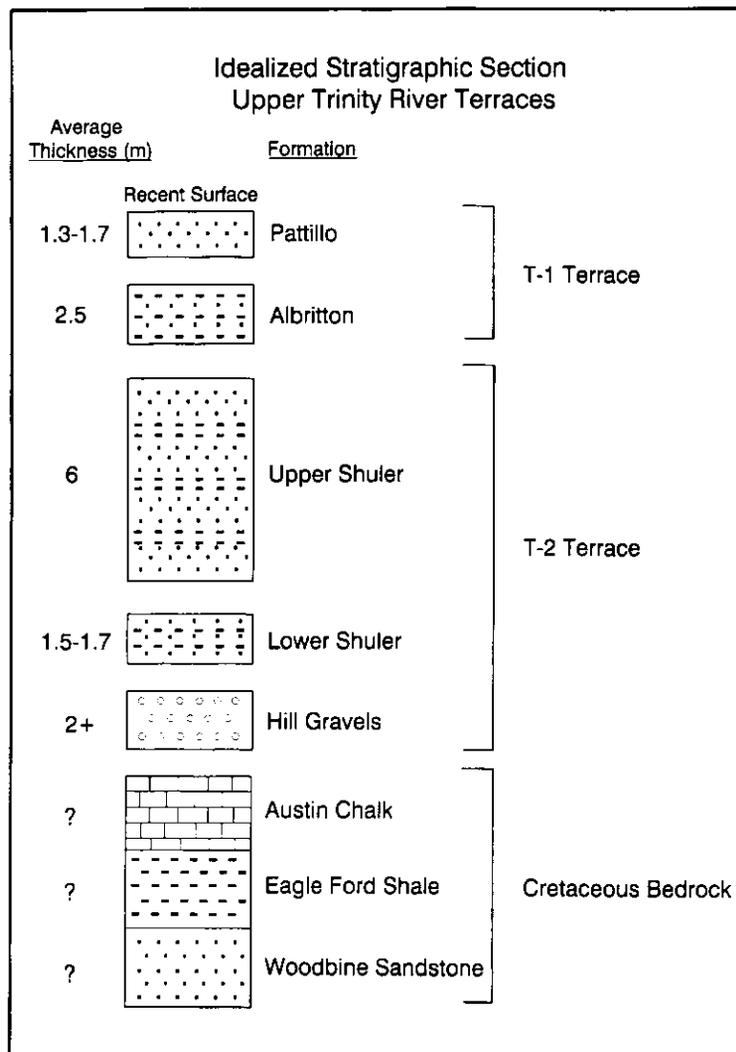




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Analysis of Human Skeletal Remains from 41FB290B

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Consulting Physical Anthropologist and Archeologist

Site 41FB290B is a Late Prehistoric campsite in Fort Bend County, Texas. The site is located on private property at the edge of a deeply cut old meander of Jones Creek, near the Brazos River. Archeological investigations were conducted by the Houston Archeological Society in December of 2002 and January of 2003.

A single human burial, designated Feature 1, was encountered during excavations at 41FB290B. Three one meter square pits were excavated, and designated as pits A, B, and E. Feature 1 was encountered in pit A, and pits C and D were 1.0 by 0.5 m units excavated to facilitate work on the burial feature.

Diagnostic artifacts recovered from 41FB290B include four Scallorn, one Perdiz, and one Gary point. A total of 171 prehistoric ceramics were recovered, consisting predominately of Goose Creek Plain and a single Goose Creek Incised sherd. The diagnostic artifacts indicate the site to date to the Late Prehistoric period (Patterson et al. 2003).

The property owners have stated that they will rebury the Feature 1 skeletal remains within site 41FB290B. The property is currently for sale; therefore, the future fate of the site is uncertain. The excavation notes and photographs for this project remain on file with the Houston Archeological Society. The author plans to send the notes and photographs pertaining to the analysis of the human skeletal remains to the Texas Archeological Research Laboratory, University of Texas at Austin, for permanent curation.

Methods: Where possible, analysis methods for the skeletal materials from 41FB290B followed guidelines developed by Buikstra and Ubelaker (1994). Measurements and non-metric skeletal traits were recorded. Dentition and fusion of skeletal elements were utilized for an assessment of the age of the individual at the time of death. Each skeletal element was further inspected for evidence of abnormalities and disease.

Location/Position: Feature 1 was a very tightly flexed primary interment located approximately 50 centimeters below the modern ground surface. Skeletal analysis indicates that the individual was buried on its stomach with the skull turned on its left side facing west. The body was positioned with the head to the south (Figure 1).

Preservation/Completeness: Bone preservation is relatively good, but the bones are broken from ground pressure and the numerous roots that had grown through the burial pit. A large tree root had grown through the rib cage (Figure 1) and disturbed the left leg. The skeletal remains are relatively complete with only the left pelvis, portions of the left femur, and both sets of ankle bones being missing.

Age: Most of the skeletal epiphyses are not fused. Analysis of the skeletal dentition has identified the remains to be those of a child, approximately 11.0 ± 2.5 years of age (Ubelaker 1989: Figure 71) (Figures 2, 3, 4, and 5).

Health: The dentition exhibits only a slight buildup of calculus on the first permanent maxillary and mandibular molars (Figure 2). The second deciduous molars are extremely worn and the first permanent molars are slightly worn (Figures 4 and 5). There are no caries or other apparent indications of dental disease.

The only evidence of disease exhibited in the skeleton from 41FB290B is the presence of periosteal infection on the medial shafts of the left and right tibiae (Figures 6 and 7). No further pathologies are evident on the cranium or other post-cranial elements.

Summary: Skeletal remains recovered from site 41FB290B were those of a child approximately 11 years of age. The only pathology observed on the skeletal remains was a slight periosteal infection of the medial shafts on the left and right tibiae. The child was buried on its stomach in a tightly flexed position, head to the south, the skull turned to the right and facing west. Archeologically, the skeleton dates to the Late Prehistoric period.

