Lithic Technology at the George C. Davis Site, Cherokee County, Texas

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ABSTRACT

This study is an analysis of the stone artifacts and debitage recovered from the 1939-41 and 1968-70 excavations at the George C. Davis Site, a nucleated Caddoan settlement in Cherokee County, Texas. The primary aim of the study is to present a comprehensive analysis of the lithic technology as a subsystem within the over-all prehistoric cultural system.

The cultural histories of the area and the site are reviewed and intrasite variability is examined. Local lithic raw material resources are discussed and compared to the debitage from the Davis Site to determine both the degree of selectivity shown by the prehistoric stoneworkers and the extent to which the local resources were utilized. Lithic debitage is described and reduction techniques are defined on the basis of the kinds of materials used. Linear reduction models are constructed to gain insight into the manufacturing strategies manifested in the debitage and finished tools.

Analysis and interpretations of the finished artifacts are presented. Attention is focused on the techniques, such as chipping, abrading, pecking and abrading, battering, and polishing, by which the artifacts were shaped to their final form. The analysis of both finished artifacts and debitage provides some indication of the degree to which nonlocal materials and artifacts were incorporated into the Caddoan material culture.

Findings of the study reveal that the majority of the flint-knapping activities performed on the site were directed toward utilization of pebble and small cobble resources for production of flakes for use as tools without further modification. Certain flakes were selected as blanks for reduction into small biface tools such as arrow points and awls. Many large chipped stone artifacts are of nonlocal resources and were probably introduced in finished form. Abraded stone artifacts manufactured on the site were mostly shaped through use. By contrast, most artifacts shaped to a preconceived form by pecking and abrading were introduced to the site in finished condition. Tentative correlation of the burial sequence in the special mortuary area with the two village Inner Precincts (Story, 1972: 73) - Mound A and Mound B - suggests that most of the nonlocal products were associated with Inner Precinct A which is probably the earlier of the two.

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INTRODUCTION

STATEMENT OF PROBLEM

The subject of this dissertation is an analysis of the stone technology at the George C. Davis Site, Cherokee County, Texas. The primary aim of the study is to present a full description of the Davis Site Caddoan stone technology. Descriptions are presented of the raw material resources which are available in the local geological deposits. Comparing these materials to the debitage recovered from the site provides a basis for determining which local resources were being utilized and how they were used. The finished tools are described and are analyzed for wear patterns. Comparisons are made of the debitage and finished tools to determine specifically which tools or artifacts were manufactured on the site and which ones were introduced through interaction networks.

Descriptions of the site, local environment, and previous work are presented. These data will provide a necessary introduction for the discussions in the following sections.

Considerable attention is paid to the archeological and cultural history of the area in which the Davis Site lies. It is important to emphasize both the history of the archeological research and cultural history of the area. The lithic materials from the site have been analyzed using different approaches. The first analysis was done by

Alex Krieger on the artifacts recovered during the 1939-41 WPA excavations (Newell and Krieger, 1949). Krieger's analysis was done without the benefit of much of the chronological information now available for the area.

The theoretical orientation taken in this study is outlined in Chapter 2; in essence, the lithic technology is considered a component of the technological subsystem of the Davis Site Caddoan cultural system. The research design and limitations of the sample are also discussed in Chapter 2.

Considerable emphasis is placed on the nature of the local and regional raw material resources. These are described in Chapter 3 with the expectation that their exploitation reflects an adaptive response to certain environmental resources. An analysis of the technological reduction strategies is presented in Chapter 5.

Several basic reduction techniques are indicated in both the finished products and the debitage. These techniques which include chipping, polishing, pecking, abrading, and battering are described. While descriptions of most of these techniques are to be found in the lithic technology literature today, the techniques are reviewed and described in Chapter 4 to clear up certain misconceptions and to clarify certain points regarding the Davis Site lithics.

The manufacture of an assortment of stone tools from one particular kind of resource (such as silicified wood, flint, quartzite, and sandstone, etc.) follows a linear sequence of manufacturing steps. Not all tools require the completion of every step, but in advanced stages of reduction, certain steps must be carried out to achieve the

desired end product. The Linear Reduction Model described by Collins (1971) and Schiffer (1972) is a useful analytical tool to provide the analyst with an insight into the strategies used by the prehistoric stoneworkers to manufacture their stone tools. Applications of this model are made to the Davis Site materials.

The size and nature of certain kinds of workable stone largely dictate the size and, sometimes, shape of the end product. Techniques for reducing large blocks of ledge flint will differ considerably from those used to reduce small cobbles or pebbles. The technological reduction systems observed in the finished tools and in the chipping residue reflect marked differences when the nature of the raw materials are considered. These differences reveal significant social and technological information relevant to understanding the behavior within the prehistoric society being studied. Descriptions of these reduction systems are included.

Functional studies were carried out principally using a binocular microscope in search for wear patterns. The results of this study are included in the debitage and artifact descriptions in Chapters 6, 7, and 8. Considered also are the functional implications of context, form, and experimental studies.

The typological analysis presented in Chapters 6, 7, and 8 will incorporate certain findings made in Chapters 3, 5, and 6 as well as basic descriptive data not considered in the earlier chapters. It is important to present these basic data which are referred to in later sections. Also, hopefully this material will be of use to other researchers. It should be emphasized, however, that weighing such

factors as technology and context, I have been more inclined to lump specimens into broad categories where some archeologists would undoubtedly choose to split them into smaller groups.

Purely quantitative distributional studies are not emphasized for specific reasons; first, this is the topic of a master's thesis being prepared by Carolyn Spock; second, the variations in the recovery techniques are considerable (especially those used by Perry Newell in the 1938-41 WPA excavations compared to that used in Story's 1968-70 investigations) and clearly skews the statistical charts (Carolyn Spock, personal communication). The distributional analysis will be devoted largely to testing certain hypotheses and attempting to establish a relative chronology within certain artifact classes.

Chapter 9 is devoted to synthesizing the findings of the study. The lithic technology component is described. The lithic assemblage which was produced on the site is defined and the functions of it and the assemblage introduced in finished form are discussed.

DESCRIPTION OF SITE AND LOCAL ENVIRONMENT

The George C. Davis Site is in the southern part of Cherokee County, central east Texas at latitude 31 degrees 35 minutes north and longitude 95 degrees 10 minutes west (Fig. 1). The site consists of three earthen mounds - designated A, B, and C - one confirmed borrow pit, and a village area covering about 20 hectares (Fig. 1).

The site is situated on a high, steep-sided terrace remnant of the Neches River system about 1300 meters northeast of the present

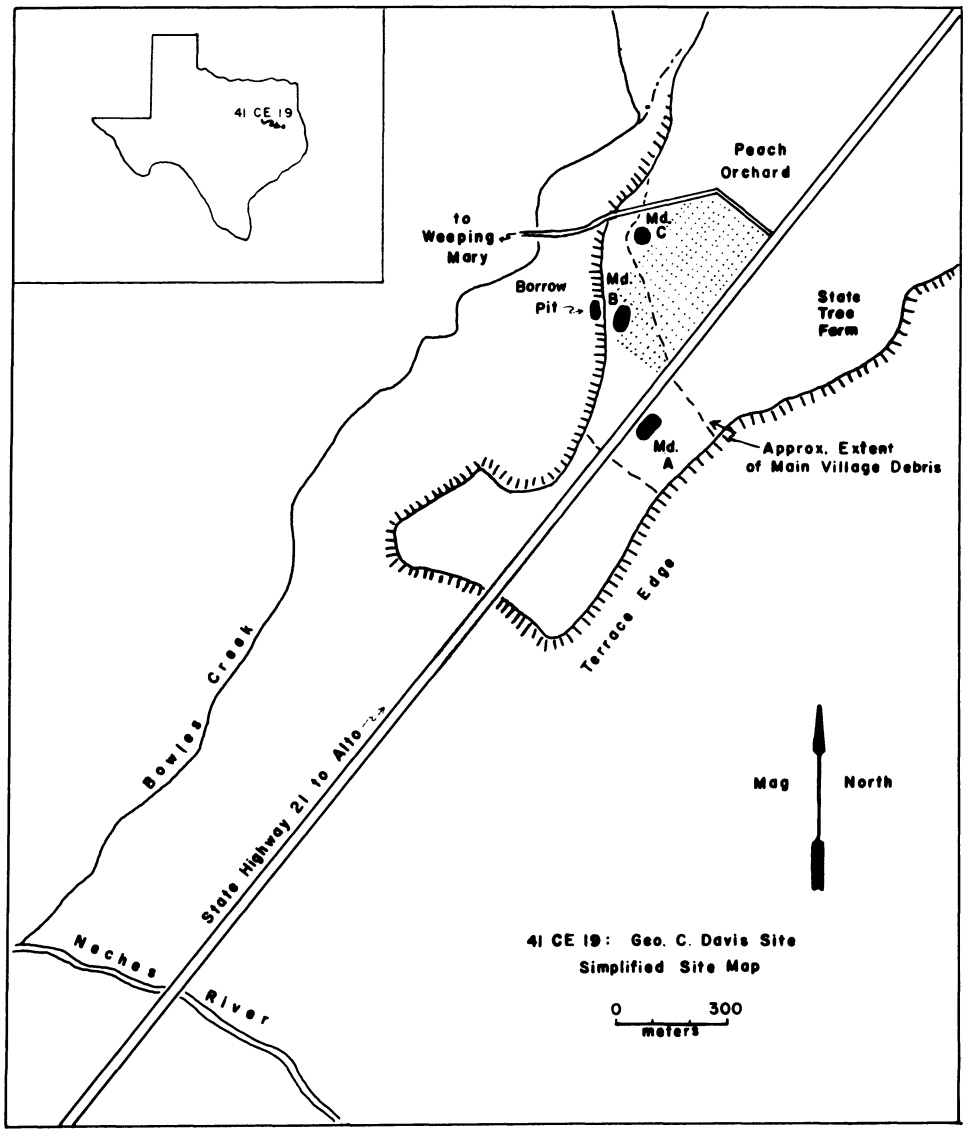

Figure 1. Map of George C. Davis Site.

river channel. This terrace is bordered on the west and southwest by the Neches River bottom lands and on the north by Bowles Creek bottoms (Fig. 1).

Mound A, the largest and southernmost of the three, lies east of Highway 21 which crosses the site (Fig. 2). The mound, prior to partial excavation in 1939-41 was an L-shaped structure approximately 82 meters long, 50 meters wide, and about 5 meters high. The height had undoubtedly been reduced by plowing and erosion.

West of Highway 21 and approximately 260 meters northwest of Mound A is a low mound, probably once a rectangular structure, designated as Mound B. This feature is now 50 meters long, 35 meters wide, and about 2 meters high. It too has been subjected to many years of cultivation and erosion.

Mound C is 175 meters north-northeast of Mound B. This mound is roughly 42 meters in diameter at the base and about 6 meters high.

A large depression superficially measuring 28 meters long and 18 meters wide proved, upon exploration, to be an aboriginal borrow pit. This feature is located west of Mound B on the slope of the terrace.

The general area lies in the interior portion of the Gulf Coastal Plain. The regional topography is gently rolling hills dissected by creeks and rivers. Bottom lands are usually broad, heavily wooded, and poorly drained; overflows are frequent.

Geologically, the Davis Site lies within the Cenozoic Gulf Coast Geosyncline. The rocks within this area were formed by a series of transgressions and regressions of marine waters which left

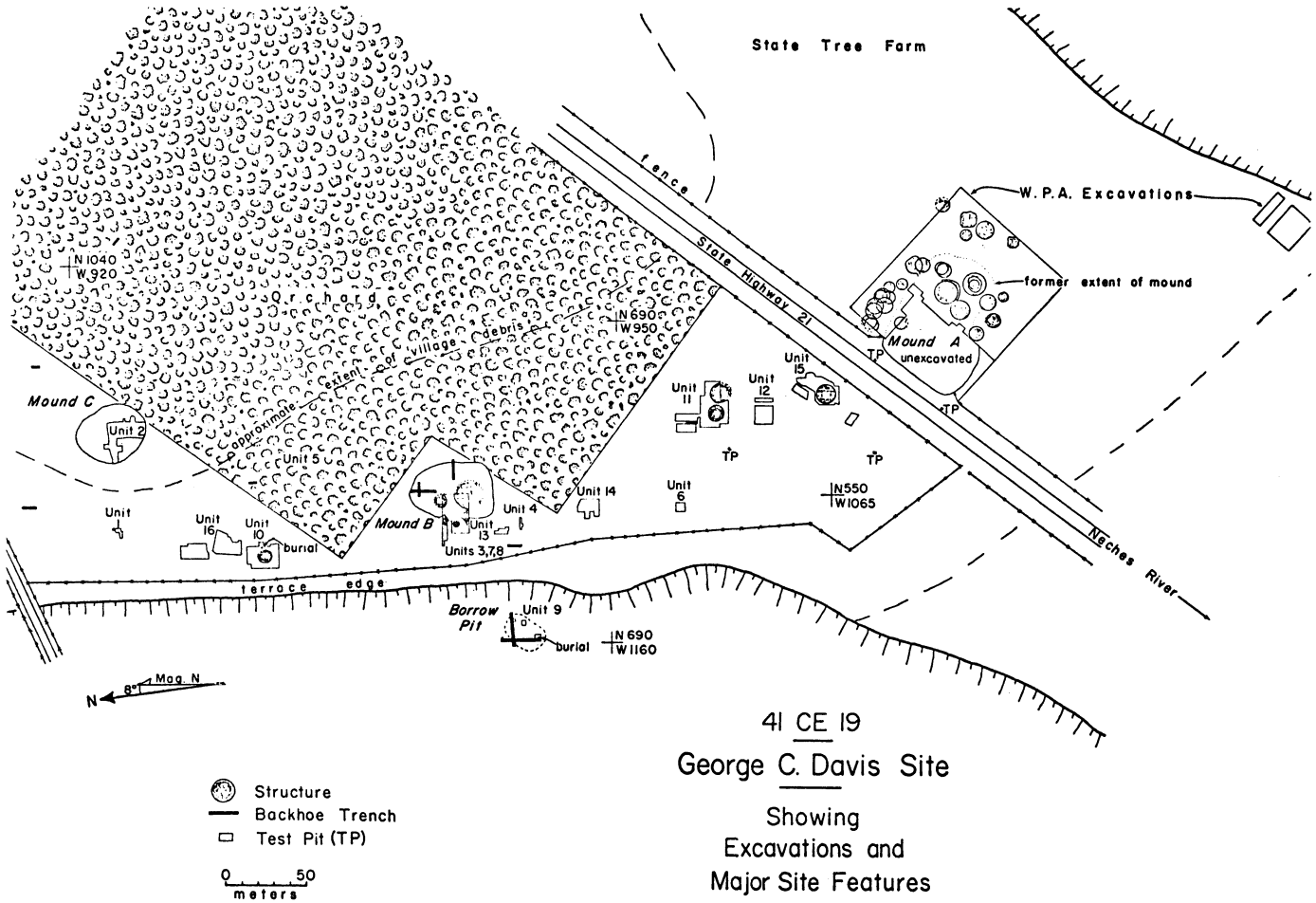

Figure 2. Map of George C. Davis Site showing location of excavation units and major site features.

a deeply stratified deposit of continental, marine, littoral, and lagoonal sediments (Sellards, Adkins, and Plummer, 1958: 526-529). In east Texas, these deposits are characterized by fine-grained sands, clays, shales, and marls.

The geologic environment in the vicinity of the Davis Site has been described by Brown (ms.: 4) as being:

> .....characterized by Eocene poorly consolidated iron-rich, fine-grained sands, clays, and shales. The Queen City and Sparta formations (fluvial and paralic sands and clays) and the Recklaw, Weches, Stone City, and Cook Mountain formations (marine clays, marls, glauconitic marls and sands, and ironstones) outcrop in the immediate vicinity of the site.

The above mentioned geological formations serve as parent materials for several different soil types in Cherokee County. Mowery and Oakes (1959: 7) have classified these into four general soil areas:

> (1) Sandy and clayey soils of flood plains; (2) sandy and clayey soils of the redlands; (3) soils with compact subsoils; and (4) sandy soils with friable subsoils.

Two major soil series are dominant in the immediate vicinity of the site; the Amite series and the Bibb series. The site and surrounding terrace constitute one of the principal areas in which the Amite fine sandy loam occurs. According to Mowery and Oakes (ibid.) this is the best agricultural soil in the area; the parent material consists of sandy and clayey alluvial sediments washed from the redlands and forested soils of east Texas. It is acidic, a factor which adversely affected the preservation of most organic archeological materials.

Mowery and Oakes state that the Bibb series:

> .....consists of poorly drained acid alluvial soils. Bibb soils occupy nearly level flood plains of streams that drain light-colored forested soils. (op. cit. 12).

The parent material is alluvial sediments.

The site lies in a humid, mesothermal climatic region (Fisher, 1965: 7). Summers are warm and long while the short winters are mild; the average frost-free season is 246 days.

The site area is within the "piney woods" region of east Texas (Fisher, 1965: 7; Gould, 1969: 10). Fisher (1965: 7) and Gould (1969: 10) record loblolly, shortleaf, longleaf, and slash pine in the area. Gould (ibid.) states that most ecologists consider the pines as a sub-climax or fire disclimax. Bottom land forests and portions of the overstory are composed of oaks, hickory, gums, cypress, elms, ash, cottonwood and maple.

Blair (1950) includes this area in his Austroriparian Biotic Province. Major mammalian fauna indigenous to the region include American black bear, now extinct in the area, but once denned in the canebrakes of giant reeds which flourished in the bottom lands (Anderson, n.d.), white tail deer, raccoon, swamp rabbit, eastern cottontail, and opossum. Various native fishes and other aquatic fauna still inhabit the streams.

SUMMARY OF ARCHEOLOGICAL INVESTIGATIONS AT SITE

The Davis Site was part of a Mexican land grant made to Peter Ellis Bean in 1821 and the terrace has been subjected to Anglo

agricultural activities since that time (Newell and Krieger, 1949). It was not until about 1904, however, that exploration was carried out in any of the mounds. The landowner, a Colonel Farris, using local prison farm labor, dug a trench across much of Mound C (Story, 1972). Despite the large size of the excavation, little damage was done.

The University of Texas-Works Progress Administration carried out the first controlled excavations at the site in 1939-41. At that time the site was owned by separate estates and permission could be obtained only from the George C. Davis estate, owner of the eastern portion of the site. These excavations, which centered in and about Mound A, were directed by H. Perry Newell. Approximately two-thirds of the mound and a portion of the village area was excavated. Combined, these excavations covered approximately 100 square meters. An additional area of excavation was done east of the mound near the terrace edge.

A detailed analysis of the artifacts and interpretations based on the findings were made by Alex D. Krieger (Newell and Krieger, 1949). According to Krieger the major occupation at the site was by an early Caddoan (Alto Focus) population; this Caddoan community was an agricultural settlement from the beginning (ibid.: 234). On the basis of interpreted construction phases of Mound A and artifact distribution within arbitrarily defined levels in the village Krieger divided the occupation, for convenience of discussion, into three phases, Alto 1, 2, and 3. The ceramics and seemingly early placement of the site by cross-dating prompted Krieger to suggest that, among other possibilities, the settlement was "representative of a migration, perhaps only of small scale, from Middle America during the Formative period"

(Newell and Krieger, 1949: 231, 232).

Traces of a much later, protohistoric ceramic complex (Frankston Focus) were recognized by Krieger. However, these materials are still too early to support the contention by Bolton (1908) that the site was the location of an historic Neches Indian village. The latter assumption led to the establishment of an historical marker on the larger mound in 1936 by the State of Texas.

Permission to explore the western portion of the site was obtained when the land west of Highway 21 was purchased by W. E. Gunderman, Jr. A total of eleven months of field work was carried out from 1968-70 by The University of Texas at Austin under the direction of Dr. Dee Ann Story. These explorations were made possible through grants GS-2573 and GS-3200 from the National Science Foundation, interagency agreements from the Office of the State Archeologist, and the State Historical Survey Committee. The principal objective of this research as outlined by Story (1972: 3, 4) was to make a thorough investigation of the Caddoan cultural system at the site. It was necessary to map the extent of the surface indication of this site and explore the major cultural features (mounds, village, and borrow pit) in order to carry out her major research aims. These aims were to determine the community structure, explore for changes within this structure, examine the cultural ecology of the system, and investigate its relationship with contemporary settlements. Story also wanted to re-examine the historical significance of the site relative to both the development of the Caddoan culture and the Mesoamerican and Eastern United States relationships (ibid.).

CHAPTER 1

Archeological and Cultural Historical Backgrounds

The purpose of this section is to review the archeological and cultural history of the region in which the Davis Site lies in order to provide a time-space frame of reference for the presentations in later sections. The following discussion will center on those cultural assemblages which are felt to be pertinent to central east Texas archeology.

ARCHEOLOGICAL HISTORY

An excellent historical review of the archeological work in east Texas was presented by Davis (1970). Although his essay was directed at investigations in the Red River basin, his periods of exploration are applicable to the east Texas area as a whole. The reader is referred to Davis' paper for an historical outline, as the following discussion will review only the major works on which the ordering and classification of archeological materials from eastern Texas are based.

The task of ordering the great quantity of east Texas materials gathered by the University of Texas during the 1920's and 1930's fell to Alex D. Krieger. Krieger spent most of the years during World War II sorting, classifying, and analyzing the ceramic collections. Classification of artifact assemblages by Krieger and Clarence H. Webb,

a major collaborator, followed the Midwestern Taxonomic System (McKern, 1939). Earlier, Jackson had suggested that style clusters in the archeological materials recovered during his investigation coincided with river valleys (Jackson, 1934). This view was challenged by Goldschmidt (1935). Later, however, Jackson himself (1938) agreed that the scheme did not present an accurate picture of ceramic style distribution and suggested, as an alternative, that east Texas be divided into regional phases designated by towns near the discovery sites (such as Frankston, Cason, Talco, and Direct). These "phases" were used in a geographic rather than chronologic sense.

Krieger divided the ceramic assemblages into two formal units, the Gibson and Fulton aspects. The Gibson Aspect was considered the earlier. In addition, he and Webb defined several foci within each aspect (Krieger, 1946; Newell and Krieger, 1949; Webb, 1948; Fulton and Webb, 1953).

The first comprehensive synthesis of the culture history in east Texas was made in 1954 by Krieger (in Suhm, Krieger, and Jelks, 1954). Krieger's ordering served for many years as the working taxonomic framework for workers in east Texas archeology.

A later synthesis of northeast Texas archeology was published by Webb in 1960. There has not been an updated synthesis since 1960, although certain aspects of the chronology as well as the culture history of certain subareas of east Texas have been given a considerable amount of attention. For example, a study of the Archaic was made by LeRoy Johnson, Jr. (1962) and a synthesis of the Red River drainage in Texas

by E. M. Davis (1970).

Archeologists working in the area began to realize that the Gibson-Fulton dichotomy was not holding up to the test of new data. As intervening areas between previously defined foci began to be investigated, the boundaries between foci became less obvious. Davis (1970) for example, avoided using the Gibson-Fulton scheme and divided the Caddoan materials into five temporal periods.

Chronology is still a major issue in east Texas archeology despite the efforts of some archeologists to ignore the time factor and classify sites according to an arbitrarily defined criterion implying site function (Hsu, Sciscenti, and Skinner, n.d.; Gibson, 1969; Anderson, n.d.). In synchronic studies, the functional classification of sites is usually carried out in attempts to delineate patterns in settlement and social organization. While these approaches can be commended for attempting to be more anthropologically oriented than the earlier works, they can be criticized for avoiding certain data such as pertinent temporal data which are absolutely essential to achieve their ultimate aims.

Lithic Technology Studies

An inspection of the archeological literature from east Texas reveals a serious lack of understanding and concern with stone tool technology. The majority of the site reports include only typological descriptions of those artifacts thought to be finished tools (e.g., Newell and Krieger, 1949; Wheat, 1953; Jelks, 1961; Johnson, 1962; Davis and Davis, 1959; McClurkan, Field, and Woodall, 1966; McClurkan,

1968; Shafer, 1968; Webb, Murphy, Ellis, and Green, 1969). When an attempt is made to analyze the lithic debris, the analysis is restricted to a broad classification of flakes and cores usually based on the amount of cortex present and striking platform morphology (e.g., Lorrain and Hoffrichter, 1968; Jensen, 1968, 1969; Skinner, Harris, and Anderson, 1969; Briggs and Malone, 1970; Anderson, n.d.). Processual descriptions of stone tool manufacture are usually restricted to specific tools and not to the over-all assemblages (Lorrain and Hoffrichter, 1968; Skinner et al., 1969; Webb, Shiner, and Roberts, 1971).

The analysis of McGee Bend materials by Honea (ms.) is the earliest and certainly one of the most thorough inquiries on record. He noted that the reduction of pebbles at sites in the McGee Bend district was principally by the bipolar technique. A quantitative study of debris was presented and this was related to specific reduction processes (hard-hammer, soft-hammer, and bipolar). He did not take into consideration a possible temporal shift in reduction practices, however. Shafer (1968) did note that a shift from a core industry to a flake industry took place within the culture history of the Conroe Reservoir area, but failed to analyze the chipping debris to show how this shift was expressed in the residue. Anderson (n.d.) has documented differential patterns of stone resource exploitation between the Archaic and Caddoan assemblages in the upper Neches River drainage.

A preliminary analysis of the Davis Site technology was carried out by this writer in order to determine the various manufacturing techniques represented in the collection and to present a preliminary definition of the technological approaches. The study revealed that

most of the stone refuse recovered from the village fill was produced by percussion (hard-hammer free-hand and bipolar) flaking; the techniques were performed to produce flakes which were either used without further modification or were shaped into small bifaces (arrow points and small, chipped stone awls) by pressure. The presence of soft-hammer retouch flakes of nonlocal materials coupled with the absence of bifaces which could have served as cores for such flakes posed certain questions. Large, finished bifaces were also made of nonlocal flint. It was not resolved as to whether or not the bifaces were retouched at the site, but the technology represented in their manufacture is in marked contrast to that represented by most of the chipped stone artifacts.

In sum, technological change has been demonstrated in the study area by analyzing only finished tools (Johnson, 1962; Shafer, 1968) but not in terms of specific industrial techniques. Intensive lithic analysis in New World archeology is receiving greater attention now than ever before, but such studies are not typical. Typological analysis of what the archeologist regards as the finished product is the most common treatment of lithic artifacts. More intensive treatments of chipped stone assemblages by White (1963), McPherron (1967), MacDonald (1969), Epstein (1969), and Kobayashi (1970) amply demonstrate the valuable returns from such studies. Analysis of major industries within the study area are lacking. Detailed lithic studies by Honea and Shafer are restricted to specific chronological periods and do not adequately serve as references for all the industries recognized in the cultural history.

CULTURE HISTORY OF EAST CENTRAL TEXAS

An updated overview of east Texas culture history is presented since there are materials in the Davis Site collection that indicate several temporal periods (i.e., pre-Caddo and Caddo). It will aid in placing the Davis Site in better regional perspective and will help to clarify certain misunderstandings regarding some of the materials gathered during Newell's work.

The Early Materials

The terms "Paleo-Indian" or "Paleo-American" have been applied to the earlier materials recognized in the area (Suhm, Krieger, and Jelks, 1954: 145; Webb, 1960; Davis, 1970). These terms will not be applied here, since their usage implies a certain continental homogeneity that did not exist at the end of the last glaciation (see Patterson, 1973: 35-39).

Davis presents a brief, but informative account of the nature of the early materials. While no Clovis complex sites are known in the whole of east Texas, projectile point forms suggestive of this earlier assemblage are frequently found in surface collections. These fluted point forms (see Johnson, 1962; Davis, 1970) are usually classified as Clovis, as are most lanceolate projectile points with short flutes in the eastern United States (Mason, 1962). Two examples of Folsom points are also known (Story, 1965; Newell and Krieger, 1949: Fig. 57, V). The specimen reported by Newell and Krieger is not classified by Krieger as Folsom, but it is by this writer. Both were

clearly recovered from archeological contexts which date much later than the late Pleistocene cultural groups that made the Folsom points. Other forms found in east Texas which are usually regarded as early are Plainview, Meserve, Scottsbluff, Angostura, and San Patrice (Suhm et al., 1954: 145; Davis and Davis, 1960; Jones, 1957; Johnson, 1962).

The environment of the area is an important factor when considering the nature of the cultures responsible for the early projectile point forms. It is very likely that throughout the period of occupation, much of the area in question was forested (Vaughn M. Bryant, personal communication). The forests were probably more of a deciduous nature at the end of the Pleistocene than they are today; this interpretation is based on the indication of frequency of deciduous plants in the earlier levels of Boriack Bog in central Texas (Bryant, 1969). According to Fitting (1970: 36, 37) deciduous forests have a greater carrying capacity potential for hunters and gatherers than boreal or coniferous forests.

The raw materials used in the manufacture of these early projectile points and other tools reflect variations in the geographical range of resource exploitation. The majority of the Plainview, Meserve, Scottsbluff, and Clovis examples are made of nonlocal flints (see descriptions by Davis and Davis, 1960; Johnson, 1962; Briggs and Malone, 1970). San Patrice points on the other hand are almost always manufactured of local chert, flint, and petrified wood (Davis and Davis, 1960; Duffield, 1963; Webb et al., 1971). In other words, the makers of San Patrice points represent populations adapted to local stone

resources whereas the earlier populations were not. Two sites yielding San Patrice assemblages have been excavated, Wolfshead and John Pearce (Duffield, 1963; Webb et al., 1971).

The full significance of the distribution of San Patrice materials cannot be known until more thorough analysis is made of the existing data, a study beyond the scope of this overview. The distribution does suggest, however, that the populations responsible for the fluted and nonfluted lanceolate forms had significantly different geographic distributions and, perhaps, subsistence patterns than did the populations responsible for the San Patrice materials. On the basis of identifiable sites, density of sites, and density of artifacts within sites, it is suggested that cultures responsible for the San Patrice materials either had a higher population density or represent a longer-lived cultural and technological tradition.

Recent findings by Albert Redder and Frank H. Watt at the Horn No. 2 Shelter on the Brazos River in McLennan County in central Texas show San Patrice-like projectile points occurring in stratigraphically early, but not yet dated, context (Albert Redder, personal communication).

Dating the earlier materials poses major problems. It is not possible to cross-date most forms with sequences in adjacent regions; nor is it possible to construct a sequence of successive occupations in east Texas to even obtain a relative date for certain lithic assemblages. However, an inspection of early sites in the eastern margins of the southern Plains as well as in the eastern United States provides some basis for placing some of the east Texas materials into broad (but general) regional traditions.

The nonfluted early projectile point forms (e.g. those classified as Plainview, Meserve, Angostura, Scottsbluff) which occur in the northern portion of east Texas as reported by Davis and Davis (1960) and Johnson (1962), can be virtually duplicated in eastern Oklahoma (Wyckoff, 1964), in the central Red River valley of Texas (Elton R. Prewitt, personal communication), in the upper Trinity River near Dallas (Crook and Harris, 1952), in central Texas (Crawford, 1965), in south central Texas (Hester, 1969), in the lower Devil's River area (Johnson, 1964; Sorrow, 1968), and in Nuevo Leon in northern Mexico (Epstein, 1969). In other words, there is an early manifestation yielding a variety of lanceolate projectile points reflecting a hunting-gathering pattern extending along a broad belt bordering the periphery of the southern Great Plains from northern Mexico to at least the Ozark Mountains of eastern Oklahoma and northwest Arkansas (including portions of eastern Texas). San Patrice points, on the other hand, may represent a western variation of the widespread lanceolate-to-pentagonal forms classified as Dalton. Dalton points are distributed over much of southern United States from central Oklahoma to the Atlantic coast. If San Patrice is a variation of Dalton, an estimated date of 6000 to 7000 B.C. is suggested on the basis of dated Dalton levels elsewhere (DeJarnett, Kurjack, and Cambron, 1962).

Later Lithic Assemblages

The later preceramic assemblages are usually termed Archaic (Suhm et al., 1954; Johnson, 1962; Davis, 1970). Johnson (1962) even classifies the earliest ceramic period as terminal Archaic.

The Archaic materials were first included under the rubric "East Texas Aspect" by Suhm, Krieger, and Jelks (1954: 148-151). Webb (1960) proposed changing the designation to "Red River Aspect" and this designation was used by Davis and Davis (1960). However, as noted by Davis (1970) it had already been used elsewhere and has subsequently been dropped. Johnson (1962) proposed the name "La Harpe Aspect" to encompass virtually the entire Archaic sequence in an area extending from the Texas Gulf Coast to eastern Oklahoma, western Louisiana, and southwestern Arkansas. The earlier portion of the Archaic Stage, according to Johnson, was marked by the dominance of expanding stem projectile point forms followed by the growth in popularity of contracting stem forms. Finally the introduction of various plain ceramics marked the beginning of the terminal phase of the Archaic. The introduction of the bow and arrow terminates the Archaic.

The chronology reviewed above is based on the inferred cultural sequence at the Fred Yarbrough Site in Van Zandt County and certain sites in east and southeast Texas and southeastern Oklahoma. There has been no subsequent field work directed at refining Johnson's sequence. The chronology of east Texas is complex and it is neither well understood nor clearly defined. Johnson's proposed chronology needs to be tested.

Johnson (1962: 269) defines the La Harpe Aspect as:

> .....a rather far-flung Archaic Stage Culture, or group of related cultures, which borders the western fringe of the eastern woodlands. The most salient material traits of this aspect are (1) flexed burials, usually without accompanying furniture; (2) pitted manos; (3) expanding stem dart points

> (early phase); (4) contracting stem dart points (later phase); (5) plain ceramics (terminal La Harpe Aspect); and (6) various polished and ground stone artifacts (axes, gorgets, etc.) which vary considerably in style and in abundance from locality to locality within the La Harpe Aspect area.

He recognized three broad areal divisions of the aspect; the northern area which included the Fource Maline Focus of Oklahoma; the central area represented by the Yarbrough, Jake Martin, Miller, and Limerick sites in Texas and the Boat Dock and James sites in Oklahoma; and a southern area represented by sites in the McGee Bend and Addicks reservoir basins. Johnson realized that each area had unique characteristics. For example, polished stone celts, gorgets, boatstones, double-bitted axes, chipped stone axes, shell gorgets, bone atlatl hooks, and corner-tanged knives were more frequent in, if not confined to, the northern area. Large numbers of gouges, full-grooved axes, many pitted manos and grinding slabs and a scarcity of polished stone artifacts typified the central area. The southern sites were distinguished by plain, sandy paste pottery, bifaces and unifaces fashioned from petrified wood.

While the La Harpe Aspect provides a working framework for the preceramic and early ceramic phases of the east Texas chronology, Johnson recognized that it was an oversimplification; he acknowledged that the differences reflect both temporal and spatial dimensions, but objected to further refinement until additional field work had been carried out.

The major shortcomings of Johnson's proposed sequence are that the only temporal indicators are certain dart point forms and ceramics.

Other tool forms, those which may reflect ecological differences, are not placed in any temporal order; hence, we do not know if the assemblages distinguishing his central region were characteristic of Archaic populations existing at one period in time. Additional work in Johnson's central region reported by Story (1965) gives some additional temporal data on the diagnostic tools outlined by Johnson. For example, numerous gouges, several notched pebbles, expanding stem and contracting stem projectile points are reported from the Wild Bull Site in the Cedar Creek Reservoir basin in Henderson county. Another site, upstream from the Wild Bull Site, yielding pertinent materials is the Gossett Bottoms Site. The latter location yielded arrow points, contracting stem dart points, and a number of small adze-like tools termed Gossett gouges by Story (1965: 208-210). On the basis of the above, it is possible to seriate certain of the tools indicative of Johnson's central area of the La Harpe Aspect. The Clear Fork gouges were confined to the site which yielded expanding stem projectile points (Wild Bull); the smaller Gossett gouges, on the other hand, are probably later as they are clearly associated with the contracting stem dart point assemblage at the Gossett Bottoms Site. The notched pebbles are probably earlier because none were found with the contracting point assemblage. Story felt that, on the basis of Johnson's findings, there were possibly two successive Archaic occupations at the Wild Bull Site, although it was impossible to separate them by vertical provenience. The earlier occupation was associated with the expanding stem projectile points and the tools mentioned above; the later was marked by the

contracting stem dart points.

It is suggested that Johnson's earlier phase is restricted to the northern part of east Texas. As Story noted, excavations reported by Crook and Harris (1952), Duffield (1963), Johnson (1962), have yielded assemblages bearing certain similarities. These include such artifacts as notched pebbles, a high percentage of scraping and cutting tools, together with a variety of rectangular and expanding stem dart points. These sites all fall within the Marginal Timbered Plains and Northern Black Prairies as defined by Elmer H. Johnson (1931). It is hypothesized then, that the diagnostic tools as recognized by Johnson and Story reflect part of a specialized technology adapted to a specific environment. However, functional studies of the above mentioned tools have not been undertaken and paleoenvironmental reconstruction in the respective areas are lacking.

Dart point forms such as Wells, Bulverde, Baird and Taylor (the latter two now classified as Tortugas) reported by Newell and Krieger from the Davis Site occur in early Archaic levels in central Texas (Shafer, 1963; Sorrow, Shafer, and Ross, 1967; Sorrow, 1969). The Davis Site specimens are all of nonlocal flint, probably of central Texas origin. Many of the other expanding stem, parallel stem (Morrill), and notched dart points reported by Krieger are also made of nonlocal (central Texas?) flint. The material identification does not agree with that made by Krieger in his initial study of the Davis Site materials. He contends that all of these specimens were made of local materials (see descriptions of local raw material resources in Chapter 3).

The dart point types mentioned above from the Davis Site are not regarded as part of either the indigenous Archaic (La Harpe) or Caddoan manufacturing technology. Most are interpreted as being intrusive, having been removed from their respective Archaic context, incorporated and recycled into the Caddoan material culture. A detailed discussion of this interpretation is presented in Chapter 7.

In Johnson's southern area, the Archaic assemblages show marked homogeneity and simplicity; that is, they are dominated by dart point forms Kent, Gary and Palmillas plus an assortment of biface forms. The biface forms are usually made from pebbles of silicified wood, quartzite, or chert. Unifacial tools of any kind are rare in the preceramic assemblages, as are ground stone tools. Pitted sandstone artifacts are common (Tunnell, 1961; McClurkan, 1968: 102; Shafer, 1968: 74). Specialized tools such as were noted in the northern part of east Texas are either not present or are unrecognized. The region is forested by conifers today and the homogeneity of the artifact assemblage probably reflects regional adaptations.

The temporal span suggested in the northern part of east Texas is not indicated in the south; however, this may reflect the amount of the research rather than reality of site distribution. Sites investigated in the Livingston and Conroe reservoir areas yielded relatively late materials even though preceramic components were found (McClurkan, 1968: 110; Shafer, 1968: 78). The sites occupied localities which were relatively low in the stream valleys. Earlier Archaic sites are known in some instances on the higher elevations along certain streams. The assemblages in the earlier sites are largely unknown

but San Patrice and Big Sandy-like projectile points occurred in the Conroe lake basin (Shafer, 1968: 79).

The morphology of the Gary point (and related forms such as Kent) may itself reflect adaptive responses. It was suggested by Don Wyckoff and this writer at the Twelfth Caddoan Conference in Austin, Texas in 1971 that the stem configuration may indicate a method of hafting whereby the points are socketed into hollow (perhaps cane) shafts. The frequent occurrence of faceted or convex bases and the virtual absence of thinned bases and stems partly support this thesis. Numerous Gary and Kent dart points in the lake Conroe excavations which had asphaltum adhering to the stems adds additional support.

Yarbrough points (which preceded Gary in Johnson's sequence) are also characteristically made of local materials. However, they are common only in the northern half of east Texas. While Gary points are more widespread, they are usually accompanied in the southern half of east Texas by Kent and often Palmillas points. To split parallel and contracting stemmed points into types Kent and Gary probably has no real meaning in the southern region since the chipping quality of the raw materials (particularly quartzite and silicified wood) prevented adherence to rigid template by the flintknappers. Technologically, they are virtually identical and there is no indication that the Kent type predates or postdates Gary. Hence, the designation Gary-Kent assemblage will be used hereon to refer to the late Archaic-early ceramic period in southeast Texas.

The widespread distribution of Gary points may be interpreted in three ways; it may reflect a rather sudden population increase,

rather long-standing stylistic tradition, or a frequent shift of encampments. There is some evidence to support each interpretation. The density of sites yielding the Gary-Kent assemblage along all major streams in southeast Texas is truly impressive. Almost every sandy knoll or ridge bordering creeks and rivers will yield some material attributable to this assemblage. Furthermore, it has been demonstrated that the Gary points precedes pottery in some east Texas areas (Johnson, 1962; Shafer, 1968: 39), and were the dominant projectile point form when the first ceramics were introduced and remained so until the bow and arrow was introduced. Attempts to distinguish regional variations has largely failed, but Johnson has suggested that there is a slight trend toward smaller size through time.

Introduction of Ceramics

The widespread popularity in both time and space of the Gary-Kent assemblage serves as a clear indication that the introduction of ceramics was not made by populations with different technology invading the area. The adoption of ceramic technology was made by indigenous populations and had no apparent affect on either the settlement pattern or stone technology. The sites before and after the introduction of pottery are usually small sandy knolls or ridges located low in stream valleys. Intensive surveys in the Conroe Reservoir area clearly showed that sandy localities were preferred; sites are usually small, but larger sites of several hectares are known (for example, Jones Hill Site in Livingston Reservoir [McClurkan, 1968: 3] and 41 MQ 6 at Conroe

Reservoir [Shafer, 1968: 20]).

Johnson (1962: 268) points out that ceramics preceded the introduction of bow and arrow; this is certainly true in the southeast in the Livingston, Conroe, McGee Bend, and Galveston Bay areas.

Subsistence data on the Gary-Kent assemblage (both preceramic and ceramic) are virtually nonexistent. Shafer (1968: 77) reports charred walnut shells from levels at 41 MQ 6 producing this assemblage. Webb and others (1969: 73) report charred hickory, walnut, and pignut hulls from levels probably belonging to this period from the Resch Site.

Only rarely is faunal material sufficiently preserved to provide even qualitative data. Story (1965: Table 2) reports deer, raccoon, bison, tortoise, and fish as major faunal remains occurring in predominantly pre-arrow point levels at the Gossett Bottoms Site. These remains indicate rather extensive use of prairie-grassland and riverine (probably backwater or slough) environments all of which occur in the vicinity.

There is regional variation in the early ceramics in east Texas to be sure. In the northern part, pottery is usually clay (grog) tempered and vessels classified as Williams Plain seem to be the predominant type. In the central and southern parts of east Texas, sandy paste ceramics are the earliest. This sandy paste ware is evidently contemporaneous with the Tchefuncte period on the coast (Aten, 1967; Ambler, 1967, 1970) and may be in central east Texas also (Webb _et al._, 1969). In both localities Tchefuncte and Tchefuncte-like ceramics occur with indigenous sandy paste pottery. The sandy paste ceramics

are predominantly plain with both rounded and flat bases. Hemispherical bowls and cylindrical jars predominate. The shapes indicate that vessels were utilitarian in nature and resemble the "cooking pot" described by Linton (1944). Incised, incised and punctated, and punctated designs occur rarely (Webb et al., 1969; Aten, 1967; Ambler, 1967) and lip notching seems to occur occasionally, although it is evidently more frequent on the Texas coast (Jelks, 1965; Wheat, 1953).

In some areas of east Texas, particularly the central portion, the sandy paste tradition is succeeded by grog tempered Coles Creek and Caddoan ceramic complexes. This change took place about A.D. 700-800. In the coastal region, grog tempered pottery became dominant about A.D. 950 (Aten, 1970). Sandy paste pottery continues in the coastal region and remains the dominant ware in the lower Trinity and San Jacinto river basins. Jelks (1965) found sandy paste (Bear Creek Plain) pottery preceding the Caddoan ceramics in the McGee Bend area.

The full distribution of sandy paste pottery in east Texas is not known at the early time level, but its firm association with Tchefuncte has already been noted. It occurs over much of the central and southern portions by the Marksville period in the Lower Mississippi Valley. Marksville Stamped is found at Jonas Short (in The University of Texas collections from the site, but not described by Jelks, 1965), at the Coral Snake Mound (McClurkan et al., 1966; Jensen, 1968), at the Resch Site (Webb et al., 1969) and as far west as the lower Trinity basin at 41 PK 21 (McClurkan, 1967). In each of these sites the predominant pottery was a sandy paste ware. Radiocarbon dates from Coral

Snake Mound indicate the presence of at least two components at that site, one which dates clearly within the Marksville time span and another which is probably protohistoric or historic. The introduction of late Caddoan sherds into the upper portions of the mound is not surprising if one considers the natural disturbances in the loose sandy matrix described by McClurkan (in McClurkan et al., 1966: 7). Jensen, who seemed to be more concerned with the Caddoan pottery than with the significance of the Marksville materials, ignored the physical disturbances of the mound fill.

Five radiocarbon dates from Coral Snake Mound have been published (Jensen, 1969). These are:

TX-265	A.D. 300 ± 90
TX-244	A.D. 1740 ± 90
TX-433	A.D. 180 ± 80
TX-442	20 B.C. ± 100
TX-444	1260 B.C. ± 210

Three of these dates (TX-265, TX-433, and TX-442) are certainly acceptable for dating the Marksville manifestation giving a range from 120 B.C. to A.D. 400. Sample TX-244 may date a late Caddoan feature associated with a nearby Caddoan occupation (Woodall, 1969). Sample TX-444 is not compatible with either component and is clearly anomalous.

Jonas Short and Coral Snake mounds are part of a vaguely defined Hopewellian expression in western Louisiana and eastern Texas. We do not yet know its full extent. The Bellevue focus described by Fulton and Webb (1953) may be part of the same phenomenon, but it is this

writer's opinion that Bellevue is somewhat different (i.e., lacks the assemblage of exotic goods found at Coral Snake and Jonas Short and yields a different ceramic assemblage). In reference to the Bellevue Focus, Clarence H. Webb (in Davis, Wyckoff, and Holmes, 1971b: 9) states at the Eighth Caddoan Conference that:

> .....we now have not only the original Bellevue site but four additional sites. In every instance these are small rounded mounds, conical essentially, placed on a terrace overlooking a stream and generally overlooking the valley. Within these mounds, in three instances, were burials, flexed and cremated in one instance.

He also states that the ceramics were mostly clay (grog) tempered. Marksville Stamped sherds are known from three of the mounds and one (Bellevue) had both Marksville and Churupa Punctuated sherds; but decorated pottery was rare at all three mounds.

Both Jonas Short and Coral Snake had cremations in central depressions as well as cremations and probably flexed burials at the base of the mound or (perhaps) on surfaces within the mounds. The accompanying artifacts constitute an impressive array of exotic objects mixed with an indigenous lithic assemblage consisting of projectile point types Gary, Kent, and Palmillas plus percussion chipped bifaces (mostly of local chert and silicified wood). Numerous sites in the area produced this same lithic assemblage along with sandy paste pottery (Tunnell, 1961; Jelks, 1965; Scurlock and Davis, 1963). Mounds similar in form (although their ages have not been ascertained) are known as far west as the Neches drainage (Kegley, ms.) and the sandy paste pottery and lithic assemblage, virtually inseparable from

that recovered from the above mentioned sites, extend westward beyond the Trinity River.

The Hopewell expression in east Texas and western Louisiana shares similarities with other Hopewell manifestations. As recognized by Struever (1964) and Caldwell (1964), the Hopewell represents a conglomeration of regional cultural traditions each adapted to its respective environment but all of which were interacting on a social level, which is reflected in certain burial practices. Although the term "burial cult" has been used to describe the phenomenon, the exotic materials in association with the burials indicate participation in an exchange network which transported objects over considerable distances. Some degree of social stratification is also indicated. The main point to emphasize here is that, like other regional cultures suggesting participation in the Hopewell interaction, the east Texas and western Louisiana area represents a regionally adapted forest economy which took part in the interaction sphere. In short, the writer is stating that the sandy paste ceramic tradition and the Gary-Kent lithic tradition represents a local Woodland manifestation which was involved for a time in the Hopewell interaction sphere, the presence of which was suspected by Webb (1960). This assemblage continued after the demise of the Hopewell, although the geographic range diminished.

Radiocarbon dates from the Jones Hill Site in the Livingston Reservoir indicate that the sandy paste pottery and lithic assemblage described above (Gary-Kent) could date anywhere from A.D. 350 to 1100 (McClurkan, 1968: 11). These dates were obtained from charcoal features in a midden deposit which contained, among other things, flexed and

cremated burials. Other discoveries in Livingston and Conroe reservoirs reported by McClurkan (1968) and Shafer (1968) also indicate that the sandy paste ceramics continue to be the dominant ware despite the introduction of grog-tempering and bone-tempering.

In the southeast portion of the state, the Woodland expression survives probably until historic times. This is inferred from the continuity of the sandy paste pottery. The principal indigenous Indian groups in this area were the Bidai, Deadose, Patiri, and Akokisa, all believed to be Atakapan speakers. It is suggested that these groups represent the historic survival of the prehistoric Woodland culture in east Texas.

Emergence of Caddo

Davis (1970), in his synthesis of Caddoan archeology along the Red River drainage, briefly discusses the origin of Caddoan culture. He recognizes three equally plausible hypotheses explaining the origin of the Caddo. The material assemblage which is regarded as prehistoric Caddo (1) developed out of a Formative complex such as Coles Creek or Troyville; (2) is strictly a local development (3) developed as a result of stimulus from Mesoamerica. While Davis avoids discussing their merits, support can be found for each hypothesis when viewing the early Caddoan archeology from intraregional perspectives. Ceramic technology of the Lower Valley Troyville-Coles Creek assemblages can be seen manifested in certain vessel forms and decorative techniques in early Caddo, particularly in the Alto ceramic complex (the term ceramic complex is

used here to refer to the ceramic assemblages characteristic of the Caddoan foci defined by Suhm, Krieger, and Jelks, 1954; the foci names are retained for convenience). Coles Creek can be seen preceding Caddoan materials at the Crenshaw Site (Hoffman, 1970). Ceramic technology, and perhaps also lithic technology in the northern Caddoan area, suggests an indigenous development to some archeologists (Frank Schambach, personal communication). The continuity of Williams Plain, for example, from Fourche Maline to Harlan and Spiro ceramic complexes supports this thesis. In the southern Caddoan area, however, the likelihood of foreign (Mesoamerican) origin for certain material and technological traits has its strongest support. Such items as dark brown to black polished ceramics with pigment-accentuated fine-line engraving, bottles, and carinated bowls are most often cited examples (Newell and Krieger, 1949: 225). In other words, the Caddoan cultural complex could represent a conglomeration of indigenous, Lower Mississippi, and Mesoamerican ideas.

The problem of origin is not easily solved. However, it is the opinion of this writer that solutions will remain elusive so long as specific traits are being emphasized. It is suggested that similarities be searched for in the underlying structures of the cultural complexes. Ceramic designs and vessel forms represent more sensitive behavior on a site level; in synchronic studies ceramics can, and often do, identify cultures which are interacting on a close neighbor basis. The problem of Caddoan origin will not be solved by emphasizing ceramics despite their importance in both synchronic and diachronic studies. The structure of the cultural systems responsible for the mounds at Crenshaw,

Mounds Plantation, Gahagan, and Davis may have been very similar and nearly contemporaneous despite the fact that each had unique characteristics and traits the others did not have. The important thing is that each site apparently represents initial occupations by fully developed, complex agricultural societies. Most have no demonstrable progenitor in their respective localities. It is quite possible that they represent part of the same phenomenon but have been differentiated in the past because the stress has been placed on differences, not on similarities. Admittedly, radiocarbon data are badly needed from all but the Davis Site.

It has been quite convincingly demonstrated in the Red River bend region that Coles Creek precedes Caddo (Hoffman, 1970), however, as one moves downstream from the bend area, there is just cause to consider contemporaneity (Webb, 1961). Pipe forms are identical in early Caddoan (Alto-Gahagan) and in Coles Creek at Crenshaw (Hoffman, 1970). Most convincing, the radiocarbon dating reported by Story (1972) from the Davis Site argues for an initial Caddoan occupation of that site at a time level equal to late Baytown-early Coles Creek in Phillips' Lower Valley Scheme II sequence (Phillips, 1970). In other words, while later (Haley) Caddoan materials may overlie Coles Creek in the Red River Bend area (at the Crenshaw and Bowman Sites), earlier (Alto-Gahagan) Caddoan materials are contemporary with or perhaps a little earlier than the Red River Coles Creek complexes. Indeed, the last named possesses a ceramic technology somewhat different from that in the Lower Valley (but similar to Caddoan technology) in the form of

highly polished vessels with typical Coles Creek and French Fork incised decorations (Webb, in Davis, Wyckoff, and Holmes, 1971b: 17).

The Gibson-Fulton dichotomy used by Krieger, Webb, and others is no longer tenable (see Davis, 1970). The only area where this division seems to remain valid is in the Neches River drainage. It has not been demonstrated that the Caddoan occupation in this region was continuous. There appears to be a real break between the early (Alto) assemblage and the later (Fulton Aspect, Frankston and Allen foci) assemblages. However, there is good continuity in ceramic styles from Frankston to Allen (Suhm, Krieger, and Jelks, 1954: 219).

Newell and Krieger (1949) report a trace of late Caddoan materials at the Davis Site, but not enough was found to be diagnostic of any formal cultural unit. However, a protohistoric Caddoan site is known on the old George C. Davis place about 1.5 kilometers south of the Davis Site. This late Caddoan site yielded ceramic types diagnostic of the Allen ceramic assemblage, specifically Patton Engraved (sherds in The University of Texas collections). Recent surveys on Loco Bayou several miles east of the Davis Site revealed sites of this late phase and one which contained European trade materials in indigenous burials (Prewitt, Clark and Dibble, 1972).

Historic Indian groups who occupied the vicinity of the Davis Site are listed by Newcomb (1961, Map 4). These include Nebedache, Nacono, Neches, on the Neches drainage, and the Namidish, Hainai, and Nacogdoche on the Angelina River drainage.

It will be difficult to relate archeological materials to specific Caddoan groups largely because of our inability to locate precisely

these groups. There is no demonstrable continuum between the Davis Site early Caddoan materials and those which appear in the area much later. The later materials apparently reflect a different kind of adaptation. The settlements are many, small, and dispersed.

Summary

East Texas has yielded archeological evidence dating (on typological grounds) to early post-glacial times. These artifact assemblages are characterized principally by lanceolate projectile point forms of nonlocal stone.

The lanceolate projectile point assemblages were presumably followed (although none have been found in stratified context) by pentagonal forms falling into the San Patrice type category. These points and their associated tools are made mostly of local materials and reflect an adaptation to regional resources. A few diagnostic tool forms are associated, although the specific nature of the subsistence base is unknown.

Eastern Texas is on the western periphery of the geographical range of the eastern Archaic. This is especially evident in the northern portion of east Texas, but the Archaic assemblages in the southern portion reflect a noticeable simplicity and near absence of diagnostic tool forms other than projectile points. This is not the result of study emphasis (i.e., focusing on projectile points) but reflects a true pattern. The Archaic in east Texas evolved through a sequence of stemmed dart point traditions; expanding stem forms were

followed by contracting stem forms. These are of local stones and clearly indicate that populations were adapted to existing lithic resources. Variation in form within these traditions may reflect ecological differences within the region.

Ceramics were introduced during the time that contracting stem dart points were prevalent. Precise dating of the introduction of ceramics is not possible; it is estimated, however, that the pottery introduction occurred between 500 B.C. and the beginning of the Christian Era. The ceramics are plain, or nearly so, and have a sandy paste in the central and southern part of east Texas but are grog-tempered in the northern part. It is possible (but not demonstrable) that the Tchefuncte cultures of the Lower Mississippi Valley and southeast Texas coast provided the idea and/or stimulus for ceramic technology. In any event, these assemblages are not unlike Woodland cultures elsewhere in the eastern United States. The ceramics are not cordmarked, but have the characteristic conical shape. Some of the local populations participated for a time in the Hopewell interaction sphere (Caldwell, 1964; Struever, 1964).

Whether the Woodland populations in east Texas utilized cultigens is a moot point. The initial Caddoan occupation at the Davis Site, however, introduced a dramatically different life style with a corn agriculture base into the area and this does not appear to have been an indigenous development.

The Caddoan occupation of certain portions of east Texas in the opinion of this writer do not appear to be continuous; for example, along the Neches River there appears to be a break of several centuries

between the abandonment of the Davis Site (ca. A.D. 1250) and the reoccupation of the immediate area about A.D. 1450-1550 (estimated). The settlement patterns of the later Caddoan populations were significantly different. These settlements are not nucleated, but rather are characterized by small, dispersed settlements.

CHAPTER 2

Theoretical Orientation and Research Design

Culture as a System

The theoretical orientation of this study assumes that cultures are systems and are composed of parts or subsystems. The subsystems are interdependent and, together, function to maintain the operation of the total system. This view is analogous to the organismic or functional model discussed by Watson, LeBlanc, and Redman (1971: 66, 67). Put another way, no part of the cultural system can be fully understood in isolation (Clark, 1972: 76). The influence of each part filters through all levels of social life.

Technology as a Subsystem

The interrelated parts of a cultural system include among others technology, social organization, religion, economics, political organization, and language. It is assumed that these subsystems are themselves composed of interrelated parts. The subsystem with which I am mostly concerned is technology. Technology is defined as those tools and social relationships which articulate man with the physical environment (Binford, 1972: 22). It may also include knowledge and behaviors related to the utilization of raw materials in the environment. Technology functions to process products from the environment and to transform them into a

form useful to the culture (Downs, 1973: 264). In other words, it provides the techniques for harnessing the energy necessary for the maintenance of the cultural system.

Components of a Technological Subsystem

The parts or components of the technological subsystem can be arbitrarily classed, among other ways, according to the type of raw material resource: stone, clay, wood, fiber, and so on. These components are also interrelated to varying degrees. For example, stone can be fashioned by bone or wooden tools, bone or wooden tools can be fashioned by stone, stone can be inserted in a wooden haft, and so forth. This manner of studying a technological subsystem is especially convenient for archeology since certain of the components survive in a material state in the archeological record. It is through intensive analysis of the surviving components that archeologists acquire a basis for inferring the character of those parts which did not materially survive in the archeological record.

Analysis of a Technological Subsystem

The analysis of a technological subsystem, or of the parts thereof, in archeology involves intensive studies of the surviving material products of this system. In such studies it is important to analyze not only tools but also the by-products of their manufacture. Many tools may have been removed from the site by the inhabitants. Furthermore, analysis of by-products of manufacture and use provides one basis for inferring techniques of tool manufacture, how tools may have been used, and how

they may have been resharpened (cf. Shafer, 1970).

In a purely technological sense, tools can be either objects used to make other objects, or used to operate on resources in processing them for consumption (Leeds, 1965: 3). A celt can be used to cut down a tree but its ownership may also symbolize social rank which can be used to manipulate others, through the exercise of power, to cut down the tree. In other words, the celt can be used directly or indirectly to carry out technological functions.

The residues of cultural behavior analyzed in this study are the consequences of technology relating to the acquisition and use of lithic materials. These residues are the material results of the operation of an integral part of the Davis Site Caddoan technological subsystem. Since the cultural system cannot be understood without some knowledge of its interrelated parts, the focus of this study is on the intensive examination of one of those parts - a part of the technological subsystem. The analysis should provide the basis for inferring major characteristics of that subsystem. Furthermore, information regarding certain aspects of social behavior relating to the technological subsystem and to the overall cultural system may also be derived. This follows the assumption that the influence of the technological subsystem permeates all levels of the cultural system. A major change in one subsystem will result in modifications of those subsystems that are most closely related to the system undergoing the most stress. This is not to say that all subsystems will necessarily show effects of the change. Should changes in the technological subsystem be discovered, effects will be searched for in other subsystems of the culture.

Research Design

A major objective of this study is to present a full description and a structural-functional interpretation of the lithic technology of the Davis Site Caddoan cultural system. This task will be accomplished in the following manner.

1. Identification of the lithic materials that served as raw material resources. This necessitates an inspection of the local geologic deposits to determine the character of the lithics in the immediate vicinity of the site (that is, the kind of stone, size of pieces in which it occurs, and its quality) and comparing these to the materials represented in the debitage at the site. In this way it should be possible to determine the choice of raw material and the relative degree of selection practiced by the stoneworkers. By being able to identify the local resources, nonlocal stones which were reduced on the site or introduced as finished artifacts should be distinguishable.

2. Descriptions of the methods of stone reduction. Certain techniques produce characteristic attributes on the objects being made and on the debitage produced.

3. Reconstructing strategies of reduction. The manufacture of artifacts from stone resources involves a sequence of acts or techniques beginning with acquisition of raw material and proceeding through a series of manufacturing steps to the finished item. The strategy guiding the sequence of behavior is dictated by several factors, among which are size and quality of raw material and shape and size of the finished product. The Linear Reduction Model (cf. Collins, 1971) is used in an attempt to

discern differences in reduction strategies relative to stone class (e.g., flint, quartzite, silicified wood) and to the size and form of the finished product.

Analysis of the debitage was carried out to determine which techniques of reduction (suggested by attributes described under No. 2 above) were used and how these varied with respect to size and kind of raw material. Failures during the course of the manufacture reveal not only the manufacturing sequence, but also which kinds of artifacts were made on the site.

4. Analysis of finished tools. This step is especially important, for as Leeds (1965: 4) points out:

> The structure of tools themselves implies, both for their entailed utilization and manufacturing techniques, a certain logic or organization of the human users.

This notion is similar to that expressed by Leslie White (1971: 376, 377). For example, the presence of mounds at the Davis Site implies a network of human organization. Similarly, large stone effigy pipes may have been used as tools to articulate the cultural system by reinforcing certain social relationships. By being able to recognize techniques and materials native and foreign to the site, it may be possible to infer how nonlocal objects were incorporated into the Davis Site cultural system. Inherent in the assumption that social implications can be inferred from the structure of tools is the need to determine function. Function can be inferred on the basis of (a) morphology, (b) ethnographic analogy, (c) experimental replication, (d) context, and (e) wear pattern analysis.

Nature of the Sample

The sample consists of two collections, one gathered by a University of Texas - WPA project under the supervision of H. Perry Newell in 1939-41 and the other by a University of Texas project under the direction of Dee Ann Story in 1968-70. The techniques of recovery and, as a result, the contents of the two collections are markedly different. The collecting techniques used during the WPA excavations were highly selective. Artifacts encountered during shoveling or troweling were apparently saved only if they were potsherds, or appeared to be finished tools of fragments of exotic artifacts. Very few pieces of debitage were saved from this excavation. The WPA excavations were carried out in two areas, the largest of which was in and around Mound A. The second area, about one-tenth the size of the first, was along the terrace edge south of Mound A. From this smaller area lithic artifacts were few and those which remain in the present collection constitute an insignificant portion of the WPA collection.

Story's sampling techniques were much more thorough; she made extensive use of one-quarter inch screen and was much less selective in her sampling procedures. Consequently, virtually all of the debitage in the following analysis came from Story's excavations.

