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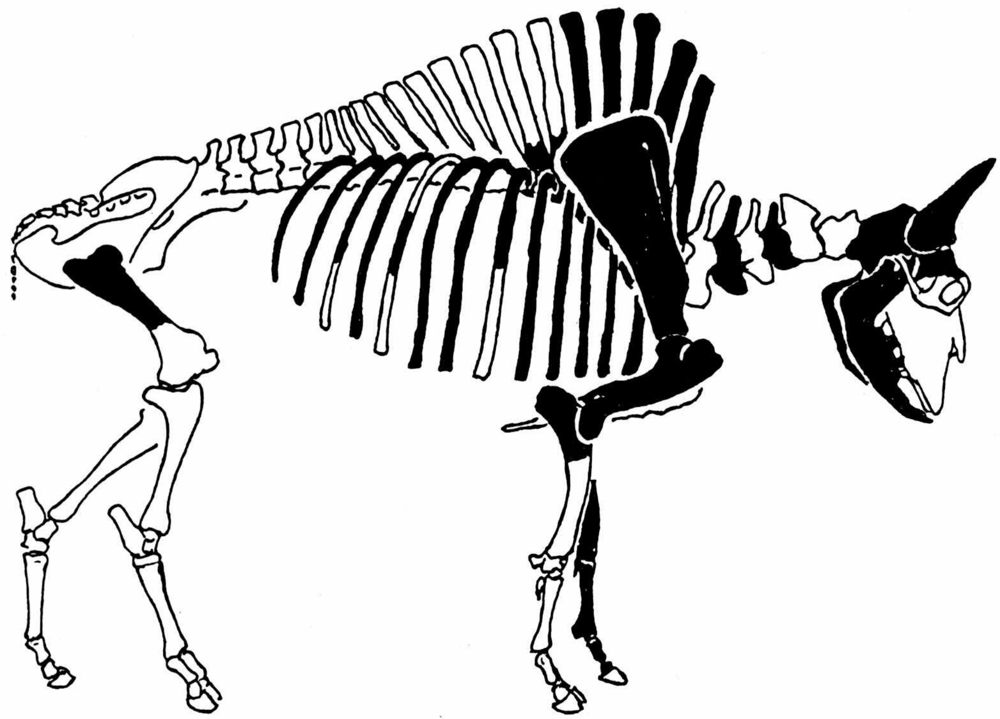

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Evelyn Lewis
Editor

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About the Cover: Generalized sketch of skeleton of *Bison Antiquus* showing bones recovered from Petronila Creek. See article starting on page 6.

Manuscripts for the Journal should be sent to: Evelyn Lewis, Editor, *La Tierra*, 9219 Lasater, San Antonio, Texas 78250. Past issues of the Journal and Special Publications available by requesting an order form from STAA (Jim Mitchell), P. O. Box 791032, San Antonio, Texas 78279. Dr. T. R. Hester may be contacted at the Texas Archeological Research Laboratory, PRC 5, 10100 Burnet Rd, Austin, Texas, 78712-1100.

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NOTES ON SOUTH TEXAS ARCHAEOLOGY: 1994-4

Large Triangular Bifaces as Grave Goods in Southern Texas: An Example from 41LC4, Lavaca County

Thomas R. Hester

In November 1972, Dr. Ernest Lundelius (director of the Vertebrate Paleontology Laboratory at The University of Texas at Austin) and several UT- Austin students visited a locality near the town of Shiner in Lavaca County, southern Texas. Along the edge of Rocky Creek, erosion had exposed two human burials. Lundelius described the context (notes on file at TARL) as "gully fill in (the) side of (a) bedrock bend overlooking low floodplain." Lundelius further indicated that the bedrock was a crossbedded yellow sandstone that he attributed to the Oakville formation. One of the burials ("western") was partly exposed on the surface; a mussel shell was found under the facial part of the cranium. The second burial ("eastern") was about 55 inches east of the first; it had been severely eroded. However, Lundelius recorded and collected a large triangular thin biface near the cranium. This biface (Figure 1), of gray brown chert, is 13.9 cm long, 5.6 cm wide, 1.0 cm thick and weighs 81.5 g.

In March 1973, Russell Graham of the UT Vertebrate Paleontology Laboratory revisited the site, accompanied by students from the paleontology and anthropology departments. They further mapped the burials at the site (notes on file at TARL) and found some evidence of a third interment. As of the present, none of the skeletal remains collected in 1972 or in 1973 can be located for osteological analysis. This is somewhat of a mystery, in that the TARL human osteology collections have since been wholly reorganized and put on a computer data base under a National Science Foundation grant awarded to Dr. Dee Ann Story. TARL staff will continue to search for these remains.

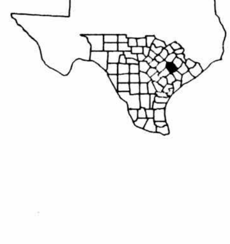
Recently, Dr. Patrick Wagner, M.D. of Shiner, Texas has provided photographs of projectile points collected at or near site 41LC4. These include Perdiz and Scallorn arrow points, and dart points of the Frio, Ensor, Darl (?), Bulverde, Pedernales and Golondrina (?) types. These indicate the use of the Rocky Creek terrace for repeated occupation over the past 9000 years.

However, the biface (Figure 1) that occurred with one of the burials has been identified by Prof. Harry J. Shafer (Texas A&M University; personal communication) as a reworked Gahagan biface. Shafer's (1973) analysis of Gahagan bifaces from the George C. Davis site involved 64 specimens, 35 of which were found with burials. Both the presence of the Gahagan biface and the stemmed dart points noted above, would suggest a closer affinity to central and east central Texas for the prehistoric populations of 41LC4.

Large thin bifaces appear to be an important item in terms of mortuary offerings on the coastal plain. At the Shrew site in Wilson County (some 60 miles southwest of 41LC4), Labadie (1988) reports a large thin biface (19.2 cm long, Figure 2, A,A') associated with Burial 1. It is extensively polished, with microwear patterns suggesting that it was used in a "cutting/slicing mode," perhaps involving plant fibers (Labadie 1988:51). [Although the Shrew site biface does not fit the Gahagan classification, Shafer (1973:228) found polish on a number of Gahagan bifaces at the Davis site; he suggested that the use-wear resulted from cutting or sawing tasks. Moreover, polish was particularly extensive on the larger Gahagan bifaces at Davis, and Shafer speculated that this might be the result of "sheath wear."]

A specimen similar to, but larger, than the Shrew site biface is in the John Kubena collection from Fayette County (roughly 30 miles north-northwest of 41LC4). This large biface (23 cm long and 8 cm wide) has polish along the lateral edges.

Other occurrences of large triangular bifaces on the coastal plain include a specimen (15 cm long and 7 cm wide) found with a burial on Baffin Bay (W. S. Fitzpatrick, personal communication; Figure 3, left). A shell gorget and a small stone mortar were also



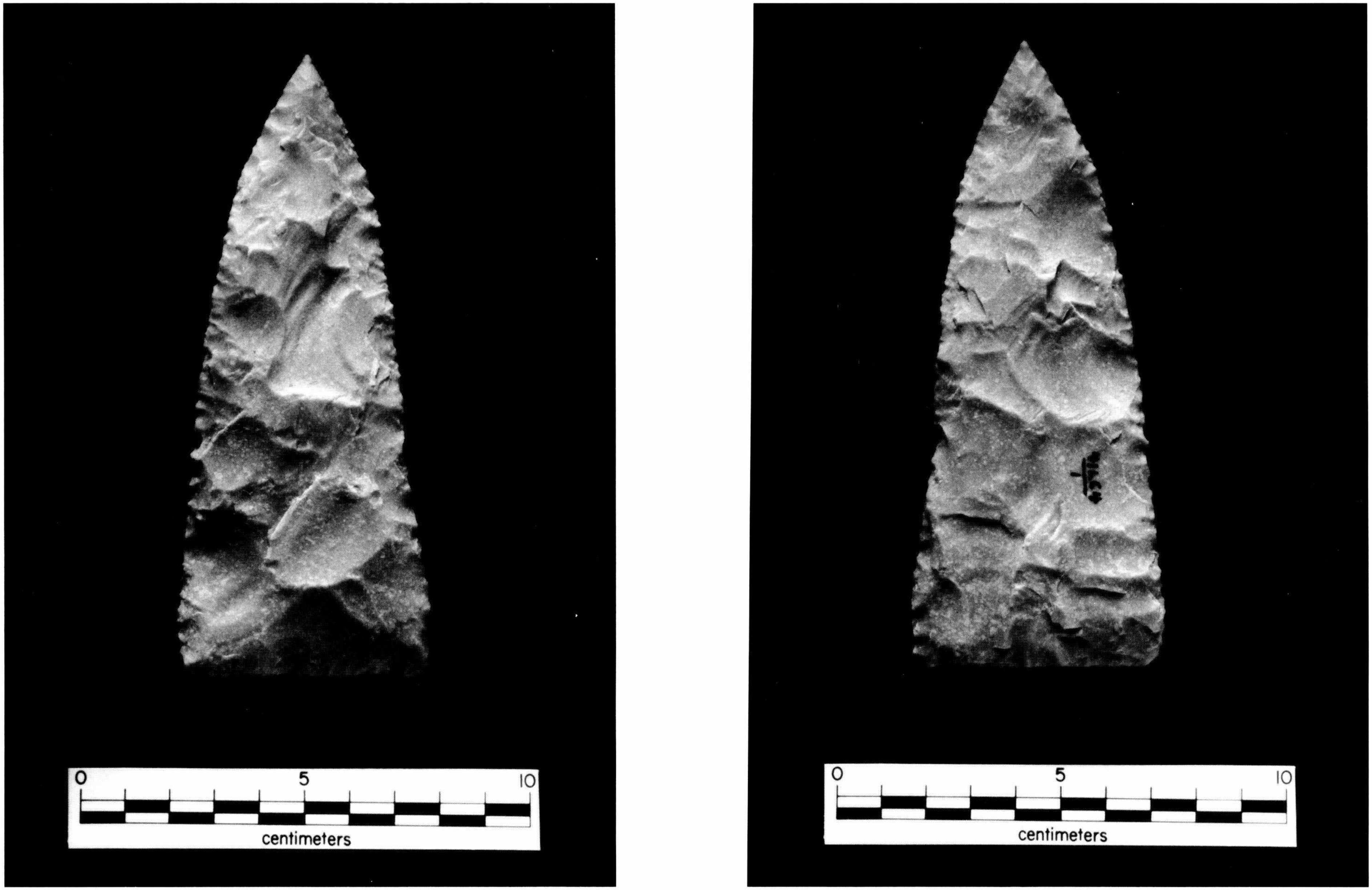


Figure 1. Biface from Site 41LC4, Lavaca County. Both faces are shown. Photograph by Elizabeth Andrews; courtesy of the Texas Archeological Research Laboratory.

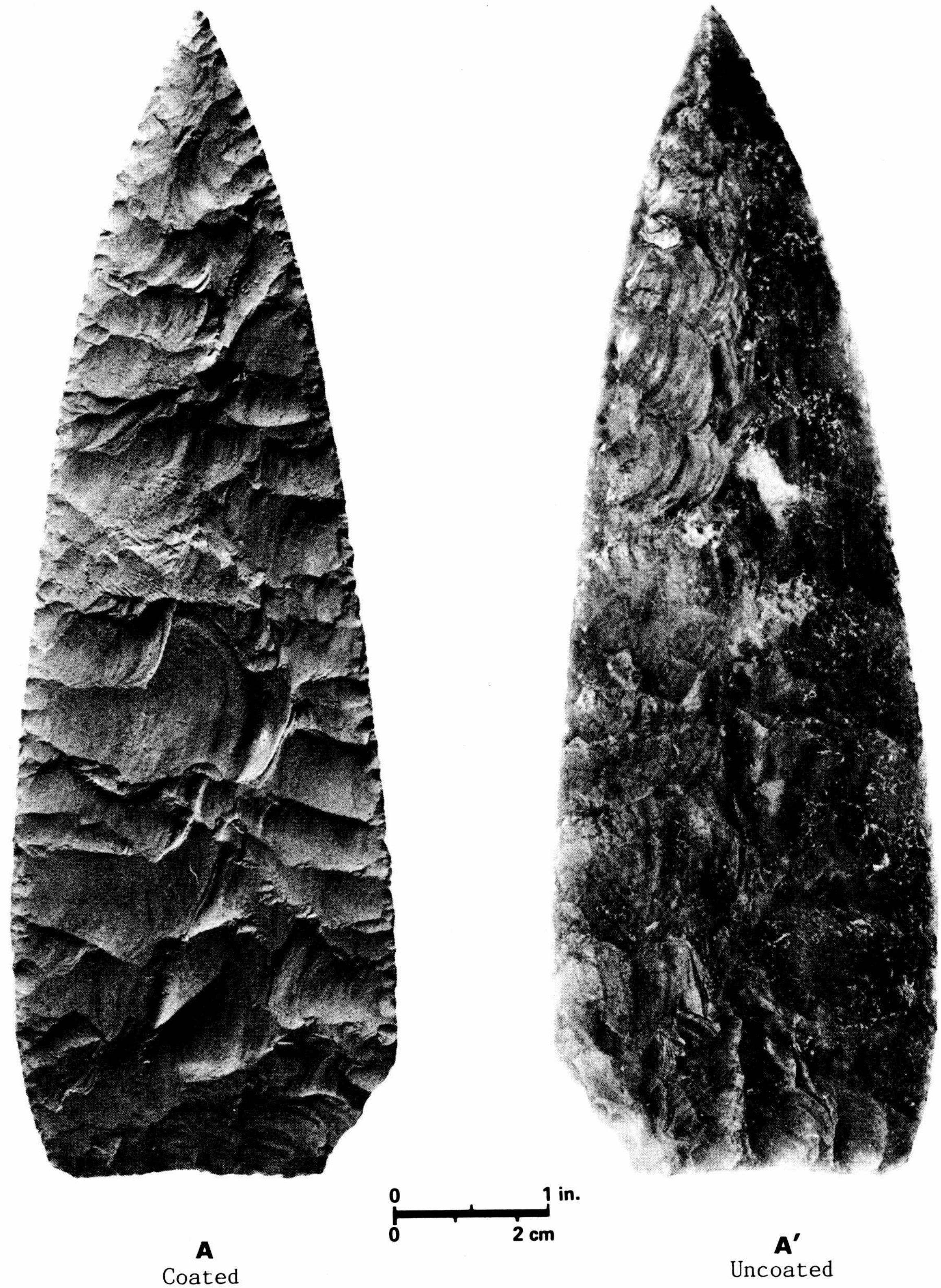


Figure 2. Biface from the Shrew Site, 41WN73, Wilson County. From Labadie (1988). Photographs by Milton Bell, Texas Department of Transportation.

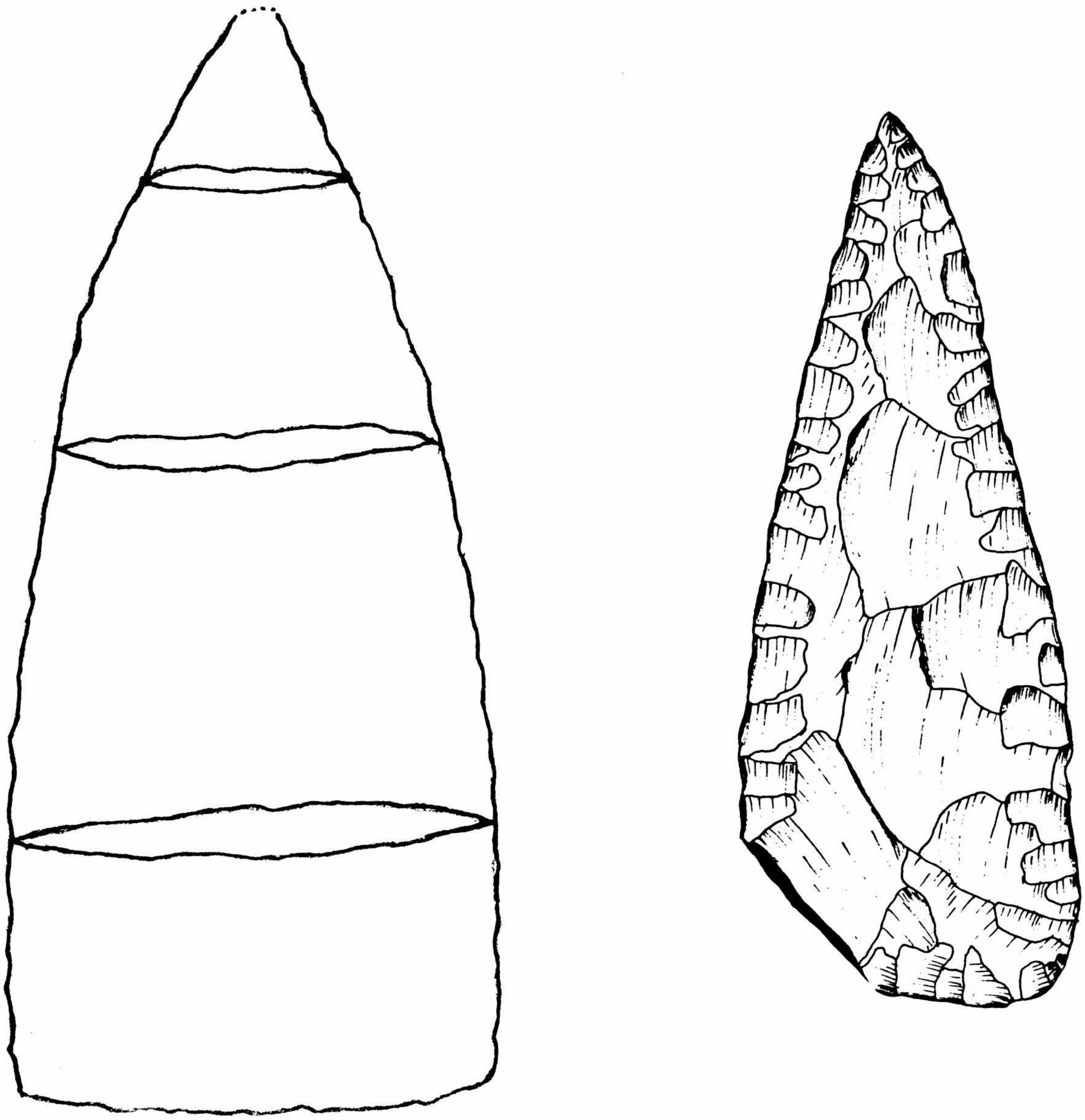


Figure 3. Bifaces from Burials on the South Texas Coast. Left, Baffin Bay (sketch by W. S. Fitzpatrick); Right, 41SP78 (from Hester and Corbin 1975). Illustrated actual size.

found with that burial (site 77C33-2). At the Ingleside Cove site (41SP78), Hester and Corbin (1975: 522) recorded a large thin biface (12.5 cm long) of central Texas chert found between two burials in an apparent Late Prehistoric cemetery context (Figure 3, right). And, there are numerous large thin bifaces with several burials at the Loma Sandia site (41LK28), the Archaic cemetery found in Live Oak County (Taylor and Highley ms.). Additional notes on large thin bifaces in the south Texas region can be found in Hester and Barber (1990).

