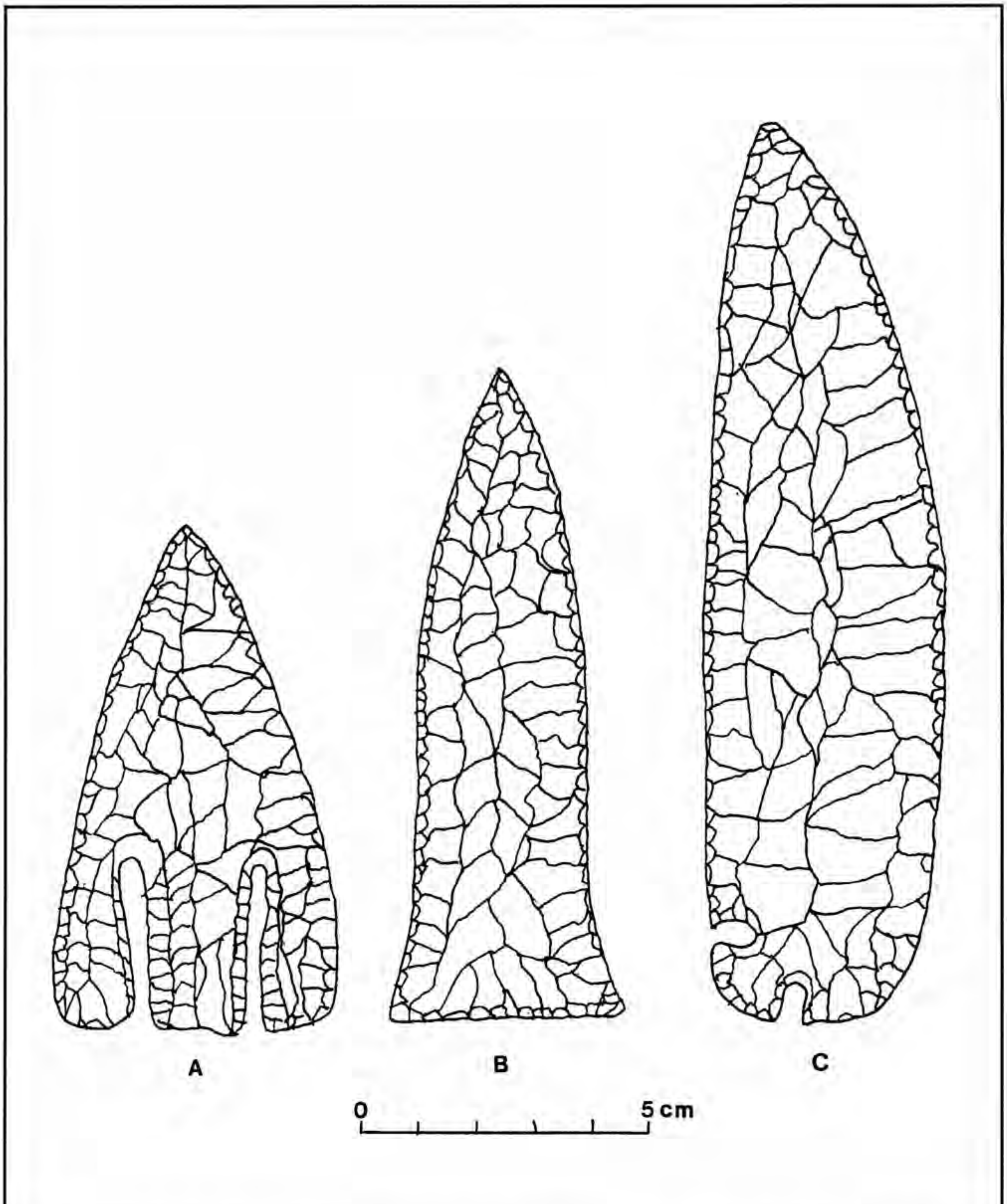

Figure 1. Bifacial Artifact Examples. A, Bell/Andice point; B, Gahagan Biface; C, Corner-Tang Knife.

turing center. Three corner-tang knives made of Central Texas cherts from sites in Southeast Texas can be used as examples, with dimensions shown in Table 1. These wide, thin bifaces have a range of W/T ratios from 5.1 to 6.1. Very skilled flintknappers, possibly craft specialists, would have been required to manufacture these specimens. Corner-tang knives found in Southeast Texas represent long-distance trade from Central Texas.

I have two corner-tang knives made by master flintknapper J.B. Sollberger. One specimen (Figure 1C) has a length of 154 mm, a maximum width of 41.5 mm, a maximum thickness of 7.4 mm, and a W/T ratio of 5.6. The other specimen has a length of 139 mm, a maximum width of 67.0 mm, a maximum thickness of 8.4 mm, and a W/T ratio of 8.0. These specimens are good examples of wide, thin bifaces produced by a very skilled flintknapper.

SUMMARY

This article has discussed the manufacture of wide, thin chert bifaces as possible indications of craft specialization by mobile hunter-gatherer groups. The Bell-Andice dart point, the Folsom fluted point, the Gahagan biface, and the corner-tang knife have been used as examples of flintknapping specialists in Texas. Generally, the manufacture of wide, thin bifaces with width-to-thickness ratios over 5.0 requires very skillful knapping ability. Also, making long basal slots in Bell-Andice points, and removal of channel flakes for Folsom point flutes require very skilled knapping ability.

It seems likely that flintknapping specialists were required to produce the types of thin bifaces discussed here. In contrast, it is probable that many individuals in mobile hunter-gatherer groups were capable of producing serviceable dart points with width-to-thickness ratios under 5.0.