Story's sample of the village area was more extensive than Newell's sample although Mound B area was not as extensively sampled as was Mound A. Qualitative comparisons between these two areas are presented in this study but definitive conclusions are not possible due to the discrepancy between the sizes of the two samples. The Mound B

area sample is assumed to be representative on the basis of the small excavation sample and the more inclusive surface sample. The validity of this assumption, however, must await further sampling of the Mound B area.

A serious handicap of the study is the near lack of chronological data at the site. The best sequence of cultural events was revealed by Story's meticulous excavations in Mound C where she was able to relate the burials to mound additions. While there are clear differences through time observed in the Mound C burial sequence, these differences do not, by themselves, adequately serve to characterize changes in the cultural system. It will be essential to relate the changes observed in Mound C to other events and trends at the site in order to present a more accurate reconstruction of the cultural system and changes it was undergoing.

Mounds A and B were constructed in stages. Krieger (Newell and Krieger, 1949: 66-70) and Story (1972: 73-80) have presented their interpretations of the construction sequences for Mound A and Mounds A and B respectively. Story (ibid.: 59) also presents a hypothetical correlation of the construction of Mounds A and B to the stages in Mound C: Mound C Stages I through III are correlated with events in the construction of Mound A, and Mound C Stages IV through VI are correlated with events associated with Mound B. She also suggests that cyclic renewal events were responsible for additions to both mounds and periodic burials in Mound C.

The lithic samples from the construction stages within Mound B are too small to permit the definition of even broad typological trends.

It may eventually be possible when larger samples are available to define temporally significant typological differences between the materials beneath Mound B and those from the borrow pit fill which could postdate the mounds.

The collection from the WPA excavations in and around Mound A is treated as a single analysis unit. Krieger's attempts to seriate general trends in Mound A and the surrounding village area are admirable but on the basis of the present knowledge his interpretations no longer are deemed valid. For example, he considered the changes in the frequency of dart points and arrow points in his three "phases" as representing a shift from the use of the atlatl and dart to the use of the bow and arrow, thus inferring that the dart points were made by Caddoan flintknappers. It is argued in Chapter 7 herein that dart points are intrusive into the Caddoan cultural system and served functions other than as atlatl dart points. No attempt will be made in this study to explore for temporal changes within the WPA sample.

Except for Mound C, Story's artifact and debitage sample was gathered from village context where chronological data are lacking. It is partly out of necessity therefore, that the debitage analysis is carried out without reference to possible temporal changes. The synchronic approach in the debitage analysis is adequate for demonstrating which techniques and materials were used in manufacturing tools at the site.

CHAPTER 3

Description of Local Resources

The local geologic deposits are characterized chiefly by fine-grained sands, clays, shales, and marls. Parent formations of rocks economically useful to prehistoric inhabitants in the area of the Davis Site are limited chiefly to sandstones and ironstones (hematite and limonite). The absence of flint and chert in the Cenozoic sediments was noted by Fisher (1965) and Brown (ms.). Quaternary outcrops along the major drainages of east Texas, including the Neches River, contain pebbles and small cobbles of stone suitable for shaping by chipping (Brown, ms.; Kegley, ms.; Shafer, ms.). East Texas streams have low gradients and terrace deposits containing gravels are rare; when they do occur, the gravels are mixed with a large proportion of sand and silt. The size of the Neches River silicious rocks rarely reaches the small cobble class on the Wentworth size scale (Wentworth, 1922); but specimens of varying quality are common in the very large pebble and large pebble range (Brown, ms.).

Geological Sample

A preliminary study was made of local raw materials for chipping using samples gathered during a survey of the surrounding region by George Kegley. Although this collection is small and is by no means

regarded as representative of the general area around the Davis Site, it does provide a basis for determining the character of local raw materials. This study was not based on mineralogical analysis but resulted in a preliminary description of the local silicious stone resources. The frequency by site of the raw material collection is presented in Table 1.

Table 1: Raw Material Frequency (Kegley survey)

	Flint	Quartzite	Silicified Wood	Total
Hickory Creek, Brown Farm	7	2	1	10
Hurricane Creek Bayou* (Trinity)	5	73	12	90
Neches River Bridge (Highway 21)	7	25	10	42
Polk Co. (Trinity)*	6	12	3	21
Total	25	112	24	163
	16%	69%	15%	100%

* Samples obtained from the Trinity River drainage.

Both Kegley (ms.) and Brown (ms.) note that the gravels become coarser as one moves west from the Neches drainage to the Trinity. Brown attributes this change to the size of the drainage basins which affect the character of the bedload. The cherty materials from the Trinity are apparently derived from Pennsylvanian, Cretaceous, and Eocene formations. However, the same variety of rocks was found in the Neches drainage which heads within east Texas and cuts through only Eocene formations. There is a hint, however, that certain materials

such as fine indurated quartzite may be more frequent on the Trinity. The gravels found in the alluvial deposits of the Neches are apparently derived from secondary deposits more ancient than either of the two streams as we see them today.

A more detailed study of the local chippable stones was made by Kenneth M. Brown (ms., 1971). Much of the following discussion is based on Brown's findings. He collected geological samples from four separate localities in the Davis Site area and also used the raw materials gathered by Kegley. While this field study was not thorough enough to provide an intensive analysis of local raw materials, his collecting technique was better controlled than Kegley's. Brown's study allows for a more confident classification of these resources, and the local rocks are described below.

The descriptions are taken largely from Brown (ms.: 7,8).

1. Limonite, hematite, coarse ferruginous sandstone and conglomerate which occur in the local formations, especially the Weches. Some of these rocks occur in the form of concretions, and the fine-grained ferruginous sandstones are sometimes micaceous; the grain size of the sandstone varies from very fine to coarse on the Wentworth scale.

2. Silicified wood which varies greatly in chipping quality. A characteristic feature of this material is that it usually fractures along preserved growth rings. The more completely silicified specimens have more homogeneous structure and are better suited for fashioning chipped stone artifacts. The pebbles and cobbles are angular to sub-angular; their origin is likely the Rockdale formation which outcrops in the upper Neches drainage.

3. Varieties of cryptocrystalline silica such as chert, flint, and jasper are grouped together by Brown. They make up a very small proportion of his geologic sample and the impurities make most pebbles unsuitable for chipping purposes. Red, gray, tan, and brown chert and flint are found in local gravel samples. He describes the cortex as "soft, thick, earthy, and light yellow to hard, worn or polished" (Brown, ms.: 7). Some are fossiliferous.

4. Medium to coarse grained friable to hard quartz sandstones are common; color ranges from white to heavily iron-stained rusty red. Origin is likely the indurated zones in the local sandy formations such as the Queen City.

5. Microcrystalline to macrocrystalline anhedral quartz.

6. Quartzite which is more specifically described as a well indurated fine-grained ferruginous quartz arenite. This was very common in the geological samples. Most of the quartzite exhibit poor fracturing qualities, but some is sufficiently indurated to give a good conchoidal fracture. The origin of this stone is the outwash of ancient mountain ranges in Oklahoma, such as the Arbuckle range. It is distributed throughout the Tertiary deposits of central east Texas drained by the Brazos, Trinity, and Neches rivers.

7. Chalky, light earthy rocks with a porous mass. This material grades into ferruginous siltstones or very fine sandstones with a quartzitic texture.

8. Basanite (?) is tentatively identified. This occurs in the form of dark, fine-grained pebbles.

9. A small group of rocks was unidentified. Brown's study revealed the most striking feature of the local resources, their small size.

Four size classes are used by Brown, medium pebble (8-16 mm.), large pebble (16-32 mm.), very large pebble (32-64 mm.), and small cobble (64-128 mm.). In his quantitative study, rocks in the medium pebble range and smaller are not sorted according to rock type. His geologic samples are taken from the Neches floodplain and lower, middle, and upper terraces.

Small cobbles in the upper terrace sample constitutes only 0.3 percent; these rocks are either ironstone, anhedral quartz, or quartzite. The very large pebble class is represented by 10.2 percent of the sample and the rocks include all of those listed by Brown in his geological samples (ironstones, silicified wood, cryptocrystalline rocks, quartz sandstone, anhedral quartz, quartzite, earthy rocks, and basanite?). Large pebble range constitutes 44.9 percent of the sample and, here again, all the rocks identified occur in this category. Silicified wood and the cryptocrystalline rocks are more common in this size range. The remaining 44.6 percent stones are in the medium pebble range.

The middle terrace sample is composed of 3.5 percent of small cobbles (ironstones and quartz sandstone); very large pebbles (29.1 percent) are represented by all the identifiable stones except basanite. Friable quartz sandstone is the most common rock in the sample. All identifiable rocks except basanite are again represented in the large pebble class. Light earthy rock, cryptocrystalline silica, and hard

quartz sandstone constitute the three more common classes of stone.

In the lower terrace sample, three pieces of ironstone are the only rocks found in the small cobble class. These rocks are also the most frequent class in the very large pebble category, although silicified wood, hard quartz sandstone, anhedral quartz, and light earthy rock are also represented in this group. In the large pebble class, all identifiable stones are present except silicified wood and basanite; ironstones are the most frequent.

The Neches River floodplain sample was not sorted except for size. The percentages within the small cobble, very large pebble, and large pebble classes are 0.2, 3.5, 13.5 respectively. The medium pebble class represented 82.5 percent of the sample.

As might be expected, the rocks found in the local Cenozoic formations represent the largest size in the samples because of the close proximity of parent outcrops. Cryptocrystalline silicate and quartzite rocks do occur in the very large pebble class; however, the former are very infrequent. The largest locally occurring mass suitable for chipping purposes is a granular quartzite. The largest stone in local outcrops is ferruginous sandstone.

Brown subjectively divided all rocks on the basis of their chipping qualities. While these qualities can be altered somewhat by heat treating (and this was apparently done at times), his sorting does provide some insight into how representative the Davis Site archeological sample recovered by Story is of the natural sample. Most locally collected silicious stones probably came from the middle and upper

terraces. For example, no suitable stones for chipping were found on the floodplain or on the lower terrace; the samples from the middle and upper terraces had 0.6 and 0.8 percent respectively.

Archeological Sample

When the Davis Site archeological sample is compared to the local geological sample the extreme degree of selection is apparent in the manner with which the local raw materials were exploited. The size and nature of the local resources automatically imposed certain restrictions of the users; restrictions which were partly circumvented by obtaining some stones from outlying regions. A comparison of the archeological sample collected from the Davis Site with the geological sample serves as a basis for identifying nonlocal materials and the degree to which these resources were relied upon. The emphasis in this discussion is on identifying those resources which were used at the site in the manufacture of stone artifacts. It is clear that there were a number of artifacts present which are made of nonlocal materials, but it is very probable that many of these were introduced at the site in a finished state. This subject, given only brief attention here, will be taken up in more detail in a latter section.

CHIPPED STONE DEBITAGE: General Characteristics

The preliminary analysis of the chipping debitage gathered during the 1968-69 excavations revealed the kinds of material modified by chipping; in their order of frequency these materials are flint,

quartzite, silicified wood, and opal. The sample consists of flakes and cores. A more accurate estimate of the amount of selection in the raw materials is gained by simple frequency of these material classes in the present debitage collection (Table 2). Here again, flint is by far the most common material used for stone tool manufacture and is represented by 62.20 percent of the debitage sample (N = 6860). Quartzite is next in frequency with 21.23 percent. Silicified wood is represented by 9.8 percent and opal (termed Manning fused glass) comprises only 2.28 percent of the sample.

Some general estimate of size range of the archeological sample is gained by taking the maximum measurement of the larger cores and flakes. In this way, a minimum size of the parent nodule can be determined. A number of specimens in each material class except opal are essentially complete.

There are only three flint specimens out of a sample of approximately three hundred which measure in the small cobble class; the remainder are in the very large pebble class and smaller. Six of the silicified wood specimens are large enough to fall into the small cobble class (the largest is 95 mm. in maximum dimension). The quartzite category has eleven specimens out of a sample of fifty-one in this size range and the largest specimen in the collection (123 mm. maximum dimension).

Flint

The principal factor suggested by the above size range in the flint debitage is that regardless of the origin of the raw materials

(i.e., local or nonlocal), they were chiefly pebbles and small cobbles. The size range correlates quite well with that seen in the local alluvial deposits. The preference of flint over all other materials, however, might well lead to exploitation beyond the local area.

The size and nature of the cobbles and pebbles are indicative of resources which are far from the parent outcrops. The cortical surfaces of the archeological specimens further supports this thesis. The cortical surfaces are rounded to subrounded, patinated, and occurs on many as a thoroughly battered crust. The cortex is most often medium to dark brown or reddish brown presumably from the absorption of iron-bearing minerals from stream waters. Essentially identical gravels have been found in the Neches, Trinity, and Brazos rivers.

Internal color is not considered a good diagnostic attribute in the archeological sample because the spectrum represented is extreme despite the fact that the hues are overwhelmingly in the light brown-tan category.

The nature of the cortex may give some indication of the environment from which the stone was collected. The logic here is that flint gravels have a well-rounded or subrounded shape due to long-distance transport. The cortex should have the appearance of that described above, but this would depend on the mineral content of each individual specimen; hence, while the battered cortex does occur in the archeological sample, smoothed to almost polished cortex occurs also. Brown's description of the local gravels pertains quite well to most of the specimens in the archeological sample. However, there are specimens that are exceptions;

these are usually subangular to angular nodules of tan, gray-tan, or gray flint with relatively thick (up to 1 mm.) chalky tan to light gray or white cortex. The surfaces of these nodules are irregular and are often pitted from what appears to be potliding from natural weathering as ancient as the patination itself. The soft cortex has not been subjected to extensive stream action and the cortex and the ferruginous minerals do not appear to be oxidized.

It is suggested that these nodules were collected in an area where the flints were exposed on the surface but not in alluvial deposits; such an area would be a prairie. Furthermore, the lack of oxidation of ferruginous minerals in the cortex could be due, in part, to limestone derived soils in the environment in which the materials occurred. This lack of iron-bearing minerals in the cortex also suggests that the geological formations in which the flint occurred were not stream borne (such as gravels). Flint with the characteristics of that described above has been observed by this writer in the prairies of central Texas, particularly in Milam, Williamson, Bell, and Travis counties.

One hundred and fifty cores from the site were sorted for the above distinguishing characteristics; 88 percent have subrounded to well-rounded forms and brown or, less often, nearly black cortex. The remaining 12 percent were pebbles and small cobbles which had angular to subangular forms and chalky irregular cortical surfaces.

On the basis of the samples of local material, those from the Trinity collected by Kegley, and specimens from the Brazos, the subangular to angular specimens can be considered nonlocal with some degree

of confidence. It is possible that sources unknown do occur between the Brazos and Trinity in prairie situations.

There is no way of determining the precise origin of the sub-rounded to well-rounded specimens. Certainly most of them could have been gathered locally and some undoubtedly were, since traces of a ferruginous conglomerate adhere to the surfaces of certain specimens. Judging from Brown's study, considerable search was required and an extreme amount of selection was needed to obtain flint from local resources.

Silicified Wood

Selection is also indicated in the silicified wood; the pebbles were quite clearly selected for chipping qualities as most are highly silicious. The heat treating is clearly indicated on many specimens by oxidation of iron-bearing minerals and glassy texture. It is not possible to quantify the extent to which heat treating was used due to the variation in the mineral constituents and quality of the stones. It is worth noting that opalized wood, which is very common in the Catahoula formation in southeast Texas (Fisher, 1965: 306), does not occur in the sample.

Quartzite

The quartzites are also considered to be largely a local resource; examples virtually identical to the archeological sample occur in the local Neches alluvial deposits. The large size of some specimens may, however, ultimately lead to the Trinity river as a primary source

area. Quartzite also occurs in small cobble form in the middle Brazos gravels, but it is rare.

Quartzites in the archeological sample fall into two basic categories, one of which is the fine indurated quartzite or quartz arenite described earlier as occurring in the alluvial formations. The poorly indurated white to light rust-colored materials, termed coarse-grained quartzite, most likely represent a locally occurring sedimentary quartzite. They occur in chunks which suggest large parent nodules, larger than the small cobble class.

Manning Fused Glass

This class is represented in the archeological sample but does not occur in the local area. The material (termed opal in the preliminary study but has since been termed Manning fused glass) has been traced to the Manning Formation by Brown (1971). This formation is of Eocene age and an outcrop producing materials identical to specimens in the archeological sample has been investigated in Walker County, about 80 kilometers south-southwest of the Davis Site. The lower part of the formation is composed of beds of tuff, tuffaceous siltstone, and lignite. Heat generated by the burning of the lignite beds in the geologic past fused the tuff in the overlying beds to form glassy materials (Brown, 1971).

Colors of both the archeological sample and geological sample are identical; the hues consist of light to medium blue-gray (the most common) sometimes occurring with streaks of reddish brown. Black,

white, brown, and yellow occur rarely. An "obsidian" flake reported by Newell and Krieger (1949: 160) is probably Manning fused glass.

The material varies from a hard, orange, brick-like siltstone to a vitreous material with a conchoidal fracture. Both occur in the archeological sample (ibid.).

This resource was also represented in the archeological collection by small nodules. The largest "core" of Manning fused glass from the site measures only 36 mm. in maximum dimension.

Miscellaneous Chipped Stone Residue

A small number of flakes of igneous rocks and fine indurated sandstones are in the sample. Their presence suggests reduction of materials of nonlocal origin. Each of the flakes has remnants of a faceted surface, indicating that it was removed from a previous artifact, namely a celt. These specimens are considered the by-products of attempts either to repair or to reduce celt fragments into other tool forms. A more thorough description of these artifacts is presented in Chapter 6.

Three flakes of hematite are in the sample. They could be the by-products of reducing some of the locally available ironstones. No chipped stone artifacts of hematite are represented.

NONCHIPPED STONE DEBITAGE

Debitage from nonchipped stone is hard to identify except in rare cases where the stone is nonlocal. Several small fragments of Catahoula sandstone are identified. This material was used extensively

for abrading stones and the small pieces of debitage are probably fragments of such items. Ferruginous sandstone nodules were frequent throughout the site and many of them could have been artifacts, such as pitted or abrading stone fragments lacking identifiable features, and fragments of burned rocks.

FINISHED ARTIFACTS

A wide variety of stones were represented in the archeological sample in the form of finished artifacts which are not found in local lithic outcrops and are rarely, if at all, represented in the debitage. The debitage is described in Chapter 6; finished artifacts are described in Chapters 7 and 8.

Summary

Medium sized cobbles and larger stones identified in the local outcrops are hematite, limonite, sandstone, and coarse-grained quartzite. Flint, fine-grained quartzite, and silicified wood occur in pebble and small cobble form. Findings from the analysis of local materials coupled with the identity of the stones represented in the debitage serve as a basis for identifying nonlocal materials. The presence of debitage from regionally obtainable resources (Manning fused glass, certain flint, and Catahoula sandstone) indicates some nonlocal resources were transported to the site in raw nodular state prior to reduction. Exotic foreign materials are rarely found in the debitage, but are common in the finished artifact sample.

CHAPTER 4

Description of Reduction Techniques

In the lithic materials from the Davis Site, several methods of reducing or shaping are recognized in both the finished products and the residue. The basic techniques are chipping, grinding or abrading, pecking, and battering. While more than one of these techniques may be represented on a single specimen, the emphasis in this section is on describing each technique. It should be pointed out that while the techniques described below can be observed on artifacts collected from the Davis Site, in certain instances we cannot be sure that the techniques were carried out at the site.

Variations within certain categories of techniques are also recognized. For example, chipping a nodule may be accomplished by holding it in the hand and striking it with a hammer. Differences in the material used as a hammer - hard (stone) or soft (soft stone, bone, antler, horn, wood) - will be reflected in attributes on the end products. Other percussion techniques which will result in variations include indirect percussion (where an intermediate tool is used between hammer and core) and bipolar percussion (where the core is placed on a rigid "anvil" and is thus subjected to opposed directions of force). Chipping can be produced by applying pressure to the edge of the core by several means.

An object can be shaped by abrasion either intentionally or through use. However, both will be discussed here, since they are

quite important determinants of final form.

Pecking is a technique of shaping hard, coarse materials which are usually not conducive to chipping. It is often accompanied by abrasion.

Battering, if extensive, is used intentionally (but rarely) to dull an edge but more frequently it results in shaping the edges of certain tools through extensive use (such as with hammerstones).

Another reduction method evident in the collection is burning, but this is apparently never intentionally used to break up stones.

Descriptions of most of the techniques of lithic reduction are available in the literature and it is not necessary to go into great detail in discussing any one of them. However, the techniques are reviewed to clear up certain misconceptions and to clarify pertinent points relating specifically to the reduction of Davis Site lithics.

CHIPPING

Hand-Held Hard-Hammer Percussion

The use of direct hand-held hard-hammer percussion was clearly the most commonly used method of chipping. This is the most common technique in stone assemblages throughout the world and is adequately described by Holmes (1919), Oakley (1959), Semenov (1964), Crabtree (1968), and Bordes (1968). The resultant flakes have prominent bulbs of percussion (or bulbs of force), normally have relatively wide and thick striking platforms (compared to platforms produced by other techniques) and are as a rule relatively straight when viewed in

cross-section. It should be pointed out that this generalized description is inadequate for sorting purposes because the size and thickness of the striking platforms vary considerably and the variations overlap with products of other techniques.

Standardization in flake morphology is rarely achieved because of the lack of precise control manifested in its implementation (cf. Crabtree, 1968). Consequently, hinged flakes, flakes with shattered striking platforms, shatter produced by misdirected blows, and splintering are expectable by-products. Too, slight variations in angle of detachment, nature of securing core, and size and mass of core will result in variations in the products. For example, the most common flint resources used at the Davis Site were pebbles and small cobbles. Laboratory experiments duplicating flakes with diffuse bulbs of percussion show that because of the light weight of the mass, the hand tended to cushion the blow when the core was struck with a hammer of equal size or larger. It was found that the larger the parent nodule, the more clearly defined were the bulbs of percussion. Also, the cushioning effect resulted in a high incidence of flakes hinging both in and out. Occasionally the striking platforms would exhibit a slight lipping effect of the cortex portion of the striking platform.

Bipolar (Anvil) Percussion

In the bipolar technique, a core is placed on a resistant anvil and is struck with a hard hammer. The core is subjected to shock from two opposed directions, a direct shock from the hammer and a rebound shock from the anvil. Bordes (1968) and Bordaz (1970) note that the

earliest recognized occurrence was at Choukoutien.

Lantier (1961) has observed that the bipolar technique was widely used in the Old World where the main choice of core material is littoral or fluviatile pebbles. It is recognized in Africa (Clark, 1954) and Australia (White, 1968) where the technique was observed and recorded ethnographically. In North America, bipolar flaking has been described in the northern Lake Michigan region (Binford and Quimby, 1963; McPherron, 1967; Fitting, 1968) in Nova Scotia at the Debert Site (MacDonald, 1969), in southern Louisiana at Avery Island (Gagliano, 1967), in northcentral New Mexico (Honea, 1965), and in east Texas (Honea, 1965; Briggs and Malone, 1970; Anderson, n.d.; Skinner et al., 1969). It is clearly present at the Davis Site (Shafer, ms.).

It is appropriate to emphasize a point made by Clark (1954) and restated by White (1963: 32) that:

> similar ecology and the use of a certain type of raw material tend to result in a similar development of technique.

On the basis of this statement and the previously cited statement by Lantier it can be predicted that where local raw materials are in the form of pebbles and small cobbles, the bipolar technique will be found. This is certainly verified in east Texas.

The bipolar technique is an efficient method of reducing small resource materials to flakes and spalls. It is, however, not an efficient technique for reducing biface preforms because blows are typically struck at angles approximating 90 degrees to the striking platform and, in addition to crushing the striking platform, it also creates numerous

internal fractures which result in premature breakage.

Since bipolar cores are struck directly down the center axis (they have to be, otherwise the end result is not bipolar) rather than at an angle as with hard-hammer percussion, the residue cannot be distinguished from any other core that was struck directly at a 90 degree angle. The features at the point of direct impact are the same on both cases. I have found in my own experiments that flakes produced by the bipolar technique having bulbs of percussion at both ends are in the minority. Consequently, flakes produced by direct (90 degree platform) impact have the same features whether the core was held in the hand or on an anvil. On the other hand, it is difficult to mistake bipolar cores with their thorough battering at each end.

Indirect Percussion

In indirect percussion the point of a punch is placed on the striking platform of the core at the desired point of flake detachment and striking the base of the punch with a "hammer." This technique provides a certain control not gained through percussion where the hammer comes directly in contact with the core. The use of indirect percussion by Apache in arrow point manufacture was recorded by Catlin (Jones, 1880). The technique is also discussed by Holmes (1919), Crabtree (1968), and Bordes (1968). Ford, Phillips and Haag (1955) suggest that the Jaketown microblades were produced by this technique.

Crabtree's discussion regarding his experiments with indirect percussion to replicate Mesoamerican polyhedral blades and cores is

worthy of review. He notes that:

> The impact from the percussor causes excessive undulations and waves on both the core and blade; the dimensions of the blade cannot be controlled with regularity; the bulbs of force are much too large, and the curve of the blades and termination of the ends cannot be controlled. Because of the angle of impact, the resultant core's form is not one with parallel sides, but it assumes a conical shape. When this method is used, the blades have better form if the material is flint than if it is obsidian, because the wave mechanics of obsidian are more pronounced than those of flint (Crabtree, 1968: 459).

The important points to Crabtree's statements are the excessive undulations and waves and the fact that the indirect percussion technique is more adaptable to less brittle materials such as flint.

Indirect percussion technique is not identified in the Davis Site chipping debris. It is quite possible that the technique was used to fashion certain dart point forms. This is suggested because flake scars on certain specimens have deep or prominent negative bulbs of percussion and small points of impact. Hence, the use of the technique may have certain temporal significance.

Soft-Hammer Percussion

The soft-hammer technique provides certain advantages that cannot be achieved by any other means. It involves the use of a hammer made of bone, horn, antler, or wood - materials that are softer than the stone being flaked (Bordes, 1968). Flakes produced by this technique characteristically have relatively flat bulbs of percussion, are thin, and are usually arched in cross-section. The striking platform

is usually lenticular when viewed from the top and is formed by the convergence of two surfaces at an acute angle. If the preform is sufficiently thin, the striking platform remnant has a lip on the interior side of the flake (Crabtree, 1970; Shafer, 1969, 1971).

Soft-hammer flaking is usually associated with the manufacture and thinning of large bifacial tools. However, it should be noted that variations in both the striking angle and in the nature of the core being flaked often result in the production of soft-hammer flakes atypical from those just described and which could be mistaken for flakes produced by other techniques. This should serve as a caution to those carrying out quantitative studies of flake types from which behavior is inferred. The entire lithic assemblage must be considered in conjunction with quantitative flake analyses.

The use of a wooden soft hammer is described by Crabtree (1970: 150):

> .....the hardwood billet will detach flakes without shattering the artifact. When the blow is struck with a wooden billet, the lateral edge margins of the artifact penetrate the wood, and a flake is detached without the shattering effect. Depth of penetration of the artifact edge into the wooden percussor determines the width of the platform, for it detaches a part of the margin with the flake. Billet-struck flakes often have a lip on the ventral side near the platform and have very little definition of the bulb of force.

The distinct advantage of this technique is in providing a means of reducing the thickness of biface cores without reducing the margins too much at the same time. With this technique, flintknappers were able to manufacture large, thin bifaces. While the mechanics responsible for

the behavior of silicious stone to soft-hammer flaking are not well understood, the partial absorption of the initial shock of the blow by the soft hammer is perhaps partly responsible for the successful use of the technique.

Pressure

Pressure flaking is performed by using a hand-held piece of material (stone, bone, antler, hardwood) to press flakes from the edge of a core (Holmes, 1919; Oakley, 1959; Semenov, 1965). This technique provides maximum control and, when the craftsman is skilled, can be used as a major reduction technique (cf. Crabtree, 1966). The intended size of the end product partly determines how and when pressure is used. For example, in the Davis Site collection pressure was used only in the final trimming of large bifaces whereas many arrow points were manufactured entirely by this technique.

Pressure can also be applied by pressing the core (such as a flake) against a rigid object (such as a large stone). The resultant retouch is usually minute and quite even. However, it cannot be distinguished from that produced by other techniques. It may have been used to create steeper angles on flake tools.

Pressure residue is extremely difficult to discern. The principal problem lies in separating it from tiny flakes produced as shatter by other techniques.

ABRADING

Reduction by abrasion is frequently represented in the lithic

artifacts at the Davis Site. It is accomplished by rubbing granular abrasive materials against the items being worked. Tiny parallel scratches sometimes accompanied by minor degrees of faceting are features usually indicative of the technique on fine-grained or crystalline materials. Finer grained abrasive materials result in smoothing or sometimes polish on the artifact being reduced. Abrasion is sometimes accompanied by pecking or chipping; the latter two techniques are the main reduction methods on some artifacts while abrasion is used to provide final shaping and finish.

Stones used as abraders at the Davis Site are quartz-grained sandstones of varying degrees of fineness. The most common abrading stones are of Catahoula and ferruginous sandstone. Stones used as abraders were usually shaped through use. Abrasion was used in fashioning the stone pipes, earspools, boatstones, discoidal, celts, hematite axe, and plummet described in Chapter 8. However, most of these were probably not manufactured at the Davis Site.

Edge abrasion of chipped stone artifacts was occasionally done to facilitate flaking; it was also the direct result of use. In either case, the amount of reduction was minute but was, nonetheless, apparent.

Drilling or boring is another method in which abrasion plays a part. Some drilling, when done with sharp stone tools is, in effect, a cutting procedure; however, drilling or boring when grit is used certainly falls into the abrading category. Examples of this type of abrasion are suggested by the even, cylindrical perforations on stone earspools, which appear to have been drilled by using sand as grit and

a reed as the abrading tool. Here again, perforated earspools may not have been made at the site.

PECKING

This technique is used to shape hard stones which do not have conchoidal fracturing properties; such stones are sedimentary, igneous, or metamorphic in origin. They are reduced by repeatedly striking their surfaces with a hard, usually somewhat pointed, stone hammer. The result is the removal of small chips which leave pits or peck marks on the surface. In essence, this is a method of chiselling stone with stone. Objects made by pecking which require a smoothed finish are further reduced by abrasion. Examples of pecked and abraded objects in the Davis Site collection include certain celts, and the sculptured quartzite pipe. These are of nonlocal materials and were probably made elsewhere.

Pecking was used to shape grinding stones and grinding slabs in other areas (such as in central Texas), but there is no indication that the technique was used to fashion the grinding slabs at the Davis Site. Since the grinding slabs were of sandstone to begin with, there was no need to roughen the surface by pecking.

BATTERING

This is another technique of reduction which is usually the result of use rather than being intentional. Battering on cryptocrystalline materials results in numerous percussor marks or impact points representing fractured cones of percussion. Repeated battering will result in crushing the outer portion and the end product is usually a

rounded, roughened surface. The same result occurs on noncryptocrystalline stones but the cones of percussion do not occur on these materials. Consequently, the noncryptocrystalline materials are usually preferred over the more flinty materials for battering tools.

Battering is also indicated in other ways as the result of use. For instance, the cutting edge of a chopping tool made of flinty material exhibits the effects of battering in the form of a series of randomly produced, stepped, hinge fractures; these are the result of direct impact fracturing caused by contact with resistant materials.

BURNING

Burning or heating is not an intentional method of stone reduction in the Davis Site assemblage. Holmes (1919) reports the use of this technique in reducing quarry materials. Burned specimens do occur and heating is the cause of reduction, but these pieces are regarded as accidental. Heating was, however, used to alter the chipping quality of certain materials.

CHAPTER 5

Reduction Strategies and Linear Reduction Models

Since the emphasis of this dissertation is on analyzing the Davis Site Caddoan lithic technology, it is necessary to differentiate the reduction techniques used by the Caddoan stoneworkers from those of the preceding cultures. In an attempt to determine temporal differences, lithic artifacts gathered from the western portion of the Davis Site (which is nearly pure Caddoan context) were compared with lithics from a preceramic site. The site chosen was 41 MQ 4 in Montgomery County excavated by The University of Texas (Shafer, 1968). Although 41 MQ 4 lies about 100 kilometers south of the Davis Site, the size and quality of the local raw materials are similar and posed the same kinds of limitations on the stoneworkers.

This cursory analysis showed that the reduction processes were different and that a greater range of reduction techniques were indicated in the Caddoan materials. For example, the 41 MQ 4 assemblage consists almost exclusively of bifaces and residual flakes; utilized flakes are rare. The paucity of recognizable cores was probably due to the fact that small pebbles were reduced directly into biface forms or that small cobbles were split and bifaces chipped out of the larger sections. Failures in the process "fossilized" each reduction step allowing a linear sequence of manufacturing events to be reconstructed

(cf. Lorrain and Hoffrichter, 1968).

The collection of chipped stone tools from the western portion of the Davis Site, on the other hand, are characteristically made on flakes. The frequent occurrence of core nuclei further indicate that the reduction strategies were considerably different from the Archaic flintknappers.

Despite the cursory nature of this comparison, the data were sufficient to formulate general reduction models to further test the apparent temporal difference in reduction patterns. If it can be shown that the Caddoan materials manifest different reduction strategies from those shown on the Archaic materials, then a better definition of the Caddoan reduction techniques would be possible because they could be more easily segregated from the earlier assemblages.

A processual analysis of a sample of the materials was begun by sorting in terms of a linear reduction model. This model (or variations of it) as proposed by Kobayashi (1970), Collins (1971), and Schiffer (1972) is analogous to the flow or tree diagram of decision theory described by Raiffa (1968). This system traces the reduction steps from the nodule to the finished product and takes into account the debitage produced at each step.

Three separate reduction processes were recognized in the initial comparative study. Models of these are presented in Figure 3. The models follow the reduction sequence from the nodule to the discarded products. Debitage produced during the course of the reduction process is termed "primary discard." Schiffer (1972: 160) uses the term "de

facto refuse" for by-products of manufacturing and use activities. Primary discard marks the manufacturing site or locus of artifacts. In rare instances, such as in Process I described below, dust and chips removed from a nodule through use constitute primary discard and are indicative of use activity loci. Discarded tools are termed "secondary discard" and their presence usually marks either the site or locus of use. There are examples at the Davis Site, however, where finished tools were either discarded by interment or were recycled. Disposal by burial and recycling are not considered in the models described below because most artifacts from the Davis Site falling into either of these categories are of nonlocal materials.

Process I (Fig. 3): Nodules are used without modification as tools. Primary discard consists of dust and chips removed through use. The size and nature of the residue precludes its being represented in the archeological sample except in rare cases when the tool splits or is broken into large pieces. Reduction of the mass results from use.

Process II (Fig. 3): The diagnostic feature of this reduction process is that the core is shaped into the tool form. Primary discard consists of flakes, chips, cleavage spalls, and broken or discarded preforms. This residue is indicative of processual tool reduction and its presence marks the reduction loci usually by site but sometimes signifies intrasite activity areas. Preforms which are successfully finished become tools; flakes produced in initial preform reduction can also be used for certain tools without further reduction. Dust and chips removed from tool edges during use constitute additional

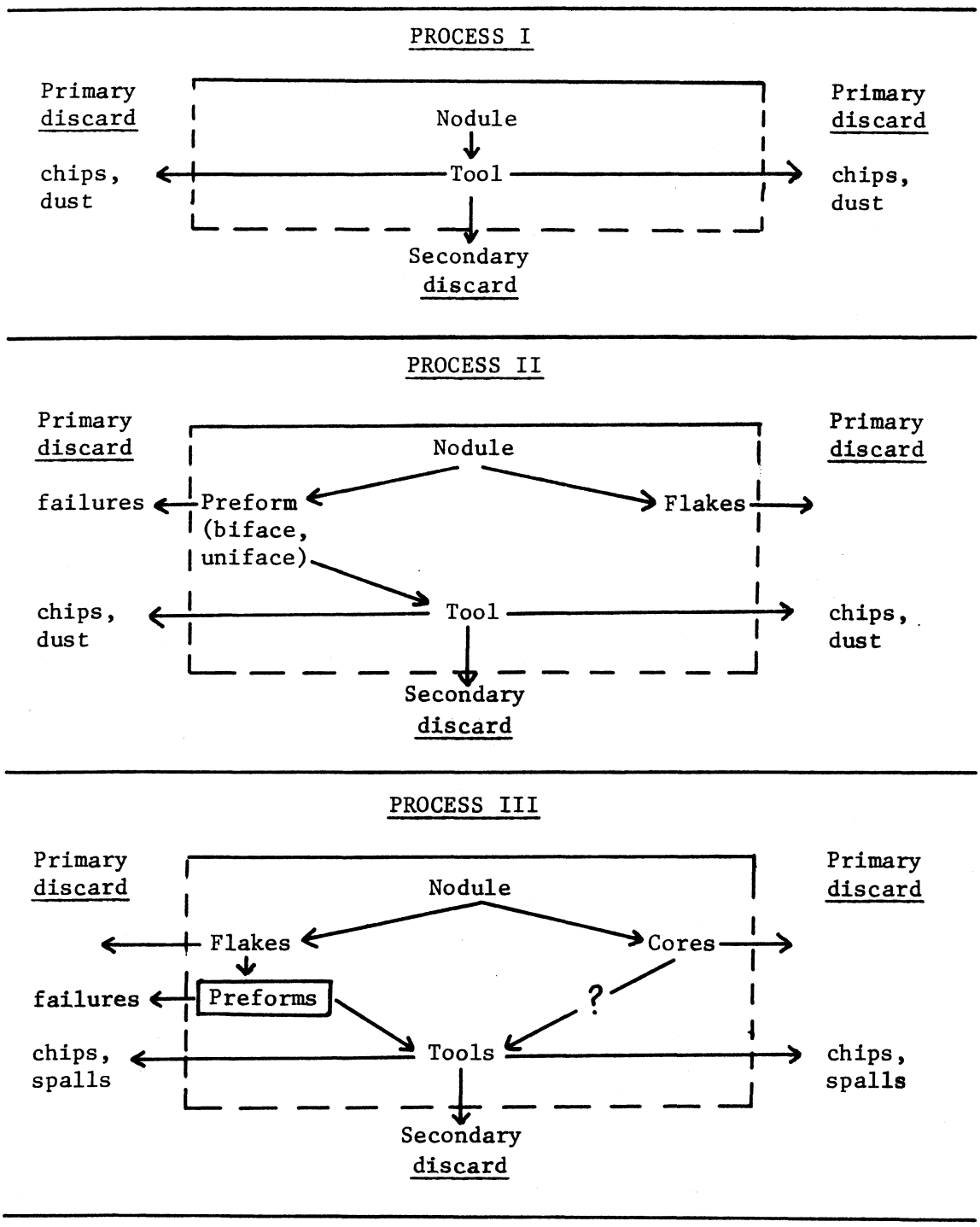

Figure 3. Diagram of Linear Reduction Models.

primary discard. Secondary discard may mark the functional loci of tools.

Process III (Fig. 3): Contrasting with Process II, the salient feature of this stage is that preforms are produced from flakes which were removed from the nodular masses. Primary discard includes chips, flakes, cleavage spalls, depleted core nuclei, and broken preforms. Successfully completed forms are tools. Tool use creates dust and minute chips which are also regarded as primary discard.

The models do not consider recycling or multiple use of tools. Recycling of primary and secondary discard is likely represented in the sample, although it is often very difficult to discern. Residue of tool repair or resharpening is possibly represented in the debitage as suggested by soft-hammer retouch flakes. Multiple use of tools is, however, demonstrable. For example, there are several pebbles which are both smoothed from fine abrasion and battered at the ends or edges from use at different tasks.

These models are based on one presented by Collins (1971) although Collins' model is too inclusive for use here since the Davis Site models are not intended to show all possibilities. Sorting within respective material classes should reveal both qualitative differences between such classes and the basic reduction techniques with respect to tool assemblages. This is what the models are designed to accomplish.

As noted earlier, there are four major classes of stone in the debitage collection, flint, quartzite, silicified wood, and opal. All but the last named occur in large pebble, very large pebble, and small

cobble-size masses. Opal occurs in large pebble form. The size variable is held fairly constant. The quality variable, however, is not, and while the flintknapping quality within any one of the stone classes varies considerably, the silicified wood class evidences the greatest range of texture qualities.

Silicified wood was selected as the class on which to test the linear reduction model, because it was one of the smaller classes of material and because I feel more confident that it was locally obtained and would be relevant to the problem of adaptation to local resources.

The model shown in Figure 3 was adjusted on the basis of the sample. Figure 4 diagrams the silicified wood model; all petrified wood material from Story's excavations at the Davis Site were sorted according to the model. Debitage (such as flakes and spalls) was not collected during the WPA excavations.

The reduction stages shown in the model are empirically demonstrable by the nature of the finished tools and failures in the collection. Flakes which have attributes of certain reduction techniques and reduction steps are also recognizable.

The three processes of reduction are not only sufficient to demonstrate the usefulness of the model, but also allow for a thorough description of the manufacturing sequences and techniques. The sample within each stage is discussed below.

Process I: Included here are two nodules with battered edges and one with a battered end and polished surface.

Process II: The Process II silicified wood nodules have been

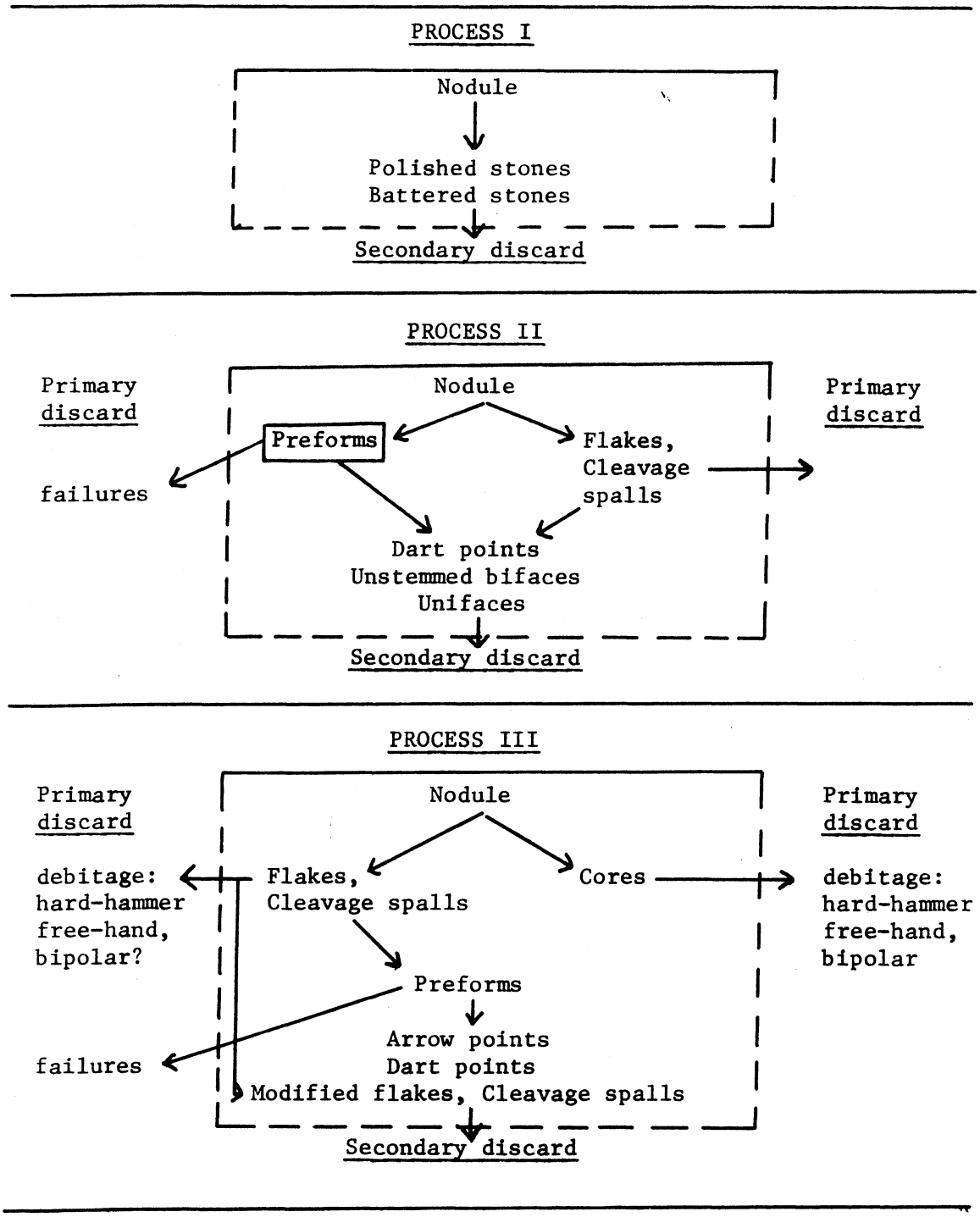

Figure 4. Linear Reduction Models for silicified wood interpreted on the basis of the debitage sample.

reduced by chipping; the reduction technique is most often hard-hammer free-hand percussion. However, for certain tool forms, soft-hammer percussion was utilized.

"Preforms" are outlined by a solid rectangle in Figure 4. This is to emphasize that preforms, as such, were not present in the sample. They represent an assumed step necessary to reach the finished form. Failures along the way constitute primary discard.

Diagnostic artifact forms include four dart points, seven broken preforms, two unstemmed bifaces, and one uniface. All of these artifacts retain remnants of cortex either on both faces or otherwise sufficiently to indicate that they were made from small tabular pebbles. In addition, there are fifteen broken preforms and seven dart points which are probably Process II products. However, these specimens do not retain enough cortex to make their classification certain.

By-products of Process II manufacture of silicified wood include hard-hammer percussion flakes, soft-hammer percussion flakes, (generally of the better material), cleavage spalls, and possibly discarded test cores.

Process III: The nodules in Process III are reduced to flakes and cleavage spalls. It is from these flakes and spalls that items are taken for further reduction or use. Process III products include arrow points, awls, small stemless bifaces, two possible dart points, twenty-four bifacially worked cleavage spalls (failures or preforms?) and numerous utilized flakes and cleavage spalls with sharp edges.

By-products include exhausted core nuclei (including two bipolar specimens); cleavage spalls, hard-hammer and (rarely) bipolar flakes,

and broken or discarded preforms.

There are no arrow points in the collection suggesting anything other than Process III strategy; there are, however, two small stemmed bifaces which are probably small dart points that belong to the Process III system. It is notable that these two specimens were probably finished or shaped entirely by pressure; there is no suggestion of soft-hammer percussion. Too, all Process III tools are noticeably smaller than are Process II tools. The main point here is that the end products of Processes II and III differ significantly in both size and technique of manufacture. To be sure, there are certain difficulties in adhering to the model but this is expected. Flakes produced by hard-hammer percussion cannot be sorted as being from Process II or Process III. Cleavage spalls produced in Process II which were picked up and utilized would ideally be classed as Process III.

Summary

The analysis of chipped stone materials using the linear reduction model results in a processual classification of all chipped stone materials. In this sense, it serves both technological and taxonomic purposes. Certain aspects of the analysis can also provide functional information; specifically to determine when certain reduction techniques are used and why. For example, the initial reduction of nodules in Processes II and III is principally by hard-hammer free-hand percussion. Further reduction of certain forms must be done by soft-hammer flaking in order to reach the desired tool form. Sorting materials by the linear

reduction model provides some insight into the decision making processes of the prehistoric flintknappers and reflects certain changes in these processes. That soft-hammer flaking was used to thin certain preforms could have been determined without using the linear reduction model, but the technique could not be related to other aspects of the reduction system (i.e., placed into its proper context within the lithic technology as a whole).

Analysis and description of the debitage (Chapter 6) and artifacts (Chapter 7) will include references to the linear reduction sequence outlined here. It would be redundant if descriptions of the various reduction sequences observed in each material category were presented here. For that reason, these sequences of reduction as well as the wear pattern analysis are incorporated in the debitage and artifact descriptions.

CHAPTER 6

Debitage Analysis

An integral part of lithic technology analysis is the study of debitage (Crabtree, 1972). It would not be possible to present an accurate description of the lithic technology without considering the residue of reduction activities at the site. Indeed, it is in keeping with a processual study to examine the by-products of the reduction sequence to determine the methods, techniques, and manner in which the reduction strategies were carried out.

The customary approach of reconstructing stone technologies by working back from finished items is inadequate since the place of tool discard is not necessarily the place of manufacture. Too, the process of reduction, if carried to an extreme, often removes traces of earlier techniques; hence it is often impossible to determine all phases of the manufacturing sequence by studying finished items alone.

The definition of the term debitage as I am using it in this discussion follows closely that of Crabtree (1972: 58). He describes debitage as:

> Residual lithic material resulting from tool manufacture. Useful to determine techniques and for showing technological traits. Represents intentional and unintentional breakage of artifacts either through manufacture or function. Debitage flakes usually represent the various stages of progress of the raw material from original form to the finished stage.

My principal deviation from Crabtree's definition in the present discussion is that artifacts broken through use are not considered here as debitage, since they would not be residual material resulting from tool manufacture. This minor point should be emphasized, at least on theoretical grounds, because manufacturing residue is termed primary discard and tool disposal is regarded as secondary discard (see Fig. 3).

In practice, it is not always possible to recognize primary discard. Hence, many flakes, upon inspection, are found to have been modified and, if modification is the direct result of utilization, these items, dulled or broken through use, would most likely represent secondary discard. The sequence would be (a) removed from core; (b) selected for use; (c) used; (d) discarded.

Another problem of classification which should be mentioned is that preforms as such cannot always be recognized. I include in the debitage descriptions of only certain examples which are felt to represent failures in the manufacture of biface tools at the site. Many of the rudely chipped bifaces described in Chapter 7 may be failures in a linear reduction sequence (cf. Muto, 1971), but this cannot be demonstrated; hence they are described along with the other bifaces.

A <u>modified</u> specimen is any flake, chip, spall, or core which exhibits an altered edge visible to the naked eye. Admittedly, every item should be thoroughly examined under magnification, but this is not always feasible. Utilization may or may not result in apparent edge modification; it depends upon the kind and intensity of utilization. Any sorting for "utilized flakes" is highly subjective, a fact

rarely admitted by the archeologist.

In sum, any flake classified here as modified simply reveals edge modification of any one of a number of forms. The forms are described later.

Modified flakes are analyzed as debitage for several reasons. First, modification is not always readily apparent. Second, modification may not be due to utilization; alteration could be due to accidental breakage or chipping, as when flakes are stepped on. Third, since flake attributes are still preserved on most flakes, core preparation and reduction patterns can still be determined. By analyzing the modified flakes along with the primary discard, the sample more closely resembles that originally produced during the reduction process.

Debitage analysis was carried out within each material class; flint, quartzite, silicified wood, and Manning fused glass. The study focuses almost exclusively on chipped stone since debitage from this activity is the most common, and, when isotropic materials are used, it is easily recognized. Flint will be discussed first; diagnostic residue from certain reduction techniques and strategies will be described under this heading even though they may be found in the other material classes as well. This includes the description of certain flakes and core types, for example, hard-hammer free-hand, and bipolar.

Flakes in each category with such diagnostic attributes as striking platforms and bulbs of force were sorted from the chips, spalls, and other debitage lacking diagnostic features. Chips include flake fragments and shatter. Spalls are items which do not, for one reason

or another, follow the predictable or characteristic fracture paths; spalls are the inevitable by-products of flaking. Chips and spalls were not separated except with the silicified wood category. However, as a group, flakes, chips and spalls were further sorted for the presence or absence of modification.

Edge Wear

One important aspect of the technological study was an analysis of wear patterns on modified flakes and the more laboriously made tools. Artifacts were examined using both Bausch and Lomb and Nikon binocular zoom microscopes with a magnification range from 7 to 40X. Attempts were made, with only partial success, to analyze minor edge abrasion by using a scanning electron microscope. Striations perpendicular to the edge were seen but since partial destruction is necessary and expense of microscope time is considerable, it was not feasible to carry out an intensive SEM study at this level of analysis.

Terms used to describe edge modification in Chapters 6 and 7 are taken for the most part from Ahler (1971: 38, 39). The following are Ahler's definitions.

> Edge smoothing is the result of fine abrasive action on the tool edge, resulting in a worn surface smoother in texture and finish than the natural, unworn surface of the raw material (Fig. 8, P).
>
> Edge polish is a fine form of abrasive wear resulting in a reflective, mirror-like surface (Fig. 8, Q).
>
> Edge blunting.....results in a surface rougher in texture than the unworn tool surface as a result of very fine comminution or microfracturing of the worn surface area.

Edge crushing can usually be detected without the aid of the microscope and results in an irregular, angular and fractured edge, both in outline and in section.

Edge striations are grooves and furrows, variable in length, width and distinctness, on a worn portion of the tool edge.

Edge grinding is a distinctive type of wear defined by a course, granular surface, often accompanied by minute striations and faceting, indicating that the tool was moved against a hard and abrasive material at a relatively constant use-angle.

Step flaking is characterized by a flake scar that is wider than it is long and that terminates in a stepped, transverse fracture. Step flakes are often compounded, one overlapping the next (Fig. 8, K).

Surface scratches are on the tool face rather than the worn surface of the edge.

Surface rounding is similar to edge rounding except that it occurs on flake ridges or intersections of flake scars on tool faces.

Surface smoothing refers to the fine abrasive action on flake ridges or other areas of the tool faces resulting in a worn surface, smoother and finer in texture than on unworn areas.

Surface polish is an abrasive wear of very fine nature resulting in a highly reflective area on the tool face.

Surface grinding is an abrasive type of wear occurring on flake ridges on tool faces and results in flattened surfaces that are rougher in appearance and coarser in surface texture than unworn areas.

I have added three terms to this list which are useful in describing the edge modification of flakes.

Edge nicking results when sometimes microscopic randomly distributed flakes are removed from an edge through use. They are frequently removed bifacially (Fig. 8, L).

Edge trimming is uniform, unifacial chipping along an edge portion.

Edge trimming and nicking denotes that both trimming and nicking occur on the edges of a single specimen.

It was not feasible to examine all specimens with modified edges microscopically. Consequently, only a sample of the debitage (totaling approximately 10 percent of the flint sample) was analyzed to define the character of modification and, if possible, to detect motions of wear. It became apparent that very often an edge would exhibit a combination of the attributes described above; for example, an edge might exhibit both nicking and smoothing, and certain portions of the smoothed edge might be polished.

Flint

This heading includes materials such as flint, chert, jasper, and other cryptocrystalline silicates. The sorting was based on the technique of removal, including both hard-hammer and soft-hammer methods.* Hard-hammer materials are further subdivided into free-hand percussion and bipolar percussion categories. There is some degree of overlap in the attributes manifested on the flakes produced by any technique of force (either percussion or pressure) and more than one technique may be used to reduce a single mass. Therefore, the classification followed here is partly subjective. However, periodic experimentation to replicate the features observed in the debitage aided in identifying attributes indicative of specific techniques.

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*There were an estimated 3,000 tiny chips, spalls, and flakes which were not sorted. Most are less than 15 mm. long.

Hard-Hammer Percussion

Debitage produced by this technique is divided into two broad categories, flakes and cores. They are classified as free-hand percussion on the basis of bulbar characteristics (positive on the flakes and negative on the cores), platform characteristics, and over-all morphology. The relative size of flakes and flake scars on most specimens precludes removal by pressure, and the absence of rebound stress features rules out bipolar percussion. Percussor marks and prominent positive cones of force on flakes and negative cones on cores clearly suggest the hard-hammer free-hand percussion technique.

Free-Hand Flake Debitage

An idealized flake of this category is illustrated in Figure 5, A showing the conchoidal fracturing attributes referred to in the following discussions and descriptions. Bulbar characteristics are extremely variable, ranging from definite cones and bulbs of force having most of the attributes of flake morphology described by Bordes (1968), Muto (1971), Crabtree (1972) and Faulkner (1972) to very diffuse bulbs of force with cones either barely discernible or split. An example of the variation is shown in Figure 5, B-G.

Examples approximating the idealized specimen are rare in this sample. This can be explained by several factors. First, the size of the nodule was typically small, rarely reaching the small cobble size (see Chapter 3). The over-all effect of this single factor cannot be measured quantitatively, but experimental reduction of nodules of like

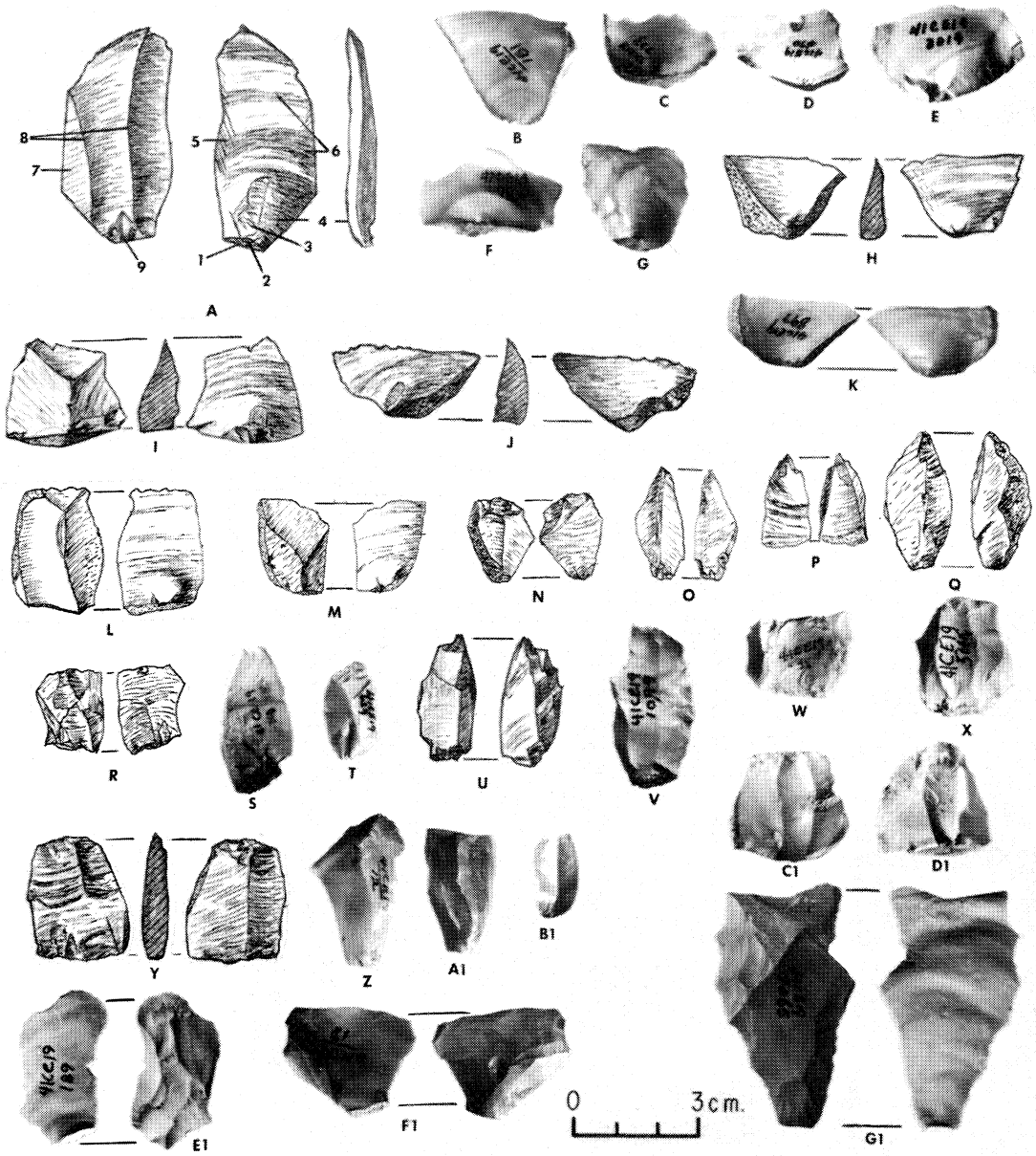


Figure 5. Debitage. A, idealized hard-hammer free-hand percussion flake showing conchoidal fracturing attributes; (partly adopted after Crabtree, 1972); 1, striking platform; 2, impact point; 3, eraillure; 4, bulb of force; 5, fissures; 6, ripples; 7, flake scar; 8, ridges; 9, platform trimming flakes. B-G, variations in bulbs of force. H-K, wedge-shaped flakes. L, M, backed flakes. N-R, bipolar flakes. S-D1, bipolar cores. E1-G1 soft-hammer flakes.

size and material has produced identical attributes. More will be said of these replicative experiments later. Suffice it to say here, that when the small mass is held in the hand, the hand absorbs a certain amount of the force, suddenly reducing some of the stress forces that are responsible for the attributes in the idealized flake. These features are discussed by Faulkner (1972). Flakes with attributes nearly identical to the idealized flake were produced by striking large (medium cobble-size) nodules.

The purpose of the experiments was to replicate the features on the flaking debitage in the archeological sample. It was noted at the beginning of this section that the sorting was partly subjective. If some of the debitage patterns could be reproduced by known techniques, then perhaps the subjectivity would be lessened. Experiments to this end were focused on the hard-hammer free-hand and bipolar techniques. Cores and hammerstones of the same size and material as those found in the archeological sample were used. The results will be discussed in the sections describing the debitage from these techniques.

One obvious factor observed during experimentation was that when one reduces large pebbles or small cobbles, the smaller the core becomes, the more pronounced the cushioning effect. It is sometimes necessary to strike a small core several times before a detachment occurs. When a flake is detached under this circumstance, it quite often exhibits more than one cone of force due to the multiple impacts. Shattering is common and splitting of bulbs is not unusual. These features were also evident in the archeological sample.

Striking platforms are characteristically unprepared. The way in which many of the cores were shaped (by systematic reduction, not preparation) and the manner in which they were struck produced flakes with flat, broad striking platforms. In fact, one common feature of the flakes in this sample is that many are wider than they are long, the widest part being at the proximal (bulbar) end. Another platform feature is the relative thickness of the striking platform. The striking platform is noticeably thick and is cortex-covered on many flakes in the hard-hammer free-hand percussion category. Here again, these features are partly explained by the small size of the core mass which necessitated moving back from the edge to remove a flake of useful size. In addition, most flakes removed would probably have some trace of cortex, because the small core size precludes decortification to prepare striking platforms.

Another notable feature which became apparent in the sorting was the infrequency with which a ridge was followed when a flake was removed. Apparently (certainly in some instances) this was due to the reduction strategy followed by the flintknapper. By not striking on top of a ridge, the knapper could ensure a short, broad flake.

Modern flintknappers are cognizant of the importance the ridge plays in guiding the path of a flake or blade fracture. Faulkner (1972: 133) states that:

> .....because the ridge is formed by the intersection of two free boundaries, stress direction in the vicinity of the ridge is well defined, and runs parallel to it. Thus a ridge serves not only to facilitate the initiation of fracture, but also to guide the fracture along a predictable path.

The absence of a definable ridge on most hard-hammer free-hand percussion flakes in the Davis Site collection partly explains their short, wide form.