The large thin biface from 41LC4 appears to be more closely related to the Gahagan form (Turner and Hester 1993), while other large thin bifaces from other southern Texas burials are more distinctly triangular in outline. Regardless, such bifaces appear to have been valued commodities, utilitarian or ritual, that were included as offerings with some individuals. Unfortunately, the contexts for many of the southern Texas burial-associated bifaces is not good (or, as at Loma Sandia, burial preservation is very poor), and we still lack data on the age and sex of the individuals with which they are found. A comprehensive study of such bifaces, their contexts, use-wear, and typology is badly needed.

References Cited

Hester, T. R. and B. D. Barber
1990 A Large Biface from Atascosa County, With Comments on the Function of Such Artifacts in Prehistoric South Texas. *La Tierra* 17(2):2-4.

Hester, T. R. and J. E. Corbin
1975 Two Burial Sites on the Central Texas Coast. *Texas Journal of Science* 126(3-4): 519-525.

Labadie, J. H.
1988 *Archaeological Investigations at the Shrew Site, 41WN73 Wilson County, Southern Texas.* Contract Reports in Archaeology 2. State Department of Highways and Public Transportation, Austin.

Shafer, H. J.
1973 Lithic Technology at the George C. Davis Site, Cherokee County, Texas. Doctoral dissertation, The University of Texas at Austin.

Taylor, A. J. and C. L. Highley
ms. Archaeological Investigations at the Loma Sandia Site (41LK28):A Prehistoric Cemetery and Campsite in Live Oak County, Texas. Manuscript in editing at the Texas Archeological Research Laboratory, The University of Texas at Austin.

Turner, E. S. and T. R. Hester
1993 *Stone Artifacts of Texas Indians.* Second Edition. Gulf Publishing Company, Houston.

PLEISTOCENE AND HOLOCENE BISON WITH ASSOCIATED ARTIFACTS FROM THE PETRONILA CREEK SITE IN SOUTH TEXAS

C.R. Lewis

ABSTRACT

The Petronila Creek site (41NU246) has remains of two species of *Bison*, both associated with humans. The shallower is *Bison bison* and is of Archaic Indian age. The deeper is from Pleistocene deposits apparently older than 16,880 years and is a very large male *Bison antiquus,* so large as to be within the size range of male *Bison latifrons*. A roughly-made stone artifact found at the level of the deeper skeleton, and approximately within the scatter of bones, is probably of the same age.

INTRODUCTION

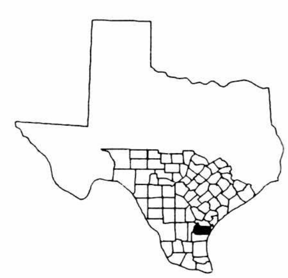
In 1985, large bones were found eroding from the bed of Petronila Creek, near Driscoll in Nueces County, Texas. Investigation revealed that the large bones were from a mammoth, and were part of a complex bone bed containing remains of 42 species of vertebrates, 16 species of invertebrates, and 5 species of plants. This principal assemblage of bones was at the deepest part of the seventeen-feet-deep gullied creek, and preliminary reports have been made (Lewis 1986; Lewis 1988; Johnson 1993) which place the age at over 18,000 years before present (a time corresponding to the greatest extent of the final ice advance of the Wisconsin glacial period) and offer evidence of human involvement. In the course of excavating this principal bone assemblage, it became necessary to take time out and recover a *Bison antiquus* skeleton, nearly intact, from a stratum just above the principal assemblage, and additional *Bison* material was haphazardly recovered from a stratum near ground level as these bones were periodically exposed by erosion. While there is much evidence pointing to human involvement in the principal bone assemblage, such as cut marks, fire, and putative bone tools, there is little lithic material and nothing that could be called diagnostic. However, at the slightly shallower level of the *Bison antiquus*, a convincing stone artifact was recovered in situ. Because the artifact, the giant bison, and the modern bison are interesting in their own right, they are reported here while work continues on the principal bone bed.

THE PETRONILA CREEK SITE

The bison bones are thought to lie within the confines of the Sangamon delta of the Nueces River that was deposited during the high-water stand of 100,000 years ago (Aronow 1971). This delta was abandoned at the onset of the Wisconsin glaciation when sea levels fell some 100 meters, causing the Nueces discharge to move 150 km gulfward. The wetter climate of the Wisconsin caused sizable rivers to form south of the Nueces, and one of these, the Petronila, drained an area that included parts of the old delta. This sluggish river incised a shallow channel in the old delta and meandered to some extent. At roughly 18,000 years ago the river was moving east, forming overbank deposits on its west bank. The *Bison antiquus* died or was killed beside the river, and its skeleton covered by silt and clay during high-water episodes. The Petronila did not again meander back over the site before the onset of the Holocene, at which time it shrank to its present status of intermittent creek. During the Holocene, this creek cut more than one channel, and the abandoned channels were filled with black clay. In one such abandoned channel, the *Bison bison* skeleton was incorporated in the fill material. In recent years, saltwater injection from oilfield operations caused the loss of vegetation, and gullying began. The gully has, within the last few years, cut deep enough to expose the old skeletons, which are now undergoing reworking for the first time.

THE GIANT BISON SKELETON

When the site was first discovered in 1985, there were fragments of large bones loose in the creek bed and their origin was not obvious. Investigation revealed that most loose bones were originating from



Nueces County

the deepest sand layer exposed, being some 17 feet below surrounding ground level, and it is this bone deposit which has received most attention. However, fragments of what were later identified as a large bison femur (the upper bone of the hind leg) were traced to the next higher sand layer, separated from the lower sand by a clay stratum about 20 cm thick. Test excavation recovered the ball joint end of the femur and revealed additional bones farther back in the bank of the gully. Because most of the encasing sediment was clay, and because the bones were in very fragile, crumbling condition, and because the bones extended under a steep bank, and because more promising work lay elsewhere, this was the last investigation made of the bison bones until 1992. In that year, erosion by the annual gully floods exposed the in situ horn core of a bison (slightly upstream) and several forequarter elements of the postcranial skeleton (at the point where the femur was found in 1985).

A bit of digging revealed that the horn core was attached to a skull, which in turn was attached to the other horn core. The opportunity thus presenting itself to recover a nice trophy, the bison skeleton became all at once more important than it had seemed, and other work was suspended. After much effort, the skull was extracted from its clay matrix (in a number of pieces), dried, consolidated, assembled, and measured – which revealed that the skull and horn cores were in the upper range of size for a male *Bison antiquus* (Lundelius 1972:57-59). Reviewing the records from the early years at the site further revealed that a big, rough, stone "chopper" had been recovered in situ from the same layer as the bison, and about half way between the skull and the exposed forequarter bones. It thus became obligatory to excavate as much of the bison skeleton as could be found, despite the great difficulty incumbent upon removing crumbling bone from hard clay. The 1992 season was spent in this effort.

Because the next major flood threatened to remove the bulk of the exposed bones, and because screening large quantities of clay is almost impossible, the bones were removed with trowel and nutpick without screening. Any significant stone artifacts would have been recovered with these methods. None were found, and the bones are in too rough condition to retain any cut marks, so the evidence for human involvement rests upon the big stone "chopper," and the fact that the bison skeleton is younger than, and directly above, what is thought to be a major accumulation of bones at a human campsite.

As recovered, the bones are interesting in their own right. All of the bones exposed, and a number exposed by further digging (Figure 1), were recovered and consolidated except the many ribs. Both jaws with all teeth but the incisors were recovered, as well as two neck bones, seven back bones, a scapula, one entire and one partial humerus, two partial radius/ulna, a metatarsal, and various foot and toe bones. Combined with the partial femur and skull and horn cores, a sufficiently complete *Bison sp.* skeleton was assembled (Figure 2), to allow detailed measurement and comparison with published material. Based upon the measurements presented in a recent major review and revision of New World bison (McDonald 1981:67,68,77,78) (Tables 1 and 2) the Petronila Creek specimen is outside the upper size range for male *Bison antiquus* in almost all measurements of the skeleton except the skull and horn cores, which are at the upper limit of size for *antiquus*. Most measurements are within the size range for male *Bison latifrons*, except the horn cores, which are too small. Skeletal measurements also exceed the upper limit for female *latifrons*. Since species recognition is most heavily dependent upon horn core size and shape, and because the Petronila Creek specimen in all horn core attributes is an *antiquus*, the author refers these bones to that species. It is a relief to be able to do this, because *antiquus* is most likely the only bison extant in South Texas at the last glacial maximum.

A BRIEF REVIEW OF NORTH AMERICAN BISON

The genus *Bison* originated in the Old World and migrated, probably in several pulses, to North America during the Pleistocene. The first bison entering the New World were probably related to the Eurasian species *Bison sivalensis* or *Bison priscus*, large forms with fairly long horns. Evidently these animals evolved into the gigantic *Bison latifrons*, which seemingly flourished before and during the preceding interglacial period, the Sangamon of roughly 100,000 years ago. These *latifrons* had the largest horns of any bison, being some two meters across, and were also largest in body size. McDonald (1981:72,74-75), while presenting evidence that *latifrons*, and possibly only *latifrons*, was abundant during the Sangamon, would allow the possibility that some isolated populations survived to near the end of the Pleistocene (Petronila Creek time). His work suggests (but he does not state) that the new species *antiquus* arose from *latifrons* stock some-

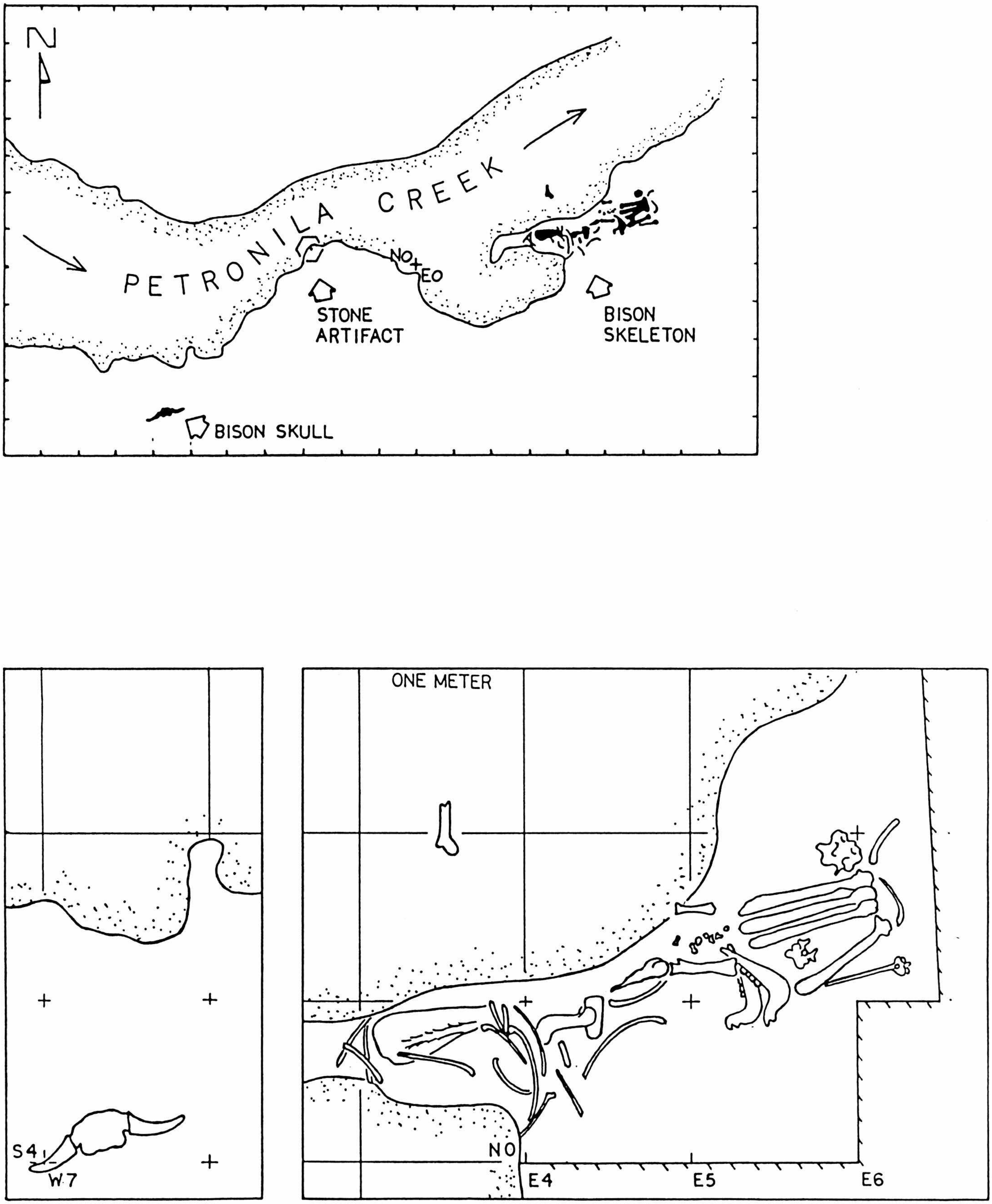


Figure 1. Location of *Bison antiquus* skeleton in banks of Petronila Creek, Nueces County, Texas. Grid size one meter.

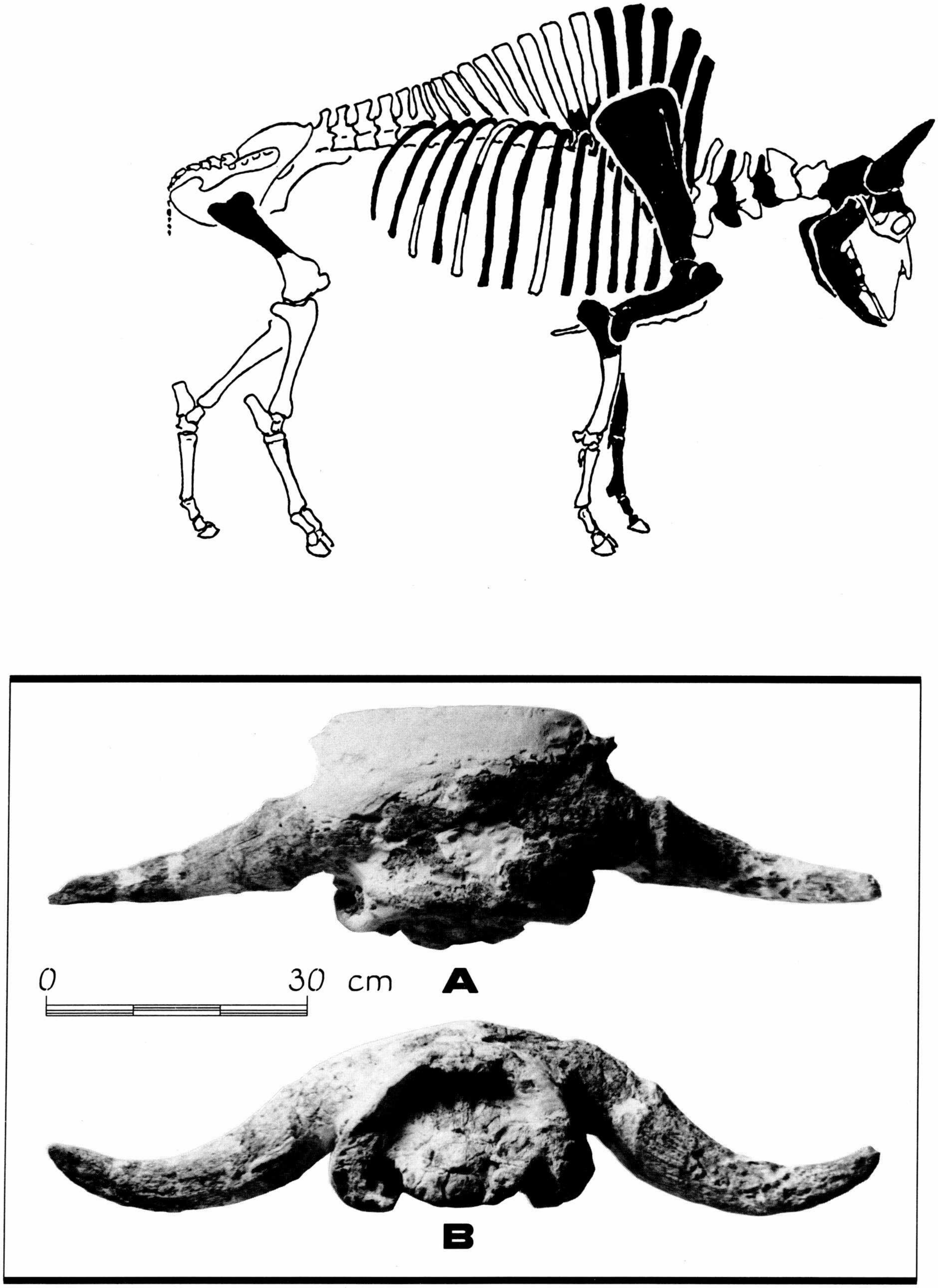


Figure 2. Generalized skeleton of *Bison antiquus*, with bones recovered from the Petronila Creek specimen shown in black. Skull in dorsal and occipital views to show *B. antiquus* attributes. Photography by Kenneth M. Brown.

