LOUISIANA ARCHAEOLOGY

THE HANNA SITE

AN ALTO VILLAGE IN RED RIVER PARISH

BY

PRENTICE MARQUET THOMAS, JR.

L. JANICE CAMPBELL

STEVEN R. AHLER

LOUISIANA ARCHAEOLOGY

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LOUISIANA ARCHAEOLOGY

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Number 5 for 1978

Jon L. Gibson
Editor

THE HANNA SITE: AN ALTO FOCUS VILLAGE IN RED RIVER PARISH, LOUISIANA

by
Prentice Marquet Thomas, Jr.
L. Janice Campbell
Steven R. Ahler

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1980

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The Hanna Site: An Alto Focus
Village in Red River Parish, Louisiana

Prentice Marquet Thomas, Jr.
L. Janice Campbell
Steven R. Ahler

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Louisiana Archaeology, Number 5 for 1978

EDITOR'S PREFACE TO HANNA

This issue of *Louisiana Archaeology* is devoted to a single archaeological site, the Hanna village in Red River Parish, Louisiana. It has always been the intention of this editor to bring to the membership a broad range of topics relevant to Louisiana archaeology, topics of substantive, methodological, philosophical, and theoretical value. The Hanna report excellently treats several of these topical considerations as well as a variety of issues in Caddoan archaeology.

Hanna represents the first large-scale excavation of an archaeological site in Louisiana since the days of federal relief programs. Hanna marks the first intensive investigation of a small Alto Caddoan hamlet since Clarence Webb's work at Smithport Landing on the upland margin of the Red River valley and the only one within the Red River floodplain proper. In terms of novel data, methods, specialist reports, and interpretations, Hanna is the most comprehensive report of a Louisiana Caddoan site since Webb's Belcher memoir. The Hanna report is an excellent case study of how modern archaeology can respond to federal agency cultural resource management responsibilities and at the same time make a strong contribution to the field of archaeology.

Hanna should put to rest once and for all the notion that contract archaeology, often still equated with "salvage" archaeology, must always be different from sound, problem-orientated research. Hanna represent one of the finest federally-sponsored mitigation efforts in the state of Louisiana, and this editor feels fortunate that the Louisiana Archaeological Society is able to bring this important work to its readership.

The Hanna investigation was accomplished under contract DACW29-77-D-023 awarded by the U.S. Army Corps of Engineers, New Orleans District, to New World Research Incorporated of Pollock, Louisiana. The Society would like to extend its appreciation to the Corps of Engineers, particularly

Col. Thomas A. Sands and his staff, for supporting this valuable investigation and for releasing the Hanna report for publication. Col. Sands' letter of transmission is reproduced after this preface.

The original draft of the Hanna report was submitted to the Corps of Engineers in 1977. It was transmitted to the Society for publication in July 1979. It is being published in 1980 as the annual bulletin for 1978.

Jon L. Gibson
Editor, Louisiana Archaeological Society
November 11, 1979

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160

IN REPLY REFER TO
LMNPD-RE

10 April 1979

William G. Haag, Ph.D.
President, Louisiana Archaeological Society
330 Magnolia Woods
Baton Rouge, Louisiana 70808

Dear Dr. Haag:

In recent years there has been a growing realization in our country that archeological and historical sites are scarce nonrenewable resources that are significant in American life and worthy of preservation. With the passage of the National Environmental Policy Act of 1969, Congress implemented an environmental conservation policy that directed Federal agencies to consider the effects of construction on the environment and to implement programs to reduce or eliminate these effects.

In compliance with Public Law 91-190, the National Environmental Policy Act, Public Law 93-291, the Archeological and Historic Preservation Act of 1974, and other requirements, the US Army Corps of Engineers developed regulations providing guidance for the discharge of Corps responsibilities for the identification, preservation and, if necessary, excavation of cultural resources associated with water resources development and other programs. Accordingly, the New Orleans District has initiated a comprehensive program of cultural resources management to insure that cultural resources throughout the district are identified, protected and managed for maximum longevity and public benefit.

The New Orleans District cultural resources staff is responsible for developing regional and discipline wide research strategies while insuring that archeologists under contract to the district provide accurate information and recommendations based on sound scientific evaluation. This information is integrated into the various phases of project planning, design, construction, and operation.

In accordance with the conservation-management philosophy of the district, staff archeologists explore possible ways to preserve significant archeological and historical sites through avoidance or protection. In many cases, it has been possible to make design changes and thus avoid significant sites. Avoidance helps preserve the site for future generations and affords continued opportunities for anthropology to realize its potential contributions to science, the humanities and to society.

Excavations at the Hanna Site were undertaken after it was determined that an engineering design change would not protect the site from lateral erosion by the Red River. Staff archeologists prepared a statement of site significance which resulted in the site being determined eligible for the National Register of Historic Places. The excavation plan, which was coordinated with the Advisory Council on Historic Preservation, was specifically designed to gather data on a wide range of research objectives with particular emphasis on isolating and describing social units and intrasite activity areas. Following initial test excavations,

large scale block excavations were designed to gather specific data on artifact distributions and architectual remains. The intensive intra site excavations and data analysis form a basic building block for developing and testing more abstract settlement models.

In order to insure that the data are available for future use all artifacts, drawings, field notes and photographs were transferred to the Department of Culture, Recreation and Tourism and are currently housed at Northwestern State University in Natchitoches. This information is available to students, scholars, and the general public.

Although the archeological excavations at Hanna represent an irretrievable commitment of the resource base, the work represents a refinement of previous archeology on Red River and provides a more accurate and reliable basis for making future management decisions. Most importantly, the archeological investigations at the Hanna Site reflect a balance between historic values and present needs and documents the successful integration of scientific research within a coordinated cultural resources management program.

It is with great pride that I transmit The Hanna Site: An Alto Focus Village in Red River Parish, Louisiana for publication by the Louisiana Archaeological Society.

Sincerely yours,

THOMAS A. SANDS
Colonel, CE
District Engineer

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Acknowledgements

In the summer of 1977, New World Research Institute conducted excavations at the Hanna site, 16RR4, under contract DACW29-77-D-0203 with the U.S. Army Corps of Engineers, New Orleans District. A special note of thanks is due to Corps personnel, Mr. Thomas M. Ryan, the Corps archaeologist, and Mr. Michael Miller, the contracting officer, without whose cooperation and sense of organization this project would not have been possible. It was a pleasure to work with these gentlemen.

A very special note of thanks goes to Dr. H. F. Gregory of Northwestern Louisiana State University. His consultations regarding the ceramic analysis and comparative site chronology proved invaluable to our understanding of the Hanna site. We are especially pleased to include his contributions to several sections in this report.

No report on Caddoan archaeology would be complete

without due appreciation extended to Dr. Clarence H. Webb. His years of research in northwestern Louisiana provided us with numerous comparative studies on which to base our findings. We would also like to express our gratitude to Dr. Webb for taking the time and having the interest to visit our site during the excavations, and for consulting with Mr. Matthews during the final analysis of the ceramic materials. His contribution to our report, and to Caddoan archaeology in general, cannot be underestimated.

The field portion of the project lasted five weeks, followed by an additional ten weeks of laboratory analysis and report preparation at the Institute research and business offices in New Orleans. During this fifteen-week period, numerous individuals contributed to the successful completion of the investigations and the resulting report. Thomas P. Van Hoy and David High served as field crew chiefs, and their supervision and archaeological expertise assured the smooth running of the field operations. Several advanced archaeology students served as supervisory laborers in the field. These persons, all capable and responsible workers, include Mr. Roger Moore, Mr. Bruce Freyburger, Mr. Jack Bergstrasser, and Mr. Fritz Hamer. The project also employed many individuals from the Natchitoches area, all of whom assisted us well; but several deserve special recognition for their hard work and diligence. Among these persons are Steven Osborne, Thomas Little, Gary Jones, and Kelvin Kerr.

A field laboratory for processing and rough sorting of the artifactual materials was operated concurrently with the five-week excavations. The processing of artifacts was carried out by Ms. June Little and Ms. Melissa Myers, who also assured smooth execution of field analysis by maintaining a constant watch on organization and keeping an extremely accurate accounting of materials brought in from the field each day. Mr. Lawrence E. Montagne was assigned the tedious position

of handling the preliminary sorting of historic artifacts, zooarchaeological remains, osteological materials, and botanical remains. His cautious judgment and meticulous handling of the materials allowed us to organize with ease the shipment of these materials to the respective specialists for final analysis.

Mr. Thomas Oertling was responsible for the preliminary sorting of lithic artifacts in the field laboratory, and joined the Institute in New Orleans to assist with the final analysis. Once the analysis of the lithics was completed, Mr. Oertling took on the job of quantifying the daub and charcoal recovered from the excavations. Mr. Oertling proved to be an excellent worker in all these capacities.

Rough sorting of the ceramic materials was assigned to Mr. James Matthews, whose keen judgment and great interest in Caddoan archaeology resulted in his joining the Institute staff in New Orleans to assist the Principal Investigator in the final analysis of materials. Mr. Matthews and the Principal Investigator spent many additional hours discussing the ceramics and apparent variations. The conclusions reached in this paper represent a tremendous input by Mr. Matthews.

Four permanent Institute staff members, involved in both the field and laboratory analysis, expended a great amount of energy and time to assure the success of this project. Mr. Thomas D. Montagne aided in the supervision of excavations and served as site photographer and cartographer. In New Orleans, Mr. Montagne took on the arduous task of drafting all of the final maps and preparing the photographs for publication. Ms. Abigayle Robbins also assisted in site supervision and excavation and produced the great majority of the field profile drawings. In the laboratory, Ms. Robbins assisted ably in the lithic analysis and took on the responsibility of much of the records research. Ms. Melissa Myers

handled the budgeting of the project, and proved herself to be indispensible in calculations and statistical tests. Additionally, Ms. Myers provided the drawings of ceramic artifacts and partial vessels in this report. Jeanne Cortians served as editorial assistant, correcting numerous grammatical errors, and also spent long hours typing the final manuscript. To each of these persons, we express our gratitude.

Several new members were added to our staff in the final analysis of the artifactual materials. Each of these individuals proved invaluable. Ms. Donna Hauler assisted with both the lithic and ceramic analyses, and demonstrated great potential in both areas. Ms. Gail Larsen was responsible for quantifying the wood recovered from the site, and also assisted in the final analysis of the ceramics and lithics. Mr. Jeffrey Altschul served in a number of capacities, but we are especially grateful to him for his analysis and quantification of the historic artifacts.

The project was additionally lucky to have the reports of several consultants, whose skills contribute much to the knowledge gained from the excavations on prehistoric Caddoan village life. These specialists are Dr. Newell O. Wright, Jr. (lithic artifacts), Dr. Kathleen M. Byrd (zooarchaeological remains), Mr. Frank N. Charles (malacology), Ms. Andrea Shea (botanical remains), Mr. Marco Giardino (osteological materials), and Mr. John P. Lenzer (geomorphology).

Larry Leggett provided the well-executed lithic drawings which appear in this report.

Several specimens of corn cobs were recovered from the site and sent to Dr. Hugh Cutler of the Missouri Botanical Gardens who graciously provided us with an analysis. The results of his findings appear in the section on botanical remains by Shea.

We would also like to acknowledge the contribution of Mr. Charles W. Campbell of Cleveland, Ohio, who was instrumental in the formation of the Institute. His unswerving support and encouragement enabled us successfully to complete the initial organization of the company.

The report on excavations at 16RR4 which follows is the final product of many individuals, many hours of hard work and a keen interest in furthering the study of Caddoan village life. The local residents of Hanna, Louisiana were most helpful in advising us on the previous condition of the site area and we are most grateful for their comments and interest. To all those persons who assisted us in New Orleans and during the field operations, we are most thankful.

Abstract

During a five-week period in the spring of 1977, New World Research conducted excavations at the Hanna site, 16RR4, in Red River Parish, Louisiana. The excavations were designed to mitigate the impact of proposed revetment construction by the U.S. Army Corps of Engineers, which threatened to destroy most of the site. The mitigation was performed in three sequential phases: [1] a controlled surface collection; [2] excavation of a series of test pits selected through a stratified random sampling design; and [3] full excavation of areas of the site based on the results of the first two phases. Upon completion of the excavation, laboratory analysis of the artifactual remains and a background and literature search were performed. Specialists were retained by New World Research to analyze and prepare reports on the botanical, geomorphological, malacological, osteological, and zoological remains. In addition, radiocarbon and pollen

samples were sent to specialized laboratories for analysis.

The Hanna site is the remains of a small village occupied during the Alto focus. Excavations revealed six structures—four houses and two problematic complexes of postmolds—situated on elevated sandy loam areas. Subsistence was obtained through a seasonal pattern which emphasized hunting, gathering, and fishing, but also involved the cultivation of a certain amount of corn, squash, and gourds through the practice of swidden agriculture. The inhabitants were largely self-sufficient, securing their own food and producing ceramics and stone tools for local use. Traces of ceremonialism or evidence of status differences were minimal. The Hanna site is one of the few excavated representatives of small Alto focus communities in which lived the majority of the population.

Introduction

This report constitutes a record of the excavations at the Hanna site, 16RR4, in northwestern Louisiana. The work was carried out by New World Research, under contract from the U.S. Army Corps of Engineers, New Orleans District. A proposed revetment threatened to destroy much of the site, and the archaeological investigations were designed to mitigate the impact by impending construction. The Hanna site, first visited by Corps archaeologist Mr. Thomas M. Ryan, warranted extensive investigation because of its relatively undistrubed condition, and, most importantly, because the site promised to add substantially to the body of scientific data pertaining to settlement and subsistence of the Alto focus, a prehistoric cultural assemblage dating to around 1000 A.D. Prior to the investigations at Hanna, no large-scale excavations had been conducted at an Alto village situated on a natural levee in the alluvial floodplain of the Red River in Louisiana.

New World Research, under the direction of Dr. Prentice M. Thomas, Jr., conducted excavations at the site during the summer of 1977. The mitigation program involved three phases: 1) a controlled surface collection; 2) excavation of a series of randomly selected test pits; and 3) full excavation, based on the results of the first two phases of operation. An in-field laboratory operated concurrently with the excavations. Subsequent to the cessation of excavations, final analysis and report preparation took place at New World Research's research offices in New Orleans. During this time, a thorough analysis of artifactual remains was completed, and a literature and records search was made. Specialists were retained by New World Research to perform analyses of the botanical, zooarchaeological, malacological, and osteological remains from the site. In addition to these specialists, a geomorphologist was retained on a consulting basis. In the field, samples were taken for radiocarbon dating and palynological analysis. The radiocarbon samples were forwarded to the University of Georgia for handling while the palynological samples were sent to Dr. Vaughn Bryant of Texas A&M University. These analyses served well to supplement the findings of excavation and laboratory analysis, and have provided this report with numerous details on Caddoan village activities, subsistence, material culture, technology, and resource exploitation.

It is the feeling of the authors that the Hanna site has been amply mitigated, and that construction may proceed without damage to the information to be gleaned from the site.

Research goals and strategies, results of analyses, and interpretation of data follow in their appropriate sections.

History of Archaeological Investigations

Archaeological investigations in the Louisiana portion of the Red River span a period of more than a century. From the earliest reports of mound groupings and exposed burials in the early 1800s to the introduction of modern systems approaches, archaeology in Louisiana has reflected the growth of archaeology as a scientific discipline in the United States. Consequently, the history of investigations in this area is best viewed withing the framework of American archaeology as a whole. Willey and Sabloff (1974) offer a temporal classificatory scheme for tracing the development of North American archaeology, and we find it to be a useful framework for discussing the archaeological background of northwestern Louisiana. While their scheme is quite adequate in general terms, it has been amended here to allow for a certain amount of overlap which occurred in northwestern Louisiana between the Classificatory-Descriptive and

Classificatory-Historical Period Stage I. The periods discussed include: Speculative Period (1492-1840); Classificatory-Descriptive Period (1840-1930)' Classificatory-Historical Period Stage I (1930-1940)' Classificatory-Historical Period Stage II (1940-1960); Explanatory Period (1960-present). The only alteration has been an extension of Willey and Sabloff's Classificatory-Descriptive period from 1914 until 1930, to accurately describe the nature of archaeology in northwestern Louisiana before 1930. As used in this report, the periods provide a suitable guideline for organizing and understanding the history of archeological inquiry in northwest Louisiana, and the relation between work in this area and the development of the discipline throughout the rest of the country.

Speculative Period [1492-1840]

Covering more than 300 years, the Speculative Period is designed as an arbitrary prelude to the actual development of archaeology. With the initial opening of the New World by explorers, and the migrations of settlers and missionaries that followed, numerous chronicles were written discussing the nature of the American Indians. In the 18th and 19th centuries, questions began to arise concerning the origin of the aboriginal inhabitants of the New World and their relationship, if any, to the earthen mounds that dotted the landscape. There were many "armchair anthropologists" during this period, people who pondered these questions and offered possible answers without actually visiting the mounds or interviewing the natives. From these speculations emerged two theories regarding the nature of the mounds and the moundbuilders: 1) that the aboriginal Americans were the moundbuilders; or, 2) that the moundbuilders were a prehistoric group of unknown origin whose race had died off many years before (Willey and Sabloff 1974:30).

In the early 19th century, spurred on by the questions raised by speculators, numerous traveller-naturalists provided descriptions of the mounds. While not concerned with scientific excavation, their reports were based on astute observations of the landscape in the areas of their travels. One of these men who journeyed extensively throughout the southeast, H. H. Brackenridge, published an article in 1813 on the mound question, and, later, a book on Louisiana tumuli (Brackenridge 1813, 1814). He suggested that the burial mounds were definitely earlier than the temple mounds. Brackenridge went on to suggest that the builders of these mounds were migratory groups from the Toltec Empire in Mexico.

Captain Amos Stoddard, another traveller-reporter, published a narrative sketch of Louisiana, in which he documents his travels, including a trip to the Red River Region, and provides a description of his observations. In this volume, he offers the theory that the moundbuilders were of Welsh descent (Stoddard 1812).

This period, covering the years between 1492 and 1840, was an era of flamboyant speculation, curiosity, and non-scientific attempts to understand the New World, its natives, and its past.

Classificatory-Descriptive Period [1840-1930]

By 1840, mere speculation had given way to a new emphasis on the description of archaeological remains, and the classification of these within a formal typology. Pure speculation did not completely disappear, but the trends toward scholarly publication, the establishment of curatorial museums, and university training for archaeologists clearly illustrate the emergence of archaeology as a discipline rather than a pastime. The establishment of two institutions, the Smithsonian Institute in 1846 and the Peabody Museum in

1866, laid the foundations for this period, with their emphasis on objective description and classification.

A major pioneer of this period, Charles C. Jones, contributed much to the knowledge of prehistory of the southeastern U.S. Jones published two books on Georgia and carried out data-oriented excavations in that state (Jones 1861, 1873). His latter publication, in 1873, contained careful illustrations of various artifacts, accompanied by descriptions and discussions, and, among the artifacts he illustrated were two pottery vessels from Louisiana. These were among the first illustrations of ceramics from Louisiana prehistoric burials. One of Jones' major contributions was his assertion that the mounds, so abundant throughout the Southeast, manifested significant variation, an indication that they were not all constructed during the same time period (Jones 1873:131-132).

In that same year, T.P. Hotchkiss reported on the strata from an Indian mound near Wallace Lake in Caddo Parish, Louisiana, in a brief statement to the Smithsonian Institute. Hotchkiss noted that an Indian grave with associated artifacts had been exposed during well-digging operations (Hotchkiss 1873). Located in a stratum thirty-two feet below the surface, the body was accompanied by flint darts (type unknown) which pointed away from the individual. Hotchkiss provided the Smithsonian with a meticulous description of the strata from the surface to some ninety-five feet below the grave. He also included measurements of the artifacts, and a hand-drawn map showing the location of the burial in relation to Caddo Lake and Bayou Pierre.

Just before the turn of the century, Professor George E. Beyer of Tulane University initiated a series of investigations of mound sites located inside the crescent of Larto Lake in Catahoula Parish (Beyer 1896). His report on these mounds was a serious evaluation based on personal observation,

excavation by natural strata, and intuitive logic. Beyer described the removal of each layer of earth and provided a description of the soil content. In the course of the excavations, he encountered several burials, which were described as brittle and necessitated careful removal in pieces with the aid of a knife. His report included a brief description of associated artifacts (pottery and lithics) and made a rudimentary identification of animal remains found within the different strata. This evaluation of prehistoric remains presented not only a careful description of the artifacts and the excavation process, but also included suggestions as to mound and associated artifact chronology and function. Beyer noted that several types of mounds were observed and investigated. The first type showed evidence of being "tenanted by the living," but having no signs of ever being used for burial practices. The second type of mound was presumed to be artificial but revealed nothing to indicate it was ever used for habitation, burial, or sacrifice. Beyer was strongly inclined to believe these mounds were not natural, but their function could not be determined. The third type of mound manifested signs of having been used for habitation as well as for burial. He commented that the skeletal remains found within this third mound type occurred at various levels and went on to suggest that the different strata represented separate living layers added to the mounds throughout the period of occupation. Like others of his time (cf. Squier and Davis 1848), Beyer was interested in discerning the age of the mounds but was unsuccessful in his attempt to provide a definite date. He did suggest that they represented the work of a flourishing culture, contemporaneous with or prior to the arrival of Columbus. Beyer's reports, like those of Hotchkiss, contained carefully hand-drawn maps and illustrations.

Professor Beyer conducted archaeological investigations throughout northwestern Louisiana, and, in addition to his

detailed descriptions of the mounds around Larto Lake, he tested numerous mounds in the vicinity of Campti, Louisiana, Clear Lake, and Black Lake. Beyer's work brought to light the vast areal expanse over which prehistoric mounds were distributed in Louisiana, many of which are now either partially or completely destroyed. He additionally made note of numerous artifacts found in the bank of the river, indicating that the erosive action of the Red River at that time was already resulting in site destruction.

For a number of years, from the late 1880s into the 1920s, Clarence Bloomfield Moore was a dominant figure, conducting archaeological reconnaissance and testing and publishing on the prehistoric remains in the Southeast. Operating from a steamship, Moore's investigations carried him through almost every navigable waterway in the southeastern states, with the only exceptions being Virginia and North Carolina. In 1911-1912, Moore's river reconnaissance took him along the Red River, at which time he visited 20 mound sites and one presumed "dwelling site" (Moore 1912). Along this route, he carried out sporadic testing excavations in Catahoula Parish. Moore's reports often provide data on mound stratigraphy, artifacts, and frequency, sex, age, and orientation of burials. In Catahoula Parish, Moore visited two sites which are correlated with the presently recorded sites 16CT9 and 16CT10 (Neuman 1970). Among the numerous other mounds investigated by Moore were Mounds Plantation Bluff, Poverty Point, and Gahagan, the last being a ceremonial center of the Alto-(Gahagan) focus (Webb and Dodd 1939a). Although his primary attention was focussed on large, ceremonial mounds and spectacular artifacts and burials, Moore is highly regarded for the promptness of his reports, the inclusion of many detailed descriptions, the high quality of his illustrations, and his willingness to consult other professionals

(most notably Alex Hrdlicka) for more thorough comments.

A well-known researcher, who figures prominently in this period, was Gerard Fowke, who, often in conjunction with the Smithsonian, analyzed artifactual materials from the Southeast, investigated the Hopewell mounds, and carried out a series of excavations along the Red River in Louisiana. Unlike many of his contemporaries, Fowke is credited with examining village settings, as well as large mound and ceremonial sites. In the area around the present town of Creston, Louisiana (previously visited by Professor Beyer), Fowke observed numerous mounds, which he referred to as housemounds (1928:408). In particular, he describes a locale known as "Salt Lick," which was surrounded on all sides by what Fowke presumed to be housemounds (Fowke 1928). Although he did not examine all of these mounds, fully 500 were counted in the area of study. Since we do not know the extent of the artifactual association, if any, with the mounds, it is probable that they represent "pimple mounds," and not actual dwelling sites. Fowke visited another salt lick similar to the one at Creston, located at Shamrock Mills, 18 miles west of Natchitoches. As in the former case, housemounds extended indefinitely from the south side of this lick. Investigating these mounds, Fowke reported that a number of them were cluttered with artifactual debris, including lithics and ceramics. Besides his work in the Caddo area along the Red River in Louisiana, Fowke is most noted for his excavations in mounds 4 and 8 at the Marksville Site (16AV1) in Avoyelles Parish (Fowke 1927).

Fowke's investigations into village settings, as well as ceremonial and mound sites, set him apart somewhat from his predecessors and contemporaries; even Fowke, however, did not initiate extensive excavation and inquiry into the nature of the villagers' remains and material culture. His work was sound in its detailed descriptions of soil content, measurement

of mounds, and artifact and burial descriptions. And, typical of many of the investigators of the period, Fowke's work was not confined to any one particular area but covered a territory from southern Ohio through the Southeast, including Louisiana (and even one trip outside the U.S.), in search of migration patterns to explain the origin of the American aborigines.

During the Classificatory-Descriptive Period, American archaeologists became increasingly active. Attention was focussed not only on North America but also on Middle and South America. Chronologic associations of artifacts were not really addressed during this period, but the detailed descriptions and site reconnaissance left a record of data on which future investigations could build. In the case of Hotchkiss' work, the burial site was eventually destroyed by construction, but his report to the Smithsonian remains to permit comparison with other grave sites in the region. The investigations of the period between 1840 and 1930 in Louisiana cannot be underestimated. The work of Hotchkiss, Moore, Beyer, and Fowke, if not systematic and problem-oriented, was professionally sound. All these men provided descriptions of stratigraphy, site location, and associated artifacts. Though the question of chronology was not adequately approached, Beyer suggested that skeletal remains found in different strata may have indicated different stages of occupation. And the work of Fowke represented at least the beginnings of investigations into nonceremonial sites.

For the development of American archaeology as a whole, Willey and Sabloff set the end of this period as early as 1914, with the broader implementation of the concept of stratigraphic control. This period has been lengthened for the area of northwestern Louisiana, since the nature of archaeological work in this region continued in the same scope of detailed description, without a strong emphasis on

chronology, until the early 1930s.

Classificatory-Historical Period State I [1930-1940]

This period is characterized by an increasing demand by archaeologists to place investigative results within a chronological framework. Careful description was supplemented in this period by the establishment of more exacting methods of survey and excavation. The principal means for insuring chronological control, stratigraphic excavations, began to be widely used in the United States around 1914 (Willey and Sabloff 1974:88-89). This refinement in excavation technique, combined with the use of seriation, enabled archaeologists to plot culture forms in terms of time and space.

As mentioned earlier, it was not really until the 1930s that archaeological work in northwestern Louisiana began to focus seriously on chronology. With the advent of the Works Progress Administration and the increased involvement by university-trained archaeologists, the development of sound chronologies and measures for interpreting data, both spatially and temporally, began to prevail.

By the end of the 1920s, researchers in Louisiana were becoming more and more preoccupied with the need for chronology and for refining techniques. One of those who urged the implementation of more exacting organization in archaeological investigation was Winslow Walker. Among his archaeological pursuits, Walker made two notable attempts to locate Indian village sites (Walker 1932a). The first of these was the "Adai Village" (16NA16) in Natchitoches Parish and the second was the Yatasi Village in Caddo Parish. Both attempts were unsuccessful because of the extensive amount of erosion and consequent geomorphological change in the areas. In 1931, Walker became involved in the excavation of the Fish Hatchery Site, about one mile south of the town of

Natchitoches, where construction was unearthing a number of burials and associated artifacts. Walker, besides giving a detailed description of the excavations, drew a comparison between the ceramic wares recovered at this site and those recovered from other sites in northern Louisiana, Arkansas, and Texas (Walker 1935). His comparisons included much of the Caddoan area, making Walker's treatment of ceramics an important step in inter-areal studies. Winslow Walker was highly cognizant of the need for a more rigidly organized archaeological program in the state of Louisiana. In a critical review of evaluation of the status of archaeology in the state in 1932, Walker called for the need to introduce more work with sound typology, to use better excavation techniques, and to pay more attention to new developments in dating; additionally, he urged the establishment of a statewide archaeological survey (Walker 1932b).

The emphasis on archaeology and the financial support to conduct the work increased with the WPA program. During the 1930s, Frank Setzler arrived in the Marksville area to administer the WPA program. At the Marksville site, Setzler expanded the earlier work by Gerard Fowke and exposed the remains of a rectangular, semi-subterranean house, purportedly the first structure of this kind to be seen in the Red River area of Louisiana. In drawing his ceramic comparisons, Setzler went even further than Walker by noting similarities between ceramics of this site and those of the Hopewell tumuli in Ohio, thus suggesting some type of commercial intercourse between sites in Louisiana, Alabama, and Mississippi and the northern Hoepwellian cultures (Setzler 1933). Setzler's discussion of these similarities marks one of the first attempts to deal with archaeological remains in terms of their spatial and temporal relationships outside a single culture area. From Setzler's work with the Marksville data, the move toward dealing more and more within a chronological framework was gaining greater impetus.

Much of the archaeological data available for northwest Louisiana can be attributed to the work of Clarence H. Webb, a Shreveport pediatrician. His keen interest in the Caddoan area led to Dr. Webb's involvement and direction of numerous investigations during theis period. Between 1934 and 1940, Webb and Monroe Dodd, Jr., conducted excavations at the Smithport Landing site (16DS4) in DeSoto Parish. Their excavations in the village area of the site represent the first examination of this nature in the Caddoan region of Louisiana. Their report of findings, published in the early 1960s, suggested an Alto and Bossier occupation sequence for Smithport Landing and enabled the author to identify a new pottery type, Carmel Engraved, for the Alto focus (Webb 1963).

Working together again in 1938, Webb and Dodd carried out excavations at the Gahagan Mound (16RR1) in Red River Parish. Their work revealed primary human interments and associated artifacts. Webb and Dodd related the artifacts to the Coles Creek culture and also suggested a connection between the Gahagan Mound and sites in northwestern Florida (Webb and Dodd 1939a).

It was also during this period that Webb, working first with Dodd, began his fifteen-year study of the Belcher Mound (16CD13) in Caddo Parish. The report on Belcher would not be published until 1959, but the excavations at this site were to yield considerable information on architecture, burials, ceramics, and lithic assemblages. Initial excavations revealed a sequence of stratified house patterns and associated burials and artifacts which Webb and Dodd assigned to a Southern Caddo affiliation (Webb and Dodd 1939b). On the basis of the house excavations at Belcher and the Greer site, and drawing upon ethnographic analogy, Webb suggested a temporal variation in preferred architectural style from the

Gibson to the Fulton aspect (Webb 1940).

In each of his investigations, Webb's concern with chronology was apparent. He also sought to examine the inter-areal relationships of the Caddoan peoples from northwest Louisiana to the more northern tribes, the southern Caddo tribes, the Lower Mississippi Valley cultures, and even so far as to deal with their relationship with cultures in northwest Florida. His involvement and the increasing interest of other Caddoan scholars were to lead, eventually, to the initiation of a series of Caddo Conferences, beginning in 1940 and continuing until the present.

In the mid-1930s, James A. Ford, one of Setzler's crew chiefs at Marksville, carried out the first reconnaissance of village settings in northwest Louisiana. His survey, conducted between Natchitoches and Shreveport, located several village sites which he identified as being representative of the Caddo complex. As a result of Ford's survey and ceramic collections from this area, and to the south, three sequential temporal periods were identified: Period I — The Marksville Decoration Complex; Period II — the Deasonville and Coles Creek Decoration Complexes; Period III — the Choctaw, Natchez, Caddo, and Tunica Decoration Complexes (Ford 1936). Though his survey went beyond the Caddo area, it represented a major step in providing Louisiana with a chronological framework on which to base future excavations. Ford's temporal sequence, however, placed the Caddoan culture complex later in time than Coles Creek, a belief held by many Lower Mississippi Valley scholars and addressed by Webb at the Belcher site.

In 1938, the same year Webb and Dodd began work at Belcher, Ford headed a Louisiana State University/Works Progress Administration excavation program at the Greenhouse site (16AV2) in Avoyelles parish. Although this site is not Caddoan, the information obtained from the ex-

cavations had a direct bearing on inter-areal studies, because Lower Mississippi Valley ceramics have been recorded in multicomponent Caddoan sites (cf. Mounds Plantation, Webb and McKinney 1975). The project, besides yielding new data on ceramic variation, house types, mound construction, and associated village features (Ford and Willey 1941), also identified a new chronological component, Troyville-Coles Creek (Ford 1951). The final publication on the excavations at Greenhouse was not released until the early 1950s, but the significant discoveries were disseminated to scholars in the Southeast via newsletters and conferences. Although Ford's attention was not specifically directed to the Caddo region, he continued to have input into Caddoan chronology, particularly with regard to the temporal relationships of the Caddo sequence and the Coles Creek Complex.

The Classificatory-Historical Period Stage I was marked by a surge in archaeological activity in northwestern Louisiana and related sites. The stratigraphic revolution and strong emphasis on chronology raised new questions regarding the appearance and integrity of Caddoan occupations. The questions of whether the Gibson aspect and Coles Creek were contemporaneous or distinguished from one another in time, and the nature of Coles Creek materials at Alto focus sites, set off a series of intense discussions in the years that followed this period.

Classificatory-Historical Period State II [1940-1960]

By 1940, the importance of detailed regional chronologies and exacting excavation procedures based on stratigraphic control was firmly established in American archaeology, and the Classificatory-Historial Period entered its second stage. The emphasis of this latter stage was on the delineation of context and function. No definitive split existed between the

earlier and later stages of the period. Chronology was still a vital concern, but new factors began to influence site interpretation. The need for settlement studies, necessitating investigation of more village sites, and for relating culture to environmental factors were emphasized. The artifacts recovered through systematic investigation were viewed as material relics of past cultures which reflected cultural patterns and behavior. With these factors in mind, the data from excavations were to yield vastly more information on the prehistoric lifestyle and material culture of the occupants of a given site and that site's relationship with other regions.

In northwest Louisiana, Clarence Webb remained the primary investigator, and his work did much to advance the archaeological knowledge of the area. Between 1940 and 1960, Webb conducted further excavations at the Belcher mound, defining a Belcher focus of the Fulton Aspect in an extensive monograph (Webb 1959). Analysis of the artifactual associations at Belcher indicated that the site had been occupied from the Alto focus of the Gibson Aspect until the Belcher focus of the Fulton Aspect and was finally abandoned before the historic Glendora focus (Webb 1959). Additionally, Webb proposed that the Gibson Aspect was apparently contemporaneous with the Coles Creek period in the Lower Mississippi Valley (Webb 1959:207). This question of the temporal placement of Caddoan occupation with regard to the Coles Creek period was the controversial subject of much debate among scholars from the two respective culture areas. Working at the Lawton site (16NA13), eight miles south of Natchitoches, Louisiana, Webb uncovered an historic Caddo component and, using comparative data from the Fish Hatchery site, designated both as part of the Glendora focus (Webb 1945). In the late 1940s, Webb synthesized materials and information obtained through excavation and surface collection in northwest

Louisiana and defined the Bossier Focus (Webb 1948). He characterized this focus as consisting of hillside sites, whose inhabitants practiced hunting, fishing, and agriculture, and showed little concern with ceremonialism (Webb 1948). The definition of this focus is important in interpreting the apparent disappearance of mound construction between the Alto and Belcher foci. The Bossier focus was thought to represent a population trend characterized by movement away from the centers of ceremonial influence.

There have been two schools of thought regarding the temporal placement of the Caddo complex. On the one hand, Krieger and his followers believed the Caddo archaeological sequence extended over a period of more than one thousand years. This view would place the beginnings of the Alto focus somewhere around A.D. 700, and perhaps even earlier. Thus, the Gibson Aspect was seen to begin at the same time as Coles Creek in the Lower Mississippi Valley. On the other hand, Ford suggested the Caddo sequence was of relatively short duration, beginning with the end of the Coles Creek period around A.D. 1200. Although the problems remain largely unresolved, it appears that, based on the ceramics and radiocarbon dates from sites such as Mounds Plantation (Webb and McKinney 1975) and George C. Davis (Story 1974), Krieger's date for the Alto focus was perhaps too early and Ford's date too late. The assumption is that the Alto focus began at least by A.D. 800 and lasted until at least A.D. 1050, and probably as late as A.D. 1200 (H.F. Gregory, personal communication).

The second stage of the Classificatory-Historical Period focussed on the delineation of context and function, and, with regard to the Caddo area, debate over the chronology of the Gibson aspect relative to the Lower Mississippi Valley sequence.

Explanatory Period [1960-present]

As American archaeology entered the 1960s, the emphasis was firmly on the implementation of new scientific techniques to answer old questions and to devise new ones. It is a period that has witnessed the birth of a wide variety of new approaches to archaeology. The use of mathematical models, the systems approach, processual archaeology, "new" archaeology, and quantitative archaeology, are a few of the terms developed since the early 1960s. The various approaches share in the attempt to go beyond chronology and culture history. There is an emphasis on observing regularities or patterns resulting from past human behavior, and attempts are being made to deal systematically with archaeological manifestations of social organization such as residence patterns and political organization. Following the work of Spaulding (1953, 1968) in the 1950s, quantitative techniques are being applied to archaeological problems with increasing sophistication.

In northwest Louisiana, no large-scale projects have, as yet, been undertaken with such a theoretical orientation. However, during this period, there has been a surge in archaeological activity in the area. Much of this work has not appeared in publication, but several reports from the area are noteworthy, and are discussed below.

In 1965, Clarence Webb and H.F. Gregory published an article detailing the varieties of European trade beads from six sites in Natchitoches Parish (Gregory and Webb 1965). Their report makes an association between specific bead varieties and native pottery, and dates the artifactual association to between 1717 and 1820.
1965).

In that same year, Gregory published an article on maximum forest efficiency in which he discusses the environmental exploitation potential of the area around Larto

Lake (Gregory 1965). Gregory points out the tremendous potential for hunting, gathering, and especially fishing, and believes these practices to have been as important, and perhaps more so, than maize production. This work is particularly relevant to our investigations in the alluvial valley of the Red River. Corn was recovered from one feature at the Hanna site and from several postmolds. Additionally, the prehistoric occupants of the site expended great energy in hunting and fishing (see reports by Byrd and Shea in this report). The exploitive practices of the Caddo peoples deserve further attention in future investigations. We do not, for example, have good subsistence data from an upland Alto site in northwestern Louisiana. A comparison between these practices, with respect to environment and temporal periods of occupation, would prove enlightening.

Jon L. Gibson has, in recent years, directed his studies to the interrelationship of culture to the environment. In 1969, working at Caddo Lake, Gibson focused the investigations on environmental factors in site selection and related site location to a number of ecological zones (Gibson 1969). Studies of this kind would greatly benefit our knowledge of the influence of environmental factors on cultures located in the uplands and bottomlands of northwestern Louisiana.

Two recent syntheses of archaeological inquiry in the Caddo regions have been produced in this period. The first, a report edited by Hester Davis for the Corps of Engineers, New Orleans District, includes a report by Gregory evaluating the status of sites in northwest Louisiana (Gregory 1967). In this paper, Gregory details the numerous known sites in the area and indicates that, although some have been surface-collected, few have been fully investigated. He stresses the large area occupied by the prehistoric Indians of the region and urges investigation of these sites before they undergo some alteration by natural forces, agriculture,

construction, or relic hunters. His report is a significant contribution and points out the sparse amount of work conducted in the area relative to the number of sites that exist or have existed in the past.

The second synthesis, also edited by Hester Davis and published by the Arkansas Archaeological Survey, contained an article by Robert Neuman of Louisiana State University. His report was not so much an evaluation of the archaeological potential of the area, as it was an incisive history of past projects and a brief presentation of their findings (Neuman 1970). Neuman documents the history of archaeological inquiry from the late 1800s until the present, correlating previously investigated sites with those now catalogued with the State Archaeologist's office. Although Neuman's article is not an assessment of sites in this region, it offers a concise review of work and provides a lengthy bibliography.

Even more recently, Gulf South Research Institute undertook a massive survey project for the Corps of Engineers, New Orleans District. This project involved an on-foot and water survey of sites along the Red River in the area of proposed waterway construction. Numerous sites were discovered, and others were relocated and evaluated for potential harmful impact by the proposed construction (G.S.R.I. 1975, Vol. II). Although the report's evaluations seem sound, artifacts are not illustrated, and many ceramics are described, but not typed. Attempts were not made to date the sites discovered during the reconnaissance, except to refer to prehistoric or historic components. Additionally, it was often difficult to locate the sites on their map. Illustrations or photographs of the artifacts would have been helpful, and the inclusion of a more detailed description of each new site would have been desirable.

Dr. Clarence H. Webb remained active in this area during

the Explanatory Period, working primarily in the vicinity of Shreveport. The work of Dr. Webb and Ralph McKinney at Mounds Plantation, published in 1975, revealed a site first occupied during the Coles Creek period, apparently followed by an Alto focus component (Webb and McKinney 1975). This report is significant in that it comments upon the long-running debate on the temporal duration of the Alto focus in relation to Coles Creek. Dr. Webb points out that, although the Alto focus was perhaps not so early as once postulated (around A.D. 400 or 500), the data from Mounds Plantation certainly support an appearance date for Alto before A.D. 1000, well before the end of Coles Creek (Webb and McKinney 1975:72).

In 1977, Jon L. Gibson carried out a survey of 16NA171 (Gibson 1977). The research was conducted to determine the potential harmful impact of the proposed construction of the Cognac Revetment, south of Natchitoches, Louisiana. This report, filed with the Corps of Engineers, New Orleans District, suggested the site to be an Alto focus occupation and recommended further testing to determine the precise nature of the site, and whether or not the site offered enough in the way of data to require mitigation.

During the summer of 1977, New World Research, under contract with the Corps of Engineers, New Orleans District, carried out excavations of a testing nature at 16Na171, the Bayou Cognac site. The testing program substantiated Gibson's earlier assignation of an Alto focus date and revealed the site to be somewhat similar in content to the Hanna site and the Smithport Landing site investigated by Webb (Webb 1963). Once a village setting, the Cognac site has been largely destroyed by the action of the Red River. Approximately 325m of alluvium have eroded in the past 40 years, taking most of the site with it. Although the collection of artifacts recovered from the site was meager, it was sufficient to

determine the Alto date. The absence of mounds, either intact or visible on the 1934 aerial photograph, and the lack of evidence of ceremonialism suggest the Bayou Cognac site was the locus of a village occupation (Thomas *et al* 1977).

This review of work conducted in northwest Louisiana since 1960 represents only a small portion of the investigations which have actually been conducted. In recent years, the faculty and students of Northwestern Louisiana State University have been active in surveying and testing of sites in the area; however, the majority of this work has not been published. H.F. Gregory, H.K. Curry, and Clint Pine, all faculty members of the university, have been working primarily to the south of Natchitoches, Louisiana, to build a stable chronology to be used as a datum for other portions of the Red River valley in the state (Gregory, personal communication). In addition, these individuals have conducted cultural resource surveys to evaluate the impact of proposed construction on archaeological sites at Lower Bushley Bayou (Gregory and Curry 1976) and Bossier City (Gregory, Brasher, and Curry 1977), as well as at other locations in the area. Under the direction of H.F. Gregory, numerous students have been involved in transect surveying and test excavations. The following information on their work is provided by H.F. Gregory. Intensive work on lakes Iatt and Nantachie has been conducted by David Jeane; Donald Hunter supervised a series of environmental transect surveys on Black and Clear Lakes and implemented a series of test excavations to test a regional sequence there. Joseph Frank surveyed portions of Sibley Lake Lowland, and Brent Smith expanded that into his Master's thesis on the Young's Bayou watershed (Smith 1975).

Cline Pine and his parents, Mr. and Mrs. Archie Pine, have concentrated on surveys of Sibley's Lake and the Gorum-Flatwoods areas. Another local amateur, Larry

Leggett, has surveyed and excavated a number of sites in the Gorum area.

Reports are in preparation on Hunter's work, Leggett's work, and one some of the data gathered by David Jeane. Additionally, Jackie Wise has conducted extensive surveys in the Rodemacher Lake and Cane River mouth areas, which will be reported in part by the recent Interstate Highway Survey.

The work of H.K. Curry, Clint Pine, and, specifically, H.F. Gregory and his students, indicates the presence of numerous archaeological sites, most of which have not been investigated. From the earliest reports to the most recent work, the record of archaeological investigations in northwestern Louisiana has not been proportional to the number of known sites, and there remains a pressing need to investigate settlement patterns, especially with regard to different potentially exploitable environmental zones. Gregory has been compiling a file of sites, both prehistoric and historic, in northwestern Louisiana for a number of years, and has kindly permitted his map of known archaeological sites to be reprinted in this report (Fig. 1).

History of Hanna Property

The record of transactions concerning the property on which 16RR4, the Hanna site, is located, dates back to the mid-1800s, when the United States sold 21.03ha (51.96 acres) to Allen Ratcliff on July 1, 1845. At this time, Red River Parish did not exist as a separate parish. It was not until 1871 that the parish boundaries were set, with land ceded by DeSoto, Natchitoches, Bienville, Bossier, and Caddo Parishes to comprise Red River Parish. At that time, the land on which the site is located was held by Elizabeth A.R. Brown, a former owner of the property in 1852 under the name of Elizabeth Williams. From the first documented acquisition of the site land in 1845, until its present owner's

purchase in 1975, this property was the subject of numerous transactions, partial sales, retention of mineral rights, accretions by the river, and inheritances. Several family names stand out as holding the property, or parts of the property, for many years. The primary holders of the land were the families Brown, Williams, and Jones. The last Jones, Sidney A. Jones, sold his portion of the property and all improvements upon the land to Robert Martin in 1974. In that same year, Martin sold the land to James R. Fare and W.H. Franklin, Jr. The last property owner was Richard Magee, who acquired the property in September of 1975. At present, the U.S. Army Corps of Engineers, New Orleans District, is constructing a revetment on the property.

Prior to the investigations conducted by New World Research, no intensive archaeological work of a professional nature had focussed on the Hanna site. The site was discovered by U.S. Army Corps of Engineers archaeologist, Thomas M. Ryan, while examining the location of the proposed Hanna Revetment. The site was lying fallow and unplowed at the time of Mr. Ryan's reconnaissance. A dark band of midden containing cultural debris was seen in the profile of the river bank, and casual surface collections yielded material from the plow zone. The Hanna site, subsequently designated 16RR4, was previously unrecorded in the state survey files.

Prior to the initiation of excavation, Mr. Ryan, Dr. Prentice M. Thomas, and Mr. Steven R. Ahler visited the site. Since Mr. Ryan's initial visit, the site had been disked and the ridges and surface soil zones were visible. Ceramic and lithic artifacts were collected from the surface, and the horizontal extent of the site was roughly determined. Preliminary analysis of the artifacts indicated the site to have been primarily an Alto focus occupation, though some later material was also present. Excavations began at the site approximately two weeks later.

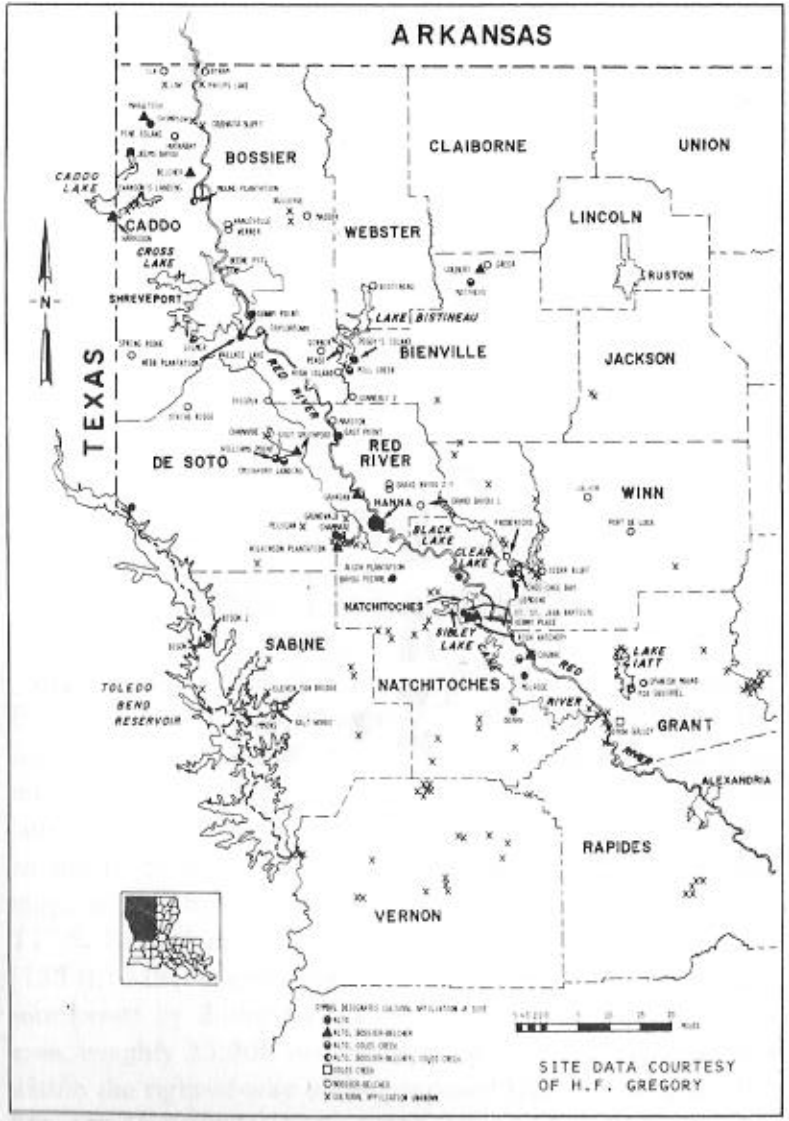


FIGURE 1. MAP OF NORTHWESTERN LOUISIANA SHOWING PRINCIPAL ARCHAEOLOGICAL SITES.

Site Description

The Hanna site is located in the southwestern portion of Red River Parish in northwestern Louisiana (Fig. 2). The site is situated on a natural levee on the right descending bank of the Red River. The approximate center of the site is at latitude 31° 57' 45" N and longitude 93° 19' 43" W, as found on the U. S. G. S. 1957 series Hanna (Fig. 3) quadrangle map, in the SE one-quarter section of partial section 6, T11N/R9W. The site has an elevation of approximately 40m (133 ft.) MSL and is estimated to be about 140m (northeast-southwest) by 250m (northwest-southeast). Of the total site area, roughly 35,000 m^2, or approximately 70 per cent, lies within the right-of-way of the proposed Hanna revetment (cf. Fig. 11). Only the latter area of the site was investigated.

The Red River, which flows east-by-northeast past the Hanna site, forms its northern boundary (Plates I-II). The western terminus of the site is marked by a line of pecan trees

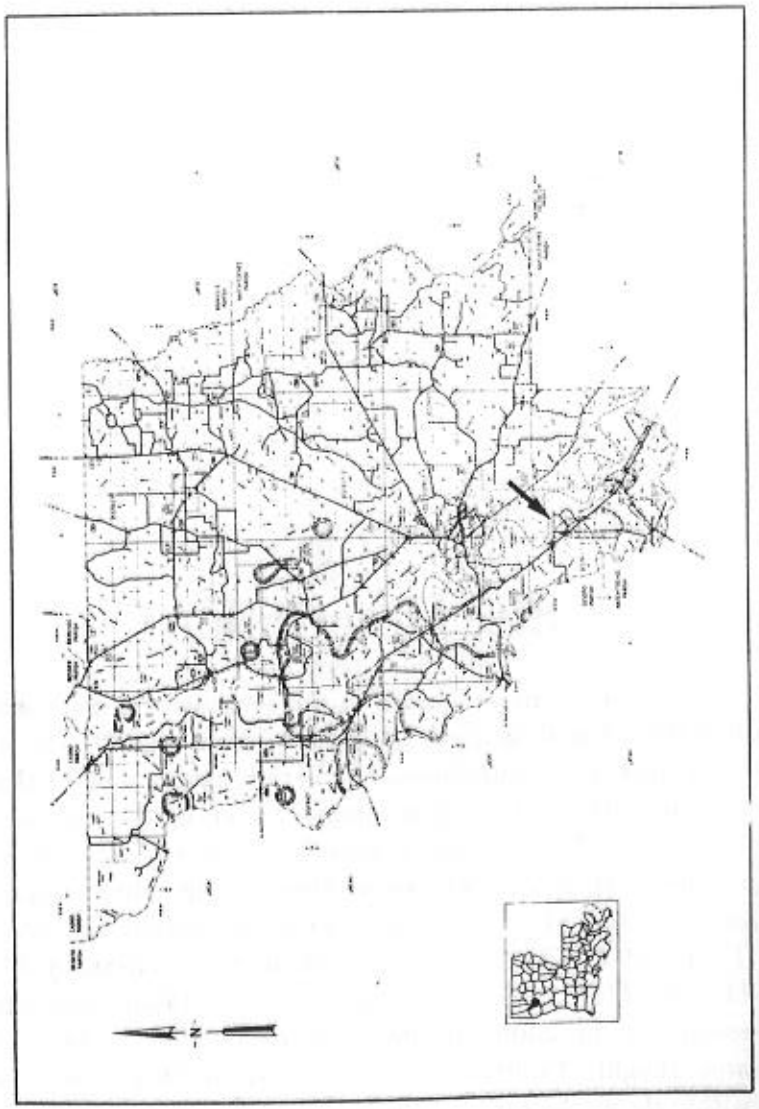


FIGURE 2. MAP OF RED RIVER PARISH SHOWING THE LOCATION OF THE HANNA SITE, 16RR4. ARROW POINTS TO THE SITE AREA.

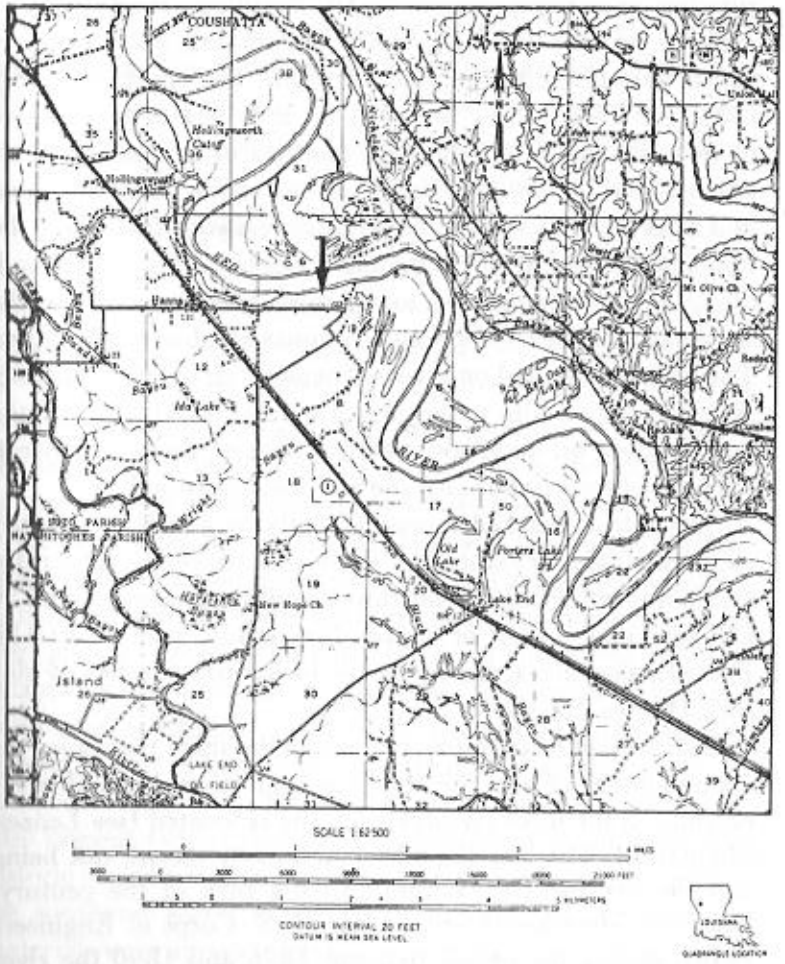


FIGURE 3. MAP SHOWING LOCATION OF HANNA SITE. (BASE MAP U.S.G.S. HANNA QUADRANGLE, 15-MINUTE SERIES, 1957).

running in a northwest-southeast direction. West of these pecan trees, the terrain is level, continuing approximately 300m before ending in a small bluff. The bluff, currently being eroded by the river, rises to a height of one to two meters. To the south, the land consists of a relatively level plowed field. A dirt road, which winds to the south and east, and a borrow area (an area used historically for fill), mark the limits of the field in which the site is located. Beyond the road, the level terrain continues to the south but terminates to the southeast at a stand of pecan trees near an abandoned house. The house is situated on the west bank of an old river channel that lies about 300m to the east of the site, at which point the terrain drops off about two or three meters. To the northeast, the plowed field terminates at a grove of hardwoods.

The field is marked topographically by a series of slightly elevated ridges, separated by shallow depressions. The ridge areas, traversing the site northwest-southeast, are elevated 50 to 75cm and consist of a very fine sandy loam (Fig. 11). Between the ridges, the surface is lower and consists of clay soils (Plates III-V).

The present river course represents the third time since the abandonment of the site that the Red River has cut away portions of the levee on which the site is located (see Lenzer, Chapter V). The last meander is relatively recent, not being occupied by the Red River until the turn of the century. Based on Meander Overlay maps (U.S. Corps of Engineers 1976), during the period between 1826 and 1890 the river flowed between 420m and 335m to the east of the site. Sometime between 1890 and 1930, the river adopted its present course. Aerial photographs taken in the early 1930s show the river approximately 325m north of its present position (Plates I and II), indicating relatively severe erosion in the recent past. The erosion has washed away a significant portion of the present northeast sector of the site but has not reached other areas.

Aerial photography and the reports of local informants indicate that the site has been under almost continuous cultivation since at least the 1930s. The results of our excavations suggest that portions of the site have been under cultivation even longer, perhaps since 1910 or before. The intensive plowing and disking have resulted in a 15 to 20cm deep plow zone over the entire site. The extent of damage incurred through these practices varies somewhat. Plow scars were detected at a level deeper than 20cm in some areas, but, for the most part, prehistoric feature and architectural remains were still intact and only minimally disturbed. Damage to midden deposits has been more extensive, particularly in the southeast and southwest sectors.

At least three historic structures were located at the site according to surface indications and the reports of local informants. Based on aerial photographs, all of these structures were standing at least until 1930. One of the structures was located in the western part of the site, overlapping our designated southwest and northwest sectors. On the surface, numerous bricks and brick fragments and several pieces of tin, presumably from the roof of the structure, were noted. Also present were considerable quantities of metal, glass and historic ceramic fragments. A second structure was located in the southeast sector of the site. Although no construction materials were apparent on the surface, historic artifacts, such as glass, ceramics and metal were recovered from excavations. The third structure has been destroyed by the river, and no trace remained in 1977. Disturbance of the prehistoric component caused by these structures was not great, and, in general, accounted for less destruction than the many years of plowing.

Evidence of recent looting by relic seekers was not found, so accounts of local residents in the area that the existence of

Plate I. 1930 aerial photograph showing the area of the Hanna site, 16RR4. The arrow points to the precise location of 16RR4. (scale approximately 1:18,000) Photograph courtesy of the U.S. Army Corps of Engineers, New Orleans.

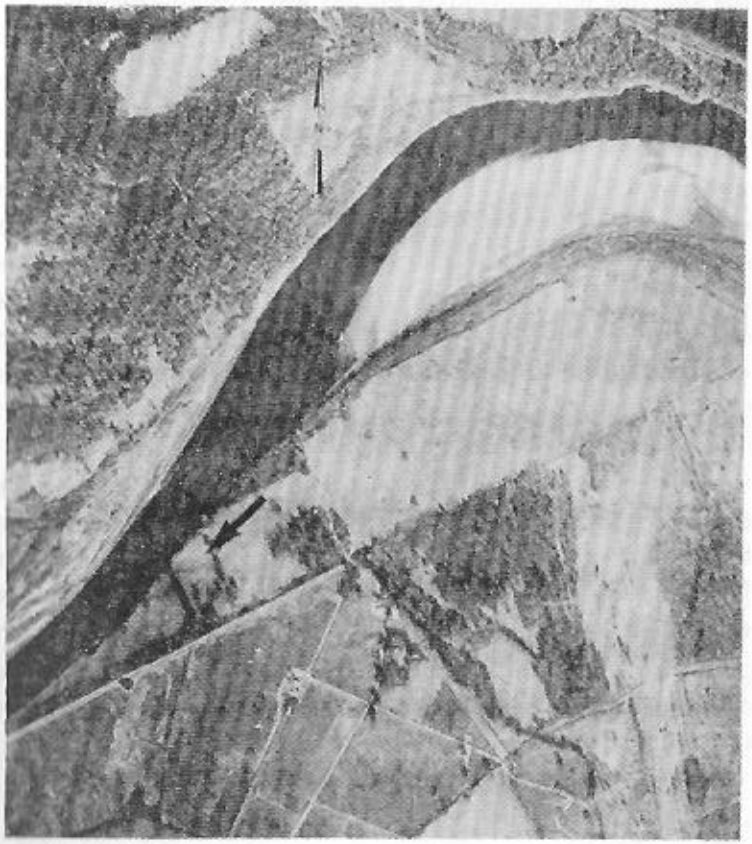


Plate II. 1976 aerial photograph showing the area of the Hanna site, 16RR4. The arrow points to the precise location of 16RR4. (scale approximately 1:12,000) Photograph courtesy of the U.S. Army Corps of Engineers, New Orleans.

the site was not previously known are, apparently, accurate. Additionally, no mounds or earthworks are evident at the site, a fact which has certainly contributed to its obscurity and consequent preservation.

A bulldozer was used at the site in recent years to remove some isolated pecan trees. The depressions gouged out by the bulldozer were not located in the areas of aboriginal habitation, so destruction was minimal. The disturbances caused by the bulldozer may have created an artificial division between the southeastern and northeastern ridge of sandy loam soil (Fig. 11). A large dead tree located between these areas shows signs of recent excavation by heavy machinery.

In considering all of the potential sources of disturbance, this site was relatively well-preserved when excavations were begun. The erosive action of the Red River probably accounts for the greatest amount of damage, since a portion of the site was, most assuredly, washed away. With the exception of plowing, all other possible destructive factors — historic construction, bulldozing, and looting—have had a minimal effect on site integrity.

Plate III. General view of the site looking west along S200 grid line. Note clay in foreground.