The thickness of the striking platform at the point of detachment is usually considered a determinant of flake thickness. Evidently, the lithomechanics are more complex than initially thought. For example, Crabtree (1972: 6) notes that flake removal forms a cone and implies that it is, in effect, a Hertzian cone (for a detailed discussion of the Hertzian cone, see Faulkner, 1972: 124-132). Faulkner (1972) in his experiments replicating Mesoamerican blades, showed by photoelastic analysis of epoxy fracture that the conical surface on the bulb of a Mesoamerican blade was not a classic Hertzian semi-cone. Producing Mesoamerican-like blades and true Hertzian cones in epoxy revealed that they both are formed under different stress fields (Faulkner, 1972: 115). This discovery clearly indicates that different stress fields are established simply by moving deeper into the core from the free surfaces to initiate a flake removal.

Analysis of the flakes reveals a spectrum of striking platform thickness, with thick platforms with diffuse bulbs and distinct cones of force being the most common. It is suggested that the more distinctive cones of force and prominent radial fractures are due to impact and stress forces approximating the Hertzian cone due to the thickness of the striking platform. That is, the impact was not close enough to the free surfaces of the cone for them to have a significant effect on the stress fields.

Another common feature in the sample is the sheared cone or split cone described by Crabtree (1972: 92). Crabtree considers these features indicative of anvil support for cores, but I suggest another possibility; that is, direct impact on a striking platform without free surfaces to guide the stress force creates a Hertzian-like cone which shatters under the crushing force of the percussor. It is obviously necessary to strike the core with sufficient force to shatter the cone. It is not necessary to rest the core on an anvil; I have accomplished this effect by simply holding the core (in this case, a pebble) in one hand and striking it very hard with a stone hammer.

Hinge fractures are common on the hard-hammer free-hand percussion flakes. Hinge fracture, according to Faulkner (1972), is probably due to sudden premature release of applied compressive stress which reduces the strength of the material (strength which is momentarily increased under compression). If this is true, then the premature release of applied compressive stress may be due to several factors. Two are offered here as suggested explanations. First, the cushioning effect of holding the small core in the hand could result in a sudden release of applied stress; second, the expenditure of energy in the radiating fracture paths which do not intersect with free surfaces causes the compression to be released before the flake has fractured the length of the core (cf. Pond, 1930: 53). Another explanation offered by Pond (1930: 54) is that hinge fracture is due to bending stress. It is possible that these factors may be related.

Hard-hammer free-hand percussion flakes are sorted further into three broad groups based on morphology. These are <u>wedge-shaped</u>,

naturally backed, and random. Flake morphology is due to a number of factors, including the characteristics of the core prior to removal, where on the striking platform the core was struck, the nature of the hammer, the nature of the material, the size of the core, and how the core was secured. For a discussion of variables affecting flake morphology, see Muto (1971). Patterning in debitage is largely due to patterning in the reduction strategies and to consistency in adhering to a standard size and quality of raw material.

Flake dimensions are not presented. Flakes in the following categories generally measure between 15 and 35 mm. Flakes larger than 40 mm. are rare.

Wedge-Shaped Flakes (N = 242; Fig. 5, H-K)

Description: Wedge-shaped flakes are characterized by thick, relatively wide striking platforms and over-all short length; most are about as long as they are wide, but length varies considerably. Some, for example, have their widest point at the striking platform. Distal ends usually terminate in feather edges, but hinge fracturing is also common, particularly on unmodified examples. A few also terminate in step fractures (cf. Muto, 1971; Crabtree, 1972). Approximately 90 percent of the wedge-shaped flakes have cortex striking platforms, a factor attributable to the small size of the original core mass and to the reduction strategy. The flaking axis on only about 4 percent follows some kind of ridge. Following a ridge was probably an accidental matter on most specimens since only one of the specimens has a ridge which follows the axis of percussion. The flake axis is diagonal

to the axis of the ridge on the other examples.

Noncortex free surfaces (i.e., flaked surfaces) on cores used in wedge-shaped flake production were nearly flat; some were slightly concave (Fig. 5, K). Bulbs of force are typically diffuse and eraillure scars are infrequent.

		No. of examples
Modified		
cortex platform	--	142
without cortex platform	--	17
Unmodified		
cortex platform	--	75
without cortex platform	--	8
	Total	242

Discussion: It is proposed that wedge-shaped flakes were intentionally produced to serve directly as cutting tools. Their naturally backed platform area, short length, and acute distal edge make them ideal for such tasks. The presence of numerous cores in the collection which could serve as products of systematic wedge-flake removal adds strength to this proposition.

A sample of one hundred wedge-shaped flakes was examined under magnification to test for patterned wear. This sample was compared to one hundred modified flakes in the Technique Uncertain category. Technique Uncertain specimens were chosen for comparison because it is felt that they more closely represent a random sample of flakes, spalls, and chips.

		No. of examples
Wedge-Shaped Flakes: Modified		
Nicked	--	52
Nicked and Trimmed	--	3
Trimmed	--	38
Nicked, Trimmed, Polished	--	1
Smoothed	--	1
Irregular Modification	--	5
Total		100
Technique Uncertain: Modified		
Nicked	--	22
Nicked and Trimmed	--	3
Trimmed	--	38
Irregular Modification	--	14
Nicked and Polished	--	9
Nicked and Smoothed	--	4
Crushed	--	3
Trimmed and Smoothed	--	6
Trimmed and Polished	--	1
Total		100

The samples show interesting similarities and differences. Nicked flakes and trimmed flakes are the most frequent forms of modification in both samples. Perhaps the most significant difference between the samples is that the twenty specimens of the Technique Uncertain sample exhibit smoothing and/or polish whereas only two of the

wedge-shaped flakes possess these attributes. No attempt will be made here to explain these differences in wear patterns, although such a study would undoubtedly prove fruitful. The brief inspection does suggest that the function of the wedge-shaped flakes was more specific than those of the Technique Uncertain category.

Naturally Backed Flakes (N = 82; Fig. 5, L, M)

Description: Naturally backed flakes are removed from a core in such a way as to produce an "orange slice" shaped flake having one acute-angle edge and one naturally backed edge. They are typically longer than they are wide but rarely are blade proportions achieved (i.e., flakes which are twice as long as they are wide). The flakes are relatively thick as a group and have a characteristic triangular cross-section. Bulbs of force are typically diffuse and eraillure scars are infrequent. Bulbar surfaces are generally smooth; hackles and ripples are uncommon. The flake axis follows a ridge on 65 percent of the sample.

		No. of examples
Modified		
cortex platform	--	42
without cortex platform	--	10
Unmodified		
cortex platform	--	23
without cortex platform	--	7
Total		82

Discussion: Backed flakes may be fortuitous. Systematic reduction of small cobbles or large pebbles by hard-hammer free-hand percussion frequently produces backed flakes. They are also easily produced intentionally by the same technique.

All of the modified specimens were examined microscopically. The findings are tabulated below:

		No. of examples
Trimmed	--	23
Nicked	--	20
Nicked and Trimmed	--	2
Nicked, Smoothed, Polished	--	6
Nicked, Trimmed, Polished	--	1
	Total	52

Random Flakes (N = 858)

Description: No discernible pattern of removal was recognized except that removal was by hard-hammer free-hand percussion. A ridge was followed in the removal of about 27 percent of the flakes. There is a significantly high frequency of prepared striking platforms on flakes which followed a ridge (153 without cortex striking platforms, or 73 percent, and 74 with cortex striking platform) than on the flakes which did not follow a ridge (302 without cortex striking platforms, or 51 percent, and 288 with cortex striking platforms). This higher frequency of prepared platform, ridge directed flakes is in contrast to the near absence of this method of removal in the wedge-shaped

category; ridge directed flakes are common in the naturally backed category, but they usually have cortex platforms. Cortex platform flakes appear larger than prepared platform flakes as a group. This again can be partly attributable to the size of the raw material being worked. Once the cortex has been removed, the core mass has been significantly reduced in size. Eraillure scars are infrequent and bulbs are typically diffuse.

		No. of examples
Modified		
cortex platform	--	161
without cortex platform	--	216
Unmodified		
cortex platform	--	221
without cortex platform	--	260
Total		858

Discussion: A sample of one hundred modified random flakes was examined microscopically. The results are tabulated below:

		No. of examples
Trimmed	--	44
Nicked	--	34
Nicked and Trimmed	--	7
Nicked, Smoothed, Polished	--	7
Trimmed and Polished	--	2

Nicked, Trimmed, Polished	--	3
Miscellaneous	--	3
	Total	100

Miscellaneous (possible retouch) Flakes (N = 4)

Description: Three of these items are flakes removed from the flat side of tools with unifacially trimmed edges. The platform edge on two have stepped flaking and dulling. The third specimen was removed from a tool with a denticulate edge; the edge projections are smoothed and lightly polished from wear. These three examples conform to the Method C uniface retouch technique described by the present author (Shafer, 1970). The fourth specimen is a burin-like spall removed from a smoothed and polished edge of a biface tool. It resembles Method A retouch (ibid.: 481-484).

Free-Hand Core Debitage

Nodular masses showing varying degrees of reduction by hard-hammer free-hand percussion and fortuitous shapes (i.e., they are not reduced to conform to some preconceived form) are described here. They are divided into five descriptive groups.

Group 1 (N = 19; Fig. 6, A-C)

Description: These are nodules which exhibit one or two removals possibly to test the quality of the interior mass. Most are stream worn pebbles or small cobbles with deeply weathered cortical surfaces; one example (from Feature 119, a Stage II burial in Mound C)

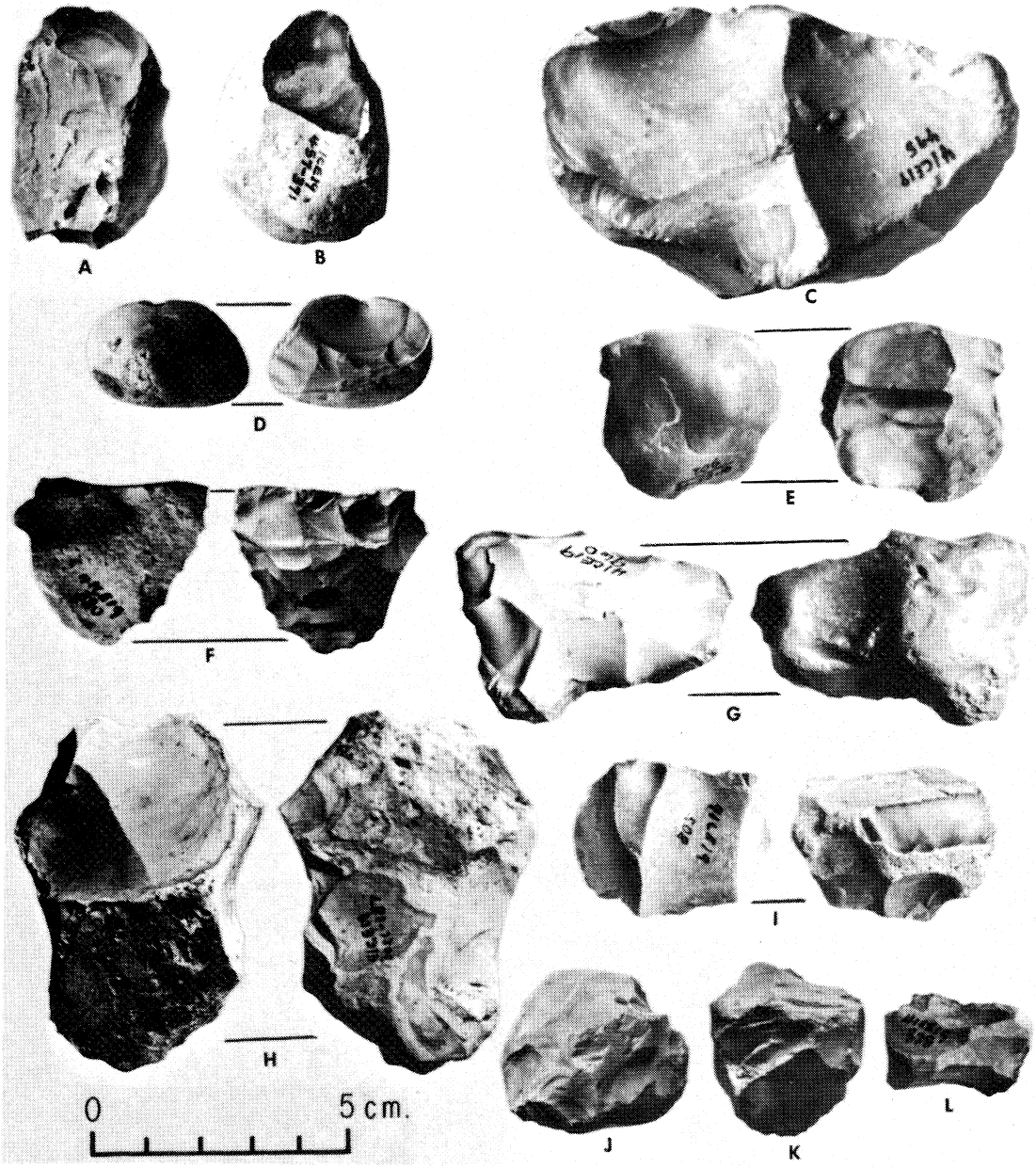


Figure 6. Hard-hammer free-hand percussion cores. A-C, Group 1. D, E, Group 2. F-I, Group 3. J-L, Group 5.

has a chalky, pitted surface not suggestive of alluvial deposition. Another peculiar example is from a cobble-size nodule from which most of the original cortical surface has been removed. The edges produced by this chipping are battered and the surfaces are partly polished as if from minor stream abrasion. One relatively fresh flake has been removed subsequent to the stream alteration (Fig. 6, C). Most (particularly the small specimens) are probably from local deposits; the larger (small cobble size) specimens are almost certainly nonlocal.

Size range varies from 30 to 90 mm.; mean is 49. Three of these can be classified in the small cobble range; 13 in the very large pebble class; and 3 in the large pebble range.

Discussion: If these are indeed test cores, then some insight into the size of the pieces of raw material procured for reduction by chipping is provided.

Group 2 (N = 15; Fig. 6, D, E)

Description: These items are pebbles showing multiple flake removals; most have been reduced beyond the point where their original size can be determined other than to say that they appear to have been no larger than very large pebbles.

Size range varies from 28 to 36 mm.; the mean is 33 mm.

Group 3 (N = 34; Fig. 6, F-I)

Description: Most of these cores are thoroughly reduced pebbles or small cobbles. The characteristic feature is that most of them served as cores for wedge-shaped and other cortical platform flakes. The result of repeated removal of cortical platform flakes was in many instances

a unifacial core. Many specimens have stepped hinge fractures. Sharp edges on two are modified. Two subangular specimens apparently non-local in origin which have chalky, pitted cortex surfaces evidence only a few flake removals. One is illustrated in Figure 6, H. These latter specimens suggest some degree of conservation when resources were being used. Flakes may have been removed from such cores only when needed.

Size range varies from 27 to 95 mm.; the mean is 47 mm. Only four measure in the small cobble class in their present condition. There are twenty-seven in the very large pebble range and three in the large pebble range.

Group 4 (N = 99)

Description: These items are very thoroughly battered and fragmented cores. Final attempts at flake removal on most of them resulted in hinge or snapped fractures, and some of these fractures are stepped. Reverse hinge fractures and shattering along previous stress lines are also evidenced. These artifacts are characteristically small, owing to their extreme state of reduction. Maximum dimension varies from 15 to 44 mm.; the mean is 29. Twenty are in the very large pebble category and all but one of the remainder are in the large pebble range in their present condition.

Group 5 (N = 19; Fig. 6, J-L)

Description: These interesting specimens are nearly exhausted core nuclei (for the most part) with thoroughly crushed edges. Their function or the cause of the battered edges is enigmatic. It is possible that these items served as some kind of battering tool after they

became depleted cores, but their resemblance to the cores in Groups 3 and 4 above and their small size also leave open the possibility that they are simply thoroughly battered cores. Direct impact blows and percussor marks are common. Maximum dimension range varies from 19 to 53 mm.; mean is 33.

Discussion: All of the free-hand cores are clearly the product of hard-hammer percussion. All recognizable bipolar cores are described elsewhere. However, since many of these specimens (especially examples in Groups 4 and 5) exhibit direct impact blows, they could represent variants of bipolar flaking where the core is placed on a nonresistant anvil such as a block of wood.

As an experiment, three flint pebbles 55 to 65 mm. long obtained from gravels in the central Brazos valley were reduced by hard-hammer free-hand percussion to produce a comparative sample of debitage. A quartzite hammerstone about 60 mm. long was used. The reduction strategy was to produce wedge-shaped flakes and uniface cores similar to those classed under Group 3 above. The flake classification follows that used in the archeological sample.

Results:

		No. of examples
Core 1		
Hard-hammer free-hand flakes: Three have split bulbs of force; four have eraillures. Two fit the wedge-shaped flake category.	--	7

Direct Impact: Both have definite cones of force.	--	2
Shatter	--	9
Total		18

Core 2

Hard-hammer free-hand flakes: Six have diffuse bulbs of force; one has a sheared cone; none have eraillures. Four fit the wedge-shaped flake class.	--	7
Direct Impact	--	1
Shatter	--	4
Total		12

Core 3

Hard-hammer free-hand flakes: One is wedge-shaped; one is naturally backed; two have eraillures; three have diffuse bulbs.	--	4
Direct Impact	--	1
Technique Uncertain: This specimen is a blade.	--	1
Shatter	--	5
Total		11

Discussion: This experiment produced residue inseparable from the archeological sample and provided a check on the classification used in sorting the flint and core debitage. Cores produced in the experiment

are very similar to Group 3 described above. Some insight was gained into the behavior of flint when small masses are chipped by hard-hammer free-hand percussion. The size of the mass has hitherto not been considered a determining factor in flake morphology. Discussions by Crabtree (1972) and Muto (1971) center on the kind of percussor used, platform preparation, core shape, and kind of material. These are determinant factors to be sure, but the size of the mass being flaked can now be added to this list. The core size is directly proportional to the amount of the cushioning affect the hand will cause. Since it is a matter of inertia, larger masses will be significantly less cushioned than smaller masses. Cushioning is a determinant factor of flake morphology due primarily to the absorption of shock.

Bipolar Flake Debitage

Debitage classed under this heading has attributes indicative of hard-hammer anvil percussion. Three principal forms of percussion surfaces characteristic of bipolar debitage have been described by Binford and Quimby (1963). The ridge of percussion "is defined by the line of convergence of two opposite cleavage faces. It is normally straight and considerably bruised with many short hinge fracture scars on the cleavage faces directly below the ridge." A second feature is the point of percussion which "is formed by the convergence of three or more cleavage faces resulting in a pyramidal form, the apex of which is the point of percussion" (ibid.). The third feature is an area of percussion defined as usually being relatively flat, "generally the

cortical surface of the pebble, from which flakes have been detached along the edges" (ibid.).

The sixty-six flakes are divided into six descriptive groups based on the combination of specific bipolar attributes. These are: opposed-ridge, point-ridge, point, bi-pointed, ridge, and miscellaneous flakes.

Opposed-Ridge Flakes (N = 12; Fig. 5, N)

Description: These flakes have such features as multiple step fracturing and a remnant of a ridge of percussion at each end. Five have modified edges.

Point-Ridge Flakes (N = 16; Fig. 5, O)

Description: Each of these has a point of percussion on one end and a ridge of percussion on the opposite end. Eight are modified.

Point Flakes (N = 6; Fig. 5, P)

Description: A point of percussion is exhibited at one end of each of these specimens. The end opposite the point either hinged or feathered out without showing definitive features from impact. None is modified.

Bi-pointed Flakes (N = 4; Fig. 5, Q)

Description: A point of percussion occurs at each end of these flakes. One has a modified edge.

Ridge Flakes (N = 17; Fig. 5, R)

Description: A remnant of a ridge of percussion is retained

on one end of these examples. The opposite end feathers out on five examples, eight have rebound stress features, and four are snapped. Two are modified.

Miscellaneous Flakes (N = 11)

Description: Flakes which retain stress features suggesting bipolar flaking but lack definitive platform features are assigned to this group. Shattered platforms with negative cones of force, multi-faceted surfaces oriented toward one apex, and snapped flake fragments with small hinged flake scars on one end are notable features of this group. Only one is modified.

Bipolar Core Debitage

The one hundred and twenty-four cores, like the flakes, are described according to their combination of basic percussion features of bipolar flaking. The descriptive groups are: bi-pointed, point-ridge, opposed-ridge, point-base, ridge-base, and miscellaneous cores.

Bi-pointed Cores (N = 11, Fig. 5, U)

Description: Each end is formed by a point of percussion. Two have traces of percussion ridges on the other edges. None is modified. Size range: 18-32 mm.; mean, 26.

Point-Ridge Cores (N = 13; Fig. 5, S, T)

Description: One end has a point of percussion, and the opposite end exhibits a ridge of percussion. One has a modified edge. Size range: 17-41 mm.; mean, 24.5.

Opposed-Ridge Cores (N = 50; Fig. 5, V-Y)

Description: These items have opposed ridges of percussion. Most appear to be nuclei, but some are clearly flakes which have been battered on an anvil of some kind. Several have more than two ridges of percussion (i.e., another percussion ridge is sometimes apparent at 90 degree angle to the opposed ridges). A sharp edge on one is modified. Size range: 15-36 mm.; mean, 24.

Point-Base Cores (N = 9, Fig. 5, Z, A1)

Description: A point of percussion occurs on one end while the cortical surface (which is usually relatively flat) forms the opposite end. None is modified. Size range: 16-32 mm.; mean, 23.

Ridge-Base Cores (N = 21; Fig. 5, B1-D1)

Description: A ridge of percussion occurs on one end and a flattened base area (which is a cortical surface on 12) forms the opposite end. Sharp lateral edge of one has been modified. Size range: 16-38 mm.; mean, 24.

Miscellaneous Cores (N = 20)

Description: These cores possess one of the principal features of bipolar flaking but all are fractured in such a way as to remove the opposite end. Hence they cannot be classified in any of the above descriptive groups. Sharp edges on two are modified. Size range: 16-34 mm.; mean, 25.

Discussion: The disparity between the flakes and cores (65 flakes and 122 cores) in the bipolar sample is striking. Several

explanations are examined here and some inferences are advanced.

The comparison of the archeological sample with that produced by experimental bipolar flaking is particularly relevant with respect to the core-flake ratio and the accuracy of the classification. The classification used here is subjective to a degree especially in the cases where it was difficult to classify an item as a flake or a core. This was particularly true with regard to the opposed-ridge flakes which, when battering was intense, sometimes had characteristics of cores.

Three pebbles between 50 and 60 mm. long were reduced experimentally by bipolar flaking. The debitage was sorted according to the same criteria used in classifying the archeological sample. The tabulation of the combined experimental sample is as follows:

		No. of examples
Flakes		
point	--	2
opposed ridge	--	1
ridge	--	2
bi-pointed	--	1
miscellaneous bipolar	--	3
direct impact	--	3
hard-hammer free-hand percussion	--	1 (diffuse bulb)
shatter and dust	--	-
	Total	13

Cores		
opposed ridge	--	5
Total		5

The sample is admittedly small, but it is interesting that only nine flakes could be confidently sorted as bipolar and, in addition to the three original cores, two other segments were classified as nuclei. Also, three flakes have defined cones of force and fit into the "direct impact" flake category described under the next heading. Finally, one flake had attributes indicative of hard-hammer free-hand percussion. This experiment was especially revealing in that not a single flake produced experimentally had the supposed diagnostic trait of bipolar flakes, a positive bulb of force at both ends. This popular misconception about diagnostic bipolar debitage was pointed out by Crabtree (1972).

The experiments suggest that spalls identified as bipolar flakes are infrequent; a ratio of about two flakes to one identifiable nucleus can be predicted. This is still in marked contrast to the archeological sample; part of the inverse ratio between cores and flakes in this sample is probably due to the inability to separate bipolar debitage from that produced by direct impact blows on hand-held materials.

It is possible that the bipolar cores are not nuclei from flake production, but are tools. Artifacts identical to many of the Davis Site bipolar cores have been described as Pièces esquillées (MacDonald, 1969: 85-90), outils écaillés, lames écaillés, lames esquillées, or scalar cores (White, 1968: 660). MacDonald (1969: 88) presents a

thorough discussion regarding their use. He states:

> Pièces esquillées are generally considered to combine several functions, primarily as a wedge but secondarily as a slotting tool, both of which are associated with the groove and splinter technique of working bone, antler, ivory, and hard wood.

J. Peter White (1968: 660-662) presents a convincing argument, on the other hand, that many similar items in Australia and New Guinea assemblages are nuclei from bipolar flaking. He includes a photograph of an aborigine in New Guinea wrapping a flint pebble in bark and proceeding to reduce it using the bipolar technique. The nucleus was a characteristic "pièce esquillée."

Four advantages to the variant of bipolar flaking reported by White (1968: 661) are worthy of mention here because they are relevant to the economical use of sparse resources.

> 1. The bark wrapping directs the force of the hammer blow down the core so that more long and thin flakes are produced by this simple and uncontrolled process.
>
> 2. Smaller pieces of stone can be flaked thus producing more of the fine, thin flakes less than 3 cm. long....
>
> 3. All flakes are kept neatly together for selection and are not scattered around by the flaking process as is the case when an unwrapped core is flaked by this method. This is particularly important since any flake may be a suitable tool and all flakes must therefore be inspected.
>
> 4. Raw material is used more economically since much smaller pieces of stone can be flaked without risk of damage to the worker's hand.

White cautions that these artifacts may well have different functions in different industries.

Both interpretations, bipolar cores being tools and their being by-products of flake acquisition, are applicable to the Davis Site sample. Flakes which have bipolar battering on their edges (classified as opposed-ridge cores) could have served as wedges or slotting tools. Others, such as ridge-base cores, could hardly serve as wedges.

Finally, if the bipolar nuclei are indeed cores, then what was being made from the flakes? The answer to this question is unknown. Some of the modified flakes and cores may have been cutting tools, but it is unlikely that this intended function explains the relatively common use of this reduction technique. It is possible that the thinner flakes were made into arrow points, but this hypothesis cannot be adequately tested. It is suggested that a primary purpose of the technique was to reduce small resource masses into usable flakes; how the flakes were used is difficult to say.

Direct Impact Flake Debitage (N = 90)

Description: These flakes were produced by hard-hammer percussion, but it is not possible to determine whether an anvil was used. Consequently, they are described separately.

Direct impact flakes are characterized by clearly definable cones or apex points of impact. Blows were struck at angles approximating 90 degrees to the platform. Shear cones and platform shattering around the cone are frequent.

		No. of examples
Unmodified		
Wedge-Shaped		
cortex platform	--	2
Backed		
without cortex platform	--	1
Random		
cortex platform	--	8
without cortex platform	--	40
Modified		
Wedge-Shaped		
cortex platform	--	4
without cortex platform	--	3
Backed		
cortex platform	--	5
Random		
cortex platform	--	11
without cortex platform	--	16
Total		90

Discussion: A ridge was followed in the removal of only ten examples.

The thirty modified flakes were examined microscopically and the wear patterns are listed below:

		No. of examples
Trimmed	--	17
Nicked	--	15
Nicked and Trimmed	--	2
Nicked, Smoothed, Polished	--	5
Total		39

Soft-Hammer Percussion

Flake Debitage (N = 306; Fig. 5, E1-G1)

Flakes sorted into this category are described as a single lot and are not subdivided into smaller descriptive groups.

Description: These flakes are assigned to this category largely on the basis of their lipped striking platforms and very diffuse bulbs of force. The dorsal surfaces characteristically have multiple flake scars and the cross-section is usually arched. The peculiar striking platforms are formed by the convergence of two planes at angles of less than 90 degrees. The acuminate lip occurs on the ventral or bulbar side of the striking platform. Striking platforms are usually bifacially prepared and dulling and/or smoothing and marginal retouch are not uncommon features. One specimen is a fragment of an "outrepasse" (reverse hinge) flake (see Muto, 1971; Crabtree, 1972: 80, for excellent descriptions of both the technique and residue).

Some cortex is found on thirty-one specimens; this feature is not particularly meaningful, however, without some knowledge of the primary raw material or sources.

The size range is significant since it provides some data regarding the size and nature of the preform. Flake length varies from 11 to 61 mm. Most specimens however, are in the 15-30 mm. range and all but one are under 40 mm. in length.

Color and texture are variable, but tan and brown fine-grained flint predominate. White, opaque and semi-translucent blue-gray flint does occur, but it is not common. Most of the flint is believed to be nonlocal. The projected size of the cores alone on many specimens precludes the likelihood that they have been gathered from local resource deposits.

Discussion: Many flakes in this category fit the criteria for thinning flakes described by Muto (1971: 70). Cores from which flakes of this kind were removed can be distinguished by the presence of large, oval flake scars on one or both surfaces. Such bifaces do occur in the collection (see Chapter 7) but interestingly, they occur principally in a finished state; some are interpreted as being finished and subsequently broken through handling or use. Items which can be considered (or demonstrated) to be bifaces broken during the thinning process are rare; almost without exception, they are classifiable as dart point failures, are mostly of local materials, and predate the Caddoan occupation.

Another plausible explanation for the presence of the soft-hammer flakes is that many are the by-products of biface <u>retouch</u> - that is, a biface edge has merely been reshaped, or has become dulled and/or smoothed through use and has been rejuvenated by soft-hammer flaking. The size of most of the flakes in the sample supports the retouch explanation. There are also suggested examples of rejuvenated edges on

biface tools. Presumably some of this retouch took place on the site and some of the soft-hammer flakes would be the expected by-products of this activity. It is not possible to determine if all platforms on soft-hammer flakes with dulled and/or smoothed striking platforms were abraded intentionally. The possibility is left open that some of the flakes in the sample were retouch flakes removed from worn edges. It is also possible that some do indeed belong to the pre-Caddoan occupation and have no relevance to the Caddoan technology. The absence (or seeming absence) of preforms ruined during the thinning process should be emphasized because their absence suggests that manufacture of large bifaces was not part of the Caddoan technology.

There are bifaces in the sample which are interpreted as being preforms (i.e., unfinished, unused forms of a proposed artifact shaped mainly by percussion flaking; cf. Crabtree, 1972). However, most of these specimens came from a single cache (see Chapter 7) and, with one possible exception, were introduced into the site in their present state.

Pressure

The only residue indicative of pressure flaking which is regarded as debitage was a group of arrow-points interpreted as failures in a linear manufacturing sequence. They are not "preforms" in the sense that they represent a stage in the sequence (cf. Muto, 1971). The method of reduction is clearly pressure flaking on most of the specimens, although it is possible that indirect percussion could have been used in certain flake removals.

Arrow Point Failure (N = 33; Fig. 14, A-D)

Description: Specimens in this sample represent varying degrees of reduction and provide considerable insight into the nature of the flake blanks used and the general reduction strategy. Eight specimens can be oriented with respect to the bulbar position of the flake blank; the bulbar portion formed the stem on four, distal end on two, and shoulder area (oblique to the base-tip axis) on two. All exhibit rudimentary stems. Premature breakage appears to be the most frequent cause of failure, but inability to remove a thickened portion is also common.

Length: 17 to 33 mm.; mean, 25; width: 11 to 23 mm.; mean, 17.5; thickness: 2 to 8 mm.; mean, 4.

Technique Uncertain

Flake-Spall Debitage (N = 2272)

Description: These are either flakes, flake fragments, chips, or spalls for which the technique of production cannot be confidently determined.

		No. of examples
Unmodified		
Wedge-Shaped	--	2
Random	--	36
Fragments and Spalls	--	1787
Modified		
Wedge-Shaped	--	2

Backed	--	4
Random	--	25
Fragments and Spalls	--	416
	Total	2272

Core Debitage

Dart Point Failures (N = 4; Fig. 12, R-T)

Description: These are failures in attempts to make contracting stem dart points. Two failed due to unsuccessful attempts to remove thickened portions. The result of this effort was multiple stepped fractures. The reasons for not completing remaining two are difficult to determine. One is a heat-treated (direct impact?) flake. The materials could be of local origin.

Length: 40 to 58 mm.; width: 27 to 34 mm.; thickness: 7 to 13 mm.

Summary of Flint Debitage

The major purpose of the debitage analysis was to determine how the flint was reduced and, from the failures, what was being made. The basic techniques are hard-hammer free-hand percussion, bipolar percussion, soft-hammer percussion, and pressure. Figure 7 illustrates the reduction models interpreted on the basis of the sample. Pebbles and small cobbles were reduced by hard-hammer free-hand percussion into flakes including wedge-shaped, naturally backed, random flakes, chips, and spalls. From these flakes, chips, and spalls were drawn the blanks which were either used as tools or were modified into tool forms.

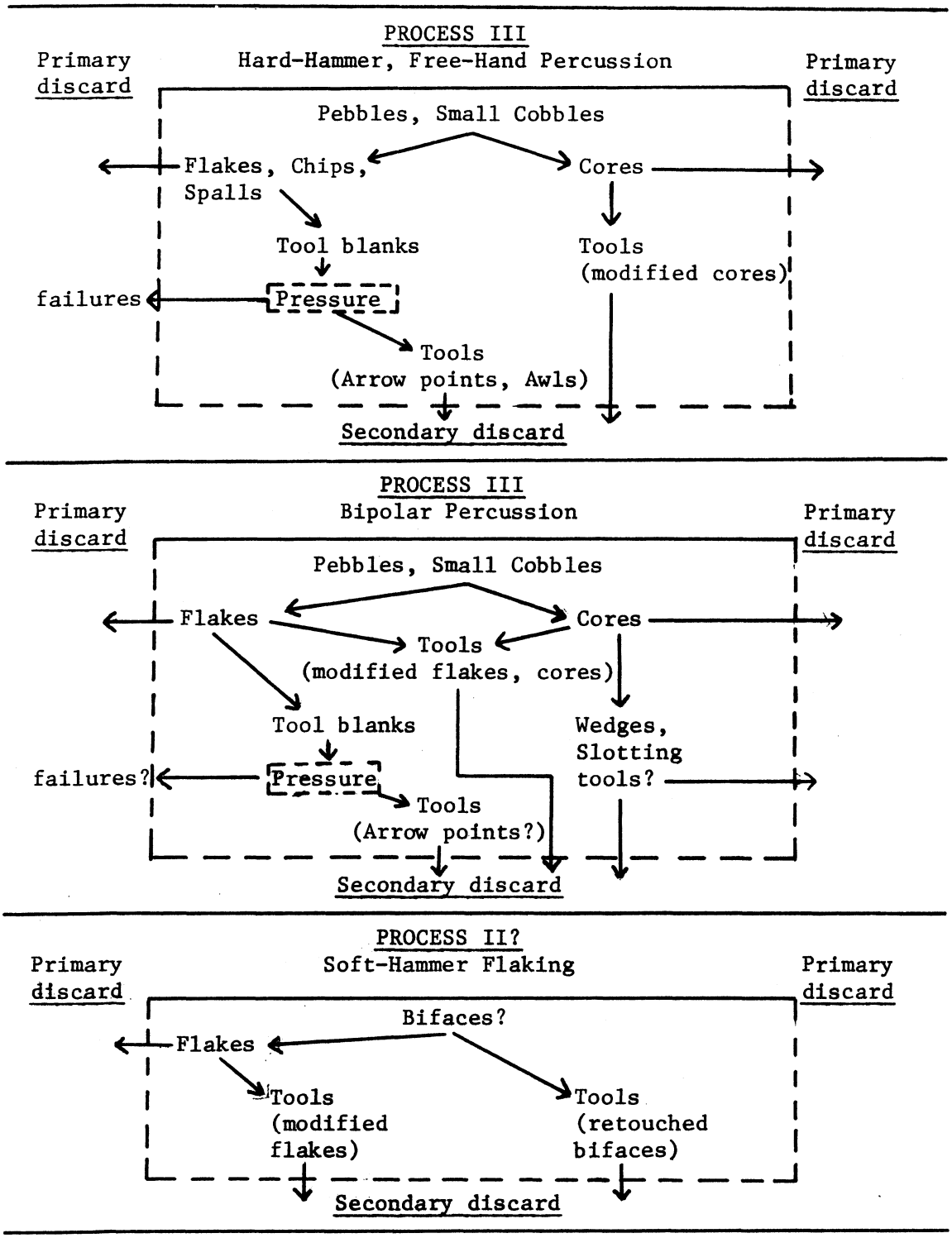


Figure 7. Reduction models for flint interpreted on the basis of the debitage sample.

Others were discarded. Cores were usually discarded when depleted, but a few which had sharp edges were utilized without further shaping.

Tool blanks were fashioned by pressure into tool forms; arrow points are demonstrable results of items of this strategy and awls and a few uniface tools described in Chapter 7 should be considered here as well.

Use of sharp edges on flakes, spalls, chips and cores, produced modified edges at the time of discard. Other by-products of this activity are microscopic flakes and chips produced by the modification itself. Not all modified flakes are considered the product of use although most of them probably are; surface specimens and examples from the plow zone sometimes show modification from being struck by the plow.

Other pebbles and small cobbles were reduced into flakes, spalls, and chips by bipolar percussion. Some of these products with sharp edges (including nuclei) were used, as indicated by modified edges. Certain cores may have functioned as small wedges or slotting tools, but others were apparently discarded on depletion. Tools made on bipolar flakes are rare, but this may be due to my inability to recognize such flakes after minor alteration. These slivers may have been fashioned into arrow points but this is merely conjecture and is not demonstrable.

The disparity in numbers between the bipolar flakes and cores is difficult to explain; inability to factor out the chips and other debitage from that produced by other techniques is probably a major cause.

The soft-hammer reduction model is also problematical. Biface

forms are not represented in the debitage sample in the form of failures, but soft-hammer flaked bifaces do occur as finished tools. It is conjectured that the most common use of the soft-hammer technique at the site was to refurbish dulled edges of biface tools. Several bifaces described in Chapter 7 appear to have been retouched by this technique.

Muto (1971) argues that the manufacturing process of bifacial percussion-flaked implements is a continuum starting with the raw material and ending with the last blow delivered. Provided the resources are available and the end product is in the mind of the maker, this process probably was a continuum. He further states that the stage by stage manufacturing sequence sometimes suggested statistically has little meaning to the flintworker. However, such "stages" could have meaning if certain products are to be transported great distances and reduced into several different end products. The soft-hammer debitage collection from the Davis Site is an example. There is no evidence to suggest that the continuum Muto describes exists at the Davis Site. If anything other than retouch is represented there, it appears only to have been final soft-hammer thinning of biface "preforms."

Quartzite

The sorting of the quartzite debitage followed the same criteria of attribute combinations that were used in the classification of flint debitage. Although this classification has limited applicability (as does any classification), it has been used to examine the

contrast which was hypothesized as existing between the various categories of material.

The quartzite debitage was sorted into two broad categories, fine-grained and coarse-grained. The coarse-grained quartzite debitage was sorted from the fine-grained quartzite because the coarser and granular texture may have required different reduction methods and the size of the parent mass was obviously much greater than that of the finer grained materials.

FINE-GRAINED QUARTZITE

Hard-Hammer Percussion

Wedge-Shaped (N = 24)

		No. of examples
Modified		
cortex platform	--	5
Unmodified		
cortex platform	--	17
without cortex platform	--	2
Total		24

Naturally Backed (N = 13)

		No. of examples
Modified		
cortex platform	--	1
without cortex platform	--	2

Unmodified		
cortex platform	--	6
without cortex platform	--	4
Total		13

Random (N = 302)

		No. of examples
Modified		
cortex platform	--	7
without cortex platform	--	9
Unmodified		
cortex platform	--	68
without cortex platform	--	218
Total		302

Free-Hand Core Debitage

Fine-grained quartzite cores are divided into two descriptive categories.

Group 1 (N = 5)

Description: All are very large pebbles exhibiting either a single removal or impact points in attempts to remove flakes. Maximum dimensions range from 36 to 63 mm.; mean is 51.

Group 2 (N = 28)

Description: These are stream worn nodules exhibiting random flaking. Two indicate possible attempts to shape the pebbles into some

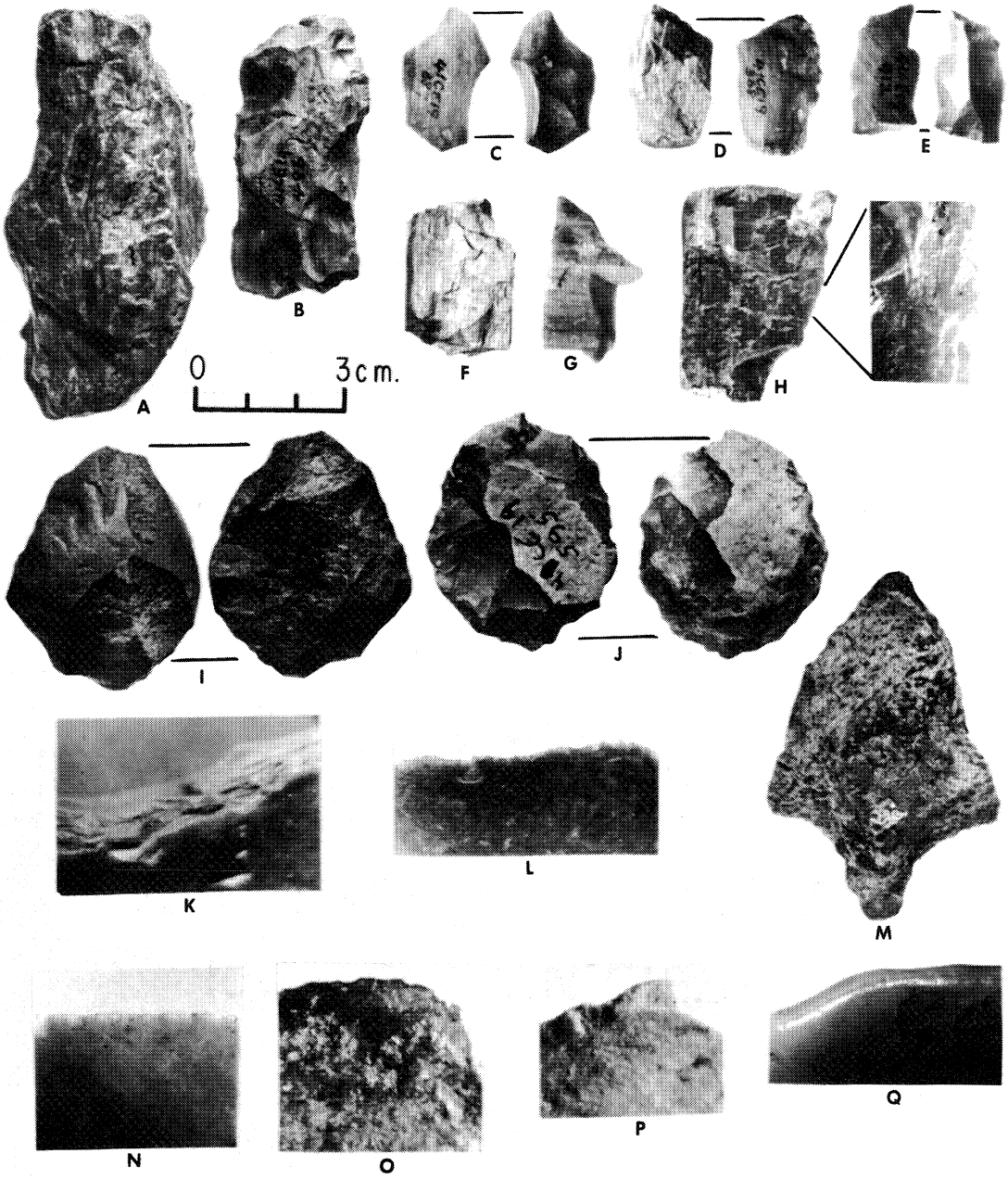


Figure 8. Silicified wood debitage, quartzite debitage, edge wear examples. A, silicified wood cobble. B, hard-hammer free-hand percussion core, Group 1. C-E, random hard-hammer free-hand percussion flakes. F, cleavage spall without sharp edges. G, cleavage spall with sharp edges. H, cleavage spall with modified (nicked and smoothed) edge. I, J, Quartzite Group 2 free-hand hard-hammer percussion cores. K, stepped flaking. L, edge nicking. N, O, edge nicking and smoothing. P, edge smoothing. Q, edge polish. M, experimental dart point.

tool form (Fig. 8, I, J); if so, they represent Process II reduction. Since this same procedure was seen in the manufacturing sequence of certain dart points, these two cores probably belong to the pre-Caddoan industry. The remaining specimens show random removals of small flakes suggesting a Process III reduction sequence. Two specimens have been heat treated.

Maximum dimensions range from 10 to 60 mm.; the mean is 39.

Bipolar Flake Debitage (N = 11)

These specimens are not subdivided into the descriptive groups used in classifying of the flint specimens because the sample is small. Bipolar features such as opposed-ridge and ridge-point occur in the sample.

		No. of examples
Modified	--	3
Unmodified	--	8
	Total	11

Bipolar Core Debitage (N = 18)

These artifacts are classified according to the same combinations of attributes as were used in classifying the flint specimens. The categories represented in this sample include opposed-ridge, ridge-base, point-base, and miscellaneous. For descriptions of the categories, see the bipolar core discussion under Flint.

Opposed-Ridge (N = 7)

Length: 14 to 37 mm.; mean, 24.

Ridge-Base (N = 3)

Length: 19, 25, 54 mm.

Point-Base (N = 1)

Length: 41 mm.

Miscellaneous (N = 7)

Description: Each of these specimens exhibits only one of the three diagnostic features of bipolar flaking.

Length: 18 to 40 mm.; mean, 27.

Direct Impact Flake Debitage (N = 42)

Description: These hard-hammer flakes possess striking platform and bulbar features indicative of a striking angle of about 90 degrees to the platform. Most are probably anvil percussion flakes that hinged out. However, they could have been produced by direct impact (ca. 90 degrees to platform) free-hand percussion.

		No. of examples
Modified		
Random		
	cortex platform --	6
Unmodified		
Random		

cortex platform	--	33
without cortex platform	--	3
Total		42

Soft-Hammer Percussion

Soft-Hammer Flake Debitage (N = 55)

Description: These flakes are presumed to be soft-hammer produced, because of the pronounced lipping of the striking platforms. Only a small number (about 10) appear to have been removed from biface cores.

		No. of examples
Modified	--	4
Unmodified	--	51
Total		55

Soft-Hammer Core Debitage

There are several bifaces of fine-grained quartzite which exhibit what appears to be soft-hammer flaking. Since they are mostly regarded as finished forms, they are described in Chapter 7.

Pressure

Quartzite Arrow Point Failures (N = 8; Fig. 14, H1-J1)

Description: These specimens are interpreted as being failures in a linear reduction sequence from a blank to a finished arrow point. Three are lacking distal portions and probably represent specimens

which accidentally snapped during manufacture. One has an oblique fracture which removed one shoulder. All have rudimentary stems. All but one are bifacially chipped enough to remove traces of the blank features. The exception was a flake with a distinct bulb of force. The primary reduction technique in the manufacture of arrow points is presumably pressure, although a punch (indirect percussion) may have been used at times.

Length: 25 to 30 mm.; mean, 28; width: 16 to 20 mm.; mean, 18; thickness: 4 to 6 mm.; mean, 5.

Technique Uncertain

Flake Debitage (N = 893)

Description: These specimens represent fragmentary chips, flakes, and flake shatter; they cannot be placed into previous categories due to their fragmentary condition. All of the reduction techniques discussed above are probably represented.

		No. of examples
Modified	--	38
Unmodified	--	855
	Total	893

Dart Point Failures (N = 5; Fig. 13, B)

Description: All represent failures in the manufacture of contracting stem dart points. Three failed due to inability to thin, one broke across an impurity in the material, and another broke along previous stress or fracture lines. The reduction technique is

percussion, not soft-hammer, since impact areas are small and positive eraillure flakes are sometimes retained in the bulbar area of the flake scar.

Length: 37 to 48 mm.; width: 24 to 36 mm.; thickness: 9 to 15 mm.

COARSE-GRAINED QUARTZITE

Hard-Hammer Percussion

Flake Debitage (N = 23)

Description: It is not possible to determine whether these flakes were produced by free-hand or bipolar percussion. Direct impact blows are suggested on some specimens, but the radial fracture pattern at the point of impact may be due to the coarse texture rather than to the angle of the blow relative to the striking platform. A ridge was followed in the removal of six; one retains traces of cortex and none has cortex striking platforms, indicating that the core masses of most specimens were quite large (small cobble size or larger).

Free-Hand Core Debitage (N = 3)

Description: The free-hand percussion technique was used in reducing these cores. Numerous random flake removals are exhibited on each. One is a stream worn very large pebble. Maximum dimensions are 71, 61, and 33 mm.

Bipolar Cores (N = 2)

Description: Both of these specimens are opposed-ridge bipolar

cores. Maximum dimensions are 25 and 21 mm.

Technique Uncertain

Flake Debitage (N = 23)

Description: These are angular flake fragments or spalls lacking either distinct striking platforms or bulbs of percussion. Four have a medial ridge on the dorsal side. One has a modified edge.

Dart Point Failures (N = 1; Fig. 13, A)

Description: This specimen was a failure in the manufacture of a contracting stem dart point. Apparently the principal cause of failure was the inability to thin to a usable size. Negative flake scars have pronounced bulbs and small areas of contact at the striking area. Technique is unknown but indirect percussion is suggested.

Length: 65 mm.; width: 22 mm.; thickness: 12 mm.

Summary of Quartzite Debitage

Quartzite debitage was sorted into two broad groups on the basis of different physical qualities, fine-grained and coarse-grained. Separate linear reduction models were constructed for each.

The fine-grained quartzite debitage reveals the main difference between Process II - dart point manufacture and Process III - flake blank production. Linear reduction models constructed on the basis of the findings are shown in Figure 10. Primary use of Process III debitage must have been for flakes which were used without modification as tools, although tool blanks were also produced. This

corresponds to the findings derived from the analysis of flint. However, the function of flake tool production cannot be demonstrated because minute edge alteration from use is difficult to recognize due to the texture of the stone. Certainly some flakes were used but a quantitative judgement of frequency is not possible.

A comparison of the frequency of cortex platform flakes was made with the flint sample. The contrast is marked, as the graph (Fig. 9) demonstrates. Cortex occurred on the striking platforms of 56 percent (N = 1182) of the flint sample whereas only 31 percent of the quartzite flakes (N = 339) have cortex striking platforms. The difference in the frequency of cortex platform flakes can be partly attributed to the relatively larger size quartzite occurs in the local deposits (see Chapter 3). Also, the higher frequency of noncortex platform flakes in the quartzite sample may reflect a strategy of core preparation (due to the poorer chipping quality) to better ensure successful flake removal. This possibility was tested by examining the frequency with which a ridge was followed. It was proposed that if platforms were prepared to ensure successful flake removal, then it might be expected that a ridge was followed more frequently than on the cortex-platform sample. A check revealed that 9 percent of the flakes which have cortex platforms (N = 93) followed some kind of a ridge; this is significantly less than the 20 percent of the noncortex platform flakes which followed a ridge (N = 224). This finding adds some support to the proposition.

The presence or absence of a ridge, by itself, should not be taken as necessarily indicative of flaking strategy. As Faulkner's

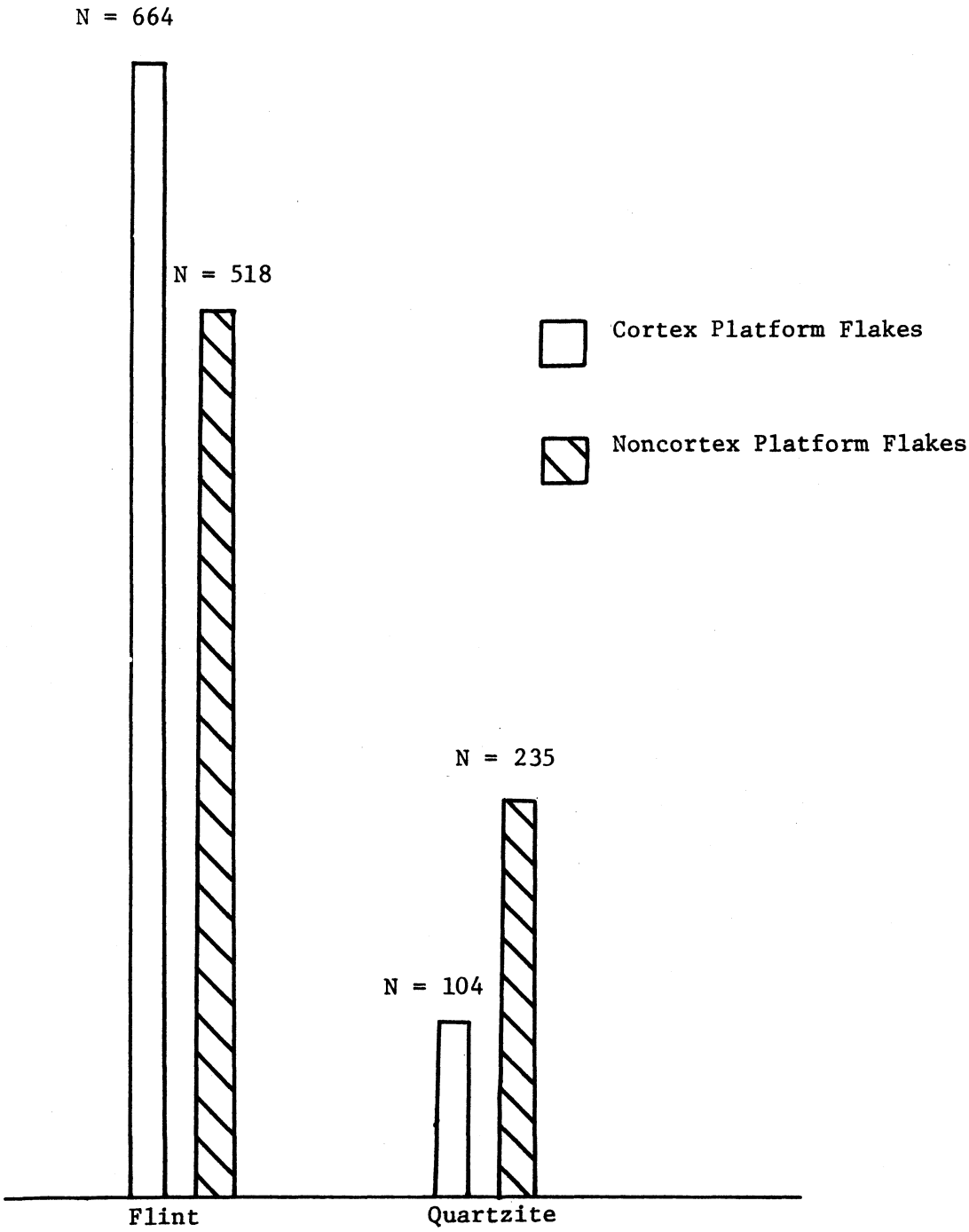


Figure 9. Frequency of cortex platform flakes in the flint and fine-grained quartzite debitage samples.

(1972) study clearly demonstrates, it is the over-all configuration of the free surfaces that largely determine the fracture plane of a flake. While a ridge may not be actually present on a core, the configuration of the free surfaces may be such that they function much like a ridge and permit a long flake removal.

All of the coarse quartzite debitage are products of Process III reduction as shown in the Linear Reduction Model illustrated in Figure 11. However, no parent nodules were recovered and, although cores are present, they had been reduced to the extent that the nature of the parent nodule could not be determined (with one exception, a stream worn small cobble). Modified coarse-grained quartzite flakes were hard to recognize and many of the flakes classified as unmodified were probably used; this, however, cannot be demonstrated.

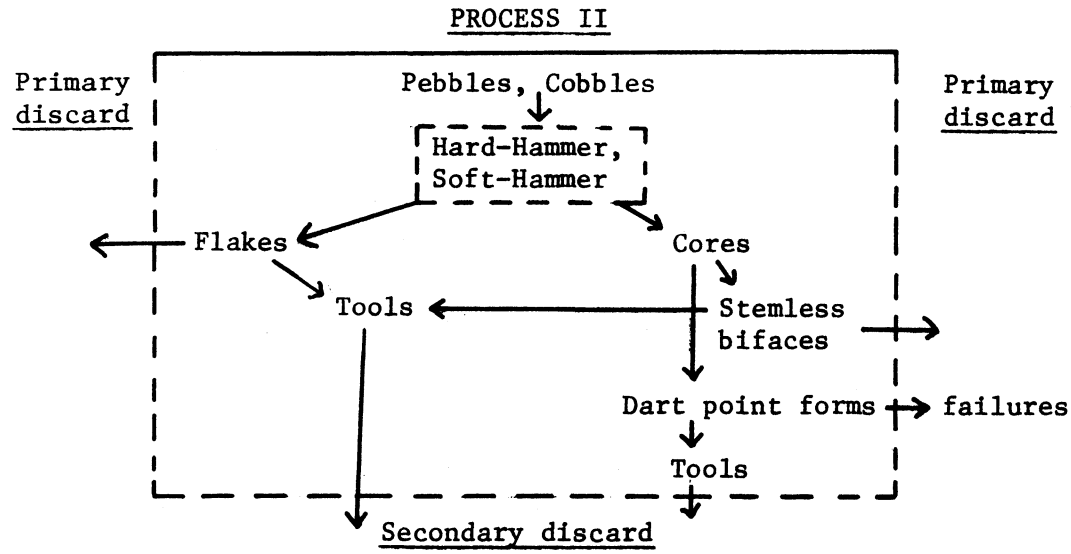
Reduction of coarse-grained quartzite was by hard-hammer free-hand and bipolar techniques. Dart points constitute the most frequently recognizable manufactured tools; hence, much of the coarse-grained debitage may predate the Caddoan occupation.

Both fine-grained and coarse-grained quartzite was used for tools shaped by abrasion and battering. Most represent Process I reduction but certain items which are formed by pecking and abrading represent Process II examples. There is no recognizable debitage from pecking and abrading, however.

Silicified Wood

One important attribute selected for in acquiring materials for

Fine-Grained Quartzite



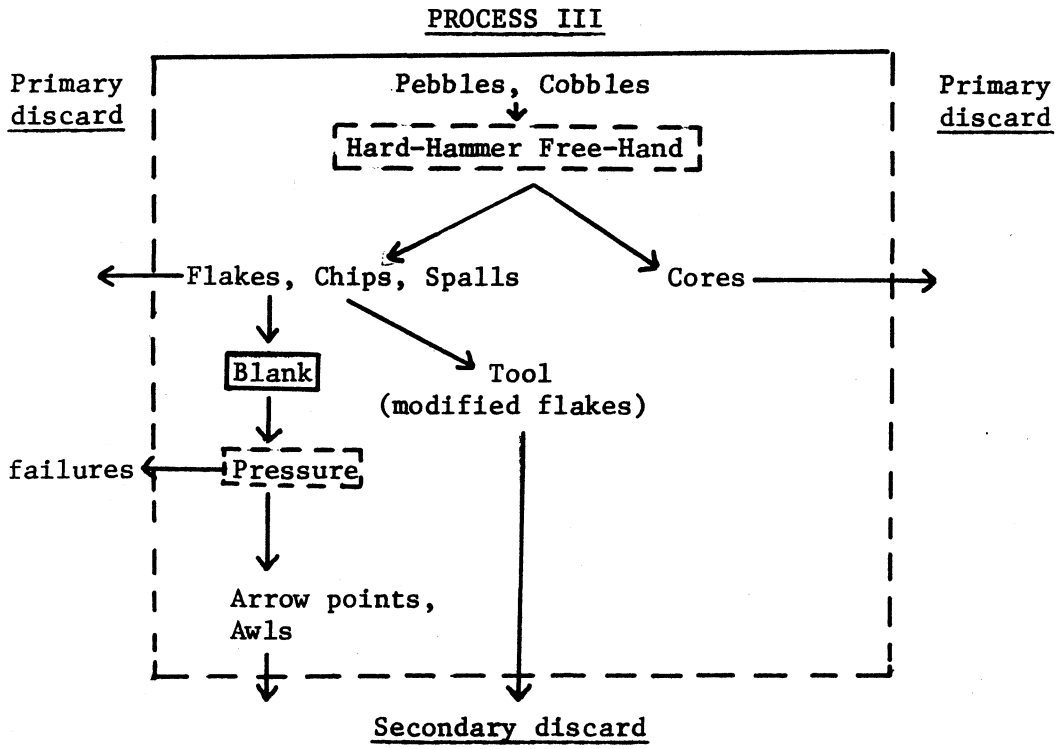


Figure 10. Reduction models for fine-grained quartzite interpreted on the basis of the debitage sample.

fabrication of chipped stone tools is uniform susceptibility to fracture in all directions (i.e., isotropic). Silicified wood rarely occurs in this form; it normally fractures either along fossil growth rings or along the axis of the grain in the fossil wood, both of which create natural cleavage planes. Therefore, silicified wood is not ideally suited for reduction by chipping. The best results are achieved by flaking perpendicular to the grain; flaking along the grain axis often results in cleavage but the cleavage path is not predictable.

Reducing a cobble or large pebble into cleavage spalls does serve one advantage. Cell bonds forming the annual growth rings are often weak and tabular cleavage spalls are common. Provided the material between these cleavage planes is sufficiently homogenous to permit shaping by chipping, such spalls can be shaped into tool forms without thinning. Heat treating was commonly used to improve the flaking quality of the stone.

The classification of silicified wood follows the previously used headings as nearly as possible. The debitage is grouped into four basic categories: hard-hammer, soft-hammer, pressure, and technique uncertain.

Hard-Hammer Percussion

Free-Hand Flake Debitage (N = 154; Fig. 8, C-E)

Description: These flakes are classified as random following the grouping used in sorting the flint and quartzite flake debitage.

		No. of examples
Modified	--	45
Unmodified	--	109
	Total	154

Free-Hand Core Debitage

The hard-hammer free-hand percussion cores are divided into three categories for descriptive purposes.

Group 1 (N = 1; Fig. 8, B)

Description: This pebble has been chipped unifacially around much of its circumference by hard-hammer percussion. The specimen appears to be a failure in the manufacture of a Process II tool. Inability to thin the core due to premature snapping and stepped hinge fracturing probably led to discard. The specimen is 54 mm. in maximum dimension.

Group 2 (N = 25)

Description: These artifacts represent attempts to fashion cleavage spalls into bifaces; therefore, they are Process II products. Most are fragmentary and no recognizable form is indicated; shapes are variable due to fracturing qualities of the stone. Fifteen appear to be heat treated. Maximum dimension varies from 19 to 58 mm.; mean is 34.

Group 3 (N = 6)

Description: These items are pebbles or small cobble fragments exhibiting flake or cleavage spall removals. Since no shaping is

indicated and the removals appear to be random, they are interpreted as being Process III cores. Maximum dimensions range from 28 to 62 mm.; mean is 49.

Bipolar Flake Debitage (N = 2)

Description: The only recognizable debitage of this technique consists of two flakes and two nuclei. Both exhibit points of percussion on one end and terminate at feather-edges on the distal ends.

Bipolar Core Debitage

Opposed-Ridge (N = 1)

Maximum dimension: 36 mm.

Point-Ridge (N = 1)

Maximum dimension: 28 mm.