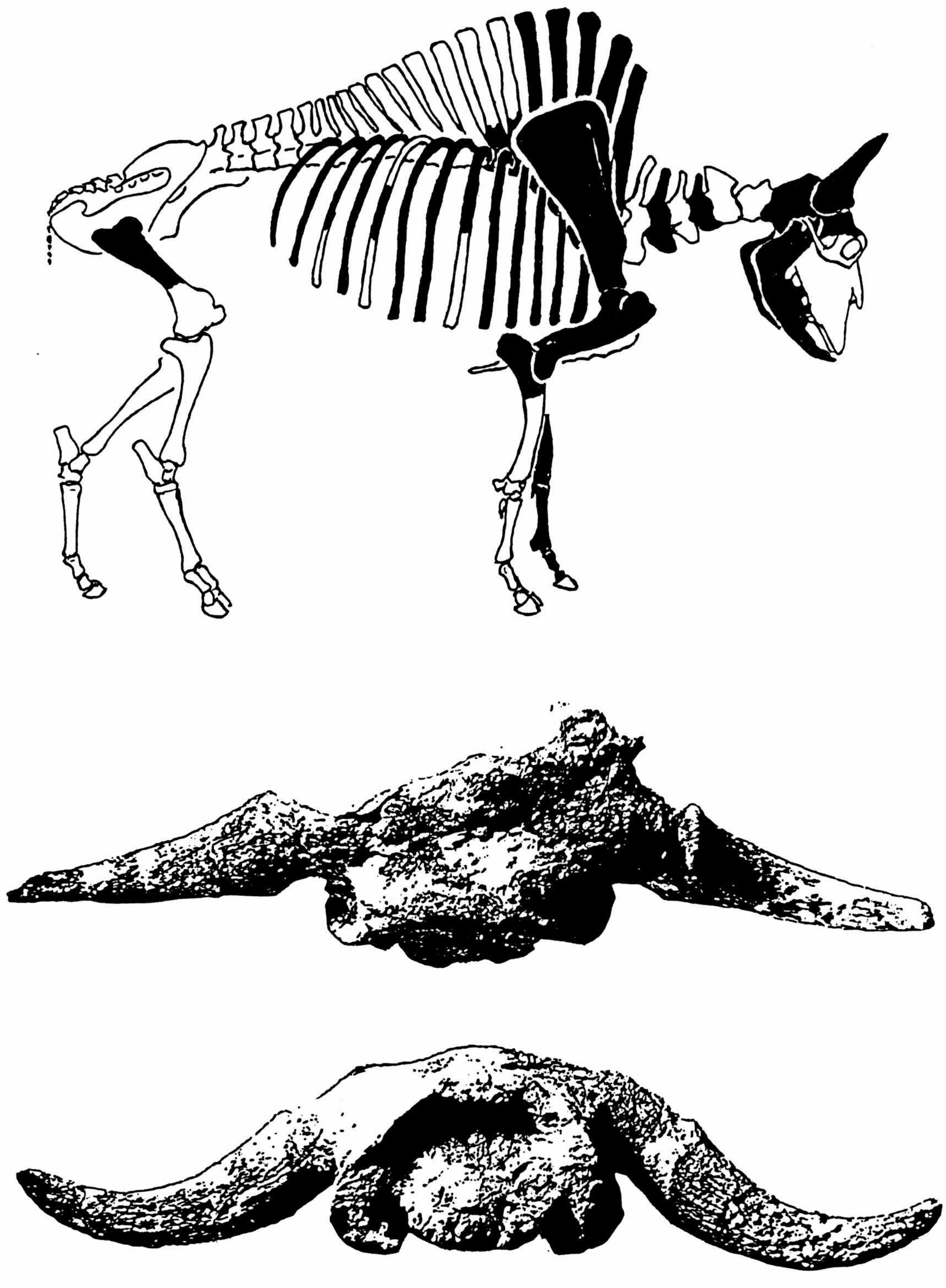


Figure 2. Generalized skeleton of *Bison antiquus*, with bones recovered from the Petronila Creek specimen shown in black. Skull in dorsal and occipital views to show *B. antiquus* attributes. Photography by Kenneth M. Brown.

Bison antiquus Skull Biometrics Compared with Petronila Creek *Bison*

Standard measurement	n	Range	*Pet. Crk. Bison*	Mean ± SE
Males				
Spread of horn cores, tip to tip	27	765-1067 mm	***960***	870.0 ± 13.7 mm
Horn core length, upper curve, tip to burr	32	203-364 mm	***295***	279.2 ± 6.2 mm
Straight line distance, tip to burr, dorsal horn core	30	185-330 mm	***280***	249.7 ± 5.3 mm
Dorso-ventral diameter, horn core base	39	81-126 mm	***122***	101.9 ± 1.6 mm
Minimum circumference, horn core base	38	233-392 mm	***290***	324.4 ± 5.3 mm
Width of occipital at auditory openings	20	251-318 mm	***305***	287.9 ± 4.2 mm
Width of occipital condyles	20	132-161 mm	***150***	143.7 ± 1.9 mm
Depth, nuchal line to dorsal margin of foramen magnum	18	94-134 mm	***130***	111.6 ± 2.2 mm
Antero-posterior diameter, horn core base	41	76-129 mm	***107***	105.6 ± 1.9 mm
Least width of frontals, between horn cores and orbits	25	276-352 mm	***325***	314.7 ± 3.9 mm
Females				
Spread of horn cores, tip to tip	20	524-802 mm		669.5 ± 15.9 mm
Horn core length, upper curve, tip to burr	26	145-253 mm		202.9 ± 5.1 mm
Straight line distance, tip to burr, dorsal horn core	25	136-234 mm		190.1 ± 5.0 mm
Dorsa-ventral diameter, horn core base	26	53-79 mm		66.5 ± 1.2 mm
Minimum circumference, horn core base	24	172-241 mm		209.0 ± 3.3 mm
Width of occipital at auditory openings	13	221-264 mm		246.2 ± 3.2 mm
Width of occipital condyles	13	116-149 mm		133.2 ± 2.5 mm
Depth, nuchal line to dorsal margin of foramen magnum	11	86-109 mm		100.7 ± 1.9 mm
Antero-posterior diameter, horn core base	26	54-75 mm		65.8 ± 1.1 mm
Least width of frontals, between horn cores and orbits	21	238-303 mm		262.8 ± 3.4 mm

Bison antiquus Limb Biometrics Compared with Petronila Creek *Bison*

Standard measurement	n	Range	*Pet. Crk. Bison*	Mean ± SE
Males				
Humerus:				
Approximate rotational length of bone	1	....	***380***	339.0 mm
Antero-posterior diameter of diaphysis	3	68-73 mm	***70***	69.7 ± 1.6 mm
Transverse minimum of diaphysis	3	58-59 mm	***65***	58.7 ± 0.2 mm
Radius:				
Approximate rotational length of bone	4	335-351 mm	***360***	343.0 ± 3.8 mm
Antero-posterior minimum of diaphysis	4	33-35 mm	***45***	33.7 ± 0.4 mm
Transverse minimum of diaphysis	4	53-56 mm	***67***	54.5 ± 0.6 mm
Metacarpal:				
Total length of bone	28	211-238 mm	***240***	222.0 ± 1.2 mm
Antero-posterior minimum of diaphysis	28	28-33 mm	***35***	30.7 ± 0.2 mm
Transverse minimum of diaphysis	28	47-61 mm	***62***	52.3 ± 0.6 mm
Females				
Humerus:				
Approximate rotational length of bone	9	311-357 mm		343.5 ± 4.6 mm
Antero-posterior diameter of diaphysis	10	55-68 mm		62.9 ± 1.3 mm
Transverse minimum of diaphysis	10	45-56 mm		50.6 ± 0.9 mm
Radius:				
Approximate rotational length of bone	8	310-351 mm		329.0 ± 5.2 mm
Antero-posterior minimum of diaphysis	8	28-37 mm		32.8 ± 1.2 mm
Transverse minimum of diaphysis	8	43-59 mm		51.1 ± 2.0 mm
Metacarpal:				
Total length of bone	40	206-230 mm		219.5 ± 1.0 mm
Antero-posterior minimum of diaphysis	40	25-32 mm		28.6 ± 0.2 mm
Transverse minimum of diaphysis	40	38-51 mm		45.0 ± 0.5 mm

Table 1. Skeletal measurements of the Petronila Creek giant bison compared with *Bison antiquus*.

Bison latifrons Skull Biometrics Compared with Petronila Creek *Bison*

Standard measurement	n	Range	*Pet. Crk. Bison*	Mean ± SE
Males				
Spread of horn cores, tip to tip	19	1445-2235 mm	*960*	1789.1 ± 48.0 mm
Horn core length, upper curve, tip to burr	25	551-1090 mm	*295*	876.0 ± 28.3 mm
Straight line distance, tip to burr, dorsal horn core	20	529- 979 mm	*280*	805.4 ± 26.2 mm
Dorso-ventral diameter, horn core base	34	107- 178 mm	*122*	144.9 ± 2.8 mm
Minimum circumference, horn core base	36	408- 669 mm	*290*	489.2 ± 8.7 mm
Width of occipital at auditory openings	14	287- 343 mm	*305*	322.9 ± 4.6 mm
Width of occipital condyles	17	140- 179 mm	*150*	159.5 ± 2.5 mm
Depth, nuchal line to dorsal margin of foramen magnum	12	109- 141 mm	*130*	125.5 ± 3.5 mm
Antero-posterior diameter, horn core base	37	137- 226 mm	*107*	164.7 ± 3.1 mm
Least width of frontals, between horn cores and orbits	19	299- 406 mm	*325*	355.1 ± 7.4 mm
Females				
Spread of horn cores, tip to tip	1	....		1238.0 mm
Horn core length, upper curve, tip to burr	3	519- 653 mm		564.0 ± 44.5 mm
Straight line distance, tip to burr, dorsal horn core	2	506- 620 mm		563.0 ± 57.0 mm
Dorso-ventral diameter, horn core base	9	89- 119 mm		105.9 ± 3.0 mm
Minimum circumference, horn core base	9	287- 371 mm		324.9 ± 8.8 mm
Width of occipital at auditory openings	3	235- 281 mm		260.3 ± 13.5 mm
Width of occipital condyles	3	135- 155 mm		146.7 ± 6.0 mm
Depth, nuchal line to dorsal margin of foramen magnum	3	95- 115 mm		107.0 ± 6.1 mm
Antero-posterior diameter, horn core base	9	92- 119 mm		103.0 ± 3.2 mm
Least width of frontals, between horn cores and orbits	5	276- 306 mm		285.2 ± 5.4 mm

Bison latifrons Limb Biometrics Compared with Petronila Creek *Bison*

Standard measurement	n	Range	*Pet. Crk. Bison*	Mean ± SE
Males				
Humerus:				
Approximate rotational length of bone	7	379- 418 mm	*380*	401.7 ± 5.7 mm
Antero-posterior diameter of diaphysis	14	73- 86 mm	*70*	79.8 ± 1.0 mm
Transverse minimum of diaphysis	14	60- 72 mm	*65*	66.9 ± 1.0 mm
Radius:				
Approximate rotational length of bone	9	362- 393 mm	*360*	383.2 ± 3.3 mm
Antero-posterior minimum of diaphysis	11	41- 49 mm	*45*	45.5 ± 0.8 mm
Transverse minimum of diaphysis	11	65- 82 mm	*67*	75.6 ± 1.3 mm
Metacarpal:				
Total length of bone	16	234- 264 mm	*240*	248.6 ± 2.1 mm
Antero-posterior minimum of diaphysis	19	33- 40 mm	*35*	36.3 ± 0.5 mm
Transverse minimum of diaphysis	18	54- 74 mm	*62*	65.7 ± 1.2 mm
Females				
Humerus:				
Approximate rotational length of bone	1	....		345.0 mm
Antero-posterior diameter of diaphysis	5	66- 75 mm		72.0 ± 1.5 mm
Transverse minimum of diaphysis	5	55- 62 mm		57.2 ± 1.3 mm
Radius:				
Approximate rotational length of bone	5	344- 366 mm		359.2 ± 4.0 mm
Antero-posterior minimum of diaphysis	10	35- 38 mm		36.3 ± 0.3 mm
Transverse minimum of diaphysis	8	55- 67 mm		60.3 ± 1.6 mm
Metacarpal:				
Total length of bone	9	238- 259 mm		248.1 ± 2.1 mm
Antero-posterior minimum of diaphysis	11	30- 34 mm		32.2 ± 0.4 mm
Transverse minimum of diaphysis	11	49- 59 mm		52.6 ± 0.9 mm

Table 2. Skeletal measurements of the Petronila Creek giant bison compared with *Bison latifrons.*

time during the Sangamon or the subsequent Wisconsin glacial period and, if *latifrons* continued, coexisted with them. By the end of the Wisconsin and the start of the Holocene, *latifrons* was certainly gone and *antiquus* began a rapid evolutionary shift to the modern *Bison bison*. The picture is almost that simple, but not quite, because McDonald recognizes the continuing occasional pulse of Eurasian bison crossing into Alaska and penetrating into the interior of North America, such as *Bison alaskensis* and *Bison priscus*. He also recognizes hybrids between *antiquus* and these Eurasian strains. The views of Kurtén and Anderson (1980: 335-337) do not seriously conflict with those of McDonald.

The present author prefers to reject the thesis that *Bison latifrons* persisted until near the end of the Wisconsin. McDonald's work shows that all *latifrons* that can be dated stratigraphically, or by both radiocarbon and stratigraphic means, date from the Sangamon or earlier. Only two sites, with radiocarbon dates as the only evidence, and these are older radiocarbon dates and appear to be on less-reliable material such as bone apatite, seem to be post-Sangamon. Most likely, *latifrons* evolved into *antiquus* at the end of the Sangamon, and that was that. Therefore, the Petronila Creek specimen, though of *latifrons* size, clearly has *antiquus* horns and is almost certainly an overgrown *antiquus* that had a well-fed life in the very hospitable Texas coastal refugium.

To expand briefly on the above statement, the Texas coastal plain must have been a very benevolent place during the last glacial maximum. It was well watered and probably never had extremes of heat or cold, perhaps never falling below freezing. Based on evidence from the bone bed beneath the bison skeleton, Petronila Creek was a good-sized river with large alligators, large river turtles, huge gar fish and abundant other large fish. The surrounding countryside was mixed grass and woods, supporting mammoth, ground sloth, horses, camel, bison, deer, antelope, and many other mammals. Giant land tortoises, which can't withstand freezing weather, were present and two types of beetles were present (Scott Elias, personal communication 1989) that are now found only in tropical Mexico and Central America.

THE MODERN BISON SKELETAL MATERIAL

While site 41NU246 is primarily a deeply buried Pleistocene site, there is an Archaic Indian component near the surface. This occupation is most readily revealed by the presence of abundant brick-red burned clay nodules from hearths, *Rabdotus* land snail shells, flakes of flint, and stone dart points and tools, all in a distinctive black clay that generally extends from the ground surface down a foot or two. Locally, however, the black clay fills old channels of Petronila Creek, and these can extend downward nearly to the Pleistocene bone bed. One such black-clay-filled channel is situated over the postcranial skeleton (but not over the skull) of the *Bison antiquus*. This channel fill (Figures 3 and 4) has several identifiable horizons, and one near the top is especially rich in burned clay, snail shells, flint and so forth. Associated with the human-derived material is another *Bison* skeleton, much smaller than the *antiquus*. Soil radiocarbon dates place this small skeleton at 700 years before present. Adjusting the radiocarbon date by a rough multiplier of 3/2, derived from a deeper radiocarbon/thermoluminescence comparison (see below), would make this horizon about 1000 years old. (Soil radiocarbon dates are always considered minimum ages because some modern contamination is always admitted. Here, with the thermoluminescence date to help correct for this contamination, we arrive at a date satisfyingly within the Archaic Indian time period, and thus consistent with the presence of dart points but absence of arrow points.)

If the black clay artifact-containing horizon is 1000 years old, the bison bones contained therein would be the modern species *Bison bison*. The few bones recovered support this assignment (McDonald 1981:97). No doubt, much of the skeleton was present and available for recovery, but the only bones recovered have been those that eroded out during floods. Again, the difficult clay matrix, coupled with the low significance assigned to this horizon, precluded any controlled excavations when more important areas were equally threatened with flood loss. Nevertheless, the recovered bones – two metatarsals, two toe bones, a rib section, and a vertebra – are sufficient to say that the animal is a *Bison bison*, probably a female less than four years old. The epiphysis-diaphysis fusion is not accomplished in the metatarsals, a process that is completed by the end of the fourth year (McDonald 1981: 48).