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A BRIEF COMMENT ON ESTIMATING RATES OF BURNED ROCK DISCARD: RESULTS FROM AN EXPERIMENTAL EARTH OVEN

Jeff D. Leach, David L. Nickels, Bruce K. Moses, and Richard Jones

ABSTRACT

An experimental burned rock pit oven was constructed using Edwards Limestone cobbles as heating elements. The hot rocks were covered with cactus pads, venison, sotol hearts, carrots, and potatoes and were baked in the oven over a 39-hour period. Thermocouples were placed in the oven to monitor the fluctuation in temperatures. Observations were made on the fracturing that occurs when limestone cobbles are heated and then reheated. Finally, inferences are made on the accumulation of burned rocks and reuse of burned rock middens in Central Texas.

INTRODUCTION

To estimate the number of cooking events that a given scatter or pile of charred and fragmented rocks represents, it is necessary to have some understanding of the rates and processes of rock discard. Simply, how many times can a given stone be subjected to repeated heating and cooling before it fragments, and thus is discarded. Unfortunately, the answer is complex. Variables such as rock size, lithology, amount and type of fuel wood, length of exposure to heat, type of heat, pit morphology, cooking environment, and so on affect the rates at which rocks are broken and subsequently cycled from their systemic context to an archaeological one. In addition, what constitutes an unusable (e.g., how small is too small?) and thus discarded rock is poorly developed in hot-rock cooking. That is, one person's spent rock is another person's reusable one.

Aside from some of the more obvious factors affecting the process of rock discard, the length of time a stone may be curated (see Shott 1996) may be linked in no small way to raw material availability. In some environments, where raw materials for cooking stones may be scarce, scavenging and recycling may be the norm. As a result, much of the archaeological burned rock in these settings may be small, having been exhausted through repeated use and curation (see Camilli and Ebert 1992). Conversely, in areas where raw materials for cooked stone are abundant, burned rocks may be discarded at an accelerated rate. Therefore, raw material source may have an impact on the curation of stones used in hot-rock cooking and thus influence rates of discard.

The current experiment focuses on discard rates for limestone cobbles typically available immediately southeast of the Balcones Escarpment, and how this may be used to model the accumulation of burned rock middens, such as one recently investigated (Culebra Creek Site, 41BX126) northwest of San Antonio by the Center for Archaeological Research (CAR) (Nickels and Bousman 1997). As a result of our admittedly narrow research focus, other characteristics of thermal alteration, such as color change, fracture type, and so on, were not systematically recorded (see Pagoulatos 1992); nor were multiple experiments conducted that recorded fracture rates on various types of raw materials.

Potential rates for burned rock discard were simulated in an experimental earth oven in which we cooked 279 pounds of food. During the experiment, temperatures over a 39-hour period were monitored with thermocouples placed at strategic locations in the oven facility. The results of this experiment indicate a shorter effective use-life for rocks in earth ovens than is currently being reported for the Central Texas area (see Black 1997; Black et al. 1997). This is important, as the survival versus failure of limestone rocks used as heat sinks in earth ovens has far reaching implications for burned rock research. Specifically, the rates at which rocks are discarded informs one about the rate at which the discard pile grew. Simply varying the number of times that a given rock or set of rocks is used may dramatically effect estimates of rock accumulation.

THE EXPERIMENT

The experiment was established in an open area behind the lab at CAR. The area was less than ideal, due to the limited space, but did provide a water source in case of emergency. A pit measuring approximately 1.30 meters in diameter and 30 cm in depth was excavated. The overall shape of the pit was round and basin-shaped in profile. The substrate was a dry, clayey-loam (B-horizon) with some gravels and larger clasts present.

Approximately 63 kgs (139 lbs.) of fuel wood was loaded into the pit. The wood included mostly (ca. 80 percent) mesquite (*Prosopis*) and some oak (*Quercus*). Small pieces of unidentified wood species were used for kindling. The fuel wood was then lit with matches; no other artificial flammables were used. The fire was allowed to burn for about 30 minutes before 26 limestone cobbles weighing 91 kgs (ca. 200 lbs.) were added to the pit. The limestone cobbles weighed an average of 3.5 kgs (7.7 lbs.) and ranged from 16–25 cm in overall length. The stones used in the experiment were collected from Culebra and Helotes Creeks near the Culebra Creek site, 41BX126 (Nickels and Bousman 1997) and are thought to represent the same raw materials sources exploited by the inhabitants who created the large midden at that site. Both creeks drain primarily through the Edwards formation and the rounded Edwards limestone cobbles used in this experiment were transported downstream to the base of the escarpment. The cobbles were dry when we collected them.

After about three hours the fire began to die down and a bed of coals had accumulated in the bottom of the pit. During the firing and subsequent heating of the limestone cobbles, every effort was made to keep the rocks in constant contact with, and on top of, the burning fuel wood. This was accomplished by constantly moving the stones around with sticks and shovels. In addition, the fuel wood was frequently hit with a stick to accelerate the accumulation of coals. Though not systematically monitored, the temperatures within the hot-rock bed (Black et al. 1997) during the initial firing ranged from 650°–900°C. During the firing of the oven, no cobbles broke. However, several small fragments (spalls) came flying out of the pit during the initial firing.

Once the fuel wood had been sufficiently reduced to coals (3.5 hours), the now-hot rocks were spread across the bottom of the pit. Every effort was made to keep the thick (ca. 10 cm) bed of coals under the hot rocks. The rocks and coals were moved about in the pit with long sticks and shovels. Once the hot-rock bed was created, the pit was ready to be loaded with food.