Soft-Hammer Percussion

Flake Debitage (N = 21)

Description: Small flakes with pronounced lipping of striking platform. Several appear to be removed from bifaces. None is modified.

Core Debitage

Cores exhibiting possible soft-hammer removal are described under the heading of Technique Uncertain since they exhibit percussion flaking, but the technique is not demonstrable. Experiments with

similar material reveal that the use of the soft-hammer technique on silicified wood in biface production rarely results in flakes diagnostic of the technique.

Pressure

The only debitage classifiable as pressure produced are the failures in the process of arrow point manufacture.

Arrow Point Failures (N = 7; Fig. 14, U1)

Description: All specimens represent failure during the course of manufacture. The chief reason for failure was inability to thin the specimen, largely because of the lack of homogeneity of the material. All have rudimentary stems and most are relatively complete (one lacks distal end).

Length: 18 to 28 mm.; mean, 22; width: 13.5 to 22 mm.; mean, 17; thickness: 3 to 5 mm.; mean, 4.

Technique Uncertain

Under this heading are cleavage spalls which fractured along a grain axis or a fossil growth ring. The technique of removal cannot be determined; identical results have been achieved experimentally by both free-hand and bipolar percussion. Cleavage spalls frequently snap in such a way as to leave a right-angle edge and tabular or blocky shapes. These squared edges are not suitable for use and are very difficult to shape, as any flintknapper will attest. However, one or more sharp edges may occur and in such cases the items are suitable

for potential cutting tools. Also, since many cleavage spalls are tabular and have suitable edge angles for striking platforms and the material was sometimes sufficiently homogeneous to allow for further flaking, some of them were flaked into tool forms such as bifaces or unifaces.

Cleavage spalls are divided into two categories, those with sharp edges and those without sharp edges.

Cleavage Spalls With Sharp Edges (N = 188; Fig. 8, G, H)

		No. of examples
Modified	--	43
Unmodified	--	145
	Total	188

Cleavage Spalls Without Sharp Edges (N = 217; Fig. 8, F)

All are unmodified.

Core Debitage (N = 7)

Description: These cores are described here since, while they are obviously percussion chipped, the precise technique (hard-hammer or soft-hammer) cannot be determined. Most are interpreted as being failures during the course of dart point manufacture. Three are made on thin silicified wood pebbles and may be fashioned by soft-hammer flaking but this is not certain. One broke along the grain, apparently while the base was being thinned; another broke along a previous stress line.

Length: 41 to 64 mm.; width: 17 to 37 mm.; thickness: 6 to 12 mm.

Summary of Silicified Wood Debitage

The inferred reduction sequences of silicified wood raw materials at the site are presented in Chapter 5 (Fig. 4). Analysis of residue from silicified wood reduction indicates that the material was used for stone tool manufacture by both pre-Caddoan and Caddoan occupants of the Davis Site. The dart points described in the next chapter and the dart point failures described above are most likely pre-Caddoan; this interpretation is favored on the basis of chronological data for the area and because there is no convincing evidence that silicified wood dart points (or any other dart points) have been found in conjunctive association (i.e., intentionally placed as furniture; Jelks, 1965) with Caddoan burials; this is certainly true in the burials at the Davis Site.

Processes II and III are indicated in the debitage; silicified wood nodules were reduced by hard-hammer free-hand, bipolar, and soft-hammer techniques; cleavage spalls with sharp edges and flakes were found with modified edges and presumably most of these were used as tools. Failure in the manufacture of arrow points and dart points is demonstrated in both Process II and Process III reduction. All arrow points indicate Process III reduction.

In order to understand better the behavior of silicified wood using hard-hammer and soft-hammer techniques, samples of silicious

pebbles and small cobbles of this material were reduced in a laboratory experiment. The raw material sample was gathered from outcrops in the Rockdale formation, the same geological formation which was probably the source for the Davis Site materials. Attempts were made to shape these pebbles into bifaces. The first three trials failed completely and ended in a small pile of cleavage spalls. In the fourth attempt, however, the pebble was successfully reduced to a contracting stem "dart point." I classify this specimen as a failure, however, due to my own lack of skill. Prior to reduction, the pebble was tabular, 78 mm. long, and roughly oval in outline, and 15 mm. thick. A quartzite hammer was used to create edge angles sufficient for soft-hammer flaking and periodically to remove troublesome portions of the platform. Most of the flaking was done with a caribou antler billet. The end product is shown in Figure 8, M. The debitage from this experiment consisted of twenty recognizable flakes (with definable striking platforms and bulbar portions) and thirty-five sharp-edged cleavage spalls, plus many tiny chips and dust particles. Although most of the flaking was done with a soft hammer, only two flakes retained attributes indicative of this technique (i.e., pronounced lipped striking platforms, arched cross-sections, etc.).

The experiment provides some insight into the problems of silicified wood reduction. The lack of success in using a hard hammer compared with the relative success in using the soft hammer leaves this writer with the opinion that a soft hammer was a necessary tool in the manufacture of bifaces from silicified wood, even though tabular

pebbles and cleavage spalls were often used. No attempt was made to use indirect percussion in the experiment.

Manning Fused Glass

The unusual properties of this material make identification of specific reduction techniques difficult. The glassy, brittle structure, coupled with the voids and fissures in the nodules themselves, resulted in a high incidence of shatter and unpatterned fracturing upon detachment. Consequently, only a small proportion of the flakes in the sample have attributes indicative of particular methods of reduction. An inspection of the cores does not shed light on the question; only three core fragments have good negative cones or bulbs of force from flake removals. These could result from either hand-held hard-hammer or bipolar percussion. By and large, the cores are angular fragments of shattered masses. Six cores are clearly the nuclei resulting from anvil percussion and represent the only certain technique of reducing this material aside from the use of pressure to shape arrow points.

Flakes were sorted and analyzed for attributes indicative of reduction methods. Flakes with striking platforms, bulbs of force, or other definitive features were first selected; next, these were sorted into two groups, bipolar and miscellaneous. Several techniques of removal could account for the flakes in the miscellaneous sample. The sorting was carried out in the hope of revealing strategies of core preparation. There are flakes in the sample that may have been removed from bifaces, but if so, the technique was not soft-hammer. There are

no recognizable soft-hammer flakes in the collection.

The only significant conclusions that can be drawn are that (1) ridges were frequently followed in removing flakes and (2) hard-hammer free-hand percussion, bipolar percussion, and pressure techniques are suggested by flake attributes. The character of the material precludes cortex as having meaningful distribution on flakes. Cortex is absent on the cores. For descriptive purposes, the flakes are divided into the following categories: bipolar percussion, miscellaneous, flake fragments, and pressure.

Percussion

Bipolar Flake Debitage

Opposed-Ridge (N = 2)

Description: Each end exhibits a ridge of percussion. One is modified.

Miscellaneous (N = 7)

Description: Each of these flakes possess one of the three characteristics of bipolar flaking (ridge of percussion, point of percussion, or area of percussion). Four have modified edges.

Bipolar Core Debitage (For description, see Flint)

Opposed-Ridge (N = 2)

Maximum dimension: 24 and 10 mm.

Point-Base (N = 1)

Maximum dimension: 20 mm.

Miscellaneous (N = 3)

Maximum dimension: 23, 22, and 18 mm.

Technique Uncertain

Miscellaneous Flake Debitage (N = 61)

Description: These flakes have either bulbs of percussion or traces of bulbs of percussion. They could be the by-products of both hand-held percussion and pressure; the latter technique is suggested by the size of certain flakes. An exterior ridge was followed in the removal of twenty-three specimens. Thirteen are modified along one or more edges.

Flake Fragment Debitage (N = 59)

Description: Flake fragments and miscellaneous shatter are included here. Seven reveal edge modification.

Miscellaneous Core Debitage (N = 20)

Description: The term core is used loosely here; most of these specimens are nodules which represent nuclei resulting from the shatter of a still larger mass. Only two have clear negative bulbs of percussion resulting from flake removals. However, four possess attributes suggestive of direct impact percussion; they are included here because they were reduced by hard-hammer percussion, although the particular techniques cannot be accurately determined.

Maximum dimensions: 17 to 38 mm.; mean, 25.

Pressure

Arrow Point Failures (N = 2; Fig. 14, D2, E2)

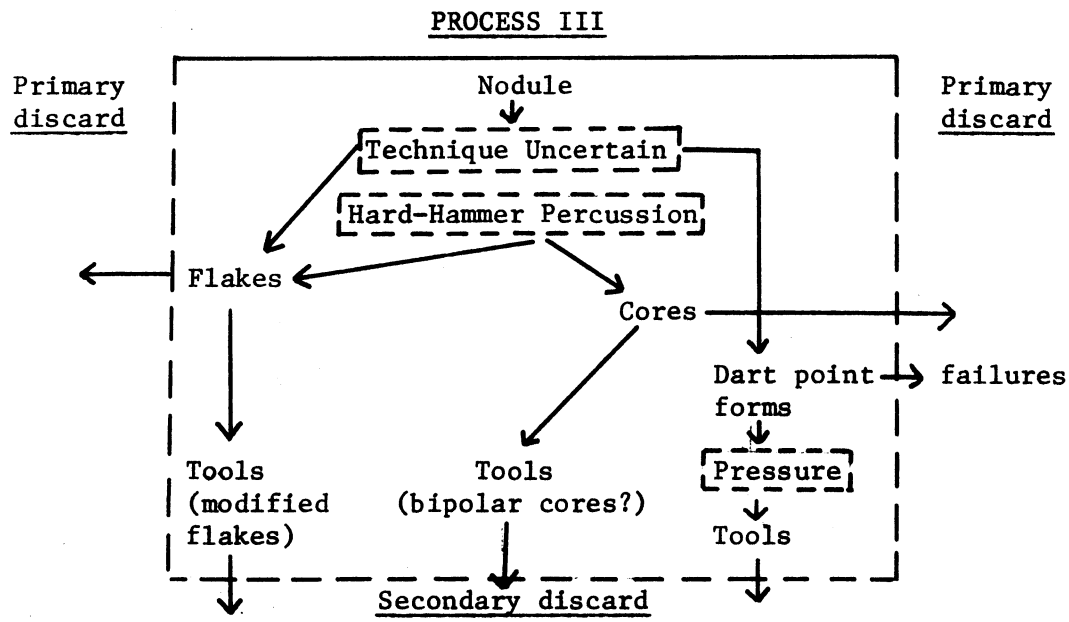
Description: These two specimens exhibit premature snapped fractures on unfinished forms. The fine marginal trimming displayed on the finished examples of this material (i.e., arrow points) is lacking on these specimens. One has a rectangular stem (i.e., Alba form) and the other has a bulbar (parallel sided, rounded base) stem. Both are regarded as failures during the course of arrow point manufacture and present demonstrable evidence that Manning fused glass was reduced into tool forms at the site.

Only one specimen retains a distal end; it measures 20 mm. long, 12 mm. wide; the second example measures 16 mm. wide; and both are 3 mm. thick.

Summary of Manning Fused Glass Debitage

Manning fused glass was acquired in small nodules which vary considerably in quality. They were reduced by anvil percussion, possibly by free-hand percussion, and by pressure. The shatter and flakes were then further reduced by utilization (if tools are actually represented in the modified flake sample). Some of the flakes and spalls were shaped by pressure into biface forms, particularly arrow points. Two obvious failures in arrow point manufacture further indicate that Process III reduction steps were being carried out at this site. The

Coarse-Grained Quartzite



Manning Fused Glass

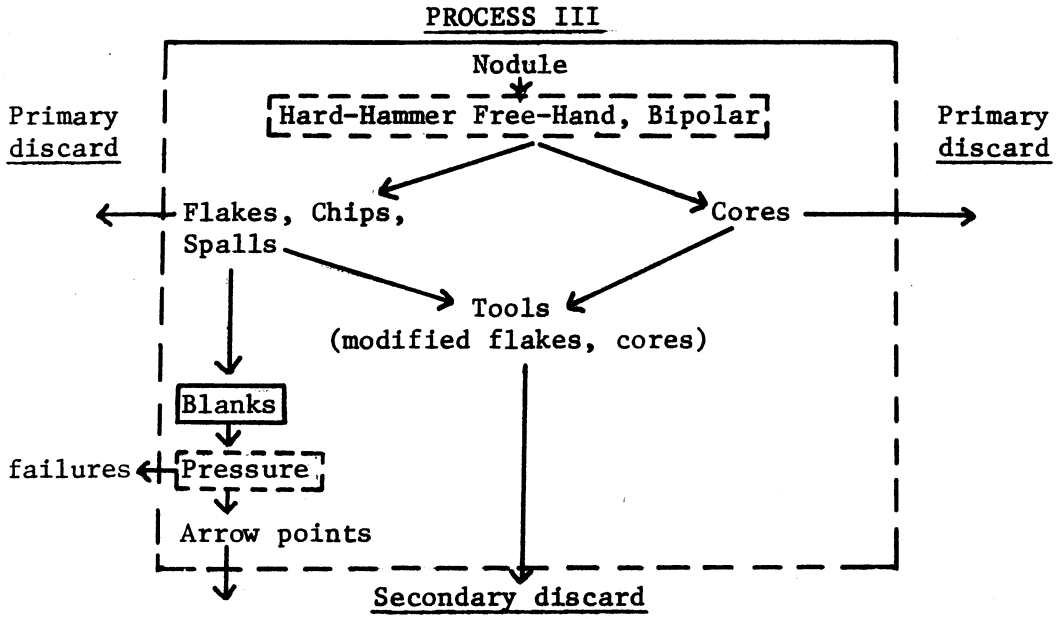


Figure 11. Reduction models for coarse-grained quartzite and Manning fused glass interpreted on the basis of the debitage sample.

linear reduction model is present in Figure 11. There is no indication that either Process I or Process II reduction steps were associated with Manning fused glass. The relative frequency with which ridges were used to direct the force of fractures is probably indicative of the brittle nature of the materials.

Attempts to produce a comparative sample by known techniques (anvil percussion and hard-hammer free-hand percussion) resulted in virtually duplicating the fracture patterns seen in the archeological samples. Flakes considered above as bipolar and free-hand percussion were produced by anvil percussion. The hard-hammer free-hand percussion techniques produced a high incidence of shatter (ca. 70 percent) and flakes considered as characteristic of the technique. None of these flakes had properties indicative of anvil percussion. This brief experiment provided some basis for future sorting as well as a check for the archeological sample. The writer is even more confident that anvil percussion was a major technique of reducing Manning fused glass.

Miscellaneous Stone Debitage

Small samples of debitage from the reduction of materials other than those just described were recovered. Despite the small sample, some of them are important because they represent reduction of foreign materials at the site.

SILTSTONE OR TUFF

Two hard-hammer percussion flakes, a flake fragment, and a

small nodule exhibiting possible flake scars of pink, very fine siltstone or tuff are present in the sample. The texture is chalky and can be scraped with the fingernail, but it breaks with a conchoidal-like fracture because of its homogeneous mass. The material resembles the pink baked tuff collected by Kenneth M. Brown from the Manning formation in Walker County, Texas (sample in the collections at the Texas Archeological Research Laboratory, Austin). Also, a pair of unperforated earspools recovered from Fea. 119 are made of a similar material; these earspools are described in Chapter 8.

HEMATITE

Three hard-hammer percussion flakes and two nodular fragments constitute the sample. These fragments may have been chipped from concretions which were fashioned into tools.

QUARTZ CRYSTAL FLAKE

One flake of quartz is present; a portion of a faceted side is retained along one edge indicating it was removed from a quartz crystal.

GRAY-GREEN SANDSTONE AND CLAYSTONE

Thirty flakes and spalls of these foreign materials are present in the sample. All were removed from celts and exhibit portions of faceted surfaces (Fig. 24, J, M). They are described here because they represent debitage from reducing celts, or celt fragments. The other fragments of celts are described in Chapter 7 because they are regarded

as pieces of broken celts and not as chipping debitage. Krieger (in Newell and Krieger, 1949: 157) stated that these minerals could have been obtained in the mineral region of the Arbuckle Mountains of Oklahoma or the Ouachita Mountains of Oklahoma and Arkansas.

FERRUGINOUS SANDSTONE

There are over three hundred fragments of ferruginous sandstone nodules in the catalogued collection. It is abundant in the local geological formation outcropping along the terrace edge, particularly the Weches formation. In the Davis Site collection grain size varies from very fine to coarse on the Wentworth scale and some grains are micaceous. Several specimens are fragments of concretions. Although some of them may have occurred naturally in the soil, most are regarded as having been introduced by man into the fill, because of their size and fragmentary condition. Some may be fragments of broken sandstone artifacts such as pitted stones. The size ranges from a few mm. long to masses of 150 mm., in length (estimated).

CATAHOULA SANDSTONE

Twelve fragments of Catahoula sandstone are in the collection; these have the characteristic quartz sand grains imbedded in a white opaline matrix. Sand grain size varies from very fine to medium on the Wentworth scale. These items could be either broken segments of artifacts such as abrading stones or by-products resulting from the manufacture or shaping of tabular abrading stones from larger masses. Flake characteristics are exhibited on two examples.

Discussion

Virtually all lithic debitage in the sample came from the 1968-70 University of Texas excavations. Tabulation of debitage is presented in Table 2. The distribution by excavation unit is not included as a part of this study; however, no area of investigation, save the fill in Mound C, was entirely free of debitage.

Three samples of debitage will receive comment because their presence in the features in which they were found provides certain data relevant to later discussions. These are samples of debitage included as furniture in Fea. 119 and Fea. 155 (both Stage II burials in Mound C). The third sample is a collection of flakes found interred in a post mold in Fea. 112, a small circular structure beneath Mound B.

The first layer of offerings in Fea. 119 contained sixty-nine artifacts classifiable as debitage. This includes sixty-six flakes and three cores. The second layer contained nineteen flakes and seven cores, giving a total of ninety-three pieces of debitage in the burial pit; this constitutes the largest single class of stone artifacts in the burial.

Hard-hammer free-hand percussion flakes and cores are predominant and random flakes and flake fragments constitute the largest categories; wedge-shaped and backed flakes occur infrequently. By inspection, the cores and flakes as a collection are larger than the village mean and the flint is, almost without exception, nonlocal. Pitted, weathered, nonstream-rolled surfaces predominate. The relative

size of the core masses probably accounts for the paucity of wedge-shaped flakes.

Two of the flakes from the first layer were removed from the same core and can be fitted together in sequence. One other flake can also be matched to a core; both of these were also recovered from the first layer. Two cores in the second layer were part of a once larger mass since they can also be fitted; both, however, seem to have been further reduced following their separation.

A surprising finding was the degree of utilization manifested on many of the specimens. Microscopic analysis reveals the following wear pattern distribution on the flakes and cores.

		No. of examples
Smoothed	--	1 (sharp edge of a core)
Nicked and Polished	--	21
Nicked	--	17
Nicked (?)	--	22
Trimmed	--	4
Nicked and Trimmed	--	2
Unmodified	--	26
Total	N =	93

The inclusion of flakes and cores with utilized edges suggests that some of these items may have been included as parts of tool kits. Others, however, probably were not; one core for example, is a nonlocal flint nodule of small cobble size which exhibits but a single flake removal; it may have represented a test core.

The sample from Fea. 155 is much smaller and contains a much higher ratio of cores to flakes (6 flakes and 3 cores). Too, there is no clear evidence of utilization on any of these. Two small cores were thoroughly battered and could represent direct percussion (perhaps even bipolar) flaking; the remainder were reduced by hard-hammer free-hand percussion.

Story (1972: 70, 71) reports a concentration of lithic debitage in an interior post mold in Fea. 112, a small circular structure beneath Mound B. This collection can be sorted as follows:

		No. of examples	
Hard-Hammer Flakes			
Wedge-Shaped			
Modified	--	3	
Unmodified	--	24	
Random			
Modified	--	16	
Unmodified	--	24	
Hard-Hammer Cores	--	6	(Group 3, 3; Group 5, 1; Group 6, 1)
Soft-Hammer Flakes			
Unmodified	--	2	(neither appear to have come from bifaces)
Technique Uncertain (flake fragments)			
Modified	--	16	
Unmodified	--	38	
Total		129	

It is worth noting that all of the flakes are of flint; most appear to be from local deposits. Attempts to fit flakes onto cores failed, and material differences indicate that the flakes were derived from numerous cores. Wear patterns are principally nicking and trimming. No obvious smoothing or polishing is indicated, raising the possibility that the edge alteration may be due more to traffic than to actual use.

Summary

There were several reasons for carrying out the lithic debitage analysis. First, we wanted to know what kinds of materials were reduced at the site and their approximate frequency. This would give some idea or measure of selectivity. Second, we needed to know the techniques of reduction and their approximate frequency relative to stone class in order to determine if there were significant changes in strategy. Third, we were anxious to demonstrate broad technological trends which characterize the Caddoan reduction systems and which could be used to separate these from the pre-Caddoan systems. Findings to these questions are enumerated below.

1. Flint is by far the most commonly reduced chipped stone material, as noted in Chapter 3, it comprises 62.20 percent of the sample (debitage sample size is 6860). Quartzite, especially fine-grained, is next in frequency with 21.23 percent. Coarse-grained quartzite is included in this figure but accounts for less than 1 percent of the total sample. Silicified wood makes up 9.18 percent of the sample. Manning fused glass comprises only 2.28 percent. All other materials account for 5.09 percent of the sample.

2. The principal reduction technique was free-hand percussion in the flint, quartzite, and silicified wood classes, despite the fact that rarely does a nodule measure larger than "very large pebble" on the Wentworth scale. Cores were characteristically not prepared; however, when platforms are faceted (prepared?), there is a vague hint that these are more frequent in the quartzite sample. If so, this could be a reflection of relative core size and material quality. Flakes are typically oval in shape and flakes having blade proportions are very rare. Cortex backed flakes are common and are likely the result of both the flaking strategy and size of raw material.

The bipolar technique was used occasionally. This technique allowed the flintknappers to maximize the reduction of small masses. Manning fused glass was apparently mostly reduced by this method. The bipolar technique was least frequently used in the silicified wood category.

Bipolar cores outnumber flakes nearly two to one and this phenomenon presently lies beyond satisfactory explanation. It is suggested that difficulty to recognize bipolar debitage in the flake fragments is partly responsible. Too, many bipolar flakes may have been extensively used in producing small bifacial tools by pressure flaking.

Flakes identified as products of soft-hammer percussion are found in every major material class except Manning fused glass. Here again, however, they are overwhelmingly of flint (306 out of a sample of 382, or 80 percent; quartzite is 14 percent; and silicified wood

6 percent).

It is difficult to quantitatively compare the reduction techniques used in chipping silicified wood because of its fracture qualities. Certainly hard-hammer free-hand percussion was a major technique and, as noted above, if our classification has real meaning, soft-hammer percussion was used. However, bipolar percussion would less likely be identifiable on this material than any other material class because of its peculiar behavior to fracture along cleavage planes. Hence, our emphasis on hard-hammer free-hand percussion could be skewed. This is equally true with regards to identifying soft-hammer flaking. Very few flakes were produced experimentally than would be classified as soft-hammer in the classification followed here.

3. Reduction following the Process III model accounts for most of the flint debitage. Items manufactured by Process II reduction sequence are rare and, in terms of sample size, are not regarded as significant. This does not seem to be the case with quartzite and silicified wood, however. Both of these stone material categories exhibit Process II products. This differential frequency of reduction methods relative to stone class is regarded as representing a significant difference between the pre-Caddoan and Caddoan technological systems. The pre-Caddoan technology centered on using the resources that were locally available and favored a greater selection of quartzite and silicified wood than did the later systems. It is doubtful that the earlier flintknappers consciously selected for stones other than flint; rather, the "core technique" of reduction (i.e., Process II) together with the particular projectile point forms needed and method

of hafting were adapted to whatever resources were available. It is further noted that the scope of interaction of these pre-Caddoan systems seems to have been localized; materials from adjacent regions are not common.

The Caddoan technology, on the other hand, was oriented or based on a Process III reduction system. Quartzite is more difficult to reduce into usable flakes because of the coarser texture, and silicified wood often shatters into unusable cleavage spalls. It is proposed that flint was better suited for this purpose than the other two locally occurring products and that a greater effort was made to procure flint. This is especially evident in the associations described above from Fea. 119, Fea. 155, and Fea. 112 where not a single flake or core of material other than flint was included.

Despite the effort to procure flint, there is no hint that nodules larger than small cobbles (64 to 128 mm.) were reduced on the site. Hence, the relatively small sample of soft-hammer flakes is attributed to reduction of Process II flint cores by pre-Caddoan flintknappers, but some of the larger flakes preclude reduction of local flint resources simply because their parent cores had to exceed the expected local resource size limits.

Reduction on the site of materials obtainable in surrounding regions by Caddoan workers is indicated. This is clear in the Manning fused glass debitage (and some of the flint also). Manning fused glass was a small size resource and was easily incorporated into the existing reduction strategies without causing a significant change.

There is a small sample of foreign materials (i.e., not obtainable in local or regional deposits), but all of these reflect reduction of previous artifacts (celts, quartz crystal) by Caddoan peoples.

The debitage discussion is, of necessity, almost exclusively devoted to chipped stone products. This is due to the near absence of recognizable debitage resulting from other methods of reduction such as abrasion, pecking, and battering. There does not appear to be a significant amount of manufacture of ground or polished stone artifacts at the site. Those ground stone artifacts produced by on the site activities are attributed to the Caddoan occupants on the basis of context and were mostly shaped through use. Hence, they constitute Process I products. It is possible that ground stone artifacts manufactured from fine micaceous ferruginous sandstone and pink tuff-like material were made at the site. However, it is hypothesized that the vast majority of the ground and polished stone artifacts of nonlocal materials described in Chapter 8, Part 1 were made elsewhere. This hypothesis is based on negative evidence, the absence of debitage of like materials and that the raw materials used in the manufacture of most are not present in local deposits. The hypothesis must await testing until an adequate debitage sample from the eastern (Mound A) portion of the site is available for study.

In summary, the Caddoan chipped stone technology as indicated by debitage analysis is characterized by Process III reduction models. Flint was obviously preferred; it was the single most frequent class in the archeological sample but was not the most frequent class in the

local geological deposits. The principal products were flakes produced by percussion techniques (mostly hard-hammer free-hand). From these flakes were drawn specimens for immediate use as tools and blanks for further reduction into tool forms. Arrow points and awls seem to be the main biface tools manufactured at the site.

In contrast, the terrace yielded a thin scattering of pre-Caddoan (late Archaic) lithic materials. Many flakes produced by these flintknappers were undoubtedly included in the above analysis and are indeed inseparable. Some of their products may also have been recycled into the Caddoan systems. However, the broken preforms give some hint that these earlier knappers were not as particular about material quality so long as the pebbles could be shaped into their desired tool forms. That is, the technology is characterized by Process II reduction although clearly it was not restricted to this strategy.

Table 2. Tabulation of Debitage.

Class	Number	Percent of Sample
FLINT		
Hard-Hammer Percussion		
Free-Hand Flake Debitage		
Wedge-Shaped	242	
Naturally Backed	82	
Random	858	
Miscellaneous	4	
Free-Hand Core Debitage		
Group 1	19	
Group 2	15	
Group 3	34	
Group 4	99	
Group 5	19	
Bipolar Flake Debitage		
Opposed-Ridge	12	
Point-Ridge	16	
Point	6	
Bi-Pointed	4	
Ridge	17	
Miscellaneous	11	
Bipolar Core Debitage		
Bi-Pointed	11	
Point-Ridge	13	
Opposed-Ridge	50	
Point-Base	9	
Ridge-Base	21	
Miscellaneous	20	
Direct Impact Flake Debitage	90	
Soft-Hammer Percussion		
Flake Debitage	306	
Pressure		
Arrow Point Failures	33	
Technique Uncertain		
Flake-Spall Debitage	2,272	
Core Debitage	4	
SUBTOTAL	4,267	62.20

Table 2, continued

Class	Number	Percent of Sample
FINE-GRAINED QUARTZITE		
Hard-Hammer Percussion		
Free-Hand Flake Debitage		
Wedge-Shaped	24	
Naturally Backed	13	
Random	302	
Free-Hand Core Debitage		
Group 1	5	
Group 2	28	
Bipolar Flake Debitage	11	
Bipolar Core Debitage		
Opposed-Ridge	7	
Ridge-Base	3	
Point-Base	1	
Miscellaneous	7	
Direct Impact Flake Debitage	42	
Soft-Hammer Percussion		
Flake Debitage	55	
Pressure		
Arrow Point Failures	8	
Technique Uncertain		
Flake Debitage	893	
Dart Point Failures	5	
SUBTOTAL	1,404	20.47
COARSE-GRAINED QUARTZITE		
Hard-Hammer Percussion		
Flake Debitage	23	
Free-Hand Core Debitage	3	
Bipolar Core Debitage	2	
Technique Uncertain		
Flake Debitage	23	
Dart Point Failures	1	
SUBTOTAL	52	0.76

Table 2, continued

Class	Number	Percent of Sample
SILICIFIED WOOD		
Hard-Hammer Percussion		
Free-Hand Flake Debitage	154	
Free-Hand Core Debitage		
Group 1	1	
Group 2	25	
Group 3	6	
Bipolar Flake Debitage	2	
Bipolar Core Debitage		
Opposed-Ridge	1	
Point-Ridge	1	
Soft-Hammer Percussion		
Flake Debitage	21	
Pressure		
Arrow Point Failures	7	
Technique Uncertain		
Cleavage Spalls w/ Sharp Edges	188	
Cleavage Spalls w/o Sharp Edges	217	
Core Debitage	7	
SUBTOTAL	630	9.18
MANNING FUSED GLASS		
Hard-Hammer Percussion		
Bipolar Flake Debitage		
Opposed-Ridge Flakes	2	
Miscellaneous	7	
Bipolar Core Debitage		
Opposed-Ridge	2	
Point-Base	1	
Miscellaneous	3	
Technique Uncertain		
Miscellaneous Flake Debitage	61	
Flake Fragment Debitage	59	
Miscellaneous Core Debitage	20	
Pressure		
Arrow Point Failures	2	
SUBTOTAL	157	2.28

Table 2, continued

Class	Number	Percent of Sample
SILTSTONE OR TUFF		
Hard-Hammer Percussion		
Flake Debitage	2	
Flake Fragments	1	
Technique Uncertain		
Nodule	1	
SUBTOTAL	4	.06
HEMATITE		
Hard-Hammer Percussion		
Flake Debitage	3	
Technique Uncertain		
Nodule	2	
SUBTOTAL	5	.07
QUARTZ CRYSTAL		
Technique Uncertain		
Flake Debitage	1	
SUBTOTAL	1	.01
GRAY-GREEN SANDSTONE OR CLAYSTONE		
Technique Uncertain		
Flake Debitage	28	
SUBTOTAL	28	.41
FERRUGINOUS SANDSTONE		
Technique Uncertain	300*	
SUBTOTAL	300*	4.37
CATAHOULA SANDSTONE		
Technique Uncertain	12	
SUBTOTAL	12	.17
TOTAL	6,860	99.98

*Estimated

CHAPTER 7

Description of Chipped Stone Artifacts

The chipped stone artifact collection is described in this chapter. It is impossible to present descriptions of all attributes of artifacts for future investigators. Hence, decisions have to be made in choosing attributes and I have based my choices first on those which best serve to answer questions or test propositions relevant to this study and second, to those that are best for comparative purposes. Comparative studies are still very important in archeology; how else can the scope and nature of cultural interaction within a specific cultural system be measured?

Principal artifact classes described here are dart points, arrow points, awls, other bifaces, and unifaces. The category "Other bifaces" includes all bifaces not considered to be projectile points or awls. These headings are further subdivided according to type of material (flint, quartzite, silicified wood, and Manning fused glass). All cryptocrystalline rocks are described under the heading of Flint.

Distributions of the chipped stone artifacts are presented in Table 3. The proveniences are listed by excavation Unit; the WPA collections are presented as a single lot. Distributional studies within respective excavation units were not carried out except for Mound C. The principal reason for not presenting more finite distributional data

is that such data are not needed to achieve the aims of this study. Mound C data were incorporated because of the temporal differences which are evident in the burial sequence.

When measurements are given, the dimensions are abbreviated as follows: L, Length; W, Width; BlW, Blade Width; BW, Base Width; SL, Stem Length; SW, Stem Width; T, Thickness. Statistical means are not presented where samples are small (usually less than 8). Estimated dimensions are denoted by an asterisk.

Dart Points

Dart points are sorted first according to material (flint, quartzite, and silicified wood) and secondly on the basis of form. They are classified descriptively but where an established type name is felt to be applicable, the name is added beside the descriptive group heading. Projectile point classification follows that of Suhm and Jelks (1962) unless otherwise stated. Since the WPA collection has been classified by Krieger (Newell and Krieger, 1949) references will be made to the earlier classification although it was not followed. Terms describing edge modification follow those of Ahler (1971: 38, 39).

FLINT

The flint dart points are divided into five broad descriptive categories; expanding stem, parallel stem, contracting stem, stemless, and miscellaneous fragments.

Expanding Stem

These are subdivided into three groups to facilitate description.

Group 1, Ellis (N = 11; Fig. 12, A-C)

Description: Expanding stems are created by either broad corner notches (9) or side notches (2) on triangular preforms. Lateral edges are nearly straight although some are slightly convex. Serrated edges occur on one. Five exhibit edge smoothing or edge blunting on the blade; evidently a function of use. This occurs near the tip on one. Corners of shoulders on two are also smoothed. Surface smoothing occurs on one. All but two appear to be of nonlocal material.

L: 34 to 44 mm.; BlW: 21 to 27 mm.; BW: 13 to 21 mm.; SL: 6 to 14 mm.; T: 6 to 9 mm.

Discussion: Most of the specimens described by Krieger (in Newell and Krieger, 1949: Fig. 58, A-I) as Ellis Stemmed points fall into this group; one example included here, however, was described by Krieger as unclassified (ibid.: Fig. 59, V).

Group 2 (N = 2; Fig. 12, D, E)

Description: Blades are long, narrow with expanding stem formed by broad, shallow side notches. Bases are straight on one and convex on the other. Lateral edges are approximately straight. Smoothing of basal corners, stem edges, shoulders and along lateral edges occurs on both. Both are of nonlocal material.

L: 46 and 61 mm.; BlW: 20 and 19 mm.; BW: (*) and 17 mm.;

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*Specimen is incomplete.

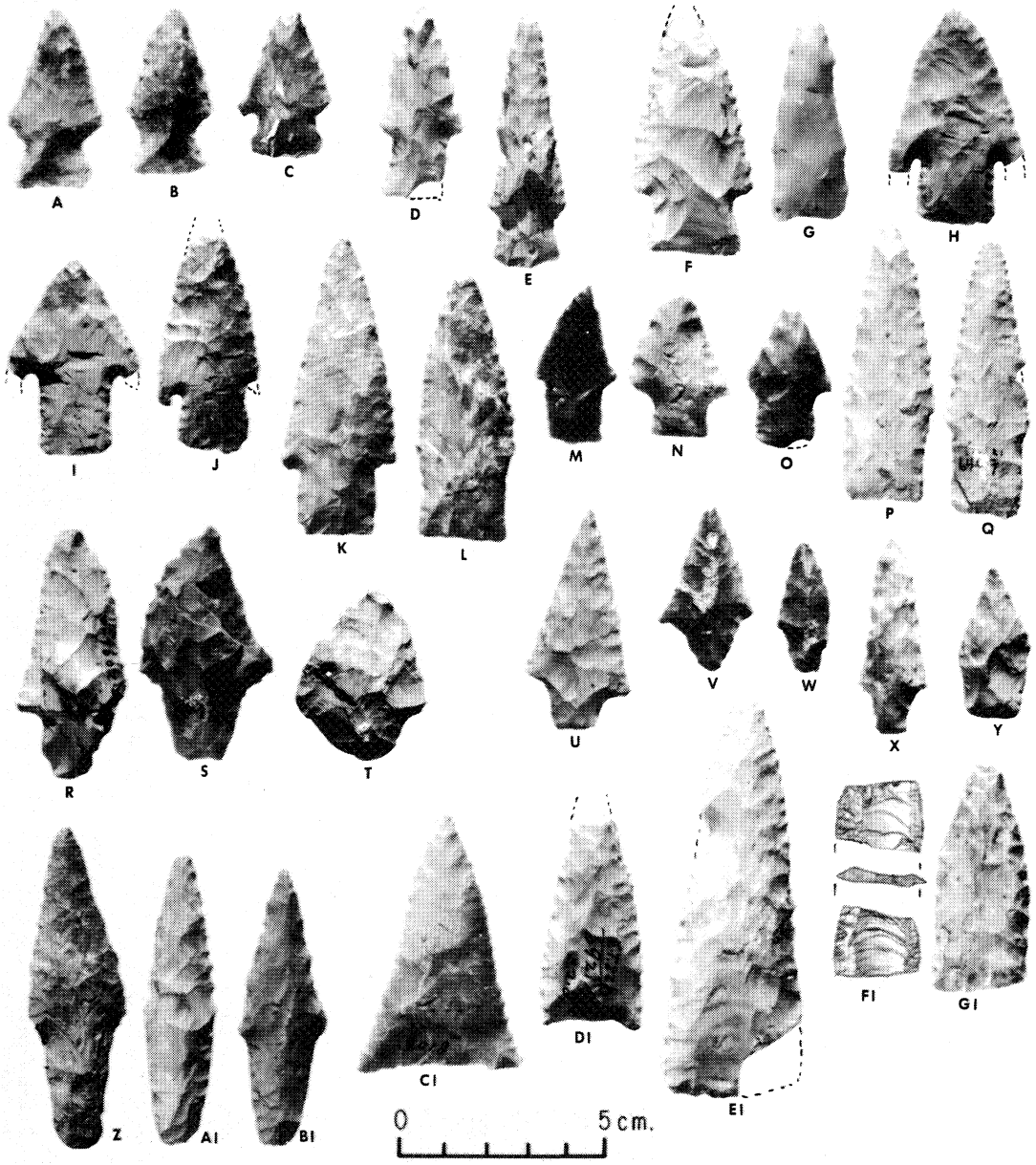


Figure 12. Flint dart points. A-C, expanding stem Group 1. D, E, expanding stem Group 2. F, G, expanding stem Group 3. H-J, parallel stem Group 1. K, L, parallel stem Group 2. M-O, parallel stem Group 3. P, Q, parallel stem Group 4. R-T, contracting stem failures. U-Y, contracting stem Group 1. Z-B1, contracting stem Group 2. C1-E1, stemless Group 1. F1, G1, stemless Group 2.

SL: 14 and 13 mm.; T: 8 and 11 mm.

Group 3 (N = 2)

Description: These two specimens are described individually. The larger (ET/5118) has an expanding stem, straight base, moderate shoulders, broad blade with serrated edges, and broken tip. Smoothing occurs along stem edges, on serration points along the lateral edges, and on the basal corners. It is of nonlocal flint. The smaller example (ET/6527) is of pink novaculite, described by Krieger (Newell and Krieger, 1949: Fig. 59, T) as chalcedony. The stem is slightly expanding with a slightly indented base. Lateral blade edges are approximately straight and bifacially beveled. Edge blunting of stem is extensive.

L: 57 and 51 mm.; BlW: 30 and 17 mm.; BW: 23 and 17 mm.; SL: 13 and 16 mm.; T: 7 and 8 mm.

Discussion: The larger specimen is illustrated by Krieger (Newell and Krieger, 1949: Fig. 58, I) and classified as a Morrill Stemmed point.

Parallel Stem

These points are also divided into three descriptive categories.

Group 1, Bulverde (N = 5; Fig. 12, H-J)

Description: Parallel stem, straight to slightly convex bases, strongly barbed shoulders (barbs on most are broken), broad blades with slightly convex edges. Blade on one has been reworked. Stem edges are

bifacially beveled due to pointed implement used to chip deep, narrow basal notches in triangular preforms to make the stem. Preforms on all were thinned by soft-hammer flaking. Bases are thinned resulting in "wedge-shaped" longitudinal sections. All are made of nonlocal material. Lateral edges are smoothed and/or blunted on three; stem and base blunted on one. Corner of broken barb smoothed on one indicating considerable handling or use subsequent to breakage.

L: 47 to 58 mm.; BlW: 25 to 36 mm.; BW: 17 to 22 mm.; SL: 14 to 20 mm.; T: 6 to 7 mm.

Discussion: These specimens are described by Krieger (Newell and Krieger, 1949: 170, Fig. 59, L-Q) as Bulverde Barbed points.

Group 2 (N = 4; Fig. 12, K, L)

Description: Stems are squared, bases straight, shoulders weak to moderate, lateral edges straight on three and slightly convex on one. All are of nonlocal material. Lateral edges on three are modified by abrasion; one is blunted, one is smoothed, and one exhibits extensive smoothing on an edge to the extent that it is faceted. Two (including the latter example) evince stem blunting as well.

L: 44 to 79 mm.; BlW: 24 to 32 mm.; SlW: 15 to 22 mm.; T: 7 to 9 mm.

Discussion: These specimens are illustrated by Krieger (ibid.: Fig. 58, K, M) who classified them as Morrill Stemmed points.

Group 3, Kent (N = 3; Fig. 12, M-O)

Description: Small points, squared stems and straight bases.

Base on one formed by a break (Fig. 12, N); attempts to thin the base resulted in multiple stepped fractures. Shoulders moderate, blades short. Blade triangular on one, asymmetrical on two. Two are of nonlocal flint; one may be local. Lateral blade edges blunted and crushed on one, presumably from use (cf. Ahler, 1971: 38, 39). Basal corners smoothed on one.

L: 33 to 38 mm.; BlW: 14 to 24 mm.; BW: 9 to 15 mm.; SL: 12 to 20 mm.; T: 6 to 9 mm.

Discussion: One of these specimens is described by Krieger (Newell and Krieger, 1949: Fig. 58, F) as Ellis Stemmed point.

Group 4, Morrill (N = 9; Fig. 12, P, Q)

Description: Stems mostly parallel (although on one it is slightly contracting); bases are straight on seven, and slightly concave on two. Lateral edges straight (serrated on five). Blades are long, narrow; two have only one distinguishable shoulder. Shoulders are faint to moderate. Stem edges blunted on all but one. All are of nonlocal flint.

L: 43 to 74 mm.; mean, 62; BlW: 18 to 35 mm.; mean, 24; SW: 15 to 23 mm.; mean, 19; SL: 17 to 33 mm.; mean, 23.5; T: 8 to 10 mm.; mean, 9.

Discussion: This group is included within the sample classified by Krieger (ibid.) as Morrill Stemmed points (specimens illustrated in Newell and Krieger, 1949: Fig. 58, J, L, N, and O are included here in Group 4).

Contracting Stem

Contracting stem points are described in two groups. The specimens in one group are characterized by relatively short stems; the others have long stems and long blades.

Group 1, Gary (N = 15; Fig. 12, U-Y)

Description: Relatively broad, contracting stems; bases are rounded on most, squared on two, and unworked on four. Lateral edges mostly straight, varying from slightly convex to slightly concave. Shoulders absent on one, moderate to prominent on most, barbed on one. Eight have faint to moderately smoothed lateral edges; stem edges on two (one of which is a pentagonal-shaped point) are extensively blunted. Six may be of local materials.

L: 31 to 60 mm.; mean, 44.6; B1W: 12 to 28 mm.; mean, 22.4; SL: 9 to 17 mm.; mean, 12.6; SW: 10 to 17 mm.; mean, 13; T: 4 to 10 mm.; mean, 7.3.

Discussion: These specimens are included in the type Gary Stemmed by Krieger (Newell and Krieger, 1949: Fig. 57).

Group 2, Wells (N = 11; Fig. 12, Z-B1)

Description: Long, contracting stem, strongly convex bases, shoulders weak to moderate. Blade long, narrow, serrated on three. Most are relatively thick. Stem edges on all but one are extensively blunted; slightly to moderate smoothing on lateral edges of six. All are of nonlocal material.

L: 51 to 76 mm.; mean, 62.6; B1W: 14 to 39 mm.; mean, 22.1;

SW: 13 to 18 mm.; mean, 15.7; SL: 21 to 31 mm.; mean, 27; T: 7 to 9 mm.; mean, 8.

Discussion: These are described and illustrated by Krieger as Wells Contracting Stem points (Newell and Krieger, 1949: Fig. 58, Q-W).

Unstemmed

These points are relatively small. All but two are included in Group 1; the two miscellaneous specimens are described under Group 2.

Group 1, Tortugas (N = 10; Fig. 12, C1-E1)

Description: Triangular shaped bifaces; bases are approximately straight, varying from slightly indented to slightly convex. Blade edges are also nearly straight, being slightly concave on four, recurved on one, and straight on the remainder. Edges are alternately beveled on two, bifacially beveled on six. Beveling is done by even pressure flaking which produced serrated edges on three. Bases are well thinned. Several exhibit moderate to extensive smoothing along lateral edges; three have glossy surfaces suggestive of extensive handling and not from heat treating. All are of nonlocal material.

L: 33 to 96 mm.; mean, 57; W: 21 to 41 mm.; mean, 29.2; T: 5 to 10 mm.; mean, 7.

Discussion: Krieger classified specimens in this group as either Taylor Thinned Base or Baird Beveled Blade. The principal characteristic distinguishing these two types is the degree of marginal retouch, which eventually results in bifacial beveling. Specimens with lightly retouched edges are classified by Krieger as Taylor Thinned Base, and

repeatedly retouched specimens are Baird Beveled Blade. Krieger illustrates both (Newell and Krieger, 1949: Fig. 60).

Group 2, Miscellaneous (N = 2; Fig. 12, F, G)

Description: One (Fig. 12, F1) is a medial fragment of a Folsom fluted point. It is of light gray, semi-translucent flint of nonlocal origin. Lateral edge remnants are faintly convex and both flutes are present. There may have been some attempt to reshape the fragment since portions of both broken edges are partially trimmed.

W: 20 mm.; T: 3 mm.

The second specimen (Fig. 12, G1) has slightly recurved lateral edges, straight base, rounded tip. Edges are moderately smoothed and edge crushing is evident. Surfaces are shiny as if extensively handled; there is no evidence of heat treating.

L: 55 mm.; W: (at base) 23 mm.; T: 13 mm.

Discussion: The Folsom specimen was described and illustrated by Krieger (Newell and Krieger, Fig. 57, V). The illustration is misleading although Krieger (ibid.: 172) correctly states that the fragment came from near the distal portion. Krieger's reconstruction shows it to be from near the base. Curvature of ripples in the flutes indicate that the specimen is illustrated by Newell and Krieger with the distal end downward.

Dart Point Fragments (N = 22)

Description: Eleven of these are stem fragments; six are contracting stems, of which five have straight bases and one has a concave

base. All have extensively blunted edges. Two are bulbar stem fragments, both with moderately blunted edges; two are parallel stem fragments with straight edges (edges on one stem are blunted); one is an expanding stem with one edge and one corner of the base smoothed.

Four of the fragments are medial portions possessing remnants of the stem. Two are serrated along lateral edges and have blunted stem edges. Light smoothing occurs along serration points of edges. Flint on one is very close to Biface Group 3, subgroup 1 (i.e., the "cache" reported by Newell and Krieger, 1949: Fig. 61).

Seven are distal fragments; four retain stem remnants; three of these have extensively blunted stem edges and serrated blades. Edge projections on all are slightly to moderately smoothed.

No dimensions are given here.

QUARTZITE

The dart point forms are distinguished primarily on the basis of stem morphology (expanding, parallel, contracting). The principal reduction technique is percussion with varying degrees of pressure retouch; the specific percussion technique is often difficult to determine. Negative bulbar areas of flake scars on some specimens indicate that the area of contact of the percussor was small, as with a punch or hard hammer. Others, however, may have been shaped largely by soft-hammer flaking. Both fine-grained and coarse-grained quartzite specimens are described here, although they are distinguished within each morphological group.

Expanding Stem, Yarbrough (N = 1; Fig. 13, C)

Description: This small, fine-grained quartzite specimen lacks the distal tip; base is straight and lateral edges are mostly straight. Shoulders are slight.

L: undeterminable; BlW: 16 mm.; BW: 16 mm.; SL: 12 mm.; T: 6 mm.

Discussion: Krieger classifies this specimen as a Yarbrough Stemmed point (Newell and Krieger, 1949: Fig. 57, W).

Parallel Stem, Kent (N = 6; Fig. 13, D-F)

Description: Parallel stems, slight to moderate shoulders; base unworked on four, convex on one, and straight on one. Lateral edges are straight generally. Two are of coarse-grained quartzite.

L: 33 to 49 mm.; BlW: 16 to 35 mm.; BW: 13 to 16 mm.; SL: 11 to 13 mm.; T: 6 to 9 mm.

Discussion: Specimens in this group have been classified by Krieger as Gary Stemmed (Newell and Krieger, 1949: Fig. 57, C) and Yarbrough Stemmed points (ibid.: Fig. 57, X).

Contracting Stem

These projectile points are divided into two descriptive categories, Group 1 items have shouldered blades; Group 2 are small, shoulderless points.

Group 1, Gary (N = 12; Fig. 13, G-J)

Description: Contracting stem with rounded base and moderate

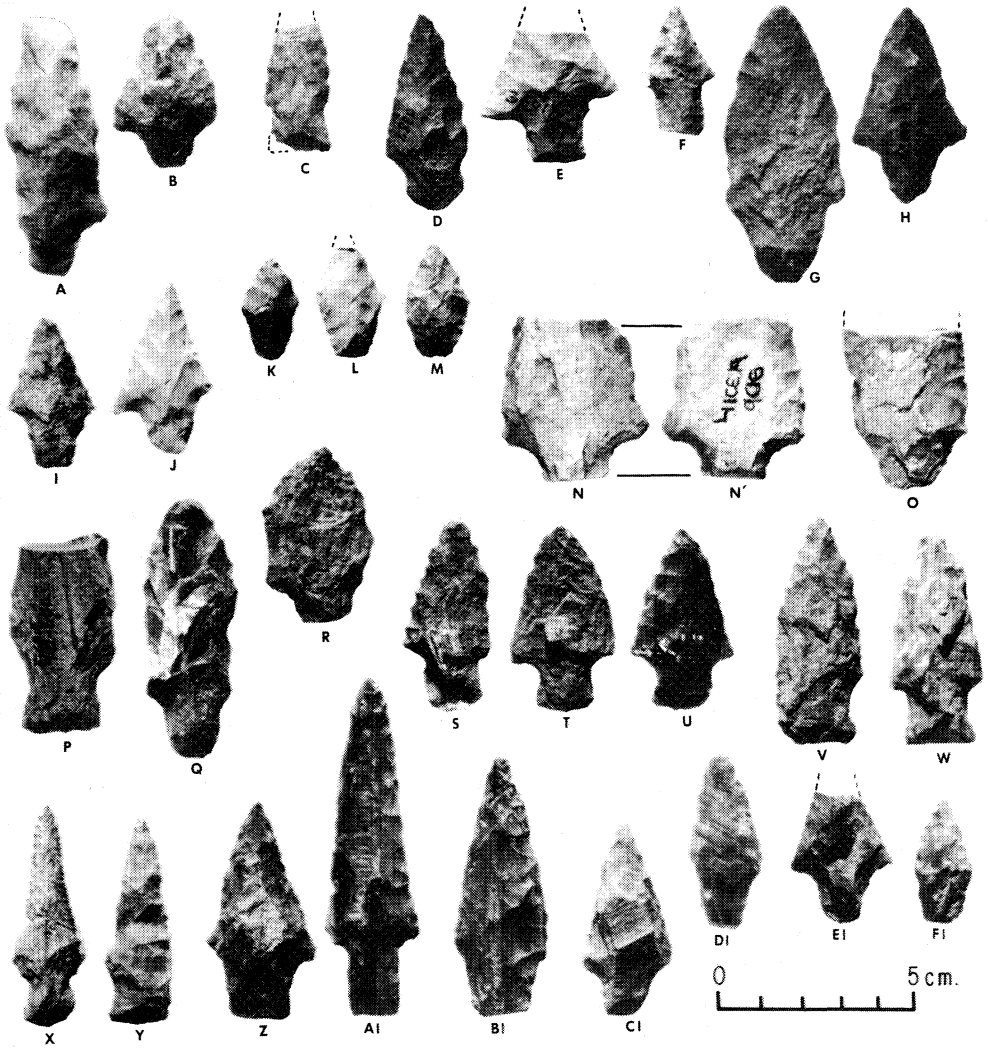


Figure 13. Dart points. Quartzite: A, B, failures. C, expanding stem. D-F, parallel stem. G-J, contracting stem Group 1. K-M, contracting stem Group 2. Silicified wood: N-R, failures. S-U, expanding stem Group 1. V, W, expanding stem Group 2. X, Y, expanding stem Group 3. Z, A1, parallel stem. B1-F1, contracting stem.

shoulders. Bases on two are unworked, stem edges on one are blunted. Lateral edges are straight. One is coarse quartzite.

L: 28 to 63 mm.; mean, 36.2; BlW: 15 to 30 mm.; mean, 23.5; SL: 10 to 17 mm.; mean, 11.6; SW: 11 to 21 mm.; mean, 13.6; T: 6 to 10 mm.; mean, 7.4.

Discussion: These fall easily into the Gary Stemmed type described by Krieger (Newell and Krieger, 1949: 164-166).

Group 2, Gary (N = 5; Fig. 13, K-M)

Description: These points are pentagonal or diamond-shaped. Stems contract from about mid-length; bases are squared or rounded. Lateral edges straight on three, slightly concave on one, and slightly convex on one. Shoulders are absent and blade begins about mid-length. Tip and edges on one are extensively smoothed. One is coarse quartzite.

L: 26 to 29 mm.; W: 15 to 19 mm.; BlW: 15 to 19 mm.; SL: 12 to 17 mm.; T: 7 to 8 mm.

Discussion: Similar shapes were noted in the San Jacinto River basin by Shafer (1968: Fig. 36, e, f, i-k).

Dart Point Fragments (N = 7)

Description: Three of these are distal fragments; three are medial, lacking most of stem and distal tip, and one is a rounded base. Five are fine-grained quartzite. Two (one distal and one medial) are coarse-grained quartzite.

No dimensions are given.

SILICIFIED WOOD

The same basic attributes used in classifying the flint and quartzite specimens are used here: expanding, contracting, and parallel stem.

Expanding Stem

Expanding stem dart points are subdivided into three descriptive groups.

Group 1, Palmillas (N = 5; Fig. 13, S-U)

Description: These specimens have bulbar stems with convex bases and rounded basal corners. Shoulders are prominent; lateral edges are convex with slightly sinuous edges. Edges on one are serrated; another example has a reworked blade. Two are made from thin pebbles; two are chipped on cleavage spalls and one is too thoroughly worked to determine the nature of the blank.

L: 27 to 49 mm.; BlW: 22 to 26 mm.; SW: 12 to 14 mm.; BW: 14 to 15 mm.; T: 5 to 11 mm.

Discussion: Krieger (Newell and Krieger, 1949: Fig. 57, R, S) classified two of these specimens as Ellis Stemmed points.

Group 2, Ellis (N = 3; Fig. 13, V, W)

Description: Stems are expanding and bases are straight. Shoulders are moderate and lateral edges are slightly convex. Distal tips are not sharp. Basal corners on two are blunted; base on one is also blunted.

L: 39 to 56 mm.; BlW: 23 to 26 mm.; BW: 18 mm. (one complete

specimen); SW: 15 to 20 mm.; T: 7 to 9 mm.

Discussion: Krieger classifies two of these as Ellis Stemmed points (Newell and Krieger, 1949: Fig. 57, Q, U).

Group 3, Palmillas (N = 3; Fig. 13, X, Y)

Description: These specimens have long, narrow blades, weak shoulders, and expanding stems. Base is straight on one, convex on two. One is plano-convex in cross-section. The convex face evidences unsuccessful attempts to thin; the rest of the specimen has a finished appearance.

L: 45 to 55 mm.; B1W: 13 to 19 mm.; BW: 12 to 16 mm.; SW: 11 to 13 mm.; T: 6 to 10 mm.

Discussion: Krieger classified two of these as Yarbrough Stemmed (ibid.: Fig. 57, Y, Z).

Parallel Stem, Kent (N = 3; Fig. 13, Z, A1)

Description: Parallel stem, straight bases; bases are unworked on two. Shoulders are moderate and lateral edges are straight. One was shaped from a thin pebble and another from a cleavage spall. Stem edges on one are blunted.

L: 46 to 53 mm.; B1W: 23 to 28 mm.; BW: 13 to 19 mm.; SL: 12 to 16 mm.; T: 9 to 10 mm.

Discussion: One specimen was classified by Krieger as a Gary Stemmed point (ibid.: Fig. 57, L).

Contracting Stem, Gary (N = 24; Fig. 13, B1-F1)

Description: Stems are contracting with rounded bases on

sixteen; unworked bases on seven, and straight bases on one. Shoulders are slight to prominent. Lateral edges are straight on most. One has the appearance of being heat treated. Asphaltum adheres to the stem of one specimen.

L: 23 to 66 mm.; mean, 40; B1W: 13 to 33 mm.; mean, 21.3; SL: 11 to 18 mm.; mean, 13.6; SW: 8 to 16 mm.; mean, 11.9; T: 5 to 10 mm.; mean, 8.

Discussion: These specimens conform to the type Gary Stemmed described by Krieger (Newell and Krieger, 1949: 164-166).

Silicified Wood Dart Point Fragments (N = 7)

Description: Six of these are blade fragments and one is a medial fragment. One was made on a thin pebble and two are reduced cleavage spalls.

No dimensions are given.

Summary of Dart Points

Krieger included the dart points recovered by Newell as part of the Alto Focus material culture (Suhm, Krieger, and Jelks, 1954: 164). He also believed there was a shift from dart points to arrow points during his postulated three mound phases, although he admitted that arrow points were present in the submound phase. He also felt that Gary, Ellis, Wells, Morrill, and possibly Yarbrough constituted resident types and that Taylor, Baird, and Bulverde represented intrusive types. About these three types he stated that:

> .....Kelley has shown the Bulverde type to be much more localized in the Colorado River basin above Austin, and we may perhaps assume that the Davis people learned to make all three types from peoples of the Round Rock Focus near Austin (Newell and Krieger, 1949: 173).

Krieger made these statements without the chronological knowledge we now have in both central and east Texas. The stemless points included in Krieger's types Taylor Thinned Base and Baird Beveled Blade (described here as Stemless Group 1), Wells, and Morrill-like, are forms which occur in early Archaic contexts in central Texas several thousand years earlier than the Caddoan occupation at the Davis Site (Shafer, 1963; Sorrow et al., 1967; Sorrow, 1969). Therefore, the kind of diffusion Krieger was suggesting was not possible.

Knowledge that we now have regarding the local resources was also not available to Krieger, since he regarded the flint used in the manufacture of Wells, Taylor, Baird, and Bulverde points as being from nearby sources (Newell and Krieger, 1949: 172, 173). Considering the size of the blanks prior to reduction, it is highly improbable that the stone used in manufacture of these points occurred east of the Brazos River. Therefore, in view of present knowledge, Krieger's statements regarding origin of raw materials are not reliable. However, he is essentially correct in saying that Gary, Ellis, and Yarbrough points (his classification) were made of local materials (certain flint, quartzite and silicified wood).

Dart points in the material culture of the Alto Focus were discussed at the Seventh Caddoan Conference at Fayetteville, Arkansas (Davis, Wyckoff, and Holmes, 1971a). Other early Caddoan settlements -

Gahagan, Mounds Plantation, and Crenshaw - reveal either a total or near absence of dart points, specifically of the types mentioned above. The discussants were generally skeptical of the assumption that dart points were part of Caddoan technology, the principal reasons being that there was no demonstrable evidence of dart points in conjunctive association with burials containing Caddoan ceramics. Dart points are absent at Gahagan and (for all practical purposes) at Mounds Plantation. McKinney (Davis et al., 1971a) reports one Gary fragment in all his work at the latter site. Wood (Davis et al., 1971a) states that none was found in his excavations at the Crenshaw Site. Clarence Webb noted that valley sites (in northwestern Louisiana?) show an absence of dart points whereas in hill sites, dart points are common. By "hill sites", it is presumed that he is referring to sites on older terrace remnants. If Caddoan settlements were located on hills or higher terraces, a mixture of dart points with Caddoan materials (especially in the shallow soil mantles) would easily be possible.

Another suggested explanation for the presence of dart points in Caddoan sites was that many of the dart points were picked up by the Caddoan inhabitants and brought to the site. As Robert E. Bell states at the Seventh Caddoan Conference (Davis et al., 1971a: 92):

> I'm convinced that a lot of these people picked up this stuff [dart points]. I've suggested on another occasion that one way we might get an answer to some of this problem is by the identification of flint material.

Bell's point is well taken and is certainly applicable to the Davis Site. Not only should the material be considered, but the residue

expected from its manufacture of dart points should also be studied. Failures in the manufacture of dart points indicate the manufacturing locality provided they occur in repeated instances. A failure could be picked up at one location and taken to another just as easy as could a completed specimen. Hence, isolated occurrences of manufacturing failures should not be relied upon as indicating manufacturing loci. Manufacturing failures for contracting stem dart points of materials duplicated in local samples (certain flints, quartzite, silicified wood) occur frequently enough to suggest that these dart point forms could have been made on the Davis Site terrace. Certain parallel stem and expanding stem dart points of apparent local materials may be included here as well. However, the points of nonlocal flint (Bulverde, Wells, Morrill, stemless, etc.) are regarded as being intrusive for several reasons. They evidently do not occur regularly in other sites in central east Texas (based on cursory inspection of Texas Archeological Research Laboratory collections from Cherokee and neighboring counties) and, more importantly, there is no evidence of their manufacture (i.e., failures) at the site.

Griffin stated at the Seventh Caddoan Conference that he believed the dart points at the Davis Site were the result of an Archaic occupation (Davis et al., 1971a: 92). Griffin further speculates that there is also a Marksville occupation on the site apparently based on his identification of several sherds as Hopewell Incised (Newell and Krieger, 1949: 133). Greengo (1964: 111, 112) offers an updated discussion of the "Marksville" ceramics at the Davis Site. Griffin (Davis

et al., 1971a) was of the opinion that the presence of the Archaic and "Marksville" materials was an historical accident and were not part of a functioning (Caddoan) technology.

It is possible that the terrace was briefly occupied during the Woodland period. This would explain the presence of certain dart points (Gary, Kent, parallel stem and certain expanding stem forms) and some of the sandy paste pottery. However, at least some of the latter could be contemporaneous and introduced by neighboring peoples to the south.

Certain dart points could be the result of pre-Caddoan occupation as Griffin suggests. This, however, is not a sufficient explanation for the presence of many of the flint dart points of nonlocal materials which do not have reduction failures represented in the debitage. Projectile points identical in type to most of the points of nonlocal materials found at the Davis Site (even including Folsom) have been seen in local collections from the central Brazos valley by this writer. Certain of them also occur along the older terraces of the Trinity (specifically Wells and Morrill types). It is offered as a possible explanation that either Caddoan peoples or peoples who were introducing resource material from the west to the Davis Site were also picking up projectile points from the same terrace exposures where the raw material was being collected. They were being introduced into the Davis material culture as raw material, not as serviceable dart points. This would partly explain the extensive amount of wear seen on many of the specimens irrespective of shape, type, or finished condition. They

could represent recycled tools as far as the Davis Site Caddoan technology was concerned.