Was the *Bison bison* killed by humans? Perhaps, but no burning or cut marks are present on the bones, and they were found in the only stratum that has not been seen to contain burned clay nodules,

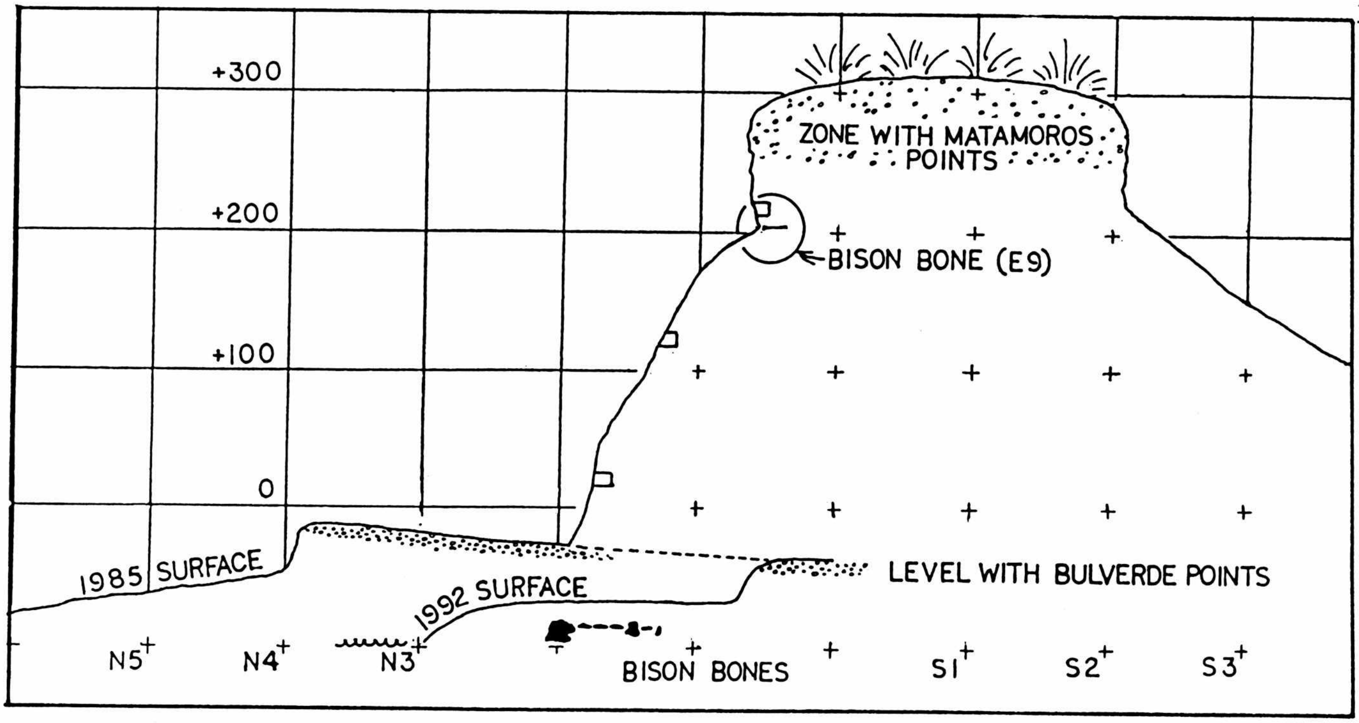


Figure 3. Cross section looking East at E-6, with bison bones and levels with characteristic artifacts shown. Regions of burned clay nodules indicated. Matamoros points are Late Archaic to Late Prehistoric (3000 B.P. - 400 B.P.). Bulverde points are Early Archaic, ca. 5000 B.P. - 4500 B.P. (see text). *Bison bison* is Holocene. *Bison antiquus* is Pleistocene, pre-10,000 B.P. Grid size one meter.

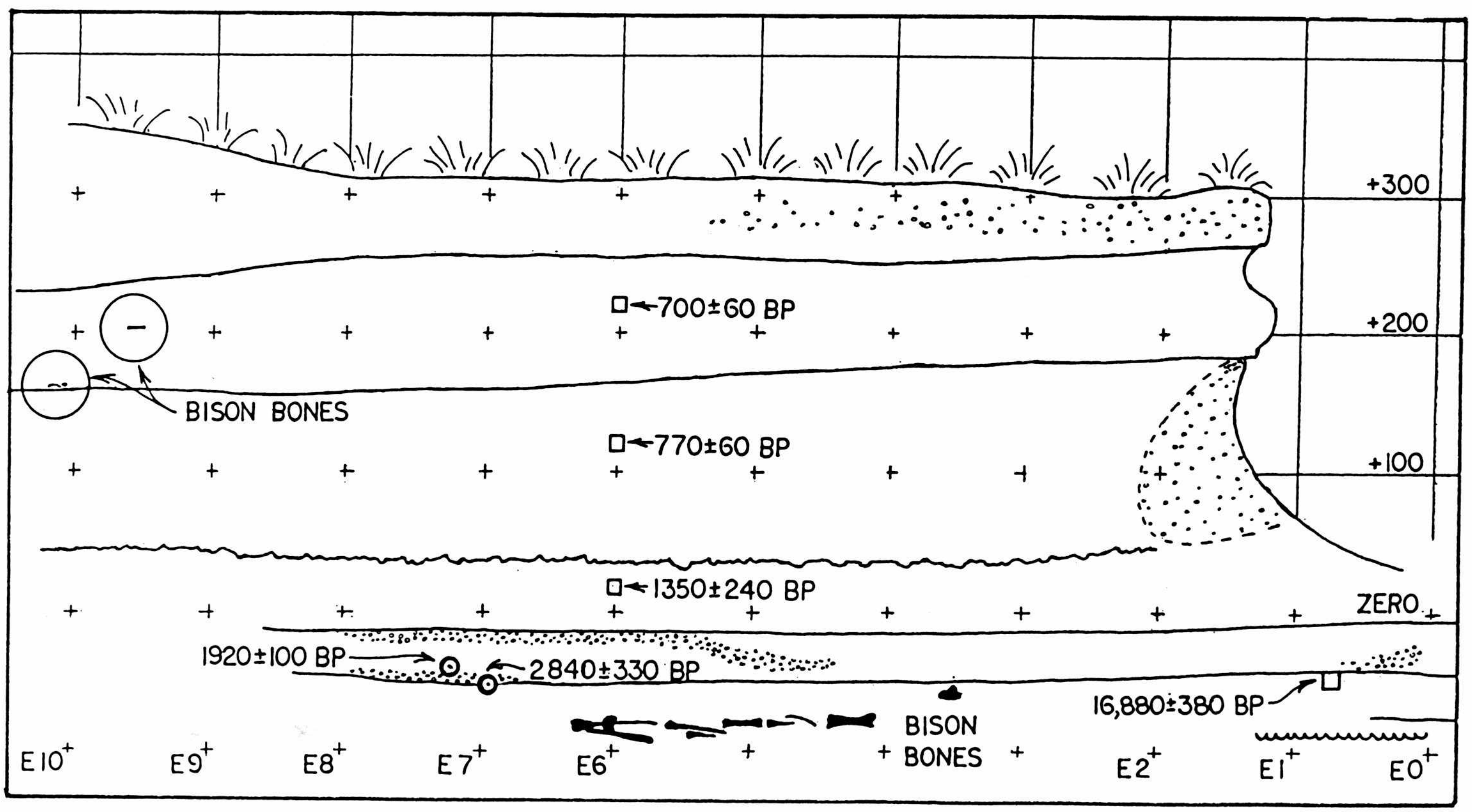


Figure 4. North-facing bank of Petronila Creek, with bison bones and dated intervals shown. Regions of burned clay nodules indicated. From top to bottom, strata are: Black clay, dark gray laminated clay (with *Bison bison* bones), black clay, tan sandy clay, white sandy clay, and white clay (with *Bison antiquus* bones). Grid size one meter.

stone chips, or other evidence of occupation. On the other hand, a broken *Bison* metatarsal, from a slightly larger and more mature individual, was found loose in the creek bed and has very obvious dismemberment cuts at the proximal joint end. This bone is in the same good condition as the in situ bones of the *Bison bison*, and much different from the degraded bones of the *antiquus*.

The deepest ^{14}C date from the lowest observed Archaic hearth region, run on a carbon-rich soil, is 1920 ± 100 years B.P. (Beta - 15995). Thermoluminescence dating of burned clay from the same deep hearth yielded an age of 2840 ± 330 years B.P. (Alpha - 3015). With the most recent realistic date being 1000 years B.P., the entire Archaic occupation at Petronila Creek seems to have spanned only about 2000 years and it thus becomes instructive to discuss the Archaic tools and dart points found above and below the *Bison bison* skeleton, because they should be roughly contemporaneous.

THE ARCHAIC ARTIFACTS

Both dart points and stone tools are present in the Archaic deposits. A few of the more readily diagnostic styles are Abasolo, Bulverde, Matamoros and/or Tortugas dart points, and Clear Fork and Nueces Biface tools (Turner and Hester 1985). The Bulverde points have only been found in situ in the deposits below the *Bison bison* skeleton, and since they date from ca. 5000 B.P. - 4500 B.P. (Turner and Hester 1985:73), this is consistent with the apparent recentness of the *Bison* (though they seem to argue that the thermoluminescence and radiocarbon date on the same level are somewhat too young). The Matamoros points are found in the surface zone, above the *Bison bison* material, and as they date from the Late Archaic to the Late Prehistoric period (3000 B.P. to 400 B.P.)(Turner and Hester 1985: 48-52), their position is also consistent with a *Bison bison* age of about 1000 B.P. The Bulverde and Matamoros points are shown in Figure 5.

THE PLEISTOCENE ARTIFACT

Contrasted with the Archaic tools, the Pleistocene "chopper" seems primitive (Figure 5). Admittedly, this lone specimen is hardly a statistical sample, but nothing in the slightly deeper principal bone bed contradicts the suspicion that it was typical of the time. Without going into detail on the contents of the slightly deeper principal bone bed, [one must refer to the published preliminary report (Lewis 1988) and hope for the eventual detailed report (Lewis, in preparation) for that information] the author can state that it contains a few flint flakes and two very small tool-like sharpened rocks. The urge to speculate on this apparent primitiveness will be resisted.

Could the Pleistocene "chopper" be intrusive? Probably not. It has crusts of calcium carbonate, which commonly encrusts the Pleistocene bones but never encrusts the Archaic tools or bones. It came from a spot well removed from any recently-filled stream channel, and thus was 15 or 16 feet below the level of the nearest Archaic horizon. Finally, though it was exposed by erosion, it was firmly and deeply embedded in the Pleistocene clay, and was spotted immediately after being exposed.

As seen in the Figure, the "chopper" is roughly flaked from a river rock of poor grain structure. The facets are jagged and poorly controlled. The bit end consists of four teeth created by removing three principal flakes. The illustration, drawn by the author, exaggerates the smoothness of these flake scars; they are not so pretty in real life. The sharp edges are still sharp, with no stream-transport rounding. Small chips along the bit may testify to utilization, and a possibly important feature is the wear-smoothing of a sharp edge running parallel to the long axis of the tool. This smoothed edge extends for several centimeters. About half of the surface of the "chopper" is cortex. The calcium carbonate crusts are on flaked surfaces, not on the cortex, and are shown as stippled spots in the Figure.

As to the age of the "chopper", and the age of the *Bison antiquus*, they are certainly Pleistocene. Furthermore, as a general rule in the surrounding sediments, scattered Pleistocene bones extend nearly to the present ground surface, so the bison and stone are both physically "deep" in the Pleistocene. It may be that the surface layer of black clay is the only Holocene material. A series of radiocarbon dates extend from below the bison/ stone level to well up the section above it. Those below, on bone apatite and sediment, are over 18,000 years B.P. No bone collagen remains, no charcoal has been found, and the few burned clay nodules are too small for thermoluminescence dating, so this date for the deeper layer can't readily be improved upon. At a point just above (about 30 cm. above) the *Bison antiquus* skeleton, a sediment date of 16,880 ± 380 years B.P. (Tx 5373) has been obtained. At a point

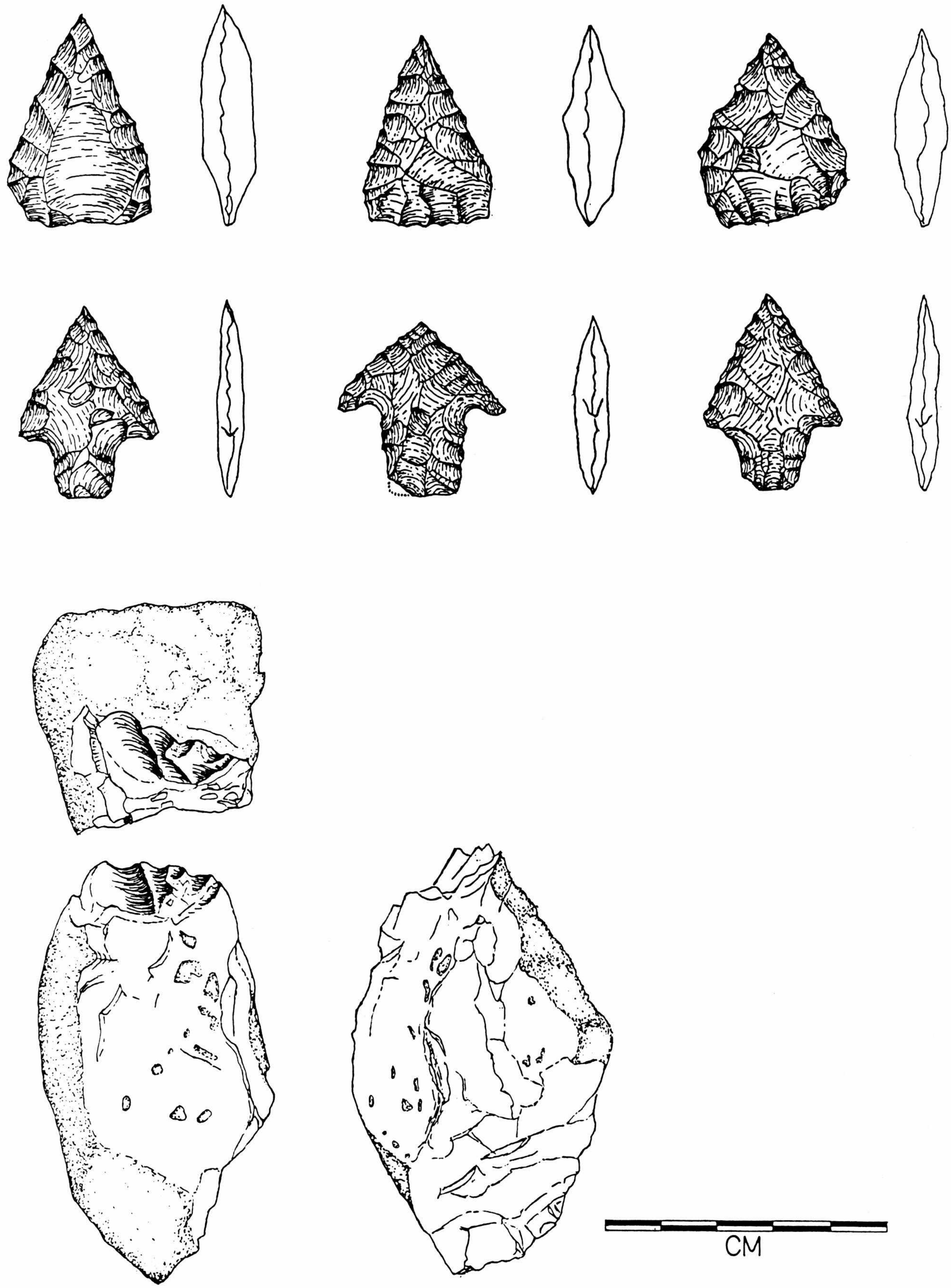


Figure 5. Lithic artifacts found near bison remains at Petronila Creek site. Top row: Matamoros points found above *Bison bison* skeleton. Middle row: Bulverde points found below *Bison bison*. Bottom: "Chopper" found at level of *Bison antiquus* skeleton. Scale size five centimeters.

about 80 cm. above the skeleton, the sediments date at 14,000 years. [Other sediment ^{14}C dates, which would need some discussion, confirm the time series presented above. All are by the Radiocarbon Lab at the University of Texas Balcones Research Center. Two additional dates, by a different lab, are obviously badly in error, giving mid- to late Holocene dates for sediment below the *Bison antiquus*. The author rejects a late Holocene *Bison antiquus* as firmly as he has previously rejected a late Wisconsin *Bison latifrons*, and says these dates are in error. One must remain ever mindful of the caution always offered by the experts in the lab: Soil dates give minimum ages (Sam Valastro, personal communication 1994; Jerry Stipp, personal communication 1994)]. Work is continuing to date this interesting site as fully and accurately as possible, and results will be published with the report on the principal bone bed.

ACKNOWLEDGMENTS

Many people have helped with the overall site, but this discrete phase of the work has seen the special contribution of Ernie Lundelius in confirming the nature of the *antiquus* material, and Ken Brown with countless encouragements and supports. Special and heartfelt thanks go to Sam Valastro and his associates at the University of Texas Radiocarbon Lab for their work in rendering down many gallons of hard white clay to obtain sufficient carbon for dating. This was above and beyond the call of duty.

References Cited

Aronow, Saul

1971 Nueces River Delta Plain of Pleistocene Beaumont Formation, Corpus Christi Region, Texas. *The American Association of Petroleum Geologists Bulletin* 55(8): 1231-1248

1988 A Possible 18,000 Year Old Hunting and Fishing Camp on the Texas Coastal Plain. *Current Research in the Pleistocene* 5: 15-16

Johnson, Eileen

1993 A Late Pleistocene Small Mammal Fauna from South Texas. *Current Research in the Pleistocene* 10:105-107.

Kurtén, Björn and Elaine Anderson

1980 *Pleistocene Mammals of North America.* Columbia University Press, New York: 335-337

Lewis, C.R.

1986 Preliminary Report and Call for Comment; Possible Paleo Site with Pleistocene Fauna and Human Artifacts in Association at Petronila Creek near Driscoll, Texas. *An Occasional Paper of the Coastal Bend Archeological Society* 2: 42-63.

Lundelius, E.L., Jr.

1972 Fossil Vertebrates from the Late Pleistocene Ingleside Fauna, San Patricio County, Texas. *Report of Investigations* 77:57-59. University of Texas, Bureau of Economic Geology.

McDonald, Jerry N.

1981 *North American Bison, Their Classification and Evolution.* University of California Press.

Turner, Ellen Sue and Thomas R. Hester

1985 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press, Austin.

INCIDENCE OF VIRGIN NERITE AS SHELL ORNAMENTS AT MORHISS (41VT1), AN ARCHAIC CEMETERY SITE

Helen Danzeiser Dockall and John E. Dockall

ABSTRACT

The use of Virgin Nerite shells as ornamentation and grave goods has been documented from the Morhiss site (41VT1) in Southeast Texas. This is only the second site to document archaeologically this marine gastropod species; the other incidence being tentatively identified at the Ferguson site (41FB42). Analysis of Nerite beads from Morhiss indicates that a different method of modification was practiced from those at the Ferguson site but Nerite beads from both sites seem to have been incorporated into an appliqué design. Microscopic analysis to determine the color patterns of periostracum remnants on the Nerite shells also gives further insight into their possible function as appliqué beads.