Sotol (*Dasylirion wheeleri*) bulbs and leaves, and prickly pear (*Opuntia phaeacantha*) pads were harvested from the area around CAR. A layer of sotol leaves was placed on top of the hot rocks to act as insulation (note that the sotol leaves were not weighed). At this point the oven created a tremendous amount of steam as the moisture in the green leaves vaporized as it came in contact with the hot rocks. Upon this first layer of insulate (packing material), 34 kgs (75 lbs.) of prickly pear (*Opuntia phaeacantha*) pads were laid in the oven. The pads (food) were spread evenly over the bottom of the oven, covering the underlying insulate and hot rocks completely. On top of this, 15 kgs (33 lbs.) of deer meat and assorted vegetables wrapped in aluminum foil were placed in the center of the pit. A total of 32 kgs (71 lbs.) of sotol hearts was then placed on top of, and around the food in the aluminum foil. The sotol hearts effectively covered the underlying meat and vegetables and most of the prickly pear pads, forming a dome-shaped pile of food. On top of this, another 45 kgs (100 lbs.) of prickly pear pads were stacked in the oven, covering all the underlying food and insulate. The whole affair was then covered with another thick insulating layer of sotol leaves. The purpose of the upper layer of insulate was to protect the food from the earthen cap that was then added to seal the oven (see below). Once finished, the entire mass of food rose approximately 75 cm from the bottom of the pit. The loading of the food and insulate took approximately 10 minutes with four people.

Once the food had been loaded and adequately protected with the upper layer of insulate, 490 kgs (1,080 lbs.) of dry earth (clayey-loam) was mounded on top of the oven (Figure 1). The sediment for the earthen cap was measured and weighed in buckets as it was placed on the oven. The volume of the earthen cap was an estimated .454 m^3 of sediment (454 liters). The thickness of the cap varied across the oven, but averaged about 30 cm. It took approximately 20

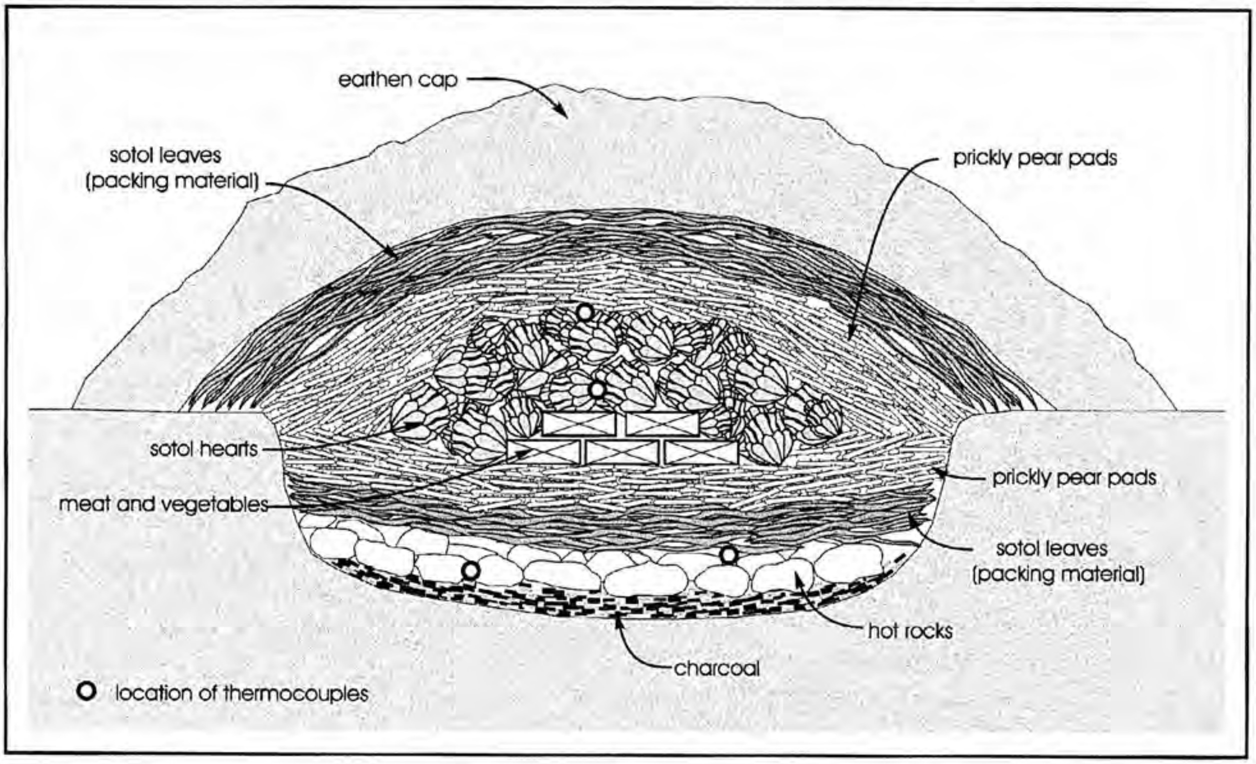

Figure 1. Schematic of the earth oven illustrating the various elements and the location of the thermocouples.