A counter argument might be that these dart points were left by hunting parties of Archaic hunters who moved into east Texas to hunt during certain seasons. The wear may be due to secondary usages the points were subjected to while on the hunt. Such use has been suggested for certain early man points at kill sites (Ruthann Knudson, personal communication). This argument is not favored here because of the near absence of other tools and residue indicative of such hunting/butchering technology.

The intrasite distribution of the dart points is also striking. The only expanding stem dart points occurring west of the WPA excavations were three silicified wood specimens (presumably of local material). Only one quartzite parallel stem point was found west of Mound A but, contracting stem points of flint, quartzite, and silicified wood were all represented west of Mound A. This interesting distribution pattern suggests that, whatever the origin of the many specimens of older Archaic form, they were clearly associated with activities carried out in the eastern portion of the site. One explanation is introduced below.

The notion was suggested above that the Archaic points of non-local material were collected in raw material acquisition areas in central Texas and introduced into the site as raw material, not as functioning projectile points. It is further suggested that these items were introduced at a time when the interaction sphere of the Davis Site Caddoan cultural system was at its climax, when either trade networks reached into central Texas or material acquisition parties were able to

go to central Texas. Furthermore, this climax period in the cultural history took place at a time when activities centered around Mound A and on the eastern side of the terrace. As the interaction sphere began to shrink the scope within which raw materials were gathered diminished and if dart points continued to be brought to the site, they were primarily of styles indigenous to the area. However, the occurrence of most contracting stem forms, fragments, and dart point failures west of Mound A is probably due to a light pre-Caddoan (late Archaic) occupation.

Arrow Points

The arrow point sample numbers eight hundred and twenty-two specimens and constitutes the largest single class of chipped stone artifacts aside from modified flakes. The sample offers some interesting tests for hypotheses regarding typology and variation within a single morphological group, since a major portion of the sample was recovered from burial context and the specimens are complete. Too, many of those recovered from burials were probably contained in quivers. Perhaps even more meaningful is the occurrence of certain arrow point clusters, possibly in quivers, made of the same nonlocal stone and probably representing the products of a single flintknapper. The variation of nonlocal flints used is considerable; consequently, when a single cluster contains specimens of a mottled gray flint which is not duplicated anywhere else in the sample, then our confidence that these represent quivers is strengthened.

All arrow points clearly are shaped by pressure flaking; indeed, most, if not all, appear to be made exclusively by this technique.

Four categories of material are represented in the sample; flint, quartzite, silicified wood, and Manning fused glass. Sorting is done on the basis of both the material and context since the latter offers a particularly unique opportunity for analysis and comparison and should not be ignored at the expense of typological study. Specimens from nonburial context are described separate from those recovered from Mound C burials. Burial specimens, which (with three exceptions) are all flint, are described with respect to specific burials and context within burials.

FLINT

Nonburial Specimens

Nonburial specimens were recovered from every excavation unit outside Mound C. They are described under the following material categories: flint, quartzite, silicified wood, and Manning fused glass.

Flint arrow points from village associations display varying degrees of completeness. Specimens classified as arrow point fragments lack stem features which prevent them from being classed into the type groups. Arrow point fragments (with or without stems) are valuable resources for functional analysis since they sometimes conclusively demonstrate use. Classification by established type names follows Suhm and Jelks (1962) unless otherwise indicated.

Group 1, Hayes (N = 7; Fig. 14, E-J)

Description: The stems on these specimens are formed by notching

a diamond-shaped preform at the shoulder. The result is a distinctive "turkey-tail" shaped stem. Workmanship is excellent and is bifacially executed to the degree that all blank characteristics are removed. All are of nonlocal flint. One is of gold-black banded flint. Two are of olive-gold "river jasper", a material seen by this writer as commonly occurring in the Red River and Sulphur River drainages of northeast Texas. Shoulders are moderate to strong and usually extend at right angles to the long axis. They are not barbed; blades are long and edges are recurved; edges on two are serrated.

L: 28 to 43 mm.; BlW: 8 to 18 mm.; SL: 7 to 10 mm.; SW: 6 to 8 mm.; T: 2 to 4 mm.

Discussion: One specimen of gray novaculite with a distinctive Hayes stem was apparently reworked into an awl (see Flint Awls).

Group 2, Perdiz? (N = 17; Fig. 14, K-P)

Description: Arrow points with contracting stems and rounded or somewhat pointed bases. Shoulders on most are not barbed but extend at approximately right angles to the long axis on most; they are prominent. Lateral edges are straight or recurved; some are serrated.

L: 20 to 47.4 mm.; mean, 28; BlW: 11.5 to 23 mm.; mean, 15.5; SL: 4 to 8 mm.; mean, 6; SW: 5 to 9 mm.; mean, 6.5; T: 1.5 to 4 mm.; mean, 3.

Discussion: Although these points resemble the Perdiz type, when viewed as part of the total arrow point collection they are more likely variations within the range of the resident arrow point (Alba) as will be discussed later.

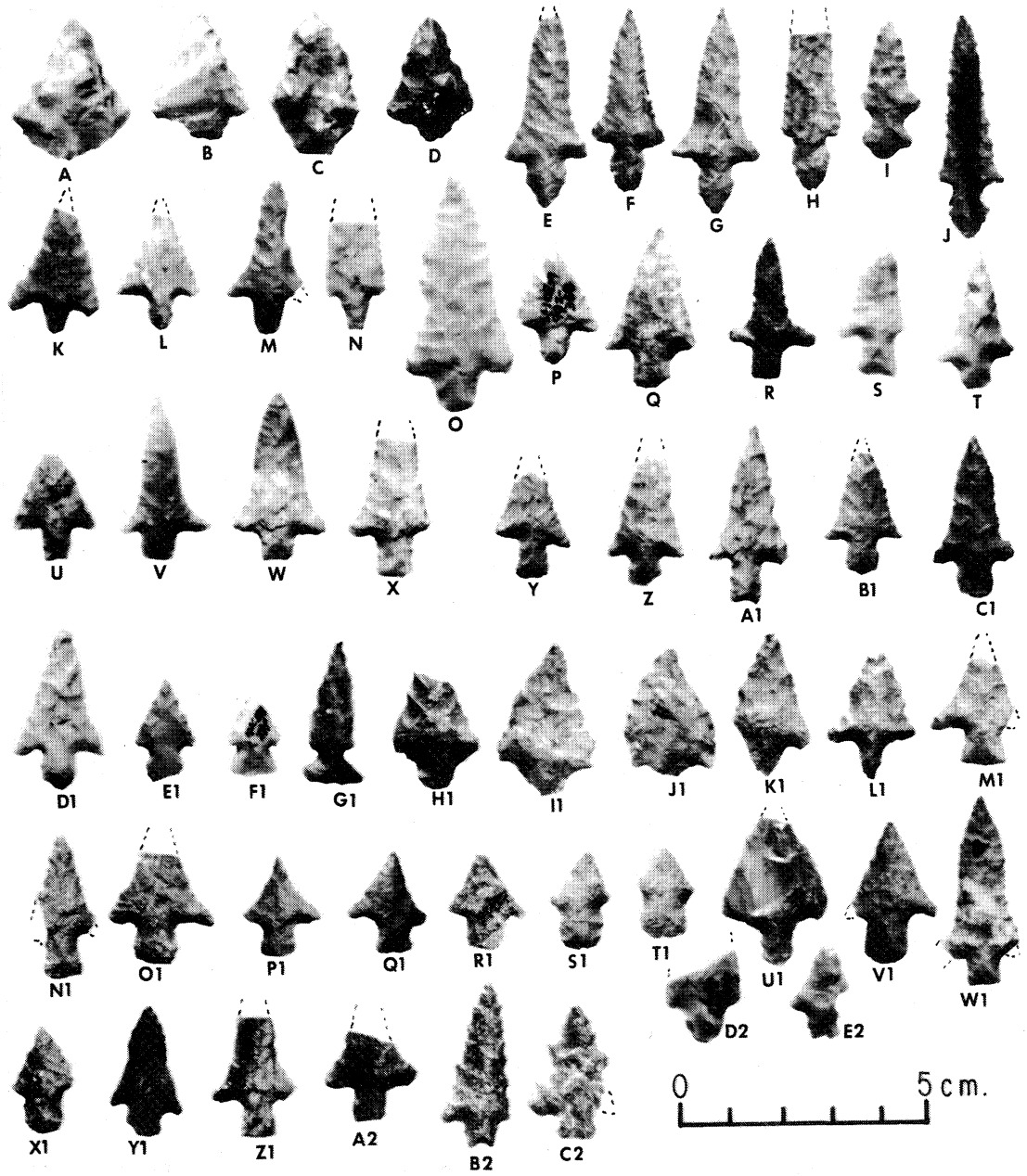


Figure 14. Arrow points of flint, quartzite, silicified wood, Manning fused glass from village. A-G1, flint: A-D, failures. E-J, Group 1. K-P, Group 2. Q-D1, Group 3. E1-G1, Group 4. Quartzite: H1-K1, failures. M1-T1, Group 1. L1, Group 2. Silicified wood: U1, failure. V1-A2, Group 1. B2, C2, Group 2. Manning fused glass: D2, E2, failures.

Group 3, Alba (N = 165; Fig. 14, Q-D1)

Description: The Alba type is distinguished by an approximately parallel stem, moderate shoulders, and triangular blade with concave, recurved, or less often, straight lateral edges. Edges may be serrated. Base is usually straight, but convex, rounded, and concave bases do occur. However, exceptions to all of the above characteristics occur on specimens within the Davis Site sample. For instance, stems vary from slightly expanding to slightly contracting; shoulders vary from definite barbs to rounded. Blades vary from long and slender to short and broad. One evinces definite direct impact fracture.

Traces of flake blank surfaces are retained on about thirty-five specimens. Orientation of point axis with respect to bulbar end of flake blank is also variable: stem of point may be at either the bulbar or distal end of flake; two are oblique to flake axis. A few examples evidence, thorough, evenly executed bifacial workmanship.

Flint includes both local and nonlocal varieties. Nonlocal flint probably is more common than local flint but this is based on subjective judgement.

L: 14 to 39 mm.; mean, 25.9; B1W: 10 to 22 mm.; mean, 15.9; SL: 4 to 11 mm.; mean, 6.5; SW: 4 to 8 mm.; mean, 6.1; T: 1.5 to 4.5 mm.; mean, 3.

Group 4, Miscellaneous (N = 3; Fig. 14, E1-G1)

Description: These three aberrant forms deserve individual attention. One is side-notched with a straight base; lateral edges are straight on the long, narrow blade. The second and smallest

specimen is corner-notched with an expanding stem; the short, triangular blade has straight edges. The specimen may have been reworked. The third specimen is a corner-notched point made on a thin flake of nonlocal material. It is a small point with a bulbar stem and oblique, unworked base. Lateral edges are straight.

L: 28.5, 16, and 21 mm.; BlW: 13, 11, and 14 mm.; SL: 3, 3.5, and 7 mm.; BW: (first two specimens) 13 and 9.5 mm.; SW: (third specimen) 8 mm.; T: 3, 3.5, and 2.5 mm.

Group 5, Arrow Point Fragments (N = 136)

Description: These are distal fragments (36), medial fragments (47), stems (2), and blades lacking stems (51). Seven medial fragments display direct impact fractures on distal ends and perhaps against the haft portion as well. One specimen lacking the stem exhibits smoothed edges indicating extensive knife-like use for the item. It has been noted earlier that the blades lacking stems from the WPA excavations were mostly of nonlocal flint and all were very well worked; workmanship is similar to points in the burials. Certain fragments west of Highway 21 also exhibited excellent craftsmanship, but as a collection, a great range in technology is exhibited.

No dimensions are given.

Discussion: Projectile point fragments are seldom given careful study especially when stems are lacking since they do not provide the kind of typological data that complete or nearly complete specimens usually do (especially those lacking stems). However, fragments do sometimes provide useful data for site functional studies.

Habitation sites often yield a relatively large number of arrow points with the delicate distal ends intact but lacking stems. The presence of stems without blades in quivers from Mound C among complete points suggests that blades are snapped off simply through normal handling.

The one specimen with modified edges (it is a long blade with a recurved lateral edge) indicates that sharp edges of arrow points were sometimes used for other purposes. Since this particular specimen is missing the stem, the blade may have been retained for other uses rather than having been discarded as many snapped arrow point blades obviously were.

Burial Specimens

Arrow points from burial contexts will be described as samples from individual burials.

The burial collections will be discussed in order of chronology, from the earliest burial to the latest. That is, arrow points from Fea. 134 will be discussed first followed by Fea. 119, Fea. 155, Fea. 161, and Fea. 118; these are the only excavated burial pits that yielded arrow points.

Fea. 134 (Fig. 26, A)

All but one of the specimens fall with the *Alba* type. The aberrant specimen, while it could be in the extreme range of *Alba*, is closer typologically to *Hayes*.

Alba (N = 160; Fig. 15, A-X)

Description: A very compact cluster of one hundred and fifty-one complete Alba points was recovered from Concentration 2 (Fig. 26, C; Story, 1972: 19). Their position suggests that they were stored in a basket-like container, possibly of wood or cane; they were associated with seven Gahagan bifaces and a lump of gray pigment (Story, 1972: 19, 20). One of the remaining specimens was found near the proximal end of the right humerus of Skeleton 2. Two were recovered near the proximal end of the right humerus of Skeleton 3. Four (one of which is missing the tip) were found near and under Log 4, between Skeletons 5 and 6. Two were recovered from loose fill on the grave floor (Story, 1972: 22).

The Concentration 2 specimens comprise a remarkably tight morphological group despite the fact that a considerable range does exist. Examples of variation are shown in Figure 15, A-X. Stems are mostly straight, although about 10 percent have slightly expanding stems. Bases are either rounded (73), convex (53), straight (18) or concave (7). Shoulders are pronounced and in most cases extend approximately at right angles to the long axis. The edges forming the top of the shoulder are convex on many. Shoulders are barbed on about 12 percent of the sample (i.e., the tip of the shoulder tapers downward from the stem juncture). Angle of shoulder tips on all is acute because of the markedly concave blade edges beginning at the shoulder. Blades on all but three specimens are recurved and are lightly serrated on many.

The majority was so thoroughly worked that no indication of

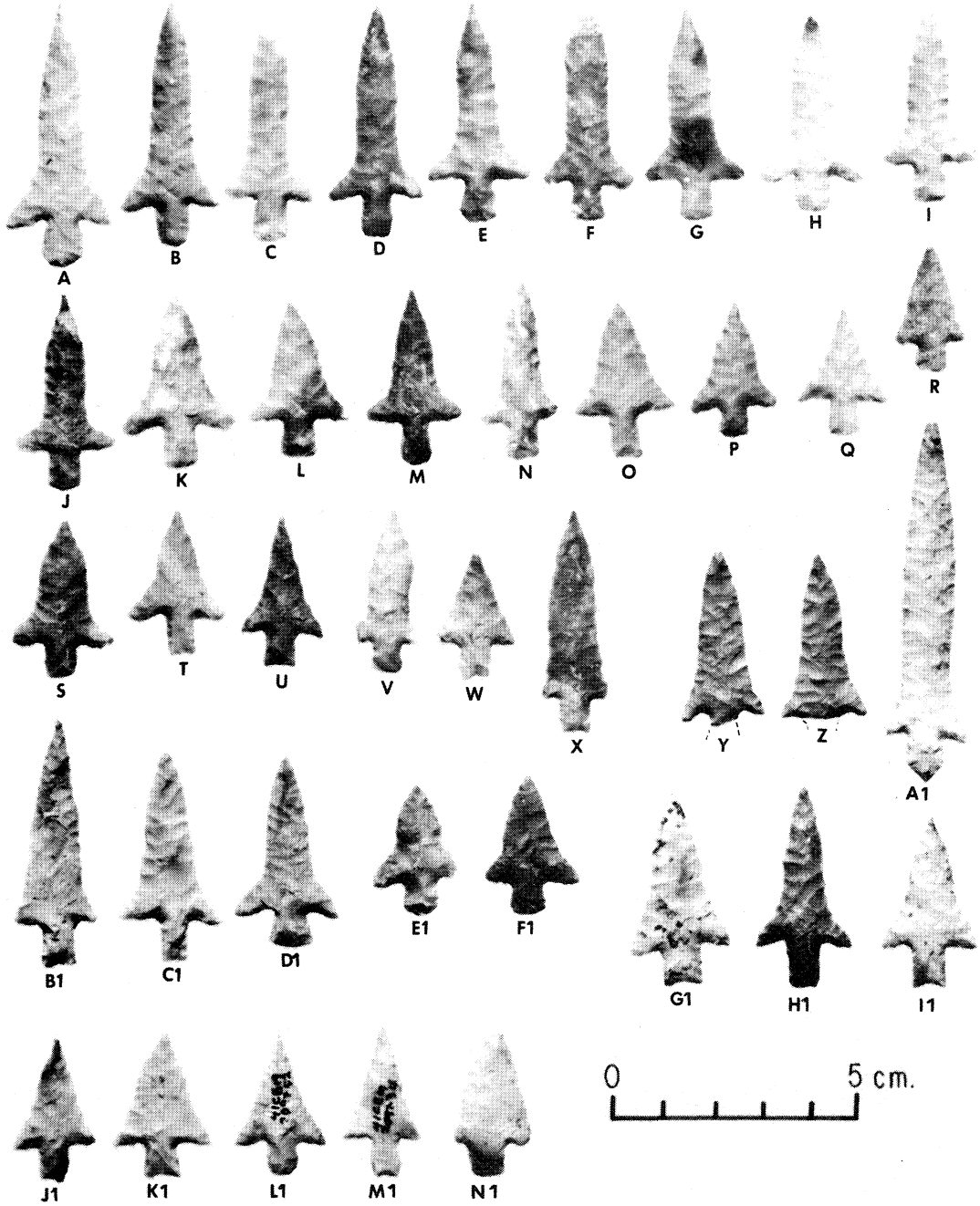


Figure 15. Arrow points from burial association. A-X, Alba, Fea. 134, Concentration 2. Y-F1, Fea. 119. Y, Z, fragments. A1, Hayes. B1-F1, Alba. G1-N1, Alba from Fea. 155.

blank morphology survives. A few of the smaller specimens are made of flakes; longer examples invariably are thoroughly chipped bifacially and exhibit little if any curvature in cross-section. Preforms were moderately large and the projected size of some precludes use of pebble resources.

All flint is nonlocal. There is a considerable range in color (about 60 percent are of tan and light brown flint; the rest are varying shades of gray) but, surprisingly, not much in texture. Either the flint was gathered in a good resource region or there was an extreme amount of selection. One can sort out clusters of points the material of which appears to come from the same outcrop.

L: 22 to 53 mm.; mean, 34; BlW: 13 to 24.5 mm.; mean, 18.7; SL: 5 to 9.5 mm.; mean, 7.1; SW: 4.5 to 7.5 mm.; mean, 6.1; T: 2 to 4 mm.; mean, 2.8.

Discussion: One is struck with the uniformity of the sample. The only marked differences in dimensions are in the length; here the standard deviation is 6 mm. Stem length and width are relatively uniform and the blade width, while varying 11.5 mm. in range does not seem to be correlated with variations in length.

Hayes? (N = 1)

Description: Blade is long and narrow with recurved lateral edges. Shoulders are moderate. Stem edges are convex and base is rounded. Flint is nonlocal. It was associated with Skeleton 6.

L: 44.5 mm.; BlW: 14.5 mm.; SL: 8.5 mm.; SW: 7 mm.; T: 2mm.

Discussion: The long, narrow blade and the long, nearly pointed

base-stem contrast sharply with the form of the one hundred and sixty Alba specimens.

Fea. 119 (Fig. 27, A)

The arrow point sample from this partially excavated feature is small; consisting of only thirteen specimens and comprising twelve individual arrow points. The specimens are described below:

Alba (N = 8; Fig. 15, B1-F1)

Description: All are well made and conform well to the type description (i.e., approximately parallel stems, strong shoulders, and recurved lateral edges). Material is presumably nonlocal (most are of gray flint). Light smoothing was noticed along the tip of one specimen. Story (1972: 25-40) lists six from the following artifact concentrations in the first layer offerings: three from Concentration 1; one each from Concentrations 2, 3, and 8. Two were found in the second layer offerings; one each from Concentrations 1 and 2. All offerings in the above concentrations were at the north end of the burial pit.

L: 25 to 55 mm.; mean, 40; B1W: 15 to 21 mm.; mean, 18.5; SL: 6 to 10 mm.; mean, 7.5; SW: 5 to 8 mm.; mean, 6.7; T: 2 to 3 mm.; mean, 2.9.

Hayes (N = 1; Fig. 15, A1)

Description: This very long, slender specimen of nonlocal material is expertly bifacially chipped and very straight in longitudinal section. It has the characteristic diamond-shaped stem and nearly pointed base. Shoulders are slightly barbed and the long, narrow blade is

recurved. The lateral edges are extensively smoothed, especially near the tip (the very end of which is broken). It was recovered from the first layer offerings in Concentration 3.

L: 71 mm.; B1W: 17 mm.; SL: 8 mm.; SW: 6.5 mm.; T: 2 mm.

Arrow Point Fragments (N = 3; Fig. 15, Y, Z)

Description: Four fragments of these arrow points were recovered; two of which fit together, so that three arrow points actually are represented. All were found in the first layer offerings, one each in Concentration 1, 2, and 3. One (from Concentration 3) exhibits light smoothing along the edges near the tip. Workmanship and form compare closely to the *Alba* specimens described above.

No dimensions are given.

Discussion: Two of the specimens from Concentration 3 exhibited smoothed edges. Wear patterns suggest that both specimens with modified edges were used as cutting tools.

Fea. 155

All arrow points found in this burial are *Alba*.

Alba (N = 8; Fig. 15, G1-N1)

Description: While all are classified as *Alba*, there is considerable variation in stem morphology within the sample. Stems are mostly parallel but slightly expanding forms do occur; two have bulbar stems. Straight (5), convex (2), and concave (1) bases are represented.

Lateral edges are either straight (3), slightly concave (2),

or recurved (3). All but one are either completely or nearly completely worked bifacially. One is rudely made from a bipolar (?) flake. The point axis on this specimen is oblique to the flake axis; flake faceting shows on both faces and material could be local. A variety of nonlocal flint types is represented in the other specimens.

One was recovered from loose fill near the left side of the skeleton; four were found near the left knee, two came from beneath a large Holly Engraved bowl along the north pit wall, and one was recovered from an artifact concentration (Story, 1972: 43).

L: 28 to 40 mm.; mean, 32; BlW: 15 to 20 mm.; mean, 18.2; SL: 6.5 to 8 mm.; mean, 7; SW: 5.5 to 7.5 mm.; mean, 6.3; T: 2.5 to 3 mm.; mean, 2.9.

Fea. 161

Two large clusters of arrow points were recovered from this burial. One was located just to the right of the right tibia; all points were oriented with the tips pointing toward the foot of the grave. The second cluster was found near the left arm, probably arrows in a quiver (Story, 1972: 45). A single specimen was found near the second cluster and probably belonged to it; it is described in that group.

The clusters will be described separately.

Cluster 1, Alba (N = 28; Fig. 16, A-V)

Description: Most specimens are finely worked bifacially and have finely serrated lateral edges. There are several, however, which retain enough flake surface on one face to determine the proper orientation

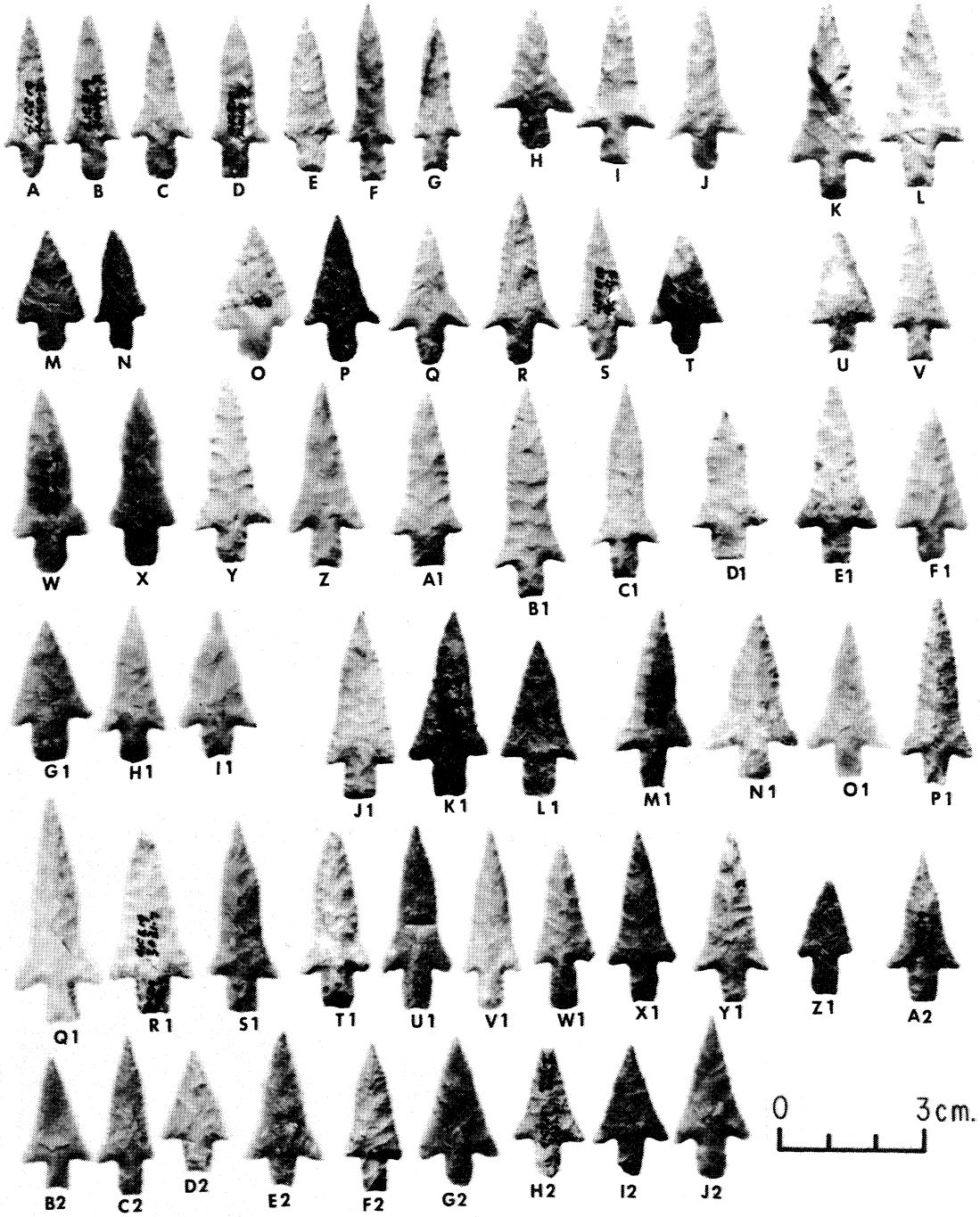


Figure 16. Arrow points from burial association. A-L1, Fea. 161. A-V, Cluster 1. W-L1, Cluster 2. M1-J2, Fea. 118, Cluster 1.

of the bulbar end on the flake preform. Point-base axis usually follows the flake axis but the bulbar area of the blank may occur at either end of the arrow point.

One specimen appears to have been heat treated. Most, if not all, flint is nonlocal.

Despite the variation in form, all are classified as Alba. However, to emphasize the diversity, the forms can be grouped into five subgroups.

Subgroup 1 consists of nine specimens having long, narrow, recurved blades with fine serrations (Fig. 16, A-G). Shoulders are small and are either straight or slightly barbed. Two have parallel-sided stems with rounded bases; three have bulbar stems, three have parallel stems and straight bases, and one has a parallel stem and concave base.

Subgroup 2 numbers three specimens (Fig. 16, H-J). Blades are relatively broad and barbed; blades are not serrated. Stems are bulbar.

Subgroup 3 consists of four specimens (Fig. 16, K-N); triangular shaped blades with broad, slightly barbed shoulders. Edges on two are straight; one has a slightly concave edge and a straight edge. The largest has recurved lateral edges. Stems have parallel edges and bases are straight.

Subgroup 4 numbers six specimens (Fig. 16, O-T). Blades are short and triangular with straight (3) or slightly concave (3) lateral edges. Shoulders are either straight or barbed. Stems are parallel-sided with rounded bases.

Subgroup 5 comprises six specimens with triangular blades (Fig. 16, U, V); edges are either straight (4) or recurved (2). Two have finely serrated lateral edges. Shoulders are either barbed (4) or are at right angles (2) to the blade. All have fairly prominent shoulders. Stems are parallel sided with indented bases.

L: 24.5 to 41.5 mm.; mean, 31.1; BlW: 10.5 to 19 mm.; mean, 15; SL: 5.5 to 9 mm.; mean, 7.2; SW: 5 to 8 mm.; mean, 5.8; T: 1.5 to 3 mm.; mean, 2.3.

Cluster 2, Alba (N = 22; Fig. 16, W-Ll)

Description: Most are so well worked that blank traces are removed. One specimen was probably made on a flake blade as suggested by its triangular cross-section. The specimens are quite large and together with flint color and texture, rule out local materials for the most part.

The cluster is much more homogeneous morphologically than Cluster 1. Blades are long, narrow (typically, but this varies) and are characteristically recurved. Six have finely serrated edges. Shoulders are either straight (at right angles to the long axis) or are barbed slightly. Stem edges are straight with faintly concave, convex, or rounded bases.

L: 29 to 43 mm.; mean, 36.2; BlW: 13.5 to 18.5 mm.; mean, 16.0; SL: 6 to 8.5 mm.; mean, 7.5; SW: 5.5 to 7.5 mm.; mean, 6.6; T: 2 to 3.5 mm.; mean, 2.5.

Discussion: The points in Cluster 2 are so uniform that most were probably made by the same individual. The contrast with Cluster 1

is remarkable. Variation observed in Cluster 1 suggests several flint-knappers were responsible for the single lot.

Fea. 118 (Fig. 27, C)

Arrow points in this burial were found in five separate clusters; these will be discussed individually.

Cluster 1, Types not distinguished (N = 40; Fig. 16, M1-J2)

Description: If these are classifiable as Alba, then the extreme variation of the type is represented in this one cluster. Specimens occurring here have forms which could be classified as Alba (18), Perdiz (4), Cuney (7), Scallorn (5), and unclassified (6). The stems fall into the following descriptive categories (contracting with concave base (4), contracting with straight base (1), parallel with straight base (18), parallel with indented base (3), slightly expanding with straight base (5), convex stem edges and rounded bases (bulbar, 5) and contracting stem with rounded base (4).

Despite the variation in stem morphology, there is a considerable homogeneity of other attributes. All are of nonlocal material and most of the flint is opaque cream or tan-colored. One specimen is opaque light gray and another is blue-gray opaque flint. The flint resembles that from sources in central Texas although specific identity is merely a guess.

All are worked bifacially to the degree that most parent flake preform surfaces are removed. Blades on twenty-one are finely serrated and technology and craftsmanship is excellent. Four are mere stem

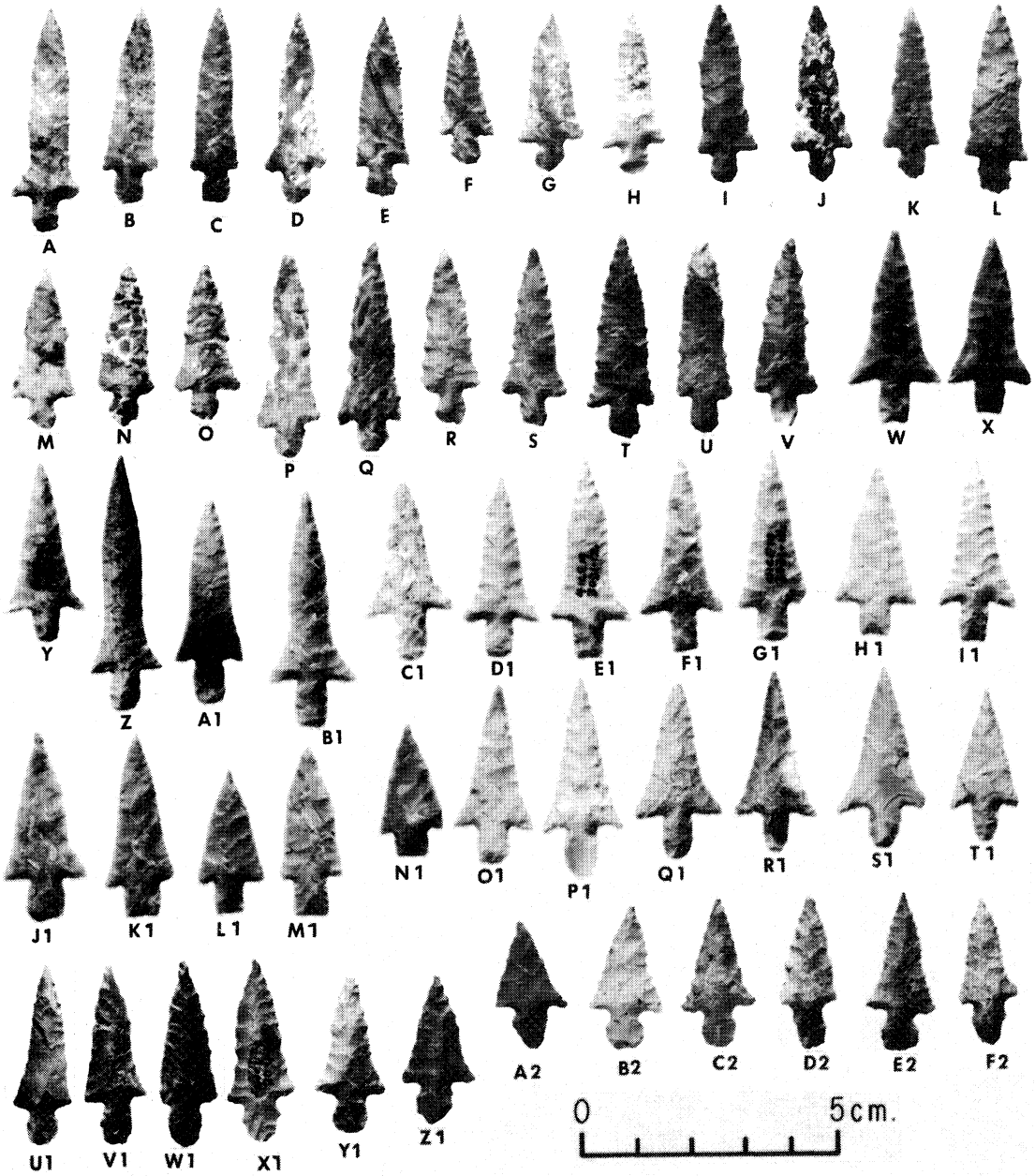


Figure 17. Arrow points from burial association. All from Fea. 118. A-V, Cluster 2. W-Y, Cluster 3. Z-T1, Cluster 4. U1-F2, Cluster 5.

fragments (one of which fits a blade portion in Cluster 2).

L: 16 to 45 mm.; mean, 32.5; BlW: 11.5 to 19 mm.; mean, 14.8; SL: 5.5 to 8.5 mm.; mean, 7.0; SW: 4.5 to 7.5 mm.; mean, 5.7; T: 2 to 2.5 mm.; mean, 2.3.

Cluster 2, Alba? (N = 24; Fig. 17, A-V)

Description: This is perhaps the most homogeneous single group from any of the burials. It can be divided into two subgroups on the basis of technology. One specimen, described separately, does not fit either group. The first subgroup consists of nine specimens which have minutely serrated blade edges and needle-sharp points (Fig. 17, A-H). Blades on eight of these are long, narrow and edges recurved. There are six of Boone chert from eastern Oklahoma (identification by Larry Banks, a geologist for the Corps of Engineers, Tulsa, Oklahoma), two are of brown flint, and one is a cream-colored flint (this specimen exhibits the greatest over-all variation in the group, not only in material, but in size; it is the smallest specimen in the cluster). Stems are either straight or bulbar with rounded bases. Lateral edges are recurved.

The second group within the cluster consists of a very homogeneous sample. All points in this subgroup are of Boone chert (Fig. 17, I-V). They vary in length from 30 to 40 mm. and chipping is bifacial. The principal difference separating the first group from the second is that lateral edges on the second group do not have either the minute serrations or the needle-like tips. In other words, there seems to be one more retouching step exhibited on the first group. Bases on

all of the second group specimens are bulbar. Shoulders are moderate and blades are long and narrow with slightly recurved lateral edges.

L: 30 to 43 mm.; mean, 34.9; BlW: 10 to 13.5 mm.; mean, 11.9; SL: 5.5 to 7 mm.; mean, 6.3; SW: 4.5 to 6 mm.; mean, 4.8; T: 2 to 3 mm.; mean, 2.4.

One specimen from Cluster 2 deserves special mention. It is a blade fragment lacking the stem; the stem that fits this specimen was recovered from Cluster 1. Together, the two fragments make a complete point having a parallel sided stem, straight base, right angle shoulders, and recurved lateral edges. This typical Alba point contrasts markedly with the other points in the cluster.

L: 42 mm.; BlW: 14 mm.; SL: 7 mm.; SW: 6 mm.; T: 2 to 5 mm.

Discussion: The presence of stem fragments in Cluster 1 is not surprising; stems could and evidently were snapped off through normal handling and carrying. What is puzzling is the blade portion in Cluster 2. How did it get there and why was it in a quiver (if the cluster does indeed represent a quiver)? One possible explanation, assuming that these two clusters are quivers, is that the blade portion was hafted differently from that of the stemmed arrow points; in view of the absence of triangular arrow points from this site, this seems to be an unlikely explanation. Another possible explanation for including fragments is token killing. This is not favored, however, because the breaks do not appear to be the result of smashing.

Cluster 3, Alba (N = 3; Fig. 17, W-Y)

Description: This small group was found near the left shoulder.

All are of nonlocal material. Blades are long and relatively broad at shoulders. Lateral edges are recurved on all and are finely chipped. Shoulders are prominent and are slightly barbed on one. Stems contract slightly; bases are straight on two and convex on one.

L: 34 to 38 mm.; BlW: 16 to 18.5 mm.; SL: 6.5 to 8 mm.; SW: 5.5 to 6.5 mm.; T: 2 to 2.5 mm.

Cluster 4, Alba-Perdiz? (N = 35; Fig. 17, Z-T1)

Description: This group also displays a considerable morphological range in stem outline but is less varied in blade shape and material. All are of nonlocal material which resembles flint in central Texas. Stem edges are mostly parallel but vary from slightly convex to definitely contracting; bases are straight (22), convex (1) or rounded (12). Blades on most are long and narrow and the moderate to prominent shoulders are slightly barbed on many. Workmanship is excellent and is bifacially done.

Most specimens fall within the Alba range but certain specimens clearly fall into the Perdiz type as well. The variation from one type to the other is indeed gradual and to separate one from the other would imply a distinction that does not visibly exist.

L: 26.5 to 50 mm.; mean, 36.2; BlW: 12.5 to 19 mm.; mean, 15.5; SL: 5.5 to 9 mm.; mean, 7.5; SW: 5 to 7 mm.; mean, 6; T: 2 to 3 mm.; mean, 2.5.

Cluster 5, Hayes? (N = 26; Fig. 17, U1-F2)

Description: These specimens were recovered from near the left foot of the skeleton and apparently represent a quiver. They form a

very tight technological group. All are made on thin flakes or flake blades. Material varies considerably but there are definite clusters here too. For instance, there are at least nine made on small curved flakes of pinkish-brown flint. Three are of a yellow-olive flint (two were thin, curved, flake blades). Six are of black or black and olive flint identified by Larry Banks of Tulsa, Oklahoma as Bigfork or Woodford chert; these cherts occur in eastern Oklahoma. The remainder are reddish-tan flint; one of them may be Kay County, Oklahoma, flint according to Banks. The specimens of Bigfork or Woodford chert are proportionally longer than the others. One specimen is clearly made on a flake blade and a segment of the medial ridge is retained (Fig. 17, U1). Since most are thicker at the base and the curvature is more accentuated near the tip, it is presumed that the bulb of force was oriented toward the base end of the point. This is certain on a few of the specimens since curvature of ripples show the direction of the striking axis on the blanks.

The stems on all are bulbar; some are more rounded than others. Some exhibit notched stems at the intersection of the blade giving the stems a Hayes-like form with markedly convex bases. Shoulders are either squared or barbed. Blade edges are usually recurved and are sinuous on all. Two are serrated. One specimen is a stem only.

L: 24 to 35 mm.; mean, 29.8; BlW: 11 to 16 mm.; mean, 12.8; SL: 6 to 8.5 mm.; mean, 7.7; SW: 5 to 6.5 mm.; mean, 5.6; T: 2 to 3.5 mm.; mean, 2.7.

Discussion: The tight morphological cluster suggests that one flintknapper is responsible for this group. The range of material

certainly indicates an eastern Oklahoma origin for most. Blade technology (i.e., systematic removal of parallel sided flakes from a prepared core) is absent at the Davis Site and does not suggest core reduction was done there. This brings up the question; in what form was the material imported? Two possibilities are favored: one is that they were introduced in finished form and the origin might be indicated by the stem morphology; the second possibility is that the material was introduced in the form of blanks (flakes or flake blades) and shaped at the site. No failures or recognizable flakes of eastern Oklahoma material were recovered.

FINE-GRAINED QUARTZITE

Nonburial Specimens

There is less variation in this group of sixty-four arrow points in the large sample of flint arrow points. The bulk of the sample falls within the range of the *Alba* type. Several contracting stem specimens are dubiously classified as *Perdiz*, and one does not fit any established type. Several fragmentary specimens are also described.

Group 1, *Alba* (N = 34; Fig. 14, M1-T1)

Description: All are well worked by pressure to the extent that only one reveals traces of flake blank surface on one side. Stem edges are either parallel or slightly expanding, with convex (or rarely straight) bases. The stems are noticeably larger in size, relative to the over-all dimensions of the points, than are those of the flint

specimens, and the blades are also noticeably shorter. Blade edges are usually concave or slightly recurved and prominent shoulders are sometimes barbed.

L: 17 to 28 mm.; mean, 22.4; BlW: 14.5 to 22 mm.; mean, 17.5; SL: 4 to 10 mm.; mean, 6.5; SW: 4.5 to 10 mm.; mean, 7; T: 2 to 5 mm.; mean, 3.2.

Group 2, Perdiz? (N = 3; Fig. 14, L1)

Description: Contracting stems and prominent shoulders characterize these specimens. Base is pointed on two and is rounded on one. Lateral edges are approximately straight on two and are concave on one specimen.

L: 18 mm. (one complete specimen); BlW: 15 to 17 mm.; SL: 3 to 8 mm.; SW: 5 to 6 mm.; T: 2 to 4 mm.

Group 3, Miscellaneous (N = 1)

Description: This specimen has a short, expanding stem and straight base. Shoulders are broad with rounded corners. Lateral edges are concave and serrated. If the specimen were complete, the edges would probably be recurved. Tip is missing.

L: undeterminable; BlW: 16 mm.; SL: 4 mm.; SW: 5 mm.; BW: 7 mm.; T: 3 mm.

Group 4, Quartzite Arrow Point Fragments (N = 26)

Description: These include distal (13), medial (8) and blade fragments without stems (5). Four are definitely made on flakes, but the technique of blank production is uncertain. Most, if not all, are

fragments of once completed points. None exhibits definite impact fractures.

No dimensions are given.

Burial Specimens

Only three arrow points of fine-grained quartzite were found in association with burials in Mound C. These are described below:

Fea. 161

Group 1, Alba (N = 3; Fig. 16, J1-L1)

Description: These specimens are well worked bifacially. Stems are rectangular and bases are straight. Blades are slightly recurved and shoulders are squared. All were recovered from Cluster 2.

L: 32.5 to 38.5 mm.; BlW: 14.5 to 17 mm.; SL: 7.5 to 8 mm.; SW: 7 to 7.5 mm.; T: 2.5 to 3.5 mm.

SILICIFIED WOOD

All silicified wood arrow points were recovered from village refuse.

Group 1, Alba (N = 44; Fig. 14, V1-A2)

Description: Variations in form are similar to those in the flint and quartzite samples; stem edges mostly parallel with straight or rounded base. Stems on two are slightly expanding. Shoulders are usually not barbed, but extend at right angles and are pronounced. Blades edges are concave, recurved, or straight; larger examples are

usually recurved.

Flakes and cleavage spalls were used as blanks in their manufacture. Heat-treating of the material is suggested on thirty-two examples, nineteen of which are cleavage spalls, three are flakes and the remainder were so thoroughly worked that the blank characteristics were removed. Eight specimens in all (including the three above) were evidently made on flakes.

In terms of reduction steps, all specimens that retain traces of blank characteristics represent Process III reduction. With one exception, the best workmanship and larger specimens are from the WPA excavations. However, selective collecting in the earlier excavation may account for this.

L: 17 to 36.5 mm.; mean, 24.6; BlW: 10 to 19 mm.; mean, 15.2; SL: 3.5 to 8.5 mm.; mean, 5.7; SW: 4.5 to 9 mm.; mean, 6.3; T: 1.5 to 4.5 mm.; mean, 3.

Group 2, Miscellaneous (N = 2; Fig. 14, B2, C2)

Description: These two points have serrated blade edges, triangular blades and prominent but unbarbed shoulders. The stem on one contracts slightly and the base is concave; stem on second is slightly expanding and the base is straight.

L: 33 and 26 mm.; BlW: 14.5 and 18 (estimated) mm.; SL: 7 and 4 mm.; SW: 7 (both) mm.; T: 3 and 2 mm. respectively.

Discussion: Both specimens were classified by Krieger (Newell and Krieger, 1949: 163, 164) as Steiner Serrated, a type which was never fully defined. The smaller specimen might fall within the range of

Friley as defined by Bell (1960: 46).

Group 3, Silicified Wood Arrow Point Fragments (N = 16)

Description: Included here are nine blade portions without stems, two medial, and two distal fragments. Most appear to be Alba although one is probably the blade portion of a Friley type (Bell, 1960: 46).

Manning Fused Glass

All Manning fused glass arrow points were found in village contexts.

Group 1, Alba (N = 7)

Description: All but one are fragmentary, probably owing to the brittle nature of the material. Stem edges are parallel, mostly with straight bases; one has a slightly convex base and another a slightly concave base. Two have barbed shoulders; others have prominent shoulders.

L: 18.5 to 25 mm.; BlW: 14 to 16 mm.; SL: 5 to 7 mm.; SW: 5 to 8 mm.; T: 2 to 4 mm.

Group 2, Manning Fused Glass Arrow Point Fragments (N = 2)

Description: Both are medial blade fragments and exhibit good workmanship. Neither evidences direct impact fractures.

No dimensions are given.

Discussion of Arrow Point Sample

Analysis of the arrow point collection from both WPA and recent University of Texas excavations leaves little doubt that the resident arrow point type (i.e., the form made at the site) is Alba. Variations resulting from differences in individual skill and quality of material produced specimens which could be classified as Perdiz and Cuney. However, sorting and classifying strictly according to published type serves little useful purpose in this analysis. Variation in arrow point form in the burial collections was considerable despite the fact that the majority fall within the Alba range. However, many of the variants may not be resident types. The fact that all arrow points are stemmed suggests that a single basic pattern of hafting prevailed throughout the duration of the Caddoan occupation.

The occurrence of arrow point stems lacking blades among complete points, tightly clustered and oriented in the same direction, suggests that blade portions were often snapped off during the course of handling and carrying. This might partly explain the common occurrence of blades lacking stems in middens.

The degree of variation exhibited within individual clusters in the burial collections differed from cluster to cluster. These variations are difficult to quantify but easily illustrated (Fig. 16, A-V, Fig. 17, Z-T1). Some clusters are markedly homogeneous in form and material (e.g., Fig. 17, A-V, U1-F2) whereas others contain a variety of stem forms and materials. In some clusters, such as Cluster 1 in Fea. 118 (Fig. 16, M1-J2), variation in form and, to a lesser extent,

in technology suggests that the several individual flintknappers may have been responsible for points included within one cluster.

Some of the variation seen in the arrow point sample (particularly regarding form and material) are undoubtedly the result of trade. For example, many of the specimens of nonlocal flint were chipped on long flake or flake-blade blanks; long flake and flake blade production, especially of the foreign materials described in preceding pages, is altogether absent at the Davis Site. Too, failures in the manufacture of arrow points in the sample are mostly represented by specimens of local or regional resources.

There is a striking difference between the materials used in the nonburial sample and those in the burial sample. Over 99 percent of the burial specimens (N = 359) are of flint, most, if not all, of which is nonlocal. Three specimens are of fine-grained quartzite and could be local. The nonburial sample (N = 463) comprises 71 percent flint, 14 percent fine-grained quartzite, 13 percent silicified wood, and 2 percent Manning fused glass. In the total sample, flint accounts for 84 percent (687 out of a total of 822). The infrequent occurrence of flint in local resources (noted in Chapter 3) might cause the flintknappers either to turn to materials other than flint for the manufacture of arrow points or seek to obtain flint from outside sources.

If there is a change in the selection of raw materials for arrow point manufacture, it could be represented in the temporal and spatial distribution of arrow points. The burial sequence in Mound C provides the best chronological sequence of events at the site but must be excluded from this analysis for two reasons; first, there is no significant

change in arrow point raw material. Only one burial, Fea. 161, contained arrow points of material other than flint. Second, not all burials contained arrow points. Comparing the frequency of fine-grained quartzite and silicified wood between the two distinct village areas recognized by Story (1972: 73) and designated as Inner Village A and Inner Village B may reveal horizontal differences. The village is divided into two parts, east and west, for this analysis. The eastern part is equivalent to Story's Inner Village A since it consists of materials recovered from the WPA excavations in and around Mound A and from Unit 15 in her excavations. Unit 15 is included because of its close proximity to Mound A and as Story notes (ibid.: 96), because certain artifacts recovered from that unit compare favorably with the WPA excavations in the Mound A area. The western part includes all units west of Mound A except Unit 15. Story's Inner Village B is included in the western part.

A Chi-square test has been used to measure the statistical significance of the differences between the two areas. The tabulations are presented below:

	Flint	Quartzite	Silicified Wood	Total
East	(a) 167	(b) 19	(c) 25	211
West	(d) 181	(e) 45	(f) 35	261
Total:	348	64	60	472

	o	e	o-e	d^2	
(a)	167	155.56	11.44	130.87	.84
(b)	19	28.61	- 9.61	- 92.35	3.23
(c)	25	26.82	- 1.82	- 3.31	.12
(d)	181	192.43	- 11.43	- 130.64	.68
(e)	45	35.38	9.62	92.54	2.61
(f)	35	33.17	1.83	3.34	.10
Total:	472	471.97	.03	0.45	X = 7.58
		P <.02			

There is a significant difference between the two collections. Flint arrow points are more frequent in proportion to those of quartzite and silicified wood in the eastern area than in the western portion. This difference is due to cultural selection and not due to chance. It is not possible to determine at this point if the differences are temporal or social. It is clear, however, that quartzite and silicified wood were used either throughout the period of occupation or by both social groups, or both.

One of the crucial problems that Story (1972: 77) stresses is determining the temporal relationship between Inner Village A and Inner Village B. It was not possible to relate them stratigraphically, and they could not be seriated on the basis of radiocarbon dates. The dates reported by Story (ibid.: Table 4) place Inner Village B late in the sequence at the site (i.e., late eleventh to late thirteenth century). Dates from Inner Village A are inconclusive although Story

hypothesized that it predates Inner Village B (1972: 77).

The frequency of flint arrow points merely validates Story's findings that significant differences exist between the artifact collections associated with Inner Village A and those found in and around Inner Village B (i.e., the western portion of the site). It is not possible to relate these differences to temporal changes at this time. That is, the differences could be due to social or functional distinctions between the eastern and western portions of the village. Individuals in the eastern part may have had first choice to nonlocal materials such as flint or flint arrow points. Individuals in the western part may have relied more extensively on local flint, quartzite, and silicified wood. If a temporal distinction exists between the two portions of the village, then differential frequency of flint arrow points could be due to changes in the selection of flint for arrow point production through time. A reason for this change in selection could be due to a decrease in nonlocal flint raw materials used in arrow point manufacture and/or a decrease in flint arrow points introduced by trade.

Assuming that a decrease existed in the supply of either flint or arrow points introduced by trade, it is hypothesized that a greater reliance of local resources for arrow point production would result in a decrease in the mean length of those tools due to the small size of the local raw materials. Since flint was less frequently used for arrow point production in the western portion of the site, but was represented in over 99 percent of the arrow points in Mound C burials,

the mean length of the Mound C samples should be longer.

This hypothesis was tested by obtaining mean length measurements on arrow points collected from the western portion of the site and comparing these with the same measurements of arrow points from the eastern portion (in, and around Mound A) and from burial associations in Mound C. The mean length and sample size are as follows:

West		East		Mound C	
mean	sample	mean	sample	mean	sample
25	63	29	31	34	359

Since flint arrow points are more frequent in proportion to those of quartzite and silicified wood in Mound C and least frequent in the western village portion of the site, the mean length test shows that as flint arrow points decrease in frequency and quartzite and silicified wood increase, the mean length decreases. The hypothesis that a greater reliance on local resources resulted in a decrease in tool size is supported by the test.

The near exclusion of arrow points of materials other than flint in Mound C burials suggests that the selection of flint over all other materials for arrow points may be due to more than functional or technological purposes. For example, if nonlocal flint arrow points were unequally distributed throughout the population, the mere possession of them may have had social implications.

Awls

Specimens described as awls have narrow, tapered points; they are usually termed "drills." The distinction between an awl and a drill is a significant one. Webster's new Collegiate Dictionary defines an awl as "a pointed instrument for piercing small holes, as in leather or wood." A drill is defined as "an instrument for boring holes in hard substances." Wear patterns indicating a boring motion were seen on several examples, particularly the longer ones. However, the smoothing and near polish on and along the distal edges of these specimens suggests use against soft materials, such as wood or leather. Hence, the distinction is justified.

The awls are grouped according to the raw material class used in their manufacture.

Flint Awls (N = 22; Fig. 18, A-J)

Description: Classified here are small flakes or bifaces having tapered points; some are long and narrow while others are short with angle of convergence of edges as much as 45 degrees. Six are stemmed (presumably reworked arrow points, but the awls themselves may have been hafted). Bases on twelve are largely unworked; the remainder are slightly to moderately bifacially chipped, but are largely unshaped. Most are made on flakes or spalls; technique of blank production is uncertain. Smoothing is extensive on the tips of five complete specimens; striations perpendicular to the edge are evident on four of these leaving little doubt that they functioned as boring tools (Fig. 18, A', B', C', C").

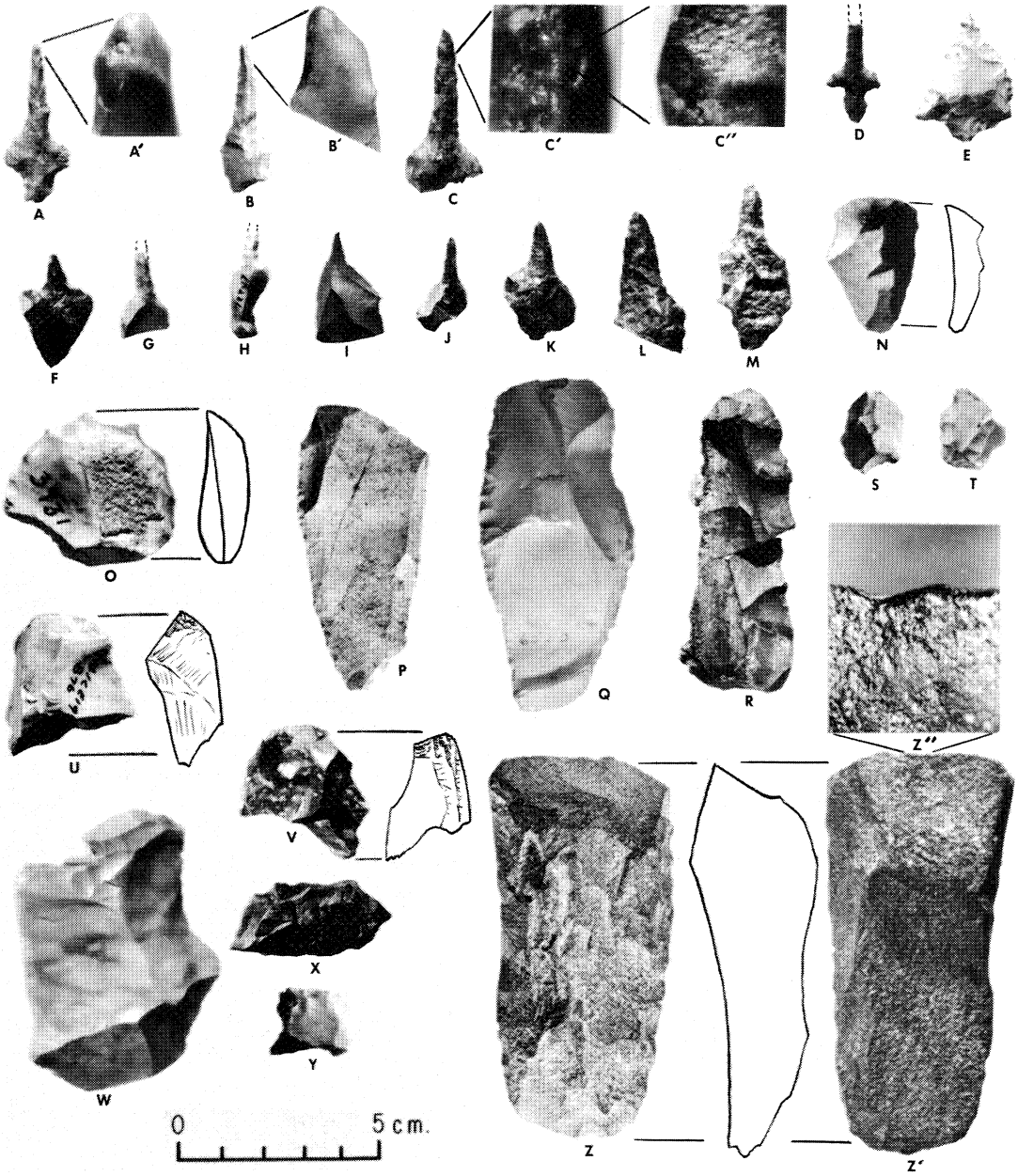


Figure 18. Awls, unifaces. A-J, flint awls. A', B', C', C", microphotographs of wear patterns. K, L, quartzite awls. M, silicified wood awl. N-Z, flint unifaces. N, Group 1. O, Group 2. P, Q, Group 3. W, Group 4. S, T, Group 5. R, Group 6. U, V, Group 7. Y, Group 8. Quartzite uniface: Z-Z", Group 2. Silicified wood uniface: X, Group 1.

Materials worked were probably soft in view of the polish that resulted on the awl points. One specimen is made on a Hayes arrow point of dark gray novaculite (Fig. 18, D). The remainder are of flint, most of which are probably of local materials.

L: 20 to 39 mm.; mean, 26.1; W: 10 to 24 mm.; mean, 15.6; T: 2.5 to 8 mm.; mean, 4.2.

Discussion: Four specimens described here are illustrated by Newell and Krieger (1949: Fig. 57, BB, CC, EE, FF).

Quartzite Awls (N = 6; Fig. 18, K, L)

Description: All of these items are made on quartzite flakes or spalls and bases on most are unworked; one has a rudimentary stem. Tapered points on five were created by bifacial pressure flaking; one is mostly unifacially flaked.

L: 20 to 35 mm.; W: 12 to 18.5 mm.; T: 2.5 to 7 mm.

Discussion: One of these is illustrated by Newell and Krieger (1949: Fig. 57, DD).

Silicified Wood Awls (N = 4; Fig. 18, M)

Description: Three of these are cleavage spalls (Process III reduction) reduced by pressure flaking which created narrow, tapered points. None shows wear, but one has a steeply chipped marginally beveled edge. Bases are unmodified on three; one has an expanding stem. Two appear to be heat treated.

L: 21 to 41 mm.; W: 12 to 23.5 mm.; T: 2 to 7.5 mm.

Summary of Awls

The entire sample of awls is included in the Caddoan technological system. Awls of this size and technology are evidently absent in the pre-Caddoan assemblages of east Texas. At Livingston and Conroe reservoirs, small awls were apparently part of the arrow point assemblages (McClurkan, 1968; Shafer, 1968). The occasional use as blanks of arrow points and flakes which are clearly part of the Caddoan technology is strong evidence for the Caddoan age of the awls.

The use of arrow points as awl blanks is also indicative of recycling within the Caddoan lithic technology system. This is one of the few demonstrable cases of re-use at the Davis Site.

Other Bifaces

The term "other bifaces" is used here to distinguish unstemmed bifaces other than projectile points and awls. This term, while admittedly cumbersome was chosen in order to avoid functional implications. These specimens were sorted with respect to an arbitrarily ranked priority of variables: (1) material; (2) reduction technique (i.e., when it can be determined with some degree of certainty); (3) form and/or completeness. Krieger's sorting (Newell and Krieger, 1949) was based mainly on form and hence our classifications will be noticeably different.

Generally, terminology of wear will follow Stan Ahler's (1971: 38, 39) definitions as near as possible; these are listed in Chapter 6. There are times when edge modification may be due to the manner in which

the bifaces were reduced and not due to function. This is particularly true of bifaces that have been thinned by soft-hammer retouch. The edge modification is reported and other variables are taken into consideration when functional judgements are made.

FLINT

Flint bifaces other than projectile points and awls are divided into six descriptive groups primarily on the basis of technology.

Group 1, Gahagan Bifaces (N = 64; Fig. 19, A-V)

Description: Thirty-five of these specimens were recovered from burials in Mound C. Twelve were recovered from Fea. 134, the Stage I burial; twenty-one came from Fea. 119, a Stage II burial; Fea. 161 and 118 yielded one each; these are Stage III and Stage IV burials respectively (Story, 1972: 10, 11).

Raw materials are all nonlocal. Krieger (Newell and Krieger, 1949: 173, 174) believed the source of those recovered from the WPA excavations to be local. A variety of flint is represented with respect to color and texture, although all of it is of excellent quality. Hues range from opaque light gray, tan, brown to translucent light gray, blue-gray, tan and brown. Certainly more than one quarry is represented. The size of the finished items indicates raw material sources were either ledges, small boulders, or large cobbles; thus, acquisition was very near the parent outcrops or from the outcrops themselves.