INTRODUCTION

The use of Virgin Nerite (*Neritina [Vitta] virginea*[1]) as a shell ornament has been reported in only two sites from Southeast Texas (Figure 1). The first account is a tentative identification of this gastropod from the Ferguson site in Fort Bend County (Gregg 1993:27). The Morhiss site (Victoria County), reported here, is the second case to document the presence of this type of gastropod as a shell ornament. Both sites have burials dating to the Archaic and both are located on the inland portion of the Western Gulf Coastal Plain. However, there are differences in the way the shell was processed at each site. In addition, at Morhiss the Nerite was found in direct association with Marginella beads (*Prunum [leptegouana] apicinia*). At Ferguson, the Nerite was found with discoidal marine shell beads.

DESCRIPTION OF VIRGIN NERITE AT THE FERGUSON SITE

Gregg (1993) noted the presence of worked gastropod shells with a burial recovered from the Ferguson site (41FB42), in Fort Bend county. This site has a sequence dating from the Late Paleo-Indian period through the Late Prehistoric; human burials occurred during the Late Archaic period. Burial 2 was found with approximately 40 small gastropod shells located near the femora and pelvis of the individual, in the area of the extended arms and hands (ibid.:26). The gastropods were described as hemi-ellipsoidal and measured 7 - 9 mm in length and 1 - 2 mm in height (ibid.:26). Characteristics seen on the shell resulted in their tentative identification as *Neritina (Vitta) virginea*, the Virgin Nerite. However, the author noted that the walls and columellae of shell were thicker than examined comparative specimens (ibid.:27). Each of these shells had been modified by grinding, producing a flat surface. The modification seen on these specimens resulted in a sectioning of the columellae (ibid.:26). The apex of the shell was left intact, but the aperture was absent (ibid.:26-27). Gregg stated that the shells were probably not strung and worn as a bracelet since they were fragile. In addition, no wear expected from stringing was identified on the shells. Because of this, the author suggested that these gastropods were most probably used as an appliqué, sewn or fastened with an adhesive (ibid.: 27). He also noted that the Ferguson site is the first site in Southeast Texas from which shell ornaments such as these have been reported (ibid.:27).

Figure 1. Location of sites yielding Virgin Nerite as grave goods.

[1]Taxonomic classifications used in this report follow Andrews (1981).

DESCRIPTION OF VIRGIN NERITE AT MORHISS

It is the purpose of this paper to document the presence of this type of shell ornament, made from the Virgin Nerite, at another Southeast Texas site. An analysis of the shell assemblage from the Archaic site of Morhiss (41VT1) located in Victoria County, approximately 75 miles from Fort Bend County, has yielded evidence of the Virgin Nerite as shell jewelry. This type of shell was found in association with four burials from the site, totaling 19 shells. In all cases, the Virgin Nerite was found with Marginella beads. Identification of these shells as *Neritina (Vitta) virginea* was made by comparing them to descriptions from Andrews (1981) and specimens present in the Zooarchaeological Research Collection at Texas A&M University. The shells ranged in length from 8.8 mm to 11 mm and in width from 6.4 mm to 8.7 mm (Table 1). The periostracum, usually brightly and diversely colored in this species, was only visible microscopically on six specimens at the juncture of the inner and outer whorl.

Virgin Nerite shells present at the Morhiss site had all been processed in a similar manner. Each bead exhibits a ground facet on the side of the outer whorl opposite the aperture (Figure 2). The aperture is present in each case and the spire is intact. The perforations ground into the shells are oval in shape and measure 3 mm in length and 2 mm in width. All Marginella beads present with the burials were also processed in the same manner. However, the Virgin Nerite found at the Ferguson site was processed differently so that the columellae were sectioned and the apertures were obliterated.

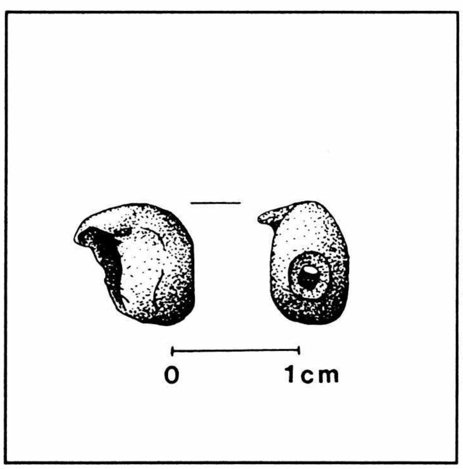


Figure 2. Virgin Nerite at 41VT1 showing localized modification of the outer whorl. Note intact aperture of shell.

VIRGIN NERITE AS GRAVE GOODS

Virgin Nerite has been tentatively identified as a grave good at the Ferguson site and has been definitely identified at Morhiss. In both cases the shells had been manufactured into ornaments and were associated with other types of shell jewelry. However, Nerite occurs at a higher frequency at the Ferguson site. Burial 2, age and sex unknown, had 40 ground gastropods, in addition to over 210 shell disk beads (Gregg, 1993:22,26). Therefore, Virgin Nerite composed approximately 19% of the shell ornament assemblage interred with that individual from the Ferguson site. The four burials from Morhiss that had Virgin Nerite shell yielded a total of 360 shells, including Marginella. Virgin Nerite accounted for only 5.2% of the shell ornament assemblage associated with these four burials. On an individual burial basis, the percentage of Virgin Nerite found with the burials at Morhiss ranges from a low of 2.1% to a high of 25% of the total shell grave good assemblage found with each burial (Table 2).

Unfortunately, age and sex data of all known individuals interred with Virgin Nerite are deficient. Demographic information was not available for Burial 2 at the Ferguson site, and, due to the fragmented nature of the remains, all that is known about the four individuals from Morhiss is that they were of an adult age. Therefore, it is not possible to assess any type of social status that may be related to the occurrence of the uncommon Virgin Nerite with Archaic burials.

NERITE SHELL ORNAMENT FUNCTION

Researchers at the Ferguson site speculated that, based on the fragility of the shell, the ground gastropods recovered with Burial 2 were not strung as a bracelet (Gregg 1993:27). Gregg suggested that the shells were used as an appliqué, either by sewing or an adhesive. However, the archaeological specimens did not exhibit evidence to support either of these suggestions, possibly because caliche deposits may have obscured some of the indications of fastening (ibid.:27).

Macroscopic and microscopic analyses of Virgin Nerite beads from the Morhiss site indicate that these artifacts were not used as bracelet or necklace components. No microscopic polish or abrasion traces not attributable to manufacture were observed. Unlike specimens from the Ferguson site, specimens at Morhiss were not as heavily encrusted with calcium carbonate that would hinder observation of these traces.

Table 1. Dimensions of Virgin Nerite at 41VT1 (mm)

Field Specimen No.	Length	Width
5177	9.9	8.3
	10.7	8.6
	11.0	7.6
	9.8	7.6
	9.2	8.7
	9.0	8.1
	9.7	8.0
	-	-
5194	10.3	8.4
5266	8.8	6.4
	9.7	8.1
	10.0	8.0
	9.4	7.1
	9.7	7.8
5271	10.5	8.4
	8.9	7.5
Average Length = 9.8 mm	s.d. = 0.7	
Average Width = 7.9 mm	s.d. = 0.6	

Table 2. Percent of Virgin Nerite Composing Shell Ornament Assemblage per Burial at 41VT1.

Burial #	#Marginella	# Nerite	% Nerite
211e	83	8	9.6
213	12	3	25.0
216	37	2	5.4
219	292	6	2.12

Microscopic remnants of the periostracum were also present on some of the Nerite beads.

It is presently felt that Gregg's (1993:27) initial suggestion that the shells were used as appliqué may be a plausible explanation for the Virgin Nerite specimens at Morhiss. The associated Marginella shell beads at Morhiss were also modified in an identical manner being lightly ground to perforate the last whorl adjacent to the aperture and exposing the columella.

The location of modification on both the Nerite and Marginella at Morhiss is such that the string is directed behind the columella and out through the aperture. If these shells were strung as part of an appliqué or were perhaps part of a cape or sash, this method of suspension would position the shell so that the aperture would not be visible. Only the outer body of the shell bead would be observed. No residues of asphaltum or other adhesive were noted. Further, no wear may be expected if the shells were firmly affixed to or incorporated into some type of garment. Evidence from Morhiss strongly suggests that Marginella and Nerite were used in the same manner.

Further possibilities of the function of Virgin Nerite beads at Morhiss may be gained by comparisons of the natural color variation of both Marginella and Nerite shells. Common Marginella shells vary from a bright golden yellow to an orange brown and exhibit a highly polished surface (Morris 1973: 232). Other color variation includes a polished cream, yellowish, or grayish tan (Andrews 1981:61). Virgin Nerite is well-known for its distinctive brightness and contrast. Color patterns commonly include various shades of gray-green, tan, or yellow, marked with a variety of lines, circles, or dots, often being very banded (Morris 1973:128). Andrews (1981:8) noted a wider variety of colors including olive, white, gray, red, yellow, purple, or black with dots or white waves, stripes, dots, lines, or other mottled surface patterns. Periostracum remnants on Virgin Nerite beads from Morhiss include the following colors: black or dark brown with white spots or splotches, black or dark brown with wavy lines, alternating white and gray lines or bands, and alternating thin, deep red lines and wider white lines.

Examination of burial photographs from Burials 211e and 219 at Morhiss that included both Common Marginella and Virgin Nerite beads indicate that the Marginella beads appear to be in distinct patterns such as may be associated with a cape or sash with a solid background of these shells. It may be that this species was used as the foundation of a design in which the more colorful Virgin Nerite shells were incorporated as accent pieces or to break up the monotony of the overall pattern created by the Marginella beads.

DISCUSSION AND CONCLUSIONS

Although the Virgin Nerite has now been reported as grave goods associated with five Archaic burials from two Southeast Texas sites, there are some notable differences in the accounts. The most significant contrast in both sites yielding Virgin Nerite as grave goods relates to the frequency at which the shells were used as ornaments. Virgin Nerite was recovered more frequently at the Ferguson site than at Morhiss. The relative positions of the sites to the coast does not explain this frequency difference, because both sites are located at approximately the same distance from the strand line of the Texas coast. Morhiss is located 40 miles inland, while the Ferguson site is situated 50 miles inland. In addition, Morhiss is actually closer to coastal waters because it is only 20 miles from the northernmost area of the San Antonio Bay (Campbell 1976: 81). Virgin Nerite is known to travel up rivers (Morris 1973:128), so it is possible that more Nerite travelled up the San Bernard River (on which the Ferguson site is located) than up the Guadalupe River (where Morhiss is located). It should also be pointed out that although Nerite can be collected from both shallow ocean and riverine localities, the shells are more colorful in brackish water than in saline water (Andrews 12981:8). Therefore, if these shells were being collected as accent pieces (as discussed earlier) then it would make more sense for them to have been collected in rivers, especially in the region opening to the ocean. It is also very possible that, at Morhiss, the Virgin Nerite shells were collected fortuitously as Marginella gastropods were being collected, especially as both types inhabit shallow, bay waters and grassy flats.

The other significant difference between the Nerite found at both Southeast Texas sites relates to the manufacturing process. At the Ferguson site the shells were ground flat on one side, thereby obliterating the aperture and sectioning the columella. At Morhiss, the aperture and columella were preserved but a perforation was ground into the opposite outer whorl. Regardless of the manufacturing differences, the shells do seem to have been used in the same manner, most likely appliquéd to clothing.

Accounts of Virgin Nerite in Southeast Texas have been limited to the Ferguson and Morhiss sites which date to the Archaic. However, the Nerite genus has been identified at another site in Texas, Horn Shelter Number 2 (41BQ46) (Redder 1985; Redder and Fox 1988). Redder and Fox (1988:7) noted that over eighty beads manufactured from the species *Neritina reclivata* (the Olive Nerite) were found associated with a double burial (an adult and a twelve year old child). Although these specimens are a different genus from those identified at Ferguson and Morhiss, it is apparent from both descriptions and photographs (ibid.:7) that these specimens were modified by exactly the same technique as described for those at Morhiss. The Horn Shelter 2 burials have been established as being Paleo-Indian in age, which adds a significant time depth to the use of Nerite as ornamentation and its inclusion as part of a burial assemblage in Texas.

ACKNOWLEDGMENTS

The authors would like to acknwledge the Texas Archeological Research Laboratory for access to the shell collection from Morhiss. In addition, we thank Barry W. Baker, D. Gentry Steele, and Laurie S. Zimmerman for helping to identify the Virgin Nerite. Lynne O'Kelly is also thanked for providing the illustration of the Virgin Nerite bead.

References Cited

Andrews, J.
1981 *Texas Shells, A Field Guide*. University of Texas Press, Austin.

Campbell, T.N.
1976 Archaeological investigations at the Morhiss site, Victoria county, Texas, 1932-1940. In *An Archaeological Survey of Coleto Creek, Victoria and Goliad Counties, Texas*, by A.A. Fox and T.R. Hester. Center for Archaeological Research, The University of Texas at San Antonio, Archaeological Survey Report, No. 18.

Gregg, R.L.
1993 Mortuary Data. In *Excavations at the Ferguson Site, 41FB42, Fort Bend County, Texas*, by Patterson, L.W., J.D. Hudgins, R.L. Gregg, S.M. Kindall, W.L. McClure, and R.W. Neck, pp. 20-28. Houston Archeological Society Report No. 10.

Morris, P.A.
1973 *A Field Guide to Shells of the Atlantic and Gulf Coasts and the West Indies*. Third edition. Houghton Miller Company, Boston.

Redder, A.J.
1985 Horn Shelter Number 2: The South End. A Preliminary Report. *Central Texas Archeologist* 10:37-65.

Redder, A.J., and J.W. Fox
1988 Excavation and Positioning of the Horn Shelter's Burial and Grave Goods. *Central Texas Archeologist* 11:1-10.

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COASTAL BEND ARCHEOLOGICAL SOCIETY

Another local archaeological society our readers may find interesting to participate in is the Coastal Bend Archeological Society, recently risen from a short functioning hiatus, and now a very active group.

A recent business meeting vote has returned their monthly meeting to the first Wednesday of each month. The meetings will be in the Hilltop Community Center, Corpus Christi, at 7:00 o'clock p.m.

Contact Larry Beaman, 303 Rolling Acres Dr., Corpus Christi, Texas 78410 to confirm time and place and for further information.

A MESERVED PLAINVIEW POINT FROM 41AT118, NEAR LA PARITA CREEK, SOUTHEASTERN ATASCOSA COUNTY, TEXAS

David G. Robinson

ABSTRACT

A Plainview projectile point was excavated from stratified context in 41AT118, a buried site in drainage divide uplands above La Parita Creek in the Atascosa River drainage, Atascosa County, south Texas. The artifact has beveled resharpening termed meserving, and literature survey of additional Paleo-Indian finds in the region shows that the practice of resharpening in this way may have been common. Meserving suggests a combination of technological traits related by Johnson (1989) to processes of migration and adaptation of plains Paleo-Indian people to woodland environments in territories ranging from the Central Great Plains to eastern Texas. The identification of these traits in the Middle Nueces Zone of south Texas suggests the application of the Johnson model here or two alternative models.

INTRODUCTION

This study is a report of a Paleo-Indian (Plainview) artifact which, due to the peculiarities of its fashioning, may hold implications for Paleo-Indian lifeways in south Texas. The specimen was unearthed at site 41AT118, a small upland site above La Parita Creek in the Atascosa River drainage of southeastern Atascosa County (Figure 1), an area otherwise known as the Middle Nueces Zone (Office of the State Archeologist 1988:8-12, Figure 2).

Excavations at 41AT118 were part of an archaeological testing program of sites on the San Miguel Mine, a large strip lignite mine providing power for the San Miguel Electric Cooperative. The testing program was part of mandated cultural resource management conducted by the Texas Archeological Research Laboratory (TARL), The University of Texas at Austin, under contract to Morrison-Knudsen, Inc.

Based on the limited testing to date (Robinson, in press) site 41AT118 appears to be a thin, single-component Paleo-Indian site well-buried in an upland sandy clay loam. Radiocarbon analysis of soil organics was unsatisfactory and inconclusive, and the dating of the component rests entirely on the Plainview point. The cultural assemblage consists otherwise of scattered lithic debitage, a few chert cores, and burned chert and sandstone cobbles. Patterning suggestive of constructed features has not been found (Robinson, in press).

DESCRIPTION

The meserved Plainview point was found in Test Unit C, Level 7, at a depth of 65 cm below surface (Figure 2). The artifact is made of a fine quality chert, translucent yellowish amber to root-beer brown with fine opaque specks throughout the material. There is white, smooth cortex on one face and the ends of the basal ears. Although the overall quality of this chert falls within the range of materials available locally (originating ultimately on the Edwards Plateau), closely similar material was not observed in the several samples and collections examined during the fieldwork and analysis. Thus, the material and artifact may have been introduced to the region, but this possibility cannot be confirmed.