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- 1 tree root
- 2 skull
- 3 left humerus
- 4 right tibia
- 5 right pelvis
- 6 right hand
- 7 right foot
- 8 humerus
- 9 left radius & ulna
- 10 left tibia & fibula

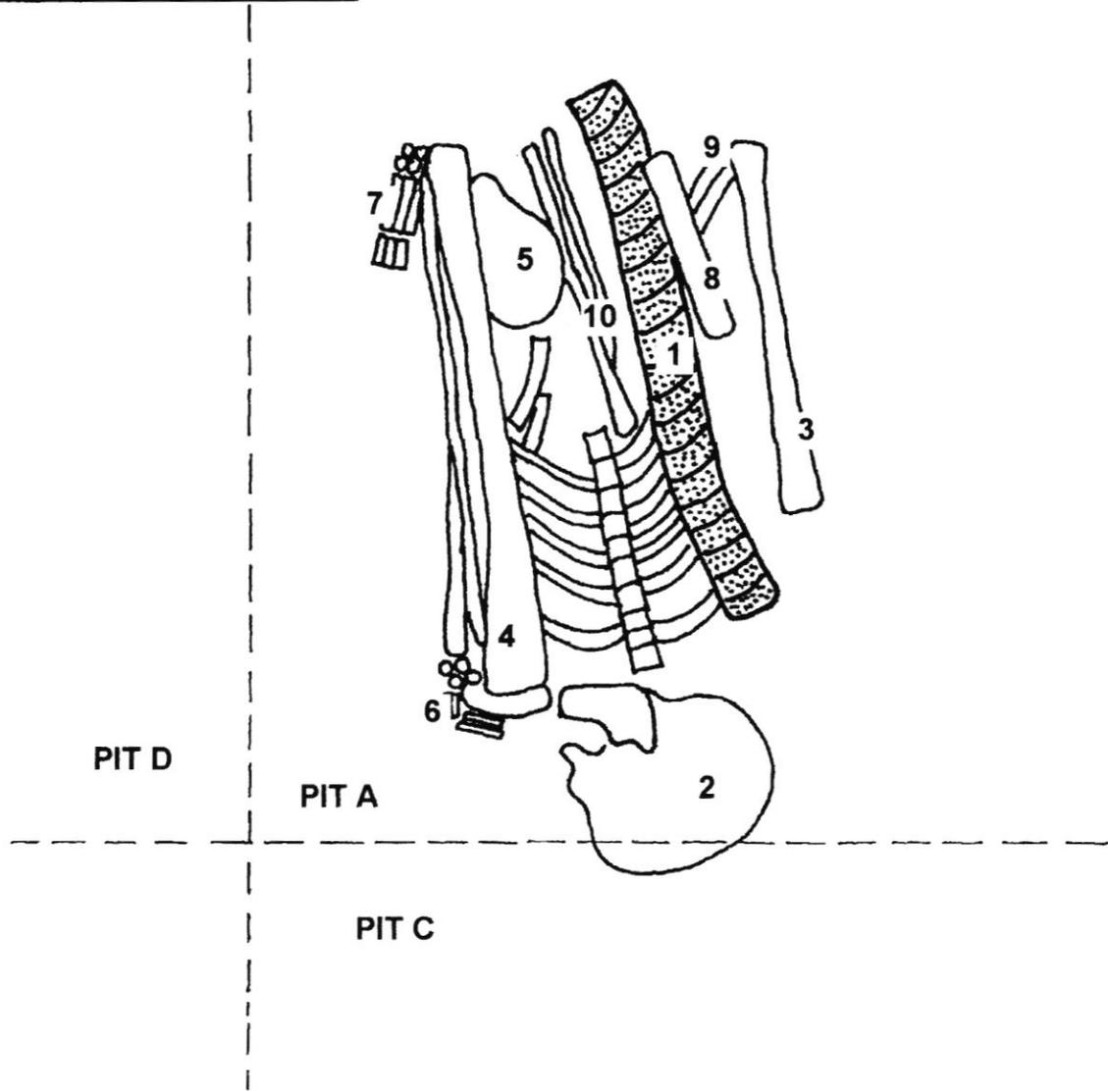
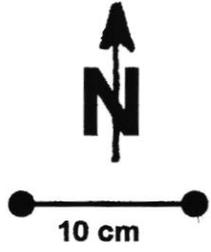


Figure 1. Burial Plan



Figure 2. Right Mandibular Dentition, anterior view



Figure 3. Left Mandibular Dentition, posterior view

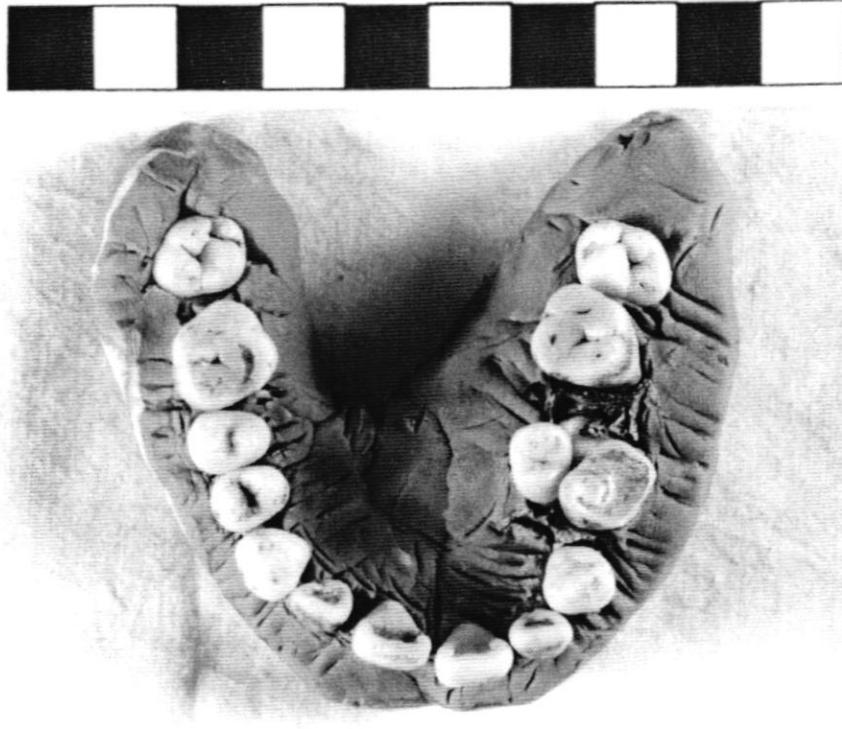


Figure 4. Maxillary Dentition (note: teeth are set in clay)



Figure 5. Mandibular Dentition



Figure 6. Periosteal Infection on Right Tibia



Figure 7. Periosteal Infection on Left Tibia

Additional Comments on Unifacial Arrow Points

Leland W. Patterson

Introduction

Many prehistoric sites in Southeast Texas have been published that have unifacial arrow points (Patterson 1992: Table 1). Unifacial arrow points are one of the most numerous arrow point types in this region (Patterson 1996: Table 6). For example, 64 unifacial arrow points were found at site 41HR184 in Harris County (Patterson 1994a:3).