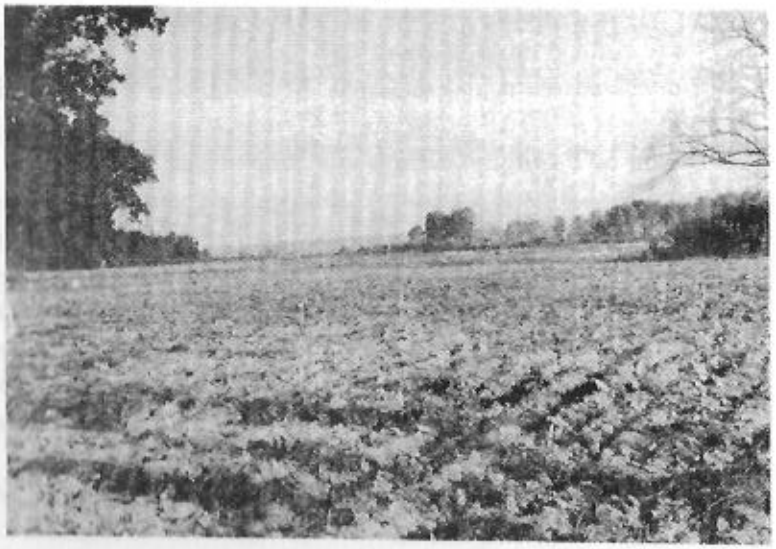


Plate IV. General view of the site looking northwest from the southeast site sector. Note sandy loam in foreground.

Plate V. General view of the northeast sector of the site looking west with the Red River in background.

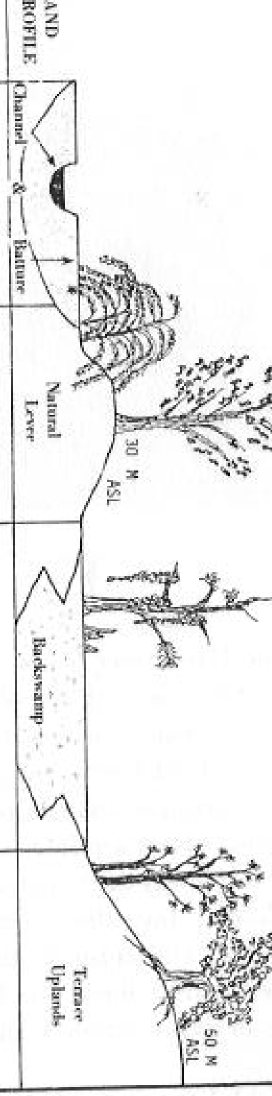
Environment

The Red River plain, like most alluvial valleys, can be divided into a number of econiches or microenvironments. The floodplain on which the Hanna site, 16RR4, is situated is a bottom-land hardwood and cypress region. The econiches present include backswamps, natural levees, and terrace uplands, which are less than 10km away (Fig. 4). Each of these zones was exploited by the prehistoric Indian occupants at Hanna, but the intensity of that exploitation varied seasonally and through time. The environmental zones did not necessarily determine Indian adaptations, but limited the range of exploitation strategies in each case.

Natural Levees

Natural levees build up during times of flooding when the water spills over the river banks and onto the floodplain. According to Russell (1969:54):

FIGURE 4. - IDEALIZED CROSS-SECTION OF ENVIRONMENTAL COMPONENTS OF THE RED RIVER ALLUVIAL VALLEY



	Channel & Batture	Natural Levee	Backswamp	Terrace Uplands
SOIL TYPE	Sandy loam and clay Valley Alluvium	Sandy loam and silty-clay	Clay	Sandy loam and red clay, Sparta sand
UPPER-STORY	Same as Natural Levee	Sweetgum, oak, pecan, willow, sycamore, honeylocust	Bottom hardwoods and cypress-water oak, overcup oak, sweetgum, winged and white elm, black locust, red gum, may haw	Mixed Southern Upland Hardwood-oaks, hickory, shortleaf pine, holly, black walnut, cedar, plum
UNDER-STORY	Same as Natural Levee	Cane, "tie vines", wild grapes, dewberry, palmetto, muscadine, cattail	Button willow near natural levee, coco grass in open areas, fresh water lotus, large canes, poke, wild mustard	Blackberry, dewberry, grape, huckleberry, sumac berries, muskmelon, goose berries, wild strawberries
FAUNA	Turtles, bass, pickerel, catfish, opossum, deer, gray squirrel, waterfowl, snakes, swamp rabbit, frogs, turkey, raccoon, crayfish			Deer, fox, squirrel, turkey, snakes, raccoon, opossum, upland bird, cottontail rabbit

(ADAPTED FROM SMITH 1975 FIG. 2 AND GREGORY N.D.)

> During flooding, the sediments in suspension in the channel move to areas of diminished velocity and decreased turbulence, an effect most pronounced on the levee crests. Only firm parts of the load travel down the backslopes of the levees, in decreasing quantities with greater distance from the River.

The deposit from one flood is a thin wedge tapering away from the river, which, over the course of many years of flooding, develops into a natural levee considerably higher along the bank tan away from it. The resultant land formation is a ridge-like deposit suitable for habitation both during the formation process and after the active channel is abandoned by the river. Flooding conditions are, of course, crucial in determining the suitability of an area for human habitation. Those areas subject to annual flooding are clearly useless for permanent, year-round settlement. However, many of the levees located at higher elevations in the Red River valley are rarely flooded, and these loci are ideal for extended occupation and, depending upon soil conditions, are well-suited to horticulture. 16RR4 is located on such an elevated natural levee, and, as discussed in Lenzer's paper, shows little evidence of successive flooding.

Soil: The Norwood-Gallion association represents the soil composition most often found on natural levees. This association is characterized by nearly level, loamy soils, which are fairly well-drained. The Norwood soil consists of recent river deposits that are reddish-brown silt loam or silty clay loam subsoil. The Gallion soils are the older river deposits, and consist of brown silt loam surface soils and yellowish-red silty clay loam subsoil (U.S. Geological Survey 1957).

Flora: On the natural levees, with their normally good drainage, a wide variety of trees (upper story) and grasses (under story) abound. These include pecan, hackberry,

sweetgum, cherrybark oak, cow oak, water oak, winged and American elm, honey locust, Nuttal oak, redgum, and persimmon (Brown 1972a:9). Under story vegetation on the levees includes cane, "tie vines," wild grapes, dewberry, and palmetto. Prior to the deposition of the natural levees and during the course of their development, the frontlands upon which they were built were receiving the new deposits of silt and sand with each flooding (Brown 1972b:xxxvii). This provided for a wide variety of vegetation, such as cottonwood, sycamore, redgum, black willow, hackberry, swamp-privet, honey locust, water locust, and green ash. Also present were goldenrods, asters, ironweed, sennas, bitterweed, and dog fennel (Brown 1972b).

Backswamps

The backswamps are portions of the floodplain behind the natural levees, farther from the river bank. They are lower-lying than the levees, often inundated with water at varying levels. During periods of flooding, fine-textured sediments are deposited in these areas. Backswamps may occur on the floodplains of old rivers, such as the Red River, and result from poor drainage.

Soil: The Moreland-Latanier association is commonly found in the area of backswamps and is characterized by somewhat poorly-drained alkaline clayey soils. The Moreland soils at lower elevations are made up of dark reddish-brown clay surface soils, with a dark reddish-brown clay subsoil. The Latanier soils on higher elevations are dark reddish-brown clay surface soils, with a light reddish-brown silt loam subsoil (U.S. Geological Survey 1957).

Flora: Depending upon the amount of standing water in the backswamps, a variety of trees, shrubs, and grasses may be found. Among the upper story in these areas are bottom hardwoods, cypress, water oak, overcup oak, sweetgum,

winged and white elm, black locust, cherrybark oak, honey locust, redgum, mayhaw (H.F. Gregory, personal communication). Baldcypress, tupelo gum, swamp red maple, and other trees and grasses that are water-tolerant are found in areas of high-standing water. Under story growth in backswamps include button willow, which occur near the natural levees, coco grass, which is found more in the open areas, water lotus, and, often, alligator grass, cattails and water hyacinth (H.F. Gregory, personal communication).

Uplands

The area to the northwest of the Hanna site is classified as the shortleaf pine-oak-hickory region (Brown 1972b:xxxvi). A marginal strip of area near Grand Ecore in Natchitoches Parish is more properly classified as the Upland Hardwood region (Brown 1972b:xxviii). Both these areas are characterized by dissected Pleistocene terrace formations which vary between 2.0 and 45m in relief. The streams draining the surface have developed a dendritic pattern which has resulted in a large number of hills and ravines separated by flat to gently sloping divides (G.S.R.I. 1975:2). Forests are extensive, comprising some 68 per cent of the total area (St. Amant 1959:68).

Soil: The sloping terrain of the upland region consists of the Shubuta-Boswell association. The soil is acid with clayey subsoils. The Shubuta soils are well-drained, having a grayish-brown fine sandy loam surface and a red sandy clay subsoil. Ironstone pieces are common. Boswell soils are moderately well-drained, with a dark-brown, very fine sandy loam surface, and a gray, mottled, red clay subsoil.

Flora: The shortleaf pine-oak-hickory region boasts a wide variety of trees, shrubs and grasses. In this rolling hill country, original vegetation included shortleaf pine, post oak, blackjack oak, southern red oak, sand hickory, white hickory,

Louisiana hickory, and nutmeg hickory (Brown 1972b:xxxvi). Along streams, redgum, hawthorn, dogwood, redbud, oaks, basswood and hackberry are common. Other vegetation in this region included goldenrods, asters, blazing-stars, windflowers, drummond rain-lily, trout lily, yellow violet and bloodroot (Brown 1972b:xxxvii).

Resource Exploitation by H. F. Gregory

Numerous natural resources were available within easy walking distance of the Hanna site, or within only a few days travel. Gravels, including cherts, jaspers, petrified woods, and chalcedony were available in the upland terraces west and east of the alluvial plain. Outcrops of white Catahoula Sandstone and various marls were available at several points along the stream, such as Coushatta Bluff, Grand Ecore, DeLoge's Bluff, and the rapids below Boyce, Louisiana, not to mention the hills paralleling the stream. Point bar deposits contained black and red cherts, as well as rare pieces of novaculite, the latter having rolled downstream from the Kiamichi or Sulphur rivers, which flow out of the Ouachita and Kiamichi Mountains, respectively. Fairly massive pieces of quartzite and veins of highly-silicified sandstone, or "orthoquartzite", occur in the uplands. Fine-grained silicified palm was available in the Kisatchie Wold (the Sleet Hills and the Gorum Hills).

Game, especially the white-tail, or Virginia deer, and black bear, was everywhere. The uplands carry the densest populations today, but, before European agricultural practices, large herds of deer existed even in backswamp areas. Smaller game—squirrel, raccoon, rabbit, and opossum—complemented crustaceans (crayfish), molluscs, and fish (gar, freshwater drum, buffalo fish, catfish, bass and sunfish). Seines operating on the Red River in the 1940s had no trouble catching 900 to 1300 kg of fish a day. Indians, at

the height of the trade in deer hides, reportedly killed 300 deer a season. This immense biomass is virtually inestimable. Waterfowl, migratory birds including duck, goose, and passenger pigeon, came in the autumn in vast flights, some taking three days to cross the sky (Lowery 1974a).
1974a).

Plant foods were as rich and varied as animal foods: freshwater lotus seeds, honey locust beans, pecans, acorns, three to four varieties of hickory nuts, smilax roots, coco grass bulbs, wild onion, poke, cattail, paddleweed, grapes (two varieties), blackberry, dewberry, mayhaw, wild plum and sloes, mulberry, purslane, and other plants were readily available and were used for foodstuffs. Most have some representation in the archaeological sites along the Red River. Purslane has been reported archaeologically (Webb and McKinney 1975), as have honey locust (Gregory 1965), hickory nuts and acorns (Webb 1959; Smith 1975), possible sloes (Webb and McKinney 1975), and smilax (Gregory 1969). Nut stones are found at many sites in the valley and caches of hickory nuts occur throughout the culture sequence.

Raw materials, including osage orange for bows, dogwood for arrow shafts, river cane for blowguns and basketry, and hickory for a wide variety of artifacts were readily available.

Great salt flats were located at Lake Bistineau on Saline Bayou in Natchitoches Parish, and on Grand Bayou in Red River Parish.

In sum, the valley provided its occupants with a more than adequate selection of resources necessary to ensure survival, without the addition of agricultural crops. Game, fish, fowl, and plant resources were available in sufficient quantity to provide ample food, yet even early Caddoan occupations have yielded small quantities of maize (Webb and McKinney 1975; also Chapter 17, this report). The point at which the shift from hunting, gathering, and fishing to intensive

agriculture as the primary subsistence mode took place remains unknown; but, as will become clear in this report, the occupants of the Hanna site were clearly engaged in horticultural, as well as exploitative, pursuits.

Geology And Geomorphology

John Lenzer

Background

Interdisciplinary studies of Late Quaternary and Holocene prehistory by geologists, archaeologists, and palynologists are creating an increasingly detailed view of North America during the past 30,000 years. Man has probably been present on the Gulf Coastal Plain for at least 13,000 years and has lived in the alluvial valleys, on their borders, and at the coast. Archaeological site investigations can contribute absolute dates and palaeoecological data; historical geomorphic work provides information about geomorphic and hydrologic elements in palaeoenvironments; the addition of palynologic studies gives support and extension to palaeoclimatic and palaeoecologic inferences.

The study of the geomorphology and geomorphic history at the archaeological site 16RR4 was conducted for New World Research Institute, New Orleans, adjunct to the Institute's

archaeological investigations of that site. The author had made a prior reconnaissance of the Red River natural levee in that area, and conducted field investigations at the site on 17 and 24 June, 1977.

Previous Work: The general geology and geomorphology of Red River Parish were described by Murray (1948). Smith and Russ (1974) prepared profiles and geomorphic interpretation maps (based on U.S.G.S. 15-minute quadrangles) for the lower Red River Valley. The "Hanna" map covers the area around 16RR4. The form and alluvial fill of the entrenched, latest-Pleistocene, and Holocene Red River alluvial valley were investigated by Kolb (1949) and Schultz and Krinitzsky (1950). Price (1964) and Abington (1973) described and quantified Red River meander morphology, hydraulics, and channel scour-and-fill processes and deposits. Abington extended his work, including historical data, to interpret recent changes in Red River channel morphology. Russ (1975) investigated the Quaternary geomorphic history of the Red River alluvial valley and its boundaries. Lenzer (1977a) analyzed the methodological and geological problems in interpretation of the geomorphic history of the Red River alluvial valley and synthesized interpretations of other investigators.

Process, form, and sedimentation in meandering fluvial systems have been studied by many workers. Leopold, Wohlman, and Miller (1964), Allen (1970), Reineck and Singh (1975), and Ray (1976), describe fluvial systems other than the Red River. S.E.P.M. Special Publication No. 12, *Primary Sedimentary Structures and Their Hydraulic Interpretation* (Middleton 1965), contains much original work on the interpretation of primary sedimentary structures in fluvial systems. Ray (1972) reported on his continuing work on lower Mississippi River fluvial deposits. Fisk (1938,

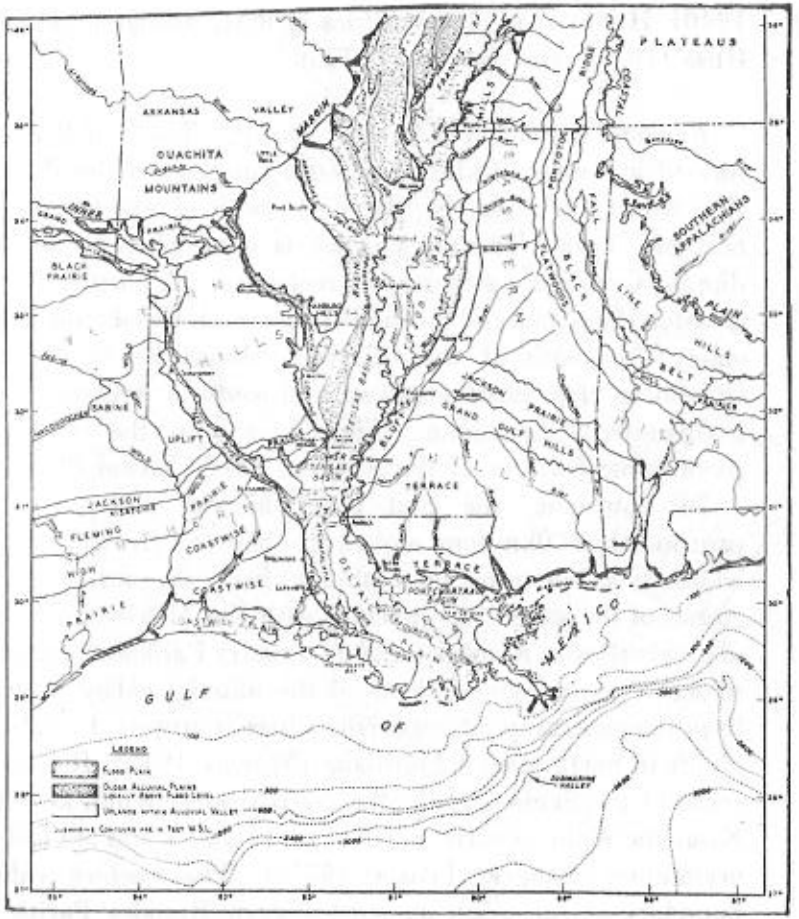


FIGURE 5. REGIONAL GEOMORPHIC FEATURES. (FROM FISK 1944)

1940), Harms *et al* (1963), Price (1964), Abington (1973), Russ (1975), and Lenzer (1977b).

Regional Geology and Geomorphology: The Red River is formed in western Oklahoma by the juncture of the Prairie Dog Town Fork and the Salt Fork, both of which arise in northern Texas. The river valley is entrenched in gently-dipping Cretaceous sedimentary rocks near the northern Gulf Coastal Plain margin through Texas and Oklahoma. The valley lies south of the Ouachita Mountains in eastern Oklahoma, then turns southeast and south in Arkansas and northwestern Louisiana (Fig. 5 shows the regional geomorphic features of the northern Gulf Coastal Plain).

In Louisiana, the Red River alluvial valley is approximately 320km long and ranges between five and 30km wide. Its mean trend is southeast, from the northwestern corner of the state to its juncture with the Mississippi River alluvial valley in Avoyelles and St. Landry Parishes. Straight, structure-controlled segments of the alluvial valley diverge from the general trend, especially where it crosses the Sabine Uplift in northwestern Louisiana (Murray 1948). Resistant rocks of the Sabine Uplift, the Nacogdoches Wold, and the Kisatchie Wold constrict portions of the valley and are loci of orientation changes (Lenzer 1977a). The western valley boundary as far south as northwestern Rapides Parish is primarily an upland on Tertiary marine sedimentary rocks. The southeastern portion of the western boundary, and most of the eastern valley wall, are uplands and terraced uplands of Pleistocene-age, Red River fluvial deposits. The southeastern boundary of the alluvial plain is the Teche Ridge, an abandoned, ancestral Mississippi River meander belt along the western margin of the Mississippi River alluvial valley.

Floodplain elevations in the northwestern part of the valley in Louisiana range between 58m (backswamp) and 62m

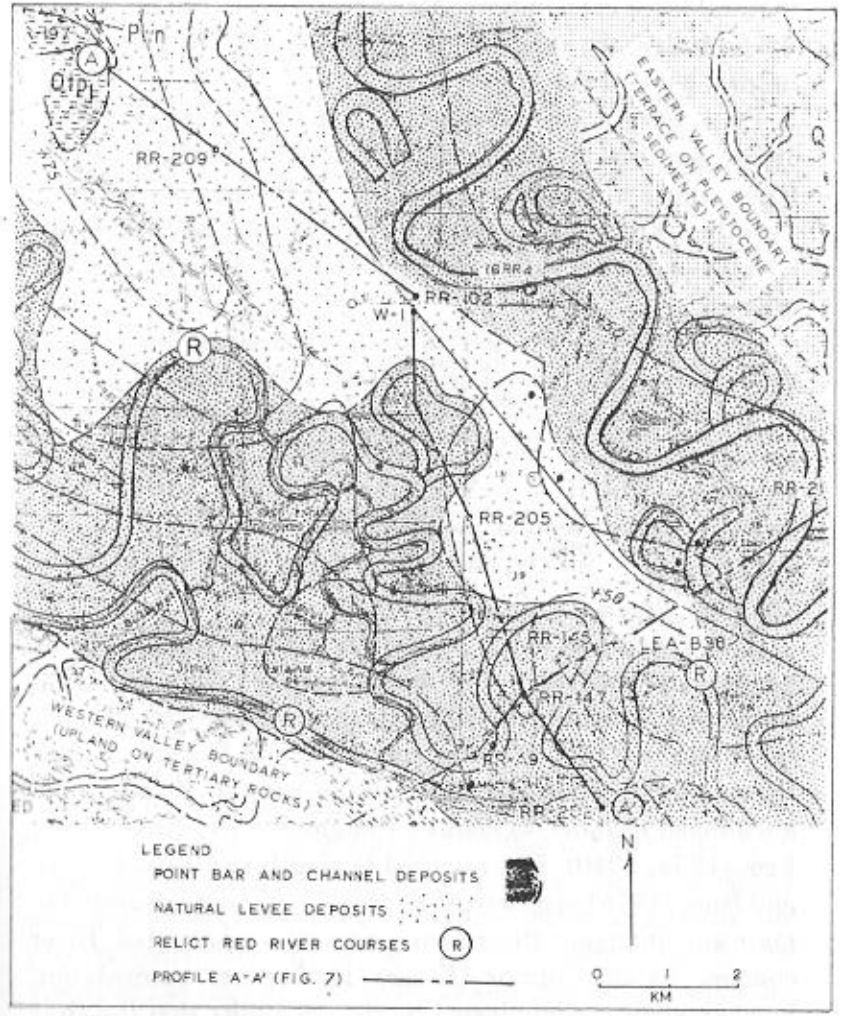


FIGURE 6. FEATURES IN THE VICINITY OF THE HANNA SITE, 16RR4. (PORTION OF HANNA QUADRANGLE FROM SMITH AND RUSS 1974)

(natural-levee crest) above Mean Sea Level (MSL). At the Teche Ridge, the range is eight (backswamp) to 11m (relict natural-levee crest) above MSL.

From the Arkansas/Louisiana boundary to a point some 30km southeast of Alexandria, the present, meandering Red River course migrates from one side of the alluvial valley to the other. From that point, it turns northeast and leaves the Red River alluvial valley through Moncla Gap in the Terrace uplands.

Site 16RR4 is on a section of the river which lies close to the eastern valley boundary. In and adjacent to its present meander belt, the Red River erodes and deposits channel, point bar, natural levee, crevasse splay, and backswamp sediments. The river section which includes 16RR4 comprises a series of regular meanders with wave lengths of one-and-one-half to two km, and amplitudes of approximately two km (Fig. 6).

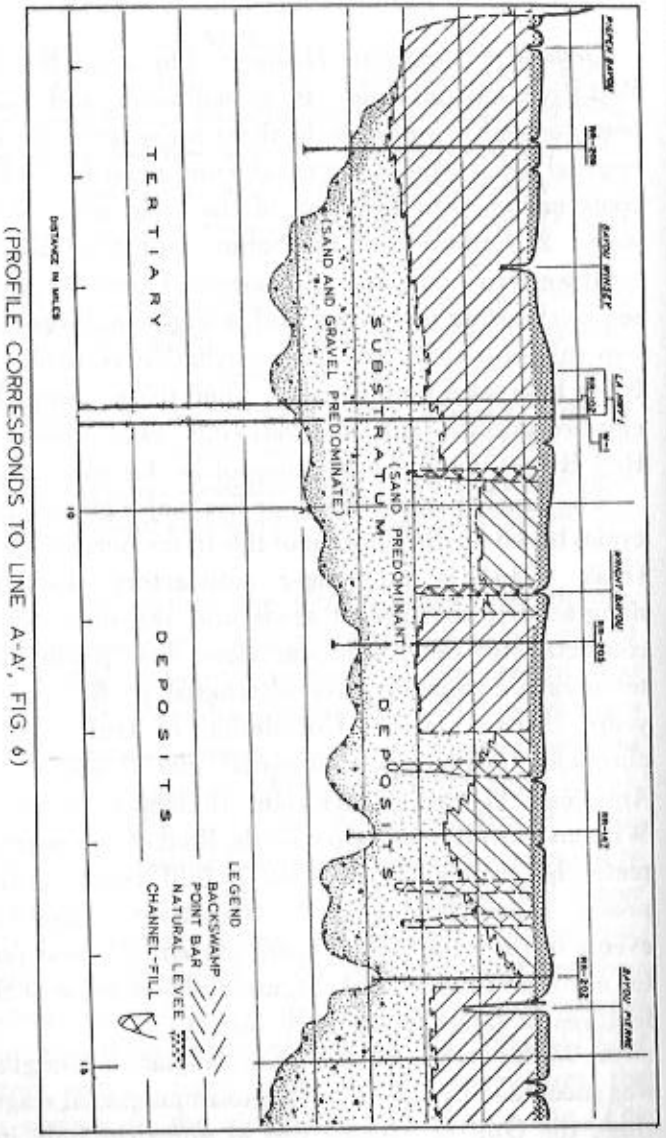
Throughout the length of the alluvial valley in Louisiana, bayous, streams, lakes and minor drainage features exhibit forms and dimensions similar to those of the present Red River meander belt. Meander migration and channel changes have occurred in historic times, leaving cut-off meanders and abandoned channel segments (Abington 1973; Russ 1975). Fisk (1938, 1940), Murray (1948), Smith and Russ (1974), and Russ (1975) synthesized available data and attempted to map and interpret the relative ages of various Red River courses. As this author (Lenzer 1977a) has pointed out, interpretation is complicated by the possibility that the river occupied simultaneously two or more channels, or reoccupied portions of abandoned channels. Smith and Russ (1974) identify two major, recent, abandoned courses on the floodplain surface in the vicinity of the Hanna site. The present course occupies the eastern side of the valley, an older, nearly-obscured course the center, and the Jim's River course

occupies the western side of the valley (Fig. 6).

General Geomorphic History: The gross features of the Red River alluvial valley (form, sediments, and courses) have been formed in response to three major geologic events: 1) gradual depression of the continental crust in the Gulf Coast Geosyncline, with elevation of the area north of the downwarp; 2) formation of the Sabine Uplift, a broad dome in northwestern Louisiana and eastern Texas; 3) oscillation of sea level during the glacial and interglacial stages of the past two million years. Sea level oscillation controlled the Red River base level both directly, when the ancestral Red River emptied into the Gulf, and indirectly, as at present, when the Red River joined the Mississippi or Arkansas Rivers.

The simple picture of four or five major glacial/interglacial cycles based on distribution of tills in the northern hemisphere (Fisk 1944) is no longer satisfactory. Evidence from nonglaciated continental areas and the deep ocean basins conflicts with the traditional view. Ten glacial/interglacial temperature regimes have alternated in the past 800,000 years (Butzer 1976). Correlation of Gulf Coastal Plain chronology with five continental glacial stages (in North America: Nebraskan, Kansan, Illinoisan, Early and Late Wisconsinan) is uncertain past the limit of radiocarbon dating methods. Events of the past 75,000 years controlled the present geomorphology of the Red River alluvial valley; the events of the past 45,000 years present the best possibilities for accurate time control. Figure 8 shows some of the salient features of latest Quaternary history.

At 75,000 to 80,000 B.P., the Sangamon interglacial stage was succeeded by the early Wisconsinan glacial stage. At that time, the Gulf of Mexico was at approximately its present level. The Mississippi and Red Rivers (and other Mississippi tributaries) had aggraded their alluvial valleys to flat



(PROFILE CORRESPONDS TO LINE A-A', FIG. 6)

FIGURE 7. PROFILE OF ALLUVIAL VALLEY FILL WEST OF THE HANNA SITE, 16RR4. (FROM SMITH AND RUSS 1974).

floodplains shortly after the preceding Illinoisan glacial stage and were in meandering states. With the onset of glacial growth and sea level fall, the rivers began to entrench their floodplains, and probably became braided streams. The early Wisconsinan glacial maximum probably occurred approximately 50,000 to 45,000 years ago. Saucier (1974) tentatively proposes that the late waning stages of early Wisconsinan glaciation occurred about 35,000 to 40,000 B.P., and the mid-Wisconsinan interglacial stage lasted until approximately 30,000 to 25,000 B.P. During this time, valleys were aggraded as the Gulf returned to nearly its present level. During the late Wisconsinan glacial stage sea level again dropped to about -120m MSL (Frazier 1974; see Fig. 8), and the rivers again entrenched and widened their valleys. Remnants of the mid-Wisconsinan floodplains (Deweyville terrace, cf. Saucier 1968) occur in the Pearl, Sabine, and various other Texas, Mississippi and Atlantic coast plain rivers (Gagliano and Thom 1967), the Ouachita River (Saucier and Fleetwood 1970) and the Arkansas River (Saucier 1974). In the lower Mississippi and Red River valleys, the Deweyville terrace has not been identified. Mid-Wisconsinan floodplain deposits could be buried, completely eroded away, or unrecognized. In the Red River alluvial valley scalloped re-entrants in the valley walls could be the products of lateral erosion by the mid-Wisconsinan, meandering Red River (Lenzer 1977a).

About 19,000 to 18,000 years ago, glacial retreat began, and the Gulf level rose rapidly. Figure 8 shows Frazier's (1974) interpretation of the rates and minor still-stand events within the general transgression. Other workers (e.g., Shepard 1960) differ slightly in rates and magnitudes of events. Coleman (1966) calculated that the present stable sea level state began at approximately 3,650 years B.P.

For the Red River, the rapid rise of base level during latest

Wisconsinan (19,000 to 11,000 B.P.) and Holocene (post-11,000 B.P.) time caused dumping of large amounts of sand and gravel in the valley. These deposits extended upstream from the river's initial debouchement into the Gulf of Mexico and later from the juncture with the rapidly-aggrading Mississippi River alluvial valley (according to Fisk 1944). During at least the past 12,000 years, the Red River has spread meander-belt and backswamp deposits over the earlier, graveliferous deposits (Fig. 7). Saucier (1974) estimates that by 12,000 years B.P. the floodplain was four to five meters lower than at present. A large difference between Red River and Mississippi River floodplain gradients has caused the Red River to change meander belts frequently. Dissipation of kinetic energy through formation of meanders and flow in two or more major channels, are important controlling factors in Red River floodplain morphology. Smith and Russ (1974) mapped and profiled the complex of meander belts in the vicinity of 16RR4 (Figs. 6-7).

By approximately 6,000 B.P., the Teche-Mississippi meander belt had been established along the western side of the Mississippi River alluvial valley. The Red River emptied into the Teche-Mississippi until the Mississippi River diverted to a new meander belt on the eastern side of its alluvial valley, then used the abandoned course to reach the Gulf of Mexico. The Red River floodplain was gradually aggraded to nearly its present elevation. At approximately 2,400 B.P., the river diverted through a low area (the present Evergreen Gap) in the eastern alluvial valley wall (Saucier 1974). Bayou des Glaises in Evergreen Gap occupies the last course of the meander belt which resulted from this diversion. After occupation of the Evergreen Gap course for 500 to 1,000 years, diversion occurred into the Boeuf-Red River course (which again exited the Red River alluvial valley at the abandoned Teche-Mississippi meander belt).

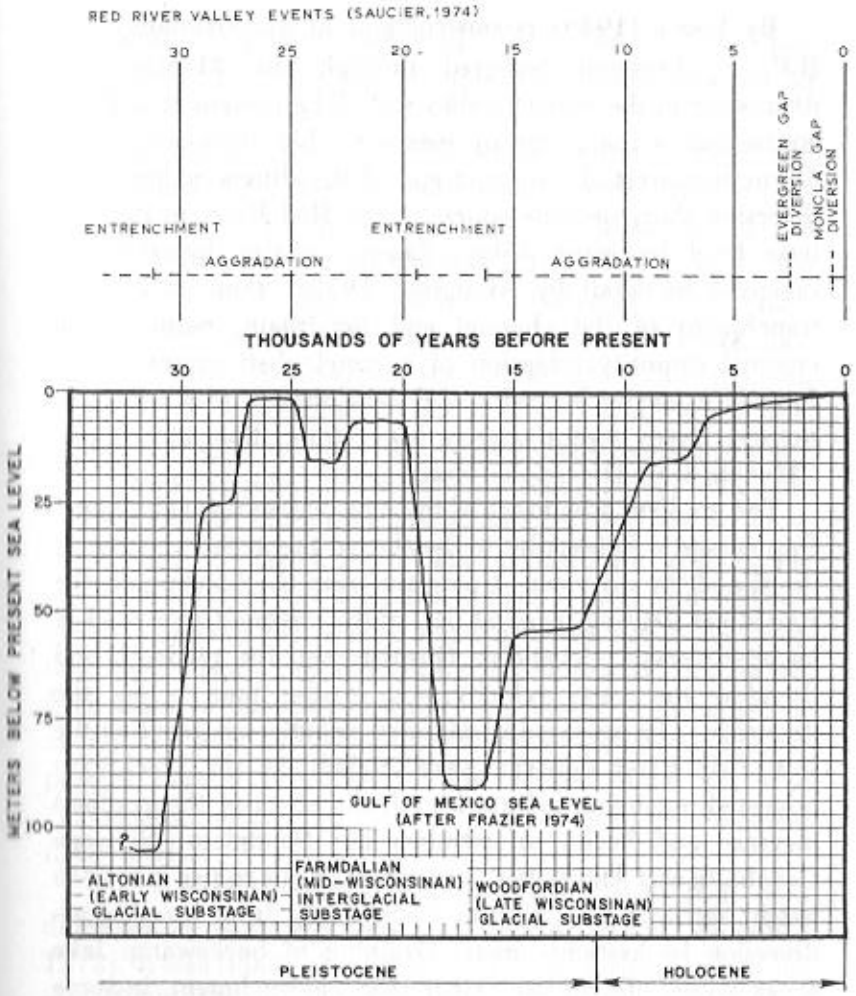


FIGURE 8. LATE PLEISTOCENE/HOLOCENE EVENTS.

By Fisk's (1940) reconstruction, at approximately 500 B.P., a diversion occurred through the Moncla Gap depression in the eastern valley wall. The present Red River course leaves the valley by means of this depression, some 48km northwest of the lower end of the alluvial valley. This diversion shortened the course of the Red River to its local base level by some 45km. Effects of the diversion are reviewed in detail by Abington (1973); they include entrenchment of the channel and floodplain, reduction in channel sinuosity, creation of channel obstructions in the form of extensive log rafts, and development of a system of natural levees several meters lower than those of the pre-"Moncla Gap Diversion" courses.

The gradient advantage of the new course through Moncla Gap caused a knickpoint to develop in the active channel at the site of the diversion. Upstream from the knickpoint, the Red River thalweg (deepest part of the channel) remained at its pre-diversion elevations. Downstream, the gradient, and therefore the water velocity, was greater than before the diversion. The knickpoint migrated rapidly upstream as the soft, Red River deposits were eroded. As the knickpoint migrated, upstream tributaries felt the effect of the gradient increase and began to entrench the floodplain. Between Coushatta and Alexandria, low scarps of one to two meters in height separate pre-diversion backswamp from lower, post-diversion backswamp areas. Draining of backswamp lake areas caused alluviation, rather than entrenchment, in some places (Murray 1948).

Part of the effect of knickpoint migration was obstructed by a resistant Miocene siltstone, which the river encountered north of the site of Alexandria. This siltstone formed the rapids for which Rapides Parish was named. In 1892 and 1893, the U.S. Army Corps of Engineers removed siltstone outcrops from the channel, eliminating the rapids, and full

knickpoint migration resumed (Abington 1963). Entrenchment effects in the floodplain are now seen up to 110km north of Moncla.

In addition to progressive floodplain entrenchment, the gradient increase caused an increase in meander wavelengths and a decrease in channel sinuosity. Comparison of the present course of the Red River south of Shreveport to the Bossier/Caddo Parish boundary illustrates how much straighter the river has become in the past 150 years, particularly since removal of the Great Raft. In general, meanders of post-Moncla Gap diversion courses are less regular and less numerous than those of pre-diversion courses. The recent meanders are commonly separated by relatively straight reaches more than five kilometers long. As the river cut its channel deeper, flood stages reached the crests of the old natural levees less frequently. Fisk (1938) and Murray (1948) observed two sets of natural levees which occur intermittently in the Colfax-Campti-Coushatta area. One set lies from three to five meters lower, and closer to an active or abandoned Red River course. The lower set corresponds to present normal flood levels. The higher, outer set (the "Coushatta Surface") probably corresponds to pre-diversion flood levels.

The historic "Great Raft" or Red River Raft was described by early explorers (Brackenridge 1814; Stoddard 1812). It was finally cleared by the Corps of Engineers in the mid-1870s. This migrating complex of log jams created local dams, diverted the river into multiple courses between Shreveport and Alexandria, and caused large, longlasting lakes in backswamp areas. Indian legends place the foot of the raft in late prehistoric time as far south as the site of Alexandria (Fisk 1940). The log rafts were probably products of the Moncla Gap diversion event. Entrenchment of the channel cause exposure of natural levee strata containing high

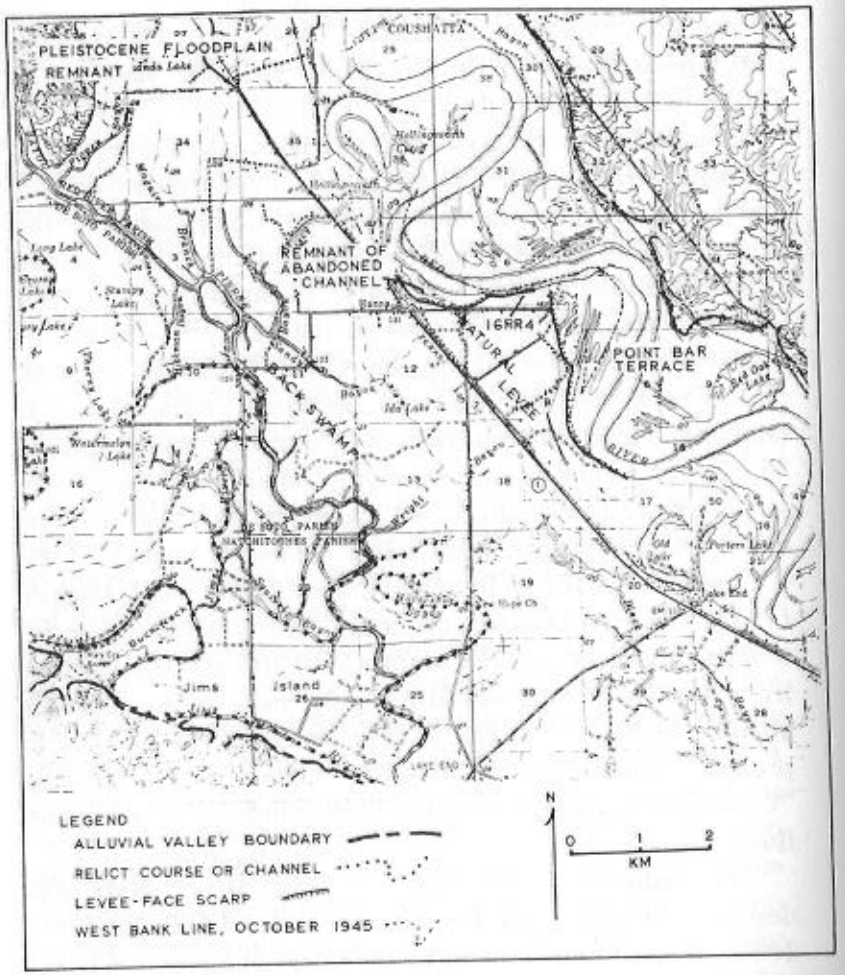


FIGURE 9. INTERPRETATION OF GEOMORPHIC FEATURES AT THE HANNA SITE, 16RR4. (BASE MAP - U.S.G.S. HANNA QUADRANGLE, 15-MINUTE SERIES).

percentages of montmorillonite clay. Alternate wetting and drying made this expanding-lattice clay unstable, promoting caving of the tree-covered levee banks. If, in fact, the foot of the raft was gradually retreating upstream (from Alexandria in late prehistoric times to near Campti in the late 18th century) the Corps of Engineers and farmers, by clearing the log jams and the banks, may have only hastened natural processes which would eventually have eliminated the raft. After the raft was cleared, the river was restricted to one channel, long-lasting backswamp lakes were drained, and entrenchment effects became more pronounced.

Site Geology and Geomorphology

Geomorphic Features: The Hanna site lies on a presently eroding, slumping physiographic natural levee. The crest of the natural levee at the site, ca. + 40.5m MSL, is approximately eight meters above normal June low water level. Figure 9 and Plate I show the geomorphic features in the vicinity. The crest extends west above the Red River for approximately one kilometer. Farther west, (toward La. Highway 1 and town of Hanna), the levee crest and river diverge. The intervening, slightly lower area is a remnant of a cutoff meander. From its eroding edge, the levee slopes down to the south and southwest, over distances of one to two kilometers to the backswamp (elevation approximately + 38.5m MSL), drained by Sandy, Wright, and Horseshoe bayous. The two latter drainage channels probably occupy relict, early Red River meanders, which are now nearly obliterated by compaction, erosion, and submergence (Lenzer 1977a).

Approximately 350m east of the site, the levee crest turns sharply south and extends in a shallow, concave curve to the southeast for 1.2km. At that point, the crest makes another

sharp bend to the south, and continues south in a shallower 1.2km long arc that swings to an easterly strike. These arcuate reaches of the levee exhibit west and southwest-trending backslopes. The two arcuate sections overlook a terrace approximately three meters lower, which shows two contrasting terrain styles. Adjacent to the northern arc is a set of short-period ridges and swales (100 to 200m long, ridge-to-ridge distance 25 to 35m) that approximately conform to the trend of the levee crest. This terrace is separated from the river on the north by a three to four meter scarp. To the east, a series of northeast to southwest-oriented point bars lines the west side of the river and extends south until it pinches out against the east-trending natural levee (Fig. 9).

Stratigraphy and Sediments: Seen from above, the riverward face of the natural levee at the site displays alternating salients and re-entrants giving it a scalloped appearance (Fig. 11). Ten sediment profiles were logged from the levee crest to the river edge (where possible). Figure 10 shows the stratigraphy of the levee face. Approximately 50m west of Profile X, the Corps of Engineers revetment begins and covers the levee face completely. East of the site, the scalloped levee face is replaced by an even, lower, gentler slope. Above the June low-water level, this slope comprises a three to four meter section of layers of silty, clayey-fine sand, and fine sandy clay. The layers dip toward the river, are 10 to 20cm thick, and are cross-stratified. They appear to be recent high-water channel slope deposits related to meander migration.

At the base of the exposed levee face, extending one and one-half to two meters above the June low-water level (from approximately +32 to +34m MSL), is a continuous stratum of clay, weathered gray-brown to dark red-brown, exhibiting blocky jointing, with iron-stained fracture surfaces. The clay

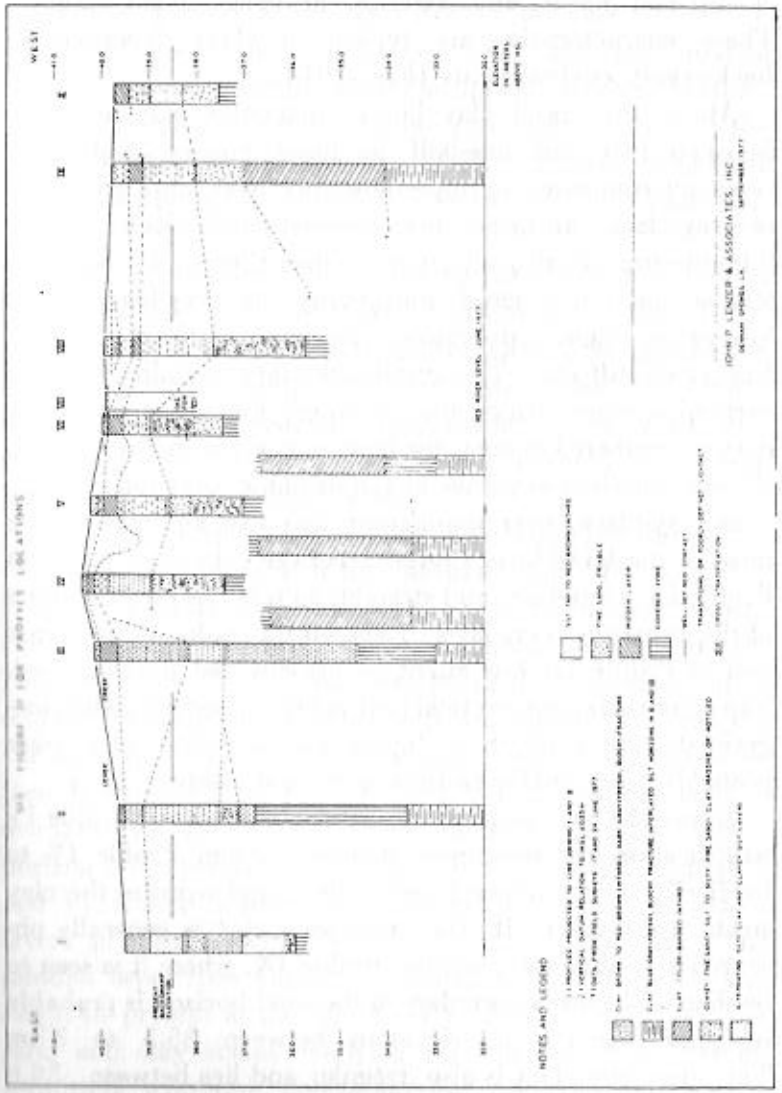


FIGURE 10. NATURAL LEVEE STRATIGRAPHY SITE 16RR4

is stiff and plastic, and contains carbonized plant material. These characteristics are typical of clays deposited in backswamp environments (Fisk 1944).

Above this basal clay lies a distinctive clay sequence between two and one-half to three meters thick. The sequence comprises an uppermost clay layer, dark-gray, tan, or gray-black; an upper, maroon-weathered, blocky-jointed, limonite-stained, silty clay layer; a lower, silty clay, limonite-stained and weathered bluish-gray to gray-black; and lowermost, light tan-banded, maroon-weathered, blocky-fractured, stiff clay. The gray-black clays contain abundant carbonized wood fragments. Although these clay strata are deeply weathered (except for fresh exposures in Profile IX), the characteristic sequence of tan or black, over tan-maroon, over gray-black, over tan-maroon clay can be traced along most of the levee face. Contacts between the four layers at Profile IX were sharp and straight, as was the upper contact of the uppermost clay layer. These strata could not be traced east of Profile III but might be present and unrecognized. The color variations, vertical position in the sections, and fine-grained nature of these layers indicate that they were probably deposited in the distal portion of a natural levee.

Above the color-banded clay layers, and east of Profile IV stratification becomes more complex. From Profile IV to Profile X, a continuous layer of fine sand overlies the clay strata. Its contact with the underlying clay is generally obscured by colluvium, except in Profile IX, where it is seen to be sharp. The lower boundary of the sand horizon is probably irregular, ranging in elevation between 35.5 to 37.m The upper boundary is also irregular and lies between 39,0 and 38.0m MSL. Higher and lower portions of the upper and lower contacts do not appear to be correlated; therefore, the irregularities do not represent differential compaction in the substrata after deposition of the sand. Scattered

throughout portions of the sand stratum are silty and clayey interlayers. Sedimentary structures of the sand layer include trough cross-stratification, climbing ripple cross-stratification, and horizontal lamination. Massive zones are common in the section. Sediments and structures similar to these are present in the upper portions of inactive point bars on the present Red River.

Overlying the sand horizon is a variable sequence of clay, sandy clay, silty clay, clayey sand, and silty sand layers. These strata are much harder than the friable sand. The aggregation ranges between one-quarter to one-and-one-half meters thick. Colors of the layers are light shades of tan, brown, and red-brown. This sequence represents gradual flood-stage construction of a natural levee.

An irregular boundary ranging in elevation between 39.0 to 40.2m MSL separates the hardpan sand, silt, and clay layers from an overlying dark gray-brown to dark red-brown, silty, sandy clay stratum. The latter stratum is traceable from Profile II to Profile IX, and corresponds to the archaeological midden layer excavated on the levee top. Figure 10 shows the variation in thickness (15cm to one meter) along the levee face. In Profiles III, IV, V, VI, and VII, the midden layer is overlain by a thin (10 to 15cm) sandy loam. The midden horizon is not present in Profiles I or II. Between Profiles V and VI, it dips down to the east, below a 60cm section of layers of silty, sandy clay, and blocky-jointed clay. The midden layer rises slightly in elevation at Profile IX and might be present at the top of the section in Profile X. The sand and clay strata overlying the midden show that intermittent overbank deposition has occurred since abandonment of the site. The thin sandy loam in Profiles III through VIII indicates that the levee crest at the site has been above the mean height of flood stages at least since abandonment of the site.

Figure 10 shows the change in distribution of the sediment types east of Profile III. The basal clay is present in Profiles II and III; if it is present at Profile I, it is covered by recent deposits. In the upper portions of Profiles I through III, a section of gray-brown, weathered, stiff, blocky-jointed clay displays a level upper contact, and an irregular lower contact. The form and elevation of this upper clay zone indicate that it might represent the filling of an abandoned crevasse. The midden layer overlaps this clay in Profile III. Below the blocky-jointed clay lie sand, silt, and alternately sand and silt layers.

Discussion and Conclusions

Red River Deposits: In the Red River alluvial valley, back-water areas (backswamps, and abandoned channel segments in meander belts) commonly contain deposits of dark gray or blue-gray clay. Relatively pure clay can alternate with layers of silty clay. These quiet-water clays typically contain much plant debris. Occasional subaerial exposure causes shrinkage and development of joints in the clay layers. Ground water migrating along the joints leaves deposits of hydrous iron minerals. In backswamp areas of the floodplain, aggradation occurs only by overbank deposition from floodwaters of the Red River or its tributaries.

Meander belt deposits comprise channel (point bar, high-water levee slope, etc.; Fisk 1944, Gagliano and Van Beek 1970, Abington 1973) and overbank (upper point bar, natural levee, crevasse; see Fisk 1944, Saucier 1963, Reineck and Singh 1973, Ray 1976) types. Initiation of a new Red River meander belt could occur by formation of a crevasse during a flood, with rapid down-cutting of the natural levee. A crevasse could subsequently be filled and abandoned or become a permanent floodwater distributary, with low

natural levee, crevasse; Fisk 1944, Saucier 1963, Reineck channel and associated backswamp drainage had a gradient advantage over the main channel, the river would eventually divert into the secondary drainage and form a new meander belt.

In that process, river flow in the channel would form new meanders. Natural levees would grow vertically and laterally by flood-stage overbank deposition, and point bars would be built laterally by flood-stage channel deposition. Lateral migration of the channel causes a succession of point bars to be built, with deposition occurring on the channel face and downstream end of the point bars. Flood-stage deposits of sand and silt on active point bars grow and merge with the outer, natural levee deposits. Eventually, in each meander belt a stage is reached in which the natural levee crests match the height of normal flood stages, and only a major flood can overtop the banks.

Meander migration downstream erodes older channel and point bar deposits and forms new ones. Flow around meander bends also erodes inner portions of the natural levees. However, meander belts do not migrate laterally to any great extent, so outer natural levee deposits are usually much older than adjacent channel deposits.

In general, point bars contain the coarsest sediments of the meander belt; the major exception is the bottom of the active channel, where gravel is concentrated. Grain size generally decreases upward, but interlayered fine sand and silt are common in the upper portions of the bars (Lenzer 1977b). Pebble concentrations are common along Red River channel bars. Within a point bar, sedimentary units tend to be lenticular and pinch out over short distances. Structures include trough cross-stratification, tabular cross-stratification, and horizontal or planar stratification.

Overbank deposits on inactive Mississippi River point bars

were described by Ray (1976), and are similar to those found along the Red River. He found that sand and silt strata most commonly showed climbing ripple cross-stratification, trough cross-stratification, horizontal and parallel lamination, and several varieties of distorted lamination. Distribution of the structures was roughly cyclical, corresponding to several annual flood stages with climbing ripple cross-stratification at the base, trough cross-stratification (or, infrequently, horizontal lamination) at the top. Thin, discontinuous clay layers (clay drapes) and erosion surfaces marked the upper and lower boundaries. Overbank deposits of this type are intermediate between discontinuous, highly variable, coarser-grained point bar strata, and more continuous, finer-grained, natural levee strata.

The earliest layers in a growing natural levee along a diversion channel should be similar to point-bar overbank deposits but more continuous. As overbank deposits build up to the level of normal flood stage, the accumulation forms a mature natural levee. The upper portion of a natural levee generally comprises layers of fine-sandy clay and silt, each less than a few tens of centimeters thick, which can be traced for long distances in the natural levee face.

Crevasse channels do not necessarily become new meander belts. Sediments deposited in them include cross-stratified channel sands, silts, and clays from waning flood currents. Silt and clay layers deposited from subaerial slope wash can also be found in the channel-fill strata. Crevasse channel-fill material is laterally and vertically variable in composition and stratification.

Deposition at the Site: Despite the restricted exposures on the levee face, some tentative identifications of the strata are possible. The basal clay and, possibly, the overlying, color-banded clay layers were deposited in a backswamp, which

slowly aggraded to an elevation of at least +37m MSL. The color-branded clays could also represent sedimentation on the distal portion of a natural levee during a major flood. The present backswamp lies at an elevation approximately +38.5m MSL; these lower clay deposits are therefore probably several thousand, and perhaps as much as 5,000 years old. Following a diversion of the Red River channel, overbank sands and silts were spread across the lower clays. The irregular contact of the lower sand layer could indicate local erosion of the clays.

Accumulation of sand and silt during one or more flood stages eventually built up a natural levee, and silt and clay deposition predominated. The mixture of sediment types in Profiles I, II and possibly III could represent crevasse channel-fill deposits. A sandy, silty clay draped over the irregular top of the growing natural levee was metamorphosed into a midden by prehistoric Indians. The archaeological excavations (see section on "Site Stratigraphy") indicate that occupation was concurrent with formation of a soil "A" horizon on sandy and clayey sediments, which formed a slightly irregular natural levee crest. The midden stratigraphy indicates that deposition on the levee crest was rare or was not occurring during the occupation. The low area at the eastern end of the site, over variable Profile I and II strata, could have been a marshy depression during Indian occupation. Subsequently, a thin, overbank sand layer covered a portion of the site, and flood-stage silts and clays filled in some of the lower areas.

Age of the Site: Although the present meander belt has been greatly modified by the effects of removal at the Rapides in the 1870s, the elevation and continuity of the natural levee crest between Natchitoches and Armistead offer some evidence of its relative age. New topographic maps at ap-

proximately 0.6m (two feet) contour intervals (New Orleans District 1978, Sheets 12, 13, and 14) show that the natural levees along the present course probably reflect the combined influences of mean floodplain gradient, local hydraulic effects, and multiple meander development. Except for the rafts, pre-1870 effects of the Moncla Gap diversion are not readily detectable above the Rapides (however, a mathematical analysis which might discover clustering at levee crest elevations was not made in this study). The new data indicate that the effect of clearing the Rapides might have been reduction at normal flood stage in this area to below +39.6m MSL.

The levee crest which contains site 16RR4 lies between approximately 40.2 and 40.8m MSL. Crestal elevations are generally 0.3 meters greater than those of relict natural levee crests of the Dolet Bayou/Jims River — Red River meander belt, on the western side of the alluvial valley. It appears that the natural levee at site 16RR4 is later than that of the Jims River meander belt and the thinness of the sediments overlying the midden indicates that agradation of the levee had largely ceased by the time human occupation began. The effects of the Moncla Gap diversion included the formation of rafts in the course, and the consequent splitting of the river into multiple, well-to-poorly-defined channels. This probably caused a reduction of mean normal flood stages, as the flood waters could spread across more of the floodplain more rapidly. Although the evidence is slight, it is a feasible argument that the Moncla Gap diversion occurred prior to human occupation at 16RR4.

The six radiocarbon dates from the site show wide scatter and low precision (see Chapter 20). They range between A.D. 855 ± 205 and A.D. 1645 ± 220. As the earlier dates are probably more accurate (Prentice Thomas, personal communication), the Moncla Gap diversion could have occurred

at least as early as A.D. 1000.

Physical Environment of the Site: The hydrologic environment at the site during occupation can be estimated from geomorphology and sedimentary evidence. There is no evidence of a channel to the west or south, and the levee here slopes to the southwest; the channel along which the levee was deposited must have been east or northeast of the site. The eastern alluvial valley wall is only one and one-half kilometers distant, and recent meander amplitudes have been two and one-half to three kilometers, so the site was probably close to the Red River course.

The question of whether the channel was active or abandoned during occupation is difficult to answer (see also Chapter 16). The levee-crest stratigraphy of the site could be the result of occupation either during a period of abandonment of the meander belt which constructed the natural levee, or during a hydrologically-controlled period of lower maximum flood stages following the Moncla Gap Diversion.

Post-Occupation History: Stratification shows that the occupation was followed by a period of overbank deposition from the active course, which filled in low areas and covered the site. Maps of meander lines surveyed since 1826 show that at least three active meanders have cut away portions of the levee salient on which the Hanna site is located (Fig. 9). The earliest is represented by the arcuate scarp which begins 300m east of the site. The second is the southern arcuate levee/terrace boundary above the recent point bar deposits. The last is the active meander, which is cutting away the levee from the north. The course in this area appears to have been stable until after the rapides were removed. Aerial photographs (Plates I and II) show that some 325m of lateral erosion occurred from north to south at the site between 1930 and 1976.

Summary of Conclusions: The Hanna site, 16RR4, lies on the crest of a physiographic natural levee which is presently under erosional attack from the north by an active Red River meander. The levee is probably part of the latest-pre-Moncla Gap diversion-meander belt. Shortly after construction of this levee system, the Red River diverted through Moncla Gap, entrenchment (reduced above the Rapides), raft formation, and avulsion into multiple channels followed. Flood stages were lower and Indians occupied the high, rarely-flooded natural levees. The meanders were stable until the rapides were removed and entrenchment proceeded upstream in the last decade of the 19th century. Since then, three waves of erosion have attacked the natural-levee on which the site is located.

Testing Program

Project Goals: Testing Phase

Archaeological investigations at the Hanna site proceeded in three stages: a controlled surface collection; a test pit program, and full-scale excavations. The goals of the various stages differed. The surface collection and test excavations were designed for evaluation of the site content and integrity, whereas the excavation project was conducted to address a variety of questions.

The initial goal of the testing phase was to determine the horizontal and vertical extent of the site. Since the site had been recently plowed, the surface collection was quite productive and meaningful. Concentrations of artifacts were plotted. A sampling schedule for the ordering of test pit placement was devised, and excavations proceeded to confirm the implications of the surface collections. These randomly placed pits served to delimit the depth of cultural deposits, in

addition to defining the horizontal extent of occupation.

The initial project stages were also designed to determine the site integrity and cultural affiliation. The physical stratigraphy of the site was to be defined, and evidence of architectural remains, should it exist, was to be recorded. Finally, two soil types were observed during the initial visit to the site, a fine sandy loam and a clay (Fig. 11). It was necessary to examine the relationship between these soil zones and the loci of human occupation in order adequately to interpret the site.

These goals, typical of a short-duration testing and excavation project, were designed to determine the nature and significance of the Hanna site. The results of the testing program led to the conclusion that the Hanna site offered an excellent opportunity for substantially adding to our understanding of the Alto focus, and thus it was deemed significant. In the following pages, the project's testing phase is outlined, as are the results of these preliminary investigations. The research strategy of the full excavation program was based on these results and will be presented in a later section.

Grid System

Work was inaugurated at the Hanna site in June 1977, with the first two weeks of the project constituting the testing phase of the excavations. Based on the information obtained during this initial investigative phase, large-scale excavations were subsequently undertaken to mitigate the adverse effects of proposed revetment construction. The grid system was established with a bearing of N28 W (magnetic north at the Hanna site has a declination of N7.5 E). The grid was oriented to conform with local topography, the course of the present river, the configuration of the plowed field, and the proposed construction right-of-way.

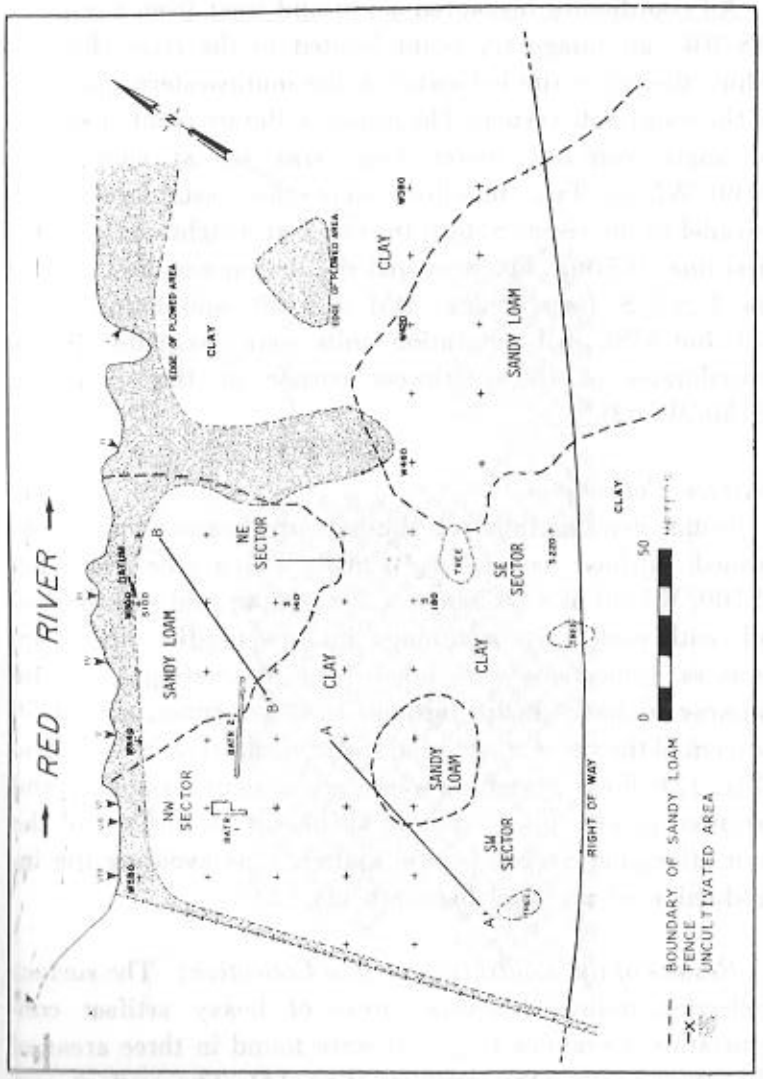


FIGURE 11. MAP OF SITE SHOWING GRID COORDINATES, SITE SECTORS, AND SURFACE SOIL ZONES. A-A' AND B-B' LOCUS OF IDEALIZED PROFILE DRAWINGS (FIGURES 21 AND 22). ROMAN NUMERALS INDICATE LOCATION OF BANK PROFILES (FIGURE 10).

All coordinates measured south and west from the point 0S/0W, an imaginary point located in the river channel. Thus, the entire site is located in the southwestern quadrant of the coordinate system. The principal datum point, a section of angle iron one meter long, was set at coordinates S100/W500. Two baselines were then established, one parallel to the river (S100), the other at a right angle to the first line (W500). The principal site datum was tied in with the U.S.G.S. bench mark, BM 9 + 50, and found to be 40.78m MSL. All excavation units were designated by the coordinates of the southwest corner of the unit (e.g. S130/W562).