The biface was originally fashioned to form a lanceolate Plainview point with a deeper than usual basal concavity (Krieger, in Sellards, Evans, and Mead 1947), which also suggests the Barber type (Table 1). The artifact is allied most closely with

Table 1. Metrical Data--All units in millimeters

Specimen	L	W	T	Wt(gm)	Provenience
No. 64	53.5	24.5	6.0	8.6	Test Unit C, Level 7

Basal Width: 20.2
Basal Concavity: 5.2
Basal Thinning Flake Scar Lengths: 7.8,12.1, 13.3.
Length of Lateral Grinding: 19.5, 20.0

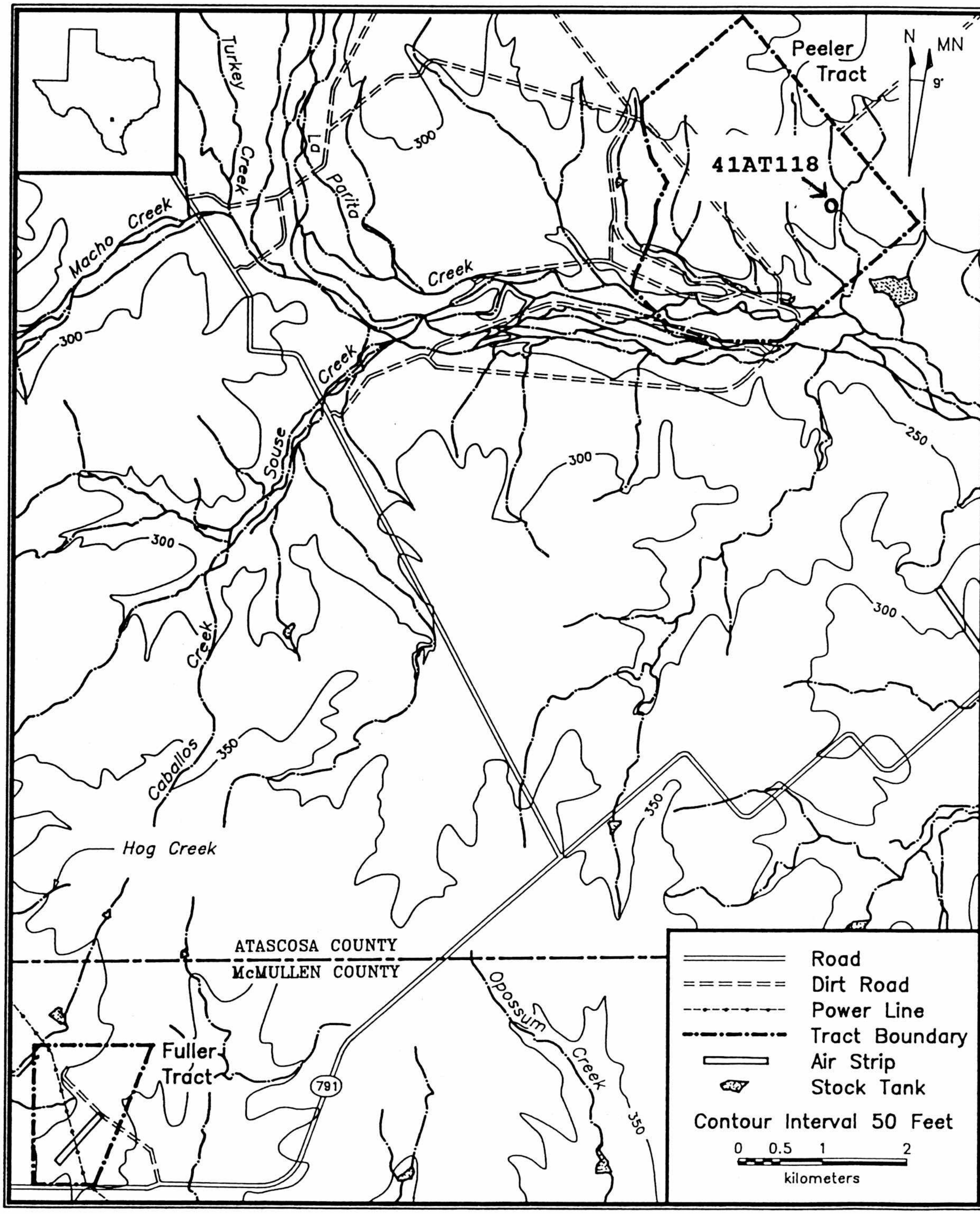


Figure 1. Map of project area. (Location of Atascosa County indicated in small Texas map insert, upper left corner.)

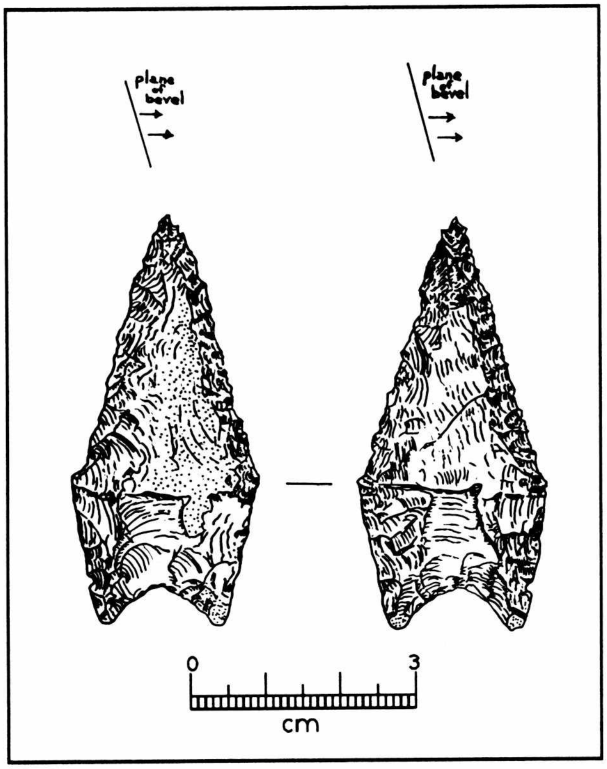


Figure 2. Obverse and Reverse of Meserved Plainview point from 41AT118.

Plainview, however, and that attribution is accepted here. The body was steeply right-beveled along the distal two-thirds of the artifact. This secondary manufacturing effort gives the point a configuration also qualifying it as a Meserve point (Davis 1953). The beveling has left the edges fresh, sharp, and jagged; by contrast the original Plainview lateral edges, basal ears and basal concavity are wellground, straight, and smooth to the touch. This difference suggests but does not prove that the beveling came after the artifact's initial flaking as a Plainview point. Flakes struck distally from the base have removed portions of the white cortex on one face. The cortex on the basal ears is thick enough to suggest that it was actually pockets of whitish opaque chert within the original core rather than cortex. The fluting flake on one face hinged against this material. The steep beveling on that face has also removed this material. From these observations, it is clear that the whitish material, whether native or the product of cortification and patination, did not form after the original Plainview point was completed or after the later beveling.

The beveling treatment of the artifact is termed meserving by Johnson (1989:44), who argued that it was practiced on a wide geographic scale as a process of technological adaptation to more wooded environments by previously Plains-adapted people. These processes of adaptation and migration, regardless of their exact causes and nature, took place in late Paleo-Indian times.

REGIONAL COMPARISONS AND IMPLICATIONS

Plainview points are common in the Atascosa County/Middle Nueces Zone of south Texas, as is the characteristic resharpening termed meserving. Hester (1968:154-156;Figures 4, e-e' and f-f') illustrated two projectile points with this resharpening. One is actually described as a possibly resharpened Plainview, although it was included in a group called Meserve. All the projectile points in the study came from surface localities along San Miguel Creek in Atascosa, McMullen, and Frio counties. These areas are near the San Miguel Mine, south and west of the mine.

McReynolds et al. (1979:21-23) reported additional Plainview points from the San Miguel Creek localities. Their specimens are fragmentary, but one, Specimen E, is right-beveled. Interestingly, their Golondrina Specimen D has right-beveled meserving as well, as has their Golondrina Specimen A, reported later (McReynolds et al. 1980:34-35).

Kelly (1982, 1983) studied the Paleo-Indian projectile points from the Brom Cooper Collection, taken from the surface of a series of sites in western McMullen County. This area is on the divide between the Frio and Nueces rivers and is farther south from the San Miguel Mine than the San Miguel Creek localities. Combining his Plainview and Miniature Plainview categories, 14 specimens were found on the site surfaces. Although resharpening was not discussed in Kelly's descriptions (Kelly 1983:28-30), one specimen appears resharpened, based on observation of its drawing (BRM 10, pg. 29). In fact, Specimen BRM 10 closely resembles the Plainview point from 41AT118.

Dusek (1980:39-41) reported two Plainview basal fragments from 41MC10 in the Frio River valley near Calliham in northern McMullen County. The points were too fragmentary to observe any possible resharpening.

This survey of the regional Paleo-Indian artifact literature is not intended to be exhaustive; but these studies are summarized to show that the Plainview type is regionally common as a Paleo-Indian diagnostic, as is beveled resharpening on Plainview and other Late Paleo-Indian projectile points. Doubtlessly, Plainview points and beveled resharpening are present if not common in other South Texas Paleo-Indian collections.

Johnson (1989) related Paleo-Indian stone tools and various styles of reworking them in a wide distributional study ranging from the Central Great Plains to eastern Texas. To him, the repeated and widespread patterns of reworking of Paleo-Indian stone tools in the woodland peripheries of the plains indicated periodic movements or migrations of plains Paleo-Indians into these regions. The different environments demanded changes in economic strategies, hence adjustments of the technology and toolkit. Resharpening of stone tools to give a heavier, beveled edge to meet the demands of the greater amount of woodworking necessary in woodland environments would be only one expectable adjustment, but one of the few which would be observable archaeologically.

The identification of this relationship between resharpening (meserving) and Paleo-Indian diagnostics at 41AT118 and in the regional literature indicates that the same process may have been taking place in the Middle Nueces Zone of south Texas. This region is outside the bounds of distribution examined by Johnson. The findings of this study therefore suggest potentially three conflicting explanations. First, the findings may reveal an extension of the geographic range over which economic adjustments, or adaptations, described by Johnson took place. They also increase the inferred scale of Late Paleo-Indian migrations, if indeed these are indicated by the data. Second, the key artifact features (meserving) and their distributions imply other adaptations and environmental relationships than those promulgated by Johnson. This explanatory model would have to be fleshed out with other artifactual relationships and floral and faunal data from Paleo sites, rare as hens' teeth in south Texas. Lastly, the Johnson model may be strictly correct, but the south Texas environment was markedly different in late Paleo-Indian times, with more sharply defined woodland communities capable of being identified and targeted for occupation by far-migrating Plains Paleo-Indian people. General paleoenvironmental research (pollen analysis, geo-morphology) may help evaluate this model.

ACKNOWLEDGMENTS

Morrison-Knudsen, Inc. sponsored the research which resulted in the finds reported here. Dr. Thomas R. Hester and Dr. Solveig A. Turpin, respectively director and associate director of the Texas Archeological Laboratory, UT-Austin, offered useful comments on early drafts of the manuscript.

References Cited

Davis, E. Mott
1953 Recent Data from Two Paleo-Indian Sites on Medicine Creek, Nebraska. *American Antiquity* 18(4):380-386.

Dusek, Curtis
1980 Plainview Points from 41MC10, McMullen County, Texas. *La Tierra* 7(3):39-41.

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

Johnson, LeRoy, Jr.
1989 *Great Plains Interlopers in the Eastern Woodlands During Paleo-Indian Times.* Report 36. Office of the State Archeologist, Texas Historical Commission, Austin.

Kelly, Thomas C.
1982 Criteria for Classification of Plainview and Golondrina Projectile Points. *La Tierra* 9(3):2-25.

1983 The Brom Cooper Paleo-Indian Collection from McMullen County, Texas. *La Tierra* 10(3):17-40.

McReynolds, Richard, Ben McReynolds, and Mike McReynolds
1979 Additional Paleo-Indian Artifacts from San Miguel Creek, Atascosa County, Texas. *La Tierra* 6(2):20-25.

McReynolds (Continued)

1980 Additional Late Paleo-Indian Artifacts from Southwestern Atascosa County, Texas. *La Tierra* 7(3):34-38.

Office of the State Archeologist

1988 *Proceedings of the First South Texas Archaeological Palaver*. Office of the State Archeologist. Austin.

Robinson, David G.

in press Upland Sites in the Middle Nueces Zone: Testing in the San Miguel Mine, Atascosa County, Texas. *Studies in Archeology*. Texas Archeological Research Laboratory. The University of Texas at Austin.

Sellards, E. H., Glen L. Evans, and Grayson E. Meade

1947 Fossil Bison and Associated Artifacts from Plainview, Texas, with Description of Artifacts by Alex D. Krieger. *Bulletin of the Geological Society of America* 58:927-954.

JADE CACHE DISCOVERY

The largest cache of Maya jade artifacts ever found has been located at Blue Creek in Belize. The site represents more than 80 buildings including a tomb temple, ballcourt, and a 20-foot high structure which contained the cache pieces of shells, stone and bone beads, obsidian blades, some evidence of human remains, and ceramics.

Dr. Tom Guderjan, longtime member of the Southern Texas Archaeological Association and contributor of many articles to *La Tierra*, is director of archaeological studies at St. Mary's University in San Antonio.

Five of Dr. Guderjan's students felt that nine weeks in the middle of a hot summer, plus tuna and Spam dinners, was a small price to pay for the thrill of discovering such a collection of rare artifacts dating to about 1300 B.P. The team was breaking camp when Pamela Weiss, a graduate student from Montreal, was inside the 20-foot high shaft when she came upon the final two vessels of jade. After handing the vessels up, she climbed out and saw the contents. Her screams of delight brought others running, including a nurse with a snakebite kit.

Excavations of this site began in 1992, but this past summer's finds have made this Maya settlement one of the most significant discoveries to date.

SANDSTONE ARTIFACTS FROM TERRELL COUNTY, TEXAS

C. K. Chandler

ABSTRACT

Artifacts made of sandstone are comparatively rare in the limestone areas of Texas. This report documents two unusual artifacts made of ferruginous sandstone. They are from southern Terrell County in eastern Trans-Pecos.

THE ARTIFACTS

Specimen A, Figure 1, is a reddish brown ferruginous sandstone pebble with engraved designs on both faces. It is small and flattish with a subrectangular outline and has been shaped by grinding. On the obverse there is carved a very square-shouldered human figure with arms oriented downward with five fingers on each hand. It has a head with all the facial features of two eyes, a mouth and a nose. The nose is a slightly protruding hematite pebble with a carved eye on each side. There is a single line around the head from shoulder to shoulder in the form of an arch. Several short straight lines protrude from this arch toward the edge of the pebble much in the fashion of a sun shield design. There are eight vertical parallel lines within the body outline and very abbreviated marks for legs.

The design on the reverse is more deeply engraved than is the human figure. It is a single concentric circle with eight radiating lines meeting at the center of the circle and extending to the pebble edge. This motif may be considered a rayed sun disk. It was popular as a Plains Indian design on robes and shields.

This design occurs often on the large conch shell containers from Spiro Mounds in southeastern Oklahoma where it is suggested to represent the eight pointed world symbol that seems to be characteristic of Spiro (Hamilton 1952).

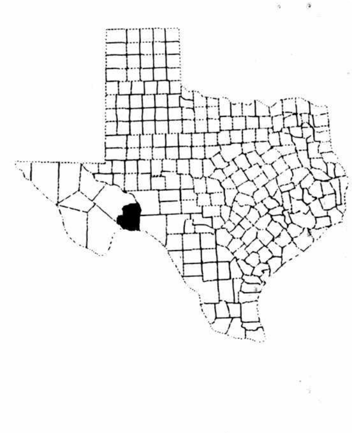
Dimensions of this pebble are: Length, 45 mm; Width, 33 mm; Thickness, 11 mm. It weighs 22.3 grams. It is illustrated in Figure 1.

Specimen B, Figure 2, is a reddish brown ferruginous sandstone palette. It is rectangular in outline with a length of 15 cm, a width of 9 cm and thickness varies from 1.6 to 1.9 cm. It has a raised border on all sides and a drilled suspension hole near the center of one end. Dimensions of the cutout depression are 12 cm by 6.7 cm with a depth of 3 to 5 mm. Examination of this palette under magnification reveals a large portion of the depressed area being much redder than the border and the reverse side. This definitely appears due to penetration of a red hematite powder into the pores of the sandstone. The distribution of this redder color is not uniform. One small area of the dark brown hematite grains show polish. Since this is the only polish found it may be due to its resistance to the scraping that produced the depression. The darker hematite stain into the pores of the sandstone may be evidence that this artifact was used as a paint palette.

This artifact was found on the same burned rock midden as the small ground and incised sandstone pebble illustrated in Figure 1. This site is about one mile east of where San Francisco Canyon enters the Rio Grande River at its northernmost point east of El Paso in southern Terrell County.

DISCUSSION

Incised and engraved pebbles were much less abundant in Texas than were the painted pebbles. Several authors have documented and illustrated numerous painted pebbles and recent studies have proposed some styles of painted pebbles to be as early as 6500 B.C. (Parsons 1986). Jackson (1938) states that while a few similarities are noted between painted pebbles and picture writing on cave walls there is a marked absence of realistic humans and animal paintings on the pebbles. It is also notable that the profuse number of shaman paintings in the Lower Pecos-Rio Grande area never depict facial features of eyes, nose and mouth.



Most incised and engraved pebbles are without facial features. Of the engraved pebbles reported by Jackson (1938) only three have motifs depict-

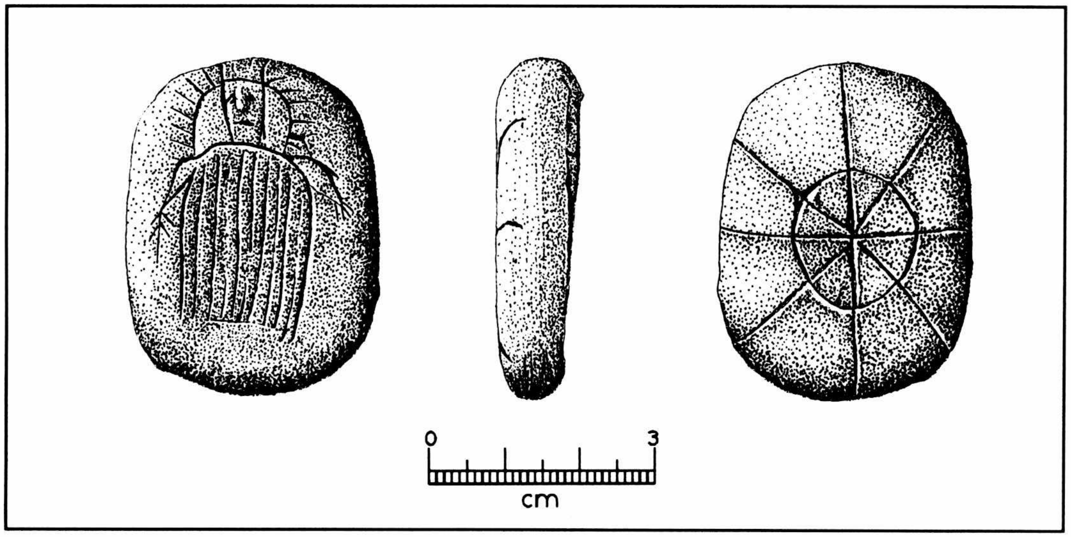


Figure 1. Engraved pebble from Terrell County. The specimen is illustrated with front, side and back views.