In Southeast Texas, unifacial arrow points start much earlier than standardized bifacial arrow point types, such as Perdiz, Scallorn, Alba, and Catahoula. Bifacial arrow point types start at the beginning of the Late Prehistoric period, about AD 600. In contrast, unifacial arrow points start in the Middle Archaic period (3000-1500 BC) and continue to be used through the Late Prehistoric period (AD 600-1500) as summarized by Patterson (1992: Table 1). Unifacial arrow points are particularly well dated to the Late Archaic period at site 41FB3. There were 18 unifacial arrow points found in excavation depths from 10 to 50 cm (Patterson et al. 1998: Table 10), with a calibrated age range of 790 to 60 BC (Patterson 1999: Table 1) based on six radiocarbon dates.

Many archeologists seem to be able to recognize only bifacial arrow points. Unifacial arrow points are easily overlooked in lithic flake assemblages if detailed examination of individual flakes is not done. The identification of unifacial arrow points has previously been discussed in detail (Patterson 1994b). This article gives some additional comments on this subject, particularly in regard to recognition of purposeful edge retouch patterns for the manufacture of unifacial arrow points.

Analytical Criteria

Unifacial arrow points were made on small prismatic blades and other types of small flakes (Patterson 1994a: Figure 7). Analytical criteria for the identification of unifacial arrow points have previously been discussed (Patterson 1994b:20), including purposeful retouch, specimen shape, weight and thickness, evidence of hafting, and impact fractures. As previously noted, it is generally necessary to use a 10-power magnifier to identify purposeful fine marginal retouch, to distinguish between unifacial arrow points and fortuitously pointed flakes. My standard procedure is to examine all lithic flakes of suitable shape and size in a flake assemblage for evidence of purposeful marginal retouch. Evidence of impact fracture is also noted. If this procedure is not done, unifacial arrow points can be easily overlooked.

Retouch Patterns

As previously noted (Patterson 1999b:42), unifacial arrow points were made by pressure flaking retouch and by raking edge retouch (Patterson 1998). Pressure flaking gives a series of facets that create a serrated edge (Patterson 1998: Figures 5,6). Raking retouch gives a series of flatter facets along an edge without serration (Patterson 1998: Figures 3,4).

A good example of a unifacial arrow point made by pressure flaking is shown in Figure 1. All edges are serrated. This specimen is from site 41WL3 in Waller County (Patterson et al. 2003, Figure 3C). A good example of a unifacial arrow point made by raking edge retouch is shown in Figure 2. Raking retouch can be seen on the left lateral edge of the dorsal face. There is also raking

retouch on the right lateral edge of the ventral face that cannot be seen in Figure 2. This specimen is also from site 41WL3 (Patterson et al. 2003, Figure 3B). Edges are not serrated.

An unusual example of a unifacial arrow point is shown in Figure 3 with two types of edge retouch. The left lateral edge has been pressure flaked, creating a serrated edge. The right lateral edge has been modified by raking retouch without edge serration. This specimen is from the Early Ceramic period (AD 100-600), earlier than the start of standardized bifacial arrow point types, from excavations at site 41WH77 in Wharton County (Patterson et al. 1995, Figure 2F).

Summary

This article has given additional comments on unifacial arrow points in Southeast Texas, especially concerning the recognition of edge retouch patterns from the manufacture of this artifact type. It has been noted that pressure flaking and raking edge retouch were used to manufacture unifacial arrow points from small flakes and small prismatic blades.

The recognition of the use of unifacial arrow points is essential for understanding the chronology of the use of the bow and arrow in Southeast Texas. Use of unifacial arrow points started much earlier in this region than the use of standardized bifacial arrow point types, such as Perdiz, Scallorn, Alba, and Catahoula. Early use of the bow and arrow increased hunting success, which contributed to the rapid rise in population level during the Late Archaic (1500 BC-AD 100) and Early Ceramic (AD 100-600) periods (Patterson 1996:59). It is concluded that many archeologists do not find unifacial arrow points simply because they do not look for this type of artifact.

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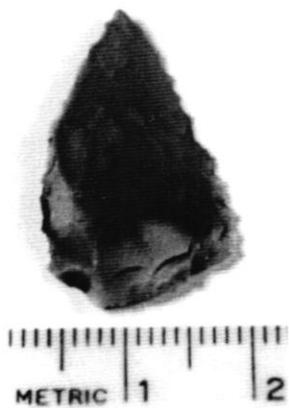


Figure 1. Unifacial Arrow Point with Pressure Flaking

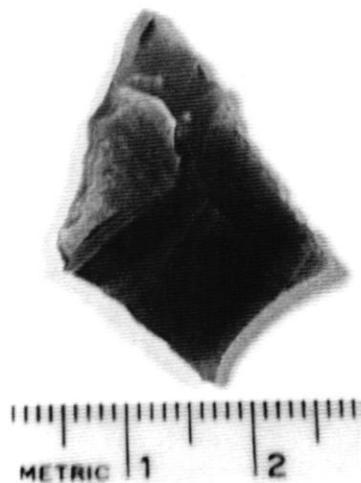


Figure 2. Unifacial Arrow Point with Raking Edge Retouch



Figure 3. Unifacial Arrow Point with Two Retouch Types

Use of Malacology to Reconstruct the Paleo-Environment of the Upper Trinity River Terrace System, Dallas County, Texas

Wilson W. Crook, III

Introduction

The Upper Trinity River terrace system has traditionally been subdivided into six members of presumed consecutive deposition. The lower five represent paleo-environments, with the surface floodplain being a unit of active sedimentation. Extensive geologic investigation coupled with Fluorine-Uranium-Nitrogen (F-U-N) analysis on fossil material from parts of the series suggests that the entire unit is of a single depositional sequence, separated only by relatively short-term erosional unconformities. Dillehay (1974), Bryant (1975), Lynott (1979), Story (1981), Johnson (1989), and Prikryl (1990) have variously used palynology, the presence or absence of megafauna (primarily bison), and artifact typology to attempt to reconstruct the paleo-environment for north-central Texas including the area covered by the Upper Trinity River watershed. In general, these methodologies have demonstrated a trend from more humid climate at the end of the Pleistocene to a drier climate present in the region today.