Surface Collections

Initial investigations at Hanna were begun with a controlled surface collection (CSC). Using the baselines (S100/W500) as a reference, a 20m x 20m grid was marked off, with each unit partitioned into twenty-five 4m x 4m squares. Collections were taken from alternating 4m x 4m squares in checkerboard fashion. In this manner, almost 50 percent of the site was collected, covering an area of 16,800m² (Fig. 12). Field personnel were each assigned a square and required to pick up everything visible on the surface of the unit other than recent vegetal matter, thus avoiding the introduction of personal bias into the CSC.

Results of the Controlled Surface Collection: The surface collection indicated several areas of heavy artifact concentration. Ceramics (Fig. 13) were found in three areas of the site, as were lithic artifacts (Fig. 14). The artifact concentrations are clearly associated with soil type, with high frequencies of cultural materials occurring in the zones of sandy loam soil (compare Figs. 13 and 14 with the outline of the sandy loam soils in Fig. 11). Beyond the sandy loam

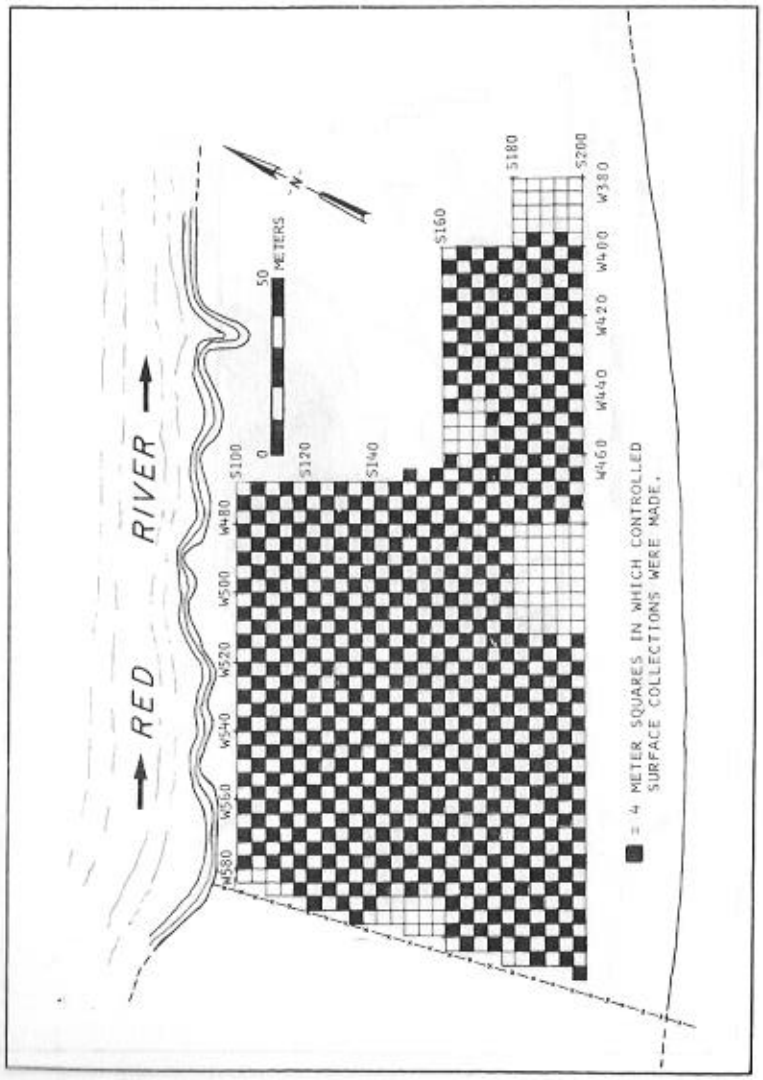


FIGURE 12. GRID SYSTEM SHOWING AREA OF SURFACE COLLECTION.

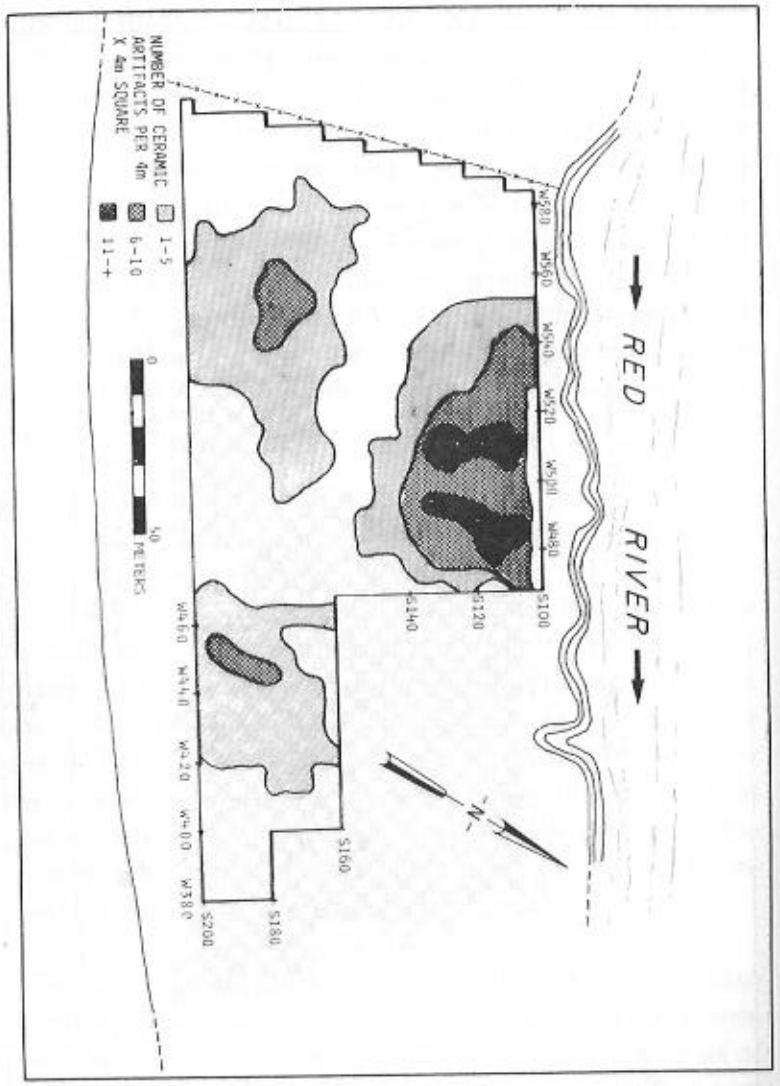


FIGURE 13. DENSITY OF SURFACE CERAMICS

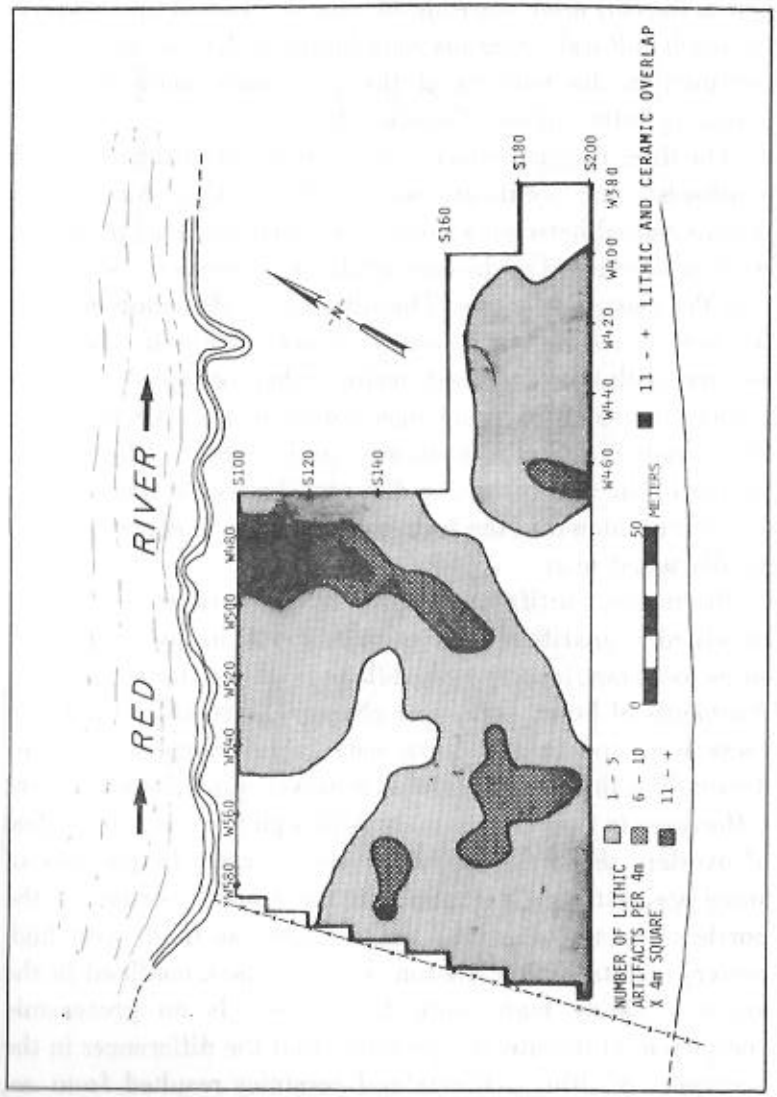


FIGURE 14. DENSITY OF SURFACE LITHICS.

zones, the clay areas were almost sterile. Most of the instances in which cultural materials were found in the clay zones were confined to the borders of the clay-sandy loam soils and probably reflect plow disturbances.

The three major clusters of artifacts occur in the northeast, southwest, and southeast sectors of the site. But artifact density varied between sectors. The northeast was by far the most productive of prehistoric artifacts, whereas the southeast was the least productive. The differential distribution could be due to a different intensity of occupation in the three sectors, with the northeast sector either occupied by more persons, or occupied for a longer period of time. Alternatively, the variation in artifact density could reflect different activities in the three areas, or different degrees of disturbance. It is our opinion that the former explanation is correct, as will be discussed later.

Prehistoric artifacts recovered in surface collections consisted primarily of pottery sherds and the by-products of stone tool manufacture—chert flakes and raw material. A few fragments of bone, shell, and charcoal were also found, but these were too few to allow meaningful conclusions to be drawn. The lithic and ceramics, however, manifest significant differences in their distribution. Although there is a great deal of overlap, the areas exhibiting the greatest frequencies of stone are, with one exception, in the eastern portion of the northeast sector (Fig. 14), not the same as those with high pottery counts. This variation is, in all cases, confined to the areas of sandy loam soils. Since there is no preceramic component at the site, it is probable that the differences in the occurence of lithic artifacts and ceramics resulted from activity localization within the site.

Test Excavations

To achieve the goals outlined for the testing program, a

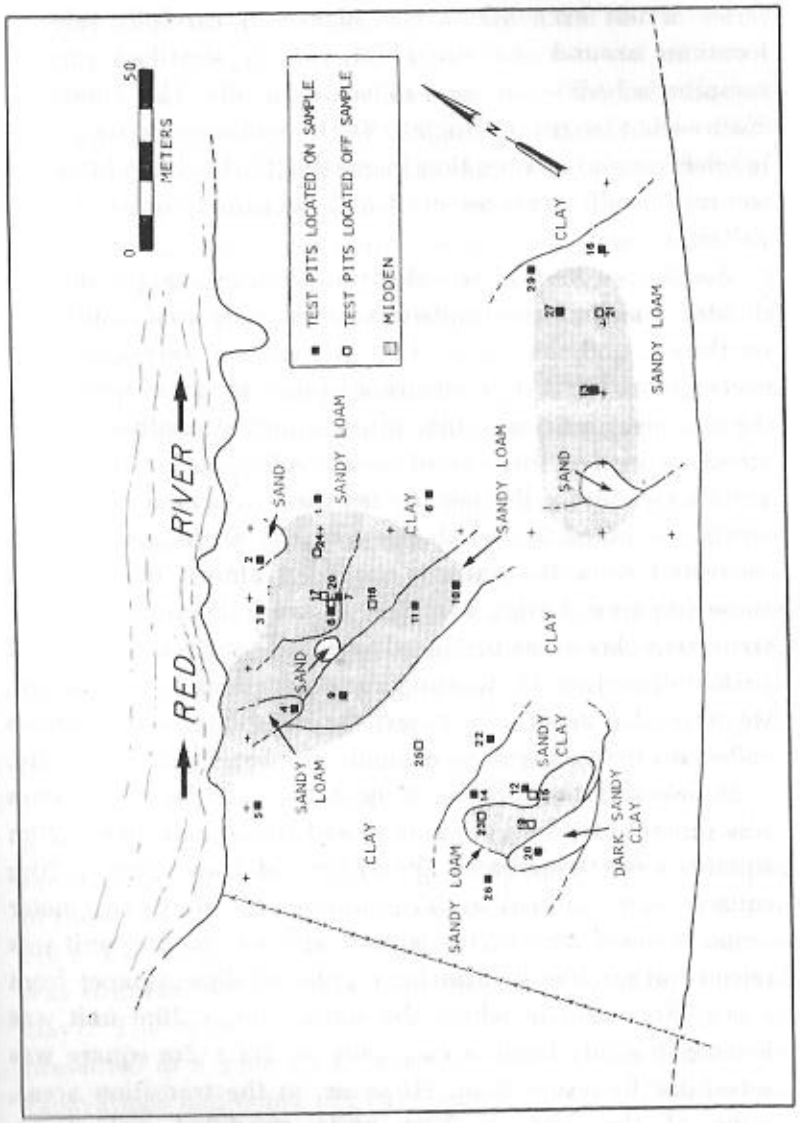


FIGURE 15. LOCATION OF TEST PITS AND SUB-PLOW ZONE SOILS.

series of test excavations was placed at carefully selected locations around the site (Fig. 15). A stratified random sampling schedule was used to locate the pits. This approach, discussed at length by Ragir (1972), eliminates personal bias in selecting pit location, thus increasing the likelihood that the test results will be representative of the sample universe (i.e., the site).

For the purposes of selecting test pit locations, the site was divided into four quadrants or sectors: northeast, southeast, northwest, and southwest. Test excavations were located in each sector. Further to ensure a proper selection technique, the site was partitioned into discrete and mutually-exclusive strata, defined on the basis of surface soil texture. Sandy loam and clay surface soil types formed the two primary sampling strata. As noted above, the presence of artifactual remains recovered from the surface coincided almost exactly with those site areas having a surface of sandy loam soil; the intermittent clay areas produced very little surface material of prehistoric origin. By locating test excavations in both strata, we were able accurately to test the reliability of the surface collection data as well as evaluate site extent and integrity.

In selecting the location of each test pit, the grid system was superimposed on the map of soil zones, and 20m x 20m squares were demarcated. Forty-four of these 20m x 20m squares were outlined, each containing 100 two by two meter units. In every 20m x 20m square, at least one $2m^2$ unit was selected at random by drawing numbered slips of paper from a box. For cases in which the entire 20m x 20m unit was located in sandy loam or clay, only on 2m x 2m square was scheduled for excavation. However, in the transition areas, some of the 20m x 20m units straddled soil zones, necessitating that a 2m x 2m square be tested from each one. In these cases, two 2m x 2m squares were selected for excavation, one from the sandy loam, one from the clay.

The limitations of time precluded excavation of one or two pits in every 20m grid square, but a least two test pits were scheduled for excavation in each sector. The information gained from these initial test pits indicated that some 20m units should be eliminated from the sample universe. The clay zone in the northwest sector, for example, proved to lie outside the site area, and further tests were deemed pointless. Also, it soon became apparent that the clay zones elswhere at the site were not occupied, and test excavations ceased in these areas.

Still another deviation from the sampling schedule was often necessitated by the goal to delineate house areas. In the event that a test pit yielded evidence of a structure, the excavation was expanded fully to investigate this possibility. Units excavated as an expansion of the original test pit were not part of the random sample and are not directly comparable to the sample units. Additional off-sample units were excavated to investigate particular phenomena at the site, such as areas of high or low elevation. Consequently, only a portion of the selected test units was actually excavated. Of the 20 test pits excavated according to the sample schedule, 17 were located in the sandy loam stratum, and only three were placed in the clay stratum. An additional nine pits were excavated as off-sample units. Figure 15 indicates the location of these test pits and the sub-plow zone soils. These soils are not to be confused with the surface soils. The test pit sample was stratified on the basis of surface soils (sandy loam and clay). The more complex picture of sub-plow zone soils presented in Figure 15 is based on data obtained from the excavations and could not have served to stratify the sample universe.

In addition to test pits, the testing phase included the excavation of two deep backhoe trenches (Fig. 11) to aid in stratigraphic interpretation of the site. The first trench

(BATR 1) was located in the northwest sector of the site, running north-south from S121.5 to S132.5 along the W562 grid line. At its north end, the trench was expanded to cover a 5m x 5m area, and two 2m x 2m excavation units were placed here. The second backhoe trench (BATR 2) was dug in a generally east-west direction, extending from S130/W522 to S128/W551 (Figs 11, 19), in order to test the strata buried in that area.

The recovery of artifactual material was facilitated by the use of a standard pressurized water-screening device. The soil was screened through a quarter-inch wire mesh, which proved adequate for most cultural material such as ceramics, lithics, and bone fragments; minute pieces of bone and most floral material, however, passed through the quarter-inch opening. Features and postmolds uncovered during the initial testing program were left to be excavated during the full-scale excavation program, when their respective contexts could be adequately established. This fact accounts for the absence of fine-screening (with a sixteenth-inch mesh) and special recovery techniques, such as water flotation, during the testing phase.

Two recovery strategies were employed during this phase of the investigation. All dirt from random sample test pits was screened, but in the off-sample pits, only three wheelbarrows of dirt from the distrubed plow zone were screened. This procedure, adopted to speed excavation, was followed only for the plow zone; all other levels were screened. The test pits were excavated in both arbitrary and natural levels. The plow zone, usually 15 to 20cm deep, was excavated in one or two levels. Below the plow zone, excavation proceeded in arbitrary 10cm levels, unless a natural stratigraphic break was encountered.

Results of the Testing Excavations: Fourteen test ex-

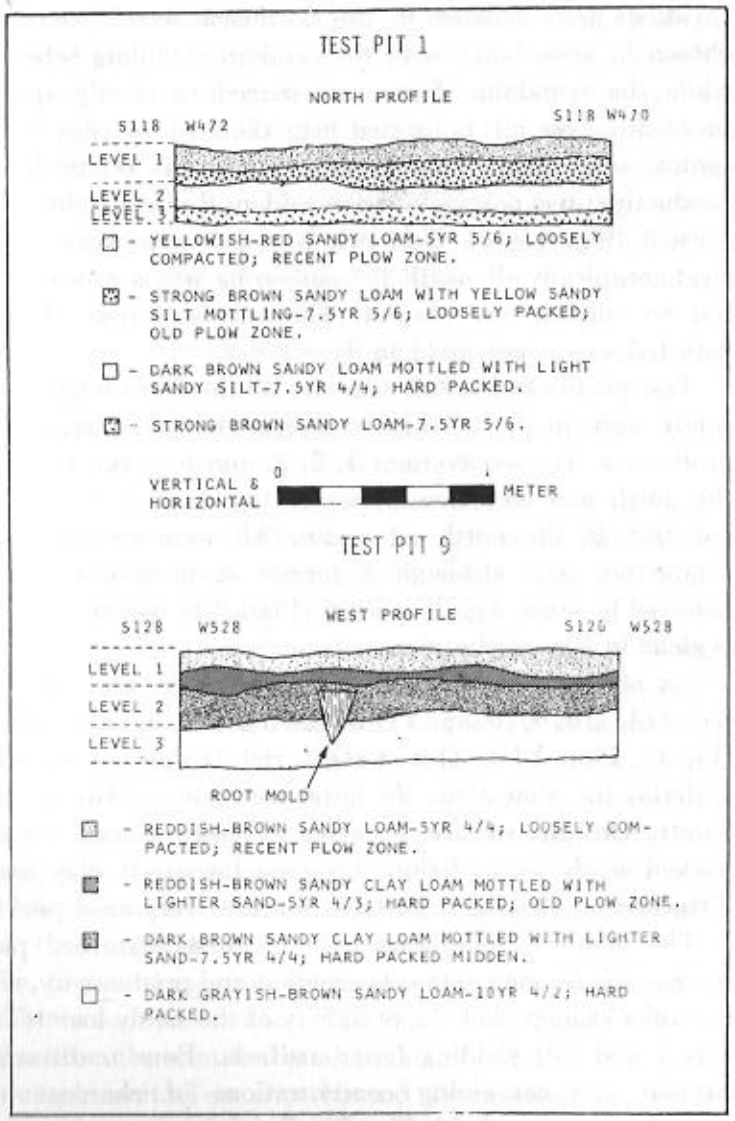


FIGURE 16. PROFILE, TEST PITS 1 AND 9.

cavations were located in the northeast sector; ten were chosen in accordance with the random sampling schedule, while the remaining four were placed to clarify specific problems. Test pit 1, located near the eastern edge of the central sandy loam area in this sector, was relatively unproductive; two postmolds were evident, but no midden was present (Figs 15-16). Test pits 2 and 3 were very similar stratigraphically. Beneath the plow-zone was a sandy loam, but no midden was present. The only subsurface feature detected was a postmold in Test Pit 3.

Test pit 6 was located near the southeastern edge of the sandy loam in the northeastern sector and was largely unproductive. Test excavations 1, 2, 3, and 6 served to define the north and east boundaries of the area of intense occupation in the northeast sector. All were relatively unproductive, and although a former A horizon could be detected in some, e.g. Test Pit 6 (Plate VI), no midden was evident in any of the pits.

Six of the on-sample test pits, located in the northeast sector (4, 7, 8, 9, 10, and 11) revealed a dark band of midden (Fig 16, Plate VII). This stratum, rich in cultural material, underlay the plow zone, the latter consisting of two distinct bands. On the surface occurred recently disked, loosely packed sandy loam. Below this zone lay sandy clay loam, disturbed by plowing in the past but now very hard packed.

The midden, underlying both of these disturbed plow zones, varied somewhat in clay content and productivity, with the units located near the periphery of the sandy loam (Test Pits 4 and 10) yielding fewer artifacts. Four undisturbed circular pits containing concentrations of charcoal and ceramics were revealed in Test Pits 7 and 8.

All of the test excavations discussed so far (1-4, 6-11) represent units selected as part of the stratified random sample. Four additional, off-sample, test pits were excavated

in the northeast sector. Three of these, 17, 18, and 20, exhibited productivity similar to Test Pits 7 and 8. Test Pits 17 and 20 were located for the specific purpose of expanding the excavations around Pits 7 and 8, on the assumption that the numerous features and posts in the area indicated the presence of a structure. Test Pit 18 was dug to provide an additional sample unit in the midden area. Test Pit 24 was placed at the point of greatest elevation on the sandy loam ridge in the northeast sector.

It is noteworthy that the test pits which were located near the limits of the sandy loam soil in this sector, Test Pits 1, 2, 3, 4, 6, and 10, yielded very few artifacts compared to the units situated closer to the center of the soil zone. The evidence derived from the test excavations confirms the results of the surface collection; the artifactual materials are concentrated in areas which exhibit sandy loam soils and a generally higher elevation. However, the points of greatest elevation were not exceptionally productive, perhaps because plowing has created more disturbance of the midden in the slightly elevated areas. Test Pits 6 and 10 indicated that artifactual remains and midden deposits decrease as one proceeds toward the clay zone. The division between the northeast sandy loam area and the southeast sandy loam zone is, therefore, assumed to be a natural break, and not the result of bulldozer action. The two sandy loam areas would seem to have been separate loci of occupation.

In the southeast sector, five tests pits were excavated within the sandy loam zone. Test Pits 13, 16, 27, and 29 were drawn from the stratified random sample, while Pit 21 was an off-sample unit. Test Pits 16 and 29 revealed no midden stratum, but unit 16 did expose several historic refuse pits and postmolds. Test Pits 13, 21 and 27, located near the middle of the sandy loam area, revealed a dark sandy loam midden layer directly underlying the plow zone (Fig. 17). Plow

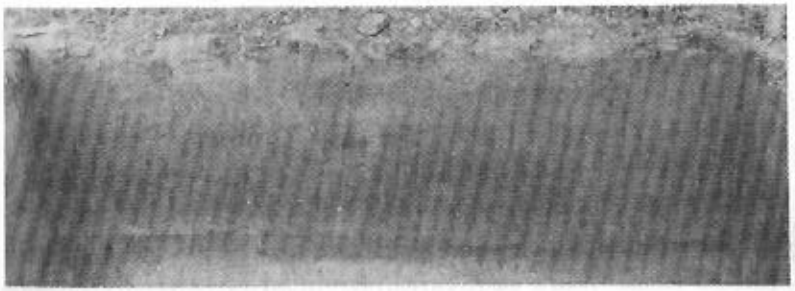


Plate VI. West Profile, test pit 6, northeast site sector.

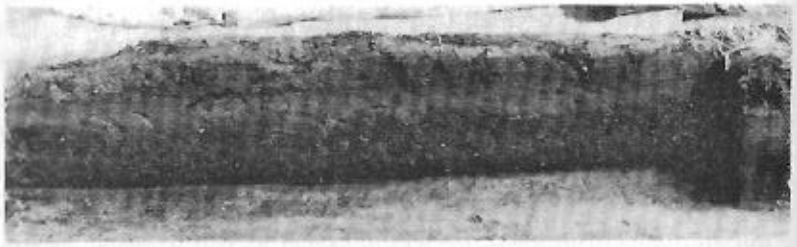


Plate VII North profile S124/W500, northeast site sector, showing dark midden south of Structure 2.

Plate VIII. West profile, test pit 21, southeast site sector.

disturbances was extensive in Test Pit 13, but in Test Pits 21 and 27 the midden was about 18-20cm thick (Plate VIII). Several posts and one possible feature were defined at the bottom of the midden stratum, but, otherwise, no evidence of a structure was found in these pits. The midden in the southeast sector yielded far fewer ceramics, lithics, and bone than the midden in the northeast sector, and, in general, the disturbance caused by plowing seemed more pronounced in this sector.

Eight test excavations were placed in the southwest sector of the site, five of which were drawn from the stratified random sample (12, 14, 22, 26, and 28) and three of which constituted off-sample units (15, 19, and 23). The southwest sector consists of a small area of sandy loam soil which is separated from the well-defined clay by a transitional zone of sandy clay (Fig. 15). Test Pits 12, 14, 15, and 26 were located in this sandy clay zone, north, west, and east of the sandy midden (Fig. 15). Units 12 and 14 yielded moderate amounts of material, and, in addition, three postmolds were uncovered in Test Pit 12. Adjacent to Test Pit 12, excavations were expanded to determine if the postmolds were part of a structural pattern. Test Pit 15 was placed diagonally southwest of Test Pit 12 to investigate this possibility, but only one post was found in that unit. Test Pit 26 produced few artifacts and no evidence of midden or features.

Two test pits revealed the presence of midden in this sector. Test Pit 19, located eight meters west of Units 12 and 15, was excavated near the southwest edge of the sandy loam area, and, although no posts or features were found, a dark, organically-stained midden layer was encountered (Fig. 18). This unit was the most productive in the southwest sector. Test Pit 23 was placed north of Test Pit 19 in the sandy loam area and also revealed a midden stratum. These two midden deposits in the southwest sector were not nearly as productive

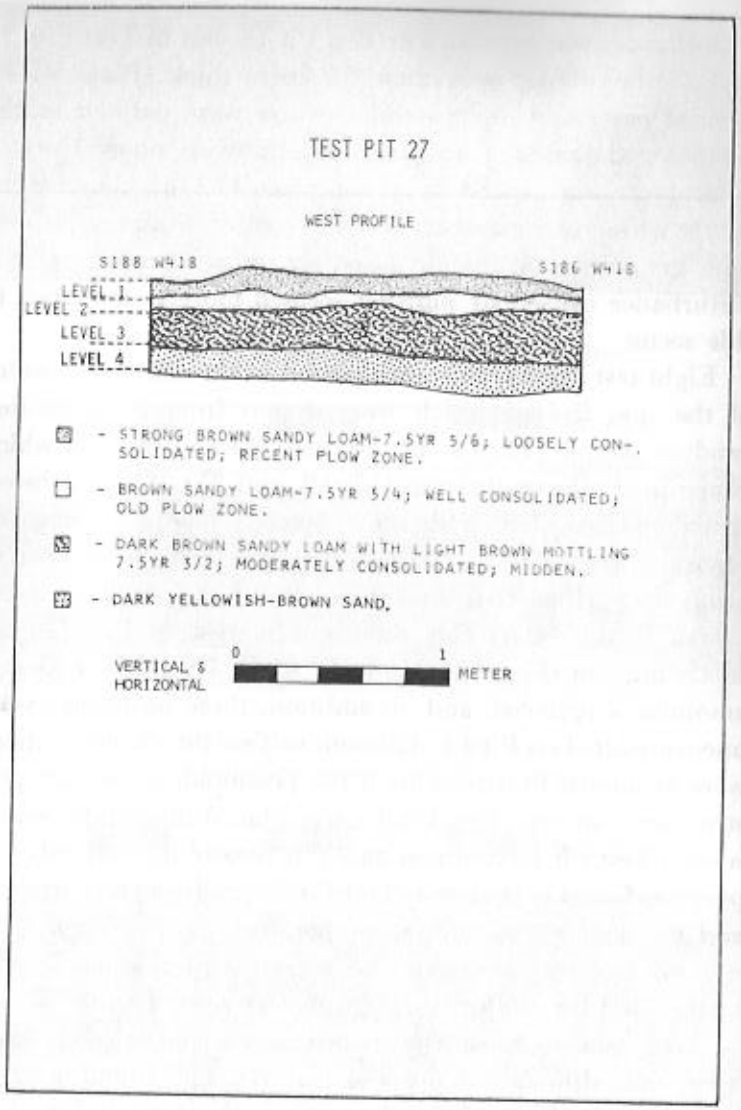


FIGURE 17. PROFILE OF TEST PIT 27.

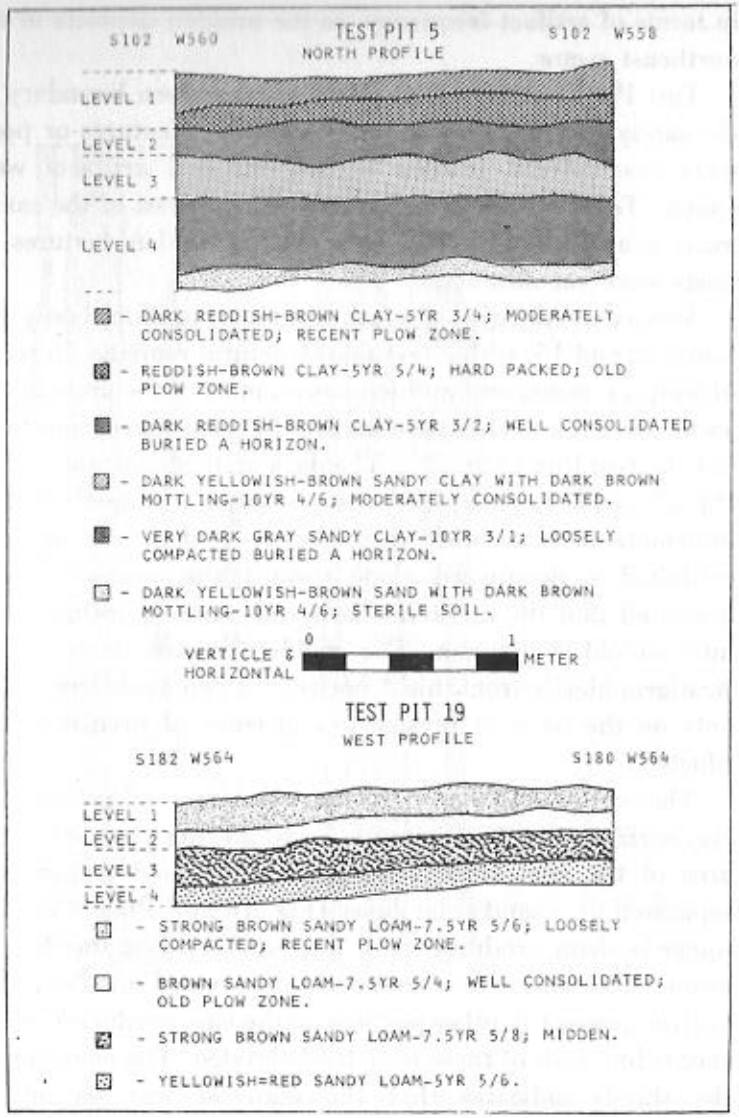


FIGURE 18. PROFILE, TEST PITS 5 AND 19.

in terms of artifact frequency. as the midden deposits in the northeast sector.

Test Pit 22 was located at the northeastern boundary of the sandy clay and clay zones. No midden, features or posts were encountered in this excavation, and artifacts were sparse. Test Pit 28 was located to the southwest of the sandy loam in an area of dark sandy clay. No midden, features, or posts were encountered.

Test excavations in the southwest sector produced only two units, 12 and 15, which revealed structural remains. In terms of features, posts, and midden layers, most of the units in this sector were relatively unproductive. Midden was encountered only in Test Pits 19 and 23. The dark-stained stratum in Test Pit 23, while fairly thick, was minimally productive. This information, combined with the fact that the midden exhibited a downward slope toward the west-southwest, indicated that the midden debris was actually incorporated into an old A horizon. The midden cannot be separated stratigraphically from this A horizon; it can be differentiated only on the basis of presence or absence of prehistoric artifacts.

The northwest sector of the site was composed primarily of clay surface soils. Two test pits, 5 and 25, were located in this area of the site. Unit 5 revealed two buried A horizons, separated by a sandy clay layer (Fig. 18 and Plate IX). The upper horizon produced only two badly-eroded sherds; the lower, which seems to correspond to the mixed midden and A horizon present in other portions of the site, produced several sherds but most of these were badly eroded. The condition of the sherds indicates that the material was secondarily deposited from higher elevations to the east and south. Test Pit 25, also located in the clay, was unproductive. No midden, features, or postmolds were noted, and only a few eroded fragments of pottery were found.

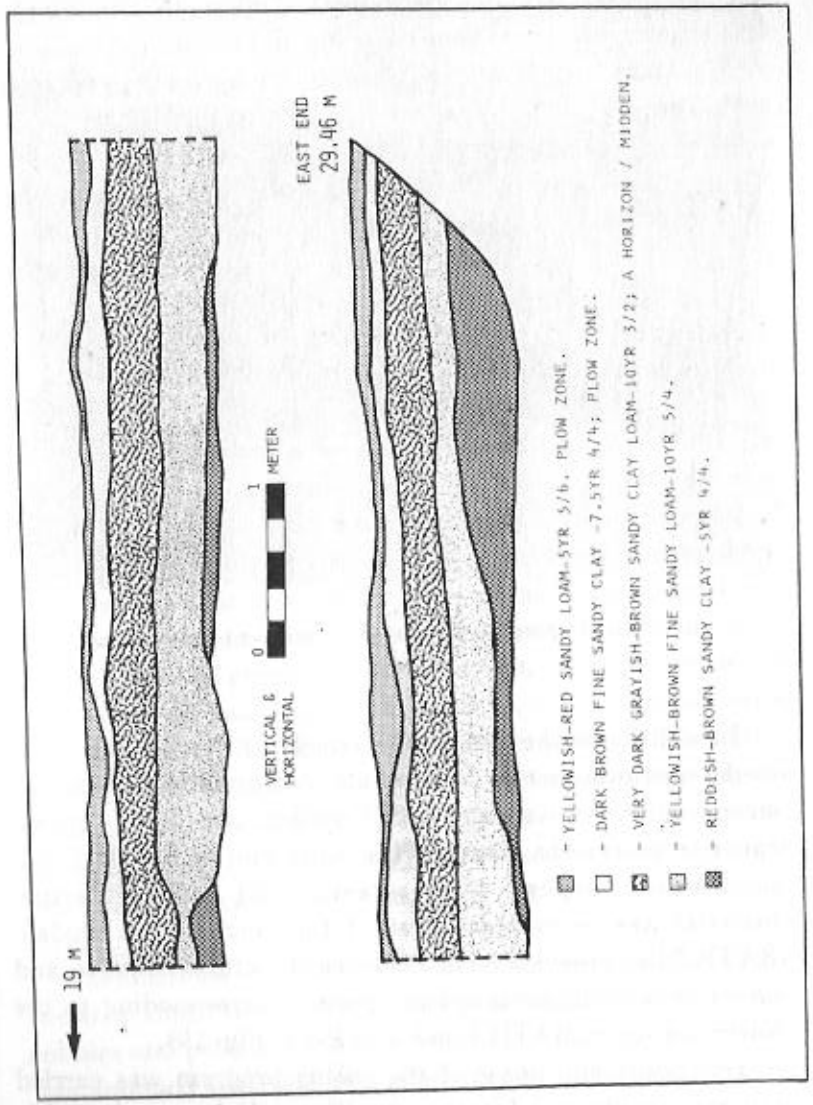


FIGURE 19. PROFILE OF BACKHOE TRENCH 2.

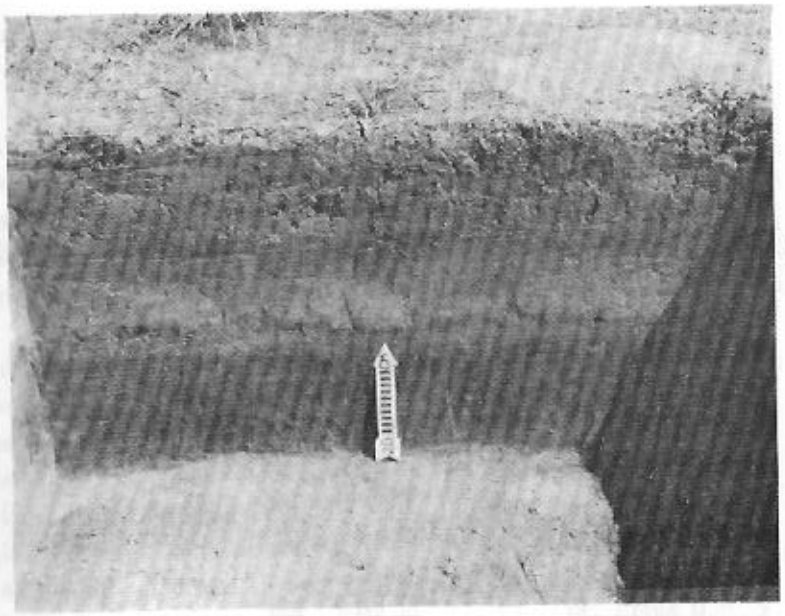


Plate IX. North profile, test pit 5, northwest site sector.

In addition to the test pits, two backhoe trenches were dug in the northwest sector to facilitate interpretation of the site stratigraphy. As was mentioned earlier, two 2m x 2m excavation units were placed at the north end of BATR 1, but no features or posts were revealed and little artifactual material was recovered; most of the sherds were eroded. BATR 2 likewise yielded no evidence of features or posts, and only one organic horizon was present, corresponding to the lower horizon in BATR 1 and Test Pit 5 (Fig. 19).

One additional phase of the testing program was carried out specifically to address a question relating to the lithic analysis. The surface collections and the test pits produced numerous unmodified pebbles too small to have served as raw material for knapping. Nevertheless, the pebbles appeared

not to occur naturally but to have been introduced to the site by man. In order to test the hypothesis that these cobbles and pebbles were brought to the site area, several small pits were excavated to the east of the site in a natural levee deposit similar to that at Hanna. These investigations yielded no lithic debris whatsoever, either in the form of lithic artifacts or naturally-occurring stone pebbles. We conclude that the pebbles are manuports brought to the site by the prehistoric occupants.

Summary: The results of the test excavation program at Hanna concur with those of the controlled surface collection. Both phases of investigation indicate the site may be separated into three areas of sandy loam soil with intervening zones of clay. The latter zones produced little or no cultural material, whereas all indications of architectural remains were confined to the sandy loam areas. Also, prehistoric artifactual remains were concentrated in the three sandy loam zones. Traces of structures were found in the northeast sector in and around Test Pits 7, 8, 17, and 20, and in the southwest sector in Test Pits 12 and 15. On the basis of the testing program, the southeast sector, while yielding some evidence of posts and features, was far less productive than the other site sectors. Of all three, the northeast sector showed the most promise for locating architectural remains of prehistoric origin.

The small test excavations placed to the east, outside of the site area, confirmed the fact that the abundance of river-worn cobbles and pebbles at the site was not natural to the area. It was assumed that they represent manuports brought to the site for unknown purposes.

Preliminary analysis of the artifactual materials suggested that all three sectors were, at least in part, contemporaneous. The ceramics recovered in the surface collection and through

test excavations were types primarily associated with the Alto focus, although later types were present. Lithic analysis revealed a range of tools, as well as the by-products of stone tool manufacture.

The testing program confirmed the presence of *in situ* midden in several site locales. Also, the postmolds and features indicated that architectural remains existed at the site. Thus, Hanna offered an excellent opportunity to gather data on an Alto focus village.

Excavations

Project Goals: Excavation Phase

The results of the surface survey and test pit program indicated that a more ambitious project was warranted at the Hanna site. The site integrity was quite good with no major disturbance evident in any of the site sectors. Also, based on artifact frequencies from surface collections and test excavations, the site was quite rich in cultural materials and promised to yield excellent samples of prehistoric ceramics and lithics.

Possibly at the most significant aspect of the Hanna site is its location and internal structure. Most Alto sites that have been investigated have been ceremonial centers with earthen mounds. Other Alto sites also include small villages located on upland ridges extending into the alluvial valley, and small sites situated on point bars (cf. Gregory, this volume). To date, only two Alto focus sites have been located on relict

natural levees in the alluvial valley of the Red River in northwestern Louisiana, the Bayou Cognac site south of Natchitoches, Louisiana (Thomas, Wright, Cambell, and Ahler 1977) and the Hanna site. The Bayou Cognac site has been largely destroyed by erosion, so Hanna offered the first opportunity to examine fully a type of site previously uninvestigated, a small late Alto village located on a natural levee. No mounds are present at Hanna, and our test excavations revealed no traces of ceremonialism. Moreover, the site was apparently not important as a center of intercommunity or intraregional activities. Rather, on the basis of the test program, we suggest it was a small village or hamlet occupied by a group of individuals who were not members of the elite segment of Caddoan society. The research strategy of the excavation program was designed to evaluate this hypothesis.

Since Hanna represents a type of Alto site in Louisiana about which virtually no information exists, the research goals were almost limitless. However, merely to excavate for information is not an acceptable research design. A more appropriate procedure is to address a series of specific problems, in such a way that the field data may be utilized to evaluate the propositions relating to those problems. At the Hanna site, our investigations were designed to address two major topics: 1) intrasite variation in a village setting; and 2) the place of the Hanna settlement within Caddoan prehistory and the interregional network relating to status, ceremonialism, and exchange.

In dealing with the internal variation, field investigations were undertaken to produce data relevant to several aspects of the structure of the site. First, work was directed to evaluating the proposition that the Hanna site represented the remains of a village or hamlet, as opposed to a ceremonial center, cemetery locus, or specialized activity site. Should our supposition be correct, we would anticipate finding artifacts

typical of village life, including items associated with both sexes, and tools utilized in a variety of tasks, ranging from food procurement and processing to hide processing and hunting or defense. Also, architectural remains of housing and special purpose structures should be present, as would specific activity areas such loci for food preparation, stone tool production, and possibly pottery making. In order to obtain relevant data, the excavations were designed first to seek the remains of houses (since domestic activities in a village tend to be organized around the household) and, secondly, to locate hearths, storage and refuse areas, etc., anticipating that these features might shed light on a wide range of activities, such as storage and cooking. Finally, the excavations in undisturbed midden deposits were conducted to recover a large sample of artifacts, representative of the full range of activities conducted at the site.

Data pertinent to subsistence and seasonality were carefully sought during the excavations at Hanna. Specifically, we wished to determine if horticulture was practiced at the site and to evaluate the relative importance of cultigens in the diet of the prehistoric inhabitants. The degree of dependence on other subisitence strategies was, additionally, of interest. The riverine environment offered a wide variety of food resources, but prior to our investigations, very little was known of Alto peoples' reliance on hunting, fishing, and gathering. If, as we suspected, the Hanna site was occupied for only part of the year, the subsistence remains could offer valuable insight into that portion of the year spent at the levee sites. The project was not designed, however, to address the nature of regional settlement patterns. For example, our research design would yield little data relevant to small hunting camps utilized during the winter hunts. But the absence of certain artifact classes may indicate that particular activities were conducted elsewhere, and our

research did address this matter. Wright's analysis of lithics considers the questions of whether initial reduction of stone in the manufacture of tools took place at the site or in specialized quarry areas.

The delineation of intrasite activity areas was a major concern of the project. The surface collections and test excavations indicated a great variation in artifact distribution at the site, and efforts were devoted to isolating such zones.

Finally, the excavation program was designed to investigate intrasite community patterning. However, this goal was not among our primary interests. Had the midden throughout the entire site been disturbed by plowing, we would have stripped all of the village and mapped the house remains. But the presence of *in situ* midden prompted our decision to devote extensive effort to the recovery of materials from these undisturbed deposits. As a result, a careful examination of several houses took precedence over investigation of the entire village.

Excavation Techniques

The information derived from the test pits indicated the presence of architectural remains and associated features in the southwest and northeast sectors. Since these areas were the most productive in terms of artifact frequency, investigations were concentrated in the northeast and southwest sectors. The testing phase revealed no structures in the southeast sector, and the artifact frequencies were low, so it was decided to investigate this sector as limitations of time permitted. Several procedures were employed in excavation of the site, including the use of power equipment, skim-shoveling, and hand excavation. Also, several different methods of artifact recovery were utilized. These techniques are discussed below in their appropriate contexts.

The test excavation stage of the project included the

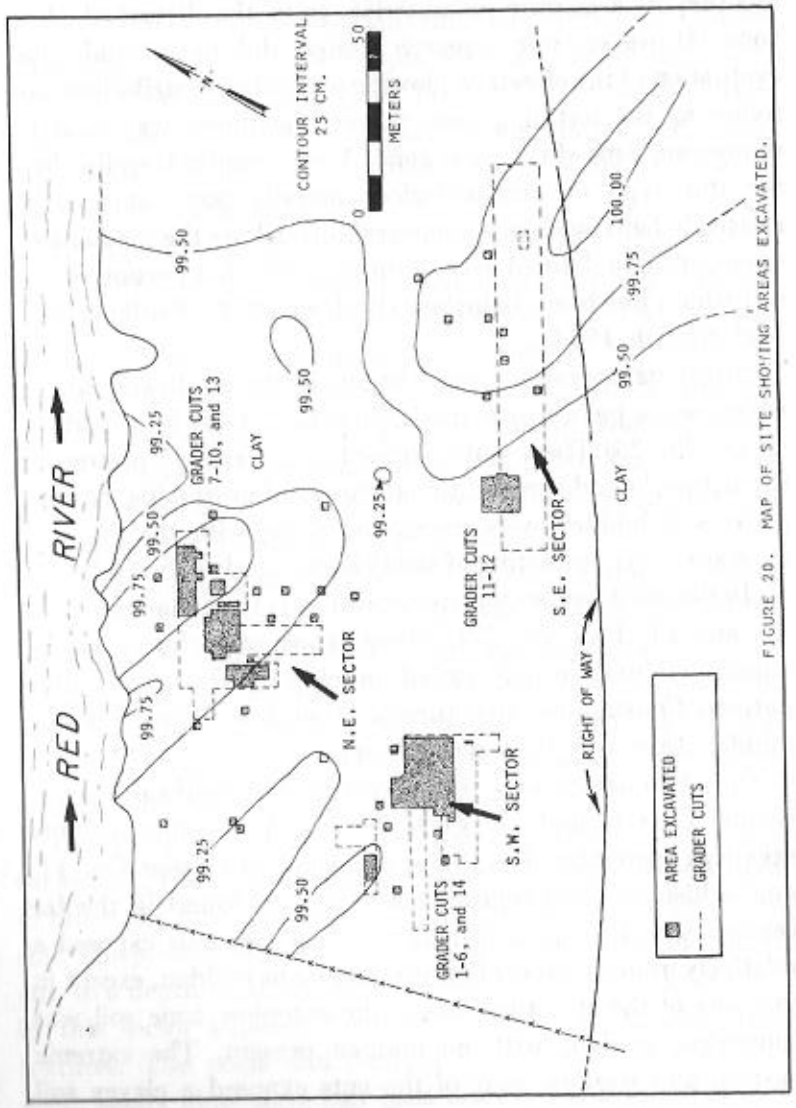


FIGURE 20. MAP OF SITE SHOWING AREAS EXCAVATED.

recovery of a sample of materials from the disturbed plow zone. However, our research design did not include the evaluation of the effects of plowing on artifact distribution, so, following the testing phase, power machinery was used to remove sections of the plow zone. A road grader is well-suited for this type of archaeological investigation, since it is relatively light, and its maneuverability allows the machine to move within a defined area, stripping only that portion of the soil which has been disturbed (Binford 1972; Faulkner and McCullough 1974).

Stripping operations were begun in the southwest sector where seven passes were made, cuts 1, 2, 3, 4, 5, 6, and 14 (Figs. 20, 23).These cuts exposed a pattern of postmolds (Structure 1) and one additional cluster of postmolds. Several pockets of midden were uncovered along with the the sub-plow zone soils consisting of sandy loam, sandy clay, and clay.

In the northeast sector, five grader cuts were made, 7, 8, 9, 10, and 13 (Figs. 20, 27). These exposures revealed an extensive midden, which varied in clay content, and three patters of postmolds, Structures 2, 4, and 6. To the west the midden gave way to a sterile clay.

Only two passes were made through the southeast sector, Grader Cuts 11 and 12 (Figs. 20, 23). A possible structure area was encountered in the western part of Grader Cut 11, and a historic 20th century trash pit was found in the far eastern end of the cut. In general, these two cuts exposed a relatively uniform layer of light sandy loam midden, except in the area of the structure, where the sub-plow zone soil was somewhat sandier, with no midden present. The extreme eastern and western ends of the cuts exposed a clayey soil under the plow zone.

All grader cuts were skim-shoveled as soon after excavation as possible, in order to locate and record soil zones and expose features and postmolds before they became obscured by

drying. Hand excavation was also employed during this phase of the project with excavation proceeding in arbitrary 10cm levels and natural stratigraphic levels. The arbitrary levels were maintained until a natural stratigraphic break was encountered. At this point, a new level was defined which followed the stratigraphy.

Controlled excavations were conducted in the southwest sector with 2m x 2m units to complete the exposure of Structure 1 and to examine the midden south and west of the structure. These excavations also revealed Structure 5, located south of Structure 1. In addition to the controlled excavations, skim-shoveling was carried out in Grader Cuts 3, 4, and 5 to define more clearly the postmolds, features, and midden revealed in those areas. All of the exposed features and posts were subsequently excavated.

Several areas were excavated by hand in the northeast sector of the site (Fig. 20). The area S116-S126/W496-W512 was excavated in order to expose Structure 2 and to sample the *in situ* midden. Other excavations were placed to examine midden deposits to the east of Structure 2. In the vicinity of Structures 4 and 6, skim-shoveling was undertaken to delineate the features and posts.

In the southeast sector, a total area of about 120m was excavated. The plow disturbance in this area was greater than in other site areas, probably due to the sandy texture of the soil. The plow zone extended well below the level of the grader cut, to a depth of about 35cm below the surface. Excavation in this sector exposed Structure 3 and several associated features. The posts and features were excavated after the deep, sandy plow zone had been removed and the area had been mapped. The extensive disturbance in this area hampered recovery and justified our earlier decision to concentrate on other site sectors.

Additional excavations in the southeast sector included two

2m x 2m units in the midden areas revealed in Grader Cut 11 and the excavation of a historic feature.

In sum, the hand excavations, including both controlled 2m x 2m units and skim-shoveling operations, uncovered a substantial portion of the three site sectors. Six definite structure areas, comprised of numerous posts and associated features, were exposed. Structures 1, 3, 4, 5, and 6 were partially disturbed by the plow, but Structure 2 was buried below a heavy, dark midden several centimeters in thickness.

As was the case with the testing phase of the project, recovery techniques varied, depending upon the nature of the excavation unit. In each 2m x 2m unit, the plow zone materials were sampled by screening three wheelbarrow loads through ¼ inch mesh hardware cloth. All dirt excavated beneath the plow zone stratum was screened through the ¼ inch mesh water screen, and, in addition, a 50cm x 50cm control block in the southwest corner of each unit was screened through both ¼ inch and 1/16 inch mesh screen, and the materials bagged separately according to the mode of recovery. The control blocks proved invaluable in the recovery of floral and faunal material which would have passed through the ¼ inch screen. All soil removed from the postmolds was screened through the 1/16 inch mesh only. Soil taken from features and burials was screened through both the ¼ inch and 1/16 inch mesh, and the materials bagged separately, as in the case with the control blocks. In addition to the pressurized water screen, a sample of soil from burials and features was taken for flotation. The average sample size, removed from the center of the feature, was 10cm x 20cm. The technique carried out in the laboratory consisted of water flotation only, and provided a substantial body of botanical and faunal remains (see reports of Byrd and Shea in this volume).

Samples were also taken for radiocarbon dating from all

features, posts, burials and excavation levels which yielded concentrations of charcoal of sufficient size and integrity. Of the 22 samples taken in the field, seven were subsequently shipped for dating. Numerous pollen samples were also taken.

Site Stratigraphy

The physical stratigraphy at the site was relatively complex, in the sense that two close-spaced test pits often produced markedly different stratigraphic profiles. (As mentioned earlier, the surface soils present at the site fell into two textural classes: clay and fine sandy loam.) It was not until stripping operations had removed large surface areas that the stratigraphic picture began to come into focus. To present the stratigraphic situation with adequate clarity, the following discussion deals with a generalized stratigraphy for each sector based upon test excavations and the stripping operations.

The southwest sector produced an initial impression of conflicting soil situations. For example, Test Pits 12 and 15 yielded no intact midden deposits, whereas Test Pit 19 (Fig. 15), located only four meters to the west of Test Pit 15, revealed a productive midden, approximately 25cm thick, which sloped downward to the south. Test Pit 23 was the only other test excavation in this sector which produced a midden stratum. In this excavation, the midden sloped downward to the southwest. Stripping operations clarified the stratigraphy by revealing the presence of parallel bands of soil in the southwest sector, each presenting differences in color, textural class, and artifact productivity. A plan map of this sector delimits subsurface soil zones (Fig. 15) and a profile of the sector (Fig. 21) depicts the subsoil stratum proceeding from northeast to southwest (A-A').

The surface stratum on the borders of the sector represents the clay plow zone encountered in the lower areas of the site.

The soil is yellowish-red, (5YR5/6) with a firm granular structure. Stratum 2, composing the surface of the sector, consists of a very fine sandy loam plow zone, typical of the higher ridge elevations at the site. It has a granular structure, but is looser than that in Stratum 1, and is strong brown (7.5YR 5/6) in color. Underlying Stratum 1 on the borders of the sector is Stratum 3, a compact, reddish-brown (5YR 5/4) clay with subangular blocky structure. With respect to cultural deposits, this stratum was very unproductive. Stratum 4 consists of a band of yellowish-red (5YR 4/6) compacted sandy clay with granular structure. A moderate amount of cultural material was encountered at the top of this layer. Stratum 5 is a strong brown (7.5YR 5/8) sandy loam midden with a granular structure. Artifact density in this stratum was high, but structural remains and features were difficult to identify in the dark soil. Stratum 5 grades into Stratum 6, a dark reddish-brown (5YR 3/2) sandy clay horizon with a high organic content. This stratum exhibited subangular blocky structure and was very firm, but little cultural material was recovered from this zone. As a whole, this profile represents a low sandy ridge, which was once covered by an A horizon. Prehistoric occupation near the top of the ridge caused an accumulation of midden on the slopes to the southwest. Since historic times, the strata have been truncated by plowing, removing almost all of the A horizon and midden areas from higher elevations.

A similar picture emerged for the northeast sector, where stripping operations once again revealed a pattern of banded soil zones running parallel to the direction of the elevated ridge. A plan of soil zones in this sector appears in Fig. 15, and a generalized soil profile is depicted in Fig. 22 along the B-B' line.

Within the northeast sector, Strata 1 and 2 represent the clay and sandy loam plow zones visible on the surface at the

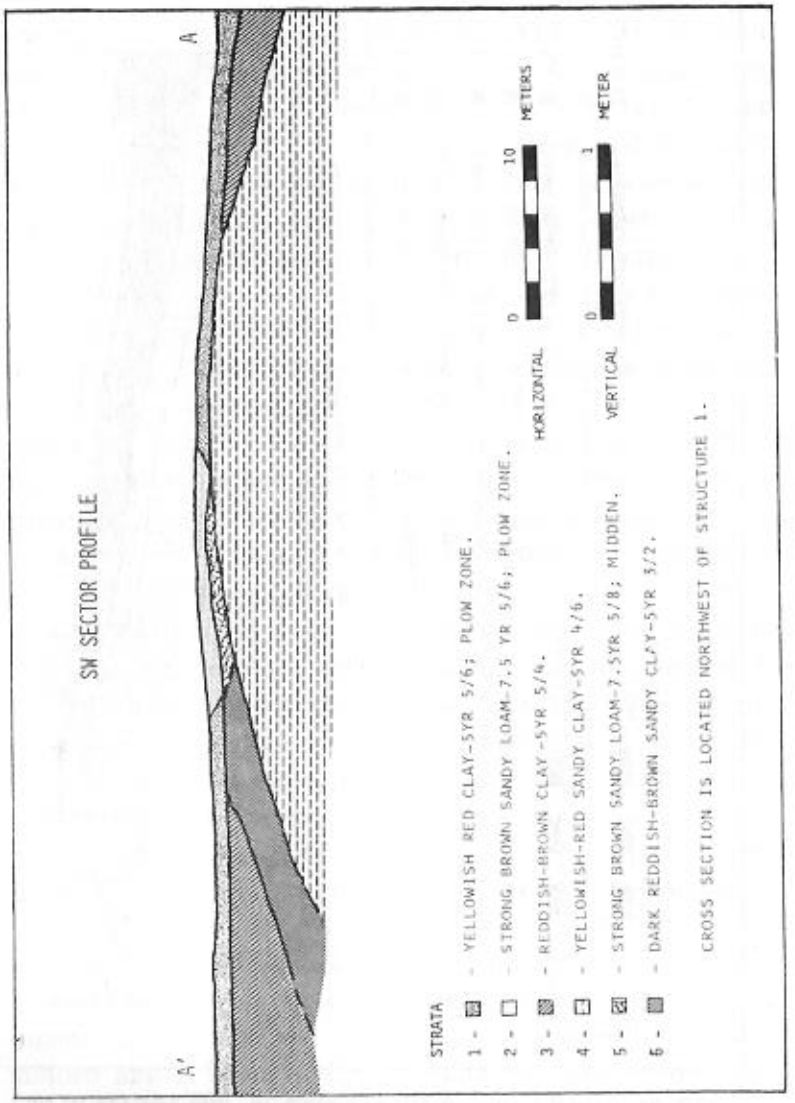


FIGURE 21. PROFILE OF SOUTHWEST SECTOR. FOR LOCATION OF A-A' SEE FIGURE 11.

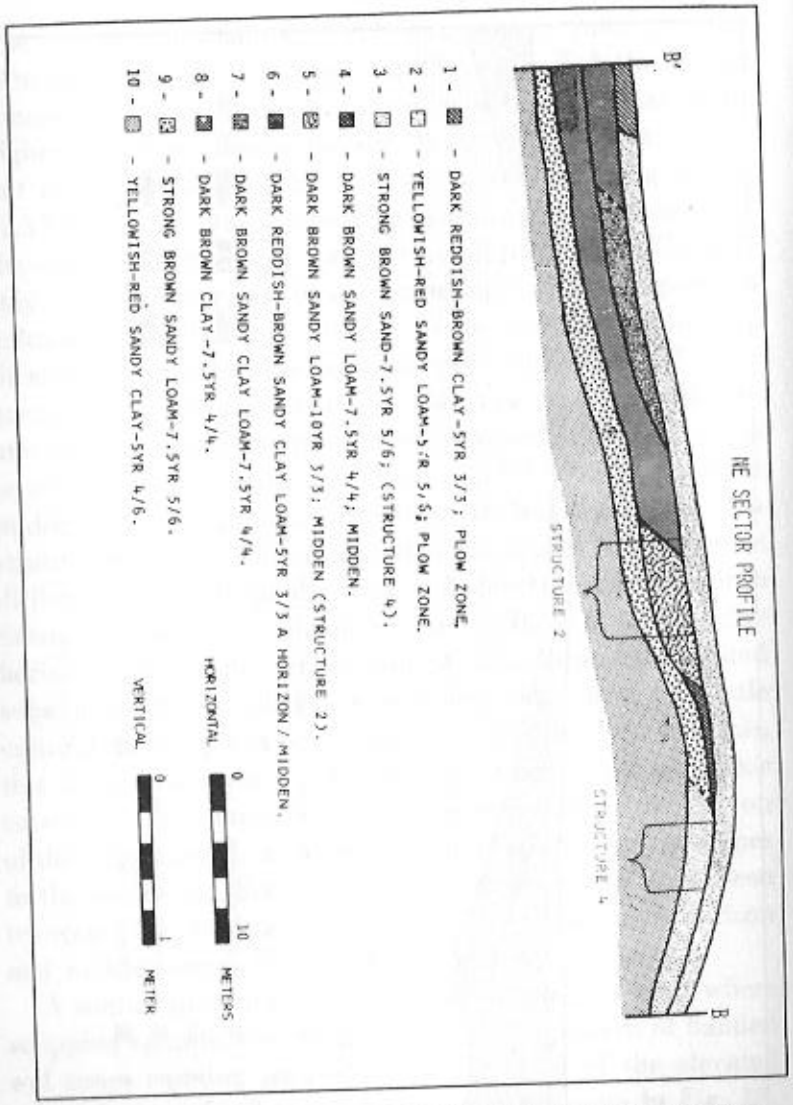


FIGURE 22. PROFILE OF NORTHEAST SECTOR. FOR LOCATION OF B' -B SEE FIGURE 11.

site. Stratum 1 is a dark reddish-brown (5YR 3/3) clay with the same firm granular structure as seen in the southwest sector. Stratum 2 is a yellowish-red (5YR 5/6) sandy loam with a granular structure. (The upper, recently disked and lower, hard, packed subdivisions within the plow zone are not depicted in Fig. 22). Stratum 3 is a strong brown (7.5YR 5/6) sand, in which appeared the remains of Structure 4 and its associated features. Stratum 4 is a dark brown (7.5YR 4/4) sandy loam midden with a granular structure. It is generally quite thin (2cm-7cm) and contained a moderate amount of artifactual material. Stratum 5 is midden consisting of dark brown (10YR 3/3) sandy loam with a granular structure and high organic content. The remains of Structure 2 were found within this stratum and appeared to originate here. The clay content of Stratum 5 increases toward the southwest, where it gives way to Stratum 6, an A horizon/midden layer of sandy clay loam with granular structure. This stratum appears to represent the original A horizon which once covered the site. It is dark reddish-brown (5YR 3/3) and produced a moderate amount of artifactual material, becoming less productive toward the south and west. Stratum 7 represents a layer of erosional fill. In general, the organic content is low, and the color is a dark brown (7.5YR 4/4). Artifactual content was low, and no features or posts originated in this stratum. The sharp boundary with the underlying A horizon/midden stratum, the lower organic content, and the relative sparsity of prehistoric disturbances, suggest that Stratum 7 is a layer of redeposited, mixed midden and A horizon. Clay content increases toward the southwest, grading into Stratum 8, a dark brown (7.5YR 4/4) clay with subangular structure. Overlying a dark A horizon (Stratum 6), Stratum 8 represents a continuation of Stratum 7, with increased accumulation of clay in the lower elevations of the site. Little or no artifactual remains were

present, and no features or posts originated in this stratum. Underlying strata 4, 5, and 6 is Stratum 9, a layer of strong brown (7.5YR 5/6) sandy loam, which exhibited some degree of mottling as a result of root and animal action. This sandy loam graded into the sand layer of Stratum 3 toward the northeast. The final stratum, Stratum 10, was yellowish-red (5YR 4/6) sandy clay which underlay both Structures 2 and 4.