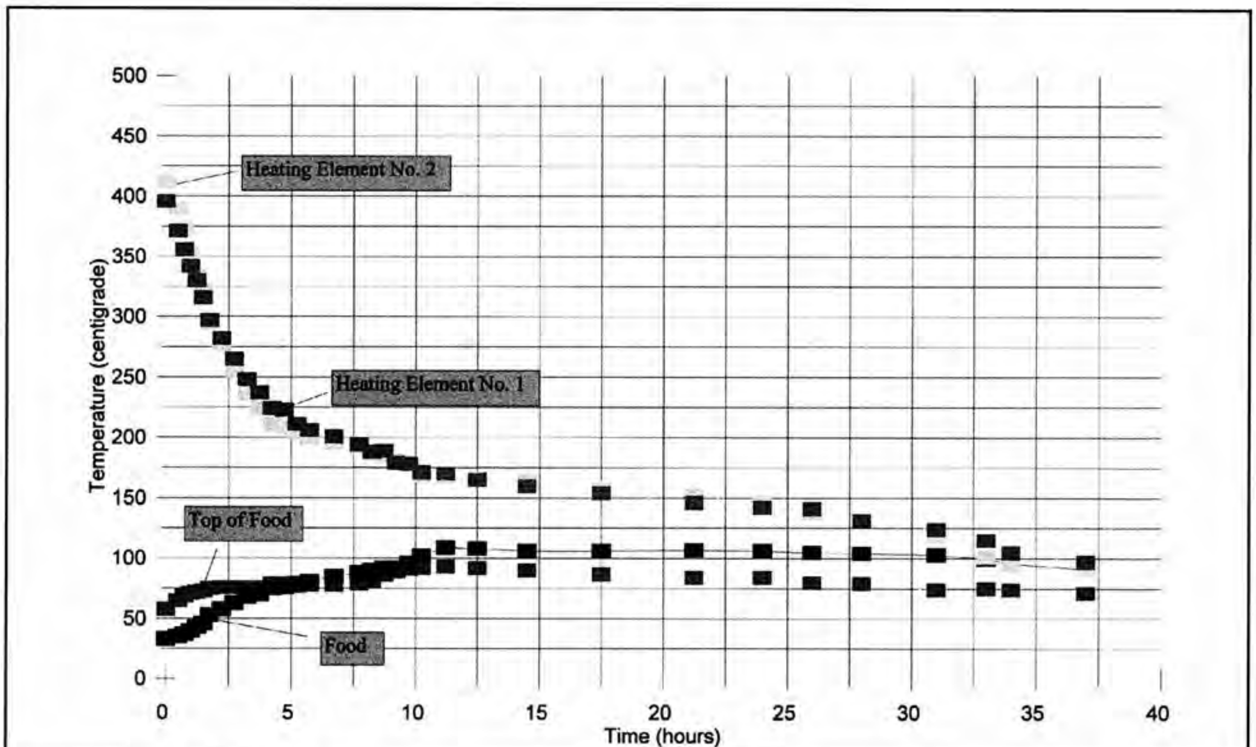

Figure 2. A line plot of the temperatures recorded within the various components of the experimental oven.

minutes from the time the coals and hot rocks were spread in the bottom of the oven to completion of the earthen cap.

Placement of the Thermocouples

Four thermocouples were placed within the oven to monitor temperatures (see Figure 1). The first two were placed at the bottom of the oven in the heating element (hot-rock bed). Both were placed between the rocks just above the coals, and near the center of the hot-rock bed (under the first layer of insulate). The thermocouples were located about 20 cm from each other. The third thermocouple was placed in the largest (ca. 25-cm diameter) of the sotol hearts in the center of the oven. This was accomplished by drilling a small hole in the sotol heart with a knife. The tip of the thermocouple was located near the center of the heart. The fourth thermocouple was sandwiched between the upper layer of prickly pear and the upper (top) layer of sotol leaves. The thermocouple placement allowed us to monitor the long-term performance of the heating elements, the cooking and temperature of the food, and the overall performance of the oven. Temperature data were collected via the thermocouples and digitally displayed on a hand-held Omega® Microprocessor Thermometer (Model HH21). The temperature data were monitored at regular intervals (see below) with the processor, and manually recorded in a field log.

Results

The temperatures recorded (raw data) by the various thermocouples are provided in Table 1 and graphically displayed in Figure 2. The first temperature reading (noted as "0") was taken approximately five minutes after the earthen cap was finalized. As shown in Figure 2, the temperature of the heating element started out just above 550°C, and quickly began to drop off in the first 5–7 hours. This may be caused by the sudden drop in oxygen and dampening of the oven with the earthen cap; effectively smothering the fire. The thermocouple placed on top of the food rises at a much faster rate than the temperature recorded for the food (sotol heart). The more rapid rise in the temperature recorded for the top of the oven may be a function of the great amounts of steam as the moisture in the insulate and food is vaporized. The moisture in the vegetal material in the oven creates a moist cooking environment. This steam, which rises in the oven, causes the hotter temperatures at the top of the oven. This is very similar to the steam that rises from a pot of boiling water when the lid is removed. The food on the other hand, while rising in temperature, increased at a much slower rate in the first five or so hours. If the reader will recall, the thermocouple placed in the sotol heart is monitoring the temperature of the inside of the food and thus took longer for the "core" of the food to heat up. It was not until about 6–7 hours after sealing the oven that food actually reached the temperatures experienced at the top of the oven. As the amount of available moisture in the oven decreased through evaporation, the temperatures at the top of the oven became more reflective of the overall temperatures in the oven and not as much a function of the steam generated early on in the cooking process.

After about 10–15 hours, the temperature of the heating element started to level off and drop at a much slower rate. During this time period the food and top of the food leveled out around 100°C. The food temperature stayed at or above 100°C until 32 to 35 hours, when the temperature started to drop. After about 33 hours, an abrupt drop in temperature is noted in the heating element. This coincides with the beginning of a light rain. The increasing cool moisture from above contributed to the drop in temperature. After this point, the temperatures throughout the oven began dropping. We decided to open the oven after 39 hours, before more intensive rains were expected to begin. Note that the rain only penetrated the top few inches of the earthen cap and did not reach the underlying stones.