Members of the Class Gastropoda are readily susceptible to changes in both temperature and humidity. As such, the writer has explored the use of malacology as a tool to augment previous paleo-environmental studies for the region. Samples were collected and identified from both the paleo-stratigraphic units as well as the present surface throughout Dallas, Denton, and Collin counties. In addition, a basic elemental chemical analysis was made on each formation including determination of humus and pH.

In general, local extinctions and arrivals suggest a climate from humid to more arid conditions which are prevalent today. Two short reversals of this trend were observed which have tentatively been identified as representing short drying periods toward the end of the Pleistocene. These periods may represent a known terminal phase of continental glaciation between 9,400 and 6,400 BP, known as the Cochrane readvance.

Geology of the Upper Trinity River Terrace System

Shuler (1935) described the Trinity River as a stream on the upland plain of Cretaceous bedrock between the western Brazos drainage, the northern Red River, and the Sabine drainage to the east. In Dallas County, the Trinity has exposed the bedrock and formed a notch where the West Fork and Elm Fork join. The Elm Fork, which continues to the north, flows along the contact line between the Austin Chalk and the Eagle Ford Shale. One of these two formations comprises the bedrock over the entire area described herein.

The ages of the alluvial terraces seem to be entirely late Pleistocene with no other Tertiary sequences observed. This suggests a long time of continual erosion of the region, but of a low gradient not conducive to notable foreign terrigenous clastics. Pleistocene deposits occur only as alluvial terraces, the product of cyclical stream rejuvenation within a period of general land rise.

The sequence of the Trinity River alluvial terraces has been partially described by Shuler (1935) and Pattillo (1940), and correlated by Taggart (1953), Crook (1957), Slaughter et al. (1962), Willimon (1970), and, most recently, Ferring (1986). Each of these researchers has unfortunately used a slightly different terminology in their geologic descriptions (Prikryl 1990). The author has done extensive archeological work along the main channel of the Trinity in southeast Dallas, Kaufman, and Ellis Counties. The Trinity terraces along the Elm Fork in northwest Dallas County

and southern Denton County have also been studied, albeit not as extensively. While none of the proposed sequences is an ideal model for the entire Upper Trinity watershed, the series proposed in Slaughter et al. (1962) best fits both geologic convention and the author's personal observations, most notably in accounting for the high terraces between Pemberton Hill and the Buckner Home in southeast Dallas County. Therefore this terminology has been adopted for use here.

The terrace system consists of a depositional sequence from the modern floodplain through five paleo-terraces, composed of a series of apparently distinctive formations. The idealized stratigraphic section can be seen in Figure 1. The thickness of each of the terrace deposits varies considerably along the Upper Trinity sequence. An observed average over the area from southern Denton County to southeast Dallas County is used in Figure 1.

Bedrock: Cretaceous in age, the bedrock varies from Eagle Ford Shale (eastern Dallas and Denton Counties) to Austin Chalk (central to west Dallas and Denton Counties and Collin County). These units are poorly exposed and are normally seen only in railroad cuts near the river terrace system. Age of the bedrock is Upper Cretaceous Gulf series of approximately 90-110 million years.

A third Cretaceous unit, the Woodbine Sandstone which underlies the Eagle Ford Shale, forms the bedrock immediately east of the study area, including eastern Denton and Tarrant Counties.

Hill Formation: The Hill Formation consists of basal gravels of the T-2 terrace within the Upper Trinity system. Total thickness of this unit is unknown as usually only the top 1 to 2 meters are seen in any one exposure. The pebbles and cobbles contained in the Hill Formation are part of the Uvalde Gravels (Menzer and Slaughter 1971) which are erosional lag deposits from the High Plains Ogallala Formation. They are typically composed of about 80+% quartzite, 10-15% chert, and about 5-10% petrified wood and ferruginous sandstone (Crook 1988).

The Hill gravels are typically highly mineralized, most commonly with a limonitic iron cement. This creates an upper cap of conglomeratic sandstone which is the most prevalent element exposed in local sand and gravel pits. Fossil evidence is restricted to vertebrate mammals, particularly proboscidian (elephant) leg bones, horse teeth, and carapace fragments of *Colossochelys (Testudo)*. All bone remains are highly mineralized and generally in poor condition. The Hill Formation is believed to lie unconformably on the Cretaceous bedrock and is estimated to be early Wisconsinan in age.

Lower Shuler Formation: The Lower Schuler Formation is characterized by finely laminated sands which are typically stained yellow by limonite. The formation is extremely variable in depth with a minimum of 3 meters in thickness observed in Denton County near Lewisville. In southeast Dallas County, the unit is more often about 1.5-1.7 meters in thickness. Calcareous lenses are common, often cementing the loose sands. No gastropods were observed in the Lower Shuler at any of the localities.

Upper Shuler Formation: The Upper Shuler is composed of finely laminated yellow and white sands, apparently the result of cyclical deposition over a length of time. Within the unit, at least seven discreet layers are evident, each representing a distinct time of major river flooding. These lenses vary in thickness from less than a meter to over 2 meters in thickness, with a total unit thickness of about 6 meters. The entire sequence is characterized by an

abundance of caliche nodules which increase in both size and abundance from the bottom to the top of the formation. The calcareous nature of the Upper Shuler creates an extremely hard upper section into which rodent, root, and crayfish burrows are calcified. Fossils of all types, both vertebrate and invertebrate, are abundant (Lull 1921; Stovall 1941; Slaughter et al. 1962). Some of the earliest evidence of man is also present in the upper portions of this unit (Lagow Sand Pit, Lewisville, Hickory Creek, Pemberton Hill), although with the exception of land turtle, it is unclear what association there is between early man and the rest of the Pleistocene fauna. The Lewisville site has now been radiocarbon dated as terminal Pleistocene contemporaneous with Clovis time (Stanford 1983; W. W. Crook, Jr., 1985, personal communication), with the mammalian fauna in the rest of the formation dating from roughly Mid-Wisconsinan age.