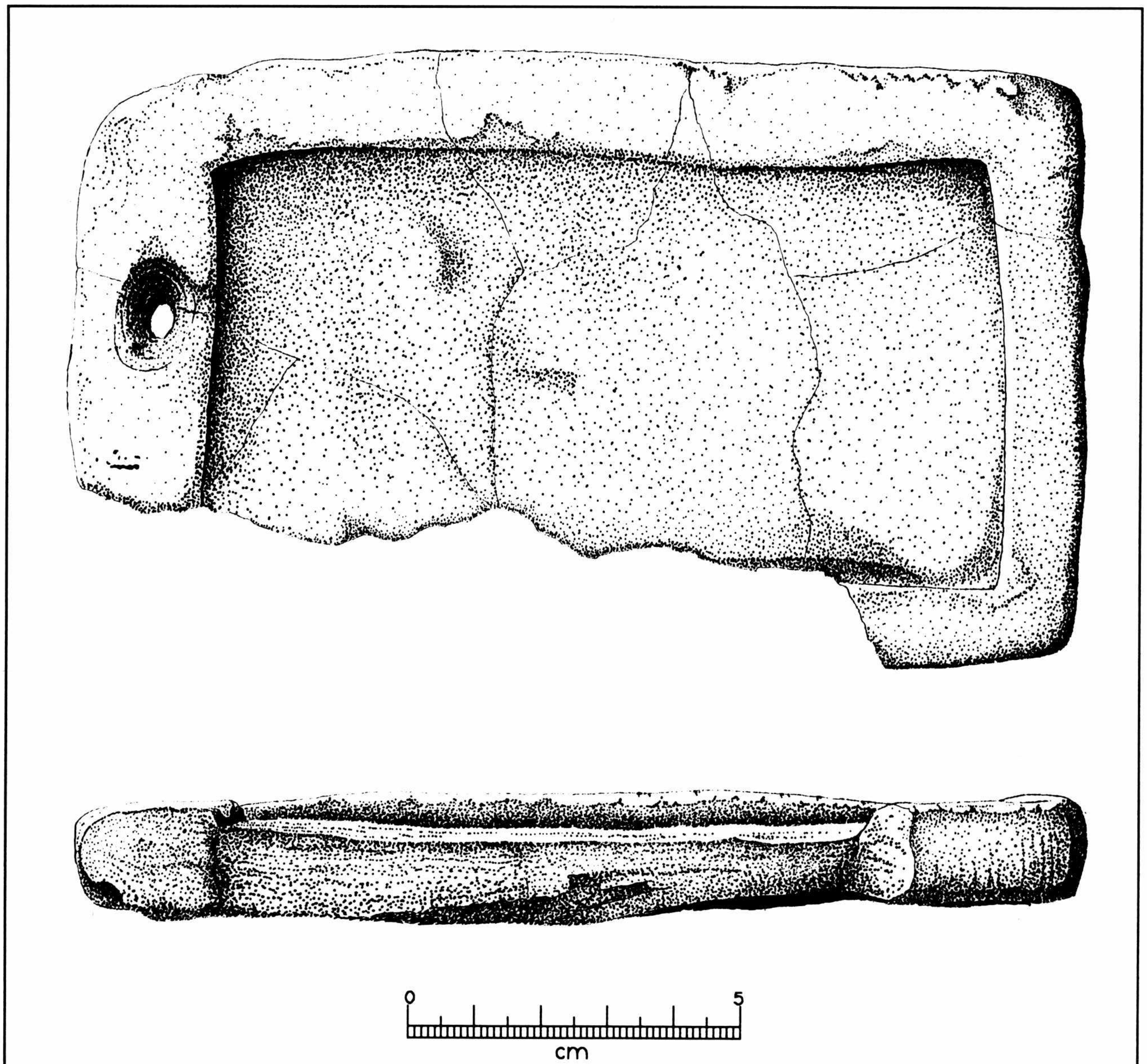


Figure 2. A sandstone palette from Terrell County. Top and side views shown.

ing humans. One from Johnson County shows a human stick figure and one from Williamson County is described as having two deeply incised, square-shouldered human figures on one side. This stone is 8.9 cm x 5 cm. It is not illustrated. A larger engraved stone (16.5 cm x 11.4 cm) from Hopkins County represents a smoking scene with a human head wearing a headdress and with a pipe in the mouth. Suspended beneath the bowl of the pipe are three feathers and rising from the pipe bowl are faint lines suggesting smoke. This specimen is thought to be historic (ibid.). None of the engraved stones reported by Jackson are from the Lower Pecos or Trans-Pecos areas.

This author has not found any documentation of stone palettes in Texas literature. They are best known in the southwest among the Hohokam and Mimbres cultures, but even there they are not common (Anyon and LeBlanc, 1984).

Excavations at the Galaz Ruins, a prehistoric Mimbres village in southwestern New Mexico, yielded nearly one hundred palettes where the predominant material was local shale or slate with sandstone the next most common (Anyon and LeBlanc 1984). All the materials were locally available.

Haury reports the Hohokam first appeared in Arizona about 300 B.C. and undecorated rimmed palettes first appeared in the Snaketown phase about A.D. 100 (Gladwin, et al. 1975). The palettes found at Snaketown are made of quartzite, andesite porphyry and mica schist.

The palette documented here, Figure 2., is made of reddish brown ferruginous sandstone. This material is available locally. It occurs as small pebbles thinly scattered on the surface at the junction of Isinglass and Washboard Canyons and there is a low mesa capped with this material about three miles north of where this palette was found.

CONCLUSIONS

Painted pebbles and engraved stones occur in many places around the world. They may all be anthropomorphic though not portraits. The predominance of painted pebbles in Texas over the engraved ones may be a factor of the climate, or possibly the incised stones are more common than the literature suggests.

The human figure engraved on the pebble reported here may represent an ancestor or an important person in the local society. The vertical body lines may identify traditional tribal garments or body decoration. The concentric circle with lines radiating from the center may be so elementary that parallels, however close, have little meaning.

It appears both the palette and the engraved pebble were locally made and are not the product of trade. They appear to be the product of cultural contact to the west in New Mexico or Arizona.

ACKNOWLEDGMENTS

I wish to extend my sincere appreciation to Walt and Ruth Carruthers for the loan of their artifacts for study and documentation and to Richard McReynolds for the preparation of the illustrations.

References Cited

Anyon, Roger and Steven A. LeBlanc
1984 *The Galaz Ruin: A Prehistoric Mimbres Village in Southwestern New Mexico.* Published by Maxwell Museum of Anthropology and the University of New Mexico Press. Albuquerque, New Mexico.

Gladwin, Harold S., Emil H. Haury, E. B. Sayles, and Nora Gladwin
1975 *Excavations at Snaketown: Material Culture.* The University of Arizona Press, Tucson, Arizona.

Hamilton, Henry W.
1952 *The Spiro Mound.* The Missouri Archaeologist, Vol. 14, 2nd Printing, 1981.

Jackson, A. T.
1938 *Picture Writing of Texas Indians.* The University of Texas Publication No. 3809.

Parsons, Mark L.
1986 Painted Pebbles: Style and Chronology. In: *Ancient Texans, Rock Art and Lifeways Along the Lower Pecos* by Harry Shafer with photographs by Jim Zintgraff.

INCIDENTAL IMPACT BREAKAGE OF ARROW POINTS

Leland W. Patterson

ABSTRACT

Results of experiments for incidental impact breakage of arrow points are given, using brush piles, rocks, trees, and soil as targets. Breakage types are similar to those published by others when using dead animal targets.

INTRODUCTION

It is common to find broken arrow points at archaeological sites. Experiments have been done by Barton and Bergman (1982), Cox and Smith (1989), and Odell and Cowan (1986) using dead animal targets, and by Bergman and Newcomer (1983) using meat backed by bones, to simulate point impact breakage patterns when animals are hit by projectiles during hunting. As a comparison, results of experiments are described here to determine incidental arrow point breakage patterns using non-animal targets, to simulate point breakage when animal targets are missed during hunting, or point breakage during archery practice. Targets used for these experiments included soil, rocks, trees, and brush piles.

A variety of arrow point breakage patterns were obtained by these experiments. The range of breakage types for incidental breakage from non-animal targets is similar to the range of breakage types obtained by others when using dead animal targets. It may also be noted that arrow points, which are small, and spear points, which are large, have the same types of impact damage (Odell and Cowan 1986).

EXPERIMENTAL METHODS

Experiments for arrow point impact breakage were conducted using a bow with a 30 lb pull and modern wood arrows. Arrow points were all Perdiz replicates made by the author from Central Texas cherts that had been heat treated. A slotted haft was used, with Elmer's glue as an adhesive. Elmer's glue does not set hard, and this type of glue simulates adhesives used by Indians, such as asphalt and pine resin. The haft was wrapped with waxed dental floss to simulate sinew or fiber haft wrapping. Two trials were made without haft wrapping, and the arrow shaft split in each case. Haft wrapping was used for all other trials, and no further shaft splitting occurred.

Types of targets were chosen to simulate cases where an animal target was missed, or a non-animal target was being used for archery practice. Types of targets included rocks, wood fence, trees, soil, and brush piles. In one trial, a brush pile was missed, and a small roll of chicken wire was hit. It was not necessary to use soil as a purposeful target, because arrow hits into soil resulted from missing other targets. A summary of experimental results is given in Table 1. When no breakage occurred in an experimental trial, another trial was done with the same specimen, using the same or a different target. No point breakage occurred when an arrow hit soil.

In two trials, deep penetration of oak tree bark resulted in only minor tip damage. Two trials with hard rock targets both resulted in arrow point stem breakage. Most experimental trials were done using a brush pile target, because a brush pile has a variety of impact possibilities, including not contacting a solid object, a glancing hit, and a hit into solid wood material. A total of 82 trials were done, using 53 Perdiz point replicates. No point breakage occurred in 24 of the trials. In many cases where stem breakage occurred, the blade of the point was lost, but the stem fragment remained in the arrow shaft haft.

TYPES OF ARROW POINT IMPACT BREAKAGE

A summary of arrow point breakage types obtained by these experiments is given in Table 2. In some trials, more than one type of breakage occurred on the point specimen. The most frequent type of point breakage was stem fracture, which occurred at the junction of the blade and stem or below on the stem. Some examples of stem fractures are shown in Figure 1. Most stem fractures were snaps, which were tensile fractures caused by bending force. In one case, Figure 1D, the stem was fractured by torsional force (twisting).

Table 1. Results of Arrow Point Breakage Experiments

Specimen	Target	Trial	Breakage Pattern
1	oak tree	1	none
1	wood fence	2	tip snap with step termination
2	soil	1	none
2	oak tree	2	blade snap with step termination
3	rocks	1	stem snap
4	chicken wire	1	tip snap and shoulder fracture
5	oak tree	1	minor tip damage
6	dead oak	1	none
6	dead oak	2	tip crushed
7	dead oak	1	stem snap
8	soil	1	none
8	dead oak	2	none
8	wood fence	3	tip crushed
9	soil	1	none
9	dead oak	2	stem snap
10	brush pile	1,2	none
10	brush pile	3	tip snap with step termination
11	brush pile	1,2	none
11	brush pile	3	none
11	brush pile	4	tip crushed
12	brush pile	1,2	none
12	brush pile	3	burination
13	dead oak	1	stem snap
14	soil	1	none
14	brush pile	2	stem snap
15	brush pile	1	stem snap
16	brush pile	1	blade snap
17	rock	1	stem snap
18	wood fence	1	stem snap
19	brush pile	1	none
19	brush pile	2	tip snap with step termination
20	brush pile	1	none
20	brush pile	2	stem snap
21	brush pile	1	none
21	brush pile	2	stem snap
22	brush pile	1	shoulder fracture
23	brush pile	1	minor tip damage
24	brush pile	1-4	none
24	brush pile	5	stem snap

(page 1 of 2)

Table 1. Results of Arrow Point Breakage Experiments — (page 2)

Specimen	Target	Trial	Breakage Pattern
25	brush pile	1	minor tip damage
26	brush pile	1,2	none
26	brush pile	3	stem snap
27	brush pile	1	stem snap
28	soil	1	none
28	brush pile	2	minor tip damage
29	brush pile	1	none
29	brush pile	2	tip crushed
30	brush pile	1,2	none
30	brush pile	3	stem snap
31	brush pile	1	none
31	brush pile	2	stem snap
32	brush pile	1	minor tip damage
33	brush pile	1	impact flute
34	brush pile	1	impact flute
35	brush pile	1	tip crushed
36	brush pile	1	impact flute
37	brush pile	1	impact flute
38	brush pile	1	impact flute
39	brush pile	1	none
39	brush pile	2	tip snap
40	brush pile	1	stem snap
41	brush pile	1	stem snap
42	brush pile	1	minor tip damage
43	brush pile	1	tip snap, shoulder fracture
44	brush pile	1	stem snap
45	brush pile	1	blade snap
46	brush pile	1	impact flute
47	brush pile	1	minor tip damage
48	brush pile	1	tip crushed
49	brush pile	1	burination, shoulder fracture
50	brush pile	1	minor tip damage
51	brush pile	1	tip crushed
52	brush pile	1	tip snap
53	brush pile	1	tip and stem fractures

Table 2. Experimental Arrow Point Breakage Types

Breakage Type	No.	%	Reuse Category
tip crushing	7	13.1	6B, 1C
tip snap	4	7.5	B
tip and stem snap	2	3.8	C
stem snap	18	34.0	C
blade snap	3	5.7	C
impact flute	6	11.3	B
shoulder fracture	3	5.7	A
minor tip damage	8	15.1	A
lateral edge burination	1	1.9	B
burination, shoulder fracture	1	1.9	B
	53	100.0	

A - could be reused without modification
B - could be reused after some retouch
C - too damaged for reuse

Tip crushing is defined by multiple irregular small fracture scars at the point tip, with examples shown in Figure 2. Snap fractures occurred in several trials at the tip or farther down on the point blade, as shown in Figure 3. As noted above, snap fractures are tensile fractures caused by bending force. Some of the snap fractures had step terminations, which Odell and Cowan (1986:204) refer to as "snap-and-step." As an analogy, a bending fracture is common when removing a flake from a core. In this case, a step fracture termination would sometimes occur at the dorsal surface of the flake being removed because the bending force is outward from the core face. A "snap-and-step" fracture would not occur during arrow point manufacture by pressure flaking, because force for pressure flaking is applied into the edge of the object, rather than as a bending force on the face of the object. Most manufacturing breakage of arrow points occurs during pressure flaking of a thin flake blank, where the flake is split by a fracture instigated on an edge. In this situation, there is seldom a step fracture termination, although some bending force may be involved. To test this concept, I split ten thin flakes by using pressure on a lateral edge. There were no step fracture terminations on any of the specimens. In some trials, only minor arrow point tip damage occurred, that could be observed well only with a 10-power magnifier. Points with only minor tip damage could have been reused without modification.

Impact flutes occurred on several specimens, as shown in Figure 4. An impact flute is a flake scar with fairly parallel sides on a face of the point (Odell and Cowan 1986:Figure 2b; Whittaker 1994: Figure 7.41a; Barton and Bergman 1982: Figure 1; Bergman and Newcomer 1983:Figure 1). Most impact flutes were narrow, but there was one wide impact flute (Figure 4A).

In two trials, burination of a lateral edge occurred, as shown in Figure 5. Burination is where a spall is removed on a lateral edge by impact force (Odell and Cowan 1986: Figure 3; Whittaker 1994: Figure 7.41b; Barton and Bergman 1982:Figure 1;

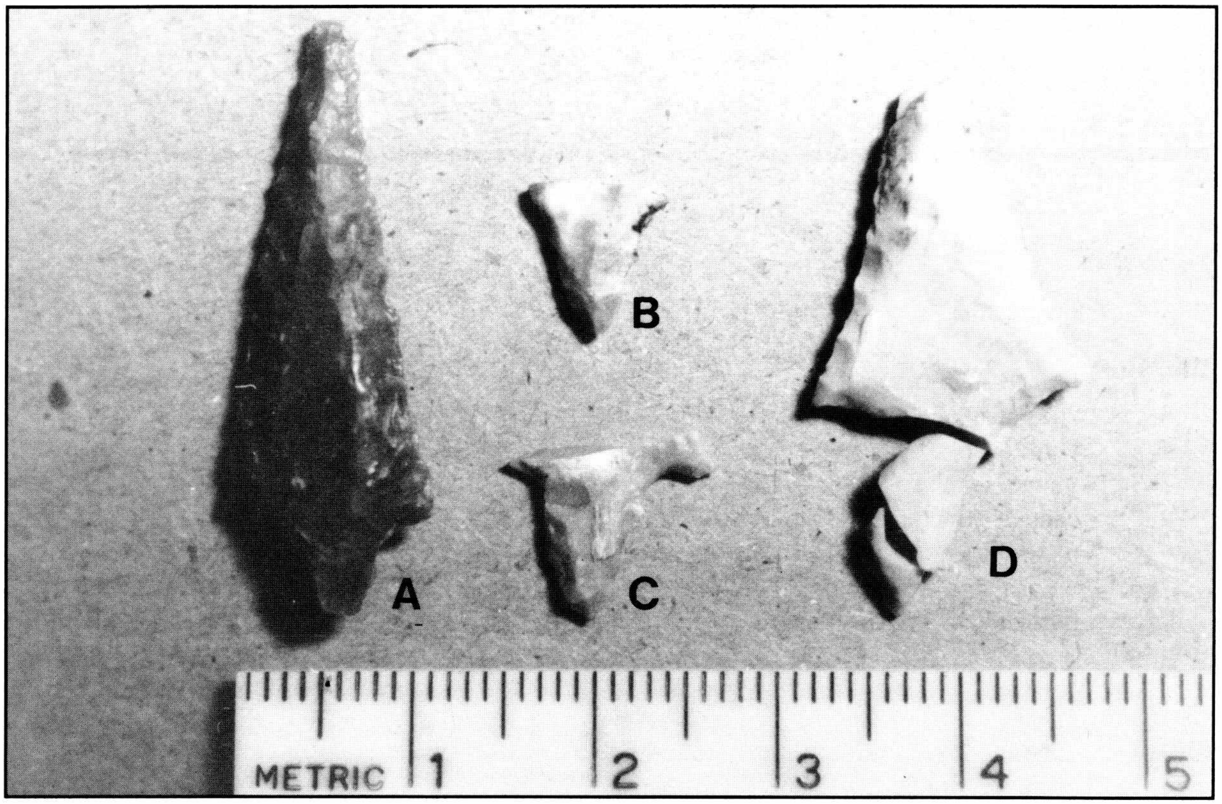


Figure 1. Stem Fractures. A, B, C, snaps; D, torsional fracture.