The oven was opened by pulling back the earthen cap with shovels. Once the soil was sufficiently cleaned from the cap, the sotol leaf packing overlying the first layer of food (prickly pear) was removed. While the surface earthen cap never felt warm, the upper layer of packing was still warm to the touch.[1]

[1] It is the senior author's opinion that if the surface of the earthen cap ever gets hot, the cap is either too thin or is the wrong material (e.g., too coarse/porous). As the object is to cook the food, any heat loss through the cap will only hinder that process. If less than ideal sediments are available, thick earthen caps may mitigate excess loss of heat through the cap. In either case, more is better.

Table 1. Cooking Temperatures for the Various Components in the Oven
(All time is in hours and temperatures are in centigrade.)

Elapsed Time (hrs.)	Top of Food	Food (Sotol heart)	Heating Element No. 1	Heating Element No. 2
0.00	39.00	34.00	554.00	583.00
0.25	49.00	34.00	438.00	435.00
0.50	58.00	33.00	412.00	396.00
0.75	65.00	35.00	390.00	371.00
1.00	69.00	37.00	373.00	356.00
1.25	71.00	40.00	352.00	342.00
1.50	72.00	43.00	334.00	330.00
1.75	73.00	46.00	322.00	316.00
2.25	75.00	53.00	295.00	297.00
2.75	76.00	58.00	277.00	282.00
3.25	76.00	63.00	255.00	265.00
3.75	76.00	68.00	236.00	248.00
4.25	76.00	70.00	224.00	237.00
4.75	79.00	75.00	211.00	224.00
5.25	79.00	76.00	208.00	223.00
5.75	77.00	79.00	204.00	211.00
6.75	78.00	81.00	200.00	206.00
7.75	78.00	85.00	195.00	201.00
8.25	79.00	88.00	192.00	194.00
8.75	81.00	90.00	186.00	188.00
9.25	86.00	92.00	184.00	189.00
9.75	89.00	92.00	181.00	179.00
10.25	91.00	96.00	179.00	178.00
11.25	92.00	102.00	168.00	171.00
12.50	93.00	109.00	168.00	170.00
14.50	92.00	108.00	166.00	165.00
17.50	90.00	106.00	164.00	160.00
21.25	87.00	106.00	158.00	154.00
24.00	84.00	107.00	152.00	146.00
26.00	84.00	106.00	146.00	142.00
28.00	80.00	105.00	138.00	141.00
31.00	79.00	104.00	131.00	131.00
33.00	74.00	103.00	119.00	124.00
34.00	75.00	100.00	101.00	115.00
37.00	74.00	96.00	95.00	105.00
39.00	71.00	91.00	90.00	97.00

One layer of food at a time was removed from the oven. The sotol hearts were sweaty, brown (somewhat caramelized), and sweet smelling. The only material charred in the pit was the first layer of sotol leaves placed directly on top of the hot rocks. The rocks were still hot to the touch.

The Hot Rocks

The goal of the study was to monitor the fracturing of the rocks as they were heated and subsequently cooled when the oven was sealed. As mentioned above, although several spalls had been noted during the firing of the oven, only a single rock fractured at this time. However, closer examination (less than an hour after removal from the oven) of the rocks after 39-hours of cooking revealed that 23 of 26 rocks showed evidence of cracking; many had multiple cracks. It was also interesting to note that many of the rocks did not exhibit visible cracks until several hours after they had been removed from the oven.

To assess how the rocks would perform during reuse, a second oven was built in the same pit. The procedures for the second oven followed much the same protocol outlined for the first. This included the same amount of wood, same length of heating of the stones, etc. Insulate, prickly pear, and sotol hearts were loaded in the second oven. Sediment for the earthen cap included soil from the first firing and sediment scraped from around the immediate area. The second cap was not weighed or measured but was consistent with the thickness of the first cap. Also, the temperatures through the cooking process were not systematically monitored.

Following the second firing, **all** 26 rocks (27 counting the cobble that split during the first firing) fractured into numerous pieces. After only two firings, the original 26 rocks were reduced to 217 pieces (see Table 2). Note that this does not include the countless spalls [<2 cm] that littered the bottom of the pit. During the initial firing of the second pit, many of the rocks that showed multiple fractures began breaking as the stones were heated. However, most of the stones were still intact when the oven was loaded with food and sealed for the second time. Thus, it appears that most of the fracturing took place after the oven had been sealed. Many of the stones literally broke in our hands as they were pulled from the bottom of the oven following the second firing. Of the 217 pieces of burned and fractured rocks, many of the now-smaller stones exhibited numerous thermal cracks (see Table 2).

Table 2. Analysis of the Burned Rocks after Two Cooking Events

Size[a]	Number of fractures[b]	Qty.
1	0	45
2	1	6
	2	26
	3	15
	4	3
	5	1
3	1	12
	2	24
	3	27
	4	7
	5	2
	6	2
4	1	11
	2	12
	3	5
	4	7
	5	5
	6	1
	7	1
5	1	3
	2	1
	4	1

[a] Size categories: 1=2–4 cm; 2=4–8 cm; 3=8–12 cm; 4=12–16 cm; 5=16–20 cm; 6=20–24 cm; 7=>24 cm. Burned rock less than 2 cm in length was not recorded.

[b] The number of fractures is measured after the second firing, suggesting that the stone may crack further is subject to heat or natural weathering processes. This would result in an increase in smaller stones.

DISCUSSION AND CONCLUSION

This experiment considered discard rates for limestone cobbles heated in an earth oven similar to ovens documented in many of the burned rock middens of Central Texas (see Howard 1991; Black et al. 1997). More specifically, we were interested in the number of uses in an earth oven we could expect from limestone cobbles collected from sources near the Culebra Creek site. While less than ideal, the experiment did provide insight into discard rates.