Albritton Formation: Resting unconformably upon the Upper Shuler sands is the red sandy clay of the Albritton Formation. This unit has a fairly constant thickness of about 2.5 meters and is typically void of all fossil evidence, save that of man. Even so, the evidence is restricted almost entirely to stone tools, with carbon matter of any type being extremely rare. The Albritton Formation is highly acidic in nature, which contributes to the lack of preservation of fossil material. Because of the lack of fossil material, no precise date has been assigned to the unit. It should also be noted that the unit changes color somewhat across the region, being more yellow-red in southeast Dallas County to a darker red-brown near Carrollton Dam.

Prikryl (1990) has postulated that based on borehole data from the floodplain of the Elm Fork in north central Denton County, the Albritton and overlying Pattillo Formations are pedogenic development of A and B horizons rather than two distinct alluvial deposits. Personal observation of these units, especially within newly cut gravel deposits in southeast Dallas County, showed fine-grain lamination consistent with alluvial floodplain deposition. Moreover, the unit is not present on any of the higher terraces (T-2 through T-5) except where draped as a significantly thinner veneer over some of the T-2 terraces in southeast Dallas County.

Pattillo Formation: The uppermost unit of the Trinity terrace system is the gray sand of the Pattillo Formation. This unit is a loosely consolidated sand that is approximately 1.3-1.7 meters in thickness. Like the Albritton, the Pattillo Formation is acidic in nature but not nearly to the degree of the underlying red sandy clay. Thus fossil material, notably gastropods and human skeletal evidence, is also more abundant. The unit is better exposed in southeast Dallas County where the basal section has been radiometrically dated at 6,000 BP (Crook 1959).

Present Surface: The surface soils of the present floodplain appear to be a general continuation of the Pattillo depositional sequence. Chemical composition is similar although with an even higher pH and humus content. Vertebrate and invertebrate fossils are abundant. All species of Gastropoda evident in the Pattillo sands are also present as living organisms on the modern floodplain surface.

Deposition of alluvial terrace fills, such as the Hill Formation, must have begun shortly after the beginning of the retreat of the continental glaciers following their maximal extension. Thus alluvial terrace formations of non-glaciated plains, such as in the Upper Trinity River system, should

represent the period of deglaciation plus the period of interglacial climate adjustment. Geologic evidence in the Shuler Formation indicates at least four periods of glacial retreat-halt-readvance during the Wisconsinan period (Slaughter et al. 1962). Each glacial readvance was followed by valley cutting by the Trinity and terrace deposition.

Recent borehole evidence from the floodplain of the Upper Trinity indicates that the Elm Fork, White Rock Creek, and main Trinity River channels are all deeply incised with a substantial amount (12-22 meters) of recent floodplain alluvia (Ferring 1986). It is as yet uncertain as to precisely when this significant incision of the Trinity channel took place, but if at the end of the Wisconsin Glaciation (as proposed by Ferring), then both the Albritton and Pattillo Formations are considerably older than originally supposed and there has been a significant amount of alluvial deposition during the Holocene. This would then suggest that Archaic sites on the T-1 terraces are intrusive rather than stratigraphic, and there is the possibility of finding in situ Paleoindian through Archaic sites within the Holocene floodplain alluvium.

Geochemistry of the Trinity River Terraces

During the mid-1970s, the author was engaged in a series of chemical analyses for faculty members of the Department of Geological Sciences at Southern Methodist University using flame photometry. Permission was asked and granted for the writer on his own time to conduct brief determinative analyses on the Trinity River terraces. Due to limited amount of time and monies available at the time, detailed chemical analyses were not possible. Thus a series of tests were devised to provide a rapid rating of high, medium, or low elemental concentration. The materials came from fresh, unweathered exposures made by the author in the Dowdy Ferry and Milton pits of southeast Dallas County.

Clearly, these analyses should not be confused with a series of detailed quantitative analyses throughout each formation and from multiple locations. However, they can be instrumental in demonstrating some key geochemical differences among the units as well as support the general paleo-environment conclusions derived from the fossil gastropods. The results of these analyses are listed below:

| Element | Hill | U. Shuler | L. Shuler | Albritton | Pattillo | Surface |
|---------|--------|-----------|-----------|-----------|----------|---------|
| Na | Medium | Medium | Medium | High | Medium | Medium |
| K | Medium | Medium | Medium | High | Medium | Low |
| Ca | Low | High | High | Low | High | High |
| P | Low | Low | Medium | Medium | High | High |
| N | Low | Low | High | Low | High | High |
| C | Low | Medium | High | Low | High | High |
| Si | High | High | High | High | High | Medium |
| Fe | High | High | High | High | Low | Low |
| Mn | High | Low | Low | Low | Low | Low |
| Humus | Low | Low | Low | Low | High | High |
| pH | 6.8 | 7.2 | 8.1 | 4.3 | 6.9 | 7.75 |

The results of the chemical analyses are as would be expected from physical observation of the terrace deposits. The Hill gravels are iron, manganese, and silica rich and poor in calcium and humus. The Shuler sands are high in silica, iron (from the limonitic staining), and calcium, with an increasing pH toward the top of the formation. This rise in pH is consistent with the abundant presence of caliche. The Albritton Formation is high in iron and low in carbon material, with a very

low pH. The Pattillo is, at least on this macroscopic level, chemically similar to recent floodplain deposition, demonstrating increasing carbon and humus content with time.

Malacology of the Terrace Deposits

A number of specimens of both terrestrial and aquatic members of Class Gastropoda were collected from deposits in Denton, Dallas, and Collin Counties. Only specimens which could be clearly identified as being in situ within each formation were included in the analysis. It should be noted that the following results by no means represent an extensive sampling. However, as the results will demonstrate, they provide a sufficient reference sample to make some generalized observations regarding the paleo-environment of the Upper Trinity terrace systems. The specimens were identified with the help of members of the Department of Biological Sciences at Southern Methodist University as part of course work undertaken by the author in the mid-1970s. All specimens were later donated to the collections of the Heard Natural Science Museum in McKinney, Texas.

Prior to the 1960s, little was known of the mollusca from the Trinity terraces, save that the Shuler sands were the only major fossil gastropod-bearing unit. A small collection was made at the Lewisville Site (Upper Shuler) and identified by Elmer Cheatum as follows (Crook 1957):

- *Stenotrema monodon* (Richet)
- *Stenotrema monodon alicae* (Pilsbury)
- *Stenotrema leai* (Binney)
- *Anguispira alternata* (Say)
- *Polygyra texasiana* (Moricand)
- *Mesomphix* sp.