Reduction of large blanks or nodules was by expertly controlled soft-hammer flaking. This process was so thoroughly carried out that

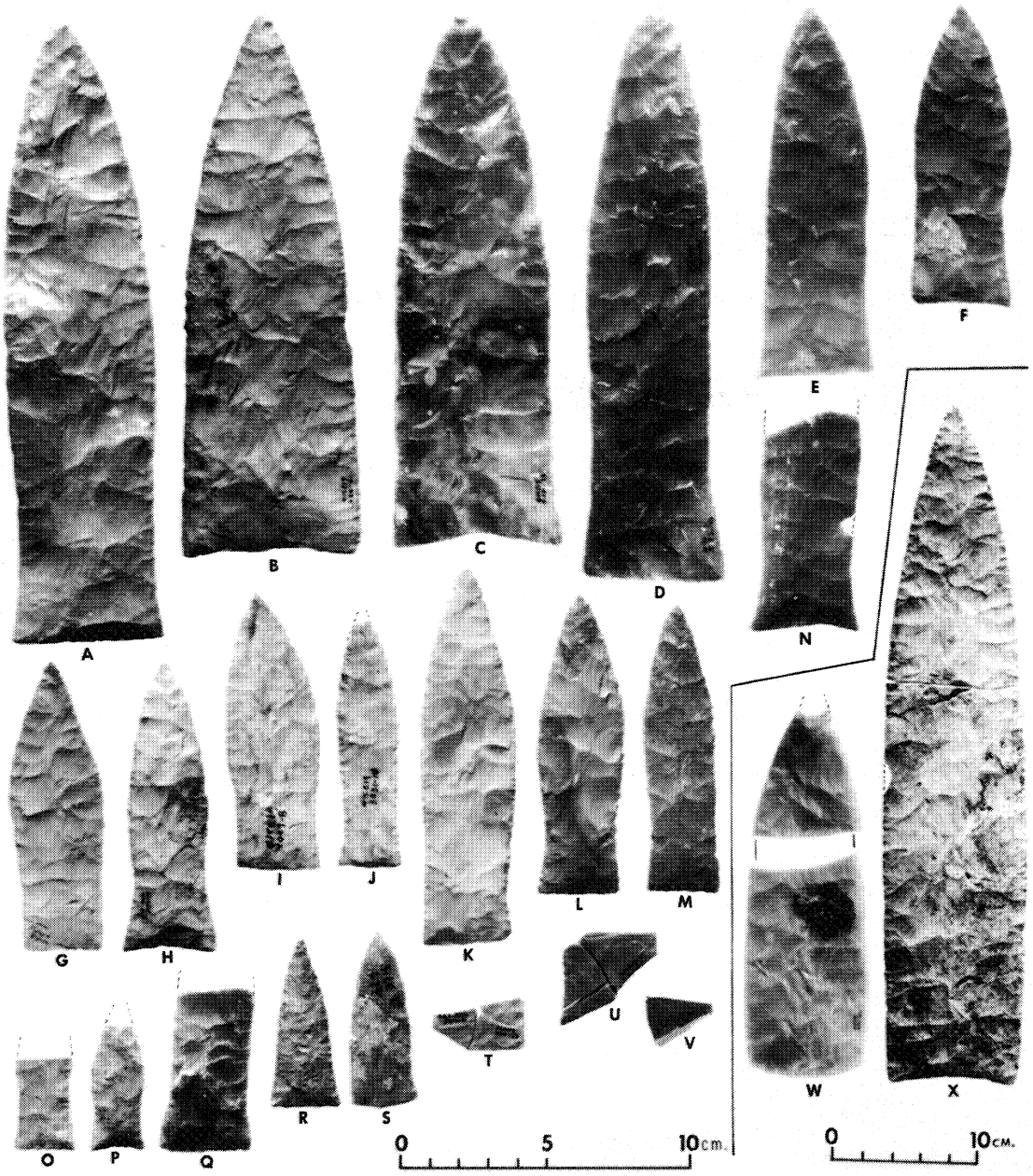


Figure 19. Other bifaces. A-V, Group 1 (Gahagan bifaces). A-H, T-V, Fea. 119. I, Fea. 161. J, Fea. 118. K-S, nonburial context. W, X, Group 2. W, Fea. 119. X, Fea. 134.

all traces of cortex and initial reduction were removed. Final shaping was done around entire margins by light soft-hammer percussion and pressure; the latter resulted in fine marginal trimming.

Outlines are variations of a long, narrow triangular pattern. Bases are generally straight or slightly concave; slightly convex and moderately concave bases do occur, but they are infrequent. Bases are thinned to about the same degree as the lateral edges.

Lateral edges of most are recurved (Fig. 19, A, D-Q). Of the six complete specimens that do not exhibit apparent blade recurvature, four have concave bases (Fig. 19, B, C). Edge recurvature may have facilitated hafting, but this is not demonstrable.

The amount of recurvature varies; bases are usually wider than the maximum blade width, but this is not always the case. On most recurved examples, the edges taper in slightly just above the base and expand outward again near mid-length. There are examples, however, where the edges are parallel above the base and expand outward near mid-length making the blade wider than the base. Distal ends are sharpened.

A comparison was made of the burial clusters. The sample exhibiting the most over-all uniformity in size and form was that from Fea. 134 (Fig. 26, A-C). The group which was recovered from Fea. 119, on the other hand, exhibits a wide variation in size and shape (Fig. 19, A-H). As a collection, this sample compares very closely with three burial samples reported from the Gahagan Site (Webb and Dodd, 1939; Moore, 1912).

The variations in size in the nonburial sample are more striking than those in shape (Fig. 19, K-S). It is worthy of note that twenty-two of the twenty-nine specimens from nonburial context with good provenience data were recovered from the vicinity of Mound A (including three from Unit 15); three are from the vicinity of Mound B (two from Unit 13, and one from Unit 14) three from Unit 10 along the western edge of the terrace between Mounds B and C; and one was recovered from the surface in the western portion of the site.

The extent and degree of wear, secondary retouch, and trimming is variable. Specimens from Fea. 134 and Fea. 119 exhibit only hints or traces of wear for the most part; one specimen recovered from Fea. 118 (Fig. 19, J), a Stage IV burial exhibits extensive lateral smoothing and significant reduction of lateral margins by retouch which resulted in noticeably steeper edge angles. In other words, edge modification on burial specimens (with the one exception just described) is mostly confined to faint traces of polish and smoothing. This wear occurs most often at the widest portion of the blade (usually about mid-point) and near the tip. Faint surface smoothing was noted along flake scar ridges on certain examples, particularly larger ones.

Edge wear is more pronounced on specimens recovered from non-mound context. All but two of the twenty-nine specimens in the present collection from proveniences other than Mound C exhibit some edge modification under magnification. Smoothing (from faint to pronounced), polished, nicking, retouch (which sometimes results in beveling), surface smoothing and surface polish are all represented.

Cutting (or sawing) in a back and forth motion is indicated by the presence of the smoothing and polish on both faces of the edges although striations conclusively revealing directions of motion were not detected. Edge nicking suggests cutting materials hard enough to cause sufficient pressure to chip edges but soft enough to produce smoothing and sometimes polish. Almost any vegetable or animal substance except bone could have been involved. Extensive cutting of bone with flint does not result in polish on the flint (Curwen, 1935). Surfacial smoothing and polish seen on village and Mound C specimens could be due to use wear; however, since it seems to be more pronounced on larger specimens, this modification could also be due to sheath wear, which may also account for some of the edge polish. Organic stains adhering to several of the specimens may be the remains of leather or bark sheaths or cane wrapping.

Eighteen fragments of eight separate Group 1 bifaces were included as furniture in Fea. 119. At least three of these were intentionally smashed, as indicated by percussor marks and percussion cones on broken surfaces (Fig. 19, T-V). All appear to have been fragmentary to begin with, and consequently the smashing does not suggest "killing." It is suggested that these fragments may have been intended as tool blanks such as wedges and slotting tools; similar fragments produced by deliberate smashing of flakes is reported in Canada by Bonnichsen (1968).

Additional suggestions regarding the functions served at the Davis Site by the Group 1 bifaces are provided through the contextual data. That they were prestigious items is suggested by their associations

in burials - Fea. 134, Fea. 119, Fea. 118, and Fea. 161. The specimen reported in the post mold by Newell and Krieger (1949: 174) may have been an offering (Story, 1972, reports a celt in an interior post hole in Fea. 111, a large circular structure beneath Mound B). Wear patterns, as noted above, indicate that some of these specimens actually served as tools, and the broken condition of many of those recovered from nonmound context further suggests that they were broken through use. Only one of the burials contained a specimen which evidenced extensive use (Fig. 19, J). This was Fea. 118, a Stage IV burial, which did not have a great variety of furniture compared to Fea. 134, Fea. 119, and Fea. 155.

L: 56 to 280 mm.; mean, 129; (there is a noticeable clustering between 95 and 113 mm. and the mode is between 100 and 110 mm.); BW: 20 to 65 mm.; mean, 36; B1W: 20 to 64 mm.; mean, 34; T: 4 to 9 mm.; mean, 5.5.

Discussion: Dr. C. H. Webb suggested at the 1970 Caddoan Conference in Magnolia, Arkansas, that specimens previously called "Copena Knives" by Newell and Krieger (1949: 173, 174, Fig. 60, A-H) and others be termed Gahagan bifaces. This was proposed because there is no demonstrable cultural connection between Copena Focus and Caddoan materials because of technological and morphological dissimilarity, and because these finely made bifaces were first found by C. B. Moore at the Gahagan Place. Krieger (ibid.) unfortunately termed the artifacts "Copena Knives" on the basis of their vague resemblance to certain Copena Focus bifaces reported by Webb and DeJarnette (1942: 301-306).

He went on to suggest that:

> This easily identified type provides a very definite connection with cultures to the east and across the Mississippi. On the other hand, it spread westward to central Texas (Newell and Krieger, 1949: 173, 174).

We know now that the Copena Focus is Adena-Hopewell (Willey, 1966, places this complex in Burial Mound II which is equivalent to Hopewell) which is several hundred years earlier than the Davis Site. Too, artifacts of similar form in different cultural systems do not, by themselves, indicate interaction between these systems. That a marked similarity exists with the Davis Site specimens and others from sites west of the Mississippi, however, cannot be denied. It is quite possible that some of these sites are contemporaneous (this is particularly suggested of Davis and Gahagan sites) and were obtaining the bifaces from the same source by way of trade networks.

In addition to the occurrences at Gahagan and Mineral Springs sites, bifaces similar technologically and morphologically to Group 1 specimens above have been reported from Burris No. 1 Site in Livingston Reservoir basin (McClurkan, 1968: Fig. 46, D) and at Belton Reservoir (Miller and Jelks, 1952: Pl. 26).

One final note is offered regarding the technology. It is the opinion of this writer and of others who have experimented with flint-knapping and have viewed this collection that the makers of these bifaces must have resided on or very near a large supply of raw materials. This suggestion is offered on the basis of the fragile nature of the specimens owing to the extreme amount of thinning; there surely were many failures

in attempts to achieve this degree of reduction despite the expert skill these flintknappers must have had. Such failures are not present in the Davis Site collection.

Group 2 (N = 2; Fig. 19, W, X)

Description: These very large bifaces exhibit skilled shaping and thinning by soft-hammer flaking but do not possess the fine pressure flaked margins of the Group 1 bifaces.

Specimen 4078-63 (Fig. 19, X) is of light gray opaque flint and was associated with Skeleton 5 in Fea. 134 (Fig. 26, A). The size, thinness, and ultimate control required in removing the thinning flakes on this specimen are outstanding.

Base and edges are thinned to about the same degree. Final retouch was mostly by light soft-hammer flaking but some pressure flaking is also indicated.

The base is slightly concave with distinct, but rounded basal corners. Blade widens very gradually from the base to mid-length where maximum width is reached then tapers gradually to the tip. The outline is lanceolate with faintly convex lateral edges.

The specimen was broken by ground pressure but the damage was insignificant from an analytical point of view. A semicircular chip broke from one edge near mid-length after interment.

Edge smoothing and some polish occurs along virtually the entire length from basal corners to the tip. Striations parallel to the edge were seen along one edge near the base. Surface smoothing and polish is also quite extensive. Since the wear does not appear to be coarse

and edge damaging (such as nicking, etc.), it may have been the result of abrasion against a sheath. The weight of the specimen in a loosely fitted sheath of leather or bark could result in this kind of alteration. A layer of organic material beneath another layer of bark or cane adheres to one side of the specimen. This organic material may be the remains of a leather sheath.

L: 480 mm.; WB: 80 mm.; W: (at mid-length) 87 mm.; T: 15 mm.

The second example, 424-133, 48 (Fig. 19, W), is of cream-colored novaculite and was recovered from a north wall offering in Fea. 119. It was recovered in two pieces (broken by a snapped fracture) and the position of the fragments (which were not immediately adjacent) indicates it was broken prior to interment. The distal tip is missing. One portion of the broken edge on the smaller piece is trimmed, but the trimming may not be intentional modification although it occurred before burial.

The skilled soft-hammer flaking compares closely with the other Group 2 specimen, although the lateral margins exhibit more extensive pressure retouch. Alternate marginal retouch occurs along the left edge of the distal portion.

Base is slightly convex and basal corners, while distinct, are rounded. Lateral edges are faintly convex for about two-thirds the length and become a little more so toward the distal end.

There is indication that the specimen has been reworked at the base. Steep, bifacial flaking not directed at thinning occurs across the base; these flake scars truncate lateral thinning flake scars and appear to have been done by a different technique.

Lateral edges are smoothed and polished. Smoothing is quite extensive but no striations were observed. Faint traces of surface smoothing and polish are also present.

L: 232 mm.; W: 83 mm.; T: 15 mm.

Discussion: The position in which Specimen 4078-63 was found in Fea. 134 suggests that it functioned as a symbol of authority, perhaps as a flint sword. Specimen 424-133, 48 was found in conjunction with other status objects. Its broken condition indicates a rather complicated history. It is possible that Specimen 424-133, 48 once served a function similar to 4078-63.

Large bifaces accompanying Caddoan burials are not uncommon and they occur in early as well as late burials. They may have functioned differently at different times. That they functioned as status objects is evident in their burial placement; how the objects were used by the owners is not clear and was undoubtedly variable.

Group 3 (N = 3; Fig. 20, A, B)

Description: These are triangular, deeply patinated bifaces from Fea. 119. One was deliberately smashed. Another has a burin-like spall removed from across about half of the base (Fig. 20, A). Lateral edges on all exhibit some smoothing and minor edge damage before and after patination. The smashed specimen shows some minor attempts to retouch certain portions of the lateral edges.

The principal contrast between these and the Group 1 bifaces is the absence of secondary retouch and marginal trimming. These have not been reduced beyond soft-hammer thinning and the margins are rather

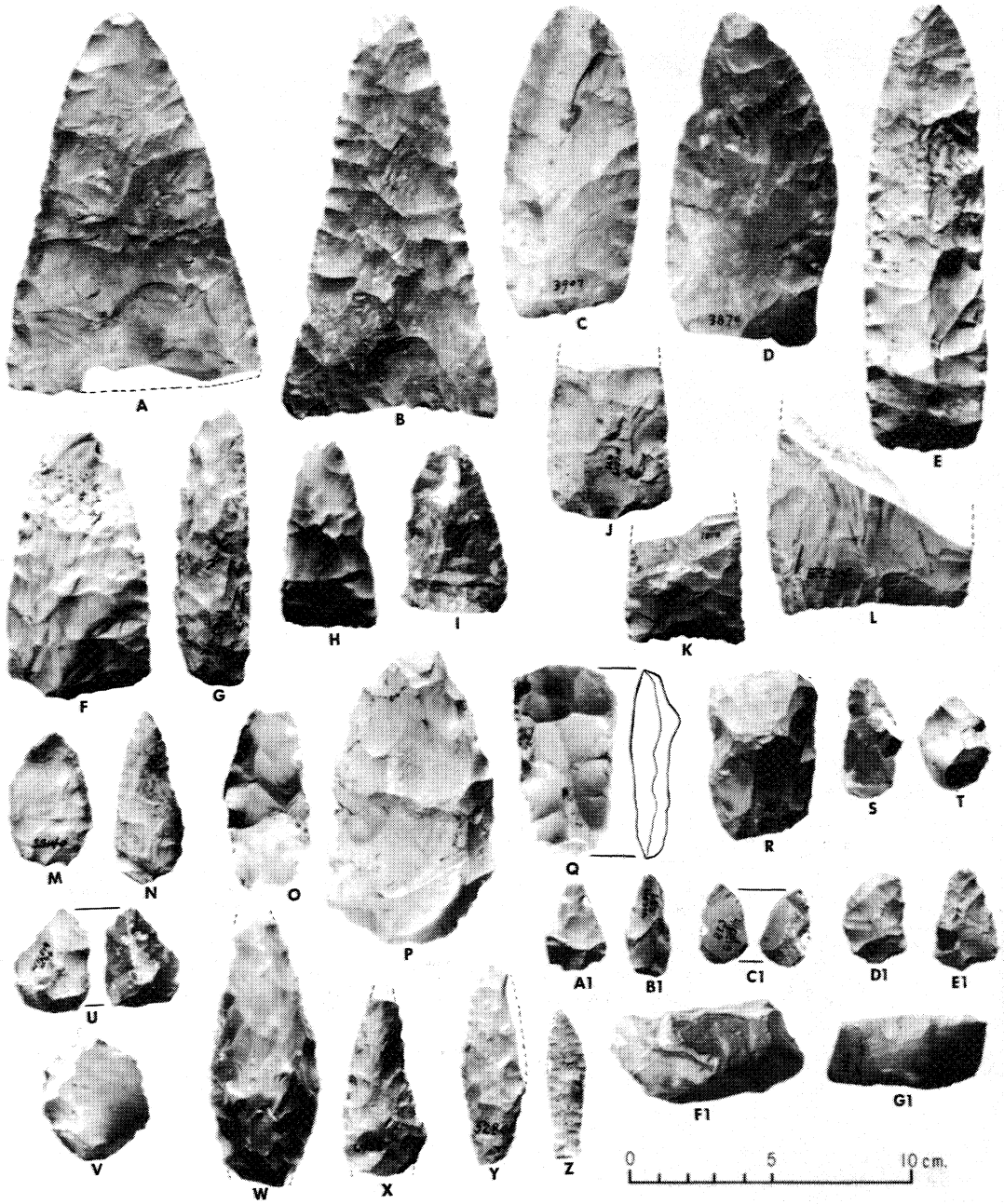


Figure 20. Flint bifaces. A, B, Group 3. C-G, Group 4, subgroup 1. H, I, Group 4, subgroup 2. J-L, Group 4, subgroup 3. M, N, Group 4, subgroup 4. O, P, Group 5, subgroup 1. Q, R, Group 5, subgroup 2. S-U, Group 5, subgroup 3. W, X, Group 6, subgroup 1. V, Group 6, subgroup 2. A1-E1, Group 6, subgroup 3. Y, Z, F1, G1, Group 6, subgroup 4.

sinuous.

Bases on all are straight or nearly so and lateral edges are straight for most of the length and then become slightly convex toward the distal end. The outstanding feature regarding the shape is their wide bases relative to the length.

L: 143, 137, 140 (estimated) mm.; W: 77, 89, 80 (estimated) mm.; T: 11, 11, 10 mm.

Discussion: These examples are so technologically homogeneous and exhibit such uniform aging characteristics that they may have been collected from an ancient preform cache. Patination is absent on the flint reduced at the Davis Site and no other bifaces from burial context are patinated.

Group 4 (N = 93)

Group 4 bifaces are divided into five descriptive categories. They are partly shaped by soft-hammer flaking but are largely untrimmed. Included under this heading are the bifaces reported from the cache south of Mound A by Newell and Krieger (1949: 176, 178). The cache is illustrated in Figure 27, D.

Subgroup 1 (N = 63; Fig. 20, C-G; Fig. 27, D)

Description: These bifaces have been thinned by soft-hammer flaking but none has been trimmed. Technologically and morphologically they appear to be preforms. There is little doubt that all are from the same quarry, although there is considerable variation in color and texture. It is possible to reconstruct the variations within the flint

seam by comparing one specimen with another. The quarry was either a thick seam or blocks broken from an exposed seam or ledge. Large flakes were removed from the ledge or blocks and these were, in turn, reduced by hard and soft-hammer percussion. Some of the large flake blanks were heat treated prior to thinning. In each instance where heat treating is assured (as evidenced by the retention of flake surfaces which existed prior to heating, cf. Purdy and Brooks, 1971) the reduction technique following the heat treating was soft-hammer flaking.

The following colors are represented: a light blue-gray with white elongated specks oriented along a definite plane; light nearly homogeneous opaque blue-gray; mottled light to moderate blue-gray; and mottled gray-olive gold with faint shades of reddish-pink combined. Definite banding of light gray flint also occurs. The variations are seen as a spectrum within the same ledge since specimens may be all of one color or exhibit several colors. The material does not resemble any central Texas flint familiar to this writer; the source is unknown.

Form varies within a certain basic outline. Most specimens are subtriangular with straight base, roughly rounded basal corners, slightly convex lateral edges and rounded distal ends. Extremes range from near oval to subrectangular in form.

Most examples have a trace of dulling along the edge points. Since the dulling is not accompanied by smoothing or polish, I interpret it as a product of platform strengthening for soft-hammer flaking.

One specimen deserves special mention; it was not part of the cache although it was recovered nearby. It is of the same material

but has been further reduced by hard-hammer flaking which reduced the lateral margins significantly but not the thickness. Both edges evidence a considerable amount of blunting and some smoothing; one edge is sinuous and the other is quite straight. It is illustrated by Newell and Krieger (1949: Fig. 56, cc) and also in Figure 20, G.

L: 79-161 mm.; mean, 117; W: 26 to 66 mm.; mean, 47.5; T: 10 to 20 mm.; mean, 14.

Discussion: Sixteen of these bifaces are illustrated by Newell and Krieger (1949: Fig. 61). Krieger (ibid.) describes them as axes and side scrapers but there is no indication that they ever served these functions. He also regarded the material as local in origin but we now know this to be incorrect.

So far as can be determined, there are no finished artifacts made of this flint except for the one mentioned above. The cache seems never to have been seriously exploited.

Subgroup 2 (N = 5; Fig. 20, H, I)

Description: These subtriangular bifaces of nonlocal flint exhibit mostly soft-hammer flaking; a minimum of retouch is present on two. The retouching may have been in conjunction with edge rejuvenation.

Edge blunting is present on sinuous edge projections on all specimens and is extensive on one. Edges are not smoothed or polished; they are blunted.

Tips are dulled or rounded. One specimen exhibits one straight and one sinuous edge; edges on the others are quite sinuous. Bases on two are thinned.

L: 42 to 70 mm.; W: 34.5 to 39 mm.; T: 5 to 11 mm.

Discussion: One specimen included in this group is described by Newell and Krieger (1949) as a flint axe and is illustrated in their Figure 56, DD.

Subgroup 3 (N = 9; Fig. 20, J-L)

Description: The only combination of attributes binding this rather loose group together is that each was thinned with soft-hammer flaking, and subsequent trimming, if any, was minor. One is a well thinned biface exhibiting evidence of failures in the form of attempts to remove a thickened knot; the result was a collapsed platform which removed a portion of the edge. Six are fragments of bases of triangular-shaped bifaces. One specimen of waxy, cream-colored flint is a fragment from the basal corner of a large biface. Attempts to reshape the fragment are evident in the form of a series of flake scars (presumably hard-hammer) originating from the facet of a broken edge which was used as the striking platform. One soft-hammer flake evidently hinged into the specimen.

Only two specimens did not show obvious wear. The degree and kind of wear on the remainder was variable; edge blunting was common and many exhibiting this feature were also smoothed; edge polish and crushing, although present, was uncommon.

L: Only two specimens are complete enough for measurement, 82 and 87 mm.; W: 33 to 79 mm.; T: 9 to 15.5 mm.

Discussion: A specimen included in this group is illustrated by Newell and Krieger (1949: Fig. 60, K) and described as a leaf-shaped

knife.

Subgroup 4 (N = 2; Fig. 20, M, N)

Description: These are both small, oval bifaces. The larger specimen is made on a flake struck from olive-brown opaque flint. It is shaped primarily by soft-hammer flaking but some retouching is evident along both edges; retouch is largely unifacial. Lateral edges are slightly convex, and one is partly sinuous. The straightest edge is extensively smoothed and slightly polished; minor smoothing of high points is seen on the sinuous edge.

The smaller specimen is made from a brown, split, stream-worn pebble, possibly of local flint. It is chipped entirely by soft-hammer technique and bears no retouching. The points at flake scar junctures along the lateral edges are blunted.

Larger specimen: L: 59 mm.; W: 24 mm.; T: 6 mm. Smaller specimen: L: 45 mm.; W: 28 mm.; T: 6 mm.

Discussion: The smaller specimen is described as a flint blade or crude knife by Newell and Krieger (1949: Fig. 56, Y).

Subgroup 5 (N = 14)

Description: These are medial and distal fragments of bifaces reduced by the soft-hammer technique; varying degrees of retouch and trimming are exhibited. Edge wear varies, from none to extensive blunting, crushing, smoothing, and polish. Most are of nonlocal material.

No dimensions are given because of the fragmentary condition of the specimens.

Group 5

Bifaces described under this heading were apparently reduced by hard-hammer flaking only. They are described in three subgroups.

Subgroup 1 (N = 5; Fig. 20, O, P)

Description: These specimens are so varying in form that individual descriptions are warranted.

Specimen CE 19/389--Rounded base fragment; may have been portion of Gary preform. Opaque white flint, presumably nonlocal. Extensive edge blunting.

L: undeterminable; W: 31 mm.; T: 14 mm.

Specimen ET/624--Fragment of a very large biface. Specimen has been heated and subsequently broken by heavy blow against edge. Material is nonlocal, pinkish-gray, opaque flint. Edges were crushed and battered prior to heating. Some blunting also present on edges.

L: undeterminable; W: 74 mm.; T: 24 mm. Krieger (Newell and Krieger, 1949: 174) classified this specimen as a heavy flint gouge or axe.

Specimen ET/1362--Lenticular with sinuous edges (Fig. 20, O); made on thick spall of nonlocal light gray flint. Minor edge blunting of high points along one edge.

L: 65 mm.; W: 31 mm.; T: 16 mm.

Specimen ET/4353 (Fig. 20, P)--Biface made on nonlocal, light, olive-tan flint. Outline is leaf-shaped. Lateral edges are sinuous. Edge blunting occurs on high points of both edges.

L: 101 mm.; W: 57 mm.; T: 17 mm.

Specimen CE/19-949--Fragment of oval biface of nonlocal flint. One area of convex edge exhibits stepped flaking; edges otherwise unmodified.

L: 52 mm.; T: 22 mm.

Subgroup 2 (N = 2; Fig. 20, Q, R)

Description: Specimen ET/78 is of nonlocal light gray fossiliferous flint. It is subrectangular in outline and plano-convex in cross-section. Extensive smoothing and some polish extend up onto extreme surface edge on both sides, but especially on convex surface. Plane surface may have been refurbished by retouch. This specimen is illustrated by Newell and Krieger (1949: Fig. 60, P) and was classed as a gouge or scraper.

Specimen ET/496 is of nonlocal brown-tan striped flint. Specimen has one broad convex end and one narrow rounded end. Broad end is beveled. Striations perpendicular to edge on unbeveled surface of wider end clearly denote use as scraper. Polish extends slightly upon the surface of the beveled portion but striations do not. One lateral edge evidences an area of heavy blunting presumably to remove sharp edge projections (for hafting?). Other lateral edge has a sharp edge portion created by a single flake removal on the ventral face struck from the small end. Some smoothing and marginal nicking is seen along this sharp edge portion.

This specimen was classified by Krieger as a scraper and/or gouge. It is illustrated by Newell and Krieger (1949: Fig. 60, O).

L: 66 mm.; W: 36 mm. (at wide end); T: 15.5 mm.

Discussion: These two bifaces are both plano-convex in cross-section and probably functioned as scraping tools.

Subgroup 3 (N = 10; Fig. 20, S-U)

Description: These are small bifaces clearly shaped from pebbles. Most appear to be of local flint, but one is probably non-local. Pebble cortex surface occurs on all specimens and denotes the strategy of reduction (i.e., Process II reduction model). All but one exhibit either blunting (the most common), smoothing, or minute edge crushing. None exhibits polish.

L: 32 to 53 mm.; mean, 41; W: 20 to 37 mm.; mean, 28; T: 7 to 24 mm.; mean, 14.

Discussion: Bifaces technologically identical to these specimens have been reported from McGee Bend Reservoir by Jelks (1965: 175, 176) and from the San Jacinto River basin by Shafer (1968: 67). In both instances, they were found in pre-Caddoan or non-Caddoan context. They may be part of the pre-Caddoan technology at the Davis Site.

Group 6

Described here are bifaces which cannot be sorted confidently on the basis of specific manner of reduction; hence, they are described as miscellaneous bifaces.

Subgroup 1 (N = 2; Fig. 20, W, X)

Description: Both evidence a considerable amount of reduction by hard-hammer flaking. Retouching is largely unifacial. Both have proximal and distal ends broken. One (ET/3129; Fig. 20, W) was clearly

once a very large biface of blue-gray translucent flint. It has been reduced considerably in width but not in thickness. Traces of large, presumably soft-hammer flake scars can be seen on both faces. The smaller specimen (ET/6426; Fig. 20, X) does not evidence soft-hammer flaking, but its surfaces have been so altered that it could have been flaked by this technique. One lateral edge has been extensively retouched unifacially. Extensive minute edge crushing and blunting occurs along the margins of Specimen ET/3129. The second specimen possesses edge crushing, blunting, and slight surface polish; minor polish and some smoothing is also seen along one edge.

Specimen ET/3129: L: 95 mm.; W: 39 mm.; T: 18 mm. Specimen ET/6426: L: 60 mm.; W: 30 mm.; T: 12 mm.

Discussion: The larger specimen was classified by Krieger as a pick-like implement (Newell and Krieger, 1949: Fig. 60, W).

Subgroup 2 (N = 2; Fig. 20, V)

Description: These oval bifaces were made on thick flakes from pebbles or small cobbles. Reduction technique is uncertain. Material could be local flint.

L: 32 and 43 mm.; W: 26 and 38 mm.; T: 9 and 17 mm.

Subgroup 3 (N = 35; Fig. 20, A1-E1)

Description: These are fragments of small bifaces. The size and technology manifested on them suggests that they may be arrow point preforms broken at an early stage of reduction. They are not so classified because stems are not present. The technique of reduction is uncertain. Surprisingly, most have been reduced beyond the point of

determining the nature of the blank; blanks for four were relatively thick hard-hammer percussion flakes and one was evidently a direct percussion flake.

L: 25 to 42 mm.; mean, 31; W: 16 to 28 mm.; mean, 21; T: 3 to 9 mm.; mean, 6.

Subgroup 4, Miscellaneous (N = 4; Fig. 20, Y, Z, F1, G1)

Description: These specimens are described individually.

Specimen ET/2447 (Fig. 20, Z)--This long, narrow, thin biface has a snapped base; it may be a fragment of a small knife or projectile point, but present condition prevents confident classification. Light edge smoothing occurs along both lateral edges. The edges are lightly convex and taper toward the narrow, broken end. Workmanship is mostly pressure; material is nonlocal.

L: 53 mm.; W: 14 mm.; T: 4 mm.

Specimen ET/5280 (Fig. 20, Y)--This lenticular biface has much of one edge missing; reduction technique may have been soft-hammer flaking but this is difficult to demonstrate. No significant wear was observed along edges.

L: 72 mm.; W: 22+ mm.; T: 10 mm.

Discussion: This specimen is described as a Gary Stemmed point by Newell and Krieger (1949: Fig. 57, K).

Specimen ET/146 (Fig. 20, G1)--This specimen is a large, wedge-shaped flake with biface retouch across the terminal edge. Minor smoothing and polish was seen along retouched edge.

L: 57 mm.; W: 27 mm.; T: 12 mm.

Specimen ET/550 (Fig. 20, F1)--This thick bifacially chipped small cobble is plano-convex in cross-section; it exhibits one beveled edge but no smoothing or other edge modification was detected. One corner is blunted. Flaking was probably hard-hammer percussion. The flint is probably of local origin.

L: 66 mm.; W: 35 mm.; T: 22 mm. This specimen is described as a side scraper by Newell and Krieger (1949: 174, Fig. 60, M).

Subgroup 5, Fragments (N = 10)

Description: These are miscellaneous fragments of bifaces which are so small that neither the shape of the parent piece nor the technique of reduction can be confidently determined.

No dimensions are given due to their fragmentary condition.

QUARTZITE

These specimens are described in four groups, Group 1 consists of small bifaces chipped from pebbles; Group 2 are miscellaneous quartzite bifaces, and Group 3 are fragments. Group 4 is made up of a single, large, retouched flake.

Group 1 (N = 2; Fig. 21, A, B)

Description: Both are oval-shaped and made on pebbles. Neither could be thinned as evidenced by multiple stepped fractures surrounding a thickened portion. They are percussion chipped but the precise technique is unknown.

L: 27 to 35 mm.; W: 18 and 23 mm.; T: 12 and 13 mm.

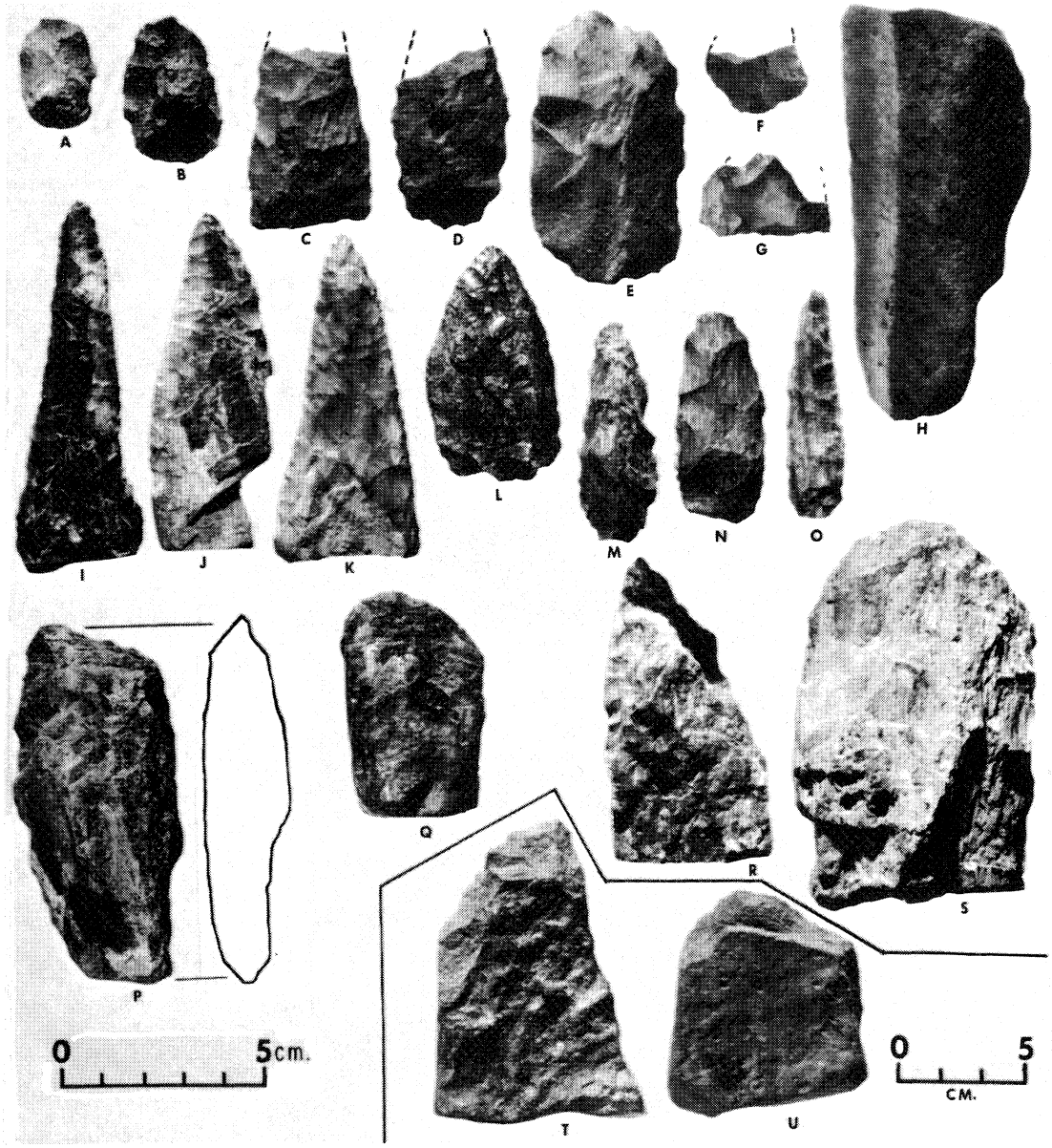


Figure 21. Quartzite, silicified wood, ferruginous sandstone bifaces. Quartzite: A, B, Group 1. C-E, Group 2. F, G, Group 3. H, Group 4. Silicified wood: I-K, Group 1. L-O, Group 2. R, S, Group 3. P, Q, Group 4. Ferruginous sandstone: T, U, Group 1.

Discussion: These items are probably failures in the manufacturing sequence of some biface tool; however, since there is no indication of what the tool was, they are described here.

Group 2 (N = 4; Fig. 21, C-E)

Description: These bifaces will be described individually.

Specimen ET/3033 (Fig. 21, C)--Triangular biface of fine-grained quartzite with distal tip missing. Principal reduction technique was soft-hammer percussion. Failure to thin a thickened portion is evidenced by multiple hinge and snapped fractures on one surface. Lateral edges and base are straight but edges are slightly sinuous. Projections along edges are blunted.

W: 30 mm.; T: 14 mm.

Specimen ET/34332 (Fig. 21, D)--Leaf-shaped biface of fine-grained quartzite with distal tip missing. Base is rounded and lateral edges are convex. Break occurred along an impurity in the material. Flaking is soft hammer.

W: 30 mm.; T: 14 mm.

Specimen ET/30411 (Fig. 21, E)--Outline is subrectangular, reduction technique is uncertain. Blank was a relatively large percussion flake of coarse-grained quartzite.

L: 65 mm.; W: 39 mm.; T: 16 mm.

Specimen ET/434--Small, lenticular-shaped biface of fine-grained quartzite. Reduction technique is uncertain. Lateral edges are sinuous.

L: 47 mm.; W: 18 mm.; T: 9 mm.

Group 3, Quartzite Biface Fragments (N = 31; Fig. 21, F, G)

Description: Included here are distal, medial, basal, and lateral fragments of fine-grained quartzite bifaces. The majority are so thoroughly worked or fragmentary that the nature of the preform or blank cannot be determined. Technique is percussion, hard-hammer seems most likely, but soft-hammer and indirect percussion could also be responsible. Size range indicates that all were from small bifaces, likely Process II or split pebbles. The largest measures only 33 mm. long.

Nine specimens revealed noticeable edge modification under magnification. Edge crushing, edge smoothing (moderate to extensive), and edge nicking were patterns observed. One interesting specimen evinces extensive edge smoothing with striations perpendicular to the edge denoting use in a scraping motion.

Group 4 (N = 1; Fig. 21, H)

Description: This very large coarse-grained quartzite flake has one nicked and smoothed edge; there is some indication of edge retouch. The specimen is blade-like and was produced by hard-hammer percussion. Ferruginous sandstone cortex is retained along a portion of dorsal surface.

L: 99 mm.; W: 40 mm.; T: 15 mm.

SILICIFIED WOOD

Bifaces manufactured of silicified wood are divided into five groups for the sake of description.

Group 1 (N = 4; Fig. 21, I-K)

Description: These are thin cleavage spalls; the material is sufficiently homogeneous to permit shaping by fine pressure flaking; one is thinned by soft-hammer flaking (Fig. 21, K). Bases on all are unworked and are approximately straight. Edges on two are slightly recurved, apparently from repeated retouching. Edges are smoothed on the three complete examples.

L: 77 to 88 mm.; W: 23 to 35 mm.; T: 7 to 9 mm.

Discussion: Krieger classified these as knives (Newell and Krieger, 1949: Fig. 56, AA, BB).

Group 2 (N = 8; Fig. 21, L-O)

Description: These are miscellaneous bifaces of silicified wood. Four oval examples exhibit soft-hammer flaking and one of these has fine pressure flaked margins (Fig. 21, L). Edges on others are sinuous and have not been retouched subsequent to the soft-hammer flaking. Two appear to be reduced by hard-hammer flaking; both of these are leaf-shaped and have sinuous lateral edges (Fig. 21, M, N). Another specimen exhibits a rounded, somewhat battered end; it is percussion flaked but specific technique cannot be determined. One long, narrow specimen evidences unsuccessful attempts to thin the base (Fig. 21, O). It is the smallest specimen in the sample and is leaf-shaped with approximately straight base.

L: 50 to 99 mm.; W: 16 to 47 mm.; T: 7 to 16 mm.

Discussion: Two are illustrated by Newell and Krieger (1949: Fig. 56, Z, EE).

Group 3 (N = 3; Fig. 21, R, S)

Description: These are large, thick percussion flaked silicified wood cobbles. Two are tapered to a point; the wider end on one is unworked. No battering or other wear is evident. The largest specimen is roughly oval-shaped with one worked end.

L: 64 to 89 mm.; W: 30 to 54 mm.; T: 22 to 25 mm.

Group 4 (N = 2; Fig. 21, P, Q)

Description: These are silicified wood nodules that exhibit bifacial flaking at one end. The flaking resulted in repeated stepped fracturing; some edge crushing is present on both and the larger specimen evidences some edge smoothing. One is a small cobble; the other is a very large pebble.

L: 88 and 53 mm.; W: 40 and 35 mm.; T: 21 and 24 mm.

Discussion: The larger specimen (Fig. 21, P) could have functioned as a celt; the over-all form and edge crushing are suggestive of this function.

Group 5 (N = 22)

Description: These are distal and medial fragments of silicified wood bifaces. Three were flaked cleavage spalls; the remainder were worked enough to remove blank characteristics. Technique of reduction on most is uncertain although some degree of pressure retouch is indicated on several.

No dimensions are given.

MANNING FUSED GLASS

There is only one small fragment of a biface made of Manning fused glass. It is largely pressure chipped and exhibits two broken awl-like projections.

L: 21 mm.; W: 16 mm.; T: 4 mm.

FERRUGINOUS SANDSTONE

Five large nodules of ferruginous sandstone were sufficiently indurated to permit shaping by chipping. These are described in two groups below.

Group 1 (N = 2; Fig. 21, T, U)

Description: These are large, tabular cobbles with sinuous biface edge chipping on one end. The remainder of the specimens is unaltered; widest portion of both is at base. Edge on one is dulled, presumably from use.

L: 110 and 151 mm.; W: 96 and 105 mm.; T: 33 and 35 mm.

Group 2 (N = 3)

Description: These ferruginous sandstone cobbles have one steeply chipped and heavily battered edge. The larger of the two complete specimens is shaped mostly by chipping and the widest portion is across the chipped edge. Edge on other complete specimen is also partly shaped. Third specimen is a fragment and retains a portion of a battered edge.

L: 87 and 119 mm. (2 complete specimens); W: 55 and 78 mm.;

T: 30 and 57 mm.

Summary of Other Bifaces

There is substantial evidence indicating that the Gahagan bifaces (Group 1) were not manufactured at the Davis Site. That they are part of the Caddoan material culture is conclusively demonstrated by burial context. Their mundane function is suggested by wear patterns and edge retouch of certain specimens particularly those from nonburial context and one from Fea. 118. The numerous specimens recovered from Fea. 134, Fea. 119, and single specimens included as furniture in Fea. 161 and Fea. 118 indicate these were prestigious items, but their social function, if any, is not suggested by the context. The Gahagan bifaces at the Davis Site may be an example of supply and demand. The supply may have been limited and only certain high ranking individuals had access to them.

The technology and material of the Group 2 bifaces also suggests that they were not made at the site. Their size alone suggests that their use was probably not mundane and the context of one in Fea. 134 suggests it may have been a stone sword. If so, then it could have served as a symbol of status or rank but this is merely speculative.

Group 3 bifaces demonstrate conclusively that ancient artifacts were sometimes picked up and recycled into another cultural system. That they predated the Caddoan occupation period is demonstrated by extensive patination.

The cache of Group 4 bifaces recovered from Newell's excavation

are regarded as imports into the Caddoan technological system. There is no evidence that extensive use was ever made of the material. They were large enough to serve as preforms for small Gahagan bifaces, but apparently did not so serve.

The function or purpose of the remaining Group 4 bifaces is difficult to assess. In view of the basic technology indicated on them and the fact that most are of nonlocal material, they could have been ancient artifacts picked up and introduced into the Caddoan lithic technology. Wear patterns indicate uses similar to those seen on dart points of nonlocal stone and the bifaces may have been introduced by the same mechanisms.

The Group 5 bifaces were also probably not made by Caddoan flintknappers. Specimens of local flint in Subgroup 1 and Subgroup 3 compare well with local and regional pre-Caddoan materials; these are attributed to the late Archaic or Woodland occupants of the terrace. At least some of the bifaces described as Subgroup 2 of Group 6 can also be added to this list. Of course, some of these could have been recycled into the Caddoan lithic systems as raw materials.

The remainder of the Group 6 bifaces, with the exception of Subgroup 3, are also probably nonlocal technological objects introduced as resource materials. The Subgroup 3 bifaces are regarded as by-products of the Caddoan reduction systems; and, although this cannot be proven, they are probably failures in early stages of arrow point manufacture.

All of the quartzite specimens could, of course, be local products. However, most are regarded as pre-Caddoan although Group 1 may

be part of the Caddo technology.

Groups 1 and 4 silicified wood bifaces are probably part of the Caddoan lithic industry but Group 2 may belong to the late Archaic assemblages. Dart point failures are present and other attempts probably failed before stem configurations could be produced. Hence, some of the Group 2 bifaces described here are possible failures in such manufacture.

Indurated ferruginous sandstone and silicified wood are the only local materials chipped into large cutting tools. Such specimens are not common, but several evidence extensive use.

Unifacial Artifacts

These artifacts are grouped according to material class.

FLINT

Uniface tools are rare in the sample and patterned uniface tool forms are not represented. The uniface artifacts are divided into seven descriptive groups.

Group 1 (N = 1; Fig. 18, N)

Description: This specimen was made on a tan (soft-hammer?) flake. The wider end is steeply beveled and edge smoothing and polish occurs along this edge; striations are absent. Minute edge crushing also occurs.

L: 32.5 mm.; W: 23 mm.; T: 7.5 mm.; edge angle: 65 degrees.

Discussion: Krieger classified this specimen as a small, snub-nosed scraper (Newell and Krieger, 1949: Fig. 56, U).

Group 2 (N = 1; Fig. 18, O)

Description: This unusual specimen is a hard-hammer secondary cortex flake of nonlocal material which has been retouched into a semi-circular shape. The convex edge is steeply retouched and has three concavities chipped side by side to create two pronounced and two tiny graver-like tips. The edge is smoothed on both sides of the concavities but not in them or on the tips.

L: 41 mm.; W: 36 mm.; T: 11 mm.; edge angle: 50 to 75 degrees.

Discussion: This specimen is described by Krieger as a circular scraper with graver tips (Newell and Krieger, 1949: Fig. 56, V).

Group 3 (N = 9; Fig. 18, P, Q)

Description: These are large flakes which evidence unifacial retouch along one or more edges. Three are hard-hammer flakes and seven are soft-hammer flakes; all are of nonlocal materials. Degree of unifacial retouch varies from hardly more than use modification to extensive unifacial chipping. Wear is mostly in the form of smoothing, nicking, and some polish. However, most edges have been so badly damaged by handling since recovery that confident judgement on wear is difficult to make. One thing is certain; there is no evidence that these items served as scrapers.

L: 47 to 80 mm.; W: 25 to 48 mm.; T: 6 to 11 mm.; edge angle: 30 to 60 degrees.

Discussion: Krieger (Newell and Krieger, 1949: 174, 176, Fig. 60, R-U) describes all of the specimens as "side scrapers." As noted, wear patterns do not suggest scraping motions on any of them; it is not

possible to determine the precise motion of use, but the kind of modification seen favors one of cutting.

Group 4 (N = 3; Fig. 18, W)

Description: These are large flakes of nonlocal material with a convex unifacially trimmed edge portion. One is a hard-hammer flake, one is a soft-hammer flake, and the third is a flake fragment. Smoothing occurs along the convex edge portion of all.

L: 70, 41 and 38 mm.; W: 53, 32 and 29 mm.; T: 10, 9 and 8 mm.; edge angle: 52, 80 and 75-80 degrees respectively.

Group 5 (N = 6; Fig. 18, S, T)

Description: These are small spalls or flake fragments that exhibit remnants of unifacially trimmed edges. The edges are convex on three, concave on two, and sinuous on one. Material is nonlocal on two. Stepped flaking occurs on three and light edge smoothing was detected on two.

Group 6 (N = 1; Fig. 18, R)

Description: This specimen from Fea. 119 was recovered in two pieces. Initially it was a large, long flake struck from the corner of an angular cobble. The stone is nonlocal. The interior edge has been bifacially chipped but broken in two sections; one was chipped additionally after the break causing an imperfect fit of the two fragments. Flaking was by hard-hammer percussion and was unifacial. The specimen may be a small flake-core since no wear is evident along the edges.

L: 73 mm.; W: 26 mm.; T: 12 mm.

Group 7 (N = 6; Fig. 18, U, V)

Description: These interesting and enigmatic chipped stone artifacts have one convex edge which evinces stepped flaking. Three features which all possess suggest their use as tools: stepped flaking along convex edge; the intersecting surface is either flat or concave (this surface is the cortex surface of the nodule on two); and dulled edges by either edge crushing (4) or crushing and smoothing (2). The angle of the presumably worked edge varies from about 75 to 100 degrees. The remainder of the specimens are rather nondescript. Most are probably core nuclei and, except for the apparent altered edge, would be classified as hard-hammer, free-hand percussion Core Group 4, although one appears to have been the core for the removal of wedge-shaped flakes.

L: 17 to 37 mm.; W: 14 to 32 mm.; T: 9 to 16 mm.

Group 8 (N = 1; Fig. 18, Y)

Description: This specimen is a subrectangular artifact of nonlocal blue-gray semitranslucent flint. It is lightly battered on all four edges. Cross-section is trapezoidal. The specimen is presumably a small gun flint.

L: 19 mm.; W: 16 mm.; T: 7 mm.

Quartzite Unifaces

Only two items of quartzite fall under this heading. They are described individually.

Group 1 (N = 1)

Description: This asymmetrical item is a coarse-grained quartzite

nodule which is unifacially chipped around much of its circumference. Edge angle varies from about 65 to 80 degrees. Cross-section is plano-convex and the plane surface is unworked. Portions of the edge are smoothed.

L: 45 mm.; W: 27 mm.; T: 18 mm.

Group 2 (N = 1; Fig. 18, Z-Z")

Description: This elongated specimen of coarse-grained ferruginous quartzite has one broad, steeply beveled end; lateral edges (which are smoothed) taper toward a narrower, rounded end. Cross-section is approximately plano-convex although the plane surface is rather uneven. Beveled end is polished along edge and this polish continues for several millimeters on under surface. Striations on polish are perpendicular to beveled edge and are readily seen without magnification (Fig. 18, Z"); these are most pronounced along the edge on the plane side. The striations clearly denote direction of abrasive force and suggest use of implement was in an adze or gouge fashion.

L: 94 mm.; W: 43 mm.; T: 31 mm.

Discussion: Krieger describes this specimen as a "concave-bit end scraper or gouge" (Newell and Krieger, 1949: Fig. 56, W).

SILICIFIED WOOD

Only three specimens were recovered; one is complete and two are fragmentary.

Group 1 (N = 1; Fig. 18, X)

Description: This small asymmetrical uniface has one slightly convex, steeply unifacially chipped edge. Edge angle is 80-90 degrees. The opposite edge is convex and sinuous; it too is unifacially trimmed. Both ends are pointed. Tips are smoothed and edges are moderately smoothed and nearly polished. The cross-section is plano-convex. The plane face exhibits some smoothing. The specimen was a cleavage spall.

L: 41 mm.; W: 19 mm.; T: 8 mm.

Group 2 (N = 2)

Description: These are small fragments of unifacially chipped cleavage spalls. No wear is evident and they do not appear to be scraping tools.

No dimensions are given.

Summary of Unifacial Artifacts

The sample of unifacial artifacts from the site is very small (N = 31) and no patterned tool form is indicated. Rarely is scraping motion suggested by wear patterns. Wear patterns on Groups 1 and 4 in the Flint category and Group 2 in the Quartzite suggest scraping. Most of the flint examples are of nonlocal material and may not represent artifacts made at the site. Too, at least half of these were recovered from Mound A vicinity and probably belong to the enigmatic assemblage of nonlocal flint artifacts including the dart points of nonresident types.

Summary

The dart points which occur in the Davis Site collection are not considered products of Caddoan flintknappers. Their presence at the site is attributed partly to intermittent occupation of the terrace by pre-Caddoan late Archaic groups and partly to introduction into the Caddoan technology as either raw materials or recycled tools acquired in either local or regional excursions or by trade. Edge wear is common and its nature indicates many of these artifacts were used in cutting and sawing motions. The distribution of most flint dart point forms not considered as indigenous to this part of east Texas is restricted to the Mound A area of the site; this alone reflects differential distribution of nonlocal materials in the area showing Caddoan utilization.

Manufacturing failures of Gary dart points suggest that these dart point types were made on the terrace. Certain parallel and expanding stem forms of locally occurring materials were also likely local products. Points of nonlocal flint (Bulverde, Wells, Morrill, stemless, etc.) are regarded as being intrusive because they do not appear to represent local Archaic forms and there is no recognizable debitage (failures) to indicate similar forms were manufactured on the site.

The resident arrow point style is demonstrably Alba even though a considerable variation exists within this type designation. Variation is attributed largely to differences in skill of individual flintknappers and to material variability. Hafting variation is not suggested since all arrow point forms are stemmed. A minor form in the sample does fit the range of Perdiz points. Several examples of the Hayes type were

found in nonburial and burial context. These are all of nonlocal materials.

The occurrence of arrow point clusters in burials may represent quivers (specifically Fea. 161 and Fea. 118). There is also suggestion that arrow points in at least one cluster were made by more than one individual (i.e., Cluster 1 in Fea. 118). On the other hand, the lack of variation in Cluster 2 in the same feature is interpreted as most likely representing the products of a single flintknapper. Implications from the variation in material and point form seen in Fea. 118 and Fea. 161 are that arrow points were probably among the products of trade and barter.

Comparisons of arrow point samples were made of the Mound C, Mound A, and western village areas. There is a significant variation in mean length of arrow points from these areas; for example, the Mound C sample were the longest followed by Mound A area and the western village sample had the shortest means. Use of flint exhibited its lowest frequency in the western village area and its highest frequency in the Mound C burials.

Flint awls constitute the only other formal tool category other than arrow points which were made exclusively by pressure chipping techniques. These items are demonstrably part of the Caddoan technological system. They functioned as boring tools for relatively soft materials.

Gahagan bifaces (Group 1) and Group 2 bifaces were unquestionably part of the Caddoan material culture although there is no clear indication that they were made at the site. In view of the fact that

all were made of nonlocal materials and that the reduction was extreme (considering the original size of the parent mass), if they were made at the site there should have been a noticeable quantity of debitage. While soft-hammer flakes are not altogether uncommon, those removed from large bifaces are. The absence of failures in every part of the site is further indication that these bifaces were introduced as finished items. The flint represented in the sample exhibits considerable variation and some of it can be nearly duplicated in central Texas. However, lacking knowledge of flint sources in the midwest and eastern United States together with the rare occurrence of similar bifaces in central Texas, it is premature to suggest possible manufacturing loci. One Group 2 specimen is of tan novaculite, evidently from Arkansas outcrops.

Gahagan, Group 2, and Group 3 bifaces were apparently symbols of status; at least their presence in the burials suggests this. The numerous Gahagan specimens in the Stage I and II burials and in the Mound A area hint that the occupation around Mound A is comparable in time to the events in Mound C responsible for the Stages I and II burials. The paucity of Gahagan bifaces in the western portion of the site could indicate that the eastern (Mound A area) is earlier than the western (Mound B area) as hypothesized by Story (1972: 59).

The recycled Group 3 bifaces stand as clear evidence that more ancient artifacts were often picked up and incorporated into another entirely different cultural system. The patination alone is sufficient indication but the technology manifested on them is also noticeably foreign in comparison to the other bifaces at the site.

That some artifacts were being introduced in preform state is illustrated by the Group 4, subgroup 1 specimens which comprise the biface cache near Mound A. Only one specimen was recovered elsewhere that matches the material in the cache; that specimen had been retouched apparently by hard-hammer flaking which had significantly reduced its margins but did not thin the specimen further. This is the only possible evidence that the cache was exploited.

The remaining biface sample is relatively small and is largely nondiagnostic. Many were probably introduced or recycled into the Caddoan system by the same mechanisms that were responsible for the intrusive dart points. Like the dart point sample a high incidence of edge wear is displayed on most items of nonlocal material. The bifaces do not appear to represent consistent failures in the manufacture of certain kinds of artifacts. It is possible that certain ones were indeed failures, but their manufacturing loci were probably not at the Davis Site. That is, I am suggesting that many of the Group 4, 5, and 6 bifaces of nonlocal flint were introduced as raw material for recycling.

Patterning of uniface tool forms is absent at the Davis Site. This finding is in general agreement with lithic assemblages in most areas of east Texas. The uniface sample is small and is largely of nonlocal materials.

Table 3. Chipped Stone.

	Provenience Unknown	Surface E.*	WPA	Unit 15	Unit 12	Unit 11	Unit 6	Unit 14	Unit 4
DART POINTS									
Flint									
Expanding Stem									
Gr. 1	-	-	11	-	-	-	-	-	-
Gr. 2	-	-	2	-	-	-	-	-	-
Gr. 3	-	-	2	-	-	-	-	-	-
Parallel Stem									
Gr. 1	-	-	5	-	-	-	-	-	-
Gr. 2	-	-	4	-	-	-	-	-	-
Gr. 3	-	-	3	-	-	-	-	-	-
Gr. 4	-	-	9	-	-	-	-	-	-
Contracting Stem									
Gr. 1	-	-	10	-	1	-	-	-	-
Gr. 2	-	-	11	-	-	-	-	-	-
Unstemmed									
Gr. 1	-	-	10	-	-	-	-	-	-
Gr. 2	-	1	1	-	-	-	-	-	-
Fragments	-	-	15	1	-	-	1	-	-
Failures	-	-	3	-	-	-	-	-	-
Quartzite									
Expanding Stem	-	-	1	-	-	-	-	-	-
Parallel Stem	-	-	5	-	-	-	-	-	-
Contracting Stem									
Gr. 1	-	-	10	-	-	-	-	-	-
Gr. 2	-	-	5	-	-	-	-	-	-
Gr. 3	-	2	-	2	-	-	-	-	-
Failures	-	-	6	-	-	-	-	-	-
Silicified Wood									
Expanding Stem									
Gr. 1	-	-	3	-	-	-	-	-	-
Gr. 2	-	1	2	-	-	-	-	-	-
Gr. 3	-	-	2	1	-	-	-	-	-

*Surface east of Highway 21.

Unit 13	Unit 9	3, 7, 8 (Md. B)	Unit 5	Unit 17	Unit 10	Unit 16	Unit 1	Surface W.*	Unit 2 (Md. C)	Fea. 134	Fea. 119	Fea. 155	Fea. 161	Fea. 118	Fea. 107	Fea. 106	Total
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
-	-	1	-	-	1	-	-	-	2	-	-	-	-	-	-	-	15
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
1	-	1	-	-	1	-	-	1	1	-	-	-	-	-	-	-	22
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	6
-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	12
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	6
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	5
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3

*Surface west of Highway 21.