The stratigraphy in the southeast sector presented a simple picture compared to the other sectors. Proceeding northeast to southwest were found first, a clay plow zone, dark reddish-brown in color (7.5YR 5/6), underlain by a clay-textured dark brown horizon with subangular blocky structure, grading into a sandy loam plow zone brown in color (7.5YR 5/4). This sandy loam was underlain in turn by a sandy midden which increased in clay content toward the southwest. The midden was fairly thick (ca. 20cm) but contained only moderate amounts of artifactual material compared to the midden areas of the northeast sector. The midden was fairly continous over the entire southeast sector, interrupted in only one area by a sandy deposit in the area of Structure 3.

It appears that the southeast and northeast sandy loam areas were discontinous. The stratigraphic profiles of both sectors were quite different, and they were separated by a zone of clay from which cultural materials were largely absent.

In the northwest sector of the site, stratigraphic data were derived from two backhoe trenches (Fig. 19) and one test pit (Fig. 18). Stratum 1 of Test Pit 5 consisted of a dark reddish-brown (5YR 3/4) clay with granular structure. The stratum was moderately consolidated and approximately 20cm thick. Underlying this stratum is a layer of reddish-brown clay (5YR 5/4), hard-packed and possessing a blocky structure. Below this is a stratum of dark reddish-brown (5YR 3/2), well-

consolidated clay with a blocky structure and high organic content. This stratum was the remant of an old A horizon, but little cultural material was present. Stratum 3 graded into Stratum 4, characterized by dark yellowish-brown (10YR 4/6) sandy loam with dark brown mottling. This layer was moderately consolidated and yielded very little in the way of cultural materials. Below Stratum 4 was another dark organically-stained horizon. Stratum 5 was very dark gray (10YR 3/1) sandy clay, which was loosely compacted and exhibited a granular to subangular blocky structure. Cultural materials were present in this layer. Stratum 6 was a dark yellowish-brown (10YR 4/6) sand, with dark-brown mottling, similar to Strata 4, 5, and 6 in the northeast sector. This layer, however, was sterile.

Backhoe Trench 2 was dug east-west from S130/W522 to S128/W551 and was approximately 30m long (Fig. 19). Backhoe Trench 2 revealed the presence of a yellowish-red (5YR 5/6) sandy loam, Stratum 1, and a dark-brown (7.5YR 4/4) sandy clay layer, Stratum 2. Both strata represent the plow zone. Stratum 3 was a very dark grayish-brown (10YR 3/2) fine sandy clay. This A horizon/midden stratum produced only a moderate amount of cultural materials. Stratum 4 was a yellowish-brown (10YR 5/4) fine sandy loam, similar to the zone underlying Strata 4, 5, and 6 in the northeast sector. A reddish-brown (5YR 4/4), sandy clay horizon underlay all of these layers and contained no artifactual materials whatsoever.

The Hanna site occupies a relict natural levee, consisting of three topographically and stratigraphically distinct sandy loam ridges. Evidence of the prehistoric occupation was generally confined to the sandy loam areas, except where later erosion created a redeposition of cultural material between the northeast and southeast ridges. Prehistoric occupation of the site created feature and structural disturbances in the

sand ridges and also resulted in the deposition of a midden stratum which became mixed with the original A horizon in and around the areas of occupation but not in the lower elevated clay zones.

Midden accumulated in greater density on the southwest slope of the ridges than on the very top of the elevated areas. It should be noted that, almost invariably in the Caddo region, entranceways to houses are located on the northeast side of the structure. The position of the midden with respect to the houses indicates that midden areas were not randomly place, but that refuse was deposited to the rear or side of the structure opposite the entranceway.

After the site was abandoned, erosion and other natural processes caused the formation of a second A horizon in the low northwest sector of the site. This horizon contained eroded sherds indicating that they were secondarily deposited.

Plowing of the site in recent years has truncated the relatively thin A horizon and midden on top of the ridges, resulting in the partial destruction of some of the structures. The plow zones formed as a result of this cultivation have textures which reflect the texture of the underlying deposits.

Results Of The Excavations

Architecture

Southwest Sector, Structures 1 and 5: A rectangular house and three distinct clusters of posts and features were defined in the southwest sector. None of the latter was well-defined, and whether they represent the remnants of a house or subsidiary structure is uncertain. The cluster of posts designated Structure 5 seems to form a right angle, but no complete pattern could be discerned. The clusters of posts to the east and northwest of Structure 5 do not form a clear pattern. A rough arc may be formed by the posts to the east, but, if they were once part of a house, plowing has since eradicated all traces of the remaining structural wall. A very small portion of the area northeast of Structure 1 was examined, and, although a cluster of posts is evident, no pattern was observed. It would be impossible, on the basis of the minimal evidence, to ascertain whether a structure existed

in this area, or whether it might have been the locus of some specialized activity.

Structure 1: Grader Cuts 3 and 4 partially exposed the postmold pattern of Structure 1 (Fig. 23), and additional hand excavation and shovel-skimming exposed the remaining associated features, postmolds, and burials. Continuous plowing activities have destroyed most of the midden in this area, but structural remains appeared directly below the plow zone, about 16-18cm below the surface. In addition to midden, plowing has destroyed all traces of the floor of the house and associated hearths, and has resulted in the destruction of all *in situ* evidence of activity localization. However, the subfloor pits and features that remained have provided a great deal of information on subsistence and daily activities, burials and house construction.

Located at grid coordinates S171-S179 and W544-W555, the house covered an area of about 36m² (Figs. 24-25). Structure 1 was composed of a series of about 85 individually set posts, arrayed in a roughly circular pattern. All postmolds appear as dark-brown stains clearly visible in the reddish-brown sandy clay matrix. Most were simple posts, consisting of straight walls and a flat or tapered bottom. The postmolds outlined a structure measuring about 6m x 6m, oriented roughly northeast. No evidence of wall trenches was found, and the post pattern was poorly defined, since the walls did not meet at right angles to form well-defined corners. Instead, the pattern of posts seemed to form an irregular wall, and the "corners" of the structure were rounded and indistinct. The pattern was further obscured by the presence of an apparent rebuilding or repair stage, best shown by the cluster of posts along portions of the north and west walls (Fig. 24).

In several instances, posts were pulled, apparently to effect repairs, and the resulting pits were subsequently filled with debris. Since it was difficult to distinguish these pits from

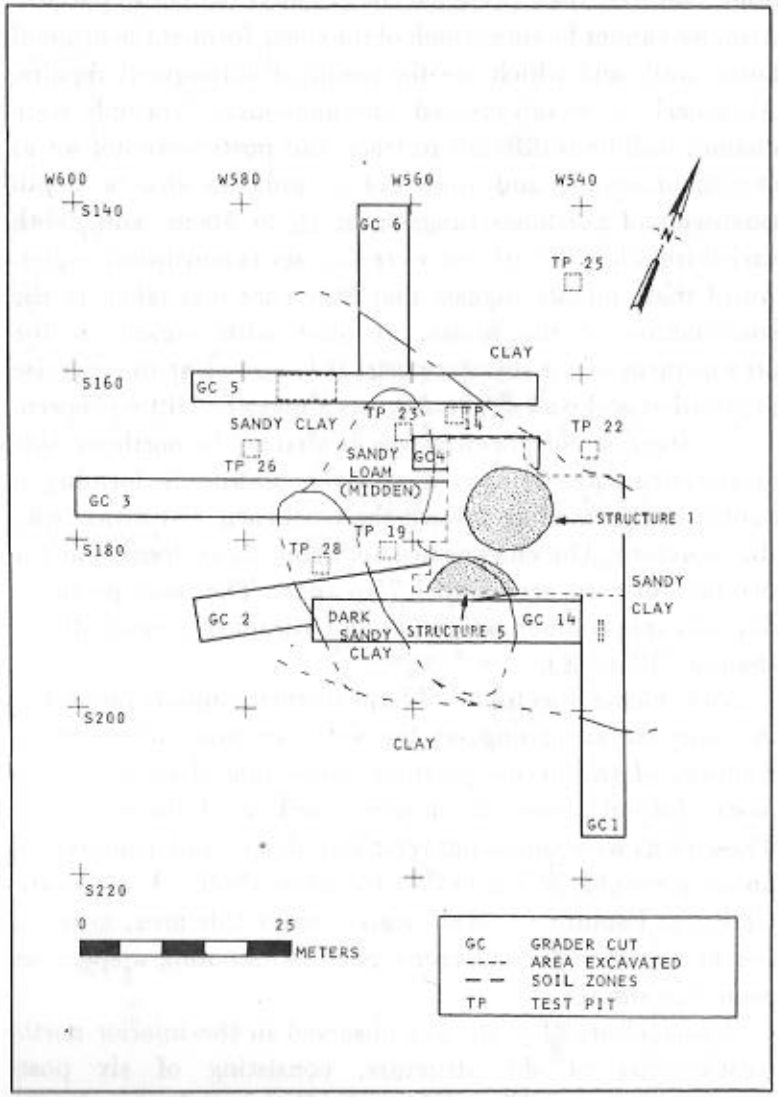


FIGURE 23. PLAN MAP OF SOUTHWEST SECTOR INDICATING SOIL ZONES AND LOCATION OF STRUCTURES 1 AND 5.

other features, their presence complicated the house pattern. Also, we cannot be sure which of the posts formed the original house wall, and which are the result of subsequent repairs. All, clearly, were not erected simultaneously. Not only were distinct wall lines difficult to trace, but posts were not set at regular intervals, and were not of uniform size or depth (diameter of postholes range from 10 to 40cm, and depth varied from 8 to 30cm), nor were they set at consistent angles. All of these factors suggest that little care was taken in the construction of the house, at least with regard to the arrangement of the support posts. It is also clear that precise orientation and wall alignment was a matter of little concern.

An irregular entranceway was located on the northeast side of the structure, composed of eight postmolds forming a double line, extending toward the northeast, and away from the structure. The entranceway is about 2.5m long, and the two lines of posts are about 1.75m apart. The posts probably did not support much weight, as all postmolds were small and shallow (Plate X).

No evidence was found of large interior support posts, but this was not surprising, as the structure was rather small. Remains of an internal partition, consisting of an arc of five posts, did cut across the northern section of the structure. These posts were small, but relatively deep, and demarcated an area roughly 2.7m (E-W) by 2.0m (N-S). A moderate-sized pit, Feature 11, was located inside this area, near the northern wall of the structure, possibly denoting a space set aside for storage.

A second arc of posts was observed in the interior northwest corner of the structure, consisting of six posts averaging between 25 and 30cm in diameter. Its location in this section of the house added to the complexity of the structure. The presence of these areas, combined with the additional post evidence, indicated that Structure 1 was

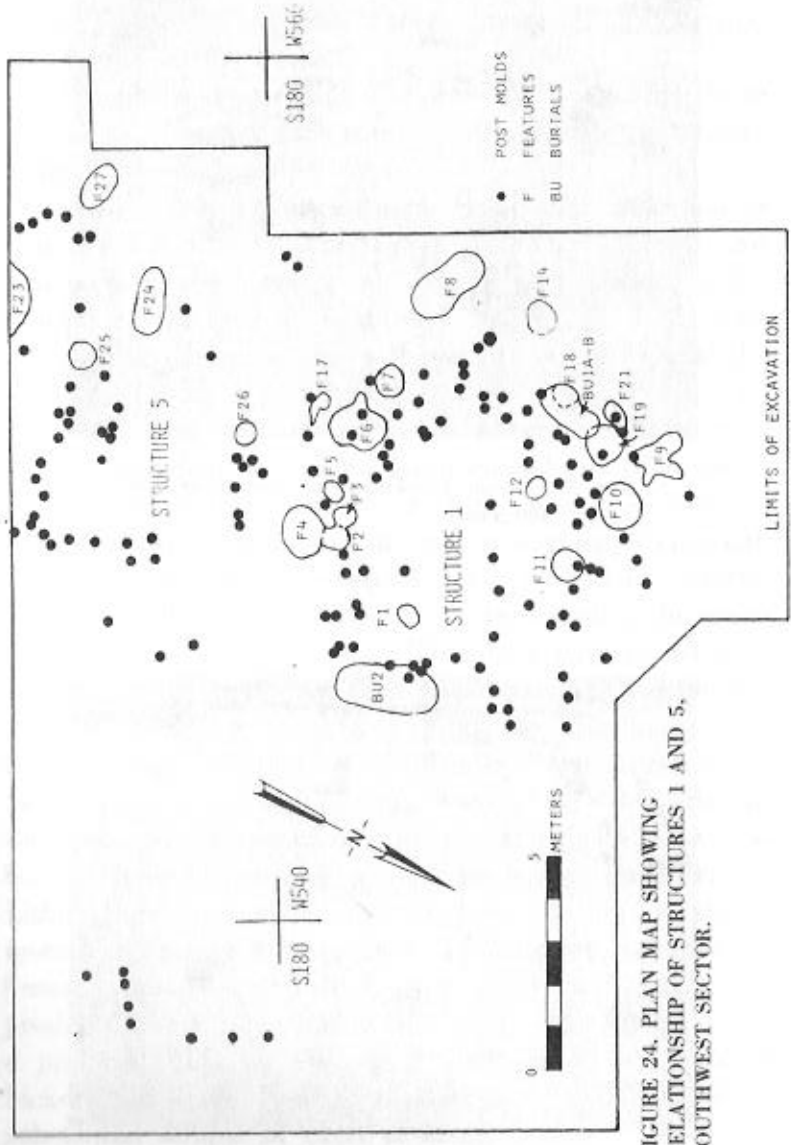


FIGURE 24. PLAN MAP SHOWING RELATIONSHIP OF STRUCTURES 1 AND 5, SOUTHWEST SECTOR.

Plate X. Structure 1 looking west. Entranceway is in foreground.

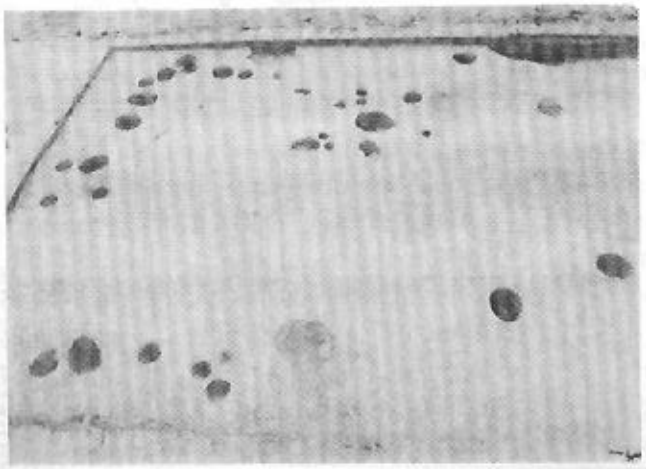


Plate XI. Structure 5 looking south.

subject to activity and disturbance subsequent to the initial construction of the house.

Although several additional interior postmolds were located, no other patterns could be discerned, and no firm evidence of benches was found.

Seventeen features were found during the excavation of Structure 1, mostly concentrated along the north, south, and west walls of the house. Five features were present in the interior of the structure (Features 1, 3, 5, 11, and 12). One was intermixed among the wall posts (Feature 2), and the remainder (Features 4, 6, 7, 8, 9, 10, 14, 17, 18, 19, and 21), were located on the exterior of the structure. The interior features included two shallow basin-shaped pits (Features 5 and 12), located just inside the structure walls. These features were moderately productive of small quantities of charcoal, hickory nut fragments, several Dunkin Incised and Hardy Incised sherds, and a variety of lithics representing the entire range of stone tool production. They may have represented storage areas or small trash pits. The remaining three interior features were intermediate-sized storage or trash pits, ranging from 20-50cm in depth and 45-80cm in diameter. Each was located just inside the walls of the house along either side. All were productive, yielding data on a wide range of activities, but the internal contents of each pit varied considerably. Lithics were recovered in each of these pits but in varying quantities. Feature 3, located near the southwest corner of the house, contained very little debitage (only nine flakes), but produced several tools, including an Alba projectile point and a preform. This pit also contained several fragments of hickory nut shells. Near the entrance, Feature 1 yielded a substantial sample of chert debitage, several utilized and worked flakes, and a bifacial tool. Decorated ceramics and subsistence remains were not found. On the other side of the entrance, Feature 11 was located between the house wall and

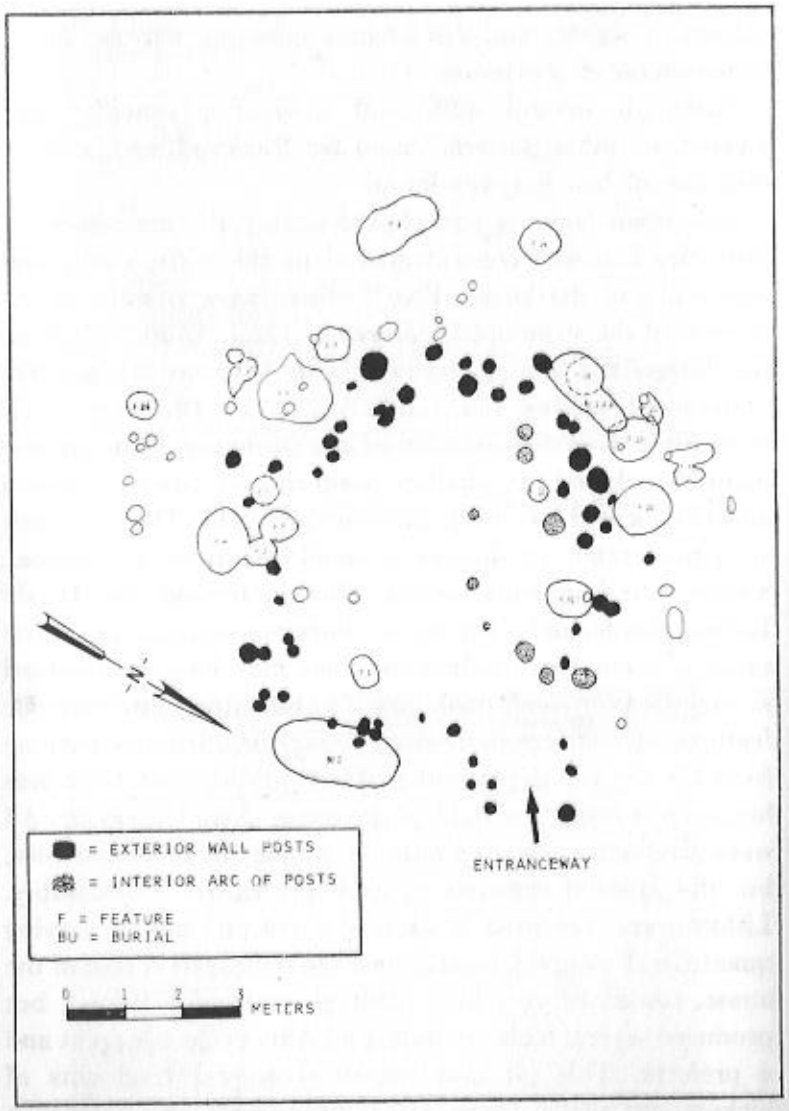


FIGURE 25. PLAN OF STRUCTURE 1.

the interior partition. This feature yielded numerous sherds and remains of stone tool production. Hickory and acorn were present, as were fruit and rind fragments of squash. Several specimens of slough sand shell, *Lampsilis fallaciosa*, were also recovered from the pit.

The features located on the interior of Structure 1 included a wide variety of materials, reflecting the activities of both sexes. Stone tool production evidently took place, on occasion, inside the house, and the ceramics clearly point to an Alto focus occupation. The presence of hickory and acorn in the interior pits indicates that the Alto inhabitants of Structure 1 were relying on wild plant foods for a least a portion of their diet, and the slough sand shells may indicate some reliance on fresh water molluscs, although the use of the latter was sparse at Hanna. The presence of squash indicates cultivation was practiced, but the extent to which cultigens were utilized remains unclear.

One feature (2) was situated among the wall posts, and we were unable to determine precisely if it was located on the interior or exterior of the structure. It was a basin-shaped pit near the south wall of the house and seems to have been a small storage or refuse area. Cultural materials were few, but several fragments of hickory nut shells were recovered.

The majority of the features associated with Structure 1 were located just outside the house, along the rear and side walls. The features, varying considerably in size, form, and content, included two large, deep pits, over 50cm in depth; six intermediate-sized pits, 20 to 50cm in depth and 45 to 80cm in diameter (Features 7, 8, 9, 14, 19, and 21); and a large cooking pit (Feature 10) with internal stratigraphy. In the cooking pit, an upper layer of midden refuse overlay an ash fill containing large quantities of bone. The walls and base of the pit appeared to have been fired, and sufficient charcoal was obtained for Carbon-14 assessment. In addition

to a full range of lithic debris and pottery, including several engraved sherds (Carmel and Holly Fine Engraved), this cooking pit yielded a wide variety of faunal remains. Feature 10 also produced corn. Another extremely productive pit was Feature 4, a deep pit on the opposite side of Structure 1. This feature yielded large quantities of cultural material, an equally wide variety of faunal remains, mollusc shells, and plant remains, including gourds. Most of the remaining features on the exterior of the house were moderately productive, with Features 7, 9, and 19 yielding hickory nut shells or acorns, in addition to lithic debris and ceramics. Both of the irregularly-shaped midden depostis (noted as Features 6 and 17) were relatively barren, although Feature 17 contained hickory nut shells.

Two burials were found during the excavation of Structure 1. Burials 1 and 2 were located near the wall of the structure. Burial 1, a double burial, was located on the northwest and Burial 2, on the southeast side of the house. Both burials were placed in long pits with rounded corners, and each was oriented northwest to southeast, paralleling the walls of the house. The individuals were merely placed in an extended position and covered over. No grave goods were found, and dating is tenuous. However, Burial Pit 1 intruded into Postmold 77, a structural post, and into Features 18, 19, and 21, and clearly postdated the construction of at least that part of the house. It is not certain that the house was abandoned before or after the burial, since repairs and the setting of additional posts could have resulted in occupancy subsequent to the burial. Burial 2 was similar to Burial 1, in that the burial pit intruded into Postmolds 115, 116, and 117.

Although no midden was found within the structure, some midden deposits were located to the west of the house. These areas were almost certainly related to the occupation of the structure, and their location on the side of the house, opposite

the entranceway, indicated refuse was deposited to the rear of the structure. Unfortunately, the midden deposits had undergone some disturbance from plowing, and our best samples of cultural material from the southwest sector were derived from features. The midden consisted of a strong-brown sandy loam stratum 10 to 25cm thick, which sloped downward toward the south and west. Artifact density was not great in this old A horizon, and the dark-brown stain probably reflects more its former status as an A horizon than the results of cultural activity. Artifact density diminished as the midden/A horizon became thicker.

Structure 5: Excavations exposed 46 postmolds underlying the dark stratum (Fig. 26, Plate XI). This cluster of postmolds, noted as Structure 5, does not form a coherent pattern. The posts seem to form a right angle, but efforts to trace the pattern proved fruitless. Quite possibly, recent plow disturbance destroyed all evidence of some of the posts, and activity associated with the occupancy of Structure 1, located a short distance to the east, may have been responsible for further disturbance. Also, the slight slope of the terrain to the south and west may have resulted in post-occupational erosion. Shallow posts may not have extended below the dark midden/A horizon, and these postmolds could not be detected.

Five features were found interspersed among the postmolds comprising Structure 5 (Fig. 26). None was very productive, and two proved, on excavation, to be only dips in the midden/A horizon. In the remaining features, two shallow basins and one intermediate-sized pit yielded no identifiable ceramics and only a few fragments of bone.

Although the midden/A horizon overlying Structure 5 and the associated features were minimally productive, the presence of the features and the cluster of postmolds clearly indicate that a structure once stood in this area of the site. But

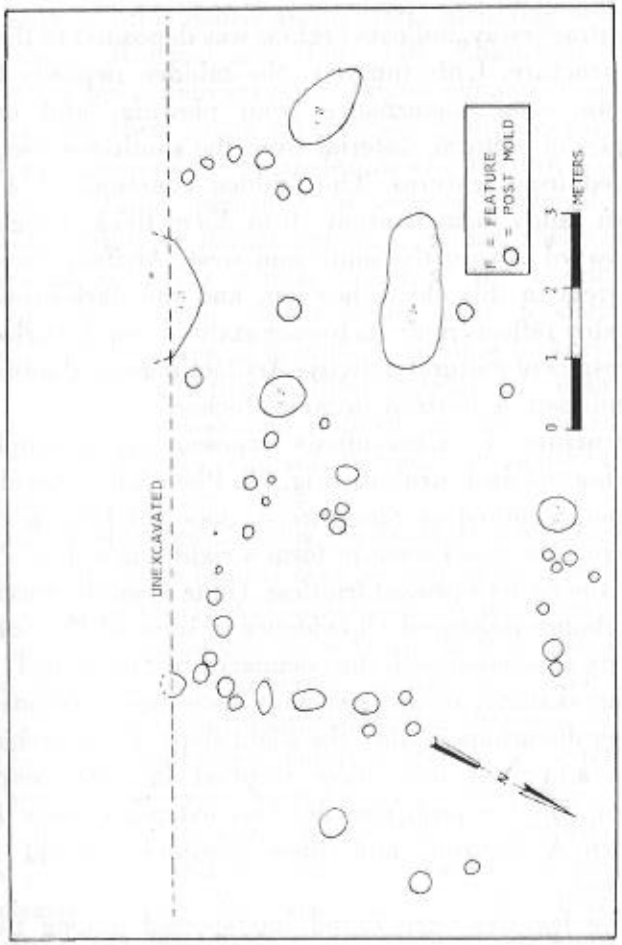


FIGURE 26. PLAN OF STRUCTURE 5.

the nature of the structure could not be determined; if not a house, possible Structure 5 was an outbuilding. Unfortunately, the artifactual remains offer little clue as to specialized activities.

Southeast of Structure 1 and east of Structure 5, a cluster of postmolds was exposed by Grader Cut 1. There were no overlying midden deposits in this area, and the postmolds appeared near the surface. A thorough effort was made to trace the pattern; thirteen 2m x 2m units were excavated in the area. However, no traces of the structure, other than the few posts shown in Figure 24, remained. Probably plow action was responsible for the disturbance of the structure pattern, and, in the view of the few posts remaining, it was not possible to suggest the original shape or function of the structure.

Northwest Sector, Structures 2, 4, and 6: Remains of two circular houses, Structures 2 and 4, were uncovered in the northeast sector (Figs. 27-28; Plate XII). To the southwest of Structure 2, a cluster of posts was designated as Structure 6, but no well-defined pattern could be ascertained. East of Structure 2, a small area was exposed by excavation and revealed a rich midden deposit overlying several features and postmolds. It is probable that a structure existed in this area, but insufficient data preclude certain identification.

Structure 2: Excavations of Structure 2 and the undisturbed overlying midden were the most productive at the site. A complex arrangement of posts, features, and burial pits was exposed beneath a midden rich in cultural debris. Unfortunately, the dark-brown color and compacted texture of the sandy loam midden soil was invariable identical to the post and feature fill and living surface of the house. As a result, it was impossible, in most instances, to discern the points of origin of posts and features, and the house floor could not be differentiated from the general midden deposit.

Features were observed in the midden stratum only in the few cases in which the fill, usually a concentration of charcoal, was sufficiently distinct from the matrix of midden.

This structure, located at grid coordinates S116-S126/W500-W510, was a circular structure about nine meters in diameter and covered an area of roughly 64m (Fig. 29, Plate XIII). The outer wall was composed of a single line of small posts. Diameter of the wall posts ranged from 15cm to around 22cm and depth varied from 35cm to 55cm below datum. The posts were rather closely spaced having been set at intervals of 25 to 30cm. The exterior wall of this circular house is very well-defined; there are no complex clusters of superimposed posts and features, such as was the case with Structure 1, in the southwest sector. It appears that the circular wall was erected in a single construction phase and that at no time were extensive modifications or repairs made.

The interior of Structure 2 was extremely complex because of the large number of postmolds located within the exterior walls. Some of these, believed to be interior support posts, were identified by their rather large diameter (33 to 45cm), and their depth (38 to 65cm below datum). The diagram of these large, deep posts (Fig. 29) shows them to be arranged in a roughly circular pattern about a meter inside the exterior wall.

Although no extended entranceway was located during excavation, there was a two-meter wide gap in the wall posts along the northeast wall of the house that suggest the probable location of the door. Inside the structure, the numerous interior posts appear to form an arrangement of partitions flanking the entranceway. This entranceway or hallway was situated in the northeast portion of the structure and extended inward for about 3.5m. At that point, the walls of the partition or structure turned at right angles. Also in the interior of the structure several support posts differed from

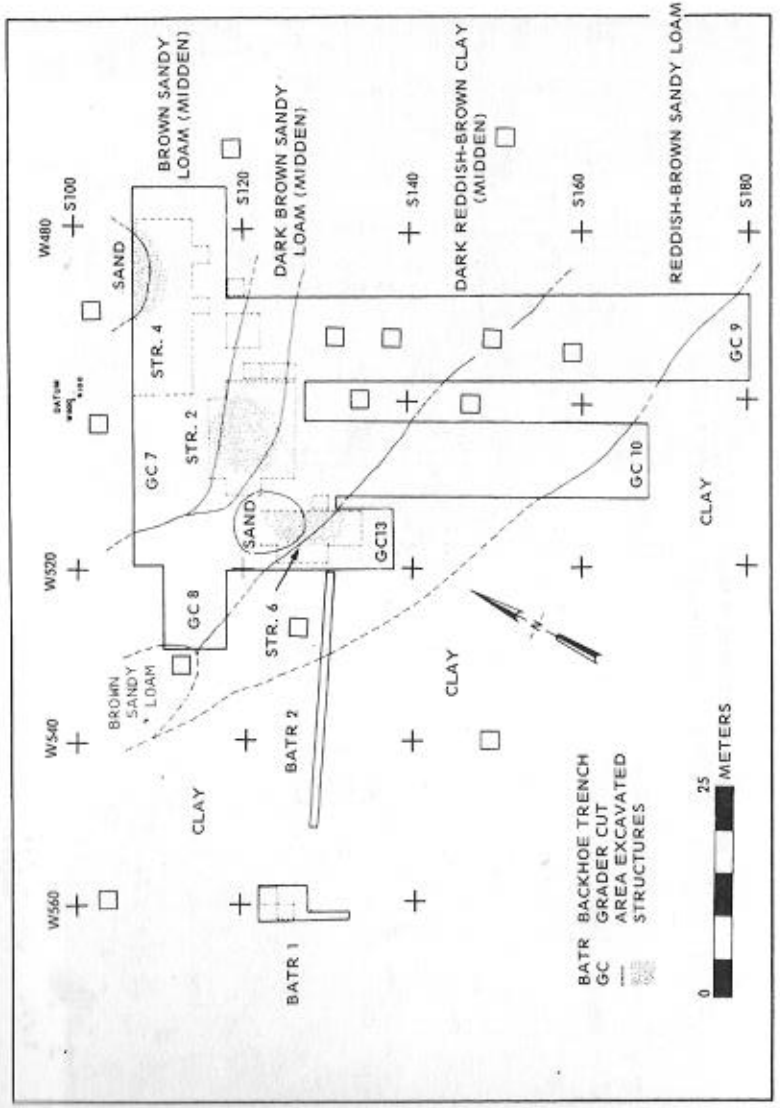


FIGURE 27. PLAN MAP OF NORTHEAST SECTOR INDICATING SOIL ZONES AND THE LOCATION OF STRUCTURES 2, 4, AND 6.

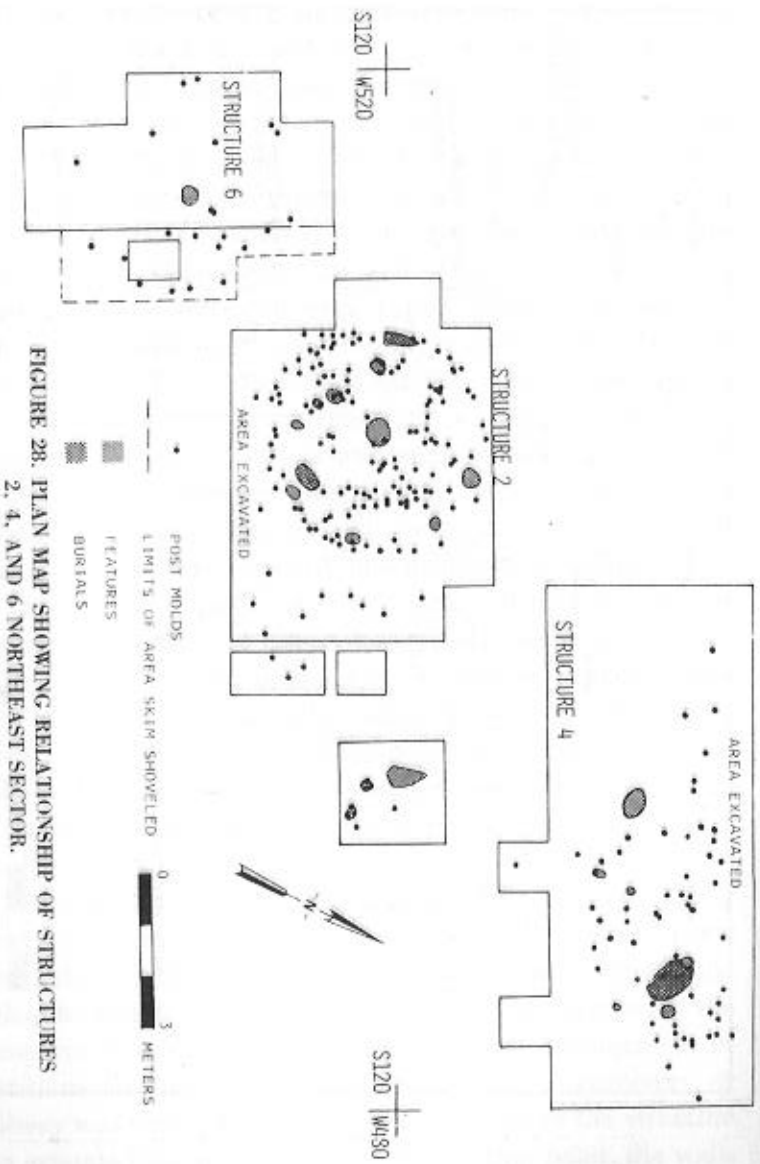


FIGURE 28. PLAN MAP SHOWING RELATIONSHIP OF STRUCTURES 2, 4, AND 6 NORTHEAST SECTOR.

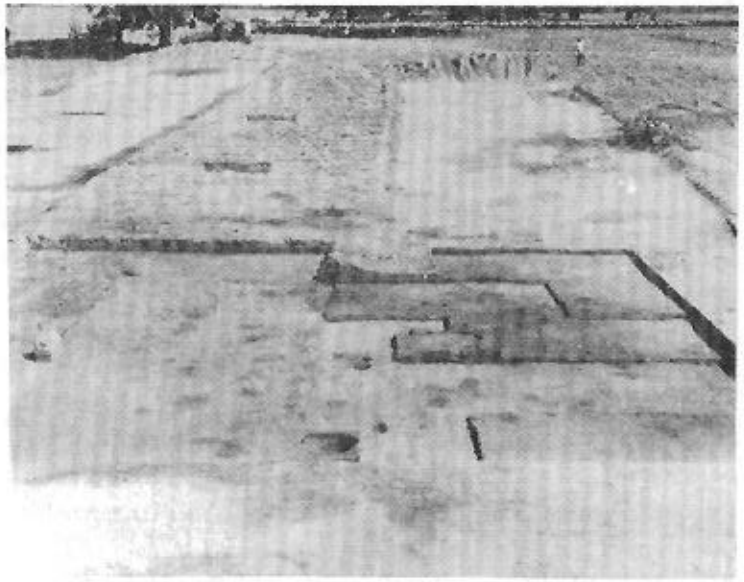


Plate XII. View of Structure 2 looking south during initial stages of excavation and grader cuts 9 and 10.

Plate XIII. Structure 2, looking south.

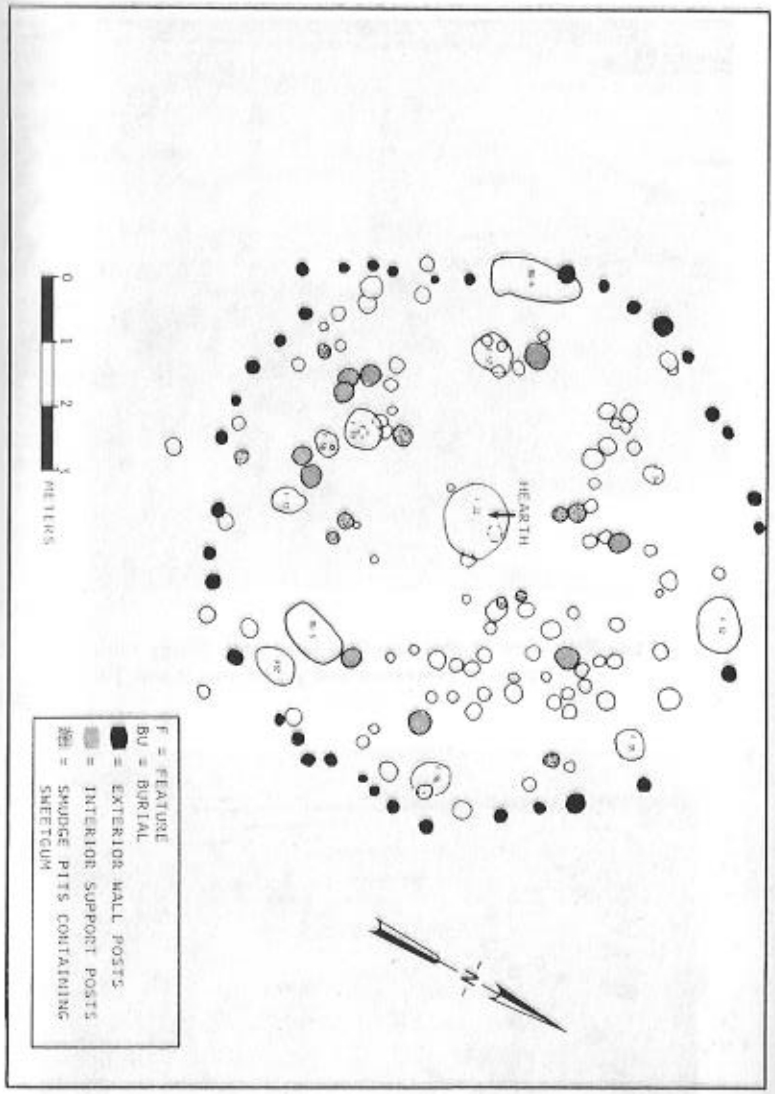


FIGURE 29. PLAN OF STRUCTURE 2.

those of the outer circular wall in their slightly greater diameter, ranging from 20cm to 33 cm. An attempt was made to discern regularities in the diameters (Fig. 30). The interior support posts, as noted, have slightly greater diameters than those of the outer wall, but there is no clear tendency with regard to depth. The remaining interior posts tend to be in intermediate in size.

Structure 2 is remarkably similar to House 5 at the Belcher site in Caddo Parish, northwestern Louisiana (Webb 1959: Fig. 28). The interior entrance-way and numerous bench, or partition, supports are almost identical in the two houses.

In addition to the complex of interior posts, 10 features were excavated in Structure 2. One of these, a hearth located in the center of the circular house, contained a large amount of ash. The clay at the bottom of this basin-shaped hearth was fired, and a total of 29 pottery sherds was found in the ash bed. All were typical Alto forms, including Dunkin Incised, Kiam Incised, Pennington Punctated-Incised, and Smithport Plain. Two sherds of L'eau Noir Incised were also located in the hearth. Only 13 lithic fragments were found, and, as might be expected in a hearth, most showed evidence of heat exposure. Small fragments of hickory nut shell and acorn shell were recovered from the hearth, as were numerous fish and small mammal bones. A postmold was located beneath the ash. The presence of a single postmold beneath a central ash bed is a common occurrence in Caddoan houses and has been interpreted as a scaffolding post erected during the construction of the roof and subsequently removed (Webb 1959).

Three intermediate-size pits, Features 33, 35, and 36, were located in the interior of Structure 2, just inside the eastern or southern portions of the house. All were similar in appearance having steep sides with rounded bottoms, and all contained moderate amounts of cultural material. Also, all contained small quantities of hickory nut shell, and one, Feature 33,

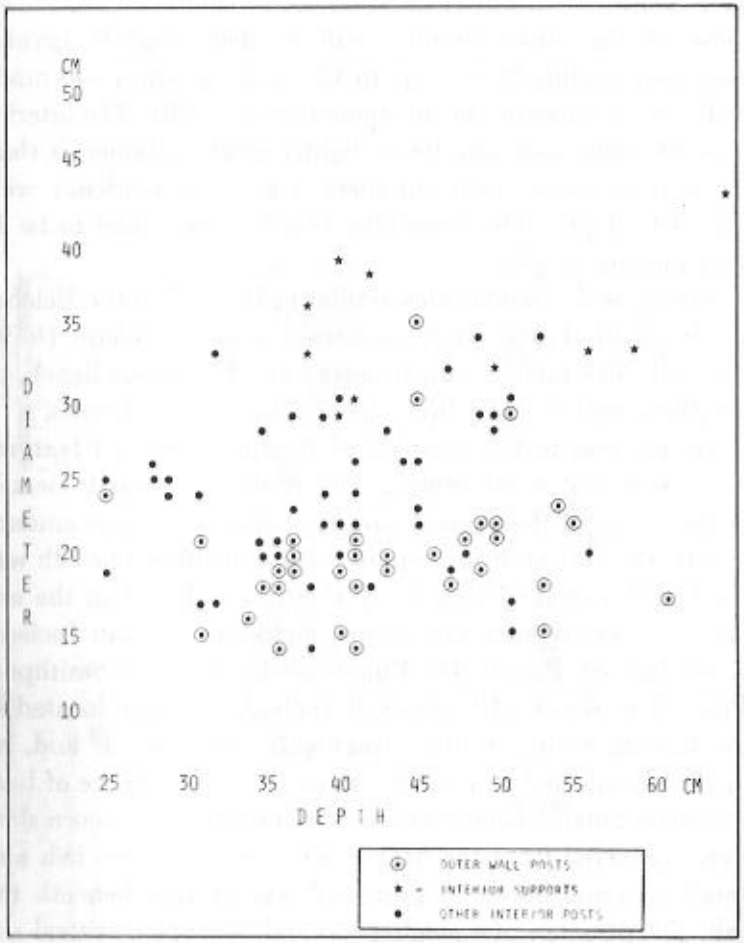


FIGURE 30. SCATTERGRAM OF POST DEPTH AND DIAMETER, STRUCTURE 2.

yielded a small amount of acorn nut shell and a honey locust seed. Feature 32, located in the entranceway in the northeast of the structure, approximated the morphology of the intermediate-sized pits. However, a large remant of charcoal and a heavy ash layer suggest a different function for this feature. In addition to the ash and charcoal, 90 bone fragments, representing deer, raccoon, rabbit, sunfish, and bowfin, were recovered, as well as gourd, squash, and honey locust. It appears that Feature 32 served as a cooking pit.

Five of the features produced little cultural material. Three were shallow basins, Features 34, 37, and 38, and two, Features 39 and 57, were shallow, irregular midden deposits. The function (if any) of these features remain in doubt.

Charred sweetgum fruits were found in 10 locations in the interior of Structure 2. All occurred in small pits of variable depth, ranging from 17cm to 39cm in diameter. The fruits were located in three areas within the house: just inside the walls of the structure; in a cluster near the rear or southwestern portion of the interior; and in two pairs of adjacent pits flanking the entranceway on the northeast side of the structure. Four alternative explanations may be offered to explain the small pits containing sweetgum balls. In her discussion of botanical remains from Hanna, Shea notes the possible medicinal use of sweetgum by the historic Natchez Indians, but the sources seem to refer to the sap rather than to the fruits. Binford (1967) has argued convincingly that smudge pits, small oval pits containing carbonized corncobs, bark, and twigs, were used by prehistoric and historic Indians of the eastern U.S. to smoke hides. His conclusions have been disputed by Munsen (1969), who argues that the pits were used in the smudging of ceramics.

Neither argument is precisely correct with regard to the Hanna material. The smudge pits described by Binford are quite similar in size and configuration to the sweetgum ball

pits at Hanna. Although Binford amassed a substantial body of comparative data on the pits, none of the sources makes reference to use of the fruit of the sweetgum as fuel. Perhaps more importantly, hide smoking was not an indoor activity, and smudge pits used for this purpose were "distributed peripherally" around farmsteads (Binford 1967:3). At Hanna, the pits containing charred sweetgum balls were located in the interior of the house.

The suggestion that smudge pits were used to produce a black surface on pottery is provocative, since black lustrous surfaces are common attributes of Caddoan pottery. As will be mentioned in the discussion of pottery coils found in the interior of Structure 2, the ititial stages in the manufacture of ceramics probably did take place in or near this structure. But, as was the case with hide smoking, it is difficult to understand why pottery smudging would take place in the interior of a house. It is possible that the smudge pits are related to use of Structure 2 subsequent to its abandonment as a habitation. In this case, the area of the structure, or perhaps the still-standing building, may have been converted from a dwelling site to a hide-smoking or pottery-manufacturing locus. However, the pits containing sweetgum fruits are strategically placed out of the main living area and near the interior walls, or flanking the entranceway. Had the pits been excavated subsequent to the habitation of the dwelling, one would expect them to be more randomly distributed in the center of the house. Therefore, we feel reasonably confident in concluding that the smudge pits were contemporaneous with the occupancy of Structure 2.

A fourth possible function of the sweetgum pits was insect control. The smoke exuded from the slow-burning pits would have proved effective in keeping mosquitoes at bay. Otherwise, it is difficult to explain the location of the pits in the interior of the house. Also, the position of two smudge pits on

either side, flanking the entrance, suggests the pits may have served to keep the doorway free of mosquitoes.

Although the function of the small pits containing sweetgum fruits remains problematic, four possible explanations have been discussed. Least attractive, because of the interior location of the pits, is the suggestion that they were used in hide smoking. The suggestion that the fruits were used medicinally seems possible, although the fruits were mature and probably dry when burned. References to the use of the sweetgum by historic groups call for the resin, not the mature fruit. The other suggestions, that the pits served in pottery smudging or as insect repellents, are the most plausible, but remain unproven.

Two burials were found inside the structure, one along the southwest wall and the other just inside the northeast wall. The pit of Burial 4 intruded into three postmolds and clearly postdated the erection of the posts.

Structure 4: Structure 4 was located 20m northeast of Structure 2 (Figs. 28, 31). Exposed in Grader Cut 7, only the southern 60 percent of this structure was excavated. Structure 4 was located at a slightly higher elevation than Structure 2, and the plow had disturbed the overlying midden and living floor of the house. Only the postmolds and features exposed in the grader cut at the base of the plow zone remained in tact (Plate XIV).

The structure was roughly circular in plan (Fig. 31) and had a diameter of about 8.5m. Some 50 posts formed the pattern of the structure, and, although the posts varied in size, the depth of the outer wall posts was slightly greater than that of the inner support posts. The exterior wall posts averaged about 25cm in diameter, but several were notably larger and were irregularly spaced. Several gaps of a meter or more occurred between the exterior wall posts. The northeastern portion of the house was not excavated, so data on an en-

tranceway in that area is lacking. However, along the northeastern wall of the structure, two arcs of posts extended inward from the outer wall at a distance of about two meters. The pattern formed by these posts was similar to that described for Structure 2, and may represent interior partitions, possibly flanking an entranceway. Alternatively, these interior posts could have served as a bench support. An interior circle of support posts was set one to two meters inside the outer wall. These posts were slightly smaller than those supporting the outer wall (most less than 25cm in diameter), and were not sunk so deeply.

No midden similar to that associated with Structure 2 was present in the interior or overlying Structure 4. However, to the south and west of the house was a dark brown sandy loam midden deposit. A few of the posts in the extreme southwest of Structure 4 overlapped this midden, but most of the structure was confined to the area of light-brown sand. The midden deposit contained a light concentration of cultural debris but was far less productive than the dark-brown sandy loam midden around Structure 2.

Five features were excavated in the area of Structure 4, but only three of these were located in the interior of the house. Two of the interior features were small pits and the third was a shallow basin. None was very productive, although all contained a few pottery sherds, and Feature 53, located near the southwest wall of the structure, yielded a small quantity of hickory nut shell and acorn shell. A concentration of pottery sherds, found about 75cm from the southwestern wall, was noted. About a meter outside the structure walls, a single oval pit (Feature 52) contained a moderate amount of cultural material, including hickory nut shell, acorn, and a small sample of sweetgum fruit. One outer wall post mold contained a single corn cob.

One burial was located in the interior of the structure.

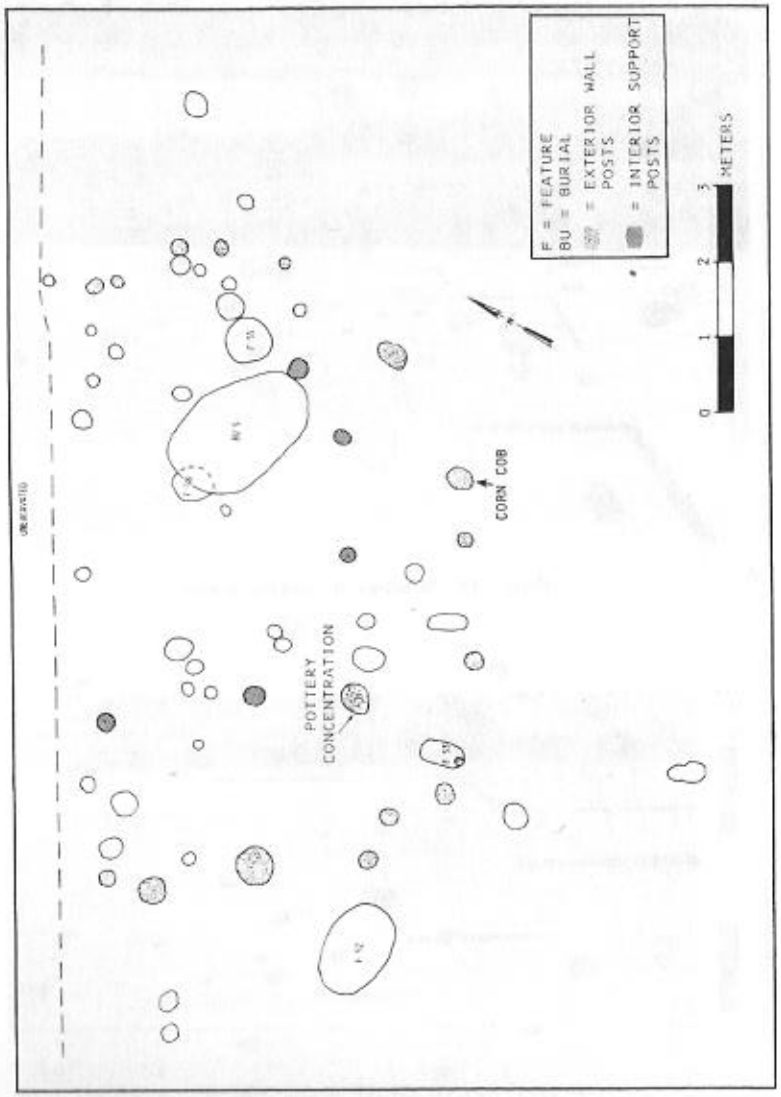


FIGURE 31. PLAN OF STRUCTURE 4.

Plate XIV. Structure 4, looking north.

Plate XV. Structure 6, looking west.

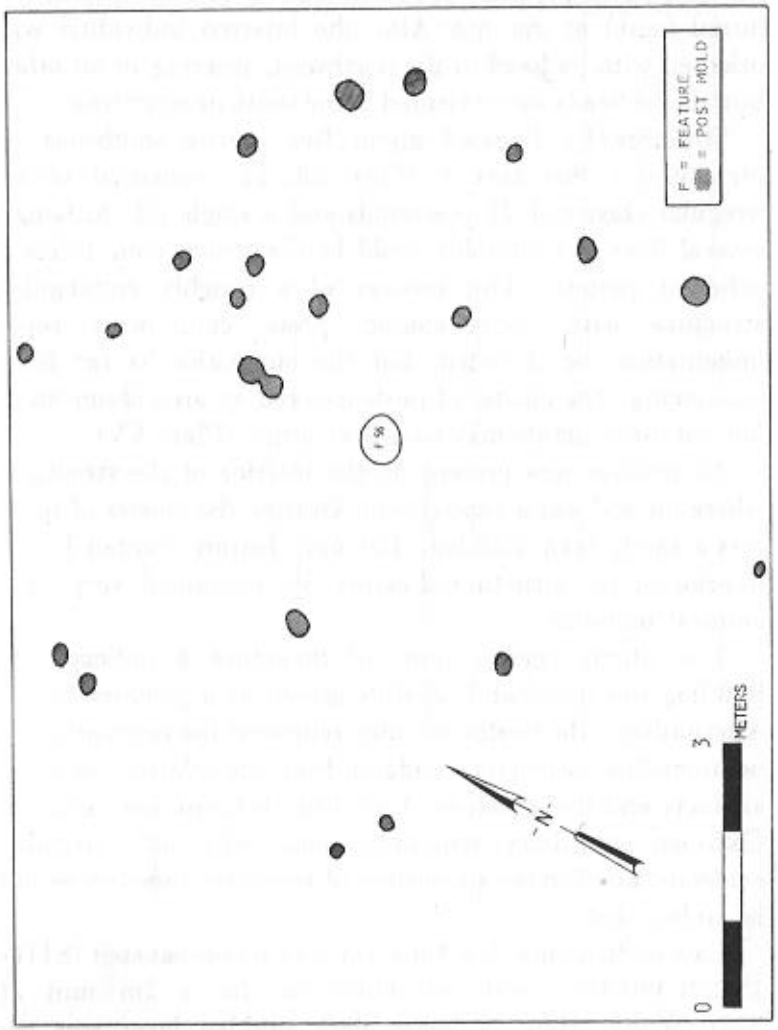


FIGURE 32. PLAN OF STRUCTURE 6.

Placed in a simple pit, this individual was the the only flexed burial found at the site. Also, the interred individual was oriented with its head to the northwest, whereas in all other burials the heads were oriented to the south or southwest.

Structure 6: Located about five meters southwest of Structure 2, Structure 6 (Figs. 28, 32) consisted of an irregular cluster of 21 postmolds and a single pit. Although several lines of postmolds could be discerned, none forms a coherent pattern. The vestiges of a roughly rectangular structure with widely-spaced posts can, with some imagination, be detected, but the suggestion is far from convincing. The cluster of posts covered an area about 8m x 5m but the structure may have been larger (Plate XV).

No midden was present on the interior of the structure, where the soil was a sandy loam. Outside the cluster of posts was a sandy loam midden. The only feature located in the interior of the structure, Feature 56, contained very little cultural material.

The widely spaced posts of Structure 6 indicate the building was open, and possibly served as a summer house. Alternatively, the postmolds may represent the remnants of a nondomiciliary structure, judging from the relative dearth of artifacts and living refuse. Very little information exists on Caddoan subsidiary structures, and, with only negative evidence, any further suggestion of structure function would be unfounded.

East of Structure 2, a 4m x 4m area was excavated (S118-122/W490-494) with an additional 2m x 2m unit at S120/W488. Here, a heavy dark midden layer was encountered below the plow zone. This stratum was extremely productive with high frequencies of ceramics and enormous quantities of stone tools and lithic debitage. Underlying the midden were six postmolds, but an insufficient area was unearthed to reveal any structure pattern. In view of the

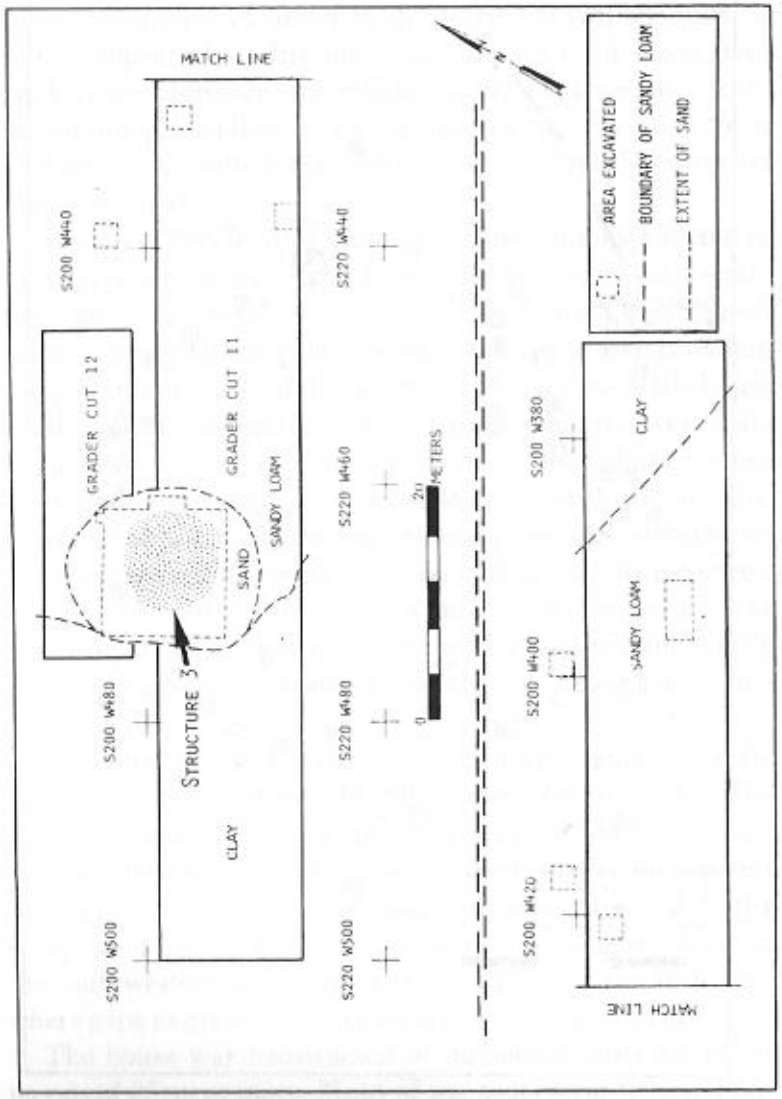


FIGURE 33. PLAN MAP OF SOUTHEAST SECTOR INDICATING SOIL ZONES AND THE LOCATION OF STRUCTURE 3.

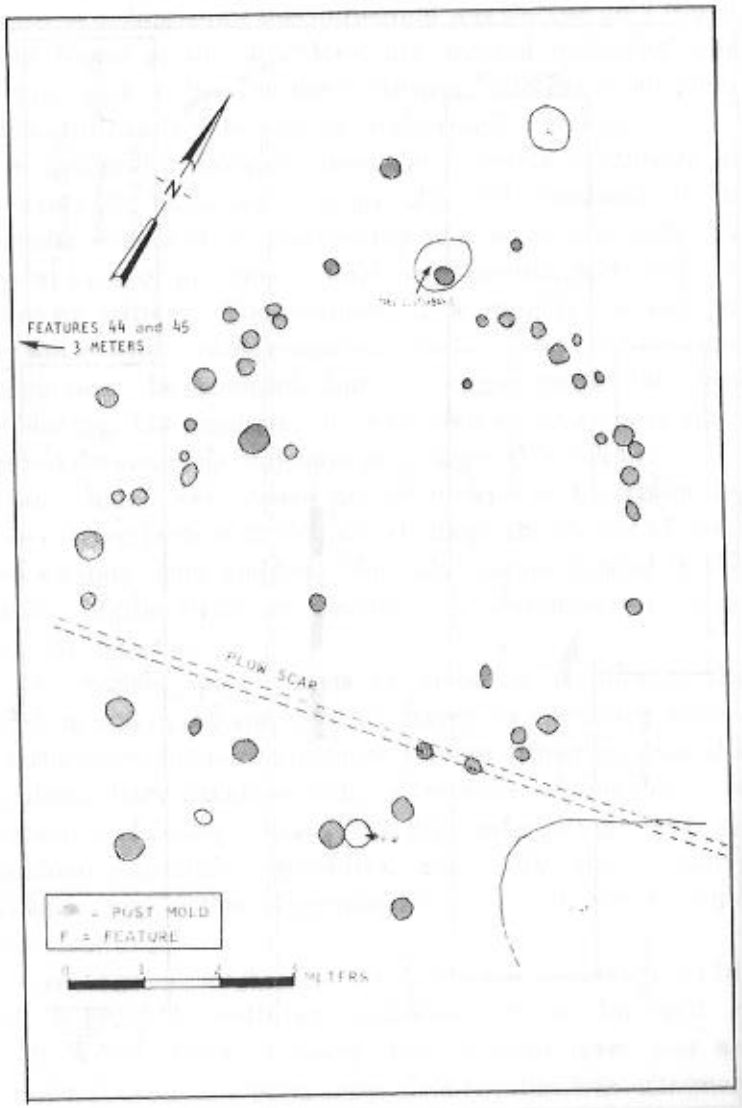


FIGURE 34. PLAN OF STRUCTURE 3.

heavy occurrence of lithics in these few excavation units, it would appear that this area was the locus of stone tool production. However, the midden could have resulted from the dumping of refuse, in which case the high frequencies of artifacts would reflect the activity of trash deposition, rather than tool production.

Southeast Sector, Structure 3: In the southeast sector of the site, Grader Cuts 11 and 12 exposed an area of soft, sandy soil, and several postmolds (Figs. 33-34; Plate XVI). Shovel-skimming operations commenced in the sandy area revealing the postmold pattern of the structure. The outline of the house walls could be determined, even though the area was badly disturbed by previous plowing. None of the original house floor, living surface, or interior features such as hearths, remained intact. Only the rather deep posts and subterraean features escaped destruction. As a result of the disturbances, no delineation of activity zones is possible, and suggestions as to the function of the structure must be based predominantly on the pattern of construction rather than artifactual associations.