The members of this assemblage suggest an environment of much wetter conditions than are present today. Subsequent studies by Slaughter et al. (1962) and the author found that only *Polygyra texasiana* was living in the region today, and then only as a relatively minor faunal component.

Additional collections from the Shuler Formation were made at the Wood Pit, the Milton Pit, and the Dowdy Ferry Site of southeast Dallas County. Specimens were most abundant in the Upper Shuler. The finely laminated calcareous sands yielded a number of specimens of at least 12 identifiable species:

- *Gastrocopta pentodon* (Say)
- *Gyraulus circumstriatus* (Say)
- *Gyraulus parvus* (Say)
- *Hawaiiia minuscula* (Binney)
- *Helicodiscus parallelus* (Say)
- *Helisoma trivolvis* (Say)
- *Lymnaea (Fossaria) humilis modicella* (Say)
- *Lymnaea (Fossaria) obrussa* (Say)
- *Physa gyrina* (Say)
- *Planorbula armigera* (Say)
- *Stenotrema leai* (Binney)
- *Succinea* cf. *S. avara* (Say)

As was the case at Lewisville, the assemblage represents an environment that is generally more humid than present in the region today. The deposition of finely laminated sands suggests a stable aquatic environment interrupted by short periods of flooding.

Two areas were collected for specimens from the T-1 terrace Albritton and Pattillo Formations. The first site was in northwest Dallas County near the Carrollton Dam. As mentioned earlier, the Albritton sandy clay is extremely acidic in nature and no fossil evidence was found within its boundaries. Collecting from the Pattillo sand and surface alluvium revealed a number of fossils of the following identifiable species:

- *Bulimulus (Rabdotus) dealbatus* (Say)
- *Gastrocopta contracta* (Say)
- *Gyraulus parvus* (Say)
- *Hawaiiia minuscula* (Binney)
- *Helicodiscus parallelus* (Say)
- *Helisoma anceps* (Menke)
- *Helisoma trivolvis* (Say)
- *Lymnaea (Fossaria) bulimoides* (Lea)
- *Physa anatina* (Lea)
- *Pupoides albilabris* (Adams)
- *Strobilops texasiana* (Pilsbury & Ferris)
- *Succinea* cf. *S. grosvenori* (Lea)

The second area for collection in the T-1 terrace was in southeast Dallas County in the Wood Pit, Milton Pit, and Dowdy Ferry Site. Specimens were not as prevalent as near Carrollton Dam but those found duplicated the results in terms of species from the Pattillo and recent alluvium. However, of notable exception, a small lens of dense, pure clay was found within the Albritton Formation at the Dowdy Ferry Site. Within this lens, several small specimens of *Polygyra texasiana* (Moricand) and *Stenotrema leai* (Binney) were found. A number of small fragments of other specimens were found elsewhere in the Albritton at Dowdy Ferry, however their small size and poorly preserved condition prevented identification.

Lastly, a trip was made to the northeastern edge of Dallas County and into Collin County where the East Fork of the Trinity joins several major tributaries and active recent deposition can be observed. Specimens of live and sub-recent gastropods were collected, producing the following assemblage:

- *Amnicola intrega* (Say)
- *Bulimulus (Rabdotus) dealbatus* (Say)
- *Gastrocopta contracta* (Say)
- *Gyraulus parvus* (Say)
- *Hawaiiia minuscula* (Binney)
- *Helisoma anceps* (Menke)
- *Lymnaea (Fossaria) bulimoides* (Lea)
- *Physa anatina* (Lea)

This grouping is extremely similar to the recent to sub-recent gastropods collected in northwest Dallas County, suggesting that climatic conditions were equivalent for this time period over the entire Upper Trinity system.

Reconstruction of the Paleo-Environment for the Upper Trinity

Using the gastropod faunal assemblages collected from the terrace deposits of the Upper Trinity, a number of conclusions can be drawn regarding the paleo-environment of the river's drainage system. Original deposition of the terrace sediments took place in an environment of greater rainfall and stream velocity than is present today. The Hill Formation gravels represent the maximal flow energy followed by deposition of sand and thin clay particles of the overlying formations, each representing lower and lower stages of stream flow. The presence of abundant manganese and iron in the Hill gravels also suggests a region of more humidity than today.

This conclusion is further supported by the fossil gastropods collected in the Upper Shuler Formation. It is significant that among the five species identified from the Lewisville Site, four of the species are not represented by a single member in the region today; and the fifth, *Polygyra texasiana*, can only be found with great difficulty (Slaughter et al. 1962). The other four, *Stenotrema monodon*, *Stenotrema monodon aliciae*, *Anguispira alternata*, and *Mesomphix* sp., are more typical today of climates that are more humid with a greater annual rainfall (Henderson 1935; Pilsbury 1940, 1948). *Stenotrema* sp. can be found today in and around the springs of San Marcos in south-central Texas. *Anguispira* sp. is found in the subtropical remnant of the Big Thicket of southeast Texas (Slaughter et al. 1962). Both of these areas are warmer and have higher annual rainfall than that of the present Dallas County region. The one species that exists within the modern environment of the region (*Polygyra texasiana*) has an extremely variable habitat and can range from a water-rich woodland area to a grassy plain.

Pollen analysis (Slaughter et al. 1962; Bryant 1975) suggests a heavily wooded region, even over the floodplain of the Upper Trinity watershed during the late Pleistocene. Today, this same area is considered to be on the border of the Mississippi timberlands and greater western prairies. This is a region of lower annual rainfall, suggested to be approximately four inches per year less than during the terminal Pleistocene (Slaughter et al. 1962). This change must have taken place after the end of deposition of the Upper Shuler Formation as the gastropod assemblage found in the Holocene Pattillo Formation is representative of those species found living in the region today.

Evidence for varied temperature ranges within the late Pleistocene can be seen in the geologic strata of the Trinity terraces. In the Upper Shuler Formation there are linear beds of calcified hard nodules known as caliche. Occurring only in areas of very arid and dry climate, they suggest that during the major interglacial period of the late Pleistocene (Olympia phase of the Wisconsinan), there were distinct periods of alternating humid and dry climates. It is significant to note that no fossil evidence of gastropods was found in zones which were heavily calichified. Since dating of the majority of the Upper Shuler is not very precise, it is unknown how long these periods of drier climate may have lasted. It has been suggested that they may represent periods of significant glacial recession. If true, this would reflect an interstadial condition and thus a more arid environment.