Table 3, continued

	Provenience Unknown	Surface E.	WPA	Unit 15	Unit 12	Unit 11	Unit 6	Unit 14	Unit 4
Parallel Stem	-	-	3	-	-	-	-	-	-
Contracting Stem	-	1	14	3	-	-	-	3	-
Fragments	-	-	5	-	-	1	-	1	-
Failures	1	-	1	2	-	-	1	-	-
ARROW POINTS									
Flint									
Nonburial Context									
Gr. 1, Hayes	-	1	4	1	-	-	-	-	-
Gr. 2, Perdiz	1	-	-	1	-	-	-	2	-
Gr. 3, Alba	-	2	84	9	2	9	4	3	1
Gr. 4, Misc.	-	-	1	-	-	-	-	1	-
Gr. 5, Frag.	1	3	35	13	3	-	8	8	3
Failures	-	1	7	6	1	-	4	1	-
Burial Context									
Hayes	-	-	-	-	-	-	-	-	-
Alba	-	-	-	-	-	-	-	-	-
Type Unspecified	-	-	-	-	-	-	-	-	-
Fragments	-	-	-	-	-	-	-	-	-
Fine-Grained Qz.									
Nonburial Context									
Gr. 1, Alba	-	-	12	3	-	-	-	-	2
Gr. 2, Perdiz	-	-	1	-	-	-	-	-	-
Gr. 3, Misc.	-	-	-	-	-	-	-	-	-
Gr. 4, Frag.	-	-	1	2	-	-	4	2	1
Failures	-	-	-	2	-	1	-	-	3
Burial Context									
Alba	-	-	-	-	-	-	-	-	-
Silicified Wood									
Gr. 1, Alba	2	1	14	5	1	1	2	2	-
Gr. 2, Misc.	-	-	2	-	-	-	-	-	-
Gr. 3, Frag.	-	-	8	2	-	-	1	1	1
Failures	-	-	-	1	-	-	-	1	-

Unit 13	Unit 9	3, 7, 8 (Md. B)	Unit 5	Unit 17	Unit 10	Unit 16	Unit 1	Surface W.	Unit 2 (Md. C)	Fea. 134	Fea. 119	Fea. 155	Fea. 161	Fea. 118	Fea. 107	Fea. 106	Total
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
-	-	-	-	-	1	1	-	-	1	-	-	-	-	-	-	-	24
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	7
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	7
-	-	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	7
3	3	-	-	-	22	4	1	17	1	-	-	-	-	-	-	-	165
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	3
6	9	5	-	-	26	1	2	13	-	-	-	-	-	-	-	-	136
-	1	1	-	-	4	1	1	5	-	-	-	-	-	-	-	-	33
-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	2
-	-	-	-	-	-	-	-	-	-	160	8	8	50	-	-	-	226
-	-	-	-	-	-	-	-	-	-	-	-	-	-	128	-	-	128
-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	3
-	1	1	-	-	8	2	-	5	-	-	-	-	-	-	-	-	34
-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	3
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
-	-	2	-	-	8	-	-	1	1	-	-	-	-	-	-	-	22
-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	8
-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	3
2	-	4	-	-	9	-	1	-	-	-	-	-	-	-	-	-	44
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	16
2	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	8

Table 3, continued

	Provenience Unknown	Surface E.	WPA	Unit 15	Unit 12	Unit 11	Unit 6	Unit 14	Unit 4
Manning Fused Glass									
Gr. 1, Alba	-	2	3	-	-	-	-	-	-
Gr. 2, Frag.	-	-	-	1	-	-	-	-	-
Failures	-	1	-	-	-	-	-	-	-
AWLS									
Flint	1	-	10	2	1	-	-	-	1
Quartzite	-	-	1	-	-	-	-	-	-
Silicified Wood	-	-	1	-	-	-	-	1	-
OTHER BIFACES									
Flint									
Gr. 1	-	2	17	3	-	-	-	1	-
Gr. 2	-	-	-	-	-	-	-	-	-
Gr. 3	-	-	-	-	-	-	-	-	-
Gr. 4									
Subgroup 1	-	-	63	-	-	-	-	-	-
Subgroup 2	-	2	3	-	-	-	-	-	-
Subgroup 3	-	-	6	-	-	-	-	-	-
Subgroup 4	1	-	1	-	-	-	-	-	-
Subgroup 5	-	1	1	4	-	1	-	1	1
Gr. 5									
Subgroup 1	-	1	3	-	-	-	-	-	-
Subgroup 2	-	-	2	-	-	-	-	1	-
Subgroup 3	-	-	5	2	-	-	-	1	-
Gr. 6									
Subgroup 1	-	-	2	-	-	-	-	-	-
Subgroup 2	-	-	2	-	-	-	-	-	-
Subgroup 3	-	1	4	3	2	4	2	1	-
Subgroup 4	-	-	4	-	-	-	-	-	-
Subgroup 5	-	-	-	1	-	-	-	-	1

Unit 13	Unit 9	3, 7, 8 (Md. B)	Unit 5	Unit 17	Unit 10	Unit 16	Unit 1	Surface W.	Unit 2 (Md. C)	Fea. 134	Fea. 119	Fea. 155	Fea. 161	Fea. 118	Fea. 107	Fea. 106	Total
-	-	1	-	-	-	-	-	3	-	-	-	-	-	-	-	-	9
-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	2
-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	2
-	1	-	-	-	3	1	-	1	-	-	-	-	-	-	-	-	21
-	-	1	-	-	4	-	-	-	-	-	-	-	-	-	-	-	6
-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	4
2	-	-	-	-	3	-	-	1	-	12	21	-	1	1	-	-	64
-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	2
-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	3
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
-	-	1	-	-	-	-	-	1	-	1	-	-	-	-	-	-	9
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
-	-	1	-	-	3	-	-	1	-	-	-	-	-	-	-	-	14
-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	5
-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	4
-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	10
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
1	-	-	-	-	6	2	-	5	-	-	-	-	-	-	-	-	31
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
1	-	1	-	-	3	-	-	2	1	-	-	-	-	-	-	-	10

Table 3, continued

	Provenience Unknown	Surface E.	WPA	Unit 15	Unit 12	Unit 11	Unit 6	Unit 14	Unit 4
Quartzite									
Gr. 1	-	-	1	-	-	-	-	-	-
Gr. 2	-	-	4	-	-	-	-	-	-
Gr. 3	1	-	-	4	-	1	-	4	1
Gr. 4	-	-	1	-	-	-	-	-	-
Silicified Wood									
Gr. 1	-	-	3	-	-	-	-	1	-
Gr. 2	-	-	7	-	-	-	-	-	-
Gr. 3	-	-	2	-	-	-	-	-	-
Gr. 4	-	-	1	1	-	-	-	-	-
Gr. 5	-	1	-	1	-	2	-	4	1
Manning Fused Glass	-	-	-	-	1	-	-	-	-
Ferruginous Sandstone									
Gr. 1	-	-	-	1	-	-	-	-	-
Gr. 2	-	-	-	-	-	-	-	-	-
UNIFACIAL ARTIFACTS									
Flint									
Gr. 1	-	1	-	-	-	-	-	-	-
Gr. 2	-	-	1	-	-	-	-	-	-
Gr. 3	-	-	9	-	-	-	-	-	-
Gr. 4	-	1	1	-	-	-	-	-	-
Gr. 5	-	1	-	1	-	-	-	-	-
Gr. 6	-	-	-	-	-	-	-	-	-
Gr. 7	-	-	-	1	1	1	1	-	-
Gr. 8	-	-	-	-	-	-	-	1	-
Quartzite									
Gr. 1	-	-	-	-	-	-	-	-	-
Gr. 2	-	-	1	-	-	-	-	-	-
Silicified Wood									
Gr. 1	-	-	-	-	-	-	-	-	-
Gr. 2	-	-	-	-	1	-	-	-	-
Totals	8	27	471	79	14	21	28	41	16

Unit 13	Unit 9	3, 7, 8 (Md. B)	Unit 5	Unit 17	Unit 10	Unit 16	Unit 1	Surface W.	Unit 2 (Md. C)	Fea. 134	Fea. 119	Fea. 155	Fea. 161	Fea. 118	Fea. 107	Fea. 106	Total
-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	2
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
-	2	4	-	1	9	-	1	3	-	-	-	-	-	-	-	-	31
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	8
-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	3
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
-	-	1	-	-	5	2	1	4	-	-	-	-	-	-	-	-	22
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	2
-	-	-	-	-	1	-	-	2	-	-	-	-	-	-	-	-	3
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	3
1	-	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	6
-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	6
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2
23	17	31	0	1	134	18	7	78	11	175	38	8	54	129	0	0	1,429

CHAPTER 8

Abraded, Pecked, and Battered Stone Artifacts

Artifacts described in this chapter are divided into two broad divisions, those which were shaped to conform to some preconceived design, pattern, or shape, and those which presumably were fortuitously shaped or altered through use. The former category, described in Part 1 below, includes effigy pipes, earspools, boat-shaped stones, a plummet, a discoidal, celts, and an adze blade. Artifacts described in Part 2 below include abrading stones, battered and polished stones, battered stones, pitted stones, and several miscellaneous artifacts.

The artifacts described in Part 1 are mostly products of Process II reduction. The specimens described in Part 2 are mostly Process I tools although some of the abrading stones could be Process II products. With the possible exceptions of one or possibly two earspool fragments, all of the items described in Part 1 are of nonlocal materials. By contrast, in the Part 2 sample only the Catahoula sandstone artifacts, certain recycled celt fragments, quartz crystals, and perhaps some of the polishing stones are of materials not duplicated in local geological samples.

Part 1

Stone Effigy Pipes (N = 4; Fig. 22)

Four stone effigy pipes were recovered from two burial pits in Mound C. Story (1972) reported that the two smaller pipes of white tuff-like (or claystone) material were found in Fea. 134, a Stage I burial; the two larger pipes were found in Fea. 119, a Stage II burial. Each pipe is described individually.

Specimen 424/2 (Fig. 22, A-D)--This large human effigy pipe of nonlocal indurated quartz sandstone was recovered from the first-layer offerings in Fea. 119 (Fig. 27, A). It stands 214 mm. high, 102 mm. wide at the shoulder and 110 mm. wide at the base; length from elbow to middle of back is 124 mm.

The specimen was sculptured by pecking and abrasion. The pipe bowl and stem were made by pecking and apparently reaming, not by drilling. The figure is symmetrical and contours are smooth and even, not abrupt.

The figure is in a kneeling position with hands on knees. Position is such that feet are beneath buttocks; feet and calves are indicated by mere contours in lines on each side above the base. Hands are clearly indicated by five fingers. Elbows are marked by slight bulges at mid-arm. The back is in an unnatural broken or humped position, but this was probably in anticipation of the pipe bowl and stem rather than to signify some humpbacked figure. This interpretation is favored because the bowl is in the center top portion of the back and the stem orifice is in the center rear portion of the back. The stem orifice is in the lower lumbar region of the anatomy rather than in the anal portion.

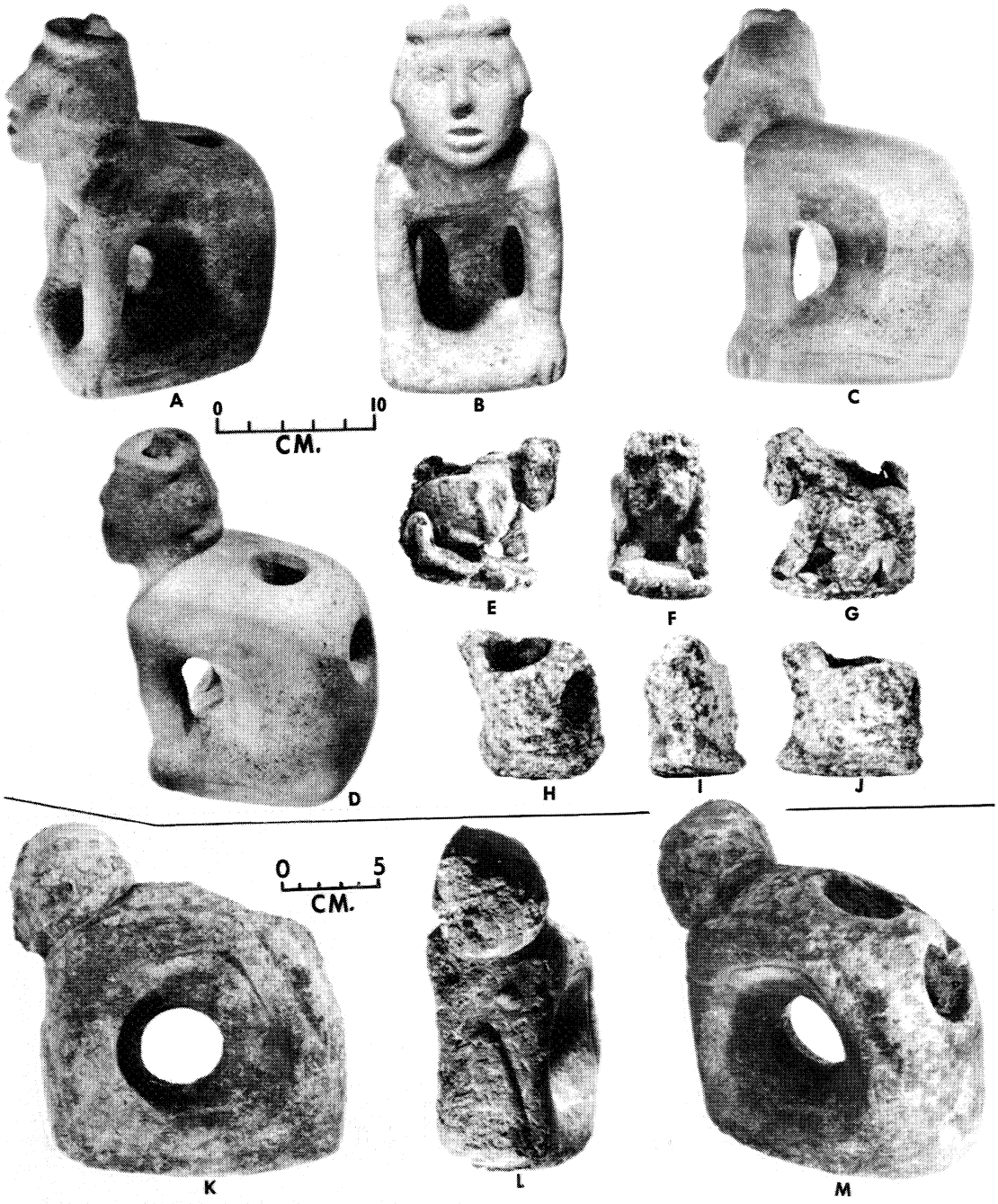


Figure 22. Stone effigy pipes. A-D, Specimen 424/2, Fea. 119. E-G, Specimen 4078/51, Fea. 134. H-J, Specimen 4078/40, Fea. 134. K-M, Specimen 424/35, Fea. 119.

The only costuming indicated is the hairdo and headdress. The hairdo is a "Dutch boy" style, close cropped just below the ear lobes. The figure is wearing a round turban-like "cap" with a topknot and a tassel down the back. The hair also is extended down the back to the apparent base of the neck. The tassel in back extends from the topknot. Similar hair style is shown on the human effigy pipe recovered by C. B. Moore from the Gahagan Site (Moore, 1912: Fig. 13-16).

The nose is convex in profile and is narrow; eye sockets are formed by depressions sculptured in the face and eyes are diamond-shaped.

In summary, the specimen was made by pecking and abrasion. Hardness and granular nature of material probably accounts for the preservation of peck marks and abrasion scars. The symmetry of the specimen and detail and technology exemplified are impressive. Most convex outer surfaces are smoothed and peck marks have been removed in most easily accessible surfaces. The inner surfaces behind the arms, on the chest, and on the stomach, remain roughened by pecking.

There is no evidence of burning in the stem or bowl.

Specimen 424/35 (Fig. 22, K-M)--This large human effigy pipe was recovered from the first-layer offerings of Fea. 119 (Fig. 27, A). It is of soft, very fine siltstone or limestone of nonlocal origin. It stands 168 mm. high, 96.5 mm. wide across the back, slightly more than 90 mm. wide at the base, and 162.5 mm. long. The stone particles are poorly cemented and the specimen is badly eroded on the right side, top, around the head, and on the bottom.

The precise form is difficult to describe in terms of anatomical

position because of the badly eroded surfaces; any detail that might have been present has been obscured. The figure is presumably kneeling and the arms pressed against its sides (Fig. 22, K). Legs are not specifically indicated but may be represented in the base. The solid portion in front probably represents the chest in front view since a small breast survives on the left side (Fig. 22, L); also sculptured in relief in the bottom portion is a triangular form which tapers upward to a point just below the breast (Fig. 22, L).

Shoulders and arms are definite and some attempt was made to delineate fingers on each hand by engraved lines (Fig. 22, K). There is no detail surviving on the head and the figure has practically no neck; the head is simply separated from the body by an engraved line which encircles its base.

The back has the same broken or angular profile as was described for the other large pipe. As in that case, this may be due to anticipation of the bowl and stem; the top orifice is 45 mm. in diameter and the back orifice measures 40 mm. in diameter. Both are conical.

This pipe is especially unusual in that a large biconical perforation passes through the center of the specimen originating from the sides (Fig. 22, K, M). The function of this perforation is difficult to explain, especially since it distorts the human form considerably. It may have functioned to reduce the mass in weight, or it may have facilitated handling.

The technology of manufacture was pecking, as indicated in the central perforation, and abrading. The soft material evidently worked easily, as evidenced by the grooves which outlined the arms and fingers.

In summary, the eroded nature of the specimen may have obscured definitive details other than those pointed out above. The survival of a single breast may suggest a female. The over-all form is seemingly one of kneeling. There is no indication of burning.

Specimen 4078/40 (Fig. 22, H-J)--This specimen was recovered from Concentration 3 in Fea. 134, a Stage I burial (Fig. 26, A). Story (1972: 20) identifies the specimen as a "small bird effigy pipe of volcanic ash (?)." The stone is a white tuff or claystone of nonlocal origin. The form is zoomorphic but whether it was a bird, human being, or some other animal cannot be determined due to the extensive erosion that the sculptured surfaces have suffered. The only identifiable details are a protrusion at one end which obviously served as the head and a shallow groove encircling the specimen at the bottom which accentuates the base (Fig. 22, H-J).

The specimen measures 81 mm. high, 90 mm. long at the base, 51 mm. wide just above mid-height, and 58 mm. wide at the base.

Both bowl and stem taper conically to an elbow juncture; the top orifice measures 42 mm. in diameter; the back orifice measures 32 mm. in diameter.

This specimen was definitely used; extensive amounts of charred unidentified organic material adhere to the walls of both stem and bowl, especially the bowl.

Technique of manufacture is presumably abrasion, although only traces of uneroded surfaces remain; these are quite smooth. The bowl and stem were probably reamed but the charred residue obscures technological details.

In summary, the details of this zoomorphic specimen are obliterated by erosion of the soft tuff-like material; it was an effigy pipe as indicated by a head-like projection. However, the specific form is no longer identifiable. The specimen was extensively used as indicated by charred organic material in the bowl and stem.

Discussion: Hamilton (1952: Pl. 8) illustrates a specimen from the Spiro Site similar in outline to the specimen described here. The Spiro Site specimen is termed "half and half", half bird-like and half human-like.

Specimen 4078/51 (Fig. 22, E-G)--This small human effigy pipe of white tuff-like material (volcanic ash or claystone?) was recovered from Concentration 5 in Fea. 134 (Story, 1972: 21). It stands 94 mm. high, slightly over 92 mm. long (from face to rear), and a little over 80 mm. long at the base (which is badly eroded). It is 57.5 mm. wide at the shoulders, and 67.5 mm. wide at the base.

The soft material is eroded and fragile; detail is missing. The material exhibits bedding planes and consequently may be sedimentary in origin; erosion has accentuated these weak bonds.

The specimen is not in natural human position (Fig. 22, E, G); the position is more like the sitting posture of a frog. Foot and leg morphology are clearly human; the hands are broken away. The face has two sculptured eye sockets and the remnants of the nose are without detail. The head portion is styled with a broad face and flattened profile; there is no indication of ears or headdress, although the flattened top of the head is badly eroded. The figure is sitting on an oval base.

There is no indication of manufacturing technique due to weathering; traces of the original surface are smoothed but, considering the softness of the material, the specimen may have been carved (assuming the material was soft when the object was manufactured).

The bowl measures 42 mm. in diameter; the stem orifice was smaller, but the back is eroded to the extent that exact size cannot be determined. The bowl and stem are charred and retain a thick charcoal residue.

In summary, this small anthropomorphic pipe is in an unnatural squatting position. The position is suggestive of a frog-like posture. The legs and feet are clearly human and the face, although badly eroded and lacking in specific detail, retains frontal eye sockets and traces of a nose. The face has a form similar to that of long-nosed gods. It is not possible to identify the face as human, only as human-like. Extensive charring of the bowl and stem indicates extensive use of the specimen.

Discussion: These four specimens are the only stone effigy pipes recovered from the Davis Site. Several clay pipes of other kinds, including the long-stem variety, were recovered from the field, and one long-stem pipe fragment was recovered from Mound C fill, possibly associated with Fea. 116, an unexcavated burial (Donny Hamilton, personal communication).

Webb and Dodd (1939) and C. B. Moore (1912: 515-519) report effigy pipes from burials at the Gahagan Site. However, Moore describes one anthropomorphic pipe as being earthenware (ibid.: 515). It is a

kneeling figure with a turban-like "cap" or headdress; the bowl is in the lap and the stem projects out in front. Another opening, much smaller, occurs at the mouth. The three pipes reported by Webb and Dodd (1939: 103) are described as being of "red pottery." One is a kneeling human figure (from Burial Pit 2) and two are frog effigies (from Burial Pit 3).

Bell (1972: 48) reports an effigy pipe from Burial 41 at the Harlan Site. It is burned and badly weathered but obviously depicts a standing human figure.

Numerous effigy pipes were recovered from the Spiro Site; Hamilton (1952: 34, 35) describes four of these.

Mr. Larry Banks of Tulsa, Oklahoma and Mr. R. K. Harris of Dallas, Texas (personal communication) report an effigy pipe from the Bentsen-Clark Site (41 RR 7).

Mr. Harris describes the specimen as follows:

> This pipe is made of a white limestone.....the bowl and probably the stem was in front of the figure. Part of the bowl is still present. On each side of the head above the ear will be found the Weeping Eye design. He appears to have a cap on the head with a little top knot on top of the cap. On the back of the head he has his hair done up in a coiled bun. Both of these features (cap and top knot and hairdo on back of the head in a bun) are like the pipe from George C. Davis.

Banks and Harris also mention that ceramic types Hickory Engraved, Holly Engraved, and Spiro Engraved among the burial associations, and bone pins fitted with copper-covered snake head effigies.

Stone Earspools

All twenty-five stone earspools from the Davis Site are pulley-shaped; all but two conform to Baerreis's (1957) Type A since they have central perforations. The two exceptions appear to be unfinished. Baerreis's (*ibid.*) descriptive terminology for earspools will be followed here.

While only four earspools from the Davis Site sample have carved decorations on the outer face, most were copper coated but the copper survives only in the form of green oxide.

These earspools are described in five groups based on the attributes of manufacture. These groups are: plain (those specimens lacking subsequent modification except addition of copper sheeting); plain with modified inner flange; decorated (that is, the outer face has been carved); unfinished (?); and plain fragments.

Plain (N = 8; Fig. 23, A)

Description: These specimens are best described individually due to minor variations in material, shape, and size. All were found in burials and were associated with skeletons.

Specimen 463/17--Large, pulley-shaped earspool, copper-covered, of gray siltstone (probably nonlocal). It was found at the left ear of Skeleton 1 in Fea. 119. It is very well made; outer flange is copper coated on both faces and is slightly concave. Spool shaft is well smoothed by abrasion and is symmetrical. The inner flange is also well smoothed and finished. Workmanship is excellent. Central

perforation is clearly drilled and appears to be drilled from the inside; it does not taper. Copper and organic residue (presumably flesh) adhere to the inner flange; the outer flange is broken from pressure of earth.

The diameter of outer flange is 81 mm.; inner flange is 63 mm.; thickness is 18 mm.; and the hole diameter is 12 mm. The outer flange has a uniform thickness of 5 mm.

Specimen 463/89--This is the companion to 463/17 and was found at the right ear of Skeleton 1 in Fea. 119. It is identical in form to the specimen described above. It too, was copper covered. One interesting technological detail is worthy of mention. The central perforation was drilled from the inside and there is a slight taper just before the outer surface is reached. This caused the outer orifice to be smaller (ca. 1 mm.) in diameter than the remainder of the perforation. Also, this left an acute angle for the copper sheet to be fastened to. Both flanges are broken by pressure of earth.

The outer flange is 83 mm. in diameter; the inner is 63 mm.; the earspool is 17 mm. thick and the hole varies from 12 (inside) to 11 (outside) mm. in diameter.

Specimen 2097/22--Very similar in shape to those described above. It was found at the right side of the skull of the skeleton in Fea. 155. The material is gray siltstone, probably of nonlocal origin. A copper sheet covers the outer flange (outer face and rim only) and all of the interior surface of the perforation. The specimen is very well smoothed but not polished. The central perforation is even and, like the above

specimens, was probably drilled by a cane tool with an abrasive such as sand.

The outer flange is 70 mm. in diameter; inner flange is 35 mm. The specimen is 12.5 mm. thick and the perforation is 18 mm. in diameter. Thickness of the outer flange varies from 1 to 2.5 mm.

Specimen 2097/15--This is the companion to 2097/22 and was found at the left side of the skull of the skeleton in Fea. 155. It too is of gray siltstone but is too fragmentary to permit accurate measurements. The stone is soft and badly fragmented due to ground pressure. The size is probably nearly equal to Specimen 2097/22.

Specimen 3031/10--This specimen was recovered from the left side of the skull of the skeleton in Fea. 118. The nonlocal material is white, chalky, and very light weight (kaolinite?). The outer flange is copper coated. The form and technology are identical to those described above. The central perforation is made by drilling but is not conical or biconical. The outer flange is slightly concave disk-shaped.

The outer flange is 70 mm. in diameter, inner measures 62 mm. Specimen is 15 mm. thick and the perforation is 18 mm. in diameter.

Specimen 3031/1--This is the companion to Specimen 3031/10. It was recovered from the right side of the skull of the same burial (Fea. 118). It is of the same white material but is too fragmentary to obtain accurate measurements. It too, was copper coated and was presumably of equal size.

Specimen 4049/6--This specimen was recovered from the left side of the skull of the skeleton in Fea. 161. It is of gray siltstone; technologically, it is nearly identical in all particulars to those

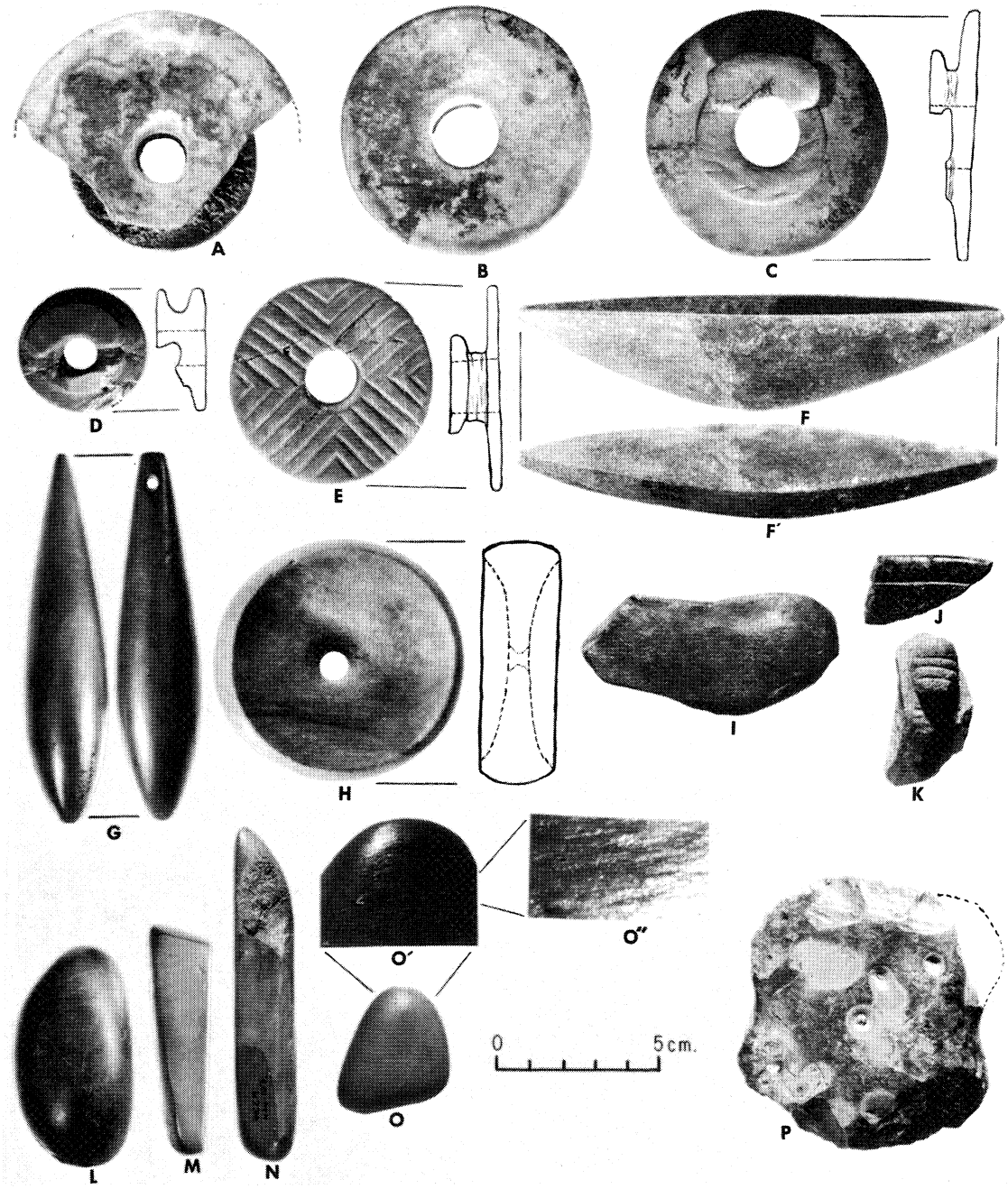


Figure 23. Abraded, polished stone artifacts. A-E, earspools. A, plain. B-D, plain with modified flange. E, decorated. F, F', boatstone. G, plummet. H, discoidal. I, adze blade. J, stone bowl fragment. K, miscellaneous carved stone. L-O'', polished pebbles. P, miscellaneous hematite artifact.

described above although the hole is smaller and the core shaft and inner flange are larger in diameter than on most.

The outer flange is 85 mm. in diameter; the inner flange is 56 mm.; it is 17 mm. thick and the perforation is 13 mm. across.

Specimen 4049/7--This specimen was recovered from the right side of the skull of the skeleton in Fea. 161. The form, technology, and material are the same as that described for its companion, Specimen 4049/6. The outer flange and rim was copper coated.

Outer flange measures 85 mm.; inner flange 55 mm.; thickness is 16 mm.; and the central perforation is 14 mm. in diameter.

Plain, With Modified Flange (N = 3; Fig. 23, B-D)

Description: Specimens 424/28 and 424/32 (Fig. 23, B, C) were found in Concentration 1 in the first layer of offerings of Fea. 119. Neither shows traces of copper covering. They are of gray siltstone, probably of nonlocal origin. Outer faces on both are slightly concave and are plain. They are well smoothed and outer rings are thin (4 to 5 mm.). The inner ring is about three-fourths removed on both specimens and an extension for button attachment, presumably to the perforated ear lobe, was retained (Fig. 23, C). Removal of most of the inner flange and a portion of the core was by sawing followed by some abrasion to flatten the remnants of the shaft.

The outer flanges measure 74 and 75 mm.; inner flange prior to removal measured approximately 52 mm. by projecting the curvature of the remnant. The remaining button measures 35 mm. long on both. The perforations measure 20 and 22 mm. respectively and thicknesses of the

specimens are 15 and 16 mm.

The third specimen (Fig. 23, D) was recovered from Unit 15. It is much smaller than those described above but is also of dark gray siltstone (probably nonlocal). It is well made, smoothed, but not polished. The outer face is plain but multidirectional scratches from manufacture are evident. The inner flange has been about two-thirds removed in the same manner as was described above, leaving a kidney-shaped button on the interior side (Fig. 15, D). Removal of the inner flange portion was by sawing.

The outer flange measures 38 mm. in diameter and projected diameter of inner flange prior to modification is about 30 mm. The button measures 26 mm. across. The central perforation is 11 mm. in diameter and the specimen is a consistent 15 mm. thick.

Decorated Earspools (N = 4; Fig. 23, E)

Description: Two of these are a matched pair recovered from Concentration 3 in Fea. 134 (Fig. 26, B). The forms are the same as described for the plain, pulley-shaped specimens. The material of both is a gray claystone; origin is uncertain, but probably nonlocal. They exhibit engraved designs on the outer faces. The design on both is a cross motif constructed by a series of opposed graduated chevrons forming a four-part design (Fig. 23, E). These are almost identical to a specimen from Spiro (Hamilton, 1952: Pl. 81, Specimen 2 on second row; (Baerreis, 1957: Fig. 4, G). The intersection of the four largest and center-most chevrons is interrupted by the central perforation. The lines are finely engraved with a fairly sharp tool. Both sides of the

outer flange are flat and very even in thickness. Holes were drilled from the exterior side. They are nearly uniform in diameter.

The outer flanges measure 60 to 61 mm. in diameter; inner flanges are 29 and 30 mm. Hole diameter varies from 16 to 17 mm. on one and 16 to 18 mm. on the other; both specimens are 16 mm. thick.

The remaining two specimens are outer flange fragments recovered from Mound A area. One (illustrated by Newell and Krieger, 1949: Fig. 53, Z) has five concentric circles incised in the outer disk (cf. Webb and Dodd, 1939: Pl. 3, 4). Krieger (Newell and Krieger, 1949: 161) reports the material to be Catahoula sandstone, but this writer does not agree with his identification. It is of fine, cream-colored sandstone, but the origin is uncertain.

Projected diameter of this specimen is about 70 mm.; it is 7 mm. thick.

The remaining outer flange fragment exhibits traces of two parallel engraved lines. It is of light gray siltstone of uncertain origin. Projected diameter is 78 mm.; it is 3 mm. thick.

Unfinished Earspools? (N = 2)

Description: This pair of pink tuff or siltstone earspools was found in Fea. 119 Concentration 2 in the second layer of offerings. The material is very similar to the pink baked tuff reported by Brown (1971) from the Manning formation approximately 100 kilometers south of the Davis Site.

The earspools are not perforated and are the only ones from the site not showing this feature. It is presumed that they are unfinished

and may give some insight to the sequence of manufacturing steps. Both flanges are of equal size, another feature unique to this pair. The spool cores are made by sawing with an abrasive tool and are not evenly finished. Only the outer surfaces of both flanges are smoothed and evidently these were manufactured by abrading against a flat surface.

Maximum diameter on both is 40 mm.; one specimen is a uniform 17 mm. thick and the other varies from 16 to 18 mm. Flange thicknesses on both are a uniform 5 mm.

Plain Earspool Fragments (N = 8)

Description: These are all flange fragments of pulley-shaped earspools. All were recovered from Mound A area (including one from Unit 15). Most are well finished, although none are polished, probably due to the nature of the stone. Three are of dark brown siltstone, three are of light gray siltstone, one is of dark brown sandstone, and one is of reddish-brown, micaceous, very fine sandstone. The origin of the stones is uncertain; the last specimen could be local since fine, micaceous sandstone does occur in the vicinity of the Davis Site.

Projected diameter of the ring fragments varies from 60 to about 90 mm.

Discussion: It is possible to infer a manufacturing sequence for pulley-shaped earspools. First, a chalky or fine granular, easily carved stone was selected and shaped into a discoidal with flattened sides and nearly round shape. It was probably at this point that the core (spool) was cut although both flanges remained the same size. It is suggested that the core shaft was nearly finished before the central

perforation was made; otherwise there may have been danger of cutting or sawing into the perforation. The drilling was probably done before the outer ring was selected since specimens show drilling from either one or the other side. Drilling was done by using a cane tool and an abrasive such as sand. It is clear that a tapered point drill or reaming tool was not used since the holes have an even diameter throughout.

Once the decision was made regarding which flange would be worn next to the head, it was reduced in size to facilitate attachment to the ear, presumably in the ear lobes. The final smoothing and decoration (if any) was applied to the outer ring. On some, the inner flange was later reduced further by cutting away most of the flange and leaving a tab or button.

Most of the stone is probably nonlocal in origin; one specimen of dark brown micaceous sandstone is very similar to certain sandstones seen in local deposits and debitage. Debitage of pink tuff or siltstone material similar to the unfinished (?) specimens described above also occurs at the site, although the material itself is not local.

Story (1972: 24) notes copper-covered wooden earspools associated with Skeleton 2 in Fea. 119. Other copper-covered wooden objects recovered from Concentration 4 of Fea. 134 and from Concentration 2 in the first layer of offerings from Fea. 119 may also be copper-covered wooden earspools. All of these are so poorly preserved that comparison in size and form is not possible.

In addition to the stone and wooden ear ornaments, ceramic rings which probably served as ear ornaments are also reported from the site

(Newell and Krieger, 1949: 146; Story, personal communication). It is worthy of note that none of the ceramic earspools were recovered from burial context and were the only forms found at the site west of Unit 15. Most are simple pottery rings, smaller than stone with a slightly concave perimeter.

Distribution of earspools in Mound C may provide some chronological and social implications. None of the individuals interred in Fea. 134, a Stage I burial, were wearing earspools. Two of the four skeletons (1 and 2) in Fea. 119, a Stage II burial, were adorned with earspools and the skeleton in Fea. 155, also a Stage II burial, was wearing a pair. The single skeleton in Fea. 161 was also adorned with stone earspools as was one Stage IV skeleton (Fea. 118).

The only engraved earspools were in Fea. 134, and were not associated with an individual. All earspools which were adorning skeletons were copper covered.

Bell (1972) reports a number of pulley-shaped earspools very similar to the Davis examples from the Harlan Site in eastern Oklahoma (e.g. Pl. 13, c; Pl. 25, b, d). He also reports composite earspools which have not been found at the Davis Site. Hamilton (1952: Pl. 79-81) and Baerreis (1957: Fig. 2, A) illustrate earspools from the Spiro Site which are similar to the type from the Davis Site.

Webb and Dodd (1939) report copper-covered wood, small stone, small bone, and copper-covered stone earspools from the Gahagan Site.

Earspools do not appear to be sex-linked. Story (1972: 24) states that Skeleton 1 in Fea. 119 (which was wearing a pair of stone earspools) was probably a female. Skeleton 2 in the same grave was

wearing a pair of copper-covered wooden earspools and appeared to be a male. However, the skeletal material was so poorly preserved in both instances that confident identification was impossible. Sex of the other skeletons wearing earspools could not be determined.

Additional data on sex of individuals adorned with earspools are provided by Webb and Dodd (1939: 95-99). In Burial Pit 2 at the Gahagan Site, Skeleton 1 was identified as a female; she was wearing stone earspools. Skeleton 4 in the same grave was also a female and was adorned with copper-covered wooden ear ornaments. Skeleton 7 in Burial Pit 2 was a male wearing copper-covered stone earspools and was accompanied with a quiver of arrow points. Also at the Gahagan Site, Moore (1912) reports possible copper-covered wooden ear ornaments with two burials in Burial Pit 1. Skeletons in Burial Pit 3 had no ear ornaments.

Skinner et al. (1969) mention earspools with both a female and a male in the round shaft grave at the Sam Kaufman Site. Woodall (1969) and McClurkan et al. (1966) report small pulley-shaped stone earspools with burials in the Toledo Bend area in Louisiana. Both skeletons were accompanied by arrow points and were probably males. At the H. R. Taylor Site in Harrison County, Texas, burial A-2 contained two pulley-shaped pottery earspools and eleven arrow points (notes on file at the Texas Archeological Research Laboratory, Austin, Texas). Identifiable skeletal material is lacking, but the individual was probably a male since a cluster of arrow points (possibly representing a quiver of arrows) was included in the grave.

Surprisingly, stone earspools were neither present at the Belcher

Mound Site (Webb, 1959) nor at the Smithport Landing Site (Webb, 1963). Webb (1959: 67, 68) does mention shell ornaments at the head of Skeleton 1 (a female) in Burial 5 and bear tooth ornaments at the head of Skeleton 2 (a male) in the same burial at the Gahagan Site.

Earspool-like ornaments have been noted on human effigy pipes; Hamilton (1952: Pl. 11, 12) illustrates a human effigy pipe from the Spiro Site depicting a human sacrifice; the dominant figure is wearing earspool-like ornaments. The "Big Boy" pipe illustrated by Hamilton (1952: Pl. 9, 10) is wearing ear ornaments of a "long-nosed god" form. The human effigy pipe illustrated by Fundaburk and Foreman (1957: Pl. 95, 96) is also adorned with earspools.

Shell engravings of human figures often depict earspool-like ornaments (e.g. Hamilton, 1952: Pl. 88, 93-96; Duffield, 1964: Pl. I, III, V, VIII, XII). One illustrated by Duffield (1964: Pl. V, 3) displays a cross-chevron design not unlike the decorated pair described from Fea. 134 above. The figures in the engravings (and in the effigy pipes as well) are presumed to be males although sexual identification is not always certain.

In summary, earspools do not appear to be sex-linked items of adornment. They are probably among the items of dress that marked status. That they are indeed earspools is verified conclusively by burial context, conch shell engravings, and effigy figures. The effect of the weight on the larger specimens, if buttoned to perforations in the ear lobes as presumed, was evidently countered by a band worn across the head and attached to each ear. Skeletons in Fea. 155 and Fea. 118 each wore a beaded head band (Story, 1972: 44, 50).

An examination of the literature in east Texas and adjacent regions reveals evidence for regional variation in styles. For example, Bell (1972) reports composite stone earspools from the Harlan Site, a style absent in the southern Caddoan area. Skinner et al. (1969) report stone earspools from the Sam Kaufman Site that are not perforated and have a distinctive bifurcated inner ring or flange. Moore (1912: 601) reports similar earspools from the Foster Site in Arkansas. The last two sites are regarded as being several centuries later in time than the Davis Site and hence this earspool style (bifurcated flange) is probably a later form.

Earspools from later Caddoan sites in east Texas south of the Red River are few; one pair of ceramic earspools was recovered from the Taylor Site in Harrison County in Texas (collections housed at The University of Texas at Austin); Woodall (1969) and McClurkan et al. (1966) report examples from two sites in the Toledo Bend region. The Harrison County and Toledo Bend specimens are small, unperforated pulley-shaped forms about 25 to 30 mm. in diameter. Hence, the later forms in east Texas may be smaller and thicker in proportion to the earlier examples, such as those from the Davis Site. This suggests that durable items of dress that marked status were not emphasized in some of the late southern Caddo groups. This is not to imply that earspools are strong status-marking items; perishable items of dress may have been even more marked but we do not have tangible evidence of this.

Boat-Shaped Stones (N = 3; Fig. 23, F)

Description: All of these items were recovered from Concentration

3 in Fea. 134 (Fig. 26, B). They are very similar in outline and size and all are made of foreign materials. They will be described individually.

Specimen 4078/25--This specimen is a dark olive, green-black mottled igneous rock; it is lighter in color on one end than on the other. The central groove which extends the entire length and partly hollows out the interior is slightly off-center but the error is the same at each end; hence, the balance is maintained. The groove continues to each end where there is a notch 1 mm. deep. The base is faceted the entire length (Fig. 23, F); the facet is 9 mm. wide in the middle and tapers to 6 mm. at each end. There is no wear evident in either notch.

The specimen is 162 mm. long; 23 mm. in maximum width; 37 mm. high; the groove has a maximum width of 16 mm. and depth of 11 mm.

Specimen 4078/28--The material of this specimen is a black, fine-grained rock (not flint); because of the finer material, walls are thinner on this specimen. There are tiny nicks at each end but these do not evidence conchoidal fractures. The form is symmetrical and nearly identical to that of Specimen 4078/25 described above; each end is notched and notches are about 1 mm. deep. The base is faceted the entire length; the facet measures 5 mm. wide in the middle and 3 mm. wide at each end. There is no evidence of wear in the notches. The specimen is nearly polished.

The specimen measures 165 mm. long, 22 mm. wide, and 41 mm. high. The groove is 15 mm. wide and 17 mm. deep.

Specimen 4078/38 (Fig. 23, F)--The material is similar to that

of Specimen 4078/25 (i.e., it is a crystalline igneous rock) but the crystals are smaller and hence the material is finer grained. The color is a mottled, dark, olive-green. The walls are thinner than on the first specimen described. The ends are notched (equal in size to the other specimens) and the bottom is faceted. The facet measures 8 mm. wide in the middle and 5 mm. wide at each end. The interior groove extends the entire length of the specimen. There are no traces of wear in the notches and the specimen is well smoothed but not polished. It is symmetrical.

The specimen measures 147 mm. long, 32 mm. high, and 23 mm. in maximum width. The groove is 18 mm. wide and has a maximum depth of 13 mm.

Discussion: These specimens compare closely to boat-shaped stones reported from the Spiro Site by Hamilton (1952: Pl. 59). Also, two of the five boat-shaped stones recovered from Phase 2 of Mound 1 at the Bayou Goula Site are very similar (Quimby, 1957: Fig. 44, top two specimens). Quimby regards these as being Plaquemine (ibid.: 145). Moore (1912) reports (but does not illustrate) a boat-shaped stone of diabase from the Gahagan Site.

J. T. Patterson (1937) carried out an extensive comparative study of boat-shaped objects. His Variety XXIV boat-shaped artifacts compare closely to the Davis Site specimens (ibid.: 29, Fig. 85-89). Three of the twelve specimens described by Patterson were from east Texas; the remainder were from Arkansas.

Although Patterson's study is outdated, some of his findings are worthy of mention. He examined specimens from Arkansas (224),

Louisiana (38), Oklahoma (6) and Texas (75). He noted that, despite the range of stone types represented in his sample, the majority of the objects were made of materials locally available in the region where they were found. He notes obvious cases of importation but his distribution of materials is indeed interesting. For example, one group of Arkansas boat-shaped artifacts was made of igneous rock (such as diabase, sanidine porphyry, syenite, and trachyte). He notes that these minerals are all found in the vicinity of Little Rock, Arkansas.

The function of boat-shaped stones was also considered by Patterson. He leans toward their use as atlatl weight stones citing archeological occurrences in the Southwestern United States and noting similarities of these to specimens in his study sample. He further states that:

> Some of the boat-shaped pieces are entirely too large and heavy to have been bound to an atlatl, and they could have been used for ceremonial purposes. Possibly some of the smaller, finely made pieces were employed for a similar purpose. Moreover, it is reasonable to assume that after the atlatl fell into disuse, the Indians continued to make, in some places and some measure, the boat-stones as charms or fetishes, and hence, in time their original purpose would have become completely lost in antiquity (ibid. 72).

Even though organic material adheres to all three Davis Site specimens, their position in Concentration 3 of Fea. 134 does not suggest that they were hafted. Rather, they appear to have been part of the contents in a container along with an assortment of other artifacts including finely made bifaces (Gahagan bifaces) and an effigy pipe (see Story, 1972: 19-22 for a complete inventory of items from Concentration 3). Their function within the Davis Site Caddoan cultural system is

enigmatic. To pass them off as ceremonial objects or as heirlooms is oversimplifying the issue because ceremonial objects have a diversity of functions and heirlooms are kept for a reason. To regard the function of all boat-shaped artifacts as being the same is also probably a mistake. A wide variety of objects fall under this heading and, while some may have served as atlatl weights in some areas, their functions are not necessarily the same in all areas. Patterson cites finds in the American Southwest where boat-shaped stones were hafted to atlatl shafts; Jelks (1965) describes a boatstone from the Jonas Short Mound which contained a number of pebbles suggesting it may have been a rattle.

Plummet (N = 1; Fig. 23, G)

Description: This teardrop-shaped object of heavy hematite was recovered from Concentration 7 in Fea. 119 (Fig. 27, B); (Story, 1972: 33). The narrow end is perforated by a slightly biconical hole; wear at the top of the hole indicates that the specimen was suspended. Fine abrasion scars occur at various places on the surface but are most apparent around the distal portion; multidirectional scratches occur over much of surface, possibly indicating handling or subsequent use, although they are most likely the result of manufacture. The tapered end is slightly flattened, probably to anticipate the perforation.

The specimen measures 110 mm. long and the maximum diameter is 25 to 26 mm.; the suspension hole is 5 mm. in diameter.

Discussion: A specimen similar in form is illustrated by Ford and Webb (1956: Fig. 33, g, h) from Poverty Point. Plummets are also described from the Spiro Site (Hamilton, 1952: Pl. 57) although these

may be fraudulent (James A. Brown, personal communication). Webb and Dodd (1939) report an ungrooved plummet from the Gahagan Site.

Discoidal (N = 1; Fig. 23, H)

Description: This probable gaming stone was recovered from Fea. 155 (Story, 1972: 42). It is of fine, reddish-brown, banded, indurated sandstone of nonlocal origin. It is round in profile and has a central perforation which is biconically drilled. The faces are concave and the outer edge is convex in cross-section.

The diameter is 72 mm.; thickness at the rim is 21 to 22 mm.; diameter of central perforation is 8 mm.; thickness at edge of perforation is 8 mm.

Discussion: Webb and Dodd (1939) report three stone discoidals from Gahagan Site burials. Hamilton (1952: Pl. 58) illustrates several from the Spiro Site and Fundaburk and Foreman (1957) illustrate several from sites in southeastern United States. The latter authors also illustrate a stone effigy pipe from Muskogee County, Oklahoma, of a kneeling human figure apparently in the process of throwing a discoidal or chunky stone (ibid.: Pl. 94 and 96). Fowler (1969: Fig. 19) illustrates a multiple burial in Mound 72 at the Cahokia Site which yielded a cache of discoidals (at least 13).

Chunky was a popular variation of the hoop-and-pole type of game among certain southeastern Indian groups (Swanton, 1946: 682-684; Culin, 1907: 420-528). It was apparently a game of skill and was accompanied by much gambling. James Adair describes the use by a Choctaw group in Mississippi of discoidal stones and behavior surrounding them.

> The hurling stones they use at present were time immemorial rubbed smooth on rocks, and with prodigious labor; they are kept with the strictest religious care from one generation to another, and are exempted from being buried with the dead. They belong to the town where they are used, and are carefully preserved (Culin, 1907: 485, 486).

Celts (N = 38)

A celt is defined here as either an ungrooved or slightly grooved stone axe. Suhm, Krieger, and Jelks (1954: 532) describe a celt as being:

> Usually round or oval in cross-section at middle, one end converging to a bit, the other a blunt poll (petaloid celt). Also refers to a flatter object with the cutting edge flaring out wider than the body (spatulate celt).

The above authors make a distinction between a celt and an adze; adzes are classified as those objects which are flat, thin, more or less rectangular polished axes with sharp "bits" (ibid.). The distinction between a celt and an adze made in the present study is based on bit morphology. Specimens with bifacially beveled bits are celts; specimens with unifacially beveled bits are classified as adzes.

A distinction is sometimes made between the longer forms and the shorter, broad forms. For instance, Skinner et al. (1969) distinguished between a celt and a chisel. If the correct definition of a chisel is followed, then the archeological specimens should have either battered proximal ends and bifacially beveled bits or long, slender forms with sharp, mostly unifacially beveled bits. The term "chisel" would probably better describe certain flint tools often referred to as "gouges."

The complete celt sample numbers only twenty-two specimens, twenty are petaloid celts and two are spatulate celts; the sixteen

fragments are evidently all from petaloid celts.

The celt sample is not sorted on the basis of material chiefly because specific material identification could be highly subjective in certain instances and could be resolved only through thin sectioning. All celts, with one possible exception, are of nonlocal material of metamorphic, igneous, and perhaps even sedimentary origin. Despite the range of mineral types, the stones used in celt manufacture tend to have greenish and brownish hues.

Petaloid Celts

The petaloid celt sample is divided into four groups for descriptive purposes. These are large, medium, small, and fragmentary.

Large Celts (N = 9; Fig. 24, A, C, D)

Description: All of these artifacts were recovered from burial context; seven from Fea. 134 (Fig. 26, A) and two from Fea. 119 (Fig. 27, A). These have extensively smoothed surfaces but faint traces of peck marks can be seen on each; traces of peck marks usually occur along the medial portions of the sides. The shapes are similar, differing mainly on the configuration of the poll end. The widest portion is near the bit end, and the thickest portion is usually just above the area where the bit taper begins. Most taper to a rounded poll end; one, however, exhibits a tapered, but flattened poll end. Two specimens exhibit differential staining presumably caused by haft elements (Fig. 24, D).

The two large celts from Fea. 119 exhibit prominent striations oblique to the cutting edges (Fig. 24, A'). These marks clearly did

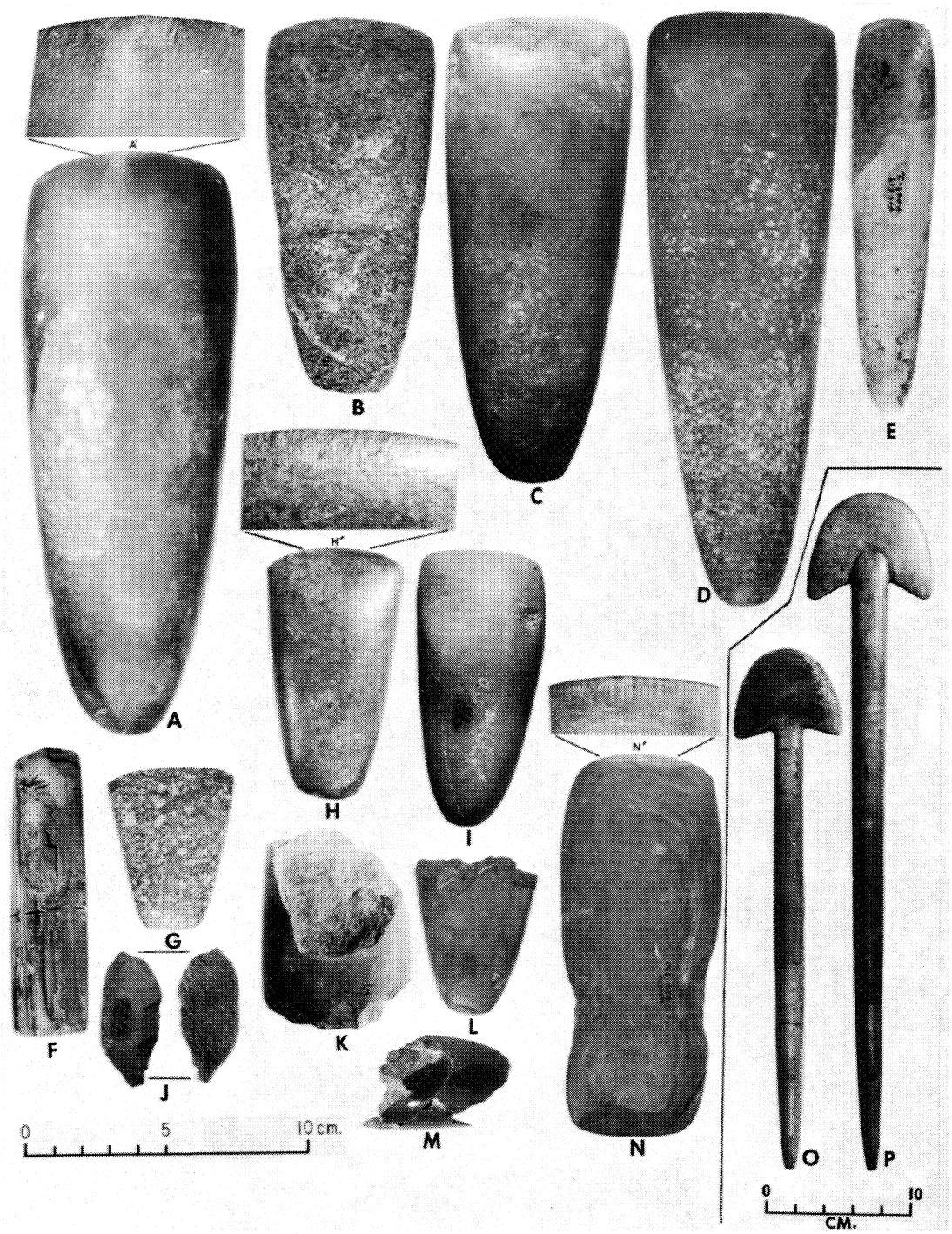


Figure 24. Celts, adze blade. A-M, petaloid celts. A, C, D, large celts. B, E, F, medium celts. G-I, small celts. J, M, debitage from celt recycling. K, L, celt fragments. N, adze blade. O, P, spatulate celts. A', H', N', enlargements of edge wear.

not result from manufacturing because their orientation on both sides matches; manufacturing scars are at opposed angles and of much finer abrasion. The bit striations are attributed to use of the celts as axes. Most large celts from Fea. 134 also bear traces of use, but it is not as extensive as the Fea. 119 specimens.

L: 161 to 211 mm.; mean, 193; W: 65 to 94 mm.; mean, 75; BlW: 50 to 89 mm.; mean, 69.7; T: 38 to 48 mm.; mean, 44; angles of bit edge: 85 to 95 degrees; mean, 90.

Medium Celts (N = 3; Fig. 24, B, E, F)

Description: Each of these is exceptional in some way. They are classified as medium-size celts by length only.

One is a long, narrow, rectangular silicified wood cobble with an abraded bifacial bit on one end (Fig. 24, F). The opposite end and edges bear only slight abrasion and are not shaped. The bit end is blunted or slightly rounded from use in cutting soft (?) materials. The specimen could be made of local stone. It was recovered from Fea. 119.

L: 110 mm.; W: 25 mm.; T: 15 mm.; BlW: 22 mm.; edge angle: rounded.

The second specimen (Fig. 24, E) is a celt of a light green stone similar to that used in the manufacture of spatulate celts. It was recovered from Fea. 161 where it was associated with the skeleton. The long, slender specimen is slightly asymmetrical in cross-section at the bit. The celt is well smoothed, but one surface is slightly flatter than the other. The bit has a minute bevel at the edge.

L: 135 mm.; W: 28 mm.; T: 22 mm.; BlW: 27 mm.; edge angle: 67 degrees.

The third specimen (Fig. 24, B) was recovered from Fea. 134. It has a shallow groove encircling the specimen about one-third the distance from the poll end. The specimen is well smoothed but a band of peck marks occurs on both sides of the groove; the groove is partly smoothed.

The specimen is classified as a celt despite the slight groove because there is no reason to suspect that it either functioned or was hafted differently from the other celts.

L: 138 mm.; W: 58 mm.; T: 32 mm.; BlW: 55 mm.; edge angle: 90 degrees.

Small Celts (N = 8; Fig. 24, G-J)

Description: These celts have broad, bifacially beveled ends. Poll ends are usually rounded; one is nearly flattened. All are highly smoothed and peck marks are rarely evident. Small celts were found interred in Fea. 134 (2), Fea. 119 (2), Fea. 155 (1), Fea. 106 (1), and Fea. 107 (1). Story (1972: 69) also reports one interred in an interior post mold in Fea. 111, the large circular structure beneath Mound B.

Wear, if it exists at all, is faint to moderate. One specimen, however, from Fea. 119 bears extensive use marks in the form of matching striations on the bit (Fig. 24, H, H').

Differential stains on the surface of two celts from Fea. 134 are probably the result of hafting.

One specimen (from Fea. 106) is asymmetrical in cross-section;

it has a more extensively faceted bit portion on one surface than on the other causing the bit to be slightly curved.

L: 55 to 95 mm.; mean, 80; W: 35 to 55 mm.; mean, 47; T: 17 to 30 mm.; mean, 23; B1W: 35 to 54 mm.; mean, 47; edge angle: 70 to 83 degrees; mean, 79.

Celt Fragments (N = 16; Fig. 24, K, L)

Description: Included here are celt fragments which do not evidence recycling. All are broken petaloid celts, but both large and small celts and perhaps medium celts are represented. Eleven are bit fragments; three are poll fragments; and two are medial fragments. One bit fragment deserves special attention. It is from a large celt which has been rechipped to retain a portion of the original bit across the wider end. No real attempt was made to smooth the specimen although light abrasion was carried out in an attempt to straighten the edges. The outline is asymmetrical. Another fragment (a poll segment) evidences unsuccessful attempts to chip a cutting edge (Fig. 24, L). The material broke along cleavage planes and prevented successful completion of the task.

No dimensions are given due to fragmentary condition.

Discussion: There are thirty flakes and chips removed from celts which are considered as debitage from attempts to refurbish or recycle fragments. These are described in Chapter 6.

Spatulate Celts (N = 2; Fig. 24, O, P)

Description: These two specimens are made of what appears under

7X magnification to be the same green stone material. It is faintly translucent with a fibrous structure which is parallel to the long axis of the specimens. Black, thread-like stripes can be seen in both specimens. The stone is a metamorphic silicate (not flint) and may contain some talc. The specimens will be described individually.

Specimen 3031/6 (Fig. 24, P)--The specimen was associated with the skeleton in Fea. 118, a Stage IV burial. It has a long, round shaft and a barbed, spade-like bit with a rounded distal edge. It measures 460 mm. long and is 85 mm. wide across the barbs. Width of the shaft at the bit is 25 mm. and maximum thickness at the same location is 23 mm. Length of the shaft is 400 mm. (i.e., to the point where the shaft joins the bit).

This specimen is one of the most artistically made spatulate celts reported, at least with respect to detail. It is monolithic but exhibits a sculptured haft where the shaft joins the blade which makes it appear, superficially at least, to be a composite tool. The blade is symmetrical within a millimeter and four shallow but clearly distinct notches occur along the blade edge near the tips of the barbs. The barb tips are faceted rather than being pointed.

The shaft has its maximum width at the juncture of the bit and tapers gradually to the poll end; the latter is blunted.

Striations of manufacture occur over most of surface but the specimen is quite well polished. There is no indication of use on the end of the bit save a small chip which was repaired by abrading. This minor alteration produced a slight irregularity in the convex edge of the bit. Traces of unidentified organic material adhere to one side.

Specimen 4091/1 (Fig. 24, O)--This specimen was recovered from Fea. 161, a Stage III burial associated with the skeleton. It is smaller than the one described above. It measures 355 mm. long, 73 mm. across at the widest point of the bit (across the barbs); the shaft is 19 mm. wide and 16 mm. thick at the juncture with the bit. The shaft is 282 mm. long from poll end to where it joins the blade.

The specimen compares very closely with Specimen 3031/6 except that the haft is not sculptured. The bit has traces of three notches on one side near one barb and traces of two notches on the opposite side. The notches have been largely smoothed over, suggesting that the specimen had been extensively handled. The bit also exhibits a smoothed-over nick although, here again, there is no evidence of use as a cutting tool. The bit is barbed and shoulders protrude downward slightly. It is quite well finished all over by abrasion and striations can readily be detected; polish, however, is not extensive.

Discussion: Webb and Dodd (1939: Pl. 27, 2, 3; Pl. 23, 3) report spatulate celts from burials at the Gahagan Site. Krieger (1946) also reports a spatulate celt of green slate from the Sanders Site. Hamilton (1952) illustrates a number of celts of this form from the Spiro Site, and Bell (1972) reports one from Burial 114b at the Harlan Site.

Griffin (in Hamilton, 1952) considers celts of this form clear time markers for the post-Hopewell Mississippian pattern.

The position of the spatulate celts from the Davis Site in the context of the skeletons is almost identical (see Story, 1972: Fig. 19, 24); both were found on the right side of the skeletons in the vicinity

of the knee; in Fea. 118, the poll end extended slightly beneath the right leg (Fig. 27, C). The celts were oriented perpendicular to the skeletons with the blade portion pointed away from the body. The position of the specimens suggests to this writer that they were hafted and the handle may well have been clutched in the right hand of each skeleton. This position certainly suggests too that these items may have served as a symbol of authority; the lack of wear indicating use as cutting tools and the fragile nature of the specimens also indicates that they served as social class accouterments.

Summary of Celts

An analysis of the celts and celt fragments from the village excavations also provided some interesting findings regarding use and function of these tools.

Wear pattern studies on celts from the Mound C burials indicate that many of these items were used prior to their interment. Wear was most obvious on the larger celts from Fea. 134; use was indicated by striations, and rarely by battering, of the cutting edge.

The distribution of the large, medium, and small celts in the burials reported in Mound C by Story indicate that seven of the nine large celts were confined to the single Stage I burial, Fea. 134. The remaining two were in a Stage II burial, Fea. 119. Small celts were in burials in Stages I, II, III, and V. Only two pits contained more than one small celt (2 specimens) and these were in Stages I (Fea. 134) and II (Fea. 119). The two spatulate celts (spuds) were in Stages III and IV.

Only one complete celt was found in a context other than burial. This specimen was found in a post mold in Fea. 111 beneath Mound B. However, sixteen fragments of large and small celts and thirty pieces of debitage resulting from celt recycling did occur in the village. There are thirteen fragments and twenty-three pieces of debitage from the area east of Highway 21 and three fragments and seven pieces of debitage from the western portion of the site (Table 4). Several fragments in the collection have been subsequently altered by chipping or, one instance only, by pecking. There does not seem to be a single instance of repairing a broken celt by abrasion; one fragment has been chipped in such a way as to maintain an approximate triangular shape and retain the cutting edge across the wider end.

Celts do not seem to have been manufactured at the Davis Site. This is indicated by the absence of materials suitable for their manufacture (with one possible exception) and the absence of debris chipped from blank preparation. There are several flakes struck from metamorphic or some other dense rock, but in each case a remnant of a pecked and smoothed surface is present, indicating that these flakes were struck from broken celts.

My technological study of celts does not support Krieger's statement that several celts were deliberately smashed (Newell and Krieger, 1949: 157). I agree that several celt fragments have been chipped, but I find no conclusive evidence that certain celts were deliberately smashed.

The results of the distributional study show that celts were

more frequent in earlier burials and that celt fragments were more frequent in the Mound A area.

Two complete celts are described from the site by Krieger (Newell and Krieger, 1949: 157); one was described as an adze. Since both were part of a private collection donated to The University of Texas at Austin, they have not been described here because their provenience is questioned. For example, one specimen of hematite illustrated by Newell and Krieger (ibid.: Fig. 55, D) is a form not duplicated in other specimens from the site but which is common in later Caddoan components in east Texas. The cross-section is nearly round, rather than being flat-oval like the burial specimens, and is thicker in proportion to length. The surfaces are almost entirely shaped by pecking, and grinding is used mainly to fashion the bit.