Structure 3 was roughly circular house, approximately seven and one-half meters (N-S) by seven meters (E-W). The point of detection of the postmolds and features had an average elevation of 99.16m, about 30cm below the present surface. As mentioned, plow disturbance had resulted in the complete or partial destruction of several posts, particularly in the southwestern and southeastern portions of the structure, where gaps as great as 1.75m separated some postmolds.

The house was constructed of numerous posts set at intervals of 25cm or more. Many of the posts seem to have been paired, although others were not. Post size varied with most measuring about 25cm or less in diameter. As was the case in other structures at Hanna, the builders were little concerned with symmetry. The posts were not set in a well-defined circle

but were rather haphazardly arranged in the roughly circular pattern. Post size was far from constant, and spacing varied, as well.

No entranceway could be identified; there were no parallel rows of posts, such as were found in Structure 1. Any of several gaps in the wall could have served as an entrance, but could also be the result of disturbance. Along the north wall, a tree may have served as a support. Swanton (1942:148-154) notes the use of trees as house supports among the historic Caddo, but we are not in a position to verify the practice at Hanna.

Several interior posts were located, but no definite pattern in their arrangement could be discerned. However, several small interior posts in the northern section of the structure hint at the presence of a partition or bench. No evidence of rebuilding or repair was evident, and it is concluded that Structure 3 was erected, occupied, and subsequently abandoned, without undergoing significant modifications.

No midden was located in the house, but surrounding the structure, a dark stratum of sandy clay stood in marked contrast to the sand in the area of the house. Apparently, the occupants kept the interior of the house quite clean.

Five features were found in association with Structure 3, including one small cooking pit (Feature 40), one intermediate-sized trash or storage pit (Feature 44), a shallow basin-shaped pit (Feature 45), a small deep cone shaped pit (Feature 42), and an irregular midden deposit (Feature 43). Three of the features were located on the exterior north of the structure (Features 42, 44, and 45), and, although few cultural remains were found, hickory and acorns were present in each pit. The cooking pit, located near the south wall of the house, was filled with ash, and showed evidence of firing along the walls and bottom of the pit.

Unlike other houses at Hanna, no burials were found associated with structure 3.

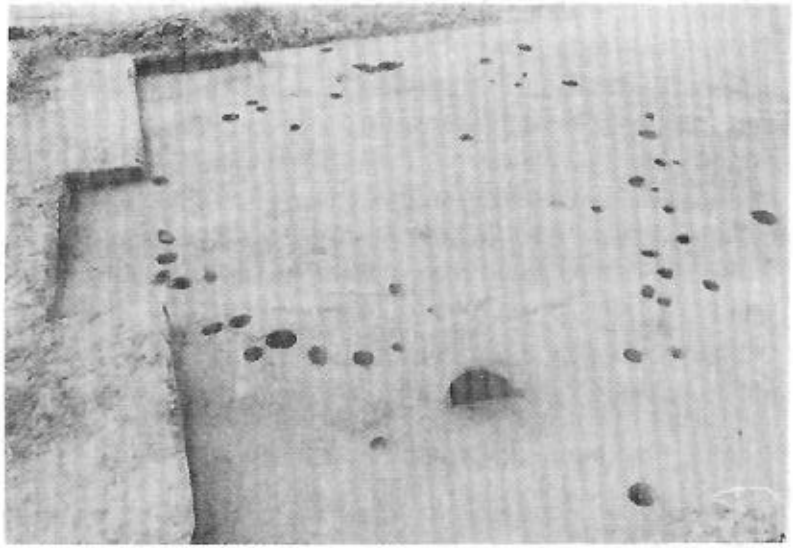


Plate XVI. Structure 3, looking south.

Features

Excavations at the site uncovered 53 features on excavated surfaces usually identified by a dark stain. The features differed somewhat with respect to size, shape, and content, but similarities could be noted among many of them. Consequently, a feature classification was constructed to assist in ordering the field data and to aid in the interpretation of the features and their relationships to structures and activity areas. The classification, based largely on morphology, includes 14 specific feature categories.

Subsequent analysis of feature morphology, the nature of the feature fill, artifactual content, and location with respect to structures, revealed certain consistencies among the feature types. Large, deep pits included only two features, both located in the southwest sector. These were greater than a meter in diameter, more than 50cm in depth, and had almost vertical walls. They contained rather sparse amounts of

cultural material, and no function, other than perhaps storage, can be attributed to them.

Twenty-one features were classed as intermediate pits, and were probably used for storage or refuse. These pits were smaller than the large deposits described above. They ranged from 45cm to one meter in diameter, had sloping walls, and reached depths of up to 50cm. Most of these features contained moderate amounts of ceramics and lithics, and several produced sizeable samples of animal bone and botanical remains (Feature 7 yielded 229 fragments of bone, and Feature 11 produced 509 bone fragments). The absence of significant quantities of ash or charcoal precludes assigning a cooking function to these features, and this fact, added to the variety of cultural debris, argues strongly for considering these features refuse pits.

Numerous basins of various sizes were identified. These features yielded little in the way of artifacts or floral and faunal remains. Ten features, identified as shallow basins, did not serve as storage or refuse pits, but appear to have represented small borrow pits, possibly for the extraction of clay for daub.

Five irregularly-shaped stained areas were located in the southwest and northeast sectors. Upon excavation, these features proved to be midden deposits containing a moderate amount of cultural debris. The majority of these features were located within structures, and one or several postmolds were located at the bottom of each pit. These features represent small midden accumulations near posts inside the houses.

One hearth was found. This feature was centrally located in Structure 2 and yielded moderate quantities of artifacts and food remains, intermixed with a heavy ash lens, a substantial quantity of bone fragments, and carbonized plant remains. In addition, three features have been identified as

large cooking pits, subsequently used for refuse. All contained ash and the walls and bottom of one of the pits showed evidence of firing. Charred food remains, animal bone, seeds, and nuts, were found in all these pits. Two (Features 4 and 10) were associated with Structure 1 in the southwest sector and yielded high concentrations of artifacts, especially burned bone fragments. Feature 4 contained 1,575 pieces of bone, the largest number recovered from any excavation unit, and Feature 10 yielded 1,026 fragments. In the northwest sector bone concentrations in features were not as high, but Feature 32, located near the entranceway of Structure 2, contained 90 bone fragments, charcoal, and ash. This feature may have served as a cooking pit for the occupants of this structure. It might further be argued that the hearth in the center of Structure 2 also served as a locus for food preparation. One small pit, Feature 40, located near the walls of Structure 3 in the southeast sector, showed evidence of firing along the pit walls and base and may have been a small cooking pit. However, no faunal, malacological, or lithic remains were found, and the very small frequencies of ceramics and botanical remains (5 sherds and 1.3gm respectively) indicate that the assignation of this feature as a small cooking pit is tenuous. Numerous smudge pits, small pits filled with charcoal, were found in the interior of Structure 2. The pits, filled with charred sweetgum fruits, are of problematic function and are discussed at length in the analysis of Structure 2. The last two feature types, ceramic concentrations and historic disturbances, need no further explanation.

Burials

Six human burials were found during the excavations at

Hanna, all directly associated with structures. The following discussion is based upon field observations; a more detailed osteological analysis is presented in the report by Giardino. Four of the burials (1, 2, 3, and 4) were quite similar in terms of position and location, but the fifth (Burial 5), was divergent in several respects.

Burial 1: Located in the grid square at S172/W552 and S172/W554, this burial was recovered from an oblong pit, 193cm long and 81cm wide (Figs. 24, 35). The long axis of the pit was oriented N-S. This relatively shallow (31cm) grave was placed parallel to, and just outside, the northwest wall of Structure 1 and intruded into Postmold 77 and several features (18, 19, and 21). Two individuals were interred, both oriented parallel to the long axis of the grave with their heads to the south. Individual 1A was an adult, lying extended and supine in the grave, facing up. Individual 1B was a subadult, approximately three to four years of age, lying extended on its left side. This subadult was wedged between the east wall of the grave and the right side of Individual 1A, overlying the right arm of the adult (Plate XVII). Preservation of both individuals was good, though a rodent burrow had destroyed most of the cranium of the subadult individual. No grave goods were found in direct association with the individuals; however, an unworked fragment of bivalve shell was lying on Individual 1A, and the grave fill contained several ceramic sherds, pieces of burned animal bone, and chert.

Burial 2: On the southeast side of Structure 1, opposite from Burial 1, Burial 2 was located in squares S170/W546 and S180/W546 (Figs. 24, 36). The oval-shaped pit was similar to that which held the remains of Burials 1A and 1B. The grave was approximately 2.25m long, 85cm wide, and 50cm deep, oriented in a N-S direction. The grave was located among the wall posts of the structure and intruded into three postmolds. One additional postmold intruded into the burial.

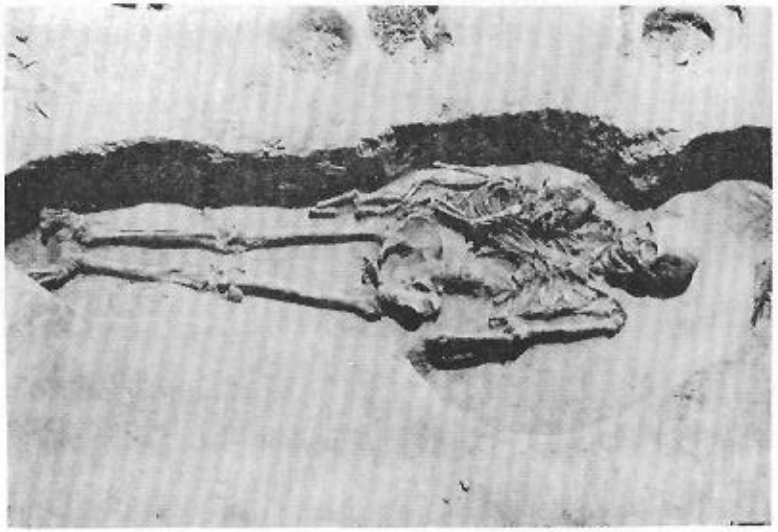


Plate XVII. Burial 1, individuals 1A and 1B

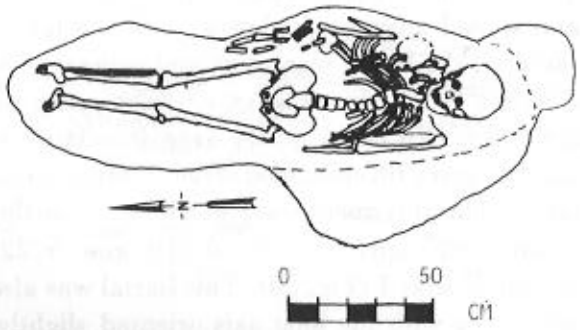


FIGURE 35. PLAN OF BURIAL 1 A-B.

This placement indicates that the grave was dug after the house was constructed, perhaps while it was occupied, and that occupation continued after interment.

Individual 2 was an adult, oriented approximately N-S, with its head to the south. The individual was in an extended, supine position, the head facing up, and the arms slightly flexed, with the hands in the pelvic area instead of at the side of the body (Plate XVIII). Preservation of the bones was good, and several bones were recovered intact. No grave goods were associated with this individual, and the grave fill produced few artifacts.

Burial 3: Located near the southeast wall of Structure 2 (S124/W504 and S124/W506) and within the structure itself, Burial 3 was placed in a shallow (22cm) oval pit, approximately 60cm long and 46cm wide (Fig. 29). It was oriented in a NE-SW direction along its long axis. No intrusive posts or features were observed. The grave contained only one individual, a subadult. The body was lying parallel to the long axis of the grave, with the head to the southwest, facing northwest. The left arm was extended alongside the body, while the right arm was partially flexed with the hand in the pelvic region (Plate XIX). Both legs were partially flexed and spread apart at the knees, with the feet together. Preservation of the bones was poor, and several of the head and foot bones were either missing or represented only by a bone meal stain. No grave goods were associated with this burial, but the grave fill contained general refuse remains.

Burial 4: This interment was located in the northeast wall of Structure 2 in squares S120/W510 and S122/W510, opposite from Burial 3 (Fig. 29). This burial was also placed in an oblong pit with the long axis oriented slightly east of north. The pit's dimensions were 1.50m x 59cm x 39cm in depth (Plate XX). Shape and orientation were very similar to the pits of Burials 1, 2, and 3. Burial 4 intruded into Post-

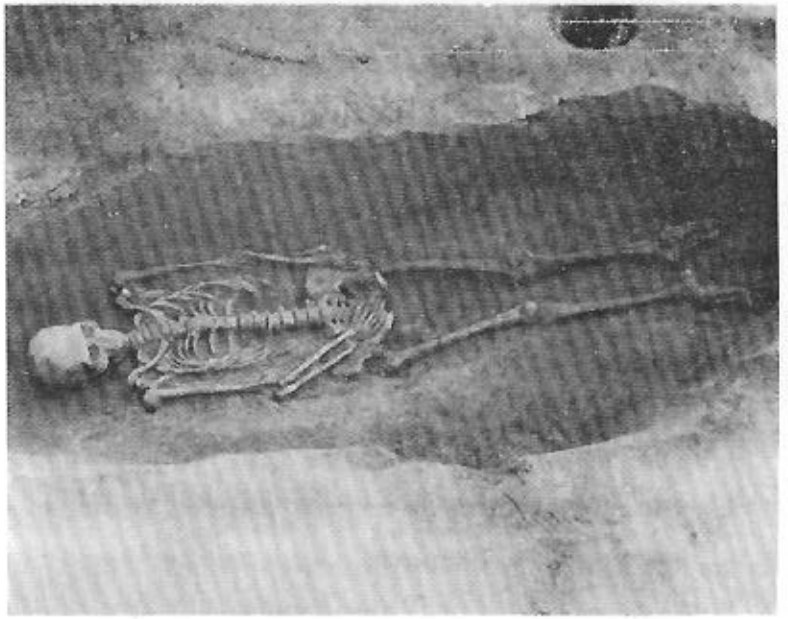


Plate XVIII. Burial 2.

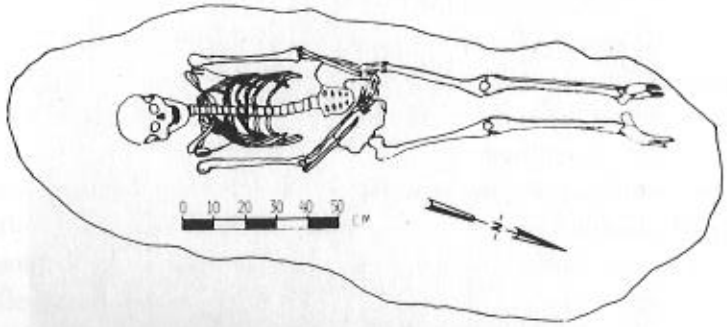


FIGURE 36. PLAN OF BURIAL 2.

Plate XIX. Burial 3.

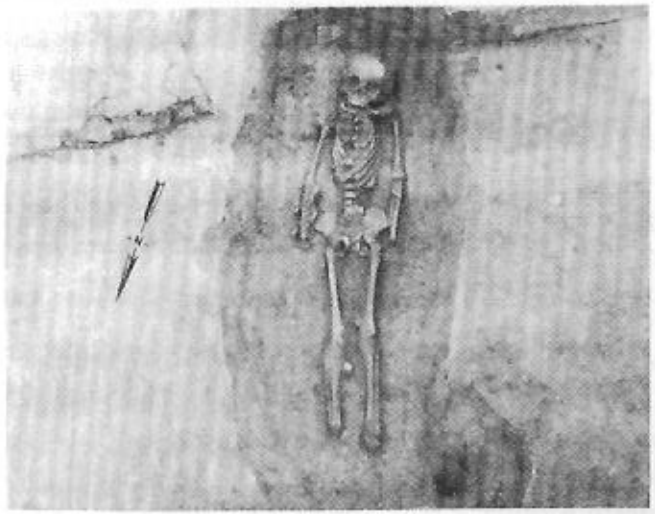


Plate XX. Burial 4.

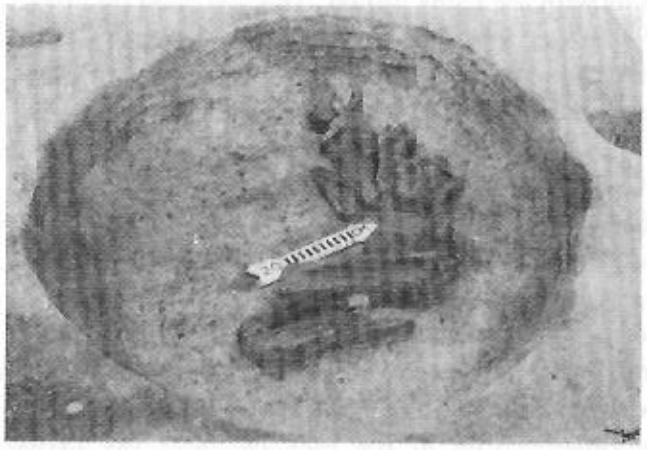


Plate XXI. Burial 5.

mold 231. The grave contained only one individual, an extended supine subadult. The body was oriented parallel to the long axis of the grave, with its head to the south, facing up. Both arms and legs were extended. Preservation was fair in this burial, but both hand and foot bones were missing. No grave goods were found associated with this individual, though the pit was filled with general midden refuse.

Burial 5: This burial was represented by an oval, shallow pit. It was oriented NW-SE on its long axis and measured 1.50m x 1.30m x 26cm in depth. It was located in the interior of Structure 4 (S110/W484, near the southeast wall of that structure (Fig. 31). Feature 58, a small pit, was intruded by the northwest end of Burial 5. The individual differed somewhat from the others recovered at Hanna because it was flexed, and oriented NW-SE. The other burials, as mentioned above, were extended and oriented NE-SW. The individual present was lying on its right side with the head to the northwest, facing southwest. The arms were flexed, with the hands located in the face region and the long bones of the arm

parallel with the trunk region. The legs were semiflexed, with the femora at right angles to the spinal column, and the knees bent to place the feet in the pelvic area. Preservation of Burial 5 was extremely poor. No grave goods were associated with this burial, and the grave fill was relatively unproductive (Plate XXI).

All of the burials at Hanna were primary interments associated with structures, and none contained grave goods. These simple burials underscore the relatively small size and, perhaps, lack of influence of the Hanna site, compared to regional or local centers and larger settlements. The lack of associated grave goods, when compared to larger, contemporaneous sites in the area indicates the existence of differential social ranking among communities. Hanna seems to have been on the lower end of the social scale, if the presence of earthworks and richly-furnished graves accurately reflects status.

Ceramics

A total of 25,368 pottery sherds were recovered at the Hanna site (Table 1). Of this total, the majority were of small size measuring less than five centimeters in diameter; sherds less than one centimeter were discarded. No whole vessels were found in excavation units or burials; however, two half-vessels (Holly Fine Engraved and Pennington Punctated-Incised) were assembled from sherd fragments (Figs. 37, 38). In the final analysis pottery sherds were classified as undecorated, unidentifiable decorated, and those which could be placed within established types. Undecorated sherds were recovered in the greatest frequency, comprising 60.97 percent (15,467) of the total collection. Unidentifiable decorated ceramics, either atypical sherds or those without sufficient design to permit typing, were sorted by decorative technique and comprise 11.8 percent of the collection. The remaining 27.5 percent were easily placed within previously-defined typological categories.

Most of the pottery types identified in the Hanna collections have been defined in the works of Suhm, Krieger, and Jelks (1954), Suhm and Jelks (1965), and Phillips (1970). We did not find it necessary to define new types, and no attempt was made to establish varieties. The collection was taken from only one site, and the establishment of new ceramic varieties is more appropriately based on material from several locations. Also, the vast majority of the Hanna materials fit precisely within the established types. However, some problems arose because Caddoan pottery types are predominantly based on whole vessels obtained from burials, whereas the Hanna collections consist exclusively of fragments of vessels. As a result, complex types such as Kiam Incised (parallel incised lines circling the rim, with vertical rows of punctations on the vessel wall) tend to be underrepresented in sherd counts. Except in the rare instances when a sherd exhibited both the incised and punctated exterior, sherds would be classed as Hardy Incised or Wilkinson Punctated.

The following discussion of the Hanna ceramics is presented in two parts: the first is a general summary of the characteristics of the entire collection, and the second elaborates the sorting criteria for the identification of each type and discusses variations in each.

Paste

Paste color was measured with the Munsell Soil Color Chart. Most of the ceramics fall within the 2.5YR and the 10YR series, including mostly shades of red, reddish-brown, yellow-brown, dark brown, buff, and black. The cores of the sherds vary in color depending upon completeness of firing. Texture varies from fine, such as in much of the engraved pottery, to very coarse, as seen in Williams Plain ware. The

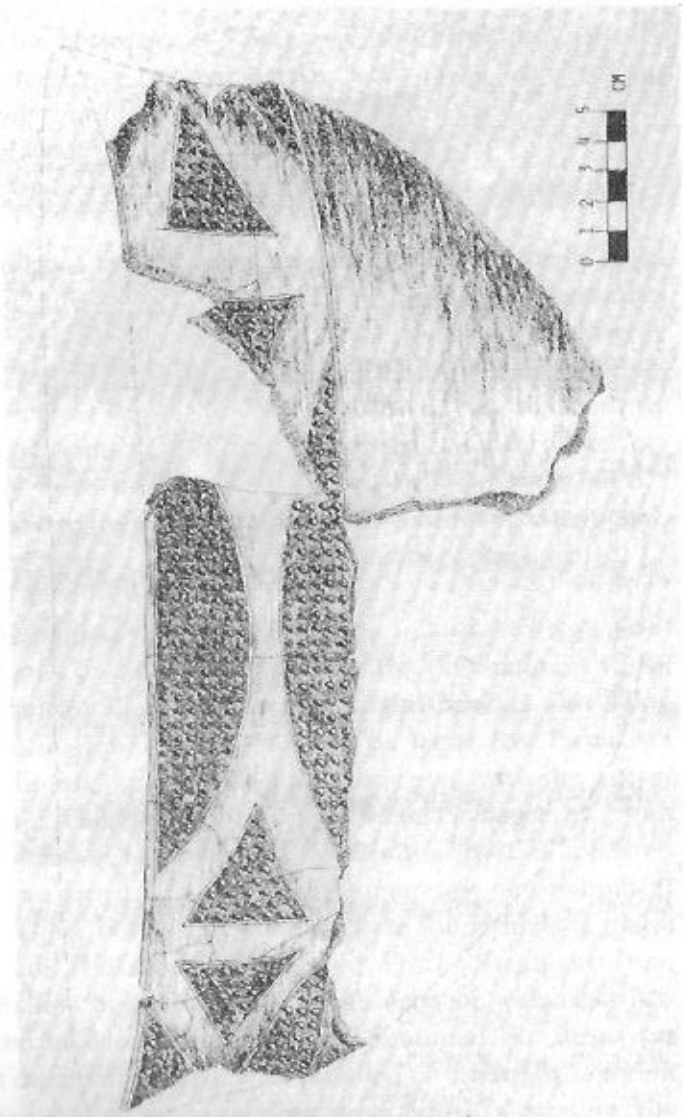


FIGURE 37. PENNINGTON PUNCTATED-INCISED VESSEL.

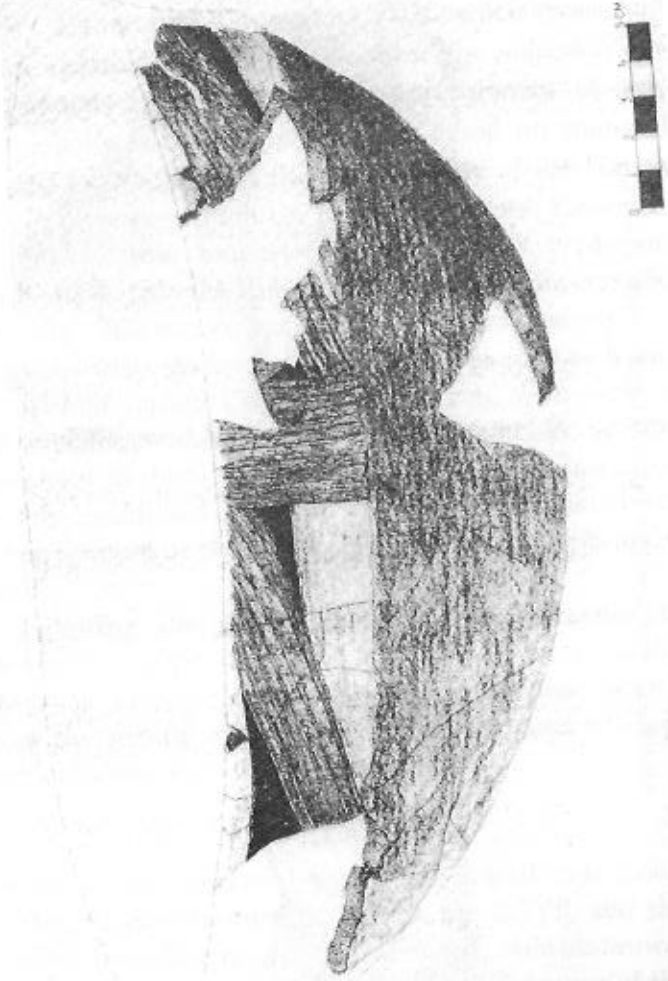


FIGURE 38. HOLLY FINE ENGRAVED VESSEL.

texture was gauged according to the Wentworths Size Classification (Shepard 1965). Hardness falls within the 2-4 range on the Mohs Scale. The unoxidized black paste sherds show a tendency to be harder and more resistant to weathering than the well-oxidized brown and red paste sherds.

Temper

The various tempering agents used were clay/grit, grog, sand, and pulverized bone; inclusions of red ochre, hematite, and charcoal were noted, as well as inclusions of a light-gray material resembling volcanic tufa. The most frequently occurring temper was clay/grit, followed, in significantly smaller percentages, by grog or sherd temper. Seen occasionally were bone and sand. No shell-tempered sherds were discovered. The inclusions, either natural or intentional, were often mixed with each of the main tempering agents.

Vessel Form

Carinated bowls and caldrons are the predominant vessel forms from the site with deep bowls and beakers also being identified in significant numbers. The latter two forms are found primarily on ceramic types associated with the Lower Mississippi Valley. The exception is the incidence of L'eau Noir, which was found on carinated bowls. Bottles appeared in very low frequencies and were apparently uncommon at Hanna. Those bottle sherds which were found include plain, slipped, and Hickory Fine Engraved. Pottery fragments from three shallow bowls were recovered, each of which had exterior and interior incising. The predominant rim forms are straight or slightly flared, with rounded or internally tapering lips. Two distinctive exceptions were noted, a straight rim with bilateral wedge from a brushed sherd, and a straight rim bearing a horizontal labial flange from a Baytown Plain vessel.

Decoration

The ceramic collection includes several variations in decorative technique, including polishing, slipping, engraving, incising, punctating, brushing, combing, and ridging. Often combinations of these occur on one vessel. Nearly all of the engraved sherds were polished to some extent, and some evidence of polishing was noted in almost every type. Smoothing was noted on a majority of the sherds, especially in the Hardy and Plaquemine Brushed types. A small percentage of Dunkin Incised and Hardy Incised seems to have been intentionally roughened. Slipping was comparatively rare at the site, with only 0.3 percent of the total being slipped, and no painted sherds were positively identified. Traces of red ochre were found occasionally in the engraved lines of some sherds.

Engraved Pottery

A total of 339 (1.34 percent of total) engraved sherds was found. Of these, 274 (80.83 percent) were typed. The engraved types include Holly Fine Engraved, Carmel Engraved, Hickory Fine Engraved, and Maddox Engraved. Eight sherds correspond to an untyped engraved ware described in earlier reports (Newell and Krieger 1949:96-123; Webb 1963:156). Paste texture varies from fine to coarse. Color variations range between the 5YR and 10YR series on the Munsell Color Chart. Clay/grit and grog are the only tempering agents used among the engraved ceramics, although natural inclusions are noted in some of the sherds. Carinated bowls comprise the majority of engraved vessel forms, with a few bottles, beakers, and deep bowls present in much lower frequencies. Wall thickness ranges from 3 to 9mm, and the rims are straight to flared with predominantly rounded lips. Internal tapering of the lip was noted on some; the engraved rims exhibit evidence of some polishing, and a

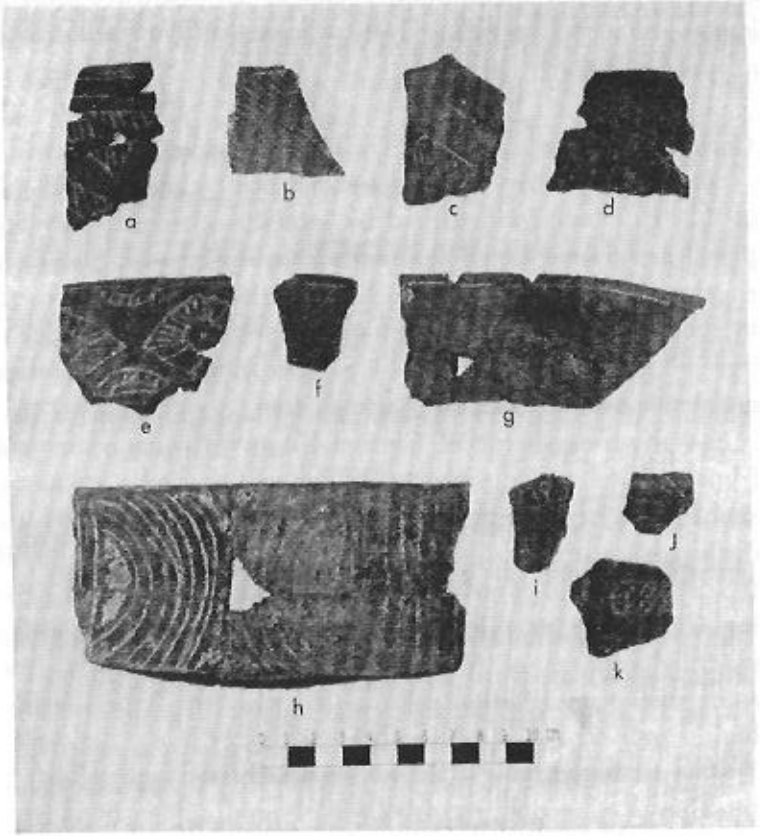


Plate XXII. Engraved Ceramics. a-f, k, Carmel Engraved; g-j, Holly Fine Engraved.

high polish is not uncommon. Traces of red ochre are present in the engraving on some Holly, Carmel and miscellaneous untyped engraved ceramics.

Carmel Engraved [Plate XXII a-f, k]: Sorting Criteria:

This type was first described by Clarence Webb (1963:155) and is identified by straight or slightly-curving parallel engraved lines 4 to 8mm apart, ending with a heavier engraved straight or curving line. Variations in decoration include diagonal engraved lines intersecting heavy straight lines, forming an abstract design. Also noted were negative geometric zones offset by parallel lines.

Seventy-four sherds of Carmel Engraved were recovered from the site and represent 21.83 percent of the engraved sherds. Color ranges between 5YR 4/6, or yellowish red, and dark reddish brown (5YR 3/2). Only one black sherd (5YR 2.5/1) was found. The tempering agent is clay/grit, but some inclusions were noted in several sherds which gives the paste a speckled appearance. Most of the sherds are unpolished, but some show signs of a low polish and a very small number are highly polished.

The carinated bowl is the major vessel form represented in the Hanna collection, but two beakers and a deep bowl were also identified. Sherd thickness varies from 5 to 8mm. One heavily flared rim was noted, but most are slightly flared with flat or rounded lips. Three externally tapered lips are the exception.

Hickory Fine Engraved [Plate XXIII a-d]: Sorting Criteria:

Multiple horizontal engraved parallel lines. The only exception was one rim sherd possessing an excised triangle along the lowest line.

Forty-two sherds (12.39 percent of engraved) of this type were recovered from the excavations. All were from simple or

carinated bowls with the exception of fragments from two bottles (Plate XXIII a). Rim forms are straight to slightly flared with rounded lips. Paste is medium texture with clay/grit tempering. The 10YR light browns and black are the prevailing colors, though five sherds show traces of having red slip (2.5YR).

Holly Fine Engraved [Plate XXII g-j, Figs. 38, 39 i]: Sorting Criteria:

For larger sherds with obvious patterns, the decorative treatment described for this type in the Texas Handbook was used in identification (Shum and Jelks 1962:77). Smaller sherds were typed as Holly Fine Engraved when they exhibited multiple straight (vertical or diagonal to the smoothing lines or rim) or curving parallel engraved lines.

This was the predominant engraved type consisting of 151 sherds. Vessel diameters range from 25 to 40cm, and wall the Holly sherds were recovered from excavations in Structure 2. Surface colors are usually black or mottled very dark brown, grading to yellowish-brown (10YR 5/6); a small percentage are paler colors. Clay/grit is the only tempering agent found in the Holly sherds. Carinated bowls are the most common vessel form with deep bowls represented by only four sherds. Vessel diameters range from 25cm to 40cm, and wall thickness varies from 5 to 8mm. Rim forms are straight or slightly outflared. The elaborate rim treatments found at the G.C. Davis site were not evident at Hanna (Newell and Krieger 1949).

Designs including etched triangles and semicircles, some bearing evidence of red ochre in the lines, were the most popular at the site. A possible variant (Plate XXII g) of Holly Fine Engraved is represented by one outflared rim sherd and two body sherds from a weakly-carinated bowl, approximately 35cm in diameter. The pattern of opposing

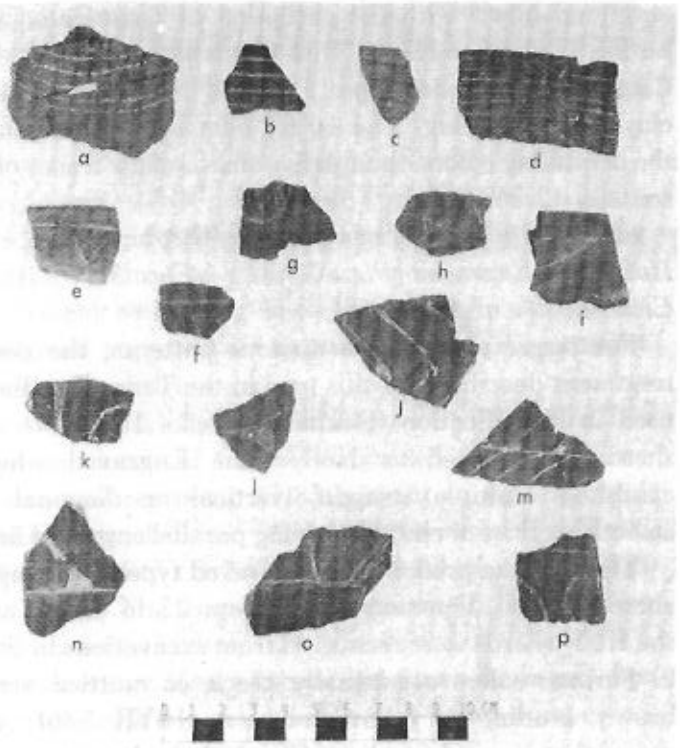


Plate XXIII. Engraved Ceramics. a-d, Hickory Fine Engraved; e-g, Maddox Engraved; h-p, Miscellaneous Engraved.

excised teardrops was apparently repeated around the vessel. A single horizontal engraved line is present on the interior wall near the break.

Maddox Engraved, variety Baptiste [Plate XXIII e-g]: Sorting Criteria: See Phillips [1970:108].

This type was rare at the site, represented in the sample by only seven sherds (2.06 percent of engraved). All sherds were less than 3.0cm in diameter, but sufficient decoration was present to permit typing. Several crosshatched engraved sherds in the collection may actually be of this type, but were too small for certain identification.

Miscellaneous Unidentified Engraved: Sherds placed in this type either lacked sufficient design to be typed or exhibited atypical engraved motifs. Also placed in this category were engraved sherds which bear designs similar to untyped engraved ware from other Caddoan sites. This category is represented by 65 sherds (19.17 percent of engraved). Two of the engraved sherds have horizontal slipped zones outlined by engraved lines. Seven sherds (Plate XXIII h-j) from three vessels have an excised zig-zag pattern strikingly similar to those found at the G.C. Davis site (Newell and Krieger 1949:96) and the Smithport Landing site (Webb 1963:156). These sherds appear to be from carinated and simple bowls. Three other engraved sherds (Plate XXIII k, n, and p) also bear a resemblance to the untyped engraved and grooved sherds at the Davis site.

Incised Pottery

Incised ceramics include decorations of simple horizontal, vertical or diagonal lines, crosshatching, and zoned incisions. They comprise the largest group of decorated ceramics, numbering 6,463 sherds (25.5 percent of total). Clay/grit

temper was observed in the majority of incised sherds with small percentages of grog, sand, and bone tempering occurring. Surface colors grade between the browns and grays of the 10YR series, and the reds of the 10R series, to black. The major vessel forms are those of utilitarian beakers, jars, and carinated bowls; other bowl forms are rare, and no bottles were identified from the fragments. Slipping and polishing are rare on incised vessels.

Coles Creek Incised, variety Chase [Plate XXIV i]: Sorting Criteria: See Phillips [1970:71].

One gray beaker sherd bearing the typical Lower Valley paste was found at the site. The sherd was polished and had clay/grit temper.

Coles Creek Incised, variety Hunt [Plate XXIV j-k]: Sorting Criteria: See Phillips [1970:74].

Nineteen fragments of this variety of Coles Creek Incised (.29 percent of incised) are represented in the collection. Sherd color ranges from light brown to black. Vessel forms represented are straight rimmed beakers. Most were decorated with a square tool or rarely with a rounded one. Two of these sherds were highly polished. At least five vessels are represented by the 19 fragments.

Coles Creek Incised, variety Mott [Plate XXIV e-f]: Sorting Criteria: See Phillips [1970:75].

Three vessels are represented by the six sherds (.09 percent of incised). Two vessels are light brown (one with a flaring rim), and one rim sherd is polished black with a straight rim. Decoration was accomplished with both round and square-ended tools.

Coles Creek, variety Coles Creek [Plate XXIV a-d]: Sorting Criteria: See Phillips [1970:70].

Fifty sherds of this variety were recovered (.77 percent of incised), 29 of which were found in Structure 2. Many of these sherds have typical Coles Creek paste, but others classified as Coles Creek on the basis of decoration were polished with paste similar to typical Caddoan ceramics. Cylindrical beakers were common, sometimes with flared rims. No sherds with incised lip tabs were found, but one had sublinear triangles present.

Coles Creek Incised, variety Hardy: [Plate XXIV l-p]: Sorting Criteria:

Coles Creek Incised, variety *Hardy* is characterized by roughly parallel, horizontally-incised lines, often with ticked rims, punch-and-drag incising, and sublinear punctates. In sorting variety *Hardy* from variety *Coles Creek*, quality of manufacture was a crucial factor. Hardy is much sloppier in terms of quality of execution, but there is much grading between the two (Phillips 1970:73).

Although *Hardy* is a typical Lower Valley type, it occurs throughout the Red River drainage in northwestern Louisiana. The identification of *Hardy* sherds from the Hanna site could be misleading, if the occurrence of Hardy is interpreted as implying a strong Lower Valley or Plaquemine presence at Hanna. Although the sherds match the sorting criteria for *Hardy*, we do not feel that they are exotic items. Rather, the *Hardy* sherds seem to have been locally manufactured and are similar to the remainder of the collection. *Hardy* is best viewed as the horizontally incised counterpart to the more common, diagonally or vertically incised type, Dunkin Incised.

A total of 851 sherds (13.17 percent of incised) was classified as variety *Hardy*. There was little polishing, and most of the decoration was rather crudely executed. The only vessel forms are jars and beakers. Rim forms tend to be

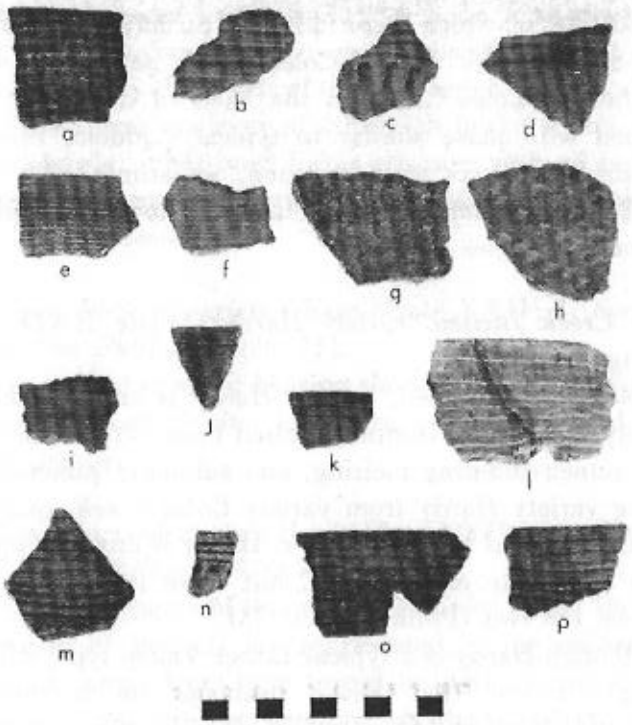


Plate XXIV. Incised and Punctated Ceramics. a-d, Coles Creek Incised, variety ***Coles Creek;*** e-f, Coles Creek Incised, variety ***Mott;*** g-h, Evansville Punctated, variety ***Evansville;*** i, Coles Creek Incised, variety ***Chase;*** j-k, Coles Creek Incised, variety ***Hunt;*** l-p, Coles Creek Incised, variety ***Hardy.***

straight, and lips are flat or rounded with occasional ticking. Vessel diameters vary from 35 to 15cm, and wall thickness from 4 to 8mm. The paste is medium to very coarse, and most sherds are clay/grit tempered with some grog and carbon present. Color variations are 2.5YR reds. 10YR browns, and grays to black.

L'eau Noir Incised, variety L'eau Noir [Plate XXV a-d]: Sorting Criteria: See Phillips [1970:101].

All of the 70 sherds (1.08 percent of incised) were from large deep bowls or carinated bowls, varying from 8 to 35cm in diameter. Rim forms are usually straight or slightly flared. Temper is clay/grit, and the dominant surface color is light-brown with a few reddish browns. One black sherd with a good polish was noted.

Harrison Bayou Incised, variety Harrison Bayou [Plate XXV i-j]: Sorting Criteria: See Phillips [1970:87].

Eighteen of the 25 Harrison Bayou sherds (.38 percent of incised) were taken from the northeast sector, and none was recovered from the southeast sector. Most are rim sherds, projected to be from vessels with an average rim diameter of 19cm. The temper is a coarse clay/grit, and polishing was noted in only three cores. Color ranges include the black, very pale browns, and yellowish brown of the 10YR series. Incising was rather haphazard.

East Incised [Plate XXIX i-k, Figs. 39, 49 e]: Sorting Criteria:

This type is characterized by horizontal, parallel incised lines, occasionally interrupted by sets of semi-circular incised lines. There is some confusion with the L'eau Noir Incised when dealing with extremely small sherds.

Only four sherds of this type were collected, and three of

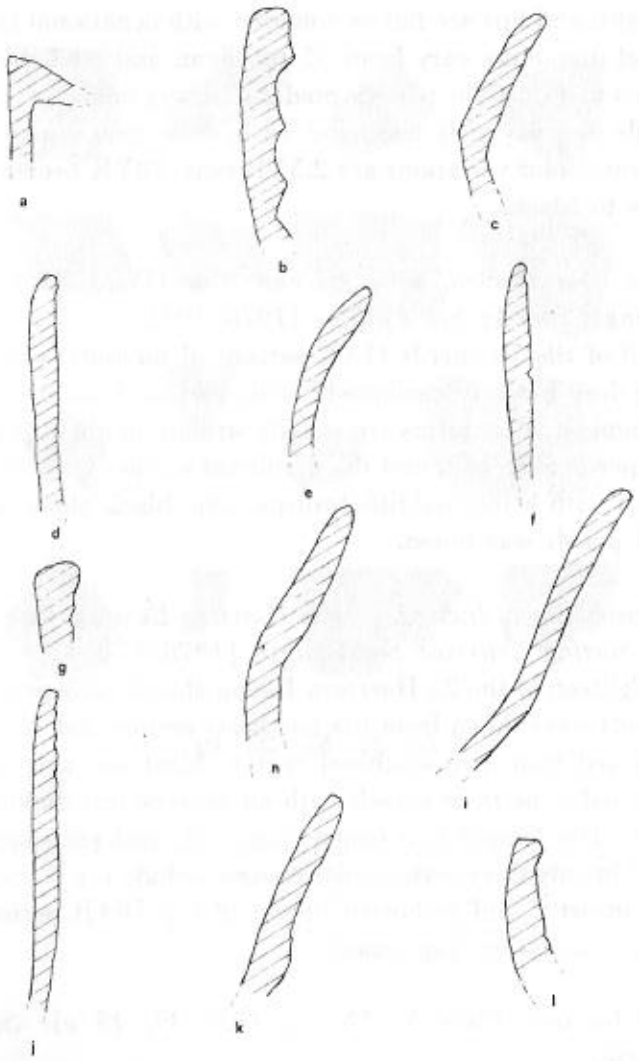


FIGURE 39. RIM FORMS.
a, BAYTOWN PLAIN, VARIETY *PERCY CREEK;* b, DUREN NECK BANDED; c, PEASE BRUSHED-INCISED; d, j AND k, CROCKETT CURVILINEAR INCISED; e - f, PENNINGTON PUNCTATED-INCISED; g, EAST INCISED; h, PLAIN RIM; i, HOLLY FINE ENGRAVED; l, DUNKIN INCISED.

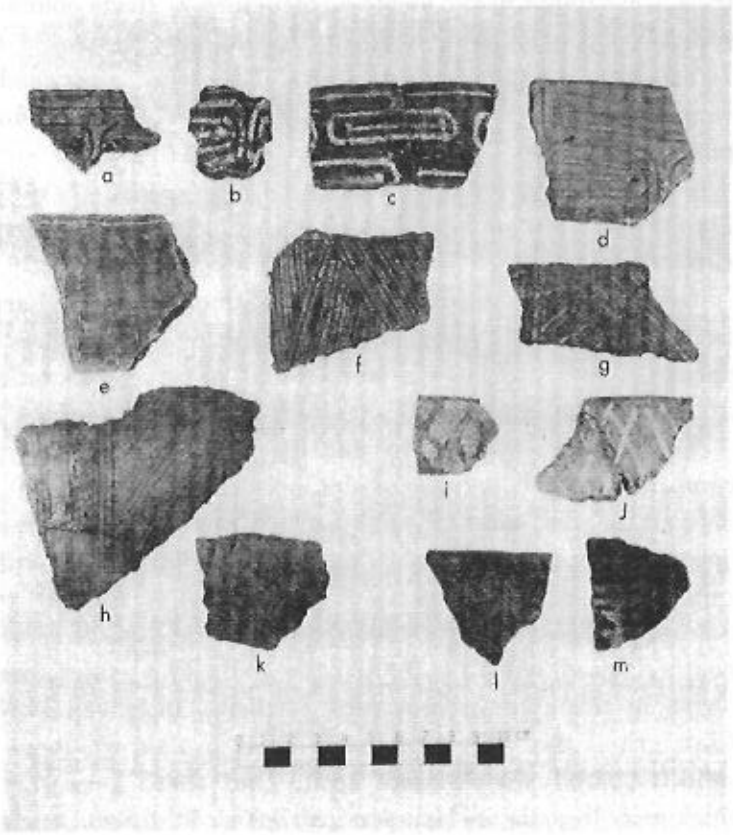


Plate XXV. Incised, Brushed, and Punctated Ceramics. a-d, L'eau Noir, variety *L'eau Noir;* e-h, Plaquemine Brushed, variety *Plaquemine;* i-j, Harrison Bayou Incised, variety *Harrison Bayou;* k-m, Evansville Punctated, variety *Wilkinson.*

these were found in the locale of Structure 2. Paste colors on several sherds fall well within the yellowish browns of the 10YR series. Evidence of red slip (7.5YR series) was noted in varying degrees. Two sherds are of typical black Caddoan paste.

Dunkin Incised [Plate XXVI d-i, Fig. 39 L]: Sorting Criteria:

Perpendicular or diagonal parallel incised lines characterize this type. Larger sherds reveal diagonal zones of parallel lines. Two sherds were found to have punctations under the zoned incising.

Dunkin Incised was by far the most abundant type, comprising 41.06 percent of the incised pottery, and 10.49 percent of the total. Numerous variations of paste and decoration were obvious. Some vessels were intentionally roughened, and then incised with an asymmetrical tool 5.0mm in diameter. At the other extreme, sherds were very neatly incised with a 1.0mm wide tool. The major vessel forms in this type include jars, beakers, and deep bowls. Clay/grit is the most frequent temper, but rarely bone- or sand-tempered sherds were seen. One sherd possesses a thickened lip; the remainder are flat or rounded. Surface colors are predominantly reddish or yellowish-brown, though very pale brown and black sherds are not uncommon.

Miscellaneous Incised: Most of these sherds were too small for identification, but a few have a typical incised designs. They compose 42.95 percent (2,776 sherds) of the incised ceramics. One sherd has a clear fingerprint on the interior, and another was patched with clay, which covers the incised decoration. Also, three sherds from a single vessel (Fig. 41a) are diagonally incised on the lip and notched below.

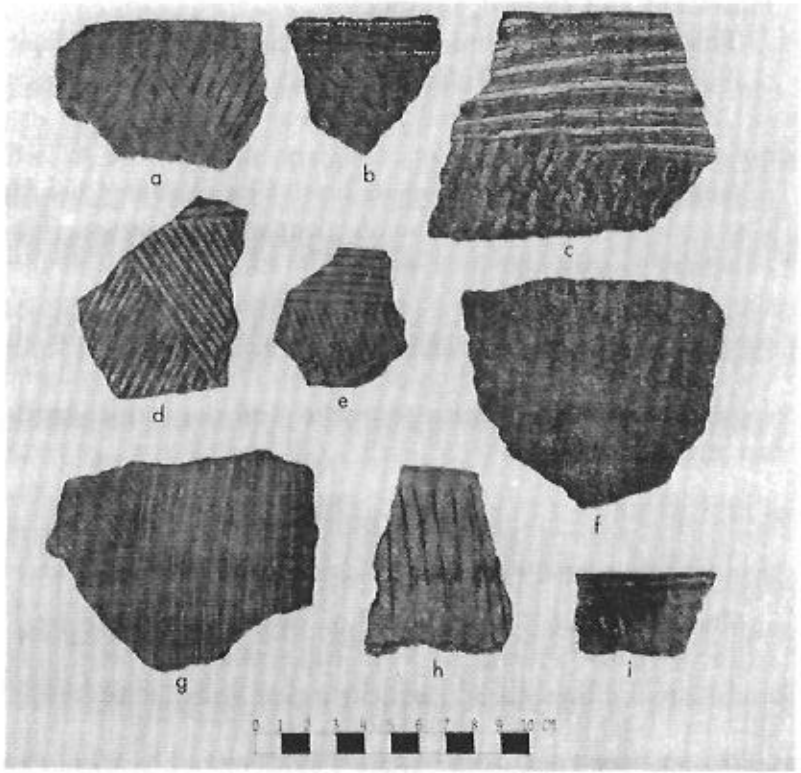


Plate XXVI. Incised and Punctated-Incised Ceramics.
a, d-i, Dunkin Incised; b-c, Kiam Incised.

Punctated and Incised Ceramics

This decorative technique was observed in 7.18 percent (1,822 sherds) of the Hanna ceramics; of these, 934 sherds (51.26 percent) were sorted into types. Punctated types are mainly expressed on beakers and jars, whereas the incised punctated forms appear on deep bowls and carinated bowls. Clay/grit is the most common tempering material. The punctated sherds were imprinted while still wet with a tool or fingernail and were rarely polished. The incised punctated ceramics were usually meticulously decorated, and almost all were polished. Black and reddish-brown are the predominant colors of the incised punctated, while most punctated sherds are gray and brown.

Evansville Punctated, variety Evansville [Plate XXIV g-h]: Sorting Criteria: See Phillips [1970:78].

Twenty sherds (1.09 percent) of variety *Evansville* were taken from the Hanna site. No Evansville Punctated was found around Structure 2, but Structure 4, in the northeast sector, yielded seven sherds of this type from features and postmolds. Punctations of variety Evansville are arranged in horizontal rows on light-brown or gray bowls or beakers. The vessels are tempered with a coarse clay/grit, and have an average diameter of 20cm.

Evansville Punctated, variety Wilkinson [Plate XXV k-m]: Sorting Criteria: See Phillips [1970:81].

The Hanna sample of variety *Wilkinson* was represented by 499 sherds (27.39 percent of punctated sherds), 439 of which (87.97 percent) were from the northeast sector. The dominant vessel forms found at the site are jars, beakers, and deep bowls. Temper is a coarse clay/grit, and color is generally mottled brownish-red with very few black or gray

sherds present. Only a few polished sherds were present.

Sinner Linear Punctated [Plate XXIX o-p]: Sorting Criteria: See Suhm, Krieger and Jelks [1954:728].

Only 18 sherds of this type were recovered from the site. Four vessels were represented, all black with coarse paste and clay/grit temper.

Weches Fingernail Impressed [Plate XXIX l-n]: Sorting Criteria: See *Texas Handbook [Suhm and Jelks 1962:153].*

Since all the sherds are very small (20 sherds were excavated at the site), vessel forms could not be positively determined. The Weches sherds are all black, except for one well-oxidized reddish-brown (Plate XXIX m). Rims are straight, with rounded or tapered lips, and vessel walls varied from 5 to 8mm. The temper is clay/grit, with no well-polished sherds noted.

Kiam Incised [Plate XXVI b-c]: Sorting Criteria:

See Texas Handbook (Suhm and Jelks 1962:89). Only sherds exhibiting horizontal parallel incised lines with multiple rows of sublinear fingernail or round tool punctations were sorted into the Kiam Incised type.

The northeast sector yielded 16 of the 20 Kiam sherds from the site. Most were from rather crudely-decorated and unsmoothed jars. Surface color for the Kiam Incised sherds is exclusively a dark reddish-brown to black.

Crockett Curvilinear Incised [Plate XXVII a-e, i]: Sorting Criteria: See Texas Handbook [Suhm and Jelks 1962:31].

There were only 89 (4.88 percent of class) Crockett Curvilinear Incised sherds identified from 16RR4. Although the Crockett (and Pennington) types exhibit overall a higher quality of workmanship than most other incised types from

the site, there is considerable variation in quality. Surface colors vary from black to the 10YR browns and 5YR reds. The temper is medium to coarse clay/grit with some carbon and clay of lighter color; clay was noted as a tempering agent in the reddish, well-oxidized sherds. The Crockett vessels at Hanna are predominantly carinated bowls with some deep bowls present. Punctations on both Crockett and Pennington types were made with square, triangular, or round tools. The dominant punctating tool was round, with a diameter averaging 1.5 to 4.0mm, creating circular or semicircular punctations. No sherds with ringed punctations were found at the site.

Webb and McKinney (1975) noted a number of Crockett-Pennington hybrids at the Mounds Plantation site, and Krieger (1949) mentions that these hybrid patterns were well-established during Phase I at the G.C. Davis site. Several sherds bearing a similar design to the hybrid combination are included in the Hanna collection. But the designs, while exhibiting some of the Crockett styles, fall more in the category of Pennington (discussed below) and are so classified. Small sherds which exhibit incising and punctations typical of Crockett or Pennington, but lacking clear diagnostic sorting criteria, were categorized in a special class, Crockett or Pennington. No attempt was made to impose a type upon these sherds.

Pennington Punctated-Incised [Plate XXVII f-h, k-l: Fig. 37] Sorting Criteria: See Suhm and Jelks [1962].

Pennington sherds comprise a total of 257, or 14.1 percent, of the punctated class. Carinated bowls are the most frequent vessel form for Pennington. Polishing was noted on many sherds of this type. Paste color and tempering variations are similar to those described for Crockett Curvilinear Incised. Exceptional sherds include two fragments of

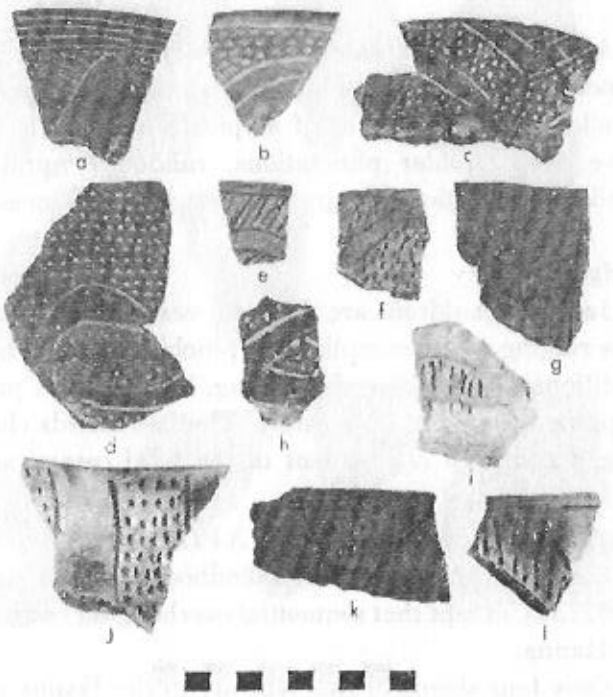


Plate XXVII. Punctated-Incised Ceramics. a-e, i, Crockett Curvilinear Incised; f-h, k-l, Pennington Punctated-Incised.

shallow bowls with slightly curving negative zones and external punctations.

Miscellaneous Punctated Ceramics: This group of punctated and punctated incised ceramics includes sherds too small to be identified, or of atypical design. The 52 sherds have deep circular punctations, randomly applied round shallow punctations, or punctations zone by incised lines.

Ridged Pottery

Jars and cauldrons are the main vessel forms in this class. The ridging was accomplised by pinching and applique, with additional decorations of brushing, incising, and punctating. Slipping occurs but only rarely. The 240 sherds classified as ridged comprise .95 percent of the total ceramics.

Duren Neck Banded [Plate XXVIII i]: Sorting Criteria:

Generally from Texas Handbook (Suhm and Jelks 1962:39), except that sequential overhanging ridges occurred at Hanna.

Only four sherds of this type are in the Hanna collection, three from the same vessel, the other is from a small jar with typical Duren Neck Banded decoration.

Pease Brushed-Incised [Plate XXVIII j-l; Fig. 39c]: Sorting Criteria:

Applique or pinched vertical ridges with vertical fields of brushing or diagonal fields of brushing between the ridges were noted. A herringbone pattern of incised lines with a single row of punctations is classed as Pease Brushed-Incised.

There were 182 Pease sherds (66.18 percent of Ridged) found at the site, 83 of which came from the southwest sector, and most of these from a disturbed area in Structure 1. The vessel shapes of Pease include jars and cauldrons. Decorative

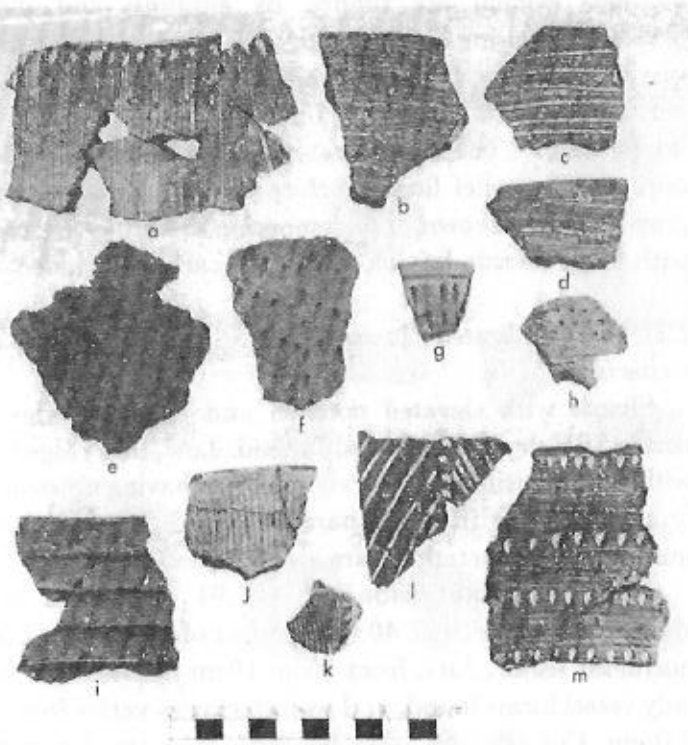


Plate XXVIII. Brushed, Ridged, and Punctated Ceramics. a-d, m, Bossier Brushed; e-h, Miscellaneous Punctated and Incised-Punctated; i, Duren Neck Banded; j-l, Pease Brushed Incised.

methods evident are ridging by applique and pinching, brushing, incising, and ticking. The patterns between the vertical parallel ridges include vertical parallel lines and herringbone patterns, sometimes with punctations at the intersections. The rims are all everted with vertical or horizontal parallel lines. Surface colors vary from black to gray and light brown. The tempering materials are clay/grit with some sherds having sand and carbon included.

Haley Complicated Incised [Plate XXIX a-e]: Sorting Criteria:

Sherds with elevated notched and brushed ridges were sorted as Haley Complicated Incised. Low, thin ridged sherds with cross-incising, and unridged sherds having cross-incising, or those having fields of parallel-incised lines bordered by multiple tool punctations, are also included in this type.

The Hanna site yielded 43 (17.91 percent of Ridged) sherds of this type, and 40 (93 percent of type) were from the northeast sector. Jars, from 15 to 19cm in diameter, are the only vessel forms found, and wall thickness varies from 5.0 to 8.0mm. Colors range from black to gray and brownish-red and to the light yellowish-brown of the 10YR series. Temper is fine to coarse clay/grit with small amounts of carbon present in a few sherds.

Belcher Ridged [Plate XXIX f-h]: Sorting Criteria:

Closely-spaced, continuous triangular ridges with some slight vertical brushing mark the sherds sorted as Belcher Ridged.

The Belcher Ridged sherds are few; only 11 sherds were found at the site. Surface color of all sherds is gray, with the exception of a single sherd that is slipped light red (2.5YR 5/6). Temper is clay/grit, and projected vessel diameters are 16 to 39cm.