The two species of gastropods found in the Albritton Formation could have significant implications for understanding the transitional environment from the terminal Pleistocene to the Holocene. Both *Polygyra texasiana* and *Stenotrema leai* are species found within the Upper Shuler and not in the overlying Pattillo Formation or in the current floodplain of the Trinity. Thus they are indicative of more humid conditions than present in the region today. The Albritton is of unknown age, primarily because of its acidic nature and ergo lack of preserved datable material. Crook (1959) reported a single radiocarbon date of approximately 6,000 BP taken from a small midden of mussel shells from the base of the Pattillo Formation, just above the Pattillo-Albritton contact. While radiocarbon dates from shell material can be suspect due to potential groundwater contamination, the midden in question was encased in a clay lens which helped shield it from groundwater and the date was made on material meticulously separated from the internal components of the shell (W.

W. Crook, Jr., 1988, personal communication). A similar date was produced from shell material at the Gore Pit in southern Oklahoma (Hammatt 1976) which is an archeological look-alike for the material in the basal Pattillo of the Upper Trinity watershed.

The upper surface of the Albritton Formation is separated from the overlying Pattillo by a major erosional unconformity. The Albritton Formation is unlike any other component in the Trinity River terrace system, its red sandy clay representing a totally different erosional source from either the underlying Shuler or the overlying Pattillo. Such a change in chemical character is likely to represent a significant amount of time – both before and after its deposition. Recently, Pearson et al. (1986) have found that there was a significant environmental change in the Sabine trench from a riverine to an estuarine system starting about 9,400 BP. This system persisted for about 2,800 years, terminating at 6,600 BP. Their work indicates a similar change is likely present for the other southeast Texas river drainages, including the Trinity.

The change from riverine to estuarine deposition is postulated to correspond to a short change in the general post-Pleistocene environment of glacial melt and sea level rise. The 6,600 to 9,400 BP date determined by Pearson et al. (1986) roughly corresponds to the last minor phase of continental glaciation, known as the Cochrane readvance. Timing of the Cochrane readvance has been variously dated, but all reported dates fall within the 2,800 year zone of observed Gulf Coast sea level fall as determined by Pearson et al. (1986). It also fits with the 6,000 BP age date for the base of the Pattillo and the presence of gastropods which reflect a more humid environment from that of the last 6,000 years of deposition. Thus while the evidence is clearly not definitive, there is enough to suggest an age date for the Albritton in the 6,000-12,000+ BP range.

Following the deposition of the Albritton, the climatic conditions in the Upper Trinity watershed have been fairly stable up to the present. This is borne out by the observation that the gastropod assemblages have been almost constant over the last 6,000 years.

Acknowledgements

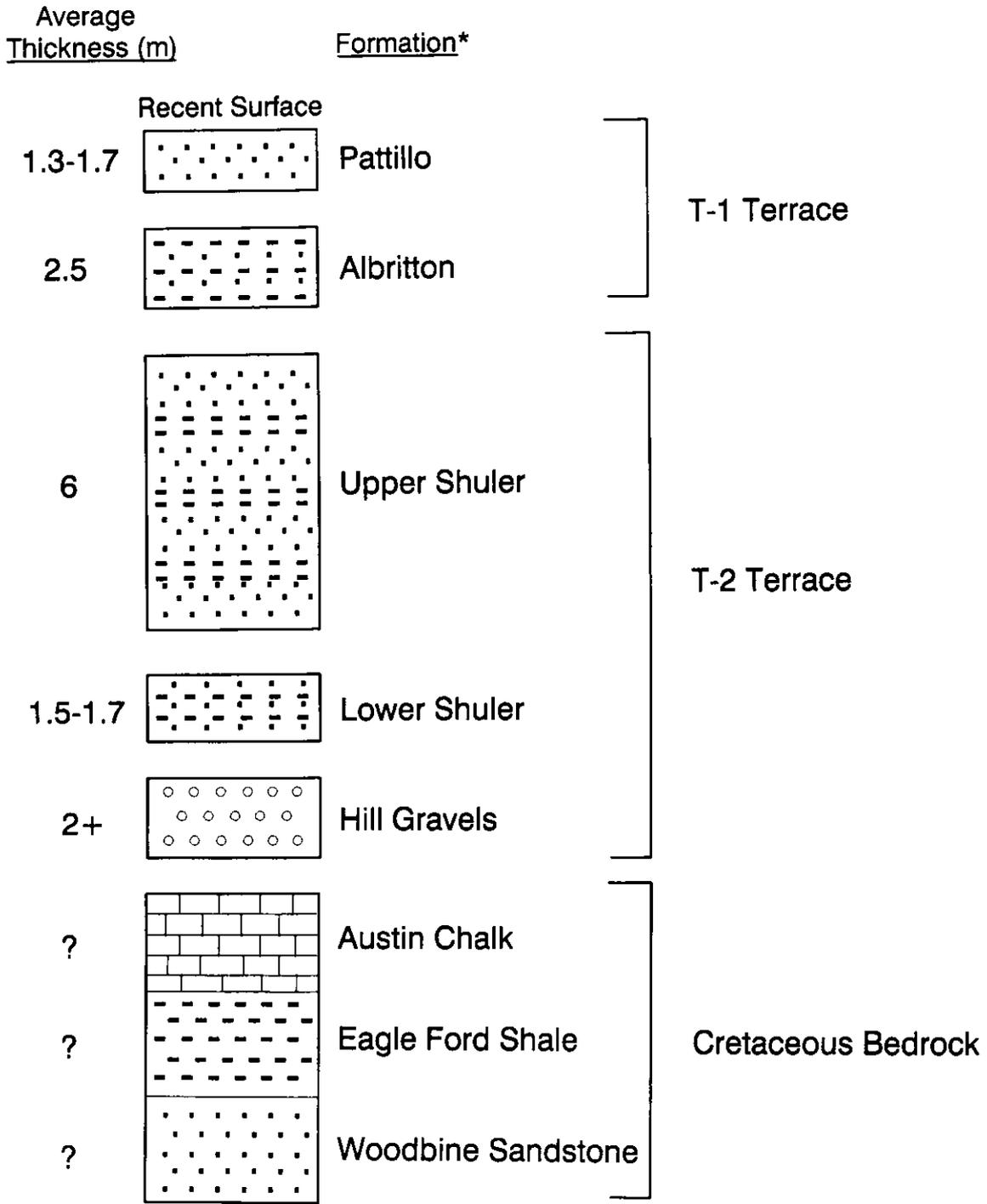
This paper was originally prepared in the mid-1970s as part of course work for a Bachelor of Science Degree in Geology at Southern Methodist University in Dallas. The original work has been augmented and updated over the course of the past 30 years. The author wishes to thank Mrs. Karen Kohl for assisting in the creation of a quick determinative methodology for analyzing the geochemistry of the Trinity River terrace formations and most notably the presence of humus. Thanks are also extended to the late Dr. Bob Slaughter in the identification of major mammalian fauna. I would also like to thank members of the Biology Department of Southern Methodist University who helped in the original identification of the various species of gastropods collected during this study.