A comparison of petaloid celts from late Caddoan contexts suggests there is a temporal shift in celt forms south of the Red River. Earlier forms are thinner in proportion to length and most of their surfaces are abraded. Later celts, those which occur with Titus and Frankston ceramic assemblages, are thicker in proportion to length, and surfaces are mostly scarred by pecking except for the ground bit.

The distribution of petaloid celts in burial context at the Davis Site provides insufficient data to determine if these artifacts are sex-linked. Only one burial (Fea. 161) contained a celt in direct association with a skeleton. In this instance despite the poor condition of the skeletal remains, the other accouterments support the proposition that this individual was a male (i.e., spatulate celt, arrow point clusters, and a Gahagan knife).

Adze Blade (N = 1; Fig. 24, N, N')

An adze is defined as a cutting tool having a blade set at right angles to the handle.

Description: This specimen is a tabular piece of dark gray silicious slate (nonlocal) with a beveled cutting edge and a convex proximal end. It was recovered from Fea. 119. Two notches have been chipped into the edge near the base; there is a light taper in the lateral edges toward the bit. It is shaped almost entirely by abrasion. Use marks are definite and occur perpendicular to the edge (Fig. 24, N'); the bevel is probably created by use.

L: 131 mm.; W: 55 mm.; T: 15 mm.; BlW: 46 mm.; edge angle: 71 degrees.

Stone Bowl Fragment (N = 1; Fig. 23, J)

Description: This specimen of gray-green talc schist is described by Krieger (Newell and Krieger, 1949: 158, Fig. 55, G).

> It is 3/8 inch thick, narrowing to 1/4 inch below the lip, which is slightly flattened. The lip and exterior are well polished, the interior scored with tool marks. A horizontal line runs 1/4 inch below the lip.

L: 40 mm.; W: 20 mm.; T: 9 mm.

Carved Human Head (N = 1)

Description: This item is described by Krieger (Newell and Krieger, 1949: 160, Fig. 55, Q) as follows:

The head was carved from a small block of gray and white kaolin, a material found about the town of Troup 40 to 50 miles due north. The principal features of greatest interest are: only the left half of the head is shown, the under side being flat and smooth; a "Forked Eye" symbol, though faint can be seen unmistakably, consisting of two straight-line prongs, one ending just below the mouth, the other fading out about where the ear lobe would be; the mouth, nostril, eye, prongs, and a deeper groove across the top are all filled with bright red ocher.

The specimen is approximately 25 mm. high and 23 mm. wide.

Miscellaneous Carved Stone (N = 1; Fig. 23, K)

Description: This specimen was also described by Krieger (*ibid.*) as a stone bowl fragment. There is no way of being certain of this classification due to its fragmentary condition. Only one definite altered surface is retained; the interior surface shows no signs of alteration; it is represented by broken, roughened surface. The material is a light brown or buff sandstone. The altered surface exhibits a carved knob crossed by three parallel lines (Newell and Krieger, 1949: Fig. 55, F).

L: 47 mm.; W: 23 mm.; T: 18 mm.

Part 2

Described in Part 2 are artifacts which presumably reached their present form as a result of use rather than being shaped to conform to some preconceived design.

Abrading Stones

Abrading stones are classified into four groups; tabular, milling stones, grinding slabs, and polishing stones.

Tabular Abrading Stones

The tabular specimens exhibit one or more of a number of attributes (such as longitudinal grooves, surface faceting, and edge faceting). These include tools often referred to as "hones." They are divided on the basis of kind of sandstone used; the principal groups are Catahoula and Ferruginous.

Catahoula Sandstone Abrading Stones (N = 61; Fig. 25, A-G)

Description: Over 50 percent exhibit one or more longitudinal grooves resulting from their use as whetstones or hones (Fig. 25, B, D, E-G). All have been shaped to some extent on one or more surfaces and on most edges. Surfaces are usually abraded, being smoothed or semi-faceted. Several have slightly concave surfaces. One specimen (Fig. 25, C) is evenly flattened and has a uniform thickness (6 mm.); a small notch occurs in the edge of one end. The shape is lanceolate and edges are abraded. It may have functioned as a saw.

Specimens with several faceted edges (either at right angles to surface or beveled) are common. Single specimens often exhibit all three attributes - grooves, surface faceting, and edge faceting.

Twenty-eight were recovered from Fea. 119; twenty-two from the first layer offerings (5 from Concentration 1; 3 from Concentration 2; 5 from Concentration 3; 2 from Concentration 4; 2 from Concentration 5; 1 from Concentration 6; 4 from Concentration 7 (Fig. 27, B). Six were recovered from the second layer offerings (1 from Concentration 1 and 5 from Concentration 2). One specimen was recovered from Fea. 155, thirty-two

from nonburial contexts (see Table 4).

Dimensions of the specimens from Fea. 119 and Fea. 155 give some indication of the size range of complete examples. Two specimens from Fea. 119 are small, fragmentary disk-shaped objects faceted on both surfaces. These were the only specimens that were not part of larger, tabular stones. The function of these smaller specimens is unknown and their fragmentary condition precludes reconstruction of the original size. The dimensions of the complete or reconstructable specimens are presented below.

L: 38 to 247 mm.; mean, 123; W: 29 to 75 mm.; mean, 57; T: 5 to 38 mm.; mean, 14.0.

Discussion: Catahoula sandstone abrading stones were evidently used for several types of abrading activities. Most evident is their use as hones as evidenced by longitudinal grooves; presumably they were used to shape slender bone and possibly wooden objects. The faceted surfaces and edges also suggest use as rasps or saws.

Despite their seemingly mundane function, their restricted occurrence, only in burial context, is striking. Catahoula sandstone tools were the second most common class of stone artifacts from Fea. 119, a Stage II burial second only to flint flakes. Feature 155, the only other excavated Stage II burial yielded one Catahoula sandstone tabular abrader; the latter specimen exhibited grooves on both sides and beveled edges.

Items in association with these artifacts in Fea. 155 included abraded fresh water bivalves, numerous bone pins, and possibly wooden objects (Story, 1972: 42-44). In Fea. 119, objects of bone or shell

(either fresh or salt water) accompanied all but two artifact concentrations which included abrading stones. Bone pins were by far the most numerous items and were associated with the skeletons (perhaps as many as 100 with Skeleton 2; ibid.: 40). In Concentration 6, bone pins were found lying on and actually adhering to an abrading stone.

Grain size in the material of these specimens varies from very fine to coarse on the Wentworth (1922) size scale (i.e., .074 to .50 microns). In view of this variation, it is hypothesized that grain size might be a functional indicator. The evidence does not negate the hypothesis; nor does it strongly support it. For example, there does not seem to be a significant clustering of attributes among groups sorted on basis of grain size. This alone, however, would not necessarily mean that grain size was significant. Concentration 1 in the first layer offerings of Fea. 119 contained tabular sandstone abraders of fine, medium, and coarse grades; Concentration 7 had fine and medium grades. While these distributions may be fortuitous, it is still possible that these tools were used in graduated sets.

The occurrence of numerous tabular abraders in Stage II burials is worthy of further attention. These are the only burials except Fea. 134 in which bone pins were preserved. Bone pins were probably made by using these tools. Why were so many abrading tools included among obvious prestigious items? One possible explanation is that these tools were essential in the maintenance of certain material items which were indicative of rank in the cultural system. Items other than bone could have been worked by using these tools. For example, shell was associated with abrading stones in artifact concentrations in burials. Wood,

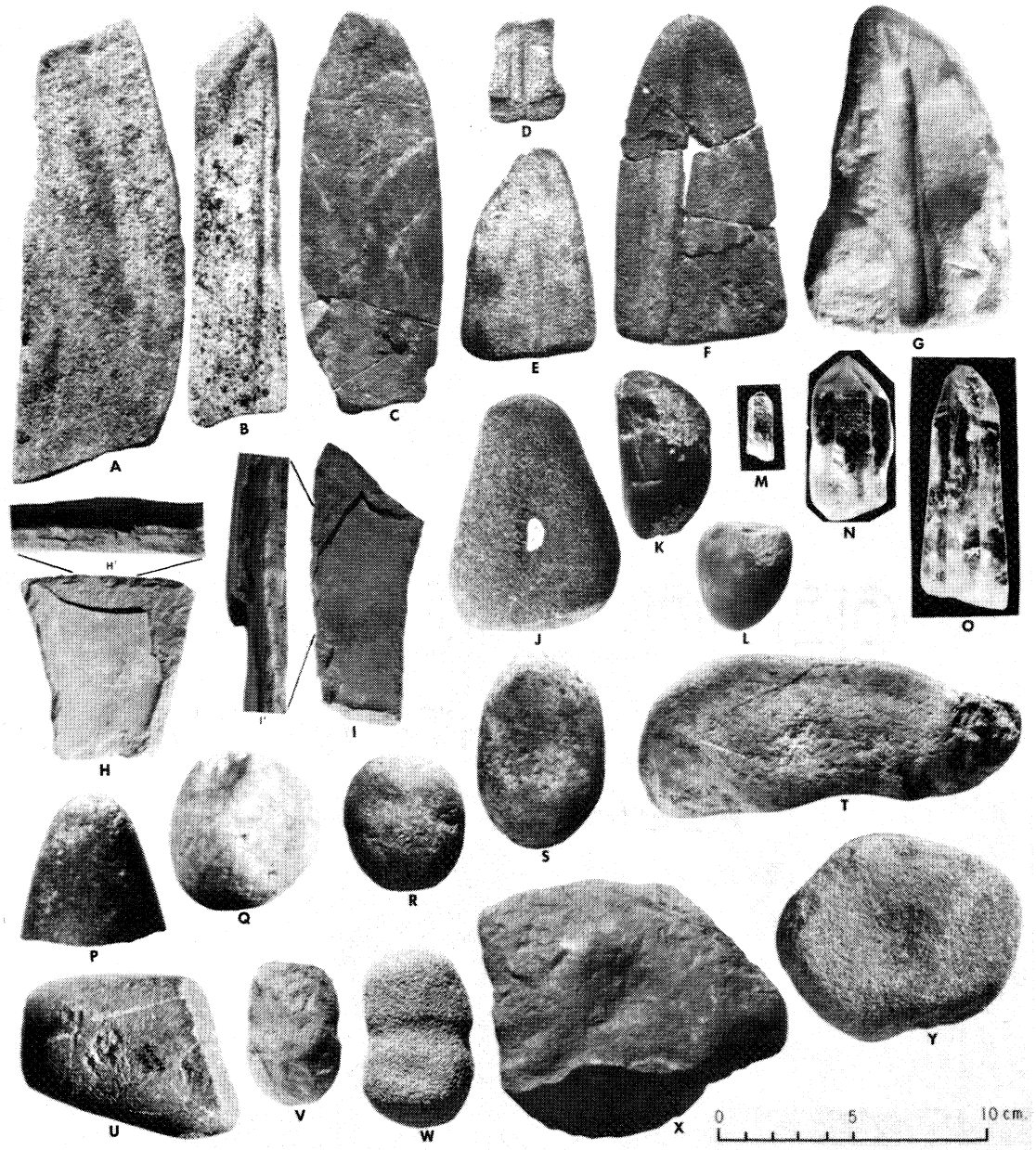


Figure 25. Abraded, battered stone artifacts. A-G, Catahoula sandstone tabular abrading stones. H, I, Group 2 ferruginous sandstone abrading stones (saws?). J, quartzite milling stone. K, L, battered and polished quartzite pebbles. M-O, modified quartz crystals. P, Q, Group 1 battered stone tools. R, S, Group 2 battered stone tools. T, U, Group 3 battered stone tools. V, W, grooved ferruginous sandstone nodules. X, Y, pitted stones; S, unshaped; Y, shaped.

which did not survive, may also have been shaped by the sandstone abrading tools.

The assemblage of artifacts associated with Fea. 119 and Fea. 155 includes other items which we would regard as mundane (i.e., flint flakes, cores, polishing stones, etc.). If the status of these individuals or their office or rank is preserved in death, then not only the status objects themselves are included but also the tools necessary to maintain and refurbish these items.

But why are there so many? Their multiple uses and use in sets may account for this. Since they are of nonlocal material (Catahoula sandstone occurs about 100 kilometers south of the site), ranking individuals would probably have first access to it.

One other possibility can be suggested. It is quite clear that the Davis Site population was involved in a trade network, but we do not know what they were contributing to this system. It is possible that bone pins, perhaps wooden artifacts, and other items made with the use of these tabular sandstone tools were a major export. Whoever controlled the tools, may have controlled the industry.

C. B. Moore (1912: 519) describes and illustrates a Catahoula abrading stone similar to those described above, from the Gahagan Site.

Ferruginous Sandstone Abrading Stones

These artifacts are divided into two descriptive groups; the first is analogous to the Catahoula specimens described above. The second group is composed of a distinctive set of abrading tools which apparently functioned as saws.

Group 1 (N = 8)

Description: These are tabular pieces of sandstone with either grooved or faceted surfaces. All are probably from local sandstone deposits. Three are grooved and the remainder have faceted, flattened surfaces. Two are concretion fragments with slightly smoothed surfaces.

L: 62 to 83 mm.; W: 44 to 66 mm.; T: 23 to 25 mm.; (measurements on complete or nearly complete specimens only).

Group 2, Saws? (N = 5; Fig. 25, H, I)

Description: These are tabular sandstone items exhibiting one or more chipped and smoothed edges. The edges are characteristically straight with slightly sinuous but extensively smoothed margins. Striations on two specimens clearly indicate back and forth motion. One of the two exhibits a smoothed surface; oblique striations (about 20 degrees from perpendicular) are on this surface some 5 mm. from the edge.

Four of the specimens are of micaceous sandstone and are evidently the shell-like outer covering of concretions. The fifth is a fragment of a multipurpose tool; it has one chipped and smoothed edge, one smoothed edge, and one face exhibiting no less than five longitudinal grooves. However, it was evidently broken, recycled, and used as a saw. Only the complete specimens are measured for length.

L: 71 to 105 mm.; W: 34 to 63 mm.; T: 5 to 11 mm.

Discussion: Three of these were recovered in Unit 11; they are complete and exhibit very similar attributes.

Milling Stones

These artifacts are described according to material class, quartzite and ferruginous sandstone.

Quartzite Milling Stones (N = 14; Fig. 25, J)

Description: These quartzite cobbles bear one or two grinding facets. Some shaping of the cobble is indicated in most instances. Twelve are medium to coarse-grained quartzite, and two are purple quartzite. Shapes are mostly oval; two are fragmentary. Three have mature (well faceted) grinding surfaces and one has a pecked depression in one surface. They were presumably used in conjunction with the oval basin grinding slabs described below. A back-and-forth grinding motion is not indicated by the wear.

Maximum diameter: 97 to 119 mm.; mean, 93; T: 47 to 79 mm.; mean, 49.

Ferruginous Sandstone Milling Stones (N = 27)

Description: These are nodules which have one or two faceted surfaces but do not have definite pitted surfaces. The nodules vary from oval to subrectangular in shape with rounded edges. Some are shaped by chipping and battering. Most exhibit only one faceted edge which is usually slightly convex, but some have faintly concave centers.

Maximum dimensions: 71 to 145 mm.; T: 17 to 57 mm.

Grinding Slabs

The grinding slabs occur in two material classes; ferruginous sandstone and Catahoula sandstone.

Ferruginous Sandstone Grinding Slabs (N = 14)

Description: These are nodules or slabs with a flat or concave grinding facet on one surface. Some are obviously fragmentary and are probably fragments of large grinding slabs. Others may have been complete artifacts even though they appear as angular sandstone slabs. Edge rounding is suggested on some. One small specimen clearly evidences parallel striations indicating a metate-like reciprocal motion of wear. The reverse side shows moderate shaping by abrasion on two.

Maximum dimension: 89 to 295 mm.; T: 24 to 69 mm.

Discussion: Four are complete and these have concave basin-like surfaces; these measure 181 to 295 mm. in maximum diameter. Grinding basins vary from approximately 15 to 30 mm. deep.

Catahoula Sandstone Grinding Slabs (N = 6)

Description: These sandstone slabs have concave grinding surfaces; the depths of the grinding basins vary from about 1 to 8 mm. The opposite faces are smoothed and faceted as well. Four are apparently complete artifacts. Three are recycled fragments of once larger artifacts. One was evidently used as a hone as evidenced by traces of longitudinal grooves; however, subsequent use has almost obliterated these grooves. Another evidences a remnant of a concave grinding facet.

L: 71 to 89 mm.; W: 31 to 71 mm.; T: 19 to 27 mm.

Polished Stones (N = 33; Fig. 23, L-O")

Description: Most of these artifacts are pebbles of quartzite or flint; some of the longer specimens fall into the small cobble

category. They evidence moderate to extensive smoothing and polishing by fine abrasion. The materials being worked were relatively hard and fine-grained (probably containing fine quartzite sand) but the nature of the substances is unknown. Surfaces and edges exhibit multiple striations (Fig. 23, O', O"). Striations along the edges and near the ends of longer specimens are perpendicular to the long axis. No part of the surface is free of striations on the more polished specimens.

All are stream-worn stones; many were probably locally obtained, although some of the longer cobbles are likely of nonlocal flint since they are mostly olive-gold and subangular.

L: 38 to 111 mm.; mean, 55; W: 15 to 62 mm.; mean, 30; T: 10 to 46 mm.; mean, 22.5.

Discussion: Krieger (Newell and Krieger, 1949: 157, 158) describes two of these as "pot polishing" stones. This hypothesis was tested by selecting a flint pebble and subjecting it to moderate use in smoothing several laboratory made pottery vessels manufactured from clay obtained from the borrow pit at the Davis Site. The resulting wear is identical to that seen on the archeological specimens. The experiment supports the hypothesis.

Krieger's (ibid.) comments regarding the smoothed stones, are worthy of note.

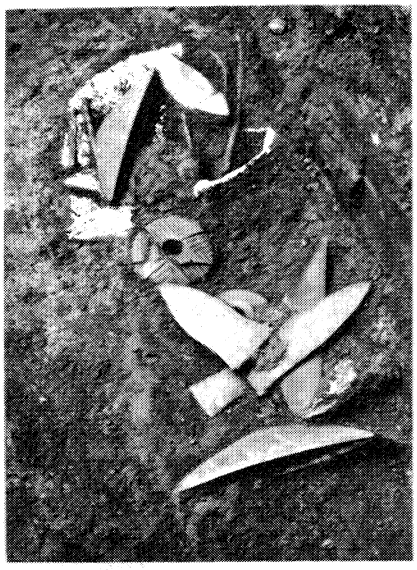
> If pottery were smoothed and polished with stones, which would seem probable in view of its generally high grade, it is possible that stream pebbles were used very slightly and discarded, not being kept long enough to develop facets. If this were true, the stones were probably not treasured or endowed with special properties in the same sense that the modern Puebloan woman regards her smoothing stone, using it for a lifetime and even handing it down to her daughter.

The distribution of nine smoothing stones that evidence extensive abrasion in Fea. 119 (plus an additional seven which do not bear obvious abrasion marks) and the interment of one polishing stone in Fea. 155 do not substantiate Krieger's findings. Whatever their function, they were evidently either valued rather highly or they were used to fashion something that was regarded as important and necessary to support the cultural system during the period reflected by Stage II in Mound C.

Smoothed and polished pebbles are not infrequent in artifact collections from other Caddoan sites. In Louisiana, they occurred at the Gahagan Site (Webb and Dodd, 1939) and Mounds Plantation (Webb, personal communication). Inspection of several east Texas collections housed at the Texas Archeological Research Laboratory also revealed several occurrences of polished pebbles in graves. At the H. R. Taylor Site in Harrison County, for example, polished pebbles or "smoothing stones" were found in five graves; these artifacts were accompanied by ceramics, pipes, celts, "paint stones", arrow points, and abrading stones in one grave; a celt, a quiver of fourteen arrow points, and ceramics in another, ceramics, arrow points, and hone in a third; ceramics and flint chips in the fourth, and ceramics only in the fifth grave. At the J. E. Galt Site in Franklin County, Burial 1 was interred with three celts, two grinding stones, one smoothing stone, and ceramics.

These burial examples are sufficient to illustrate the point that smoothing stones are often found in association with artifacts generally considered as male-linked. Either we are wrong in assuming that celts, arrow points and pipes are male-linked objects, or that

A



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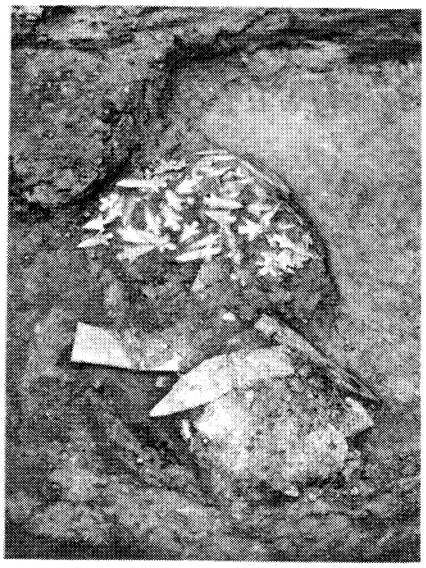


C

Figure 26. A, Fea. 134, Stage I burial. B, Fea. 134, Concentration 3. C, Fea. 134, Concentration 2.

smoothing stones were used for other purposes besides smoothing pottery; perhaps pottery was made by both sexes. There are other possibilities too, such as those regarding ownership, but it is needless to speculate further.

Battered and Polished Stones

Artifacts described under this heading cluster in two markedly different groups; quartzite pebbles and quartz crystals.

Quartzite Pebbles (N = 4; Fig. 25, K, L)

Description: These are stream worn pebbles of quartzite with battered ends and striated surfaces; most appear to have been battered after the surfaces were smoothed and striated, but it is not possible to ascertain this in every case.

L: 44 to 61 mm.; W: 36 to 43 mm.; T: 29 to 34 mm.

Modified Quartz Crystals (N = 9; Fig. 25, M-O)

Description: These are clear quartz crystals evidencing varying degrees of alteration. Most bear moderate to extensive smoothing on the angles leading to the apex and on the point itself. Some are also altered by either chipping or battering, but the most frequent and extensive edge or angle modification is abrasion. The abrasion is not smoothed or polished; it is more edge blunting.

L: 26 to 96 mm.; W: 10 to 42 mm.; T: 6.5 to 26 mm.

Discussion: Krieger (Newell and Krieger, 1949: 160) states that none of these stones revealed evidences of modification. Only six of

the nine stones forming the original sample from Newell's excavation were available for study, all evidence moderate to extensive alteration on facet junctures and on the apex. Microscopic and visual analysis also shows battering or chipping on the apex of each specimen.

Lateral and oblique angles of each apex shows dulling. The dulling is not identical on every angle of each specimen, suggesting that this feature is not caused by stream wear or even handling. The direct impact battering of the apex and the corresponding battering of the base suggests the possibility that these were used as chisels.

Battered Stone Tools

These specimens are divided into three descriptive groups: those of Group 1 artifacts exhibit batter marks over much of their ends and edges and sometimes on the surfaces as well; the battered areas on the Group 2 specimens are restricted to the ends and conform to a specific pattern of wear; Group 3 specimens exhibit areas of battering on surfaces and are classified as anvils.

Group 1 (N = 38; Fig. 25, P, Q)

Description: These are mostly oval or rounded stream worn quartzite or, less often, flint pebbles and small cobbles exhibiting battered ends. Three are recycled celt poll fragments (Fig. 25, P), and one may be a much altered celt fragment. These four are of nonlocal minerals. One is of silicified wood. Battering is severe in many examples and percussor or impact marks are definite, indicating contact with rigid, presumably stone materials. Group 1 artifacts probably

functioned as hammerstones and/or pecking stones.

L: 32 to 75 mm.; mean, 53.7; W: 27 to 56 mm.; mean, 40.6; T: 21 to 43 mm.; mean, 31.0.

Group 2 (N = 4; Fig. 25, P, Q)

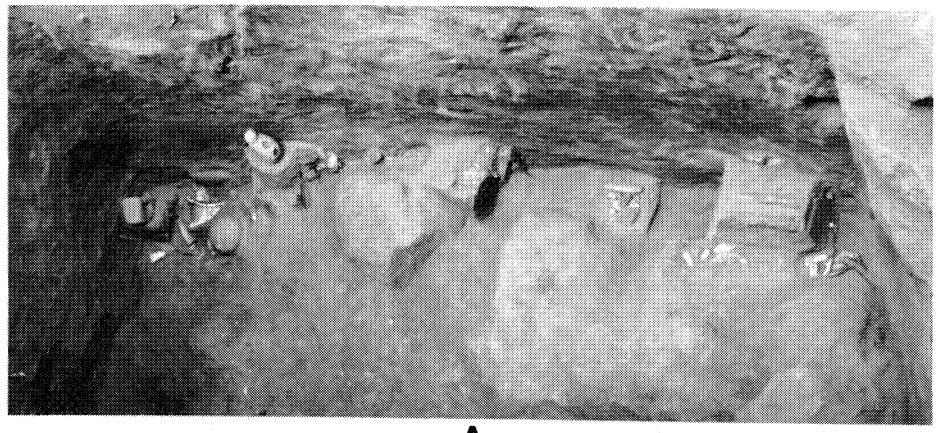
Description: These oval stream worn quartzite cobbles have a curious pattern of battering at each end, but exhibit a band virtually free of batter marks around their circumferences. The battering is patterned in such a way as to indicate that the stones were never rotated; the ends exhibit tapered, battered edges that converge to a battered, convex end. The most likely explanation for the unique wear pattern is that these specimens were hafted. The materials against which they were used was apparently not hard like the other battered stones but was relatively soft.

L: 45 to 72 mm.; W: 40 to 48 mm.; T: 34 to 39 mm.

Group 3, Anvils (N = 2; Fig. 25, T, U)

Description: These are specimens with approximately flat surfaces that evidence areas of peck and batter marks indicative of their use as anvils. These altered areas are not pits (although it is conceivable that they are incipient pits). One specimen is a long quartzite cobble exhibiting three areas of peck marks and also a lightly battered end (Fig. 25, T). The other specimen is a recycled celt poll fragment of nonlocal indurated gray-green sandstone (Fig. 25, U).

L: 81 (recycled celt) and 127 mm.; W: 57 mm. (both); T: 37 and 52 mm.



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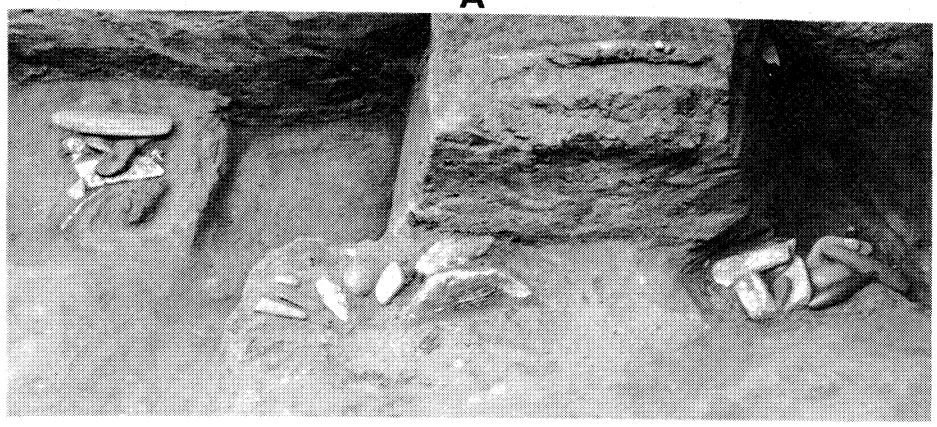

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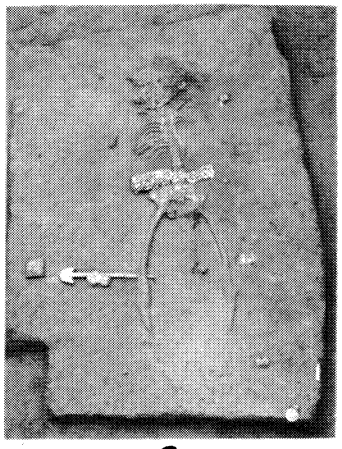

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D

Figure 27. A, north wall offerings, Fea. 119, Stage II burial. B, Concentration 5, 6, and 7 in first layer offerings in Fea. 119. C, Fea. 118, Stage IV burial. D, "cache", Group 4, subgroup 1 bifaces from Newell's excavation.

Pitted Stones (Fig. 25, X, Y)

Pitted stones are of three kinds of material, ferruginous sandstone (the most common), hematite, and Catahoula sandstone.

Ferruginous Sandstone

Pitted stones in this category are subdivided into two descriptive groups, unshaped and shaped.

Unshaped Ferruginous Sandstone Pitted Stones (N = 37; Fig. 25, X)

Description: These ferruginous sandstone cobbles exhibit one or more small pitted areas, most of which are between 20 and 30 mm. in diameter and less than 5 mm. deep. Only one pit is present on thirteen examples; nineteen exhibit pits on both faces; five evince multiple pits (up to 6). Most are angular slab fragments but two are fragments of grinding slabs (i.e., a segment of a grinding surface occurs on one face and this has been pecked into). Pecking appears to be the technique or motion which produced these artifacts since the surface of the pits is roughened.

Maximum dimension of cobbles: 72 to 187 mm.; T: 18 to 87 mm.

Shaped Ferruginous Sandstone Pitted Stones (N = 25; Fig. 25, Y)

Description: These artifacts are shaped to varying degrees, some by pecking and others by chipping or battering. The specimens are characterized by a faceted surface bearing a shallow circular pit; pit size varies from 20 to 30 mm. across and rarely exceeds 3 mm. in depth. Five have the faceted-pitted surface on one face and a faceted surface

on the opposite face. Sixteen have faceted-pitted surfaces on one face and no significant alteration on the opposite face. Four have pits and facets on both faces.

Pit surfaces are usually roughened irregular in plan, and were evidently the product of pecking; one, however, is rather smoothed.

Maximum dimension of cobbles: 72 to 123 mm.; T: 33 to 75 mm.

Catahoula Sandstone Pitted Stone (N = 1)

Description: This artifact is a small cobble-size piece of Catahoula sandstone with a trace of a faceted edge on one surface and a shallow oval pit about 25 mm. across and about 2 mm. deep on the opposite face. The pit is smoothed, but not pecked and is semicircular in plan.

Maximum dimension of cobble: 75 mm.; T: 46 mm.

Hematite Pitted Stone (N = 1)

Description: This oval cobble is shaped by battering and abrasion; both surfaces are smoothed and both have shallow pits 25 to 30 mm. in diameter and approximately 3 mm. deep. The pits are semicircular in plan. The stone has a hard, metallic-like crust and a soft ochre-like interior.

Maximum dimension: 82 mm.; T: 38 mm.

<u>Adze Blade</u> (N = 1; Fig. 23, I)

Description: This specimen is a naturally crescent-shaped tabular piece of hematite, possibly of local origin. The slightly concave edge evidences a bevel produced by wear; striations are

perpendicular to the edge and occur mainly on one face; the very edge is polished slightly. A few tiny nick flakes were removed from along the striated and polished edge. The wear pattern is almost identical to that of the adze described in Part 1. The specimen described here was also recovered from Fea. 119.

L: 72 mm.; W: 36 mm.; T: 12 mm.

Miscellaneous Artifacts

Ferruginous Sandstone Block (N = 1)

Description: This unusual large rectangular block of sandstone was recovered from near one of the large post molds in Fea. 134. The specimen has been partly shaped by pecking and one surface is smooth, as are the edges, but not polished. The specimen appears to represent a natural subrectangular block of sandstone which was further shaped by pecking.

L: 166 mm.; W: 98 mm.; T: 59 mm.

Discussion: The shape and relative mass size seem to suggest that the specimen served as an anvil, but there are no traces of battering or cut marks. However, such a tool would be suitable for an anvil in working relatively soft materials such as copper, wood, or leather.

Grooved Ferruginous Sandstone Nodules (N = 2)

Description: These specimens are described by Krieger (Newell and Krieger, 1949: 153) as follows:

> Two oblong pebbles of brown ferruginous sandstone bear shallow encircling grooves at right angles to the long axis. They may be regarded as hammerstones grooved for hafting or as club heads.

There is no clear evidence that either suffered battering on the ends.

L: 54 and 68 mm.; W: 35 and 41 mm.; T: 32 and 9 mm.

Discussion: One is illustrated by Newell and Krieger (1949: Fig. 54, J).

Miscellaneous Ferruginous Sandstone Artifacts (N = 43)

Description: These specimens exhibit some form of smoothing, faceting, shaping, or pecking, but are fragmentary. They could be fragments of pitted stones, milling stones, or other abrading tools. Some are thin tabular fragments (10 to 20 mm. thick) and others are angular fragments. Altered concretion fragments are also represented.

Maximum dimension varies from 34 to 123 mm.

Miscellaneous Hematite Artifacts (N = 2; Fig. 23, P)

Description: One specimen may be an axe-like tool (Fig. 23, P). It is an oval, tabular piece of hematite with opposed convex and opposed notched edges. The notched edges are created by abrasion; the convex edges are bifacially chipped and battered. It has a hard, outer cortex and a soft, inner core which is ochre-like. The indented or notched edges probably facilitated hafting.

The second specimen is also a D-shaped tabular segment of hematite; one edge is formed by an old break. Multidirectional striations occur on both faces. The artifact may have been used as an abrading stone. Edges are partly dulled by battering and one flake has been removed from one edge.

First specimen: L: 81 mm.; W: (at notches) 64 mm.; T: 20 mm. Second specimen: L: 72 mm.; W: 69 mm.; T: 18 mm.

Summary

The artifacts that were shaped by abrasion, pecking, and battering were divided into two groups based on the manner by which they were formed. The first group, described in Part 1 were shaped to conform to some preconceived form (such as effigy pipe, earspool, discoidal, boat-shaped stone, plummet, celt and adze). All classes (and most of the specimens in each class in most cases) are represented by specimens of nonlocal materials, were manufactured elsewhere, and without exception were interred as furniture in Mound C burials.

The artifacts described in Part 2 were shaped through use and their form is regarded as being mostly fortuitous. For instance, the abrading stones were used in several tasks which resulted in different kinds of wear patterns (such as longitudinal grooves, beveled edges, and faceted surfaces). While most of the artifacts described in Part 2 are of local stones, most of the abrading stones are not; they are of Catahoula sandstone which is available in the east Texas region but not in local outcrops. The largest artifact class in Part 2 was the ubiquitous ferruginous sandstone pitted stones which are so common throughout east Texas. Since these items are found in Archaic as well as Caddoan and other post-Archaic assemblages, they probably reflect a basic technological adaptation to (1) the locally available raw material and (2) deciduous forest products. It has also been suggested

that they were used as anvils for bipolar flaking (Honea 1965); this function could apply to the post-Archaic assemblages characterized by Process III reduction.

Table 4. Distribution of Abraded, Battered, and Polished Stone Artifacts.

	Provenience Unknown	Surface E.*	WPA	Unit 15	Unit 12	Unit 11	Unit 6	Unit 14	Unit 4
PART 1									
Effigy Pipes	-	-	-	-	-	-	-	-	-
Earspools									
Plain	-	-	-	-	-	-	-	-	-
Modified, Plain	-	-	-	1	-	-	-	-	-
Decorated	-	-	2	-	-	-	-	-	-
Unfinished	-	-	-	-	-	-	-	-	-
Plain Fragments	-	-	7	1	-	-	-	-	-
Boat-Shaped Stones	-	-	-	-	-	-	-	-	-
Plummet	-	-	-	-	-	-	-	-	-
Discoidal	-	-	-	-	-	-	-	-	-
Celts									
Petaloid									
Large	-	-	-	-	-	-	-	-	-
Medium	-	-	-	-	-	-	-	-	-
Small	-	-	-	-	-	-	-	-	-
Celt Frag.	-	2	11	-	-	-	-	-	-
Debitage	-	-	23	-	-	1	-	1	-
Spatulate	-	-	-	-	-	-	-	-	-
Adze Blade	-	-	-	-	-	-	-	-	-
Stone Bowl Frag.	-	-	1	-	-	-	-	-	-
Carved Human Head	-	-	1	-	-	-	-	-	-
Misc. Carved Stone	-	-	1	-	-	-	-	-	-
PART 2									
Abrading Stones									
Tabular									
Catahoula ss.	-	-	18	2	-	-	-	-	-
Ferruginous ss.									
Group 1	-	1	5	-	-	-	-	-	-
Group 2	-	-	-	1	-	3	-	-	-

*Surface east of Highway 21.

Unit 13	Unit 9	3, 7, 8 (Md. B)	Unit 10	Unit 16	Unit 1	Surface W.*	Unit 2 (Md. C)	Fea. 134	Fea. 119	Fea. 155	Fea. 161	Fea. 118	Fea. 107	Fea. 106	Total
-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	4
-	-	-	-	-	-	-	-	-	2	2	2	2	-	-	8
-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	3
-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	4
-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	3
-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
-	-	-	-	-	-	-	-	7	2	-	-	-	-	-	9
-	-	-	-	-	-	-	-	1	1	-	1	-	-	-	3
-	-	1	-	-	-	-	-	2	2	1	-	-	1	1	8
-	-	2	-	-	-	1	-	-	-	-	-	-	-	-	16
-	-	1	1	-	-	2	1	-	-	-	-	-	-	-	30
-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	2
-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	2	1	4	4	-	1	-	-	28	1	-	-	-	-	61
-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	8
-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	5

*Surface west of Highway 21.

Table 4, continued

	Provenience Unknown	Surface E.	WPA	Unit 15	Unit 12	Unit 11	Unit 6	Unit 14	Unit 4
Milling Stones									
Quartzite	-	1	5	2	-	-	-	-	-
Ferruginous ss.	-	1	10	-	-	1	-	1	-
Grinding Slabs									
Ferruginous ss.	-	2	6	1	-	1	-	1	-
Catahoula ss.	-	-	6	-	-	-	-	-	-
Polished Stones	-	3	4	3	-	3	1	-	-
Battered and Polished									
Quartzite	-	1	3	-	-	-	-	-	-
Quartz Crystals	-	-	6	2	-	-	-	-	-
Battered									
Group 1	-	8	15	3	-	1	-	-	1
Group 2	-	1	3	-	-	-	-	-	-
Group 3	-	-	-	-	-	-	-	-	-
Pitted Stones									
Ferruginous ss.									
Unshaped	2	3	19	1	-	-	-	1	-
Shaped	-	5	6	1	-	-	-	-	-
Catahoula ss.	-	-	1	-	-	-	-	-	-
Hematite	-	-	1	-	-	-	-	-	-
Adze Blade	-	-	-	-	-	-	-	-	-
Misc. Artifacts									
Ferruginous ss. Block	-	-	-	-	-	-	-	-	-
Grooved Ferruginous ss. Nodules	-	-	2	-	-	-	-	-	-
Misc. Ferruginous ss. Artifacts	-	-	2	5	1	2	-	2	2
Misc. Hematite Artifacts	-	-	1	-	-	1	-	-	-
Totals	2	28	159	23	1	13	1	6	3

Unit 13	Unit 9	3, 7, 8 (Md. B)	Unit 10	Unit 16	Unit 1	Surface W.	Unit 2 (Md. C)	Fea. 134	Fea. 119	Fea. 155	Fea. 161	Fea. 118	Fea. 107	Fea. 106	Total
-	1	1	-	1	-	3	-	-	-	-	-	-	-	-	14
-	1	1	5	2	-	4	1	-	-	-	-	-	-	-	27
-	-	-	-	1	-	2	-	-	-	-	-	-	-	-	14
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
-	-	-	2	-	-	7	-	-	9	1	-	-	-	-	33
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	9
-	1	-	4	-	-	2	-	-	3	-	-	-	-	-	38
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	2
-	-	1	4	1	-	4	1	-	-	-	-	-	-	-	37
1	-	-	3	1	1	6	1	-	-	-	-	-	-	-	25
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
-	3	3	10	2	1	10	-	-	-	-	-	-	-	-	43
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
1	9	11	34	14	3	43	4	18	56	6	4	3	1	1	444

CHAPTER 9

Synthesis

As stated in Chapter 2, a major objective of this study is to present a full description and a structural-functional interpretation of the lithic technology of the Davis Site Caddoan cultural system.

LITHIC TECHNOLOGY COMPONENT

The methodology used to describe the Davis Site lithic technology was both diachronic and synchronic. It was necessary to isolate the Davis Site Caddoan assemblage in order to determine which techniques and strategies were characteristic of the Caddoan stoneworkers. In an attempt to discern differences, a comparison was made between a pre-Caddoan chipped stone lithic collection from southeast Texas and a sample from the western portion of the Davis Site which was from a nearly pure Caddoan context. Major differences were observed in the end products and separate strategies of reduction were hypothesized. In essence, the late Archaic flintknappers selected a very large pebble or a small cobble from local deposits and shaped it into a specific tool form such as a dart point. Pebbles were either of flint, fine-grained quartzite, or silicified wood. Archaic stoneworkers seemed to prefer flatter pebbles irregardless of material. By contrast, Caddoan flintknappers selected pebbles and small cobbles of flint, fine-grained quartzite, or silicified

wood from local deposits and imported small cobbles and pebbles of flint and small nodules of Manning fused glass. The local and nonlocal materials were reduced by hard-hammer percussion techniques into flake blanks; these flake blanks were either used as tools without further modification or were shaped into tools such as arrow points and awls by pressure. Flint was the preferred material for most chipped stone tools irrespective of nodule shape.

The above examples are presented to emphasize differences; this is not to say that similarities between the assemblages do not exist. For instance, abrading tools, anvils, battered stones, and flake cutting tools probably belong to both the Archaic and Caddoan assemblages.

The qualitative differences between the Archaic and Caddoan assemblages were sufficient to isolate the latter for analysis. A light pre-Caddoan lithic assemblage is present at the Davis Site, and products of this component can be recognized on the basis of form and technology. For example, contracting stem dart points and certain bifaces (dart point failures among others) are among the products.

The description of the lithic assemblages proceeded through the steps outlined in Chapter 2. These are: (1) identification of lithic materials that served as raw material resources; (2) descriptions of the methods of stone reduction; (3) reconstructing strategies of reduction; and (4) analysis of finished artifacts. Summaries of the findings of these analytical steps are presented below:

1. Identification of lithic materials that served as raw materials. Descriptions of locally occurring stones were necessary in order to identify both local and nonlocal resources. Stones occurring in

geological deposits in the immediate vicinity of the Davis Site are cobbles and larger masses of hematite, limonite, ferruginous sandstone, and coarse-grained quartzite. Stones occurring only in pebble and small cobble size nodules are flint, fine-grained quartzite, silicified wood, chalky rock, and possibly basanite.

An inspection of the debitage and artifact sample revealed which local stones served as resources for artifacts. These resources include hematite (rare), ferruginous sandstone, coarse-grained quartzite (uncommon), flint, fine-grained quartzite, and silicified wood. Nonlocal stones represented in the debitage sample and which were reduced on the site by chipping were flint, Manning fused glass, and a pink siltstone or tuff (rare); Catahoula sandstone was reduced by abrasion. Certain artifacts of nonlocal materials were also recycled on the site such as celts and a quartz crystal.

2. Descriptions of the methods of stone reduction. The techniques of stone reduction recognized in the debitage and artifact sample include chipping, polishing, pecking, abrading, and battering. Furthermore, chipping was accomplished by several techniques. The techniques of chipping recognized in the sample are hard-hammer percussion (including both free-hand and bipolar), pressure, and soft-hammer percussion. A major proportion of the debitage could not be confidently sorted by technique, but it is felt that the identifiable sample is sufficiently large to serve as a basis for inferring major reduction characteristics of the Caddoan assemblage. It is likely that a small sample of pre-Caddoan debitage was included in the tabulation but in view of the small amount of artifacts present in the collection that can be attributed to

the pre-Caddoan assemblage, the amount of debitage is probably insufficient to alter the trends recognized.

The techniques used in reducing lithic resources on the site varied according to the size and character (e.g., silicious or granular) of the stone. Most silicious stones such as flint, fine-grained quartzite, coarse-grained quartzite, Manning fused glass, and silicified wood, were reduced by chipping. Stones reduced on the site by abrasion include ferruginous sandstone, Catahoula sandstone, coarse-grained quartzite, and possibly hematite (rare). Pebbles of local flint, quartzite, and silicified wood (rare) were also slightly modified by polishing. Battering from use resulted in the fortuitous reduction of flint, quartzite, and silicified wood pebbles and small cobbles. Nonlocal stones such as recycled celt fragments and quartz crystals were occasionally reduced by this technique through use.

Reduction of local materials by pecking was restricted to shaping coarse-grained quartzite cobbles and exfoliated cobbles of ferruginous sandstone into abrading tools such as milling stones, pitted stones, and grinding slabs.

3. Reconstructing the strategies of stone reduction. Linear reduction models were used in a processual classification of all chipped stone materials. Three models were proposed which were termed <u>processes</u>. Process I is characterized by the reduction or shaping nodules through use and is largely a fortuitous and unconscious behavior. Process II, on the other hand, is a conscious strategy whereby the nodule is shaped into a tool form. Process III is characterized by reducing a mass into small flakes or spalls; tool blanks were selected from the flakes and

spalls.

Debitage from all major material categories, flint, fine-grained and coarse-grained quartzite, silicified wood, and Manning fused glass were sorted on the basis of the linear reduction models. Process II was demonstrable only in the fine-grained quartzite and silicified wood samples; Process III, which is seen as characterizing the Caddoan reduction strategies for silicious stones, was demonstrable in the flint, fine-grained and coarse-grained quartzite, silicified wood, and Manning fused glass samples.

The frequency with which specific techniques of reduction were used also varies with material class. For example, Manning fused glass was reduced mostly by the bipolar technique. The bipolar technique was also used to reduce flint nodules but hard-hammer free-hand percussion clearly predominated. Likewise, hard-hammer free-hand percussion was the principal technique of reducing the quartzites and silicified wood.

4. Analysis of the finished artifacts. Comparing the finished artifacts and tools with the debitage findings provides both insight into the total range of stone artifact manufacturing carried out at the site and for a more confident identification of artifacts not made at the site. This is particularly important because with these data the degree of specialization within the lithic technological component can be determined. This subject is elaborated on below, but a listing of those artifacts produced on the site and their techniques and strategies of manufacture are listed first followed by a discussion of their intrasite distribution and their function in the technological subsystem.

Artifacts Produced on the Site

Artifacts of local material which were reduced following the Process I model include ferruginous sandstone pitted stones (unshaped), abrading stones (hones and possibly saws), milling stones, and possibly grinding slabs. Certain coarse-grained quartzite milling stones, battered stones and polished stones of quartzite, flint, and silicified wood were also shaped fortuitously through use.

Artifacts manufactured of local materials following the Process II model are shaped by chipping, pecking, and abrading. The chipped stone artifacts are exclusively bifaces of flint, fine-grained and coarse-grained quartzite, silicified wood, and ferruginous sandstone. The flint, quartzite, and silicified wood examples are primarily dart points or dart point failures; as noted earlier, their manufacture is not regarded as being a part of the Caddoan technology. Other small bifaces lacking stems or indications of stems were shaped following this strategy, but they are uncommon.

Shaped pitted stones, milling stones, and possibly certain grinding slabs of ferruginous sandstone were shaped by Process II strategy by pecking possibly combined with abrading. Certain coarse-grained quartzite milling stones were also shaped following this procedure. Abrasion was used to shape two artifacts of hematite (a partly grooved axe? and a pitted stone) but these items are not demonstrably part of the Caddoan assemblage. This strategy was evidently also used to shape nonlocal stones brought to the site; for example, Catahoula sandstone abrading stones and broken celts which were reduced by chipping

during the process of recycling.

The dominant strategy followed in the reduction of silicious materials on the site was clearly Process III. Further reduction of the flakes or spalls was either through use or by pressure. Predominant tools manufactured from the flakes and spalls were arrow points and small awls. The most common silicious stone tool, however, was a sharp edge flake or spall.

Lithic Artifacts not Produced on the Site

The following lithic artifacts are interpreted as being imported in finished form: effigy pipes, boat-shaped stones, a plummet, a discoidal, large flint and novaculite bifaces, certain small flint bifaces, certain flint dart points, an adze blade, certain flint arrow points (particularly Hayes), possibly a stone bowl, and most, if not all, stone earspools. The interpretation that these artifacts were not made at the site is based on the absence of like materials in local geologic deposits and the absence of debitage at the site relating to their manufacture. Admittedly, nearly all of the debitage in the collection is from Story's excavation in the western portion of the site. Since failures which could be protoforms of most of the artifacts mentioned above were not in Newell's sample from around Mound A, it is assumed that they were not encountered. This assumption is based on the fact that debitage from celt recycling was collected by Newell.

Quartz crystals were also imported but they of course do not represent manufactured artifacts.

Intrasite Distribution of Artifacts

The distribution of lithic artifacts provides information regarding intrasite variation, social distinctiveness, and in certain instances, technological functions.

Lithic artifacts included as burial furniture in Mound C constitute an interesting assemblage not altogether distinctive from the assemblage recovered from the eastern portion of the village. The burial specimens also reveal the social distinctiveness of certain kinds of artifacts. Items interred with burials include: arrow points of nonlocal flint (predominantly of the Alba type), Gahagan bifaces (several fragments of which were deliberately smashed in Fea. 119), huge flint and novaculite bifaces, recycled large patinated bifaces (one deliberately smashed), one Group 4 biface, nonlocal flint cores and flakes (some of which were modified), a unifacial artifact of nonlocal flint, effigy pipes, earspools, boat-shaped stones, plummet, discoidal, celts (including both petaloid and spatulate forms), adze blades, Catahoula sandstone abrading stones, polished stones, battered stones, and a large ferruginous sandstone block.

Several of the items in the above list were also found in village context, but the distribution of certain classes within the village was restricted. For example, Gahagan bifaces and fragments of stone earspools were recovered only from the eastern portion of the site - that is, Mound A and Unit 15 which Story (1972: 96) refers to as the Inner Village. Petaloid celt fragments were found in both the eastern and western areas but their distribution is restricted to the Inner Village

in the eastern area and to Mound B in the western portion. Other classes which occurred in burial context, however, show a more random distribution in both the eastern and western village areas. These are: arrow points of nonlocal flint (predominantly Alba), Group 4 bifaces, unifacial artifacts of nonlocal flint, Catahoula sandstone abrading stones, polished stones and battered stones of flint and quartzite, cores and flakes of nonlocal flint (many of which have modified edges).

Artifacts of nonlocal material which probably were not made at the site are almost exclusively associated with the Mound A area. These items include the Gahagan bifaces and stone earspool fragments mentioned above plus large quartz crystals. Celt fragments are more frequent in the Mound A area than in the Mound B area but this may be due, in part, to sampling error. Other items of nonlocal material noticeably restricted to the Mound A area are parallel, expanding, certain contracting, and stemless dart points of nonlocal flint, a stone bowl fragment, a carved human head of kaolinite (?), a Catahoula sandstone pitted stone, and Catahoula sandstone grinding slab fragments. It was shown that flint arrow points were more frequent in proportion to quartzite and silicified wood and the mean length of arrow points were longer in the Mound A area than in the western section of the site.

Judging from the artifacts interred in the burials, nonlocal materials were evidently valued over local stones. For instance, as burial furniture arrow points of nonlocal flint were selected over those of other stones. Catahoula sandstone abrading stones were included whereas ferruginous sandstone abrading stones were not. Nonlocal pebbles which were polished were evidently favored over those from local deposits

although the writer is less confident about the origin of these items.

Chronology

The temporal span of the Davis Site Caddoan occupation extended from the eighth to the fourteenth century based on the radiocarbon data reported by Story (1972: 55, 77, and 94). She regards the Stage II addition to Mound C as possibly representing the climax in the mortuary behavior (ibid.: 60) and hypothesizes that this stage in Mound C correlated with the first flat-topped mound addition to A. Stage II burials certainly yielded the largest variety of mortuary goods, especially those regarded as being items brought in through an exchange network.

The distribution of artifacts in the Mound C burial sequence also provides some basis for inferring changes within certain aspects of the lithic assemblage. For example, artifacts which are represented in each of the first four stages in Mound C include Gahagan bifaces, stone earspools, arrow points of nonlocal materials, and petaloid celts. Of these, only celts occur in Stage V burials (e.g., Fea. 106 and 107).

On the basis of lithic artifact distribution, Mound C Stages I-IV are correlated here with Mound A and Stages V and VI with Mound B. This interpretation is based on the occurrence of celt fragments around both platform mounds; celts occur in the first five Mound C stages. Earspools and Gahagan bifaces on the other hand, occur only in the first four Mound C stages. These items, as noted above, are restricted to the village immediately surrounding Mound A.

The intrasite variation in the distribution of intrusive artifacts is interpreted as reflecting temporal change in the lithic

assemblage rather than being the result of social variation within the settlement.

Assuming that the differences between Mound A and Mound B are due to temporal changes, the decrease in the kinds of nonlocal materials entering the system is striking. Furthermore, there is some hint that most of the nonlocal materials which continued to be imported throughout the duration of occupation decreased in the amount. For example, petaloid celts decreased in frequency (and in size) in Mound C burials through time and petaloid celt fragments are less frequent in the western portion of the village. Catahoula sandstone artifacts, which occur throughout the village, were found only in Stage II burials, Fea. 119 and Fea. 155. A Catahoula sandstone pitted stone and grinding slab fragments occurred only in the Mound A area, but this could be due to sampling error. Interestingly, Manning fused glass, a nonlocal material, never shows up in burials but it is found throughout the village.

It has been shown that the first four stages in Mound C yielded artifacts which were duplicated in kind in the Mound A area. It was also noted that the Mound B area may be later and could represent a decline in the cultural system. These findings support Story's (1972: 79) hypothesis that Inner Precinct A in the eastern village area was the earliest village nucleus at the site.

Structural-Functional Interpretation

There is one outstanding feature apparent in the lithic assemblage produced on the site using local and imported raw materials. This feature is that almost without exception the tools were used primarily

in coping directly with the physical environment. The possible exceptions could be certain earspools of micaceous ferruginous sandstone (possibly of local origin) and pink siltstone or tuff (a material possibly imported from the south). Arrow points were used as weapons for hunting (and possibly for warfare); awls were used for boring soft materials; pitted stones served as anvils in the process of breaking up hard case seeds and possibly pebbles. Shaping hard and soft materials such as stone, bone, shell, and wood by abrasion was accomplished using tabular pieces of sandstone. Milling stones and grinding slabs were among the tools used in pulverizing food stuffs and pigments. Sharp-edged flakes and spalls served a multitude of cutting functions.

This assemblage of artifacts is found throughout the village and there is no hint that significant changes took place through time even in the formal tool categories such as Alba arrow points and awls. It should be stated, however, that chronological data are lacking on this assemblage in the village area.

It is hypothesized that the manufacturers of the above items were semispecialists at best; put another way, lithic technology specialists were not residing at the Davis Site. Any juvenile or adult in the society could probably produce a functional tool in any of the classes mentioned above. Although arrow point makers and the individuals who made extensive use of the sandstone hones and saws could have been semispecialists (i.e., recognized among the members of the community as possessing exceptional skills). The absence of debitage resulting from the repeated production of specialized tools or artifacts lends credence to the hypothesis that lithic specialists

were not part of the community.

The absence of manufacturing specialists and specialized lithic tools at the Davis Site is paralleled by the apparent absence of specialized lithic tool kits.

A specialized woodworking tool assemblage might be expected with the location of the site in a forested region, but such an assemblage is not demonstrable. Specialized tools which could have served woodworking tasks are rare. Celts, possible adzes, and perhaps certain bipolar cores and modified flakes might be regarded as part of a woodworking tool assemblage. There are other lithic tools which could hypothetically be included here as well, for example sandstone saws, and abrading tools, Group 7 flint unifaces, a Group 2 quartzite uniface, and Group 5 subgroup 2 flint bifaces. Wear patterns, while present on many of the tools, indicate motor habits but do not conclusively show what was being cut or abraded. Wear patterns on the above mentioned tools are indicative of use against relatively hard, but not stone materials. Some of the celts were used to perform cutting tasks as indicated by bit striations. Presumably they were used to cut wood; Swanton (1946: 544, 545) notes several vague references to the uses of stone axes to cut wood among certain Southeastern Indian groups.

That corn agriculture formed a significant part of the subsistence technology is demonstrable by both Newell's and Story's findings (see the discussion by Volney Jones in Newell and Krieger, 1949; Story, 1972: 90, 92). A search for lithic tools which could be indicative of this technology was fruitless. Stone hoes are absent. We must assume that tilling implements were either wood, bone, or shell tipped. Wooden

digging tools are favored because of the digging stick marks which were sometimes preserved in Mound C burial pit walls (Story, 1972: 32); Swanton (1942: 156) notes that historic Hasinai used seasoned walnut for hoes. Swanton (ibid.) also notes that wooden mortars and pestles were used in the reduction of corn into flour. In essence, there were no lithic artifacts which could be related directly to the agricultural technology. Milling stones and grinding slabs could have served to pulverize corn but, by themselves, they are not considered diagnostic because these items occur in assemblages in neighboring regions which are considered to be Archaic (cf. McClurkan, 1967: 125, 128; Shafer, 1968: 74).

The noticeable feature about the items which were introduced in finished form is that many of them occurred in a context denoting social distinctiveness; their presence at the site also reflects participation in a relatively far reaching interaction network.

Contrasting with locally made stone artifacts, the manufacture of large flint and novaculite bifaces and possibly earspools, pipes, boat-shaped stones, plummet, and discoidal, suggests that the craftsman were specialists or at least semispecialists. The technology manifested on these items is also in marked contrast to that seen on the locally made artifacts.

What was the function of the nonsecular items? It is proposed that their general function was to structure social behavior in order to maintain social cohesiveness. Lithic items of dress symbolic of status include earspools, a possible flint sword, spatulate celts, certain petaloid celts, and Gahagan knives. These could be part of a

complex of objects kept to be worn or carried during certain social occasions. This is merely a suggestion based on the contents of historic Caddoan temples reported in Swanton (1942: 215, 216). He reports among other things, such items as stone and wooden idols, wooden effigy bowls, feathers, and a feather headdress. The heavy stone earspools, conch shell belts, conch shell beads, pearl beaded headbands and chokers, stone sword, and possibly the spatulate celts reported by Story (1972) from Mound C burials are offered as possible items belonging to "uniforms" marking social status. Likewise, the stone effigy pipes, boat-shaped stones, plummet, discoidal, large, patinated flint bifaces, novaculite biface, could be among items retained in special activity areas such as temples; their inclusion in the burials could be due to activities associated with the cyclic renewal events suggested by Story (1972: 59).

Social Organization

The above findings which suggest that lithic specialists were not residing at the Davis Site are important since they provide information regarding the structure of the cultural system. The presence of specialists would indicate that the society was structured on the level approaching that of a chiefdom as defined by Service (1972: 133-143). The presence of mounds at the site indicates that it served as a social and religious center which is one of Service's chiefdom characteristics. There are two factors, however, that suggest that the Davis Site was not the nucleus of a chiefdom. One is the average population estimate of one hundred and forty-seven to two hundred and

eighty-seven persons by Jack Keller (Story, 1972: 94); this estimate is based on the house size and allowing 10 square meters of enclosed living space per person and is far below the population mode of five thousand to twenty thousand for chiefdoms (Sanders and Marino, 1970: 7). The second factor concerns satellite villages; since the population at the center is small, one might expect that it was supported by satellite settlements. A survey in the Middle Neches area by Kegley (ms.) failed to find such settlements.

Service (1972: 136) notes that reciprocal exchanges of goods between inhabitants of different specialized zones evidently took place on both the band and tribal level of social organization. He sees the amount of exchange and the degree of economic and social significance as important factors which could transform a society to the chiefdom level (ibid.). He notes two variables which affect this amount and significance: (a) the degree of sedentariness and (b) the actual degree of regional differentiation (ibid.).

There is little doubt that the Davis Site Caddoan settlement was a permanent one and supported, at least in part, by corn agriculture. The degree of regional differentiation between the various nucleated settlements or ceremonial centers outside the Middle Neches River area which could be contemporaneous with the Davis Site varies; the writer includes the following sites based mainly on similarity of exotic artifacts recovered from burial context: Gahagan (Moore, 1912; Webb and Dodd, 1939), Mounds Plantation (Clarence H. Webb, personal communication), and Smithport Landing (Webb, 1963) sites in western Louisiana, Crenshaw (Hoffman, 1970) and Haley (Moore, 1912) sites in

southwestern Arkansas, Harlan (Bell, 1972) and Spiro (Brown, 1966) sites in eastern Oklahoma, and the Bentsen-Clark Site (Larry Banks and R. K. Harris, personal communication) in northeast Texas. The Gahagan Site, for example, is in an environment quite similar in some respects to the Davis Site with regards to proximity to potential resources from the coastal plains and mountainous regions of Oklahoma and Arkansas. The Harlan and Spiro sites, on the other hand, in eastern Oklahoma are in areas having different resources compared to the Gahagan and Davis sites. In other words, there is ample room to suggest reciprocal exchanges of goods between inhabitants of different specialized zones; these goods which were coming into the Davis Site were largely nonutilitarian. That is, they were serving nonsecular functions except for Catahoula sandstone abrading stones. Petaloid celts and arrow points of nonlocal flint evidently served both secular and nonsecular functions.

The absence of lithic specialists or specialized lithic tool kits does not preclude the absence of other specialized tool kits. The writer's attempt to recognize evidence for technological specialists who used other raw materials was inconclusive. For example, shell working, if present, appeared to be at a minimum. Bone working cannot be ruled out but a search for a possible bone working industry is hampered by the poor preservation of bone debitage; the same holds true with basketry technology. It is possible that the ceramic technology was specialized to some extent. Certainly great care was taken in decorating the fine-line engraved Holly and Hickory type vessels. Functional analysis of the Davis Site pottery may provide the information

needed to determine the degree of specialization in the ceramic industry. On the basis of the present evidence, indications for technological specialists are either lacking altogether or are inconclusive.

It is suggested that the presence of marked social ranking, the existence of a mound center and nucleated population can also be used as evidence for inferring a social organization more complex than a tribe as defined by Service (1972: 131, 132).

The presence of artifacts which the writer considers as possible products of specialists such as Gahagan bifaces, Group 2 bifaces, earspools, boat-shaped stones, and celts (especially spatulate celts) suggests that the interaction sphere of the Davis Site Caddoan populations reached into areas where lithic specialists did exist. This hypothesis can be tested by technological analysis of other sites within and outside the Caddoan area. Morse (1971) for example, has found in certain Middle Mississippian sites specialized lithic tool kits which were used to manufacture conch and freshwater shell artifacts.

In summary, it is proposed that the Davis Site was not the nucleus of a chiefdom despite the fact that it was a mound center. It does not fit the criteria for a tribal settlement either. Service's (1972) classification for social organization was therefore found to be too generalized to be applicable to the Davis Site Caddoan cultural system.

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