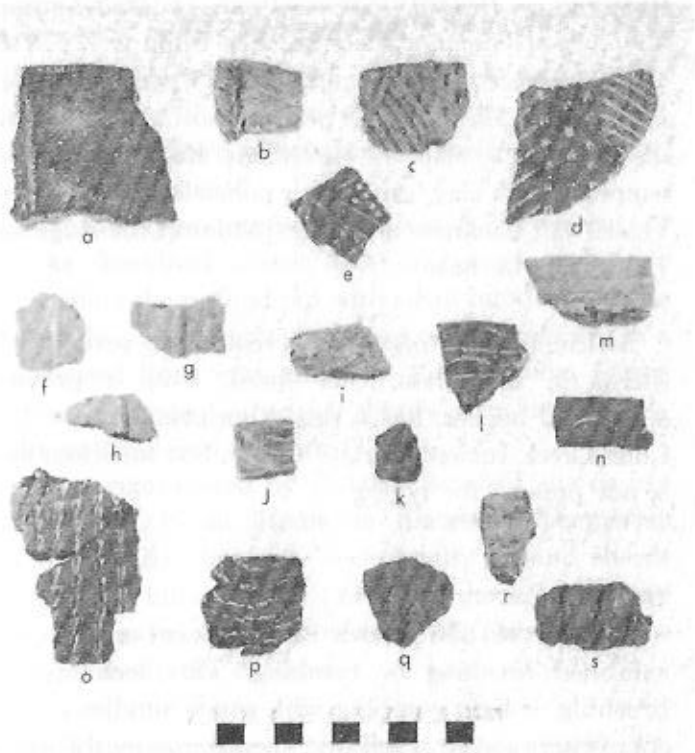


Plate XXIX. Punctated, Incised-Punctated, and Ridged Ceramics. a-e, Haley Complicated Incised; f-h, Belcher Ridged; i-k, East Incised; l-n, Weches Fingernail Impressed; o-p, Sinner Linear Punctated; q-s, Hollyknowe Ridged Pinched, variety Hollyknowe.

Hollyknowe Ridged Pinched, variety Hollyknowe [*Plate XXIX q-s*]: *Sorting Criteria:* See Phillips (1970:89).

Hollyknowe sherds comprise 12.73 percent of the Ridged sherds from Hanna. The predominant surface color of the sherds is black, with few exceptions. *Hollyknowe* was usually tempered with clay/grit. A fair polish is seen on some sherds. Vessel wall thickness averages 6.0mm at the ridge apex, and 7.0mm at the base.

Miscellaneous Ridged: There are only seven unidentified sherds in this class. One sherd, from a grayish-brown cylindrical beaker, has a single horizontal ridge. It may be Coles Creek Incised, variety *Chase*, but sufficient decoration is not present for typing.

Brushed Pottery

A total of 858 sherds (3.4 percent of the collection) exhibited brushing or combing. This technique involved brushing or light combing with small bundles of grass. The sherds were sorted as follows: sherds apparently brushed with bundles of grass were classified as Bossier Brushed; those which were decorated by a combing technique were designated Plaquemine Brushed.

The brushed sherds from the site appear to be from medium- to large-sized utilitarian vessels such as jars and beakers with diameters ranging from 16 to 37cm. Surface color is mostly black with some yellowish-red (5YR 4/6). Punctations and incising were occasionally added as decoration. Some light polishing or smoothing over was noted, especially among the combed sherds. The primary tempering agent is clay/grit, although occasional crushed sherds and charcoal are seen. A very small number of sherds include pulverized bone or light gray tufa-like material as temper. No

sand-tempered brushed sherds were found.

Bossier Brushed [*Plate XXVIII a-d, m*]: *Sorting Criteria:*

Sherds brushed with grass were sorted into this type. Brushed sherds that have punctations or incising were also classed as Bossier Brushed.

Sherds of this type numbered 650 (75.75 percent of brushed). As described above, this decorative technique required brushing the unfired pot with small bundles of grass and occasionally adding horizontal rows of punctations. In a few cases, incised lines were added to the brushing. Cross-brushing was also noted on several sherds. Brushing usually covered the entire vessel exterior.

Vessel types represented by Bossier Brushed sherds are jars and beakers, 16 to 36mm in diameter. Tempering materials are usually clay/grit, occasionally ground sherds and carbon, and, infrequently, pulverized bone. Rims are straight with rounded lips. Ten sherds, all from the same vessel, are polished; the remainder are unsmoothed.

Plaquemine Brushed, variety Plaquemine [*Plate XXV e-h*]: *Sorting Criteria: See Phillips* [*1970:153*].

Sherds were generally typed according to Phillips. Those that showed evidence of combing were placed in this group; as in Bossier Brushed, rows of punctations were also noted.

A total of 208 sherds (24.24 percent of Brushed) was classified as Plaquemine Brushed. Vessels represented by this type appeared to be from jars or beakers, varying in diameter from 18 to 38cm. Sherds were combed with a 2.0 to 5.0mm toothed instrument (a four-toothed comb was most popular) in vertical, diagonal and horizontal rows, often forming geometric zones. Some sherds were found to have rows of triangular punctations at the zone interfaces, and relatively few were cross-combed. Almost all of Plaquemine

Brushed sherds were smoothed over, and some polishing was noted. Surfaces are primarily the reddish-browns of the 5YR series or the brown or yellowish-browns of the 10YR series. Clay/grit is the usual tempering agent, followed to a lesser extent by grog. A light gray tufa-like material was noted in a few cases.

Slipped Pottery

Twenty-eight slipped or filmed sherds were found. Some of the slipped sherds were highly polished, but most were badly weathered. Color varies from red (10R 4/8) to reddish-yellow (5YR 6/8). Vessel forms of slipped ceramics include bowls or bottles, varying in diameter from 18 to 30cm. Wall thickness varies from 5.0 to 6.0mm. Slipped sherds from the Hanna site are tempered with fine to coarse clay/grit.

Undecorated Pottery

A total of 15,486 sherds, or 61 percent of the total sherds excavated at the Hanna site, make up this category. Of this amount, only 19 (0.1 percent of Plain) presented enough data to be typed.

Baytown Plain, variety Percy Creek [Fig. 39 a]: Sorting Criteria: See Phillips [1970:51].

Only one rim sherd of this type was found. It was from a mottled dark grayish-brown (10YR 3/2), lightly polished vessel, with a rim diameter of 20cm and a wall thickness of 5.0mm. It is clay/grit tempered. The rim tab is roughly triangular and angled downward.

Smithport Plain: Sorting Criteria: See Suhm and Jelks [1962:145].

Eight sherds were classified as Smithport Plain. All of these are rim sherds; seven are from carinated bowls with

vertical or slightly outflaring rims. The sherds are light yellowish-brown (10YR 6/4) to reddish-brown (5YR 4/4) with clay/grit temper. Some light-gray inclusions were noted. Vessel diameters vary from 18 to 24cm, and wall thickness was 6.0 to 8.0mm.

Williams Plain: Sorting Criteria: See Bell and Baerreis [1951].

Ten sherds of this Fourche Maline type were excavated at Hanna. The northeast sector yielded nine of these, two of which were rims. Vessel diameters are projected to have been 18 to 24cm with wall thicknesses of 8.0 to 17mm. Rims are straight with internally-tapering lips. Tempering is very coarse clay/grit and occasionally pulverized sherd. Two sherds of this type appear to be bone-tempered. Surface color for seven of the sherds is brown (10YR series), and three are reddish-brown (2.5 YR series).

Discussion

Types characteristic of the Coles Creek period were rare at Hanna, totaling only 1.41 percent of the identified sherds. This very small quantity contrasts markedly with the Mounds Plantation site, where Webb and McKinney (1975) identified Coles Creek ceramics which comprised 56 percent of the identifiable ceramics. The Coles Creek presence at Hanna was minimal and probably reflects sporadic trade. Smithport Landing, an Alto focus village located on an elevated ridge upriver from Hanna, yielded a similar percentage of Coles Creek ceramics (1.0 percent) (Webb 1963). In fact, the ceramics from Smithport Landing are, in all respects, more similar to those from Hanna than are any other reported collections.

Pottery typical of the Alto focus comprises 65 percent of the identifiable sherds. These sherds constitute a clear

TABLE 1 CERAMIC FREQUENCIES

ALTO TYPES	Surface	Northeast Sector	Southeast Sector	Southwest Sector	Total	% of Identified	% of Total
Holly Fine Engraved	1	111	7	32	151	2.19	.60
Hickory Fine Engraved	1	36	2	3	42	.61	.16
Carmel Engraved	1	61	1	11	74	1.07	.29
Dunkin Incised	23	2323	56	252	2654	38.53	10.46
Crockett Curvilinear Incised	2	64	4	19	89	1.29	.35
Crockett or Pennington	29	643	26	161	859	12.47	3.39
Pennington Punctated-Incised	7	217	5	28	257	3.73	1.01
Weches Fingernail Impressed		18		2	20	.29	.08
Kiam Incised	1	16	1	2	20	.29	.08
Haley Complicated-Incised		40		3	43	.62	.17
Duren Neck Banded		3		1	4	.06	.02
East Incised		3	1		4	.06	.02
Smithport Plain		5	1	2	8	.12	.03
Alto Totals	65	3540	104	516	4225	61.34	16.65
SHARED COLES CREEK & ALTO TYPES							
Evansville Punctated var. Evansville		9		11	20	.29	.08
Coles Creek Incised var. Coles Creek		44		6	50	.73	.20
Coles Creek Incised var. Hunt		18		1	19	.28	.07
Coles Creek Incised var. Mott		6			6	.09	.02
Coles Creek Incised var. Chase		1			1	.01	.004
Williams Plain		9	1		10	.15	.04
Hollyknowe Ridged Pinched var. Hollyknowe	1	32	2		35	.51	.14
Baytown Plain var. Percy Creek		1			1	.01	.004
Shared Totals	1	120	3	18	142	2.06	.55

TABLE 1 CERAMIC FREQUENCIES continued

SHARED PLAQUEMINE AND ALTO TYPES	Surface	Northeast Sector	Southeast Sector	Southwest Sector	Total	% of Identified	% of Total
Coles Creek Incised var. Hardy	4	742	9	96	851	12.35	3,35
Evansville Punctated var. Wilkinson	12	439	13	35	499	7.24	1.97
L'eau Noir Incised, var. L'eau Noir		68	1	1	70	1.02	.28
Harrison Bayou Incised, var. Harrison Bayou		18		7	25	.36	.10
Totals	16	1267	23	139	1445	20.97	5.70
BOSSIER & BELCHER TYPES							
Maddox Engraved, variety Baptiste	1	5		1	7	.10	.03
Bossier Brushed	4	513	10	123	650	9.44	2.56
Plaquemine Brushed, var. Plaquemine	5	178	4	21	208	3.02	.82
Pease Brushed Incised	17	79	3	83	182	2.64	.72
Sinner Linear Punctated		12		6	18	.26	.07
Belcher Ridged	3	8			11	.16	.04
Bossier & Belcher Totals	30	795	17	234	1076	15.62	4.24
TOTAL IDENTIFIED SHERDS	112	5722	147	907	6888	100.00	27.15
MISCELLANEOUS AND UNIDENTIFIED DECORATED SHERDS							
Incised	249	2130	87	338	2804	93.06	11.05
Slipped or Filmed	13	58	1	6	78	2.59	.31
Engraved	10	42	6	8	66	2.19	.26
Punctated & Incised Punctated	13	26	2	11	52	1.73	.21
Brushed	5	1		1	7	.23	.03
Ridged	1	3		2	6	.20	.02

	Surface	Northeast	Southeast	Southwest	Total	% of Identified	% of Total
Miscellaneous and Unidentified Decorated Sherd Totals	291	2260	96	366	3013	100.0	11.88
PLAIN SHERDS							
Clay/Grit	480	10,540	800	3573	15,393	99.52	60.68
Mixed	9	40	4	11	64	.41	.25
Bone	1	7		2	10	.06	.04
Plain Sherd Totals	490	10,587	804	3536	15,467	100.00	60.97
GRAND TOTALS	893	18,569	1046	4860	25,368		
% of TOTAL	3.52	73.20	4.12	19.16	100.0		

TABLE 1 CERAMIC FREQUENCIES continued

majority and firmly identify the Alto component at the Hanna site. Of this total, Dunkin Incised occurs in very high frequency, 2,654 sherds, followed by Pennington Punctated Incised and Crockett Curvilinear Incised.

Bossier focus sherds, including Bossier Brushed, Sinner Linear Punctated, Maddox Engraved, and Pease Brushed Incised, occur in moderate quantities at Hanna. The total number of Bossier sherds comprises 15.5 percent of the identified sherds and indicates tht occupation of the Hanna site continued until Bossier ceramics were beginning to increase in popularity. However, the site was abandoned before Bossier ceramics attained their full expression, and well before Belcher ceramics came into vogue.

Ceramic types and varieties common to the Lower Mississippi Valley comprise 2.79 percent of the identified sherds from Hanna and include the Coles Creek and Plaquemine types. Three alternative explanations for this Lower Valley presence at Hanna may be offered: 1) a pre-Caddoan occupation; 2) on-site simulation of Lower Valley decorative techniques; and 3) trade.

A pre-Caddoan occupation may account for the Coles Creek sherds (1.4 percent of identified sherds) found at the site. However, no Coles Creek occupation could be distinguished stratigraphically. Coles Creek sherds were intermixed in all levels. Therefore, the suggestion of an early, pre-Caddoan, occupation at the site is rejected. Several ceramic types typical of the Plaquemine period in the Lower Valley were found at Hanna, but we do not feel that those sherds imply an occupation by Lower Valley Plaquemine peoples.

The second possibility, that local potters were imitating Lower Valley ceramics, is substantiated by the fact that most sherds decorated with the Lower Valley motifs have dark reddish-brown or black paste, typical of the local Caddoan

ceramics. These vessels were manufactured locally, probably at Hanna, but with decorations or vessel forms copied from Lower Valley forms.

The third explanation, that the Lower Valley ceramic types were imported to Hanna as trade wares, is a probable explanation for a small number of the sherds recovered. Some sherds were clearly manufactured in the Lower Valley, as attested by their paste in addition to decoration and vessel form. Trade in ceramics was never extensive, however, and the number of actual imports was quite small.

It would seem that trade in pottery did occur between Hanna and the Lower Valley, resulting in the appearance at the site of a few exotic vessels. The local ceramic artisans apparently copied some of the trade items, using local clays, the result being Lower Valley decorative patterns applied to locally-made ceramics.

Ceramic Artifacts And Stone Vessel

An extremely small number of ceramic artifacts and one stone vessel were represented at the Hanna site. A fragment of pumice, probably from a shallow bowl with a diameter of 36cm, was found; wall thickness is 6.0mm on the upper part of the vessel fragment, and 1.0cm on the lower part (Fig. 40 b). The dark-gray exterior surface is very rough while the interior is covered with a reddish-yellow (7.5YR 7/8) clay. Several small punctations and one incised line appear on the interior of the sherd. A square- or triangular-tipped tool was most likely used.

Pumice is not native to the vicinity of Hanna but was imported. The source could have been any number of areas of volcanic activity. Also, some pumice floats, washed on shore along the Gulf Coast, could have been traded from that area.

Four ceramic pipe fragments were recovered. These fragments are so small that no positive typological iden-

tification could be made. Three bowl fragments are of a pale brown to black color, with vertical or slightly flaring walls, and may be from Red River pipes. Two are incised with orifice diameters ranging from 1.5 to 2.0cm. One pipestem was found (Fig. 40 c). It has a diameter of 1.1cm and a wall thickness of 0.2cm and is reddish-yellow (7.5YR 6/6). Fragments of two platform pipes were found. The fragment illustrated in Fig. 40 f has a diameter of 2.5cm and a maximum thickness of 0.4cm. The surface color is a mottled brown (7.5YR 4/4). The other fragment has a surface color of 7.5YR5/6, strong brown, and a coarse paste. It is incised on both sides but very badly weathered. It is only 1.3cm long from front to back expanding to a thickness of 1.0cm in the rear portion.

Two ceramic discs were recovered from the site. One was cut from a ceramic vessel wall or base. The other (Fig. 40 d) has a rough surface and is light gray in color (10YR 7/2). The diameter is 2.8cm, and the wall thickness is 0.6cm. The fragment appears to be untempered.

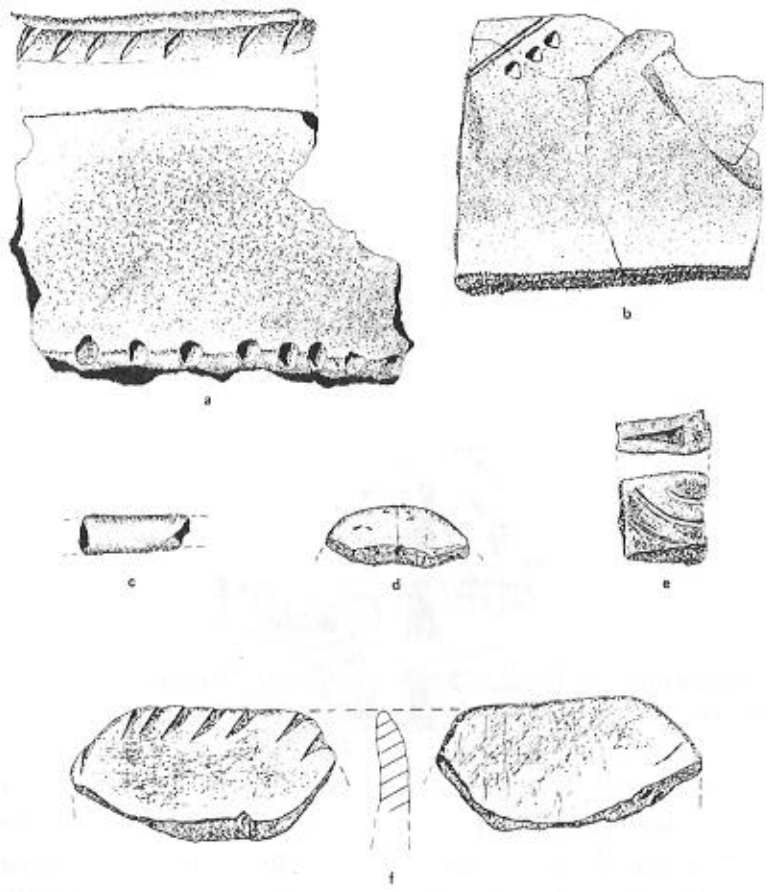


FIGURE 40. MISCELLANEOUS POTTERY SHERDS, ARTIFACTS, AND PUMICE VESSEL FRAGMENTS.
a, NOTCHED RIM; b, PUMICE VESSEL SHERD, INTERIOR (5.25 CM WIDTH); c, PIPE FRAGMENT (2.50 CM LENGTH); d, CERAMIC DISC FRAGMENT (4 CM DIAMETER); e, EAST INCISED RIM FRAGMENT; f, ENGRAVED AND NOTCHED CERAMIC PIPE OR PENDANT FRAGMENT (3 CM WIDTH).

Pottery Coils

Caddoan pottery was made by coiling, a widespread technique among North American Indians in which the potter built up the sides of the vessel with successive coiled layers of ropelike pieces of clay. Each ropelike strand was made by rolling a lump of clay between the hands, and then coiling the strand on the previous one. The potter then kneaded the contact between the last coil and the new one to smooth the sides of the vessel (Driver 1961:169). Excess clay from the coils or strands with undersirable inclusions or bumps were clipped and discarded. Archaeologically, these coils will be found if they were never crushed, or if they were discarded in a fire pit or location that would result in the clay becoming fired. Therefore, the recovery of pottery coils in archaeological contexts may be taken as evidence for the presence of this stage of the ceramic manufacturing process and may indicate loci where pottery manufacture was performed.

A total of 40 pottery coils was recovered from 16RR4; 11 were found the southwest sector, 29 in the northeast sector, and none were found in the southeast sector.

Eleven pottery coils were found in the southwest sector near Structure 1. Eight of these were found in the complex northwestern corner of the structure where numerous features and posts overlap. The coils were found within the pits and in the fill of Burial 1. The remaining three coils were found in two test pits just to the southwest of Structure 1.

In the northeast sector, a total of 29 pottery coils was recovered from general excavation units, test pits, and features. Twelve of these coils were found on the interior of Structure 2 with one located in Feature 22, the center hearth. Three were found just outside the walls of the structure, one from a feature, and one from the midden. To the southwest of Structure 2, one coil was recovered in a general excavation unit, and one coil was recovered to the southeast of the structure. The two remaining coils came from well outside the vicinity of Structure 2. One was recovered to the southeast of the structure and another to the northwest in Test Pit 5.

The occurrence of pottery coils varies considerably in the different sectors of the site. The vast majority, 19, was found either inside or just outside of Structure 2 in the northeast sector. We feel that this concentration of the byproducts of ceramic manufacture clearly indicates that the inhabitants of this sector of the site were engaged in making pottery. The coils are distributed throughout the vicinity of Structure 2, both inside the structure and just outside to the east and southeast. It may be inferred that the manufacture of pottery around Structure 2 was not confined to a specific locale, such as an exterior firing pit. Rather, the early stages of manufacture—rolling the coils and forming the vessel—probably took place in several locales, either inside or outside the house. Regardless of precise location, the evidence clearly

indicates that the manufacture of ceramics was a task in which the inhabitants of the northeast sector of the site were engaged.

Likewise, in the southwest sector, the 11 coils recovered were from the general vicinity of Structure 1, indicating pottery-making operations in conjunction with this household as well. The absence of coils from the southeast sector does not definitely indicate a lack of ceramic manufacture-related activities, since this area was not investigated so intensively as the other two sectors. It is noteworthy, however, that coils were not recovered from either test pits, postmolds, general excavations, or features in the vicinity of Structure 3 in the southeast sector.

The presence of numerous pottery coils in both Structure 1 and Structure 2 strongly suggests that pottery was manufactured on a household basis, probably by the female members of the household. It also appears that the coiling stage of the manufacturing process took place either indoors or outside, whereas the final firing stages probably occurred outside the house.

Lithics

Newell O. Wright, Jr.

Excavations at the Hanna site produced 15,365 lithic artifacts representing the process of manufacture and use of stone tools associated with a late Alto focus assemblage. The large number of tools and the by-products of their production suggest a manufacturing process carried out over a substantial period of time. The archaeological record shows the site to have been occupied by a people who practiced swidden agriculture, as well as hunting, gathering, and fishing. The large number of tools and the by-products of their manufacture indicate the site was inhabited for a considerable period of time, and valuable data concerning long-term exploitative mechanisms, settlement patterns, resource utilization, and tool production processes were recovered. The horizontal control maintained during the excavation yielded information regarding activity areas within the site. Further, the size and unity of the assemblage offer an excellent op-

portunity for comparison with collections from other sites. The excavations at Hanna represent the first large-scale investigations of a purely village setting in the Caddoan region of Louisiana. Since previous excavations have tended to focus on mound centers or sites with cemeteries, the data recovered from 16RR4 can yield significant insight into the technology of late Alto focus peoples living in small villages located on the alluvial plain.

The commonly recognized categories of Alto focus stone tools, such as projectile points, have received substantial attention from Caddoan scholars, and the outline of their temporal and spatial variations is well established (Bell 1958, 1960; Suhm, Krieger, and Jelks, 1954; Suhm and Jelks 1962; Webb 1959). Many of the projectile points from Hanna fit easily within this well-defined typology, but, in most typological analyses, the primary objective is the classification of the end products of the manufacturing process. Our aim has been to adopt an analytical system which addresses the problems of production technique and process. The research design for lithics, therefore, was formulated to deal with the full range of activities involved with stone tool production, including the procurement of raw materials, the process of production involved in tool manufacture, and the relationship of specific tool categories to ecological system exploitation.

A generalized model which reflects tool manufacture and use as part of an ongoing cultural process was developed by Wright (1976) and is portrayed schematically in Fig. 41. Since this hypothetical model can be used with any assemblage of stone tools, it can be applied to other lithic collections either from the Caddoan area or elsewhere. Although tool manufacturing and use is continuous, for purposes of explication the scheme adopted here treats this process as if it were composed of discrete stages. All of the stages are

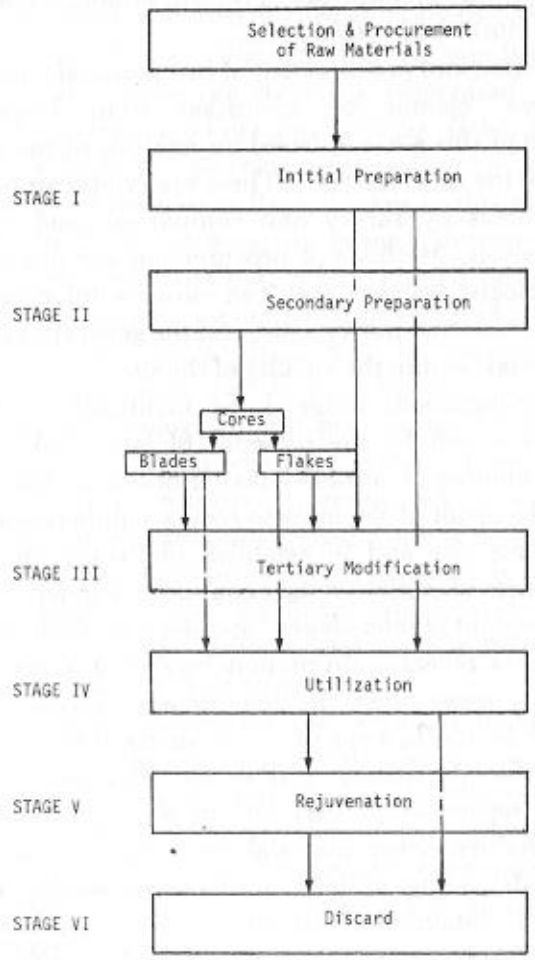


FIGURE 41.
A GENERALIZED MODEL FOR THE PRODUCTION OF CHIPPED STONE TOOLS.

represented in the archaeological record, although not always at the same site or loci within a site.

The selection and procurement of raw materials, unlike the other stages, cannot be identified from by-products. Recognition of this stage is based on analysis of the physical properties of the raw materials. These materials can be traced to their sources by survey and comparison and by trace element analysis. Methods of procurement are important to the archaeologist because they can provide information on trade routes, seasonal movements, and the general availability of raw materials within the vicinity of the site.

Initial preparation, Stage I, is identified in the archaeological record by the presence of large flakes and a substantial number of cortical flakes. Both large and cortical flakes are the result of attempts to reduce cumbersome pieces to manageable size and to establish platforms for further work. Products of initial preparation are not independent of the desired output of later stages; therefore, an understanding of by-products reveals information regarding stages of the production process. Since the edge of any cryptocrystalline material can be sharp, some of the products of this stage can be utilized directly without further modification.

Stage II, secondary preparation, involves the removal of flakes to produce either material for roughouts or a core capable of delivering a flake or blade possessing specific qualities not obtainable without a preformed core. By-products of this stage are sometimes difficult to differentiate from the earlier stage, but usually can be identified by smaller size and fewer pieces with cortex.

Tertiary modification may be divided into two categories. In one category, the products of earlier stages of production are modified into their final forms as usable tools. Finished products of this manufacturing stage may be poorly represented at a particular site, since they may have been

used, resharpened, and then discarded at another site devoted to specialized activity. Although few in number, the by-products of this stage can be easily recognized. A second category of tertiary modification includes flakes which are altered to establish a working edge without changing the general shape of the parent flake. Flakes in this category are smaller than those from earlier stages. Broken or poorly formed, incomplete tools that reflect human error or structural flaws are also representative of this level of preparation.

The utilization stage, Stage IV, is not part of the manufacturing process, but is the objective of all earlier stages. The archaeological evidence for utilization of tools appears on the tools themselves in the form of wear patterns.

The fifth stage, rejuvenation, occurs when tools become dull through use and are resharpened. Only tools which retain suitable edges can be rejuvenated. This stage is reflected in the archaeological record by flakes which were previously parts of working edges of tools, and are identifiable by the evidence of wear on their surfaces.

All tools eventually become lost, worn out, or broken, and thus enter the archaeological record. Specific discard areas, such as trash pits, may exist, or discard may occur in the immediate vicinity of manufacture or utilization. The horizontal distribution of the discard class may give information about activity areas within a site. In addition, the co-occurrence of particular tool types may give evidence of the site function.

In order to utilize the interpretive model discussed above, a processual typology reflecting the various production stages was employed. This processual typology was originally developed by Wright (Thomas *et al* 1977) for the analysis of the artifacts from the Cognac site, an Alto focus village located south of Natchitoches, Louisiana. All chipped stone artifacts from Hanna were placed into one of several

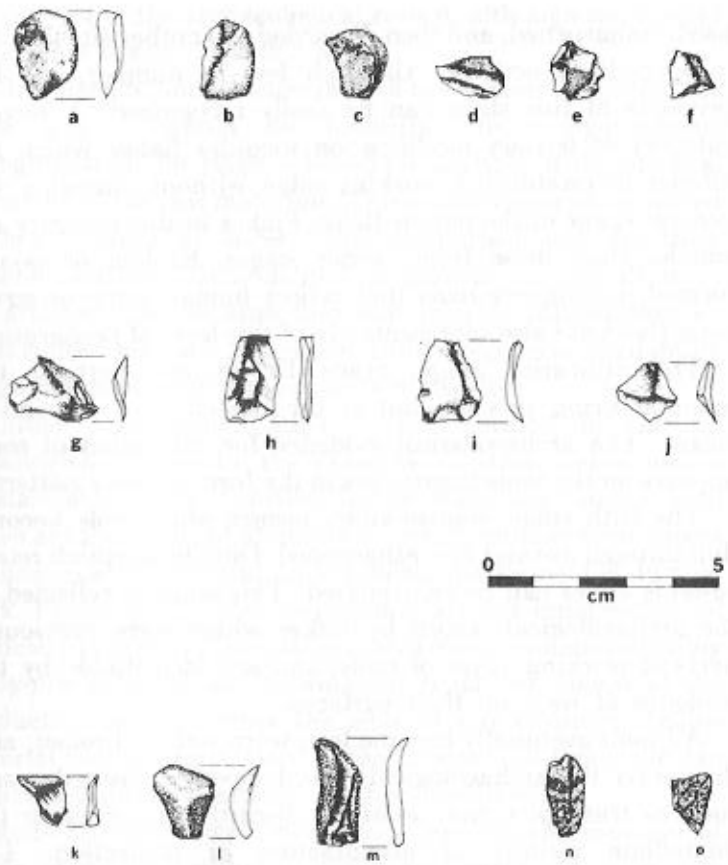


FIGURE 42. TYPICAL FLAKES FROM THE HANNA SITE: a-c, PRIMARY FLAKES; d-g, SECONDARY FLAKES; h-j, BIFACIAL THINNING FLAKES; k-l, UTILIZED FLAKES; m, WORKED FLAKE; n-o, FIRE FRACTURED STONE.

categories, including primary flakes, secondary flakes, interior flakes, bifacial thinning flakes, fire fractured stones, chunks with cortex, chunks without cortex, pebbles, raw material, cores, utilized and worked flakes, projectile points, drills, bifaces and unifaces. Each category is defined below.

Flakes are relatively flat pieces of stone which have been purposefully removed from the parent product. Within this major category are sub-categories, each of which can be associated with a specific stage of the manufacturing process. Primary flakes (Fig. 42 a-c) are defined as having more than 50 percent of their dorsal surfaces covered with cortex. While this definition is somewhat arbitrary, it is felt that these flakes are usually associated with the initial manipulation of raw material. Secondary flakes (Fig. 42 d-g) are those which have less than 50 percent of their dorsal surfaces covered with cortex. Since they have less cortex than primary flakes, at least some initial attention to the piece of stone is indicated. Although it is possible for secondary flakes to be part of the initial preparation, they usually represent a more advanced stage (Stage II) in the manufacturing process. Bifacial thinning flakes (Fig. 42 h-i) are relatively thin in longitudinal profile and have scars from previous flake removals on the dorsal surface, and have a tendency to feather on the lateral edges. Internal flakes are those which exhibit no cortex and lack the defining characteristics of bifacial thinning flakes. Both bifacial thinning flakes and interior flakes are considered to represent the stage of tertiary modification (Stage III in the generalized model).

Fire fractured stones (Fig. 42 n-o) are materials which exhibit fire spalling. They are not flakes by definition but pieces which were exposed to high temperatures either by accident or in an attempt to make the raw material more malleable. Chunks are amorphous stones which have no discernible flake characteristics. They are the result of tool

manufacturing, and, although it is difficult to place them in any particular stage, chunks were separated according to the presence or absence of cortex. The presence of cortical materials is assumed to represent initial preparation and the absence of cortex is considered to be indicative of secondary or tertiary preparation. Pebbles are small (less than 2.0cm) unmodified stones. These stones may occur naturally at a site, or they may have been acquired incidentally during the procurement of raw materials. Cores are the residual material after flake removal and are the products of Stage II (Fig. 43).

In sorting the lithic material, all utilized pieces (those which had observable edge modifications resulting from use) were separated. In addition, worked flakes, those with a working edge created by knapping but without modification to the shape of the flakes themselves, were separated from standardized tools. The categories of utilized and worked flakes represent tools which were selected because of intrinsic characteristics that allowed them to be used without significant alteration. These attributes were not produced intentionally but resulted from the knapping process. Worked and utilized flakes may be the by-products of any of the manufacturing stages, but close inspection often reveals the criteria for the selection of a particular specimen.

There are several categories of tools and preforms which are similar to traditional types. In this analysis, these categories are treated as parts of the process of tool manufacture and use, not as an end in themselves. In the following discussion, the different categories of the processual typology will be discussed with reference to the stage of manufacturing process reflected. Where possible, functional and behavioral correlates have been determined for particular tool types to yield information about activities performed at particular areas within the site.

In many areas of prehistoric America, as well as in other

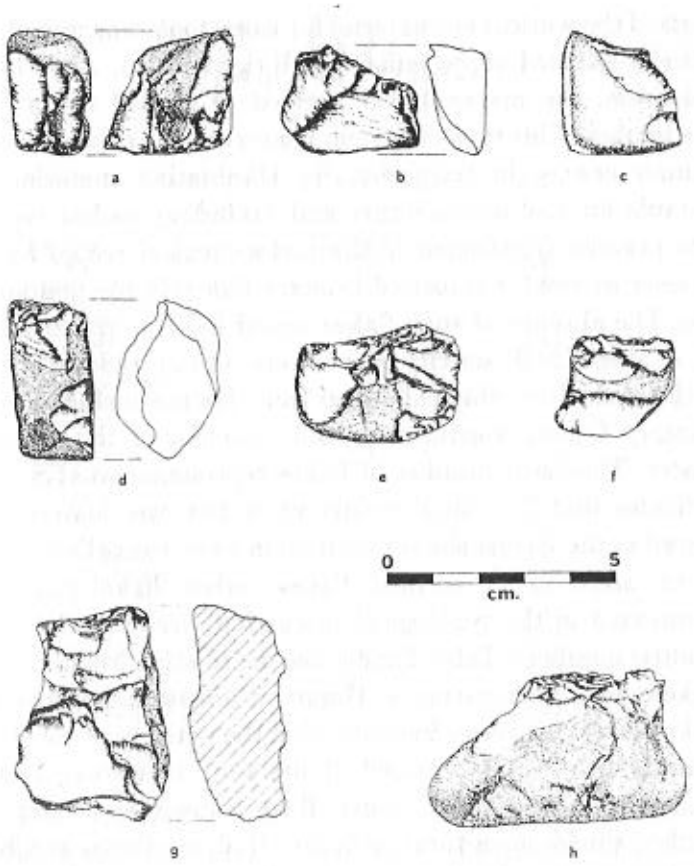


FIGURE 43. CORES.

parts of the world, raw material for stone tools was mined and initially reduced at the same site (Wright 1976). After initial reduction, the material was carried or traded to its final destination. This type of system conserved the expenditure of human energy in transport, by eliminating material unsuitable for tool manufacture and excluding useless weight. The practice is reflected in the archaeological record by the absence or small number of primary flakes in the nonquarry site. The absence of such flakes would indicate the existence of a specialized activity site where initial reduction was performed. The lithic collection from Hanna included 2584 primary flakes, constituting 16.82 percent of the total industry. This large number of flakes representative of Stage I indicates that the initial reduction of the raw material occurred at the Hanna site rather than in some specialized locus.

In addition to cortical flakes, other flake categories mentioned in the typological discussion were found in substantial numbers. Table 2 indicates the relative frequencies of flake types. The presence at Hanna of substantial numbers of flakes in all categories indicates that the entire process of tool manufacture was performed at the site; therefore, a more extensive discussion of other flake categories would not further elucidate cultural patterns. Had the flakes not been categorized in a typology which reflects process, this determination could not have been made. A mass of undifferentiated flakes would have been the result of a less sensitive analytical approach.

Much of the stone available for utilization appears to have been of rather mediocre quality. Applying controlled heat to a raw material of marginal utility results in making it more usable. The exposure to high temperatures may have been intentional or accidental, but the significance of this category lies in its relationship to the intentional process of heat treating. Heat treating would have improved the quality of

TABLE 2
FREQUENCY OF LITHICS

	SITE TOTALS	%
Uniface	32	0.20
Biface	150	0.98
Projectile Points	67	0.41
Worked Flakes		
0-1 cm	111	0.72
1-2 cm	443	2.88
2-3 cm	128	0.83
Utilized Flakes		
0-1 cm	389	2.53
1-2 cm	717	4.67
2-3 cm	119	0.77
Cores	101	6.57
Raw Material		
Pebbles	1045	6.80
Raw Material	267	1.74
Chunks		
With Cortex	708	4.61
Without Cortex	136	0.88
Flakes		
Primary	2584	16.82
Secondary	2537	16.51
Interior	1184	7.71
BTF	4193	27.29
Fire Fractured	443	2.88
Miscellaneous	11	0.07

the stone significantly. In an attempt to unravel the problem of fire fracturing, experiments were performed to determine the effects of heat treating. In the laboratory, several specimens of unused stone were exposed to controlled heat. As a result, the normally-tan river cobbles became bright red, and assumed a greasy appearance. These characteristics were found on some of the flakes and tools from the excavations, and the red color was also found on some of the untreated raw material. However, the combination of color and greasy appearance was not found in any of the unaltered stones. 4,319 specimens (28.10 percent of the industry) exhibited these characteristics and may be assumed to have been exposed to heat. The presence of heat treating at Hanna

probably indicates that some of the fire spalling is, indeed, the result of an intentional process. The only comparative data available on this process are from the Bayou Cognac site, where, with a much smaller sample, there was evidence of heat treating on 35 percent of the industry (Thomas, Wright, Campbell, and Ahler 1977).

The distribution of heat-treated artifacts is approximately the same within the various typological categories. This uniform distribution suggests that unmodified nodules were the subject of heat treating, rather than modified pieces at some later stage in the manufacturing process.

The raw material which provided the basis for the lithic industry in the Hanna settlement consisted predominantly of small chert nodules. These nodules are identical to those found at point bar formations on the Red River and in the nearby uplands. Most of the raw material was used, and, therefore, placed within another category for purposes of analysis. Only 267 specimens, or 1.74 percent of the industry, were recovered in a totally unmodified stage. In addition, 1,045 quartz and chert pebbles, 6.80 percent of the industry, were recovered. These pebbles, according to the geological analysis and test excavations in non-culture-bearing deposits, are not indigenous but were transported to the site. There is no evidence to indicate that these pebbles were used as tools nor is there any manifestation of use in other contexts. The occurrence of the pebbles, mixed with the industry, suggests possible methods for procurement of raw material employed by the Hanna inhabitants. Trade or transfer of useless pebbles is unlikely, and since the pebbles and raw materials could be obtained from the same nearby sources, it seems clear that neither was the result of trade. The occurrence of stone unsuitable for tool production refutes the possibility of procurement by the knapper, either on specialized procurement missions or in the course of some other task. It

has been suggested elsewhere (Thomas, Wright, Campbell, and Ahler 1977) that this mixture of pebbles and nodules indicates an undifferentiated gathering process, probably carried out by individuals unversed in the mechanics of knapping. The results of such a process would be a general selection of stones with little regard for size, shape, and structure best suited for tool manufacture. This conclusion also suggests the point bar formations as the source of material, since an undifferentiated collection process would be likely to rely on the nearest source.

In the model depicted in Fig. 41, cores are presented as representative of secondary preparation; however, this was not always the case at Hanna. The manufacture of tools, such as projectile points and drills, often went directly from Stage I, with the removal of cortical flakes, to tertiary modification. This procedure was followed primarily because of the small size of the nodules from which tools were made. The nodules were small enough to permit bifacial tools, such as projectile points, to be made from the nodules themselves rather than flakes.

The cores were not tools but rather the residual raw material after flakes were removed for use or modification (see Fig. 43). There were no standarized cores at the Hanna site. Flake removals were not patterned, other than by the restrictions of the mechanics of knapping. The angle between the striking platform and the flake scar was obtained through the use of a goniometer and recorded in an effort to discover some of the mechanical considerations of the Caddoan artificer. These angles are presented in Table 3. The broad range of the striking platform angles reinforces the suggestion that there was no standardization of technique. The platforms represent almost the entire possible range of platform angles. Table 4 shows the weight of cores recovered. These cores were most often extremely small. The range and standard deviation

reflect the utilization of almost any material available rather than selection for certain size.

Rejuvenation of cores was not a discernible practice at the site. Once a core became battered, little or no effort was made to restore the striking platform. Since the core was small, there was insufficient raw material to justify rejuvenation. Also, the procurement process was effective enough to make rejuvenation of these small cores unnecessary.

TABLE 3
DISTRIBUTION OF STRIKING PLATFORM ANGLES ON CORES

ANGLE	40°	41°	44°	47°	48°	50°	51°	53°	54°	55°	56°
OCCURRENCE	1	2	1	2	2	3	4	1	1	5	1
ANGLE	57°	58°	59°	60°	61°	62°	63°	64°	65°	66°	67°
OCCURRENCE	2	3	1	4	2	4	1	2	4	4	2
ANGLE	68°	69°	70°	71°	72°	73°	74°	75°	76°	77°	79°
OCCURRENCE	4	3	2	4	2	3	4	3	2	2	1
ANGLE	80°	82°	83°	84°	85°	86°					
OCCURRENCE	4	2	1	2	1	1					

N=94; X=64.63; s=11.36.
Range -- 40° to 86°

TABLE 4
WEIGHT OF CORES IN GRAMS

WEIGHT	4-4.9	5-5.9	6-6.9	7-7.9	8-8.9	9-9.9	10-10.9
OCCURRENCE	2	5	4	9	6	5	8
WEIGHT	11-11.9	12-12.9	13-13.9	14-14.9	15-15.9	16-16.9	17-17.9
OCCURRENCE	3	10	6	6	3	5	3
WEIGHT	18-18.9	19-19.9	21-21.9	22-22.9	23-23.9		
OCCURRENCE	2	3	4	1	2		
WEIGHT	25-25.9	26-26.9	27-27.9	28-28.9	29-29.9	34-34.9	
OCCURRENCE	1	1	2	1	1	1	

TABLE 4 continued
WEIGHT OF CORES IN GRAMS

WEIGHT	36-36.9	41-41.9	64-64.9	65-65.9	66-66.9
OCCURRENCE	1	1	1	1	1
WEIGHT	72-72.9	96-96.9			
OCCURRENCE	1	1			

N-101
X=16.98
s-15.02
Statistics are based on actual weights, not on grouped data.

The differentiation between utilized flakes (Fig. 43k, l) and those which have been worked (Fig. 43m) was difficult to make. Through experimentation, however, criteria were established which enabled separation into appropriate classes. Utilized pieces show edge damage of an irregular nature. The pressure to which the tools were subjected during the utilization process resulted in minor removals less than 1.0mm in length along the working edges. The category of worked flakes is characterized by continuous intentional removals more than 1mm, but less than 2.0mm in length along the work edge. These latter removals are more regular and tend to be steeper than those resulting from utilization. Both categories of modification appear on flakes which are less than .05cm thick. Though both types of specimens were recreated through experiments, there is a tendency for the two to blend; therefore, a slight possibility of error exists in placement of artifacts within segregated categories.

Within these categories, the size of the flakes and their working edges were recorded in hopes of recovering some of the criteria used in the selection of particular stones by the artificer (Table 5). It is obvious from this data that there was a selection for small flakes, especially those between 1.0

TABLE 5
SIZE CATEGORIES OF UTILIZED AND WORKED FLAKES

UTILIZED FLAKES			WORKED FLAKES		
0-.9 cm	1-1.9 cm	2 cm - Above	0-.9 cm	1-1.9 cm	2 cm-Above
389	717	119	111	443	128
31.76	58.53	97.14	16.28	64.96	18.77

N=1907

and 1.9cm long. Though many of the unused flakes were over 2.0cm in length, presenting a larger working edge than the smaller flakes, they were not preferred by the workers.

All of the utilized and worked flakes have an edge angle of less than 45 . This degree of sharpness is associated with fine or precision cutting. A more definite function cannot be determined, either by distribution or by association with other classes of artifacts.

Though both unifacial tools (Fig. 44) and worked flakes are worked on only one face, unifacial tools differ from worked flakes by exhibiting substantial flake removals (larger than 2.0mm), which impose on the shape of the parent flake along one or more edges to create a serviceable tool. This class of tools may be affiliated with the traditional scraper category; however, the unifacial tools from Hanna have no regular morphological form. An analysis of the edge angles,

TABLE 6
ANGLES OF WORKING EDGES OF UNIFACIAL TOOLS

ANGLE	22°	25°	28°	31°	34°	38°	40°	42°	43°	52°	56°
OCCURRENCE	1	1	2	2	2	3	1	1	1	2	1
ANGLE	58°	60°	63°								
OCCURRENCE	1	3	1								

N=32

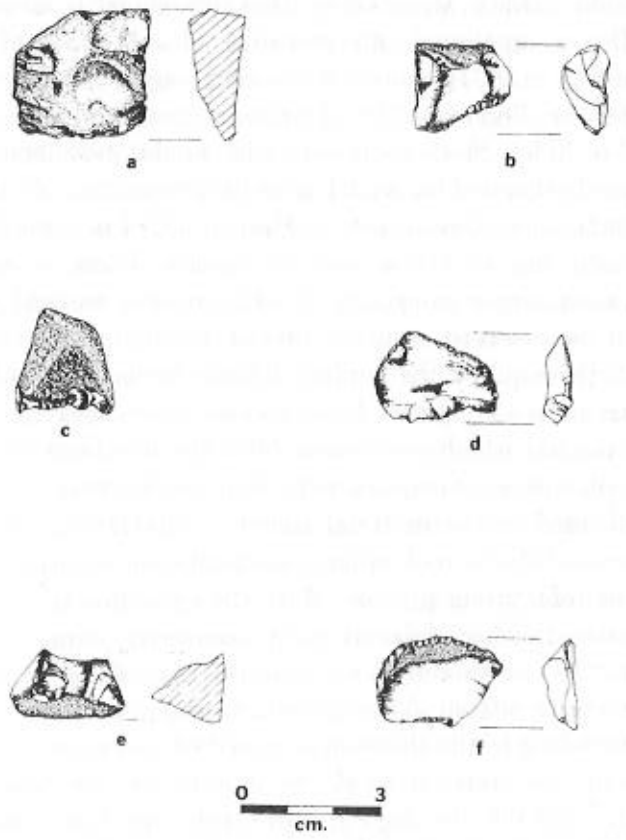


FIGURE 44. UNIFACIAL TOOLS.

shown in Table 6, was made with a goniometer in an attempt to offer a functional interpretation of this class of tools. According to D. Thomas (1974), edge angles of between 45° and 60° are best suited for skinning animals and for scraping wood or hides. Stone tools with edge angles more acute than 45° are best suited for whittling or for fine cutting of meat. Of the unifacial tools recovered at Hanna, 63.94 percent (N=14) have edge angles of less than 45 degrees. These, along with the much larger categories of utilized and worked flakes, would have served well for precise cutting. Only eight, or 36.36 percent, of the unifacial tools have edge angles of greater than 45 degrees. There was no other category of tools from the site which could have filled the functions served by the tools with edge angles greater than 45 degrees.

Included in the material found at the Hanna site were numerous bifacial tools which were broken or aborted early in the manufacturing process. With the exception of one drill, the only finished bifacial tools recovered were projectile points. It can therefore be assumed that these unfinished bifaces were related to the manufacturing of projectile points.

According to the theoretical model of tool manufacture, a piece of raw material would be modified to produce flakes which could then be worked into blanks and final tools. The variance from this theoretical model seen at Hanna is instructive. Rather than working from a core to a flake to a blank to the finished product, flat chert nodules were selected and bifacial work was begun immediately (Fig. 45). Stages I and II were eliminated as modification stages for at least some of the bifacial tools. The function of the missing stages was performed by post-procurement selection of unmodified raw material with the proper traits rather than producing these qualities through knapping.

The large amount of broken and aborted pieces indicates that the manufacturing of bifacial tools was often an unsuccessful endeavor. Though one would expect projectile points to be lost in something other than a village context, the high percentage of unfinished products in relation to finished projectile points may be indicative of the difficulty of working with small nodules.

The only class of bifacial artifacts recovered during the excavations was the category of projectile points. Their presence strongly suggests an involvement with hunting and/or defense at the site. Projectile points vary considerably in any assemblage. Variability may be the result of the knapper's attempt to make his product unique. Different forms may also reflect tool function, culture, or technological change. Such factors as technological opportunism, accident, and individual ability must also be considered to have contributed to variability. The range of forms found at Hanna may be a result of any of these causes.

Many of the established typological categories have a tendency to blend into one another, resulting in placement of particular specimens within one category or another by an intuitive process. Some of the projectile points recovered at Hanna were assignable to these traditional categories. According to the established typological description, the main difference between Alba and Hayes points lies in the treatment of the base, which is often bulb- or diamond-shaped in the Hayes point, whereas the Alba base is rectangular (Suhm and Jelks 1962). It is likely that criteria more sensitive than overall form would reveal more subtle distinctions with cultural significance. Though there are shortcomings inherent in this typology, it is used here because one site is an inadequate sample from which to establish alternatives. However, in addition to typological classification, some basic metric data is offered in hopes of presenting information which will be of value in studying intrasite variation. Fig. 46 shows the data recorded for each identifiable type of projectile point or drill recovered.

FIGURE 45. STEPS IN THE MANUFACTURE OF A PROJECTILE POINT.

Eleven Alba points were identified in the lithic collection from Hanna (Figs. 47, 48a-b, d-g). Eleven other specimens fit well within the Hayes point type description (Figs. 47 g-i, 48h-i). The differentiation between Hayes and Alba points was based on the treatment of the point base and size (see Suhm and Jelks 1962). Fig. 46 as well as Tables 7 and 8 show the metric data which were extracted from each of these categories.

All of the lanceolate forms recovered (Fig. 47 a-c) were broken; therefore, no total dimensions are available. Measurements were taken from the proximal or distal end, and the width of the blade was measured at the widest point (Table 9). These points vary substantially in length and width (range of lengths 15 to 32mm; range of widths 12 to 21mm). The variation in size within this category may indicate that more than one type is represented. It is likely that some of the forms which have been identified as having lanceolate characteristics are merely proximal or distal ends of other forms.

TABLE 7
DIMENSIONS OF ALBA PROJECTILE POINTS

Blade Length (mm)	Blade Width (mm)	Haft Length (mm)	Haft Width (mm)
18	11	6	7
19	11	5	4
--	20	7	8
14	15	7	6
16	18	7	7
13	12	8	8
--	14	6	7
--	12	7	6
--	15	7	7
--	16	5	7
14	11	6	6

N=11
All measurements are in mm.
-- : data not available

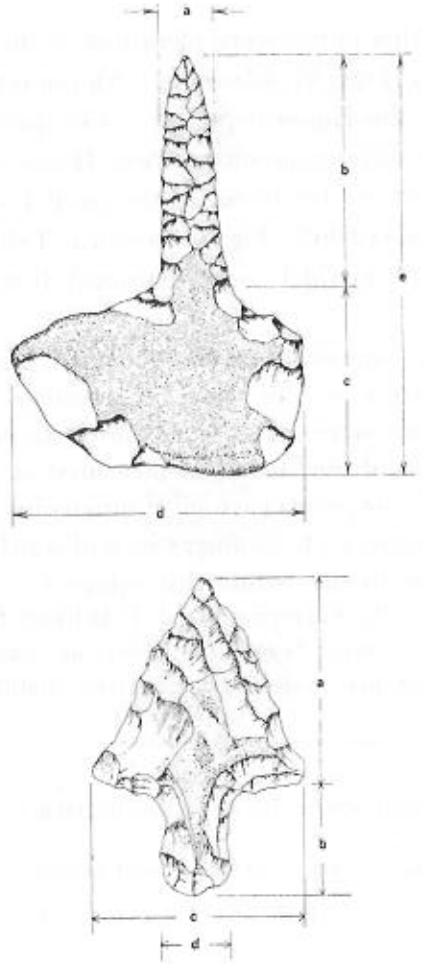


FIGURE 46. DRILL AND PROJECTILE POINT SHOWING CRITERIA FOR MEASUREMENT. *DRILL* -a, BIT WIDTH; b, BIT LENGTH; c, BASE HEIGHT; d, BASE WIDTH; e, OVERALL LENGTH. *PROJECTILE* POINT -a, BLADE LENGTH; b, HAFT LENGTH; c, BLADE WIDTH; d, HAFT WIDTH.

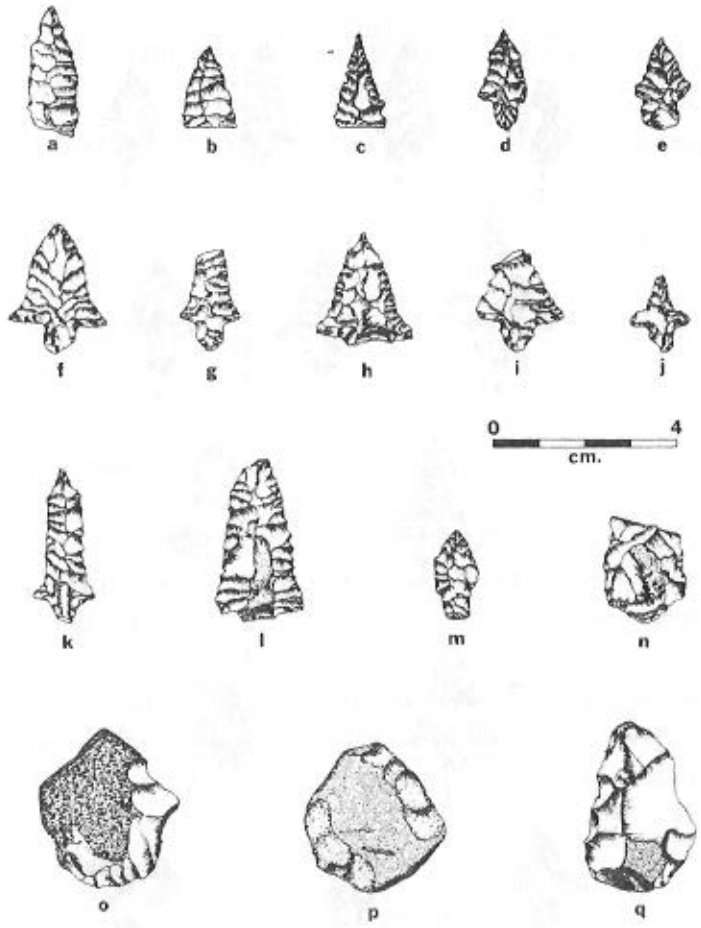


FIGURE 47. PROJECTILE POINTS. a-c, LANCELOTE; d-f, ALBA; g-i, HAYES; j-m, UNIDENTIFIED; n, CLIFFTON; o-p, BLANKS; q, ROUGHOUT.

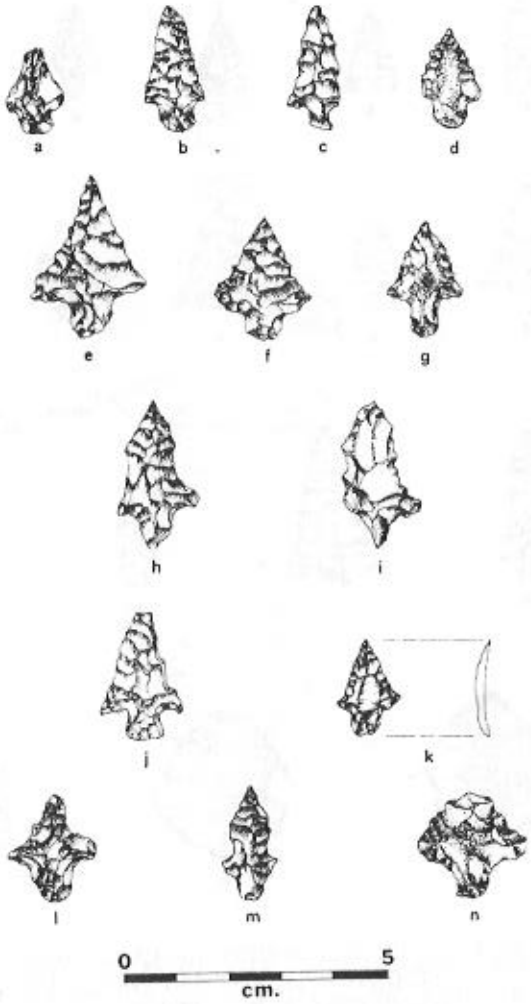


FIGURE 48. PROJECTILE POINTS. a-b, d-g, ALBA; c, BONHAM; h-i, HAYES; j, SCALLORN; k, FRILEY; l-m, UNIDENTIFIED; n, PREFORM.

TABLE 8
DIMENSIONS OF HAYES PROJECTILE POINTS

Blade Length (mm)	Blade Width (mm)	Haft Length (mm)	Haft Width (mm)
23	21	5	7
--	23	7	9
18	24	6	8
21	15	7	6
--	18	6	6
--	13	6	6
--	14	7	7
24	21		
--	19	6	7
14	11	7	4
--	20	7	8

N=11
All measurements are in mm.
--: data not available

Friley projectile points were represented at the site by two specimens (Fig. 48 k). The metric data for these points are presented in Table 10.

Scallorn and Cliffton points were each represented at the site by a single specimen (Figs. 47n, 48j) respectively. The metric data for these are represented in Tables 11 and 12, respectively.

TABLE 9
DIMENSIONS OF LANCEOLATE PROJECTILE POINTS

Length from Point	32	28	24	23		20	19	16	17	15	11
Width	21	11	13	19	14	12	13	12	12	13	10
Length from Base					28						
Length from Point											
Width	15	10	14								
Length from Base	22	14	25								

N=16
All measurements are in mm.

TABLE 10
DIMENSIONS OF FRILEY PROJECTILE POINTS

Blade Length (mm)	Blade Width (mm)	Haft Length (mm)	Haft Width (mm)
18	12	5	6
16	11	4	3

N=2
All measurements are in mm.

In addition to points which fit into these standard categories, there were 25 projectile points which, due to their fragmentary nature or aberrant form, could not be typed (Figs. 47j-m, 48l-m). Several of these (Fig. 48l, n) may be resharpened forms either of Alba or Hayes points.

Of all artifacts recovered at Hanna, the only ones which were clustered in one area of the site were the drills. Six of the

TABLE 11
DIMENSIONS OF SCALLORN PROJECTILE POINTS

Blade Length	Blade Width	Haft Length	Haft Width
26	16	6	7

N=1
All measurements are in mm.

TABLE 12
DIMENSIONS OF CLIFFTON PROJECTILE POINTS

Blade Length	Blade Width	Haft Length	Haft Width
	18		

N=1
All measurements are in mm.

eight drills unearthed were found in and around Structure 2. It cannot be determined which maintenance functions requiring the use of drills might have occurred in that structure. Figure 46 shows the dimensions which were recorded for these tools, and the metric data are presented in Table 13. Five of the eight drills have asymmetrical bases (Fig. 49 a-h). The asymmetry may be related to a hafting technique. Two of the drills have been totally bifacially worked (Fig. 49a, e). The others retain some cortex.

TABLE 13
DIMENSIONS OF DRILLS

Width of Bit	Length of Bit	Height of Base	Width of Base	Overall
5	10	11	29	21
5	7	15	17	32
6	Broken	29	26	36
5	16	11	17	27
6	11	14	16	25
5	16	9	12	25
5	Broken	6	7	22
7	23	Missing	Missing	23

N=8
All measurements are in mm.

There were no specimens recovered at Hanna which could be identified as ground stone tools. One rectangular stone was found which appears to have been ground on two sides. It measures 42mm in length x 18mm in width, and tapers from 8.0mm on one end to 3.0mm on the other. No specific function can be suggested for this artifact. Also, three pieces of sandstone showing evidence of either grinding or utilization were retrieved (Fig. 49 p). These pieces have grooves which may be indicative of their having functioned as sharpeners or abraders for bone or wooden tools.

One object was found which has the battering and

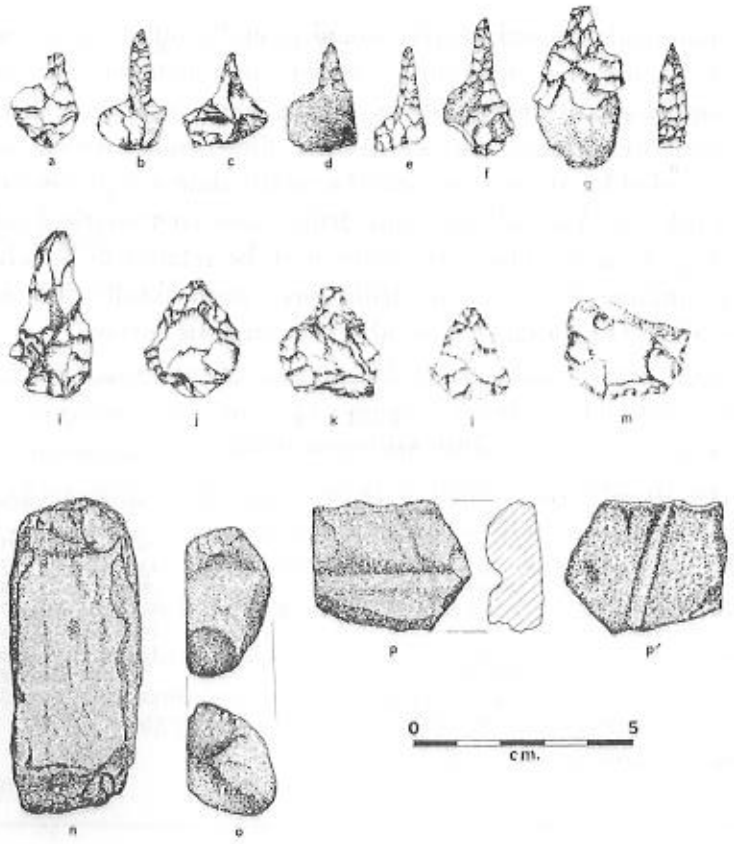


FIGURE 49. STONE TOOLS. a-h, DRILLS; i-l, PREFORMS; m, ROUGHOUT; n, HAMMERSTONE; o, POLISHED STONE; p, GROOVED SANDSTONE.

striations usually associated with hammerstones (Fig. 49 n). It weighs 485gm, and its dimensions are 60mm x 58mm x 22mm. Some objects which were classified as cores appeared to have been used as bashing tools and could have been hammerstones. As with some other aspects of the industry, pieces used as hammerstones were not morphologically distinct. It appears that, when a hammerstone was needed, any stone adequate for the purpose was pressed into service.

Resharpening was not readily apparent on the few patterned tools which were recovered, although some of the aberrant projectile points may be the result of resharpening. Since most of the tools were unpatterned or merely the result of selecting a flake which filled the functional needs of the moment, they show little investment of time and were not curated. Apparently, when a tool was needed, another flake was selected, marginally modified, used, and discarded. No resharpening flakes were found.