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Figure 1
 Idealized Stratigraphic Section
 Upper Trinity River Terraces



* All units separated by distinct erosional unconformities

Prehistory of Inland Southeast Texas: A Reply to Ricklis

Leland W. Patterson

An excellent book on Texas prehistory has been published (Perttula 2004), with coverage of Paleoindian archeology for all of Texas and the archeology of each region of Texas. In general, there are good presentations of the archeology of each region. There is a chapter on the archeology of Southeast Texas by Robert Ricklis. In contrast to other chapters of this book, this chapter can best be described as incomplete, because Ricklis has chosen to focus mainly on the coastal margin of this region, with only brief comments on the archeology of the larger inland area of Southeast Texas. Ricklis (2004:181) states that his reasons for focusing on the coastal margin are that investigations for inland Southeast Texas have focused mainly on sites with mixed deposits and have less continuity in research perspectives and goals.

Ricklis' reasons for focusing mainly on the coastal margin of Southeast Texas are not well founded. There is actually a larger published data base for the inland part of Southeast Texas than for the coastal margin (Patterson 2002), with much synthesis of the data for the inland subregion (Patterson 1995, 1996; Story 1990). The most detailed synthesis of the archeology of Southeast Texas is not even referenced by Ricklis (Patterson 1996).

In Figure 6.3, Ricklis gives what is stated to be a general dart point sequence of major types for Southeast Texas. However, Neches River, Bell/Calf Creek, Trinity, and Travis are not major dart point types for Southeast Texas (Patterson 1996: Table 7), and the Yarbrough point type is placed too early in the chronological sequence (Patterson 1996: Table 4).

The comment by Ricklis (2004:184) that archeological excavation of a Paleoindian site has yet to be undertaken in Southeast Texas is not correct. Several sites with Paleoindian components have been excavated in this region (Patterson 1995, 1996). The Paleoindian assemblage for site 41WH19 in Wharton County (Patterson et al. 1987) is discussed in the chapter on Paleoindians in this same book on Texas prehistory (Perttula 2004:60,82).

Ricklis (2004:185) states that there is a general dearth of faunal remains at inland Archaic sites. He is obviously not familiar with the many publications of faunal analysis for Archaic period components of inland sites such as 41FB37 (McClure 1987), 41WH19 (Patterson et al. 1987), 41FB3 (Patterson et al. 1993a, 1998), 41FB42 (Patterson et al. 1993b), and 41HR5 (Doering site, Wheat 1953). There is a continuing pattern from Paleoindian through Late Prehistoric periods of use of a broad range of faunal food resources, from small animals such as rabbit, squirrel, and turtle, to large animals such as deer and bison.

Ricklis (2004:181,201) seems to assume that most excavated sites of inland Southeast Texas have stratigraphic mixing, but many excavated sites of this area have good sequences of artifact types with no indications of stratigraphic mixing. When there are indications of stratigraphic mixing, this situation is noted in the site report.

Ricklis (2004:185) briefly discusses three inland sites with Late Archaic cemeteries, and comments on weak chronological control at the Ernest Witte site (Hall 1981) with only two radiocarbon dates. There are 13 sites in the Late Archaic Mortuary Tradition (LAMT) of inland Southeast Texas, confined to three western counties. Thus, only a small area of inland Southeast Texas has the LAMT. The Bowser site (41FB3) is the best dated site of the LAMT with six calibrated radiocarbon dates (Patterson 2000: Table 2) ranging from 790 to 60 BC. The LAMT may represent the highest degree of social complexity of hunter-gatherers for any prehistoric time period of inland Southeast Texas, with cemeteries, elaborate grave goods, and long-distance trade (Patterson 2000).

Ricklis (2004:194) has proposed an arrow point type sequence without much data for Southeast Texas, with Scallorn, Alba, and Catahoula types starting about AD 700 and being replaced by the

Perdiz point about AD 1200. He bases this arrow point sequence on Central Texas data, where the Perdiz point replaces the Scallorn point about AD 1200. As I have noted in several publications, there is little evidence for a serial sequence of arrow point types in Southeast Texas (Patterson 1996:20, 1999:17). There are several sites in Southeast Texas where the Perdiz point is earlier than the Scallorn point in the stratigraphic sequence (Patterson 1999:17). At site 41WH12 in Wharton County, a Perdiz point is below a stratum with a radiocarbon date of AD 900 (Patterson and Hudgins 1989). There is a Perdiz point below a stratum with a C13-corrected calibrated radiocarbon date of AD 390 at shell midden site 41GV53 in Galveston County (Patterson et al. 2001:4). At site 41FB255 in Fort Bend County, Scallorn, Perdiz, and Alba points were all found with a single burial (Rogers 2000). Ricklis dismisses all evidence of early use of the Perdiz point in Southeast Texas on the basis of stratigraphic mixing whenever data contradicts his proposed arrow point type sequence for Southeast Texas. This is not how science is done.

Contrary to Ricklis' opinion, long-term cultural patterns are as well defined for the inland part of Southeast Texas as for the coastal margin. It is interesting to note differences in lifestyles for the two subregions of Southeast Texas, with differences in subsistence patterns, mobility-settlement patterns, population dynamics, and technologies. It should be noted that Ricklis has no first-hand knowledge of inland Southeast Texas archeology, because he has not done research in this area.

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