Reports of experimental earth ovens and rates of discard, and their implication for understanding similar archaeological features, are scarce in the archaeological literature of Central Texas.[2] In one notable exception, Black (1997), citing the work of Tunnel and Madrid (1990), suggests that limestone rocks used in earth ovens may be reused in as many as four heating episodes. However, the ovens documented by Tunnel and Madrid are very different from those discussed by Black. For example, the ovens documented by Tunnel and Madrid are large, rock-lined earth ovens used to pit bake sotol and agave for making an intoxicating beverage known as sotol in modern and historic *viñatas* of eastern Chihuahua. These features are about three meters across and as much as 2.5 meters deep (Tunnel and Madrid 1990:153–155). The walls of the pits are nearly vertical and lined with large stones (both limestone and igneous rocks are used). Importantly, the heating of the rocks for the cooking of the sotol and agave is not accomplished by building a fire in the bottom of the pit and throwing rocks on top of the fire. Rather, the bottom half of the pit is a domed-shaped fill of rock with a fire box underneath (Tunnel and Madrid 1990, Figure 7). The rocks are heated from a fire built underneath the bottom layer of rocks. The fire box is accessed from the outside of the pit via a ramp cut down to the bottom of the pit. The arrangement is very similar to an *horno* for bread making.

[2] Researchers (Stark, Decker, and Black) from the Texas Archeological Research Laboratory have recently organized a series of hot-rock workshops. These well-organized experiments will make a significant contribution to our understanding of hot-rock technology once published.

Though not explicitly stated by Tunnel and Madrid, this system of heating the rocks differently affects the rocks depending on the distance of the stones from the actual fire. In northern Chihuahua, near the town of Janos, similar pits have been documented (Brown and Leach 1997). Here, the large pits, similar in size to the ones documented by Tunnel and Madrid, are lined with large stones (mostly basalt, but some limestone is used), but the fire box is not a part of the feature. Instead, the bottom of the pit is left unlined with stones. A large fire is built in the bottom of the pit and stones are thrown in. After the fire dies down, the bed of coals and now-hot rock bed is used to cook the sotol and agave. The majority of the stone making up the heating element is discarded following each firing, whereas the stones lining the side of the pits can survive as many as 20–30 firings before requiring replacement. The Mescalero Apache are known to discard all the heating element rocks in earth ovens used for pit-baking agave, as the rocks are "no good," having been compromised (as evidenced by cracks) after the first firing (David Carmichael, personal communication 1997). If the reader will recall, in the experiment reported here, a majority of the rocks showed evidence of cracking after the first firing. In light of the observations among the Mescalero Apache, these stones would have been discarded.

We suggest that the large, rock-lined pits of Chihuahua used to cooked sotol offer powerful analogs for understanding hot-rock cooking. They do not, however, provide one-to-one correlates for estimating discard rates for limestone rocks in the morphologically smaller features that are documented in the many sites of Central and south-central Texas (Black et al. 1997). The Chihuahuan examples clearly demonstrate that the location of the stone within the pit and how long it was exposed to heat can directly effect the use-life of that stone. Simply, rocks in constant contact with heat during the initial and subsequent firings will be subject to greater rates of discard. Whereas stones making up the walls of the pits and those located on the periphery of the "fire," will have longer use lives.

Why then is the number of times a rock can be reused so important? At a basic level, as pointed out by Black and others (1997), knowing that a pile of rocks (midden) represents hundreds if not thousands of cooking events, can have a sobering effect on the would-be investigator. More importantly, researchers (Black 1997; Black et al. 1997) use these minimum numbers of uses as a proxy for the length of time it **must** have taken for the midden to form under expected curation rates. Often, discard rate estimates bring the features in line with the date ranges represented by the projectile points recovered from the same deposits. That is, many (not all) of the burned rock middens of Central Texas often contain diagnostic artifacts which suggest that many middens may have accumulated over thousands of years (see Black and Creel [1997] for a thoughtful consideration of radiocarbon assays from Texas burned rock middens). All else being equal, if we entertain the idea that rocks may be recycled only once or twice, rather than four or more times, and that some of the diagnostic artifacts may be in a secondary context and as such not useful in assessing the chronology of the midden deposit (Leach and Bousman 1997), then we must reconsider the way we look at midden formation.

The current experiment was a useful exercise for the authors. The digging, collecting, and firing of an earth oven, even a small one, provides some idea of the level of effort (i.e., labor intensive) needed to make a living from bulk processing. It is hoped that future investigators follow the lead of Black (1997) and Black and others (1997) and provide some estimates of rock discard, while supporting their inferences about rates of discard and formation of large rock features with systematic (and replicable) actualistic tests. It is only through this process that we will truly understand these impressive masses of burned rock and the role(s) they played on the larger hunter-gatherer landscape.

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PAINTED PEBBLES FROM ARCHAIC CONTEXTS IN 41VV156, A ROCKSHELTER IN THE LOWER PECOS REGION, VAL VERDE COUNTY, TEXAS

Solveig A. Turpin and Lisa Middleton

ABSTRACT

Three painted pebbles were recovered during the Rock Art Foundation's 1998 test excavations in 41VV156, a rockshelter on a tributary to the Pecos River. The two specimens where the design can be fairly reconstructed are decorated with black cross-hatching that encircles the pebble; the third pebble retains only a segment of a black linear design. None belong to one of the established pebble types in this region and all are associated with projectile points that define a temporal range between 3200 and 8900 years ago.