Since the Caddoan settlement patterns and their functional ramifications are not totally understood, the presence or absence of particular classes of tools cannot be used as indicators of the relative importance of specific tasks within the exploitative system. An attempt at such an interpretation is further hampered by our ignorance of the function of many of the classes of artifacts recovered. However, the absence at Hanna of some tool categories, particularly ground stone tools, is perplexing.

The evidence is irrefutable that the site inhabitants were dependent for a substantial portion of their subsistence on domestic plants (Shea, Chapter 17 this volume). The Hanna area was undoubtedly covered by forests, which required clearing in order to establish the fields necessary for horticulture. At other Caddoan sites, groundstone celts have been recovered which would have been adequate for land clearance (Webb and McKinney 1975: Fig. 13). At Hanna, however,

no such tools were found, nor was any other class of tools recovered which could have functioned in that context. An area reflecting specialized activity of ground stone tool production may have been destroyed by the encroachment of the Red River, or it may exist in an unlocated area of the village. However, the possibility of sampling error is unlikely, given the extensive area of excavation and the large number of tools recovered. Ground stone axes require a great expenditure of time to manufacture and would probably have been carefully curated. Even so, one would expect to find evidence of their manufacture in the form of by-products and rejects. The absence of manufactured by-products and rejects may indicate that not only were these tools part of a different technological system than the majority of tools, i.e. ground stone tools *vs.* chipped stone tools, but also that the methods of procurement may have been different for the two types. Although any interpretation of negative evidence can offer nothing more than conjecture, alternative inferences may be drawn. One possibility is that ground stone axes and adzes were the products of craft specialists at occupationally specific loci. This suggestion, if true, explains the absence of evidence of the appropriate activity at the Hanna site. The absence of evidence of manifestations of the production of this class of tools from Cognac, another Alto focus site, may support this interpretation.

Another possible explanation is that axes, if primarily used for land clearance, would have been used and broken in something other than a village context. Thus, if we were to look for evidence of their existence, searching some locus other than a habitation would be in order.

The absence of tools which could have functioned as hoes is also puzzling. Digging sticks, functional equivalents to hoes, might have been used without leaving readily discernible evidence of their existence in the archaeological record,

except in the tools which would have been used in their manufacture. No tools which could be identified as woodworking tools necessary for the manufacture of digging sticks were recovered. At this time, it is difficult to be certain of the utilization of the components of the Caddoan tool kit. However, there is little evidence of a heavy woodworking industry.

As was the case with axes, it is possible that hoes were used and discarded in something other than a village context.

Summary

The analysis of lithic materials recovered at Hanna revealed patterns which allowed several conclusions to be drawn.

Apparently, the procurement of raw materials was a rather unstructured process, with no discrimination made at the source of raw materials. The unsuitability of much of the raw material suggests that this process was carried out by those unversed in the mechanics of knapping. The indiscriminate gathering process, coupled with the poor quality of material, appears to have resulted in the necessity of attempting to improve the structure of stones for knapping by heat treating.

Analysis of the flake categories indicates that there was no specialization among these Caddoan artificers. It appears instead that the entire process of tool manufacture was represented at Hanna and distributed throughout the site. There is no evidence of craft specialization, with the exception of the possibility that drills are associated with activity around Structure 2 and that ground stone tools were made and utilized at some other loci.

Substantial information was recovered on the process of projectile point manufacture. Some basic metric data were recorded which may contribute to the establishment of more

sensitive criteria for analysis of individual categories of projectile points. It is hoped that more sensitive criteria will lead to a better understanding of the significance of projectile points within the Caddoan culture system.

The model and processual typologies utilized here contributed to the optimal recovery of information. They enabled us to make tentative suggestions concerning the culture reflected by artifacts, which could not have been achieved through a strictly typological analysis.

Daub

A large quantity of daub was recovered from the Hanna site excavations. Daub, or burnt clay, was often used by prehistoric and historic Indian groups to strengthen and protect the wooden framework of structures. At the Hanna site, the daub was neither tempered, nor did it contain any impressions of plant material. The daub from each level of excavation was weighed to the nearest 0.1gm, and an estimate of the total number of fragments was made. The relative quantities for each sector of the site are outlined in Table 14. As expected, the heaviest concentrations of daub were recovered from the areas in which structures are located.

Southwest Sector

The plow zone overlying Structure 1 was removed by the grader, but several 2m x 2m excavation units were also placed in this area. It is interesting to note that the amount of daub

recovered from excavation units was moderate (176.7gm), while the quantities yielded by features and burials suggested a much higher concentration near the structure (1148.0gm and 156.9gm, respectively). This result may be due to differential preservation, with daub incorporated in feature fill being protected from weathering, while exposed daub is subject to more mechanical and chemical forces.

The area of Structure 5 yielded a moderate amount of daub (209.8gm). Elswhere in the southwest sector, daub was scarce. For example, a small area examined northwest of Structure 1 yielded only 16.7gm.

Northeast Sector

In the northeast sector, the highest concentrations of daub were found near Structure 2 and in the area east of this house. Structure 2 was excavated entirely by 2m x 2m units. The intensive horizontal and vertical excavation of this area probably accounts for the high concentration of daub (4963.7gm). The area of Structure 4 produced very little daub (78.0gm). It should be noted that the plow zone was removed by the grader in this area, a fact which might account for the relatively low frequencies. Structure 6 yielded only a very minimal amount of daub (96.1gm) as compared to Structure 2. The posts of this structure were widely spaced, suggesting that it was an open structure, in which case daub would not have been needed. East of Structure 2, five excavation units yielded a great amount of daub (734.8gm). It is possible that this area was associated with a structure.

Southeast Sector

Structure 3 was uncovered by the grader, and very little daub was recovered (23.6gm). Elsewhere in the southeast sector, test pits yielded daub ranging from 1.4gm to only 11.5gm, a relatively sparse amount.

TABLE 14
DAUB QUANTITIES

Southeast Sector	
Structure 1	1482.4 gm
Structure 5	211.7 gm
General Excavations	27.4 gm
Test Pits	62.2 gm
Northeast Sector	
Structure 2	4963.7 gm
Structure 4	78.0 gm
Structure 6	96.1 gm
General Excavations	213.2 gm
Test Pits	146.3 gm
Area east of Structure 2	734.8 gm
Southeast Sector	
Structure 3	23.6 gm
Test Pits	38.3 gm

Interpretations

Of the structures uncovered at the Hanna site, the postmold pattern of Structure 2 offer the best possibilities for attempting to interpret daub concentrations. Excavation units in and near this structure were divided by level. Level 1, the plow zone, was disregarded. Level 2, the midden stratum, yielded the heaviest concentrations of daub along the northern wall and in the center of the circular structure. Light frequencies of daub were recovered from the area between the circular wall pattern and the center of the structure. The heavy concentration of daub in the center of the circular house suggests the possibility of a smokehole in the roof, which was covered with daub to protect the grass and wood used in the consturction of the house. Webb suggested that house B-4 at the Belcher site might have had a center smokehole, as there was a heavy concentration of daub in the center of this structure (Webb 1959). The presence of greater quantities of daub near the exterior posts indicates use of this material in the walls.

At Hanna, the most convincing case for an unexcavated structure was found in the area east of Structure 2 (S118-122/W488-494), where five excavation units yielded a total of 734.8gm of daub. This suggestion is strengthened by the presence of several postmolds underlying the midden in this area. Since daub generally was found in greater quantity in the vicinity of structures, it is reasonable to assume that heavy daub concentrations may be used to predict the presence of structures.

Charcoal

Charcoal was recovered from all sectors at the Hanna site. Several samples, found in an undisturbed and culturally significant context, were taken specifically for the purposes of dating by the radiocarbon method. These received special handling in the laboratory and were isolated to avoid contamination. Other quantities of charcoal, recovered from field excavations, were taken to the laboratory for sorting. All fragments of charred seeds, nutshells, and bone were sent to the respective specialists for analysis. Also, a sample of wood and cane charcoal was selected for identification.

The total weight of charcoal recovered from the site was 140.9gm with the highest concentrations found in the northeast and southwest sectors. The only excavation unit which yielded any quantity of charcoal in the southwest sector was 12.2gm from S182/W550. This unit was located on the edge of a cluster of posts outside and to the west of Structure 1.

Two features, located on the interior of the structure, yielded significant quantities of charcoal. Feature 4, a large deep pit that was probably used for storage, yielded 12.6gm. Feature 10, a cooking pit, returned a total of 24.8gm. These two features also yielded high quantities of floral, faunal, and cultural debris. Several other features (3, 8, 9, 11, 14, 19, and 21) contained small quantities of charcoal, ranging from 0.1-2.4gm. All of these features were medium-sized storage or refuse pits.

In the northeast sector, the highest charcoal concentration was found in two adjacent excavation units, S128/W516 (11.4gm), and S130/W516 (10.9gm). Several other squares yielded small quantities of charcoal which ranged in weight from 0.1 to 3.4gm. In the vicinity of Structure 2, Features 32 and 36, intermediate-sized storage pits, contained 3.5 and 0.5gm, respectively. Feature 22, a hearth located in the center of Structure 2, yielded only 0.7gm of charcoal but contained a heavy layer of ash. Other features in this sector from which charcoal was recovered include Features 57, 58, 52, 47, and 49.

In the southeast sector, only a small amount of charcoal was recovered; this from features 43 (0.7gm), 44 (1.0gm), and 45 (0.1gm). Feature 43 was located to the southeast of Structure 3 and consisted primarily of midden. Features 44 and 45 were located to the northwest and well outside the structure.

The amount of charcoal recovered from the Hanna site was not great. The best samples were taken for Carbon-14 dating, while others were sent to specialists for identification; these are discussed in other sections of the report (Chapters 17 and 20).

Zooarchaeological Analysis Of The Hanna Site: An Alto Focus Occupation In Louisiana

Kathleen Mary Byrd

Introduction

The five-week excavation project carried out at the Hanna site uncovered numerous animal bone fragments, both in midden and feature deposits. By utilizing zooarchaeological techniques, bone remains may provide data regarding the subsistence patterns of a people, i.e., the abundance of various resources in the diet, their distribution throughout the site, and which ecosystems were exploited for animal resources. The present study is concerned with these questions in regard to the occupation of the Hanna site.

Methodology

A study of the bone remains from a site can be divided into four main stages. First, the faunal remains are identified—the species represented by the bones are determined. For the Hanna material, the zooarchaeological comparative collection

at the Department of Geography and Anthropology, Museum of Geoscience, Louisiana State University, was used in the identification.

Secondly, a method is selected to determine the abundance of the various animals. The three most commonly applied methods are the weight method, the fragment method, and the minimum number of individuals or MNI method (Chaplin 1971). Each of these methods has its applicability, but, for the material from the Hanna site, the fragment method appeared most appropriate due to the state of bone preservation, the size of the sample, and the research aims. This method relies on the number of fragments of a particular species as the basis for comparison. Minimum numbers of individuals were also computed for certain of the analytical units at Hanna. The MNI method tabulates the most often recurring bone or bone fragment of a species and uses this frequency to indicate the abundance of an animal at a site; e.g., four right proximal tibiae indicate a minimum of four individuals.

The third step in a faunal study selects those proveniences or features that are to be treated as discrete analytical units, and those which are to be considered as part of larger units. During excavation, the Hanna site was divided into three sectors, each of which is treated herein as a discrete unit. Also noted were certain areas within the sectors which had high artifact concentrations. Where sample size is adequate, these areas are also treated separately. Features were numerous at Hanna, and, where a substantial number of bones is available, the feature material is also analyzed in discrete units.

The final stage in a faunal study is the analysis of the zooarchaeological remains. For the analysis detailed below, only the *in situ* material is considered. Due to the difficulty of affixing their exact provenience and cultural affiliation, plow

zone remains, although identified, were not included in the calculations. It should be noted, however, that all species represented in the plow zone material were also found in the *in situ* samples. Of the *in situ* material, only the bone retrieved from the quarter-inch screens was analyzed in detail. Samples of the sixteenth-inch, screened bone were examined but found to contain only the smaller bone fragments of the species represented in the quarter-inch material.

In this study, tables are used to summarize the findings. Table 15 lists the species and species groups identified from the Hanna site, their common names, and their sector affiliations. Tables 16 through 20 tabulate the species present by families and enumerate the bone fragments and their relative percentages. On several tables, the MNI are also included. As is evident from Table 16, the largest category listed is unidentifiable bone. These unidentifiable bones are most often burned, amorphous fragments which, due to their size and structure, are most likely mammal and probably deer. However, other possibilities, such as large alligator, are also conceivable.

Before proceeding to the actual results of the analysis, a few problems inherent in the fragment method should be noted. First, not all animals have the same number of bones. The gar, for example, has over 2,100 scales alone. Secondly, some animal bone is more brittle than others. For example, the long bones of birds and rabbits have relatively thin walls and break easily, resulting in more fragments. Third, some bones are treated differently during butchering or cooking. This treatment can result in either increasing the number of fragments, e.g., by cracking the bones for marrow extraction, or decreasing the number by burning or boiling the bones until they are destroyed.

Because of these problems, the number of bone fragments of a particular species should not be viewed as necessarily

TABLE 15
HANNA SITE SPECIES LIST

Scientific Name	Common Name	Sectors NE	SW	SE
Osteichthyes	Bony Fishes	X	X	X
Lepisosteidae	Gar	X	X	
Lepisosteus sp.	Gar	X	X	
L. spatula	Alligator Gar		X	
Amiidae	Bowfin	X	X	
Amia calva	Bowfin	X	X	
Clupeidae	Shad		X	
Catostomidae	Sucker, Buffalo	X	X	
Ictaluridae	Catfish	X	X	
Ictalurus sp.	Catfish	X	X	
I. furcatus	Blue Catfish		X	
I. (bullhead)	Bullhead		X	
Pylodictis olivaris	Flathead Catfish		X	
Centrarchidae	Bass, Sunfish	X	X	
Lepomis sp.	Sunfish	X		
Micropteris sp.	Bass		X	
Pomoxys sp.	Crappie	X		
Sciaenidae	Drum	X	X	
Aplodinotus grunniens	Freshwater Drum	X	X	
Reptilia	Reptiles	X	X	X
Alligatoridae	Alligator	X	X	
Alligator mississippiensis	Alligator	X	X	
Chelydridae	Snapping Turtles	X		
Macroclemys temmincki	Alligator Snapper	X		
Kinosternidae	Mud-Musk Turtle	X	X	
Emydidae	Turtle	X	X	
Terrapene sp.	Box Turtle	X	X	
Chrysemys-Graptemys	Slider, Map Turtle		X	
Deirochelys reticularia	Chicken Turtle		X	
Trionychidae	Softshell	X	X	X
Trionyx sp.	Softshell	X	X	X
Testudines	Turtles	X	X	X
Colubridae	Snake	X		
Serpentes	Snake	X		
Amphibia	Amphibians		X	
Anura	Frog, Toad		X	
Aves	Birds	X	X	
Anatidae	Ducks		X	
Branta canadensis	Canada Goose		X	
Anas-Aythya	Duck		X	

TABLE 15 continued
HANNA SITE SPECIES LIST

Scientific Name	Common Name	Sectors NE	SW	SE
Mammalia	Mammals	X	X	X
Didelphidae	Opossum	X	X	
Didelphis virginiana	Opossum	X	X	
Hominidae	Man	X		
Homo sapiens	Man	X		
Leporidae	Rabbit	X	X	X
Sylvilagus sp.	Rabbit	X	X	X
S. floridanus	Cottontail	X		
S. aquaticus	Swamp Rabbit	X		
Sciuridae	Squirrel	X	X	
Sciurus sp.	Squirrel	X	X	
S. carolinensis	Gray Squirrel	X	X	
Cricetidae	Rodent		X	
Sigmodon hispidus	Cotton Rat		X	
Procyonidae	Raccoon	X	X	
Procyon lotor	Raccoon	X	X	
Mustelidae	Mink		X	
Mustela vison	Mink		X	
Felidae	Cat	X		
Cervidae	Deer	X	X	X
Odocoileus virginianus	Deer	X	X	X

indicating the abundance of an animal. The number of bones of a particular animal, however, can be used to compare the *relative* quantity of a species in different units. For example, deer bone might be twice as numerous in one unit as in another. This approach assumes that a species is always more or less treated in the same manner during butchering, cooking, and the disposal of food refuse.

Analysis

About 11,900 bones were recovered from undisturbed midden and features at the Hanna site. Generally, these bones exhibited a rather poor state of preservation. More than 60 percent of the material was burned making identification of many of the fragments difficult. Nevertheless, 33 species or

TABLE 16
DISTRIBUTION OF BONES BY SECTORS

FAMILY	NORTHEAST SECTOR Iden.Frag.	% of Iden. Frag.	SOUTHWEST SECTOR Iden.Frag.	% of Iden. Frag.	SOUTHEAST SECTOR Iden. Frag.	% of Iden. Frag.
Lepisosteidae	34	2.8	851	22.0		
Amiidae	31	2.6	70	1.8		
Clupeidae			1	<0.1		
Catostomidae	2	0.2	81	2.1		
Ictaluridae	10	0.8	64	1.7		
Centrarchidae	5	0.4	12	0.3		
Sciaenidae	2	0.2	67	1.7		
unid. Osteichthyes	85	7.0	1844	47.6	3	10.7
Total Osteichthyes	169	14.0	2990	77.2	3	10.7
Alligatoridae	3	0.2	7	0.2		
Chelydridae	12	1.0				
Kinosternidae	26	2.2	20	0.5		
Emydidae	21	1.7	14	0.4		
Trionychidae	14	1.2	175	4.5	5	17.9
unid. Testudines	453	37.5	351	9.1	16	57.1
Colubridae	2	0.2				
unid. Serpentes	1	0.1				
unid. Reptilia	4	0.3	7	0.2		
Total Reptilia	536	44.4	574	14.8	21	75.0
Anura			1	<0.1		
Total Amphibia			1	<0.1		
Anatidae			6	0.2		
unid. Aves	11	0.9	8	0.2		
Total Aves	11	0.9	14	0.4		

TABLE 16 continued
DISTRIBUTION OF BONES BY SECTORS

FAMILY	NORTHEAST SECTOR Iden.Frag.	% of Iden. Frag.	SOUTHWEST SECTOR Iden.Frag.	% of Iden. Frag.	SOUTHEAST SECTOR Iden.Frag.	% of Iden. Frag.
Didelphidae	2	0.2	4	0.1		
Hominidae	6	0.5				
Leporidae	87	7.2	78	2.0	1	3.6
Sciuridae	2	0.2	12	0.3		
Cricetidae			1	<0.1		
Procyonidae	5	0.4	12	0.3		
Mustelidae			2	0.1		
Felidae	1	0.1				
Cervidae	254	21.0	107	2.8	3	10.7
unid. Mammalia	135	11.2	78	2.0		
Total Mammalia	492	40.7	294	7.6	4	14.3
Total Identifiable	1208		3873		28	
Unid. Bone	4501		2134		155	
Total Bone	5709		6007		183	

species groups representing five classes of vertebrates were identified. Table 15 lists these species with their common names and indicates the sectors in which they were found. Table 16 quantifies these remains by families and within sectors.

Southeast Sector

As is readily apparent from Table 16, the excavations from only two sectors, the northeast and the southwest, contained enough material for a comprehensive analysis. The excavations in the southeast sector resulted in only 183 bone fragments of which 28 were identifiable. The identifiable fragments included fishes, softshell turtle, other turtle, rabbit, and deer. These species groups are heavily represented in the other two sectors, and the data indicate that the southeast sector seems to follow the general pattern for the entire site.

Northeast Sector

Excavations in this sector revealed both *in situ* midden and feature material. In addition, the bone recovered from the area of Structure 2 and the midden excavations 10m east of Structure 2 was of adequate size for zooarchaeological analysis. The northeast sector also contained 20 features, but since the bone samples from the individual features proved too small for analysis, all the material was combined and treated as a unit.

Turning first to the distribution of the faunal remains from the general midden, as opposed to the features, several points are immediately apparent. As Table 17 indicates, the feature material exhibits a higher concentration of fish remains and the only occurrence of birds. The general midden, on the other hand, contains more reptiles, primarily turtles, and a large amount of mammal bone. There are three possible explanations for this uneven distribution. First, the sample

TABLE 17
NORTHEAST SECTOR: FAUNAL REMAINS
FROM MIDDEN AND FEATURES

FAMILY	MIDDEN				FEATURES			
	Iden.Frag.	MNI	% of Iden. Frag.	% of MNI	Iden.Frag.	MNI	% of Iden. Frag.	% of MNI
Lepisosteidae	27	1	2.7	3.6	7	1	3.7	5.9
Amiidae	17	1	1.7	3.6	14	1	7.4	5.9
Catostomidae	2	1	0.2	3.6				
Ictaluridae	4	1	0.4	3.6	6	3	3.2	17.6
Centrarchidae	1	1	0.1	3.6	4	3	2.1	17.6
Sciaenidae	2	1	0.2	3.6				
unid. Osteichthyes	34		3.3		51		26.8	
Total Osteichthyes	87	6	8.5	21.4	82	8	43.2	47.1
Alligatoridae	2	1	0.2	3.6	1	1	0.5	5.9
Chelydridae	12	1	1.2	3.6				
Kinosternidae	21	3	2.1	10.7	5	1	2.6	5.9
Emydidae	21	2	2.1	7.1				
Trionychidae	13	1	1.3	3.6	1	1	0.5	5.9
unid. Testudines	410		40.3		43		22.6	
Colubridae	2	1	0.2	3.6				
unid. Serpentes	1		0.1					
unid. Reptilia	4		0.4					
Total Reptilia	486	9	47.7	32.1	50	3	26.3	17.6
unid. Aves					11	1	5.8	5.9
Total Aves					11	1	5.8	5.9
Didelphidae	2	1	0.2	3.6				
Hominidae					6	1	3.2	5.9
Leporidae	73	5	7.2	17.9	14	1	7.4	5.9
Sciuridae	2	1	0.2	3.6				
Procyonidae	4	1	0.4	3.6	1	1	0.5	5.9
Felidae	1	1	0.1	3.6				

TABLE 17 continued
NORTHEAST SECTOR: FAUNAL REMAINS FROM MIDDEN AND FEATURES

FAMILY	MIDDEN				FEATURES			
	Iden.Frag.	MNI	% of Iden. Frag.	% of MNI	Iden.Frag.	MNI	% of Iden. Frag.	% of MNI
Cervidae	232	4	22.8	14.3	22	2	11.6	11.8
unid. Mammalia	131		12.9		4		2.1	
Total Mammalia	445	13	43.7	46.4	47	5	24.7	29.4
Total Identifiable Bone	1018	28			190	17		
unid. Bone	4174				327			
Total Bone	5192				517			

size is small and the disproportionate distribution could be due, in part, to this factor, especially with respect to MNI. Since the total MNI is so small, even the presence of just one more individual could radically change the percentages. For this reason, the number of fragments probably represents a better estimate of the relative abundance. Although, by using number of fragments, the sample size remains low, nevertheless, based upon the types of fragments recovered, the sample size seems adequate.

It is difficult to determine the extent to which differential bone preservation has affected this uneven distribution. Of the 5709 bones recovered from the northeast sector excavations, about 79 percent were burned. Of these, 81 percent were from the general midden, while only about 16 percent were from the features. Since burning weakens the structure of bone, exposure to fire may destroy many small and fragile bones. Thus, burning can result in the survival of relatively more of the larger, thicker mammal bone.

A final possible explanation for the unequal distribution of the remains is that it reflects the differential treatment of the various types of meat or the disposal of the food bone refuse by the Hanna site inhabitants. If this were the case, the data may be used to determine the attitude of these Indians toward different food classes.

Two areas within the general midden of the northeast sector contained enough bones for a spatial analysis. These areas contain material from the immediate environs of Structure 2 and the midden east of Structure 2. Table 18 lists the families represented in these areas and their relative abundance. As can be seen from this table, more bones were retrieved from Structure 2 than form the midden to the east. Also, more species groups are represented in the Structure 2 material. It should be noted that species heavily represented in Structure 2 are also present in the midden to the east.

Those species with few bones in Structure 2 have few bones in or are absent from the eastern excavation units; the only exception is a snake which was absent in Structure 2.

Due to the small sample size, no definite conclusions can be drawn from the results of Table 18. A certain trend is noted, however, in the higher percentage of fish bone from Structure 2. Even if the entry for gar (Lepisosteidae), which has many more bones per individual than most fishes, is deleted, Structure 2 still exhibits a higher concentration of fish. If, with further testing at other Caddoan sites, archaeologists find consistently higher instances of fishes in certain areas, this could have interesting social implications in terms of the status of certain households, the skill of different hunters, and communal versus individual procurement techniques.

Southwest Sector

Due to modern agricultural activities, only a small area of *in situ* midden was exposed in the southwest sector, and it produced very little animal bone. Nevertheless, a number of features was uncovered which contained a high concentration of faunal remains. As evident from Table 19, material from the southwest sector shows a high preponderance of fishes with the relative amount of fish bone being considerably higher than in the northeast sector. Fish bones made up 8.5 percent of the bone fragments in the northeast sector midden, and 43.2 percent of the feature material from that same sector (Table 17). This compares with 77 percent from the southwest sector (Table 19). The percent of the MNI from the different sectors is somewhat closer, with 21.4 percent of the midden and 47.1 percent of the features of the northeast sector being fishes. This compares with 51.9 percent from the southwest sector. Again, because of inadequate sample size, the number of fragments probably provides a better estimate

TABLE 18
NORTHEAST SECTOR: IDENTIFIABLE BONE FROM FEATURES

FAMILY	STRUCTURE 2		MIDDEN EAST OF STRUCTURE 2	
	Iden. Frag.	% of Iden. Frag.	Iden. Frag.	% of Iden. Frag.
Lepisosteidae	26	3.4	1	0.5
Amiidae	16	2.1		
Catostomidae	1	0.1	1	0.5
Ictaluridae	2	0.3	2	1.1
Centrarchidae	1	0.1		
Sciaenidae	2	0.3		
unid. Osteichthyes	31	4.0	2	1.1
Total Osteichthyes	79	10.2	6	3.3
Alligatoridae	2	0.3		
Chelydridae	12	1.5		
Kinosternidae	17	2.2	4	2.2
Emydidae	21	2.7		
Trionychidae	7	0.9	4	2.2
unid.Testudines	296	38.1	77	42.1
Colubridae			2	1.1
unid. Serpentes	1	0.1		
unid. Reptilia	4	0.5		
Total Reptilia	360	46.4	87	47.5
Didelphidae	2	0.3		
Leporidae	69	8.9	2	1.1
Sciuridae	2	0.3		
Procyonidae	4	0.5		
Felidae	1	0.1		
Cervidae	154	19.8	63	34.4
unid. Mammalia	105	13.5	25	13.7
Total Mammalia	337	43.4	90	49.2
Total Identifiable Bones	776		183	
unid. Bone	3283		715	
Total Bone	4059		898	

TABLE 19
SOUTHWEST SECTOR: IDENTIFIABLE BONE FROM FEATURES

FAMILY	Iden. Frag.	MNI	% of Iden. Frag.	% of MNI
Lepisosteidae	851	5	22.0	9.6
Amiidae	70	3	1.8	5.8
Clupeidae	1	1	<0.1	1.9
Catostomidae	81	6	2.1	11.5
Ictaluridae	64	5	1.6	9.6
Centrarchidae	12	2	0.3	3.8
Sciaenidae	67	5	1.7	9.6
unid. Osteichthyes	1844		47.6	
Total Osteichthyes	2990	27	77.2	51.9
Alligatoridae	7	1	0.2	2.0
Kinosternidae	20	2	0.5	3.8
Emydidae	14	3	0.4	5.8
Trionychidae	175	2	4.5	3.8
unid. Testudines	351		9.1	
unid. Reptilia	7		0.2	
Total Reptilia	574	8	14.8	15.4
Anura	1	1	<0.1	2.0
Total Amphibia	1	1	<0.1	2.0
Anatidae	6	2	0.2	3.8
unid. Aves	8		0.2	
Total Aves	14	2	0.4	3.8
Didelphidae	4	1	0.1	2.0
Leporidae	78	4	2.0	7.7
Sciuridae	12	2	0.3	3.8
Cricetidae	1	1	<0.1	2.0
Procyonidae	12	2	0.3	3.8
Mustelidae	2	1	<0.1	2.0
Cervidae	107	3	2.8	5.8
unid. Mammalia	78		2.0	
Total Mammalia	294	14	7.6	26.9
Total Identifiable Bones	3873	52		
unid. Bone	2129			
Total Bone	6002			

of the relative abundances than MNI. Even when the numerous gar fragments are deleted from both sector lists, the percentage of fish fragments is still substantially higher in the southwest sector. It would not be absurd to suggest that these data indicate that fishes were a more important food for the people who inhabited the southwest sector than for those who lived in the northeast sector. Before accepting this proposition, however, several points should be considered.

First, the southwest sector sample contained predominantly feature material. As evident from the northeast sector, bone is not necessarily evenly distributed between features and middens. The features from the northeast sector contained proportionally more fish remains than the midden. If the same forces that are responsible for this occurrence in the northeast sector are also at work in the southwest sector, one would expect more mammal than fish bone in the southwest midden. If, on the other hand, the two sectors reflect different subsistence patterns, culinary practices, or activity areas, either more fish bone or more mammal bone could have been deposited in the midden. As mentioned above, recent plowing activities greatly disturbed the midden in the southwest sector; therefore, this question cannot be resolved at this time.

Although it is not possible to compare one sector with the other in its entirety, it is possible to compare the feature material from the different sectors. The features in the southwest sector contained relatively more fish bone fragments than those of the northeast sector. The southwest features included two large cooking or storage pits, and it was in these pits that the high concentrations of fish bones were uncovered. It is conceivable that a particular culinary technique or a pattern of disposal is responsible for the occurrence of such a large number of fish fragments in these pits. No large pits were excavated in the northeast sector, but whether the

people who utilized the northeast sector did not dig large pits, or whether the large pits were simply not located, is unclear. (Editor's note: The large pits in the southwest sector were located just outside the house walls, and since similar areas were examined in the northeast sector, we may assume that the absence of deep pits in the northeast is cultural and not due to our failure to locate such features).

A comparison of the material from these two large pits, designated Feature 4 and Feature 10, shows that most of the species are common to both features (Table 20). There are a few exceptions. Shad (Clupeidae), bass (Centrarchidae), frog-toad (Anura), cotton rat (Cricetidae), and mink (Mustelidae) are found in Feature 4, but not in Feature 10. Alligator (Alligatoridae) and deer (Cervidae) are identified from Feature 10 but not from Feature 4. With respect to the number of fragments, the classes of animals appear about equally represented in both pits. When the MNI is computed, a different configuration is evident, but, again, the sample size is small.

Intrasite Distribution of Deer Bone

Before proceeding with the examination of the actual animals present at the Hanna site, some observation is warranted respecting the occurrence and distribution of the deer bone within the site. While sorting the bones during the initial stage of investigation, an inordinate number of extremity bones as compared to larger limb bones was noted. The relative abundance of extremity bones is interesting, because of the different amounts of meat generally found on these particular skeletal segments. The shoulder and pelvic girdle and the large fore- and hind-limb bones represent primary areas of muscle attachment for the deer. The extremity bones, i.e., the cannon bones and the feet of the deer, have relatively small amounts of meat. These bones, ex-

TABLE 20
SOUTHWEST SECTOR: FAUNAL REMAINS FROM FEATURES 4 AND 10

FAMILY	FEATURE 4				FEATURE 10			
	Iden.Frag.	MNI	% of Iden. Frag.	% of MNI	Iden.Frag.	MNI	% of Iden. Frag.	% of MNI
Lepisosteidae	498	3	22.6	8.3	108	3	14.3	13.0
Amiidae	56	3	2.5	8.3	7	1	0.9	4.3
Clupeidae	1	1	0.1	2.8				
Catostomidae	59	5	2.7	13.9	4	2	0.5	8.7
Ictaluridae	54	4	2.4	11.1	4	1	0.5	4.3
Centrarchidae	8	2	0.4	5.6				
Sciaenidae	35	3	1.6	8.3	28	2	3.7	8.7
unid. Osteichthyes	1046		47.4		440		58.4	
Total Osteichthyes	1757	21	79.7	58.3	591	9	78.5	39.1
Alligatoridae	8	1	0.4	2.8	6	1	0.8	4.3
Kinosternidae	7	2	0.3	5.6	9	1	1.2	4.3
Emydidae	164	2	7.4	5.6	2	1	0.3	4.3
Trionychidae	168		7.6		1	1	0.1	4.3
unid. Testudines					69		9.2	
unid. Reptilia					6		0.8	
Total Reptilia	347	5	15.7	13.9	93	4	12.4	17.4
Anura	1	1	0.1	2.8				
Total Amphibia	1	1	0.1	2.8				
Anatidae	4	1	0.2	2.8	1	1	0.1	4.3
unid. Aves	2		0.1					
Total Aves	6	1	0.3	2.8	1	1	0.1	4.3
Didelphidae	1	1	0.1	2.8	2	1	0.3	4.3
Leporidae	32	3	1.5	8.3	18	2	2.4	8.7

TABLE 20 continued

SOUTHWEST SECTOR FAUNAL REMAINS FROM FEATURES 4 AND 10

FAMILY	FEATURE 4 Iden.Frag.	MNI	% of Iden. Frag.	% of MNI	FEATURE 10 Iden.Frag.	MNI	% of Iden. Frag.	% of MNI
Sciuridae	4	1	0.2	2.8	6	2	0.8	8.7
Cricetidae	3	1	0.1	2.8				
Procyonidae	8	1	0.4	2.8	4	2	0.5	8.7
Mustelidae	2	1	0.1	2.8				
Cervidae					30	2	4.0	8.7
unid. Mammalia	44		2.0		8		1.1	
Total Mammalia	94	8	4.3	22.2	68	9	9.0	39.1
Total Identifiable Bones	2205	36			753	23		
unid. Bone	952				389			
Total Bone	3157				1142			

pecially the phalanges, are often removed from the carcass along with the skin. The cannon bones are sometimes used in the manufacture of bone tools. If the entire carcass were treated in the same manner, both segments of the skeleton would be expected to be more or less evenly distributed throughout the midden and features. The occurrence of one type of bone over the expected frequency of the other could suggest differential treatment for different segments of the skeleton.

The impression gleaned during the initial stages of this investigation was that the latter situation prevailed at the Hanna site. To test this hypothesis, the bones of the deer were divided into two categories, the "meat bones" and the "feet bones." The meat bone division encompasses the scapula, humerus, radus, ulna, pelvis, femur and tibia. The feet bones includes the metacarpals, carpals, metatarsals, tarsals, and phalanges.

To determine the expected ratio of meat bones to feet bones, the number of each type of bone per deer was determined. Since the archaeological limb bones are often fragmented and the sample examined here is so small, it was necessary to develop an accurate and consistent method of determining the number of fragments per bone. Obviously, a bone can be broken into any number of pieces, some of which can be identified as belonging to the parent bone, while others, because of their size, cannot. For this reason, it was decided to count only the identifiable and generally intact fragments, for example, the proximal and distal ends of the humerus. Both of these segments are fairly dense and are most often found intact. For each deer, then, one would expect two identifiable fragments per humerus, and two humeri per deer, for a total of four humeral fragments. Using this method, one deer could be expected to contribute 22 meat bone fragments to the midden.

The same method is used to arrive at an estimate of the number of feet bones that could be expected. Since most of the carpals, tarsals, and phalanges are dense bone, they are generally not broken. Metapodials, however, are often fragmented, but due to the difficulty of identifying the distal pieces, only the proximal ends are tabulated here. By this method, 46 feet bones can be expected for each deer. Using these estimates, one would expect 22 meat bones for every 46 feet bones, or a ratio of 22 to 46.

Seventeen meat bones were recovered from the northeast sector of the Hanna site. One would anticipate that, if meat bones and feet bones were treated in the same manner, about 36 feet bones would be found. In actuality, 77 feet bones were recovered from the midden material—or twice the expected frequency! When the feature material from the northeast sector is examined, just the opposite occurs. The excavations yielded six meat bones. Based on the ratio, about 13 feet bones would be predicted; however, only seven feet bones were identified from the features, or only about one-half the expected number. This is exactly the opposite from the situation found in the general midden material. Although the sample size is small, this suggests that the people inhabiting the northeast sector treated the deer carcass in such a manner as to result in twice as many of the non-meat, feet bones being deposited in the midden, while twice as many meat bones were deposited in the pits.

Next, the material from the southwest sector was examined, to see if the same high frequency of meat bones occurred in the feature material in this sector. In the southwest feature sample, archaeologists recovered eight meat bones and 44 non-meat bones. With eight meat bones, one would expect about 17 feet or non-meat bones. Forty-four feet bones is about 2.6 times the predicted frequency. This more closely resembles the situation that occurred in the general

midden in the northeast sector than in the features. Admittedly, the sample sizes are small, but these findings do suggest a differential treatment of the deer carcass.

Food Values

Having discussed each sector individually, it would be tempting now to examine questions concerning the importance of the various species in the aboriginal diet. Due to the unequal distribution of the faunal remains and the generally small sample size, such an endeavor at this time would result in an inaccurate reconstruction. An effort can be made, however, to obtain some idea of the importance of different animals by examining the sizes of the various species present, the amount of edible meat found on the bodies of the different species, and the caloric and nutritional content of the different types of meat.

When the palaeontologist Theodore E. White first began to estimate edible meat weights in the 1950s, he constructed a table which listed average live weights and percentage of edible meat estimates for a number of mammals and birds (White 1953). White relied heavily on studies conducted by biologists in the formulation of these charts. Recently, zooarchaeologists have become concerned about inaccuracies in utilizing information from specific biological studies and applying these data uncritically to zooarchaeological materials. Many factors affect the weight of particular individuals, including age, sex, and time of year collected (Smith 1975). Several aquatic species present additional problems. These animals continue to grow throughout their lives and some for example, certain catfish, the alligator gar, and the alligator, reach enormous sizes. An awareness of these phenomena has resulted in an increased emphasis on acquiring more accurate live weight and edible meat weight estimates for all animals (Casteel 1974; Wing 1976). To

obtain these data, scientists routinely collect this information during the preparation of type osteological collections. Table 21 lists the results of these endeavors at Louisiana State University. Only species which occurred in the Hanna collection are included. The difficulties in assigning an average live weight for a particular species are apparent. Zooarchaeologists are concerned with these problems and are developing new techniques to remedy them, but until such time as these new methods are tested, no estimates for the Hanna material will be offered.

Even if the live weight estimates for the material from the Hanna site are not available, the percent of edible meat for various species is worth noting. Table 21 tabulates the percent of edible meat for various genera. As mentioned above, gar, because of its heavy, bony scales, contains less edible meat for its size than other fishes. Other freshwater fishes are about 80 percent to 90 percent edible. Estimates for turtles are much lower, about 45 percent to 55 percent edible. Ducks range from 60 percent to 75 percent edible, while mammals found at the Hanna site range anywhere from 55 percent to 80 percent edible meat.

As a nutritionist would be quick to remark, it is not the amount of meat eaten, but rather the nutritional and caloric content of this meat that is important. Table 22 provides estimates for some of the species considered here (Watt and Merrill 1975). As is readily apparent, some species have much higher values than others. For example, roasted opossum has three times the calories and twice the protein per 100gm of edible meat than does raw frog meat. This is an important factor to remember when determining the relative values of the different species in the diet.

Ecosystem Exploitation, Hunting and Fishing Methods, and Seasonality

In addition to indicating the nutritional patterns of a

TABLE 21
ESTIMATES OF WEIGHT RANGES AND PERCENT OF EDIBLE MEAT FOR SELECTED SPECIES

FAMILY	No. weighed	Range of live weights in grams	% edible
Lepisosteus sp.	7	485-1140	67-77
Amia calva	7	839-5050	82-87
Dorosoma sp.	4	17-126	84-88
Ictalurus sp.	9	88-1000	80-91
Pylodictis olivaris	3	634-984	84-87
Ictiobus sp.	1	278	85
Aplodinotus grunniens	5	158-602	80-89
Lepomis sp.	3	30-184	84
Micropterus sp.	6	80-1943	84-87
Pomoxys sp.	1	58	88
Total Osteichthyes	46	17-5050	67-91
Alligator mississippiensis	1	4310	66
Terrapene sp.	2	350-460	49-53
Chrysemys sp.	2	696-729	44-50
Total Reptilia	5	350-4310	44-66
Anatidae (ducks)	8	629-1306	61-75
Total Aves	8	629-1306	61-75
Didelphis virginiana	2	1578-2086	57-72
Sylvilagus sp.	3	1068-1914	56-62
Sciurus sp.	4	364-656	62-79
Sigmodon hispidus	1	62	59
Procyon lotor	3	1652-3771	58-63
Total Mammalia	13	62-3771	56-79

TABLE 22
PROTEIN AND CALORIC CONTENT OF CERTAIN FOODS

Food	Preparation	Calories/100 gm	Proteins/100 gm
Gizzard Shad	Raw	200	17.2
Sucker-Buffalo	Raw	104-113	17.5-20.6
Bullhead	Raw	84	16.3
Catfish	Raw	103	17.6
Bass	Raw	104	18.9
Crappie	Raw	79	16.8
Freshwater Drum	Raw	121	17.3
Diamondback terrapin	Raw	111	18.6

TABLE 22 continued
PROTEIN AND CALORIC CONTENT OF CERTAIN FOODS

Food	Preparation	Calories/100 gm	Proteins/100 gm
Frog	Raw	73	16.4
Duck	Raw, flesh only	138	21.3
Opossum	Roasted	221	30.2
Rabbit	Raw, flesh only	135	21.0
Raccoon	Roasted	255	29.2
Deer	Raw, lean meat only	126	21.0

people, a zooarchaeological analysis can provide data on ecosystem exploitation, hunting and fishing techniques, and, at times, information on seasonal subsistence practices. This is accomplished by examining the habits and habitats of the animals found at a site. A very brief summary of the salient characteristics for the principal animals found at the Hanna site is included below, followed by an interpretation of these findings.

All the fishes found at Hanna are basically freshwater forms, and all could easily be found within a five mile radius of the site (Cook 1959; Douglas 1974; Jordon and Evermann 1969). The gars (Lepisosteidae) are primitive armored species that favor warm, sluggish waters of lakes and streams. Four species are commonly found in Louisiana with the largest, the alligator gar (*Lepisosteus spatula*), reaching lengths of over nine feet and weights of up to 300 pounds. These animals are very predacious feeders, relying primarily on fish and crawfish, but occasionally taking birds.

The bowfin (*Amia calva*), variously called choupic, grinnel, mudfish or cypress trout, is another primitive fish that inhabits the quiet and relatively warm waters of Louisiana. This species is highly predacious. It feeds

primarily on fishes and crawfish, and attains a maximum size of about 15 pounds.

The sucker family (Catostomidae), which includes the buffalos, inhabits the bottom strata of streams, lakes, and ponds. Here they feed on the small aquatic flora and fauna, especially the plants, worms and various larval forms. The suckers spawn in the spring and congregate in schools for their travels to spawning grounds. The bigmouth buffalo, one of the larger species, reaches weights of up to 80 pounds, with a weight of 20 pounds being more common.

The catfish (Ictaluridae) inhabit a wide range of ecological areas, with some favoring the sluggish waters of the lowlands and ponds, while others are more at home in flowing, clearer streams. These fish are omnivorous, utilizing both plants and animals for food. Individuals have been recorded up to 150 pounds and five feet in length.

The members of the sunfish-bass-crappie family (Centrarchidae) also favor the quiet, sluggish waters of lakes and bayous. All are carnivores. Weights for the various species range from less than one pound to ten pounds.

The freshwater drum or, as it is locally called, the gaspergou (*Aplodinotus grunniens*), inhabits the larger lakes and the sluggish bayous of Louisiana. It is a bottom feeder, relying chiefly on crustaceans and mollusks. Individuals have been recorded weighing 60 pounds.

Turtles were, by far, the most abundantly represented reptile in the Hanna site sample, although alligator and snake were also present (Carr 1952; Conant 1975; Ernst and Barbour 1972). The alligator (*Alligator mississippiensis*) requires very little description. It inhabits swamps, lakes and bayous. Large individuals are sometimes found to reach a length of more than 19 feet.

Four turtle families are represented in the Hanna site remains. The alligator snapper (*Macrochemys temmincki*), of

the Chelydridae Family, is the largest turtle species in the sample. These turtles, some individuals reaching 200 pounds, inhabit the large rivers, oxbows, and canals, preferring streams with mud bottoms and abundant aquatic vegetation. This species is highly carnivorous, eating almost any animal it can catch.

The mud-musk turtles (Kinosternidae) are also aquatic, with some species preferring streams, others lakes, and still others being found in a variety of waters. All seem to favor slow-moving water bodies. All are omnivorous, although some species exhibit decided carnivorous tendencies. Individuals range up to five inches in shell length.

The box and water turtles (Emydidae) represent the largest, and probably the most abundant, family of turtles in Louisiana. Most are aquatic, with the exception of the box turtle (*Terrapene* sp.) which inhabits open woodlands, generally in the vicinity of a stream or pond. The box turtle feeds on plants and animals, with adults preferring the former foods, and the young the latter. The map turtles (*Graptemys* sp.) and the cooter or sliders (*Chrysemys* sp.) reside in a variety of aquatic habitats with some preferring quiet waters having soft bottoms and abundant vegetation, while others are found most often in larger rivers. These species exhibit omnivorous tendencies. The chicken turtle (*Deirochelys reticularis*) inhabits quiet ponds and sloughs and is only rarely found in streams. It, too, relies on both plants and animals for sustenance. Certain individuals of this family reach 10 inches in shell length.

The softshell turtle (*Trionyx* sp.) resides in a great variety of aquatic habitats, including swift-flowing rivers, bayous, and lakes. It prefers soft bottoms and some aquatic vegetation. The softshell turtle is predominantly a carnivore. Individuals with 17-inch shell lengths are sometimes found.

Birds were very scarce among the faunal remains from the

Hanna site, and only one family, the ducks (Anatidae), was identified. Among these were a Canada goose (*Branta canadensis*), a large species averaging about nine pounds, and an unidentifiable duck. Both geese and ducks migrate annually, and the Canada goose and many ducks winter in Louisiana (Kortright 1967; Lowery 1974a).

The principal mammals recovered from the Hanna material include opossum (*Didelphis virginiana*), rabbit (*Sylvilagus* sp.), squirrel (*Sciurus sp.*), raccoon (*Procyon lotor*), and deer (*Odocoileus virginianus*). The opossum occurs in nearly all types of wooded areas. An omnivore, the opossum does nearly all of his foraging at night. Individuals weigh from two and one-half to five pounds (Lowery 1974b). Two types of rabbits were identified in the Hanna site sample, the cottontail (*Sylvilagus floridanus*) and the swamp rabbit (*S. aquaticus*). The cottontail is most often found in fairly open country, while the swamp rabbit most frequently occurs in woodlands, swamps and marshes. Both are vegetarians. Cottontails range from one and one-half to three and one-half pounds, while swamp rabits range from about two and one-half to six and one-half pounds.

The gray squirrel (*Sciurus carolinensis*) inhabits virtually all woodlands in Louisiana. This species is diurnal and feeds on plant foods. Individuals range in weight from about 11 ounces to one and one-half pounds.

The deer (*Odocoileus virginianus*) is the largest, and probably the most important mammal, in terms of food, in the midden. This species is a browser, and can be found in a variety of habitats. The Louisiana deer is much smaller than its northern counterparts, averaging from 75 to 100 pounds.

A survey of the principal food species provides an indication of the general environs of the Hanna site and the hunting and fishing grounds utilized by the Indians. Apparently, sluggish streams, bayous, and lakes with mud

bottoms were common in the area. The Hanna site inhabitants heavily exploited these waters and obtained numerous fishes and aquatic turtles, some of large size. Twenty species groups, or 61 percent of the animals represented in the Hanna site colection, inhabited these ecosystems.

The woodlands exploited by the people incuded both dry open woodlands, such as occur on natural levees and upland terraces, and wet, lowlying swamps. Many of the species present in the midden frequented both areas, but some, for example the swamp rat, restricted their activities to the wetlands. Others, the box turtle and the cottontail, occur primarily in the dry open woodlands. Deer inhabit both zones, but are particularly abundant in oak forests during the autumn.

Although a complete reconstruction of hunting and fishing methods is not possible, the behavioral habits of the principal species found in the sample suggest some productive methods that might have been used (Rostlund 1952). Many of the fishes caught by the Hanna site people were carnivores, some aggressively so. These species, including the gar, catfish, bass, crappie, and sunfish, readily take a baited hook and line. Other species which rely more on plant foods, for example the suckers and buffalos, are less likely to be captured by this method. Nets or traps, including weirs, are more efficient methods to catch members of this family. Nets and traps also result in the capture of the carnivorous fishes, as well as the largely herbivorous forms. Large numbers of herbivores, as well as carnivores, suggest that the fishermen probably utilized nets or traps. This appears to have been the case at Hanna. The fisherman could have used hooks and lines, as well. Other fishing methods, such as spearing or gigging, should not be overlooked. These methods would be particularly productive techniques during spawning runs, or for

surface feeders. They would be less efficient for the fishes that feed on the muddy water bottom, such as suckers, during the non-spawning seasons. Fish poisoning is another method that could have been used.

The daily habits of mammals provide some indication of possible hunting techniques. Some animals are active throughout the day (squirrel); others restrict their feeding to early morning and late afternoon (deer); and still others are almost wholly nocturnal (opossum). These activities determine prime hunting time, and, to a certain extent, the hunting equipment. Obviously, a man hunting opossum with a bow and arrow at high noon would have little chance for success. The setting of a trap in an area of high opossum activity in the late afternoon, however, would probably succeed. Ambushing deer, at dusk near a water hole, with a bow and arrow, would probably be equally successful. In consideration of the speed and erratic path followed by a fleeing rabbit, snares, traps, or shooting a still target would be the most likely methods to meet with success in capturing this animal.

There is little evidence of seasonality indicated by the faunal remains from the Hanna site. The hunters did capture at least two migratory waterfowl, a Canada goose and a duck. These species generally arrive in Louisiana in the fall and fly northward again in the spring. Nevertheless, individuals have been reported in the state during the summer months. Therefore, unless large numbers of these species are recovered from a site, no definitive statement can be made concerning a seasonal occupation.

Summary

The zooarchaeological analysis of the Hanna site sample reveals a number of interesting facts about these late Alto focus people. First, they utilized a wide range of aquatic and terrestrial resources, the principal species of which included

gar, bowfin, sucker, catfish, mud-musk turtle, box and aquatic turtles, softshell turtles, rabbit, and deer. Bass, sunfish, crappie, freshwater drum, alligator, birds, opossum, squirrel, and raccoon were relatively minor resources, while shad, alligator, snapping turtle, snake, frog-toad, cotton rat, mink, and cat were represented by only a few bones.

The analysis of the *in situ* material recovered from the northeast and southwest sectors of the site indicates that the individuals inhabiting the northeast sector extensively exploited reptilian, especially turtle, and mammalian resources. The samples from the southwest sector showed a heavy reliance on fishes.

A study of the distribution of deer bone in the site suggests that the Alto focus people treated diverse segments of the deer carcass in different manners. In the northeast sector midden, proportionally more nonmeat bones than meat bones were found. In the feature material from this sector, more meat bones occurred than is to be expected. In the southwest sector feature material, the opposite situation was found. Here, feet bones predominated at 2.6 times their expected frequency. Whether these differences are due to different cultural groups or represent distinctive activity areas is unclear.

The Hanna site people exploited the vertebrate resources of the local environment by fishing and turtle collecting in the sluggish streams, bayous, and lakes, and hunting in the dry, open woodlands and the lowlying swamps. Nets and traps would have been productive methods of catching the fishes represented in the midden, although hooks and lines could also have been used. For the principal mammals, deer and rabbits, early morning or late afternoon would have been the best time to ambush game and set traps.

Although the faunal sample from the Hanna site is not extensive, it does provide the first data indicative of the Alto focus peoples' subsistence patterns. Future work at other sites

in the region will undoubtedly uncover additional data on Caddoan foodways. The present study suggests some avenues for future zooarchaeological research.

Malacological Analysis—Hanna Site, Louisiana

Frank N. Charles, III

A small sample of molluscan remains was recovered from the Hanna site during the course of excavation. In identifying these remains, several previous studies were consulted for general and specific information on molluscan habitats. Of most value were Parmalee's (1967) guide to the molluscan fauna of Illinois, his (1968) analysis of molluscan remains from three sites on the Central Wabash, and Stansbery's (1965) analysis of material from the McGraw site on the Scioto River of Ohio. In addition, this author's work (Charles, 1973) on material from the Hibbs and Doughty sites in Tennessee provided comparative data.

The Hanna site yielded an extremely small collection of molluscan material, less than two kilograms (Table 23). Of this total, the majority occurred in two pits (Features 4 and 11), both associated with Structure 1. In addition, two valves were recovered from Feature 39 in Structure 2, and an

identifiable fragment was taken from a postmold in that structure. The remainder occurred throughout the general excavation as unidentifiable fragments one centimeter or less in diameter (Table 23). Since the sample of molluscans found was so small, it is difficult to evaluate the economic importance of species or site seasonality. Nevertheless, identification of the molluscs and their native habitats provides some information on the molluscan exploitative practices of the inhabitants at Hanna.

Five species of naiades were identified. The majority of these species have a wide distribution and tolerance for a number of key habitat variables. Although the tolerance range may be broad, each species of naiad has an optimal habitat. If the majority of naiades from a site exhibits congruency of habitat optimals, it may be assumed that this habitat predominated at time of deposition. However, if conditions outside the optimal range, but within the limits of tolerance, existed, one would expect to find examples of other naiades whose optimal habitat corresponds to these conditions. This hypothesis requires that all other factors be constant, a restriction that shall be examined more fully. A summary of the Hanna collection species, their known habitats, and their preferred habitats follows:

Lampsilis fallaciosa (Rafinesque)

Commonly known as the bank creeper or slough sand shell, this was the predominant species at the site represented by eleven valves. Its optimal habitat is a mud bottom in quiet, shallow waters. The bank creeper occurs in ponds, lakes, rivers, and streams of all sizes but, as mentioned, thrives best where the current is minimal in sloughs, mud banks, and river pools. Its present distribution includes protions of the Mississippi River drainage south through Arkansas (Parmalee 1967).

Uniomerus tetralasmus (Say)

This mussel, also known as the Pond Horn, was second in frequency of occurrence, with six valves. Like *Lampsilis fallaciosa*, it is characteristically inclined to mud bottom shallows and those areas of rivers and streams with slow-running current. Sloughs, ponds, lakes and river quiets define its optimal econiche. Present distribution of the *U. tetralasmus* extends through the Mississippi River drainage south through Louisiana and into Texas and Oklahoma (Parmalee 1967).

Quadrula quadrula (Rafinesque)

The Maple Leaf was represented in the sample by two valves from separate individuals, both found in Feature 39, Structure 2. Its distributional range is very broad including the entire Mississippi River drainage. It abounds under wide varieties of conditions, occurring in depths ranging from only a few centimeters to over five meters, and in virtually all bottoms except "pure mud." While most prevalent in medium to large rivers, it also thrives in lakes and small streams (Parmalee 1967). Although *Q. quadrula* occupies a wide range of econiches, it does occur in similar habitats to those favored by *L. fallaciosa* and *U. tetralasmus*.

Quadrula nodulata (Rafinesque)

This naiad, called the Warty Back by mussel fishermen, is represented by only two valves. It has a wide distribution which includes most of the Mississippi River drainage south through Louisiana and west into Texas and Kansas. Although largely confined to large rivers, *Q. nodulata* does occur in medium-sized streams. Like *Q. quadrula*, it displays a great tolerance of variation in bottom conditions, ranging from loose gravel to sand and mud. Its young may be found in sand bars, but, unlike *Q. quadrula*, in the adult state its optimal

habitat is a mud bottom (Parmalee 1967).

Quadrula pustulosa (Lea)

This mussel was represented by only one badly fragmented valve. Its identification must, therefore, remain tentative. However, the second most likely candidate, *Cyclonaias tuberculata*, thrives in a very similar optimal habitat and for the purpose of this analysis is at least partially interchangeable. Both occur throughout the entire Mississippi River drainage on bottoms ranging from gravel through sand to mud. Moreover, *C. tuberculata* is known to occur under conditions of extreme silting (Charles 1973). This specimen represents another mussel whose optimal habitat range overlaps with the more prevalent species of the sample.

Discussion

Five species of molluscs were found at Hanna, four of which occupy mud bottoms, and one whose range overlaps and includes all but "pure mud bottoms." Of the four which may occupy mud bottoms, three prefer this habitat, and two of these are found almost exclusively in mud bottoms. It is interesting that the latter species are the most numerous in the Hanna site remains. They prefer the quiet shallows of sloughs, ponds, lakes and river pools. The remaining three thrive in shallows of a few centimeters to depths of five meters or more and, although they may be found on mud bottoms, turbidity does not seem to be an important variable.

Examining the original hypothesis of congruency-of-optimal-habitats, we find that the two predominant species exhibit total congruency, and the other three exhibit at least partial congruency. Therefore, the molluscan remains appear to indicate that, contemporaneous with site occupation, the local environs included a medium-to-large, slow-moving, meandering river with stretches of mud-bottomed pools and

TABLE 23
THE MOLLUSCAN REMAINS BY ORDER OF FREQUENCY

SPECIES	STR.1 F.4	STR.1 F.11	STR.1 F.15	STR.2 F.39	NE SECTOR PM 484	Total	Host Species
Lampsilis fallaciosa	2	9				11	Lepisosteus platostomeus (shortnose gar) Pomoxys annularis (white crappie)
Uniomerus tetralasmus	5		1			6	Unknown
Quadrula quadrula	2					2	Catfish sp.
Quadrula nodulata				2		2	Micropterus salmoides (white-mouth bass); Pomoxys sp. (crappie) Ictalurus punctatus (channel catfish)
Quadrula pustulosa					1	1	

F=Feature
Pf=Postmold

associated sloughs, ponds, oxbow lakes, and small streams. However, apparent optimal habitat congruency could be produced by cultural selectivity. It must be borne in mind that the archaeological sample is but a sample of a sample, the original sample having been collected by the inhabitants of the site and being subject to their selecting principles. At the Hanna site, horticulture was practiced, and there might have been a commensurate decrease in dependence on gathering as a subsistence stratagem. Pressure to exploit the entire range of available mussels would be lessened, and a tendency would arise to be more selective.

It is certainly more than coincidental that the optimal habitats of most of the species involved are precisely those we would expect to be utilized if the degree of exploitation were limited to occasional gathering. Put simply, almost all the optimal habitats included quiet, easily accessible shallow waters, and selective gathering alone could account for the uniformity of the sample. This uniformity does not necessarily

mirror a like condition throughout the local aquatic ecosystems.

In summary, the molluscan remains from the Hanna site exhibit a considerable congruency of optimal habitats. Such congruency might result either from selective gathering, or from a rough uniformity in the aquatic ecosystem. In the latter case, the Hanna material would indicate that this system included a sluggish, meandering river with shallow mud bottom pools and associated sloughs, streams, oxbow lakes and ponds. Should the selective gathering factors be operational, it would merely de-emphasize the uniformity of this aquatic environment. One or more of the habitats enumerated would still occur.

Analysis Of Plant Remains From The Hanna Site

Andrea Shea

The remains of carbonized plant materials were obtained from features, postmolds and burials at the Hanna site by two methods of recovery: (a) waterscreening through one-fourth inch and one-sixteenth inch mesh screens, and (b) water flotation.

Laboratory analysis involved sifting each sample through a series of four standard laboratory screens with mesh sizes 2.83mm, 2.00mm, 1.00mm, and 500 microns. Each fraction was examined under magnification from 7x to 30x. The contents of the 2.83mm and the 2.00mm screens were sorted into the categories shown in Table 24. The majority of the material in the 1.00mm and 500 micron screens consisted of unidentifiable plant materials, and was categorized as sample residue; however, recognizable seeds and fruits were removed for identification. The plant remains from the 2.83 and 2.00mm screens and the seeds and fruits from all the screens

were quantified in gram weights for each category, and percentages calculated for each sector. The sample residue is included in the total sample weight in Table 24; however, percentages and gram weights for the sample residue from each individual sample are not given.

Nuts

Hickory nutshell was recovered from 59 of the 75 samples. Both thick-shelled and thin-shelled hickory nuts were represented. The thick-shelled species of hickory which occur in the area of the site are *Carya tomentosa* (mockernut), C. *glabra* (pignut), *C. ovata* (shagbark), *C. aquatica* (water hickory), and *C. myristicaeformis* (nutmeg hickory). The thin-shelled species are *C. illinoensis* (pecan) and *C. cordiformis* (bitternut). Bitternut nutshell was recovered from Features 11, 16, 22, and 33 in Structure 1, Feature 39 in Structure 2, and Feature 44 in Structure 3. Pecan nutshell was recovered from Features 7, 10, and 11 in Structure 1, the fill of Burial 4 in Structure 2, and Postmolds 226 and 249 in Structure 2. Thick-shelled hickory nutshell was present in 55 of the samples and could represent any of the above thick-shelled species.

Espinosa refers to the use of nuts by the historic Caddoans (Swanton 1942:133):

> They gather quantities of thick-shelled nuts and acorns to last a whole year. The entire country is filled with various kinds of trees, such as oaks, pines, cottonwoods, live-oaks, large nuts—which yield the thick-shelled nuts—and another kind of tree which yields small thin-shelled nuts. The Indians use all of these for food.

The nuts, available from September through December,

TABLE 24
PLANT REMAINS BY WEIGHT IN GRAMS

Sample	Hickory	Acorn	Squash	Gourd	Maize	Sweetgum	Other	Wood or Charcoal	Total Sample Weight
Southwest Sector									
Structure 1									
Features	10.61	.54			1.09	.05	.05	46.59	125.89
Postmolds	1.80								1.80
General Excavations	.05								.05
Total Structure 1	12.46	.54			1.09	.05	.05	46.59	127.74
Structure 5									
General Excavations	1.40								1.40
Total Structure 5	1.40								1.40
General Southwest Sector									
Features	.40	.06			1.00			4.30	13.53
General Excavations	.05								.05
Total General SW	.45	.06			1.00			4.30	13.58
Total SW Sector	14.31	.60			2.09	.05	.05	50.89	142.72
Northeast Sector									
Structure 2									
Features	44.09	.23		.03			.34	10.89	61.14
Postmolds	3.55	.15				98.92	.09	16.12	261.59
General Excavations	12.55					15.50			28.05
Total Structure 2	60.19	.38		.03		114.42	.43	27.01	350.79
Structure 4									
Features	.39	.03				.03		.39	.84
Postmolds					2.78			.08	2.86
Total Structure 4	.39	.03			2.78	.03		.47	3.70

TABLE 24 continued
PLANT REMAINS BY WEIGHT IN GRAMS

Sample	Hickory	Acorn	Squash	Gourd	Maize	Sweetgum	Other	Wood or Charcoal	Total Sample Weight
Structure 6							a	.24	.24
Features									
General Excavations	.65							.24	.89
Total Structure 6	.65								
General NE Sector					2.90		a	.35	3.58
Features	.33								.10
Postmolds	.10								
General Excavations	4.05								4.05
Total General NE	4.48							.35	7.73
Total NE Sector	65.71	.41		.03	5.68	114.45	.43	28.07	363.10
Southeast Sector									
Structure 3									
Features	.33	.01				.85	.87	3.56	33.83
Postmolds	.07					.85	.87	6.87	17.97
Total Structure 3	.40	.01						10.43	51.89
General SE Sector					.01			.03	.04
Features					.01			.03	.04
Total General SE					.01			10.46	51.84
Total SE Sector	.40	.01			.01	.85	.87		
Percentages					1.46	.04	.04	35.66	
Southwest Sector	10.03	.42		.01	1.56	31.52	.12	7.73	
Northeast Sector	1.10	.11			.02	1.64	1.68	20.18	
Southeast Sector	.17	.02							

have a sweet, edible embryo and were an important food source among the historic southeastern Indians. Oil was extracted by cracking and pounding the nuts in mortars and mixing them with water (Swanton 1946:273-367). The small amount of hickory nutshell recovered from the samples may be due to the above method of processing.