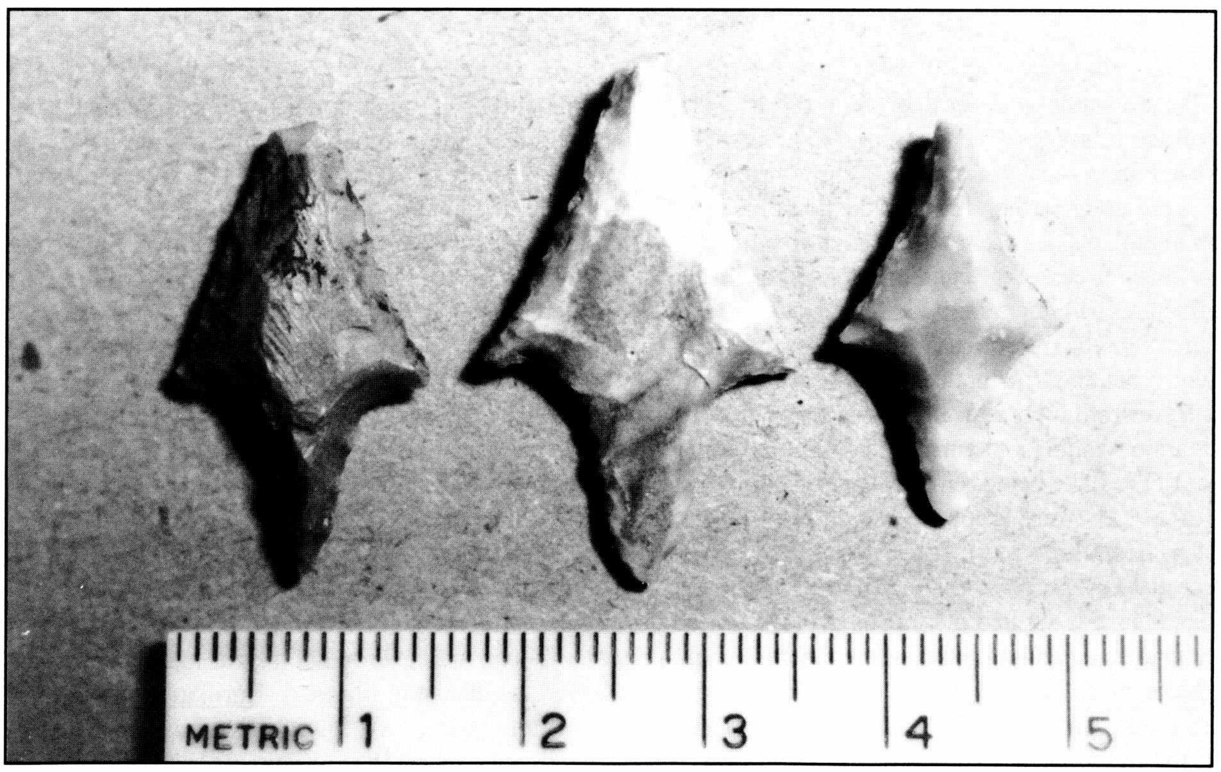


Figure 2. Tip Crushing.

Figure 3. Tip and Blade Snaps.

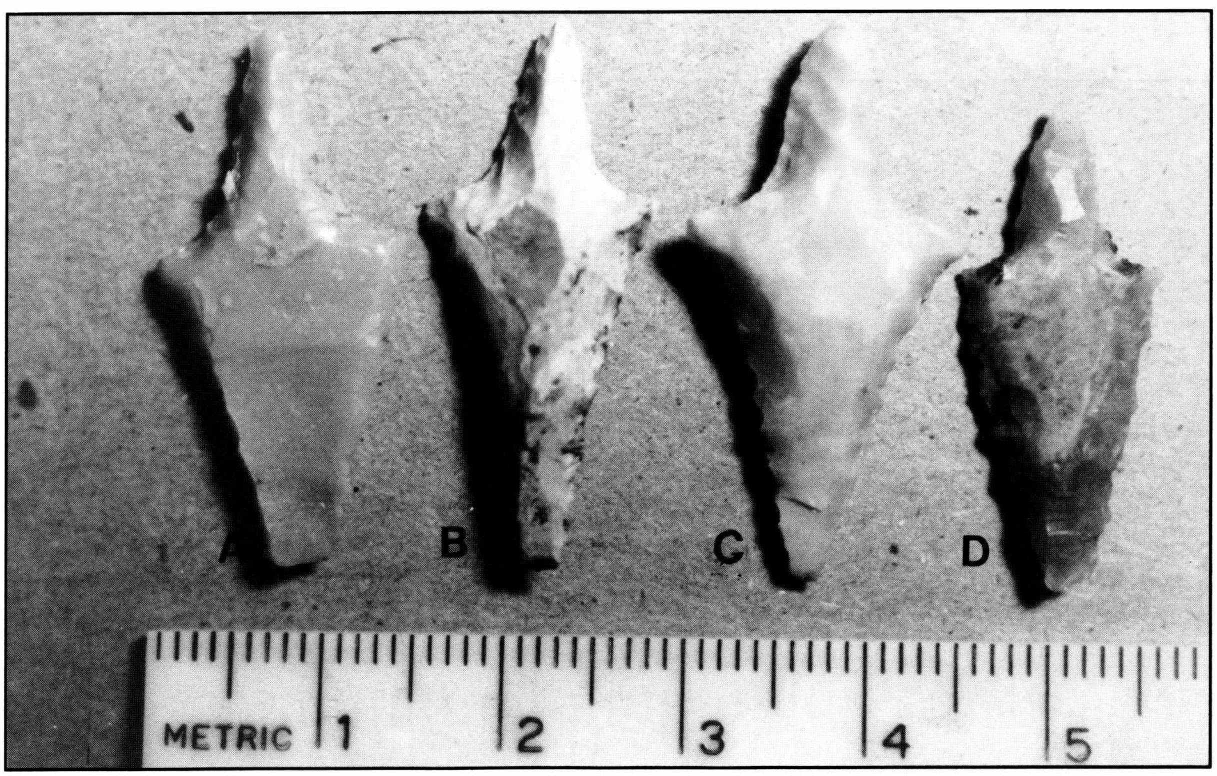


Figure 4. Impact Flutes. A, wide; B, C. D, narrow.

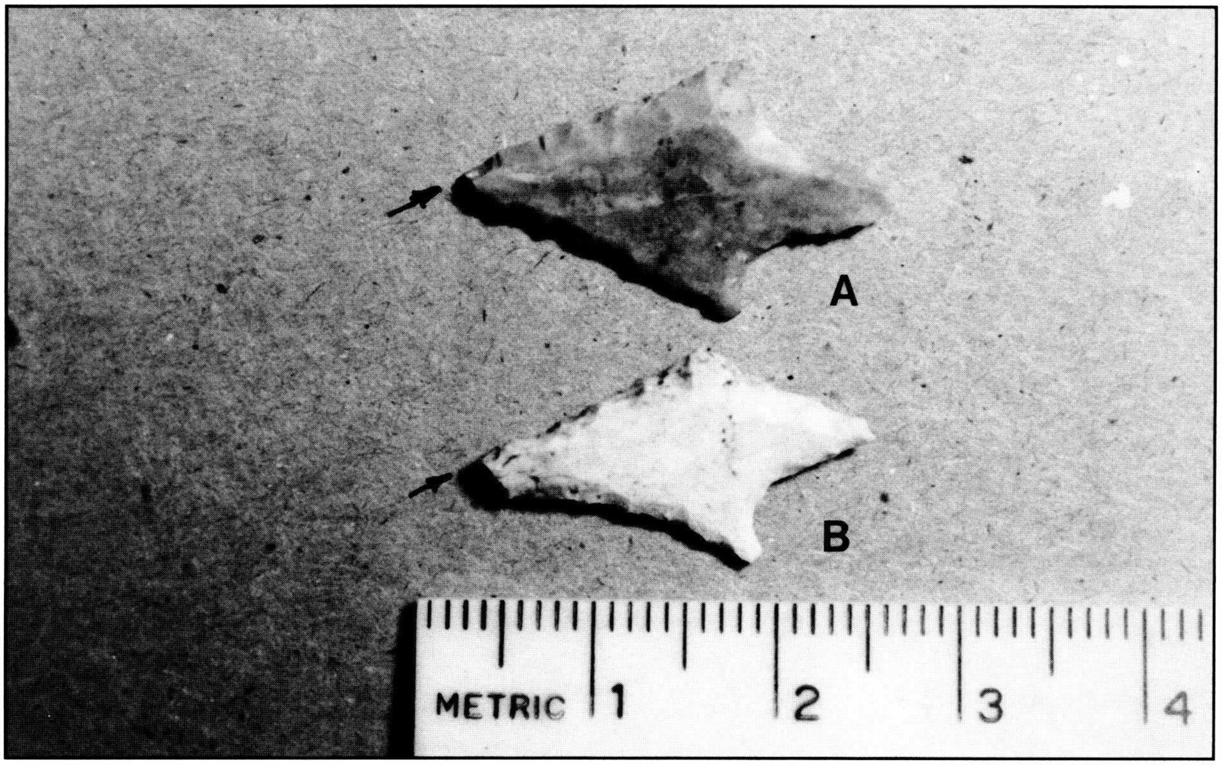


Figure 5. Burination. A, burination; B, Burination and shoulder fracture.

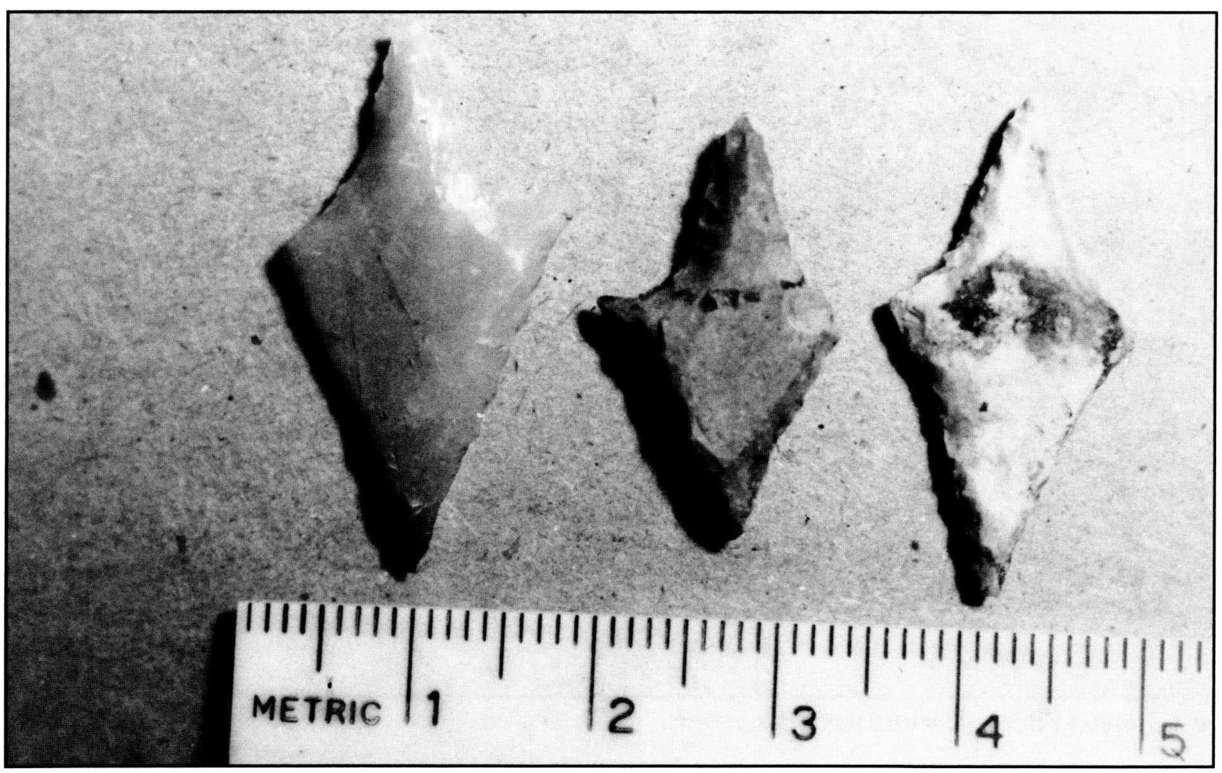


Figure 6. Shoulder Fractures.

Bergman and Newcomer 1983:Figure 1).

In some trials, a point shoulder was fractured, as shown in Figure 6 and Figure 5B. Shoulder fractures that occurred in these experiments were not severe enough to prevent reuse of the point without further modification. All shoulder fractures that occurred in these experiments appear to be from force impact on a lateral edge, and no step fracture terminations were observed.

As shown in Table 2 for damaged points, 11 (20.8%) arrow point specimens could have been reused without modification, 18 (34.0%) specimens could have been reused after some retouch, and 24 (45.2%) specimens were too damaged for reuse. Table 2 does not include the 29 trials where no point damage occurred. For the total of 82 trials, 40 (48.8%) points could have been used without modification, 18 (22.0%) points could have been reused after some retouch, and 24 (29.2%) points were too damaged for reuse. The results of these experiments indicate that a significant proportion of arrows could be reused in the field without the need to refit a new point.

CONCLUSIONS

This paper has described the results of experimental impact damage of 53 Perdiz arrow point replicates, using non-animal targets. The range of point breakage types (Table 2) for non-animal targets is essentially the same as from experiments by Barton and Bergman (1982), Bergman and Newcomer 1983), Cox and Smith (1989), and Odell and Cowan (1986) when using dead animal or meat and bone targets. The main types of arrow point impact fractures obtained from all types of targets are snap (bending) fractures, tip crushing, impact flutes, and burination. Impact fractures from torsional (twisting) force do not appear to be common. It is concluded that arrow point breakage types can show that a specimen has been used, but that the breakage type does not indicate whether or not an animal has been hit with the point.

In both the present experiment (Table 2), and experiments by Odell and Cowan (1986:Appendix), a significant number of points could have been reused without modification or after some retouch mainly resharpening.

If an arrow point was too damaged for reuse, the arrow shaft could have been returned to the campsite for refitting with a new point. In the case of stem fracture, only a stem fragment would have remained in the haft for discard at the campsite. It is common to find dart point stem fragments at campsites (Patterson 1980), but arrow point stem fragments are not as commonly reported. There is a good reason for the difference in recovey of dart point and arrow point stem fragments at archaeological sites. Most arrow point stem fragments are small enough to go through 1/4-inch (6 mm) mesh screens that are commonly used for excavations. Therefore, the frequency of arrow point refitting at the campsite is likely to be underestimated.

Another problem in the study of arrow point breakage patterns at archaeological sites is that specimens are often recorded as broken without giving any details of the breakage types. As an exception, Black (1986:Figure 14) has illustrated some broken Perdiz point specimens from the Hinojosa site, 41JW8, in South Texas, with blade, stem, and shoulder fractures that fall within the range of experimental breakage patterns covered in this paper. Some stem fragments were included in the illustrations.

As an additional observation on arrow point breakage, I have experienced very little breakage during manufacture when a specimen was anywhere near finished form. Therefore, not many failures in arrow point manufacture are likely to be mistaken for arrow point use breakage.

The study of impact fractures has been important in determining when marginally retouched flakes have been used as projectile points, in Europe (Barton and Bergman 1982), in the Middle East (Bergman and Newcomer 1983), and in the midwestern United States (Odell 1988, 1994). I am currently engaged in a study of this type for aarchaeological collections in Southeast Texas. This type of study is particularly useful for demonstrating early use of the bow and arrow in Southern North America (Odell 1988, 1994), in addition to studies of retouch patterns on flakes (Patterson 1992).

References Cited

Barton, R.N.E., and C.A. Bergman

1982 Hunters at Hengistbury: some evidence from experimental archaeology. *World Archaeology* 14(2):237-248.

Bergman, C.A., and M.H. Newcomer

1983 Flint Arrowhead Breakage: Examples from Ksar Akil, Lebanon. Journal of Field Archaeology 10:238-243.

Black, S.L.
1986 *The Clemente and Herminia Hinojosa Site, 41JW8: A Toyah Horizon Campsite in Southern Texas*. Center for Archaeological Research, University of Texas at San Antonio, Special Report No. 18.

Cox, K.A., and H.A. Smith
1989 Perdiz Point Damage Analysis. *Bulletin of the Texas Archaeological Society* 60: 283-301.

Odell, G.H.
1988 Addressing Prehistoric Hunting Practices Through Stone Tool Analysis. *American Anthropologist* 90:335-355.

1994 The Role of Stone Bladelets in Middle Woodland Society. *American Antiquity* 59(1):102-120.

Odell, G.H., and F. Cowan
1986 Experiments with Spears and Arrows on Animal Targets. *Journal of Field Archaeology* 13:195-212.

Patterson, L.W.
1980 The Significance of Dart Point Stem Breakage. *Bulletin of the Texas Aarchaeological Society* 51:309-316.

1992 Current Data on Early Use of the Bow and Arrow in Southern North America. *La Tierra* 19(4):6-15.

Whittaker, J.C.
1994 *Flintknapping: Making and Understanding Stone Tools*. University of Texas Press, Austin.

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