BACKGROUND

The 1998 Rock Art Foundation field school excavations in 41VV156, a large dry rockshelter on a tributary to the Pecos River north of the Galloway White Shaman Preserve (Figure 1), produced a number of artifacts related in some way to pigment production or painting. Pigment-stained items include a metate, a pestle, a scratched pebble, a chert flake, and a piece of roof fall. Three painted pebbles were recovered from stratified proveniences generally attributable to the Middle and Early Archaic periods based on their association with temporally diagnostic projectile point styles. Two charcoal samples are currently being assayed at the University of Texas Radiocarbon Laboratory, but the Langtry, Val Verde, Pandale, Zorra, Uvalde, and Martindale dart points that dominated the projectile point assemblage are well-dated indices of the San Felipe (3200 B.P.-4100 B.P.), Eagle Nest (4100 B.P.-5500 B.P.), and Viejo (5500 B.P.-8900 B.P.) subperiods in the local chronology (Turpin 1991).

THE ARTIFACTS

The most poorly provenienced of the three pebbles came from the upper levels of Unit A where some mixture of in situ artifacts and discards from rampant relic-hunting is possible. This smooth subrectangular brown pebble retains only a small segment of a linear design, painted with black pigment, on one side (Figure 2a) and a fleck of paint, also black, on the reverse. The pebble is 42.4 mm long, 28.3 mm wide, and 15 mm thick. The same levels in Unit A produced two Val Verde points, a Langtry, the base and one barb of a Martindale, and a thin, very well made Kinney point.

The second and third pebbles came from just above bedrock in Test Trench 2, dug to connect Unit B, which was against the rear wall, and Unit C, in the middle of the largest pothole as well as in site center. Here, the presence of intact hearths, fiber features, and ash pits indicated that the deposits had eluded the relic-hunting that has ravaged the bulk of the site. Both of these pebbles bear linear designs in black pigment but they differ in size and shape. The smaller of the two is a blunt obelisk with very faint cross-hatching that surrounds it on all sides (Figure 2b). It is 36.1 mm long and tapers from 15.8 to 10 mm wide and from 11.5 to 7 mm thick. Two burned dart points were in the immediate vicinity of this pebble—a Jora/Arenosa and a Uvalde.

The largest pebble is the most complete of the three. A brown smooth roughly rectangular pebble, broken at one end and pointed at the other, is encircled by cross-hatching, again applied with black pigment (Figure 2c). The stone was apparently modified by the detachment of two corners prior to painting but broken after the design was complete. One face is slightly more eroded than the other or the sides. The pebble is now 51 mm long, 40.2 mm wide, and 17.6 mm thick. Projectile points recovered from the vicinity of this pebble belong to the Langtry and Martindale types.

None of these pebbles strictly conforms to any of the types defined by Parsons (1986) or Mock (1987) except that the continuous design, encircling the stone, is a characteristic of Parsons' Type 1, his

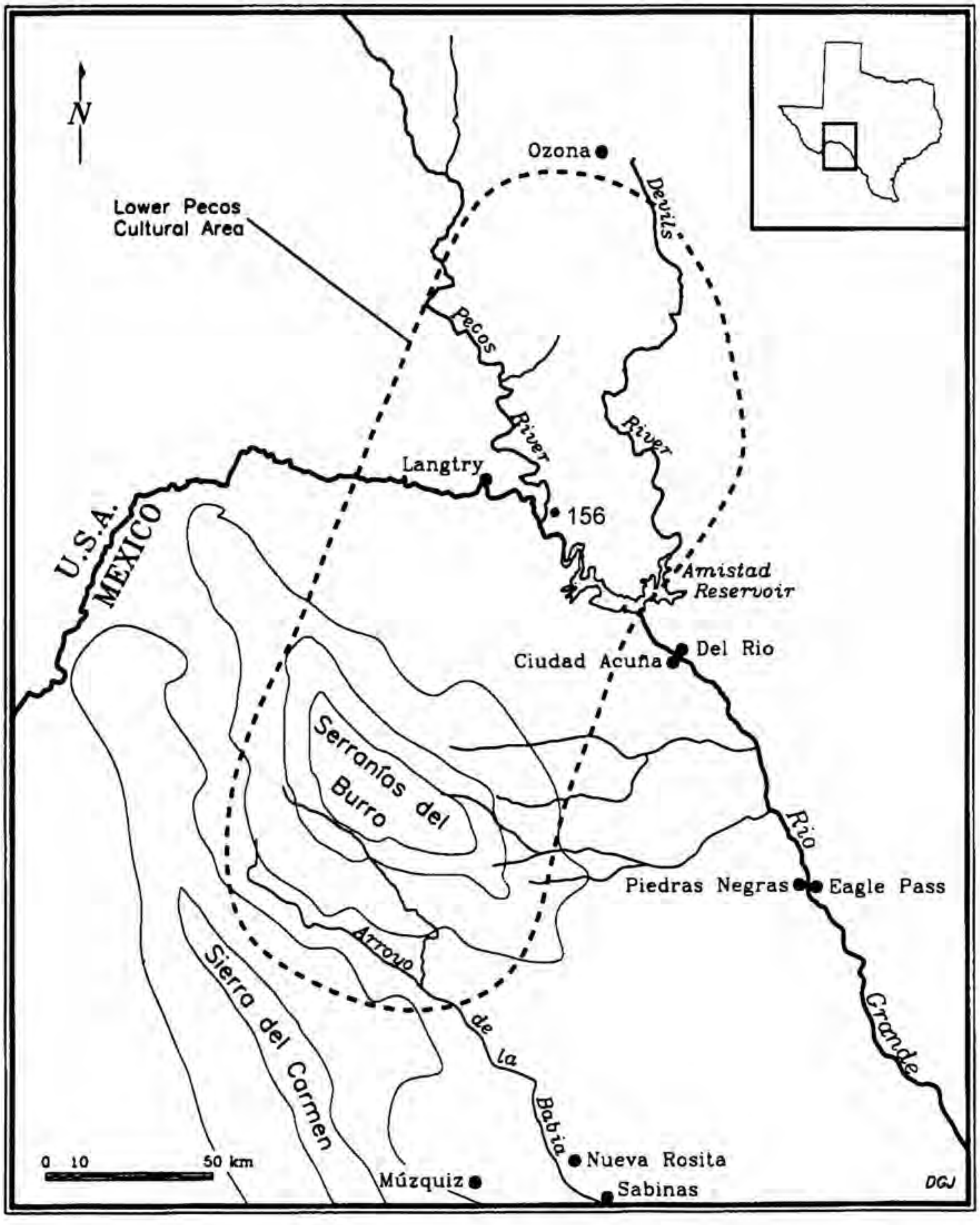

Figure 1. Map of Lower Pecos Cultural Area. Site is indicated near confluence of the Pecos River and the Rio Grande.

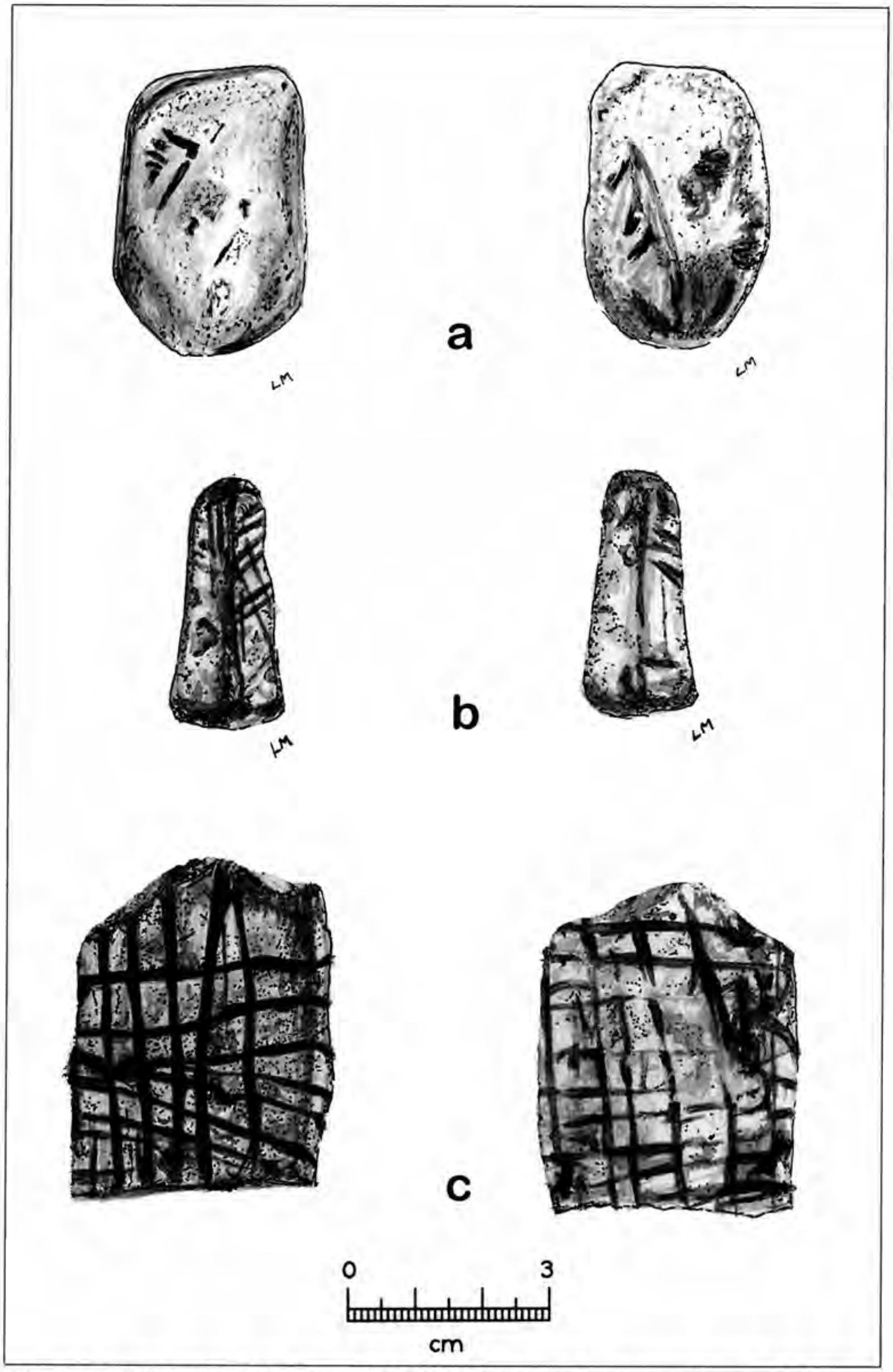

Figure 2. Painted pebbles from 41VV156. See text for provenience within the site. Drawings by Lisa Middleton.

earliest style. The simple cross-hatching is more common on incised pebbles where the medium is less amenable to complex designs. The stones themselves are unlike the classic smoothed oval river pebbles usually illustrated in Lower Pecos treatises in that they are more irregular in shape and darker in color. However, they are among the few such stones recovered from stratigraphic contexts where their age can be estimated with some security.

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INFORMATION FOR CONTRIBUTORS

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