Acorn shell and nut remains were recovered from 31 samples. Acorn nutshell is less dense than hickory nutshell, thus its presence in the samples may be misleading. Chapman (1975:228) suggests that the weight of acorn shell must be multiplied by a factor of 10-20 to derive the food equivalence of acorn to hickory nut. Preservation may be a limiting factor because of the fragile nature of the shell.

In general, the white oaks have a sweet, palatable nut, but red and black oaks yield a bitter nut high in tannic acid. The red oak acorns must be leached or boiled several times to remove the acid. The oil is extracted in the same manner used for hickory nuts. The historic southeastern Indians made bread from the pounded nuts (Swanton 1946:273-366).

Seeds and Fruits

Problems exist in interpreting seed remains from archaeological sites because, although their presence may be due to cultural activities such as accidental burning in pit fires, the seeds may occur as a result of natural seed dispersal. Nevertheless, inferences on the subsistence value of the seeds and fruits and the plants they represent can be made by referring to their economic potential and the ethnographic and archaeologic evidence for their use. In the following pages, the information on seasonal availability was taken from Radford, Ahles, and Bell (1968), unless otherwise noted (see Table 25 for quantification of the seed and fruit remains).

TABLE 25
QUANTIFIED SEED AND FRUIT REMAINS

Sample	Honey Locust	Pokeweed	Grape	Sumac	Persimmon	Cherry	Rubus	Squash	Gourd
Southeast Sector									
Features		1w							1f
Southwest Sector									
Structure 1									
Features	1f		1f,1w		5f	1w	1w	4f	1f
Structure 5									
Excavation Units					1f				
General SW Sector									
Features		2w							
Northeast Sector									
Structure 2									
Features	1w,2f		1w	1w	10f,1w			6f	2f
Postmolds			1f		1f				
Structure 6									
Features			4f		7f				4f
General NE Sector	2f								
TOTAL	5f,1w	3w	6f,2w	1w	24f,1w	1w	1w	10f	8f

f = fragment
w = whole

Gleditsia tricanthos [*honey locust*]: The remains of honey locust seeds were recovered from Structure 1 (Feature 5) and Structure 2 (Features 5, 32, and 33) and postmolds 484-485-486 in the northeast sector. The historic Indians of the Southeast dried and ground the sweet pulp of the pod for a sweetener and drink (Hudson 1976:287; Swanton 1946:285). Although the seeds are not edible, their presence suggests the use of the pod. Honey locust trees occur on bottomlands, and the fruits (pods) ripen from September through October.

Phytolacca americana (*pokeweed*): Pokeweed seeds were present in Structure 3 (Feature 42), and in the southwest sector in Feature 30. The young shoots are edible in the spring and the berries may be eaten with caution (Fernald and Kinsey 1943:185-187). The berries and root are used for medicine by the Cherokee Indians (Banks 1953:42), but we found no reference to its use among the Caddo. The fruit ripens from July through October (Fernald 195). Pokeweed would have grown on disturbed areas of the site.

Vitis sp. (*grape*): Grape seeds and seed fragments were recovered from Features 4 and 10 in Structure 1, Feature 56 in Structure 6, and Burial 4 and Postmold 216 in Structure 2. The fruits are edible and ripen from August through October. Swanton (1946:292) refers to the historic Caddoan as "particularly fond of wild grapes." Many species would have been available on alluvial soils, streambanks and in woods and thickets (Small 1933).

Diospyros virginiana [*persimmon*]: The remains of persimmon seeds were present in Structure 1, Structure 2 and Structure 5. The fruit is sweet and palatable when ripened from October through November and is commonly found on

alluvial terraces. Espinosa refers to the making of persimmon bread by the historic Caddoans (Swanton 1942:235), and Hudson (1976:295-296) states that persimmon was the most important wild fruit among the Indians of the historic Southeast.

Rubus sp. (raspberry, blackberry, dewberry): One seed of *Rubus* was recovered from Feature 4 in Structure 1. The fruits of the many species ripen from April through August and are edible. Swanton (1946:292) mentions the utilization of blackberries by the historic Caddoans.

Rhus sp. (sumac): One seed of sumac was found in Burial 4 in Structure 2. The fruits, available from late April through October, were used by the American Indians for a drink in the summer and the fruits were also stored for winter use (Fernald and Kinsey 1943:261). *Rhus glabra* (smooth sumac), *R. copallina* (dwarf sumac), and *R. aromatica* (fragrant sumac) are common species in Louisiana (Brown 1976b).

Liquidambar styraciflua (sweetgum): Whole and fragmented sweetgum fruits were recovered from Feature 15 in Structure 1, Feature 52 in Structure 4, and Postmolds 119, 121, 1·9, 132, 205, 229, 245, 249, 183, 216, and in general excavations of Structure 2. Sweetgum fruits were also found in Postmold 286 in Structure 3 in the southeast sector. The fruits were mature when carbonized, and the seeds had dispersed, leaving open capsules. Radford, Ahles, and Bell (1968:529) gives the flowering and fruiting times as from April through October. There is no ethnographic or archeological evidence for the use of sweetgum fruits, to the author's knowledge. But the gum from the inner bark is fragrant and is used as a chewing gum (Fernald and Kinsey 1943:228). Du Pratz, in making a special investigation of

Louisiana plants and their uses by the natives, notes the medicinal use of the balsam (gum?) (Swanton 1911:84):

> I will not undertake to detail all the virtues of the balsam of the sweet gum (copalm of liquidambar), not having learned all of them from the native doctors of Louisiana, who would be as astonished to see that it serves us only for making varnish as they were when they saw our surgeons bleed their patients . . . This balsam is an excellent febrifuge . . . It cures diseases of the lungs; it removes obstructions; it relieves from colic and from all internal ills; it gladdens the heart. In fact, it contains so many virtues that I learn with pleasure that something new is discovered in it every day.

Prunus sp. [wild cherry]: One cherry seed was present in Structure 1, Feature 4. The fruit is edible and ripens from June through September. Swanton (1946:292) mentions the utilization of wild cherries by the historic Caddoans, and wild cherries were doubtless gathered by the inhabitants of the Hanna site.

Cucurbita pepo (pumpkin, squash): Fruit and rind fragments were recovered from Features 4 and 11 in Structure 1 and Feature 32 in Structure 2. It was probably cultivated on or near the site and the fruit harvested in the late summer. The seeds were roasted and eaten by the historic Southeastern Indians (Hudson 1976:307). *Cururbita pepo* is a Mesoamerican cultigen, with the earliest evidence in North America from Kentucky dating from the third millenium B.C. (Watson 1976:87).

Lagenaria siceraria (bottle gourd): Rind and fruit

fragments were present in the southeast sector in Feature 31, in Structure 1, Feature 10, and in the northeast sector in Features 32 and 47. Gourd shells were most commonly used for utensils such as containers, dippers and cups. The roasted seeds can be eaten, but are usually not an important food source (Cutler and Whitaker 1961:482-483). Bottle gourd is also an introduced cultigen.

Zea mays (maize): Features 10 and 30 in the southwest sector, 31 in the southeast sector, Feature 51 in the northeast sector, and Postmold 404 in Structure 4 contained maize remains. Six cob fragments from Feature 51 were sent to Hugh Cutler of the Missouri Botanical Garden for analysis. The results are as follows: (Hugh Cutler, written communication, September 2, 1977):

1. 10 rows of grains, kernel thickness 3.9mm, cupule width 8mm. Strong twist to the cob, glumes gone, little thickening of cupule, cupules compressed longitudinally (from base to tip of cob). Approaching Eastern Eight Row race of corn.
2. 10 rows, kernel thickness 3.4mm, cupule width 8-9.5mm. Slight twist to cob, most of glumes gone, glumes and cupules moderately thickened. Approaches Eastern Eight Row.
3. 8 rows, kernel thickness 3.4mm, cupule width 8-9.5mm. No twist, most of glumes gone, glumes wide, slightly thickened. Eastern Eight Row type.
4. 10 rows, kernel thickness 3.6mm, cupule width 7.5mm. Slight twist, glumes mostly gone but narrow and not thickened, cupule slightly open. Approaches Midwest 12 Row race.
5. 12 rows, kernel thickness 3.4mm, cupule width 6.0mm. Narrow unthickened cupules, open. North American Pop or Flint Corn race. An old, small-kerneled race which persists as small flints and popcorns, usually 12 or 14 rows of hard and thick kernels which are usually at least 1/6th longer than wide.
6. 8 rows, estimated kernel thickness 2.9-3.2mm, cupule width 7.5mm. Lower glumes slightly thickened. Approaches Eastern Eight Row but has some characters of North American Flint.

One cob fragment from Feature 51 was analyzed by the author. The cob had 10 rows, cupule width 7.0mm, glumes persistent, cupules thickened and open. One cob fragment and 126 cupules were recovered from Postmold 404 in Structure 4. The cob was 12-rowed, cupule width 5.0 to 6.0mm, cupules thickened and open, probably North American Pop or Flint. The individual cupules measured from 6.0 to 8.0mm wide, and could represent 12- and 10-rowed cobs. One whole kernel, measuring 2.5mm, and cupule fragments 5.0mm wide, were recovered from Feature 30 in the southwest sector. The cupule fragments from Feature 10, Structure 1, and Feature 31 in the southeast sector could not be accurately measured.

The historic Caddoans planted two crops of maize a year. One crop was sown in April and the small ears harvested in May. The second crop was harvested in July (Swanton 1942:129).

Wood and Cane Charcoal

Cane, grape vine, and 10 genera of trees were represented by charcoal in the samples (Table 26). All of the genera represented are constituents of the "shortleaf pine, oak, hickory and bottomland hardwood and cypress" vegetation regions described by Brown (1972b). Hickory, pine, and oak charcoal occurred most frequently in the collections from

TABLE 26. OCCURRENCE OF CANE AND WOOD CHARCOAL TYPES BY SECTOR

SPECIES	SE	SW	NE
Acer sp.(Maple)		X	X
Arundinaria sp.(Cane)	X	x	x
Carya sp.(Hickory)		X	X
Gleditsia triacanthos L. (Honey Locust)		X	X
Pinus sp.(Pine)	X	X	X
Platanus occidentalis L.(Sycamore)		X	X
Populus deltoides Bartr.(Cottonwood)		X	X
Quercus sp.(Oak)	X	X	X
Red Oak Group	X	X	X
White Oak Group	X	X	X
Salix sp.(Willow)	X	X	X
Ulmus sp.(Elm)	X	X	X
Vitis sp.(Grape vine)			X
Unidentifiable (Coniferous)		X	X
(Ring Porous)		X	X
(Diffuse Porous)	X	X	X

Hanna. Their presence may indicate a preference for these wood types, or the abundance of oak, hickory and pine in the area. There were no apparent differences in the wood types represented in the sectors of the site. The unidentifiable coniferous wood could be either *Juniperus virginiana* (eastern red cedar) or *Taxodium distichum* (bald cypress).

Discussion

The seasonal availability of the nuts, seeds, and fruits recovered from the samples generally extends from summer through autumn. However, hickory nuts and acorns can be stored for winter use (USDA 1974:271). All of the nuts, seeds and fruits, with the exception of sweetgum, have known economic value and could have contributed to the subsistence of the aboriginal populations. The occurrence of the plant foods appears to be consistent in the three sectors. Maize, squash and gourd were present in the samples from all sectors and probably were main staples in the diet, with wild plant foods as supplements. There is a notable consistency of plant materials recovered in features classed as cooking pits. Examples of these feature types, Features 4, 10, and 30, contained a wider variety of plant foods, i.e., maize, squash, grape, persimmon, honey locust and cherry, than the other feature types.

Skeletal Remains

Marco J. Giardino

Six individuals were recovered from the Hanna site in Red River Parish, Louisiana. All were discovered in simple subsurface graves and, with the exception of a single bivalve shell, were unaccompanied by burial goods. The osteological analysis of this human skeletal population consisted primarily of sexing, aging, and description of each individual (Table 27).

The principal method of sexing osteological materials has been described by Krogman (1962) and Phenice (1967). Since most individuals in the sample were well-preserved, sex determinations could be made from several bones. The cranium, pelvis, and sacrum were most often used in sexing these remains.

The aging of sub-adult individuals from the Hanna site was accomplished through visual examination of the stages of dental eruption, following criteria presented by Kronfeld

TABLE 27
BURIALS FROM THE HANNA SITE

INDIVIDUAL	BURIAL TYPE	SEX	AGE IN YEARS
1A	Extended, supine	F	Adult 39-44
1B	Extended, on right side	?	Child 2-4
2	Extended, supine	F	Adult 25-35
3	Extended, supine	?	Child 3-5
3B	Skull frag. only	?	Adult
4	Extended, supine	F	Child 8-10
5	Flexed	?	Adult

(1954) and Hunt and Gleser (1955). In addition, the good state of preservation of most bones facilitated aging of individuals through examination of the stages of epiphyseal union (Krogman 1962).

Age determination of adult individuals is commonly a more tenuous undertaking. In those rare cases where the pubic symphyseal face was preserved, aging was accomplished by following the guidelines presented by McKern and Stewart (1957). All other remains were aged through the analysis of the degree and direction of dental wear (Miles 1963; Butler 1971). In addition, the stages of cranial suture closure were observed and employed to compliment the age determinations derived from the criteria outlined above.

Stature estimations were computed for the two adults best preserved, using the procedures outlined by Genoves (1967). The results are included in Table 31 along with estimated statures from other prehistoric Caddoan populations.

Several measurements were taken to calculate skeletal and cranial indices (Anderson 1962), useful in cross-cultural comparisons. The results and intersite data appear in Tables 28-30. No indices were calculated for the sub-adult individuals in the sample.

Several instances of pathology were isolated during the initial stages of the analysis, and diagnoses of disease and congenital abnormalities are discussed below.

Burials

Burial 1: This was a burial that contained more than one individual. An adult female (Burial 1A) and a child (Burial 1B) were found together in a simple pit. The child rested on its right side, facing the adult, who had been placed in an extended, supine position (Fig. 35, Plate XVII).

Since preservation of both skeletons was excellent, closely controlled sexing and aging of these remains was possible. The appearance of the pubic symphyseal face of the adult indicated an age at death of between 39 and 44 years. The extensive wear of the teeth as well as the direction of dental wear support the age determined through an examination of the pubic symphysis.

TABLE 28
PLATYMERIC AND PLATYCNEMIC INDICES (COMPARISONS)

PLATYMERIA Population	M N	M Index	F N	F Index	Combined M & F	Reference
Hanna Site B1B			1	75.95		Present study
B2			1	83.33		" "
Mt. Nebo	16	79.17	17	75.92		Giardino 1977
North California Indians					77.0	Rivet 1959
American Indians					74.0	Brothwell 1963
Arkansas: Boyt Field	15	76.6	6	69.8		Hrdlicka 1909
Louisiana	23	74.4	13	72.6		" "
Sam Kaufman Site	6	85.16	11	79.09		Butler 1969

PLATYCNEMIA Population	M N	M Index	F N	F Index	Combined M & F	Reference
Hanna Site B1B			1	57.14		Present study
B2			1	65.77		" "
Sam Kaufman Site	4	70.00	6	71.83		Butler 1969
Mt. Nebo					9(63.82)	Giardino 1977
California Indians		62.5				Bello 1959

TABLE 29
CRANIAL AND FACIAL INDICES (COMPARISONS)

CEPHALIC INDEX

Population	N M	Index	N F	Index	Reference
Hanna Site B1B			1	116.06[a]	Present study
B2			1	9.98	" "
Sam Kaufman Site	1	77.1			Butler 1969
Arkansas [b]	3	84.93	3	83.67	Hrdlicka 1909
Louisiana[b]	6	81.30	6	84.15	" "

UPPER FACIAL INDEX

Population	N M	Index	N F	Index	Reference
Hanna Site B1B			1	53.51	Present study
B2			1	49.65	" "
Sam Kaufman Site	2	73	2	68.4	Butler 1969
Arkansas	8	50.95	1	56.0	Hrdlicka 1909
Louisiana	8	52.72	8	50.94	Ibid. 1909
					" "

[a]Skull deformed
[b]Only undeformed skulls were measured by Hrdlicka.

FACIAL INDEX

Population	N M	Index	N F	Index	Reference
Hanna Site B1B			1	92.19	Present study
B2			1	82.98	" "
Sam Kaufman Site	1	123.3	1	114.1	Butler 1969
Arkansas	7	84.63	1	89.6	Hrdlicka 1909
Louisiana	6	85.92	5	83.7	" "

NASAL INDEX

Population	N M	Index	N F	Index	Reference
Hanna Site B1B			1	43.40	Present study
B2			1	45.28	" "
Sam Kaufman Site	2	44.5	2	51	Butler 1969
Louisiana	13	50.96	15	52.69	Hrdlicka 1909
Arkansas	26	50.23	16	52.02	" "

ORBITAL INDEX

Population	N M	Index	N F	Index	Reference
Hanna Site B1B			1	76.92	Present study
B2			1	100	" "
Sam Kaufman Site	2	87.5	2	78.5	Butler 1969
Louisiana	8	90.81	11	90.49	Hrdlicka 1909

TABLE 30
PUBIC INDEX (COMPARISONS)

Population	N M	Index	N F	Index	References
Hanna Site B1B			1	133.33	Present study
B2			1	157.14	" "
Arkansas	1	134	2	129.6	Hrdlicka 1909
Louisiana	6	130.6	4	141.4	" "

The cranium of the adult female, Individual 1A, exhibited moderate fronto-occipital deformation (discussed below), as well as slight deformation incurred during its period of interment. At least four wormian bones were present at the lambdoidal suture. The metopic suture, though long fused, was still evident. The left mandibular Incisor 1, as well as both maxillary M 3s, the right maxillary M2, and the left Maxillary M1, had been lost antemortem. In all cases, alveolar resorption had begun. Caries were present on the lingual side of the upper right frontal incisor, on the mesial side of the right upper first molar, on the distal side of the right upper second incisor, and on the mesial side of the right second premolar. Calculus buildup was evident on most of the dentition. This individual also suffered from periodontal osteoporosis. The upper frontal incisors were deeply shovel-shaped.

The femora showed evidence of a *trochanter tertius*, a trait absent from the skeletal population excavated at the Sam Kaufman site (Butler 1969) but common elsewhere in archaeological sites in the state of Louisiana and adjacent Arkansas. Hrdlicka (1909:218) found evidence of a third trochanter on 61 percent of the femora from Louisiana (N=84), and on 36.5 percent of the Arkansas bones (N=41). These skeletal remains analyzed by Hrdlicka were unearthed by C.B. Moore as part of his wide-ranging survey of

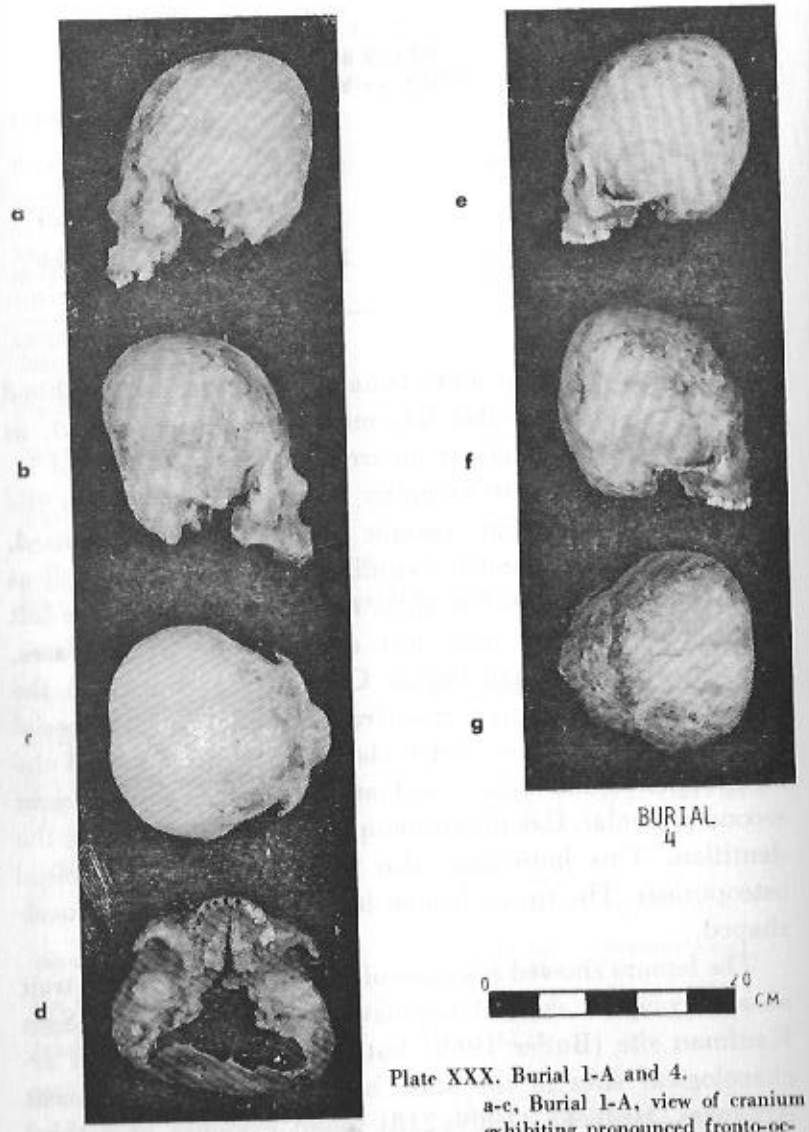


Plate XXX. Burial 1-A and 4.
a-c, Burial 1-A, view of cranium exhibiting pronounced fronto-occipital deformation; d, Burial 1-A, cranium showing evidence of cleft palate; e-g, Burial 4, cranium exhibiting pronounced fronto-occipital deformation.

Southeastern prehistoric sites. In addition, the same sample yielded a higher frequency of occurrence of this trait in females (65 percent) than in males (55 percent) (Hrdlicka 1909).

Individual 1A suffered from a cleft palate, a congenital fissure in the roof of the mouth forming a communicating passageway between the mouth and the nasal cavities (Plate XXX). This anomaly is discussed below in more detail. The vertebrae exhibited medium to heavy lipping, usually the result of osteoarthritis. The sternum was perforated, a condition which is, with few exceptions, a developmental anomaly (Brothwell 1965).

The equations employed to estimate the stature of burial 1A yielded a value of 154.9cm ±3.861.

The skeleton of a child (Burial 1B), between the ages of 2 and 4 years, was recovered alongside Burial 1A. The cranium was fragmented, but the frontal bone was sufficiently preserved to notice the effects of severe frontal deformation. The palate exhibited an asymmetrical deformity (Plate XXXI). Also, evidence of osteoporosis on the interior surface of several cranial fragments may indicate destruction resulting from a congenital abnormality associated with cleft palate (Thompson-Brooks and Hohenthal 1963). There is, however, the possibility that the anomaly evident on the palate of this child may have been the result of post-mortem deformation.

The newly-erupted and erupting molars enabled observation of the cusp number and pattern (after Dahlberg 1951). The maxillary molars were characterized by a 3+ pattern, while the mandibular first molar is +5.

Several distal phalanges of the feet from Individual 1B as well as portions of the ribs from Individual 1A are blackened, possibly resulting from contact with fire (s) in nearby features.

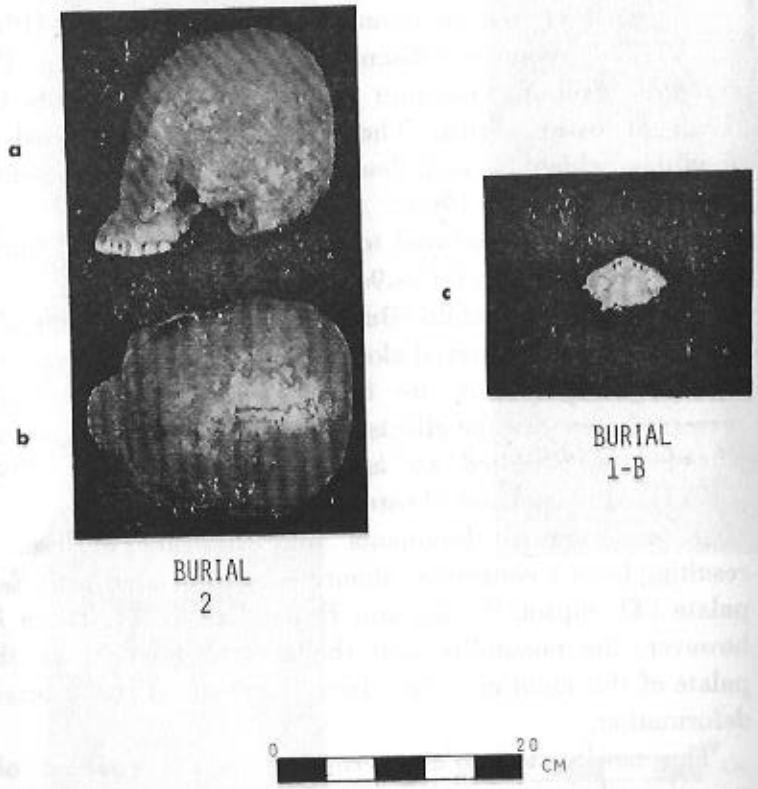


Plate XXXI. Burial 2 and 1-B.
a-b, Burial 2, view of cranium showing occipital flattening; c, Burial 1-B, cleft palate of juvenile.

Burial 2: This was a single interment of an adult female whose cranium showed the least amount of fronto-occipital deformation encountered in the Hanna population (Fig. 36, Plate XVIII). The preservation was excellent, and at least five wormian bones were present at lambda. The dental evidence, as well as the observations on cranial suture closure, age this individual between 25 and 35 years. Slight periodontal osteoporosis and alveolar thinning is present in both dental arches. A slight amount of calculus is evident on the mandibular teeth. Caries were present on the left mandibular M3 and the left mandibular M2, as well as below the crown of the mandibular right frontal incisor. On the maxilla, a carie was present on the right first premolar. The upper frontal incisors were slightly shovel-shaped (Plate XXXI).

The femora showed a well-developed *trochanter tertius*. The olecranon processes of the humeri were perforated as seen in those of Burial 1A. Stature reconstruction yielded a value of 163.61 ± 3.513cm. No arthritic lipping was evident on the vertebrae or on other skeletal parts.

Burial 3: This was a single interment of a young individual whose stage of dental eruption and stage of epiphyseal union suggest an age of 3 to 5 years at death. The skull was badly crushed obviating metric and most non-metric observations. A green stain was discovered on both malar bones and on the first cervical vertebrae of this individual. The child had been buried in an extended, supine position, with its legs akimbo, oriented with the cranium to the south, the feet to the north, and facing west (Plate XIX).

The upper frontal incisors were moderately shovel-shaped. The unworn state of the molars enabled observation of the cusp pattern. The maxillary permanent molar 1 was characterized by a 4- pattern; the mandibular molars were of the Y5 type. The right lower incisor 2 had been lost shortly before death, and resorption of the alveolus had only recently begun.

Two temporal bones thought to belong to an adult were found among the remains of Burial 3. No other bones from this second individual were present, but the occurrence of the temporal bones requires the addition of Individual 3B to the list of individuals recovered from the Hanna Site.

Burial 4: The fourth burial contained the excellently preserved bones of a sub-adult female, aged by examination of the dental and post-cranial remains, at 8 to 10 years old. The well-preserved skull exhibited severe fronto-occipital deformation, resembling that observed on the fragmentary cranial parts of Individual 1B. No wormian bones and no evidence of metopism were found (plates XX and XXX).

Digital bones were absent from the hands and feet of Burial 4. One possible explanation for the absence of these parts is offered by Orr (1952). He describes a Gibson Aspect shell--tempered jar containing only the hands and feet of a human skeleton. However, no evidence of this burial style in jars was discovered at Hanna.

The maxillary frontal incisors of Burial 4 were deeply shovel-shaped. Caries were present on the left maxillary deciduous molar 2 and on the left lower deciduous canine. The lower left frontal incisor was mesially rotated. The upper molars exhibited a 4+ cusp pattern; the mandibular molars were characterized by a Y5 pattern. Both types of cusp pattern are the most commonly encountered in the dentition of the Sam Kaufman population (Butler 1969).

Burial 5: This was a poorly-preserved interment of an adult. No aging was possible on these remains, but a preserved portion of the sciatic notch enabled the sexing of this individual as a female. The flexed skeleton had been placed in a circular pit, oriented with the cranium to the west, facing toward the south. The general architecture of the skull differed from that of the other Hanna site females. All diagnostic points of the cranium of Burial 5 were more gracile

than the corresponding areas of the skulls of Burials 1A and 2 (Plate XXI).

Pathology

As previously mentioned, the maxilla of Burial 1A was deformed by a cleft palate. This condition results from a congenital abnormality (Alexandersen 1967). Cleft palates have been described by Thompson-Brooks and Hohenthal for a population of California Indians. They note that the presence of multiple exostoses and the osteoporotic appearance of some cranial bones (the latter condition found on the cranial fragments of Burial 1B) may be attributed to the developmental stages of palatal abnormalities. The close association of Burials 1A and 1B in death could argue for a close relationship between the two individuals. Though the abnormality of the child's palate could have resulted from post-mortem deformation, the co-occurrence of the pathological traits discussed above raises the interesting possibility that the two skeletons were genetically related, and shared a congenital abnormality.

Individual A from Burial 1 was the most afflicted by periodontal disease, caries and osteoarthritis. The advanced age of this individual, 39 to 44 years, may account for the advanced destruction of bone tissue. Burial 2 shows a slight degree of periodontal destruction, fewer caries, and only slight arthritic lipping of the vertebral column. Burial 4 shows the least amount of periodontal osteoporisis in the sample, while both young children are unaffected by this disease. All individuals, including the single tooth recovered from Burial 5, had caries.

Artificial Cranial Deformation

Those crania which were sufficiently preserved for visual analysis showed varying degrees of fronto-occipital deformation (Plates XXX, XXXI). No observations were possible on the occipital bone of Individual 1B, but the frontal bone was severely deformed. Fronto-occipital deformation is the most common style of artificial deformation among Caddoan Indians, both prehistorically (Bennett 1961:383; Walker 1935:4) and historically (Swanton 1946:537). Bennett (1961:379) found no correlation between sex, status of burials, and cranial deformation in any of his skeletal samples. Webb (1959:107) discusses evidence for cranial deformation, possibly of the fronto-occipital type, discovered at the Belcher Mound, a Belcher focus site of the Fulton Aspect. Fronto-occipital deformation is also the most common style of cranial deformation in the skeletal materials from the Gibson Aspect (Bennett 1961:363). On the other hand, none of the artificially-deformed crania from the Hanna site showed evidence of the coronal "Saddle" as found among several Gibson Aspect burials (Bennett 1961:389).

The sample of human skeletons recovered from the Hanna site is too small to permit elaborate statistical manipulation. For comparison, however, data on skeletal populations from sites within the same temporal or spatial span as Hanna are presented in Tables 28-31.

Conclusion

The Hanna site population resembles that of other Caddo complex sites in several ways. Although the presence of flexed burials has been noted at Hanna and at Gahagan (Webb and Dodd 1939), this type of interment is rare in Caddoan cemeteries. The prevalent style of burial both at the Mounds Plantation site and at Gahagan resembles the extended,

TABLE 31

STATURE ESTIMATIONS FROM CADDOAN AREA

SITE	SEX*	N	STATURE X	REFERENCE
Hanna	F	2	159.26	Present study
Sam Kaufman	M	6	167.64	Butler 1969
	F	11	160.02	Butler 1969
Gahagan	M	3	177.80	Webb and Dodd 1939
	F	1	172.72	Webb and Dodd 1939
Fish-Hatchery	F	1	170.18	Walker 1935
Mounds Plantation	M	7	173.37	Webb and McKinney 1975
	F	13	162.45	Webb and McKinney 1975

*Individuals not sexed were excluded from this table.

supine burials, like the majority of those unearthed at the Hanna site.

The similarity in style of cranial deformation between Hanna and other relevant sites was noted. Similarities are also evident in the physical characteristics of the Hanna population and the other sites, as detailed in the above tables.

The skeletal remains from Hanna are different from other area sites in several ways. First, the primary type of burial at Hanna appears to have been single interment, while at sites like Spiro (Orr 1952), Belcher (Webb 1959), and Mounds Plantation (Webb and McKinney 1975), the majority of the burials are multiple interments, often lavishly supplied with burial goods. In contrast, the Hanna burials lacked grave goods, with the exception of one shell.

Secondly, while some sites, such as Mounds Plantation, contained log graves and large burial pits, the Hanna graves were simple pits apparently lacking any log or mat coverings.

Thirdly, the absence at Hanna of mounds erected for burial purposes contrasts again with such sites as Gahagan and Mounds Plantation. These observations seem to emphasize the relative poverty and simplicity of the Hanna site

burials in comparison with other sites described above. The apparent conclusion concerning the Hanna population would seem to indicate that this site was either a backwash area of poorer Alto focus inhabitants or a population socially distinct from the large and richly-adorned groups interred at the mound sites listed above.

Finally, it is of interest that all Hanna burials are either females or children. The significance of this observation is not presently clear, especially since the sample here analyzed is too small to enable statistical analysis. Nonetheless, the possibility that specific sex and age were prerequisites for interment at the Hanna site cannot be discounted.

Historic Component

Jeffrey Altschul

Prior to excavation at the Hanna site, it was known that the area had been the locus of historic activity. The 1930 aerial photograph (Plate I) shows three standing structures, none of which remains today. Surface collection and excavation recovered artifacts were associated with two of these structures, one in the southeast sector and one located overlapping the southwest and northwest sectors. The third structure was originally located close to the river channel, but subsequent erosion has completely destroyed all remnants of this structure. Information gathered from local residents suggests that the structure in the southeast sector had operated as a store in the not-too-distant past. Unfortunately, residents had no recollection of the nature either of the structure located in the northwest or of the structure which had been destroyed by the river. In addition to these finds, a third concentration of historic artifacts appeared in the

surface collection (Fig. 50) but with no apparent structural association.

The 1930 aerial photograph also shows that these three structures were part of a wider rural network, characterized by dispersed farmsteads utilizing the rich bottomlands of the Red River. This settlement pattern, typical of much of cotton-producing rural Louisiana, was shaped by factors little understood or analyzed. There is, in fact, a general lack of information on rural Louisiana between the end of the Civil War and 1930, and this situation is especially true of Red River Parish.

The information which does exist, however, indicates that a variety of events and processes has been important in shaping the history of Red River Parish. At the time of the incorporation of the parish in 1871, cotton was the major crop, accounting for over 55 percent of the agricultural produce (BHMNL 1890:209). Most of the cotton was produced on large plantations in much the same way as before the Civil War. The reconstruction era, however, did leave a mark on Red River Parish. These early years were characterized by misappropriation of parish funds and attempts to strip old inhabitants of their property. These actions finally led to the Coushatta Rebellion of 1874, which re-established the control of the white plantation owners (Hardin 1940:205).

With political control re-established, the traditional social and economic patterns again asserted themselves. These stable patterns, documented by the stationary population structure between 1890 and 1910, were finally upset by the discovery of oil in 1914 (see Table 32). This discovery led to an increase in jobs, wealth, and population. The prosperity brought about by oil, however, was short-lived. By 1938, the population of Red River Parish had decreased over 15 percent in ten years, and only one-twentieth the amount of oil

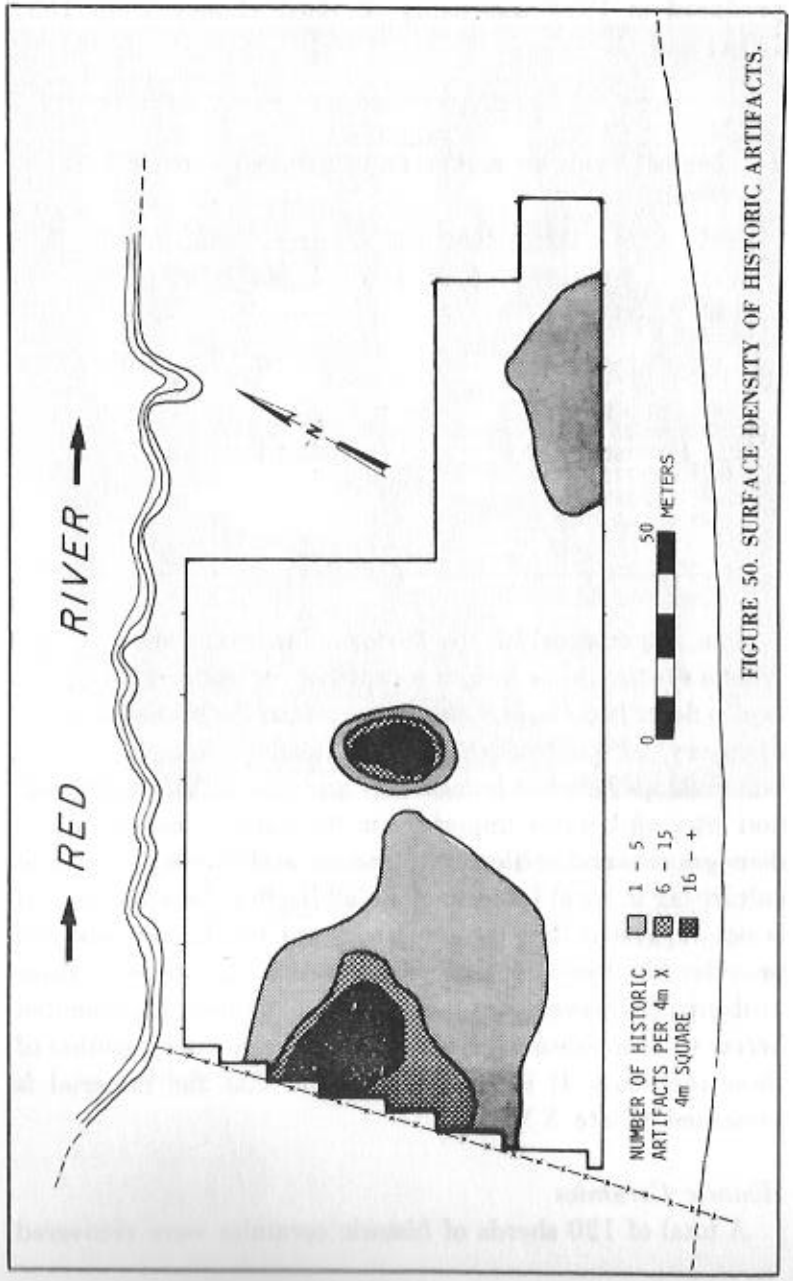


FIGURE 50. SURFACE DENSITY OF HISTORIC ARTIFACTS.

produced in 1915 was being obtained (Laney 1940:163; LDAI n.d. 12).

TABLE 32
POPULATION OF RED RIVER PARISH FROM 1880-1970

1880[a]	1890[b]	1900[b]	1910[b]	1920[c]	1927[d]	1938[e]	1950[f]
8,573	11,318	11,548	11,402	15,301	18,300	15,682	12,113

1960[f]	1970[f]
9,978	9,226

[a] BHMNL 1890:209
[b] LDAI n.d.:92
[c] LDAI 1920:165
[d] LDAI 1928:173
[e] Lane 1940:165
[f] SPRRP 1973:1

The importance of the historic material found at the Hanna site lies in the insight it provides for understanding the events described above. Questions, such as the influence of the discovery of oil on rural homesteads, changes in the relationships between homesteads and stores, before, during, and after oil became important in the parish, changes in the demographic and settlement patterns, and the importance of culture lag in rural Louisiana can all begin to be answered. It is not suggested that the material from the Hanna site will provide all the necessary information to answer these problems. However, it is believed that the data documented herein will provide a basic component of any interpretation of these problems. It is towards this end that the material is presented (Plate XXXII).

Historic Ceramics

A total of 120 sherds of historic ceramics were recovered

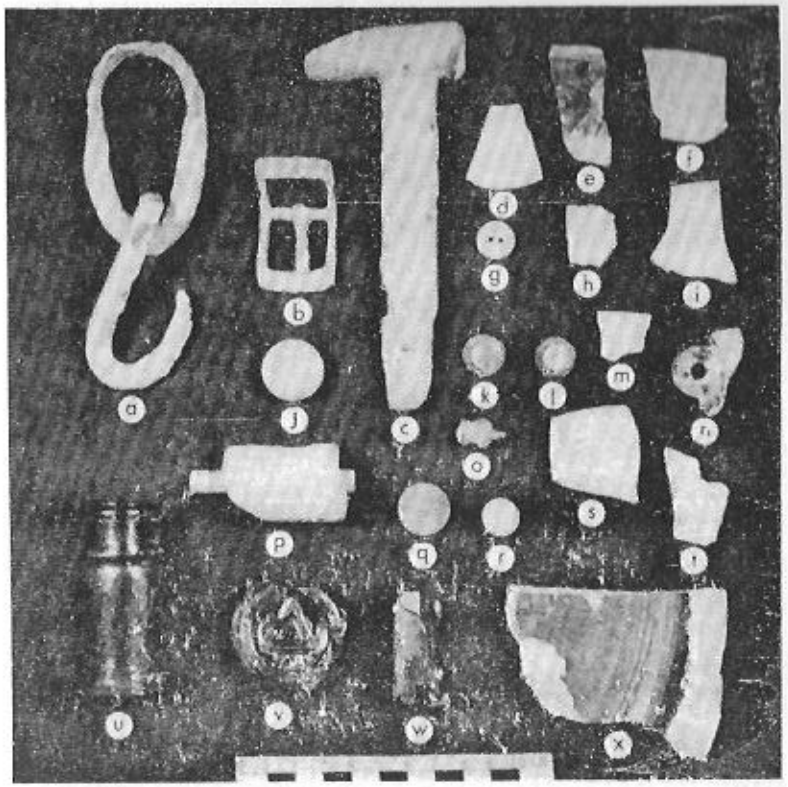


Plate XXXII. Historic Artifacts. a, Iron Rigging Ring With Attached Hook; b, Iron Harness Buckle; c, Iron Spike; d, Milk Glass Saucer; e, Clear Embossed Bowl; f, Decorated Glass; g, Brass Button; h, Crushed Plate Glass; i, Milk Glass Plate; j, # 12 Shot Gun Shell; k-l Brass Plugs; m, Creamware; n, Glass Ring Handle; o, Iron Gear Part; p, Battery; q, 1910-19 (?) Penny; r, Ceramic Marble; s, Imitation China; t, Mocha ware; u, Blue H-24 Pill Bottle; v, Pill Bottle Base; w, Amber Bottle; x, Stoneware Alkaline Glaze.

TABLE 33
ANALYSIS OF HISTORIC CERAMICS BY SECTORS

	NW	SW	NE	SE	TOTAL	%
Creamware--plain		1		1	2	1.8
Cup		1	1	2	4	3.3
Saucer		1	1	1	3	2.5
Plate	1	2			3	2.5
Bowl		1			1	0.8
Pitcher	6	11		2	19	15.8
Dish		1			1	0.8
Marble	26	17	5	7	55	45.8
Unidentified						
Creamware--decorated	2				2	1.8
Bowl						
Pearlware--plain		1			1	0.8
Saucer				1	1	0.8
Cup	6	1			7	5.8
Unidentified						
Mocha ware		1			1	0.8
Stoneware--lead glaze	1				1	0.8
Brown				2	2	1.7
Black	1				1	0.8
Cream	1	2		1	4	3.3
Brown/cream						
--alkaline glaze						
Brown	4			1	5	4.2
Imitation china	3	1			4	3.3
Embossed body sherd	2				2	1.8
Transfer print--blue				1	1	0.8
TOTAL	53	40	8	19	120	100.0
%	44.2	33.3	6.6	15.8	1	100.0

from surface collection and excavations and are quantified in Table 33 (Fig. 50). Analysis of these ceramics included the classification of each sherd by ware, and, where possible, by vessel form.

Creamware, the majority ware, accounts for 74.2 percent of the entire collection. With the exception of one sherd, all the creamware was undecorated. A wide variety of vessel forms, including plates, saucers, cups, dishes, and bowls were identified. As a group, creamwares have a long history with their production spanning the eighteenth to twentieth centuries. This collection is, however, clearly recent. One sherd is stamped "USA" in green, while another has a similar, though undecipherable, stamp in red. These stamps show that the sherds were produced by modern manufacturers.

Following creamware in frequency is stoneware, which accounts for 10.8 percent of the collection. The stoneware sherds had been treated with either a lead or alkaline glaze. This treatment resulted in producing a brown, cream, or black color on the outside of the vessel. The stoneware sherds, probably parts of heavier storage vessels, are all modern in origin.

A third major ceramic group is pearlware, a fine whiteware represented by eight sherds or 6.7 percent of the collection. None of these is decorated, and all are modern.

An imitation of fine china is represented by five sherds at the site. This whiteware is characterized by thin molded sherds which are not quite translucent. This ceramic type, usually inexpensive and produced in a variety of styles, is definitely twentieth century in origin.

The only nonmodern ware found at the Hanna site is mocha ware, and it is represented by only one body sherd collected from the surface. Mocha ware was produced between 1795 and 1890 in this country (South 1972:85), but little chronological importance can be placed on the presence of only one sherd.

The majority of the historic ceramics were recovered from the surface, not through excavation, and were distributed throughout the areas of known historic activity. Over 77 percent of the entire collection was recovered from the disturbed area of the adjacent southwest and northwest sectors. A smaller percentage was recovered from the southeast sector (15.8 percent). Historic ceramics from the northeast sector were negligible. On the basis of general ware categories and vessel types, two functions are suggested for these ceramics: a) kitchen and dining dishes; and b) storage vessels. A single ceramic marble was the only nonutilitarian ceramic object. With the exception of one mocha ware sherd, all of the ceramics appear to have been manufactured in the twentieth century.

Glassware

A large number of glass fragments, mostly from whiskey, beer, and soda pop bottles, was scattered over the Hanna site. A total of 544 pieces of glass was collected, and they are presented in Table 34. In the laboratory, the glass was analyzed first to determine whether it was hand-blown or machine-made. After this initial examination, the glass was classified as to color and vessel type. In all but a few cases, it was impossible to determine the precise function or former contents of the bottles and jars. Consequently, the final stage of the classification process was the delineation of vessel type.

All glass collected at the Hanna site was machine-made. The fragments exhibited a uniform consistency and regular thickness. No evidence of pontil marks, air bubbles, or other indicators of hand-blown or molded glass was found. Therefore, all specimens included in the assemblage could have been manufactured no earlier than 1904 (Walbridge 1920:1972).

As was the case with historic ceramics, the spatial concentrations of glassware corresponded to the two areas of historic disturbance. The majority of glass was recovered in the vicinity of the structure which was located in the northwest and southwest sectors (66.5 percent). Most of this glassware consisted of sherds of bottles and jars. Also present were pieces of glass utilized in a variety of settings including kitchen or dining use and decoration. These types include fragments of decorated plates, dishes, and objects of milk glass.

In the southeast sector, 70 percent of the glass was found in one test pit, 16. This excavation unit was located in the general area of the purported store. Except for two glass dish fragments, all the identifiable glassware from this sector was from bottles or jars. Three of these bottles were embossed with measurement scales on the side and clearly represent pharmaceutical items (cf. Walbridge 1920:101). While it is not possible to determine the exact contents of the remaining bottles and jars, it may be suggested that, due to the wide diversity of sizes and shapes, an equally wide variety of substances was contained therein. This suggestion is in keeping with the supposition that the structure in this area was a store. All glass collected from the site is machine-made, and, consequently, post-dates 1904.

Metals

A total of 806 metal objects was collected at the Hanna site from excavations and surface survey. These objects, summarized in Table 35, indicate a wide range of activities. To determine both the nature and temporal placement of these activities, an attempt was made to identify each object, although the corroded condition of some specimens made identification difficult. All questionable artifacts were simply classed as "unidentifiable metal," a category that includes 73.2 percent (591 pieces) of all metal.

TABLE 34
ANALYSIS OF GLASSWARE BY SECTORS

	NW	SW	NE	SE	TOTAL	%
Bottles						
lip--clear	1	1		1	3	0.6
amber	1				1	0.2
pink				1	1	0.2
green tint				1	1	0.2
body sherds						
--clear	53	38	17	27	135	24.8
amber	19	10	6	12	47	8.6
brown		2	1	3	6	1.1
pink	6			7	14	2.5
green tint	11	5	1	16	33	6.0
frosted				1	1	0.2
blue	7	7	2	1	17	3.0
green		1			1	0.2
base--						
clear	9	4	1	7	21	3.8
amber	6	1		2	9	1.6
brown		4			4	0.7
pink	2	2		1	5	0.9
green tint	1	2			3	0.6
green		1			1	0.2
blue	1	4	1	1	7	1.3
neck--						
clear--						
single-ringed	1	3	1	2	7	1.3
double-ringed	1	4	2	2	9	1.6
blue--						
single-ringed		1			1	0.2
double-ringed		1			1	0.2
pink--						
single-ringed				2	2	0.4
green tint--						
single-ringed	1			2	3	0.6
double-ringed				3	3	0.6
rectangular body sherds--						
clear	7	4	2	5	18	3.3
green tint	1			2	3	0.6
amber	1				1	0.2

TABLE 34 continued
ANALYSIS OF GLASSWARE BY SECTORS

	NW	SW	NE	SE	TOTAL	%
Jars						
necks--						
clear (screw top)		1	1		2	0.4
blue (screw top)	1	1			2	0.4
amber (single ringed)			1		1	0.2
green tint (single ringed)				2	2	0.4
clear (single ringed)	1	1		1	3	0.6
(double ringed)	2				2	0.4
lip--blue		1			1	0.2
Pill Bottle						
base--amber			1		1	0.2
complete--blue	1				1	0.2
Pharmaceutical bottle--						
clear	1	3			4	0.7
Soda pop bottle--clear	4	2			6	1.1
Canning jar lid (Atlas Edj Seal)--clear	1				1	0.2
Flask--base--clear	1			1	2	0.4
Dish--rim--						
clear				1	1	0.2
amber				1	1	0.2
Plate--painted--pale green	3	1	3		7	1.3
Plate--crushed glass	2	4			6	1.1
Sugar pitcher--clear--						
handle		2			2	0.4
Bowl--embossed design--						
clear	2			1	3	0.6
Milk glass--						
rim--						
saucer	5	7	2		14	2.5
plate	2				2	0.4
neck (double ringed)		1	1		2	0.4
body sherd				1	1	0.2
cosmetics case			1		1	0.2
unidentified	3	1		2	6	1.1

TABLE 34 continued
ANALYSIS OF GLASSWARE BY SECTORS

	NW	SW	NE	SE	TOTAL	%
Melted glass--						
clear	1	1			2	0.4
green tint		1			1	0.2
pink	1				1	0.2
brown	2				2	0.4
Unidentified--						
blue	3	3			6	1.1
clear	28	32	7	12	79	14.5
amber	2	3		2	7	1.3
green tint	5	1		4	10	1.8
frosted	2				2	0.4
green				1	1	0.2
pink		1			1	0.2
TOTAL	200	162	54	128	544	
%	36.7	29.8	9.9	23.5	100.00	

TABLE 35
ANALYSIS OF METAL OBJECTS BY SECTORS

	NW	SW	NE	SE	TOTAL	%
Iron						
Machine cap	1				1	0.1
Pipe	3				3	0.4
Brace	1	2	1		4	0.5
Rigging ring	2	1			3	0.4
Hook	1				1	0.1
Vessel		3			3	0.4
Nut		1			1	0.1
Garden tool		1			1	0.1
Drill bit		1			1	0.1
Pipejoint		1			1	0.1
Nail						
Machine cut				3	3	0.4
Modern wire	9	59	11	38	117	14.5
Unidentifiable	1	16	1	27	45	5.6
Railroad spikes		1			1	0.1
Barbed wire				1	1	0.1
Strap		1			1	0.1
Latch		1			1	0.1
Machine gear	1	1		1	3	0.4
Harness buckle		1			1	0.1
Lead						
Nail head		4			4	0.5
.38 caliber bullet		2	1		3	0.4
.22 caliber bullet		1			1	0.1
Unidentified			1		1	0.1
Aluminum						
Can top				1	1	0.1
Button	1				1	0.1
Brass						
Button			1	1	2	0.2
Plug				2	2	0.2
Grommet		1			1	0.1
Copper						
Penny 1910-19	1				1	0.1
Battery						
Carbon	1			1	2	0.2
1.5 to 3 volt		2			2	0.2
No. 12 gun shell		1	1		2	0.2
Unidentifiable metal		101	13	477	591	73.2
TOTAL	22	202	30	552	806	100.0
%	2.7	25.1	3.7	68.5	100	

Of the identifiable artifacts, nails were the only type to occur in great quantity. A total of 116 wire nails, 3 machine-cut nails, and 44 nails unidentifiable to specific type were collected. The manufacture of machine-cut nails began around 1790 in this country, and continues to the present (Cotter 1968:62). Wire nails, first manufactured around 1850, are also still produced. Consequently, it is impossible to date accurately the historic component at the Hanna site based solely on these items. The preponderance of modern wire nails, however, does suggest a rather recent date. This conclusion is supported by the remainder of the collection, which, almost without exception, represents twentieth-century objects. Additionally, a badly-corroded copper penny was found in the assemblage and could be accurately dated to the second decade of the twentieth century.

Metal objects recovered from the area of the northwest and southwest sectors suggest a farm or maintenance function. All identifiable objects, with the exception of one copper penny, can be classified as hardware (nails, iron straps and braces, latches, rigging rings, nuts, pipes, spikes, barbed wire, harness buckles, and grommets), tools (machine gears, batteries, and drill bits), or firearms (bullets and gun shells).

A great quantity of metal was recovered in the southeast sector but, with the exception of several nails, one button, two plugs, and a battery part, the metal from this sector was corroded beyond recognition. The analysis of metal objects from this area of the site does not permit functional associations and, therefore, cannot refute or support the belief that this structure was a store.

In sum, the metal objects appear to be of twentieth century manufacture, and their distribution at the site corresponds to the structures once located in the southeast sector and between the northwest and southwest sectors.

Conclusion

The historic artifacts at the Hanna site were concentrated in two areas, corresponding to two of the three structures shown standing in the 1930 aerial photograph. One of the structures was located north of the present site in an area that has been completely washed away by the erosive action of the Red River. Therefore, no trace of this structure exists.

The majority of the material objects associated with the two historic structures that were located in the site area are of modern, twentieth century origin, indicating that the structures were roughly contemporaneous. From the glassware, it is possible to conclude that the structures were occupied no earlier than 1904, but it is more difficult to determine the point at which they were abandoned. Residents agree that the structures had been abandoned for "a long time," recalling that the store in the southeast sector had been operating only during their childhoods. Consequently, it seems reasonable to suggest that the structures were abandoned possibly as early as 1930, and certainly no later than 1940. Abandonment, then, coincided with the general depopulation of the parish during the 1930s. Thus, it can be argued that the historic activity at the site occurred during Red River Parish's era of prosperity, or approximately between the time oil was discovered in the parish and when it ceased to be drilled.

In order to determine the relationship between the two historic structures and their probable function, a spatial analysis of the artifacts was undertaken. The surface collection in the southeast sector yielded only a small quantity of materials, while one excavation (Test Pit 16) proved to be rich in historic artifacts. This discrepancy between surface collection and excavation is probably the result of years of plowing. The artifacts collected from this sector are consistent with the identification of the structure in this area as a store.

The numerous metal objects and the large and varied number of glass, bottle and jar fragments is indicative of the structure's function as a store, probably supplying the community with a range of household items, pharmaceutical supplies, and, perhaps, foodstuffs. The small quantity of ceramics may indicate that food preparation and dining, unlikely activities in a store, were not important in this area.

The structure which was located in the southwest and northwest sectors was associated with a range of activities. The metal objects recovered in this sector suggest farm and maintenance activities. Analysis of the glass and ceramic artifacts, however, indicated that domestic activities also took place within this structure. In this respect, it is noteworthy that, while the ceramic and glass collections from the two structures are very similar, the metal collections are distinct. The artifact assemblage from the western sectors suggests that this structure was probably a "farmstead," perhaps obtaining food and household supplies from the neighboring store, but purchasing equipment for farming and maintenance at some other locale.

Whether the metal assemblage found in the area of the "farmstead" would have been considered typical for a rural homestead in the cotton-producing regions of Louisiana can be determined only by examining other rural homesteads in areas which were not affected by oil production. It is not unreasonable to suggest that one of the effects of the exploitation of Red River Parish's oil reserves was that it attracted a wider diversity of goods and services than was previously available in the parish. The increased variety of products may have forced stores to specialize in certain items. Rural households, which were formerly dependent on one or two local general stores for the bulk of their supplies, were now free to participate in even wider economic relationships. This whole system, however, was dependent on the revenues

obtained through oil. Consequently, when the drilling ceased, the system shrank to its former size. It can be argued further that, because no other industry replaced oil in importance in the parish, the "general store" pattern of tightly-circumscribed economic networks was re-established.

To determine whether the process described above is an accurate reflection of the events of the first half of the twentieth century in Red River Parish, it would be necessary to analyze a number of different homesteads throughout the cotton belt of Louisiana. When a number of reports such as this one are available, we will be in a much better position to understand the effects of oil production on rural Louisiana.

Radiocarbon Dating

Seven carbon samples were taken from the Hanna site and submitted for dating to the University of Georgia Geochronology Laboratory. After cleaning, one of the samples was found to be too small for dating. Results of the other tests appear below in Table 36.

Although the dates appear, at first glance, to have a rather broad range, further evaluation of the samples and dates shows the range to be less exaggerated. Four of the dates are acceptable, while two are not. The unacceptable dates include the 380±90 B.P.: 1570 A.D. calculation for Structure 1 and the date of 315±120 B.P.: 1635 A.D. for Structure 2.

The earliest date at the site, 1065±205 B.P.: 885 A.D., was a charcoal sample taken from a postmold located just outside Structure 3 and is well within the accepted range for Alto focus sites, usually estimated at 800 to 1000 A.D. The large sigma of 205 years is due to the small sample size which

TABLE 36
RADIOCARBON DATES FROM THE HANNA SITE

UGa-1751	Southwest Sector, Feature 10, Structure 1	905 ± 95 B.P. 1045 A.D.
UGa-1752	Postmold 107, Structure 1	380 ± 90 B.P. 1570 A.D.
UGa-1753	Northeast Sector, Postmold 229, Structure 2	625 ± 110 B.P., 1325 A.D.
UGa-1754	Postmold 250, Structure 2	315 ± 120 B.P., 1635 A.D.
UGa-1770	Feature 51	305 ± 220 B.P., 1645 A.D.
UGa-1755	Southeast Sector, Postmold 286, Structure 3	1065 ± 205 B.P., 885 A.D.

included bits of charcoal taken from postmolds. As has been indicated throughout the text, the data on the southeast sector, including the area of Structure 3, are the poorest at the site because of extensive plow disturbances. Nevertheless, the ceramics do indicate that the southeast sector may be the earliest at the site, and the Carbon-14 date confirms the ceramic evidence.

Two dates were obtained on samples from the southwest sector, both from the vicinity of Structure 1. One of these, 905±95 B.P.: 1045 A.D., was on charcoal taken from Feature 10, a large pit located just outside the walls of the structure. This pit was one of the most productive at the site, yielding large quantities of faunal remains, nuts and seeds, and a variety of typical Alto ceramics, including Dunkin Incised, Carmel Engraved, Holly Fine Engraved, and Evansville Punctated, variety *Wilkinson*, plus two sherds of

Coles Creek Incised, variety *Hardy*. Since the feature was located outside the house, it does not directly date the construction of the structure. However, we feel confident in assuming that the feature was associated with the house and, further, suggest it served as a cooking and refuse pit utilized by the occupants of Structure 1. This carbon sample was the largest sent for dating, and its unquestionably undisturbed context makes the date highly reliable. 1045 A.D. falls near the end of the presumed temporal range for the Alto focus. The second date, 1570±90 A.D., was from a sample taken from Postmold 107, located near the rear wall of the structure. This sample was very small, a fact which may account for the unexpectedly recent date. The postmold does not appear to have served as a wall support but was an extraneous post located outside the house. There is a good possibility that this postmold was in some way disturbed, but our field records do not note any disturbance. This date is, in our opinion, inaccurate, due to the small sample size.

Alternatively, the date of 1570 ± 90 A.D., which could indicate an occupation as early as 1480 A.D., may be related to disturbance around Structure 1. We have interpreted the relatively high frequencies of Bossier focus ceramics in the northwestern part of Structure 1 as reflecting activity in that area, subsequent to the initial construction of the house. This activity, occurring at a time when Bossier ceramic types were increasing in popularity, could have occurred around 1300 A.D. If this suggestion is correct, the 1480 A.D. date would not be too far off.

Three Carbon-14 dates were obtained for the northeast sector of the site. One of these was from a sample of charred corncobs removed from Feature 51, a small pit underlying a midden stratum south of Structure 2. The date 305±220 B.P.: 1645 A.D. is, unfortunately, not very meaningful. The sample was extremely small, thus accounting for the huge

sigma. Also, corn consistently gives falsely recent dates (E. Mott Davis, personal communication). The radiocarbon dates on corn from the George C. Davis site in East Texas averaged about 250 years more recent than the wood charcoal dates, and errors up to 275 or 300 years may occur. As a result of these problems, the corncobs from the Hanna site could range from as early as 1200 A.D. to as late as today.

The two remaining dates from the northeast sector are not in agreement. A date of 625±110 B.P.: 1325 A.D. was obtained on a charcoal sample from a smudge pit containing charred sweetgum balls in the interior of Structure 2. This carbon sample was one of the largest submitted for dating, and the date seems quite consistent with the ceramics and architectural evidence. If, as we have suggested, the smudge pits located on the interior of Structure 2 are contemporaneous with the construction and habitation of this circular house, we would expect a date more recent than that for Structure 1 in the southwest sector. The carbon-14 date of 1045±95 A.D. for the structure, compared to the date of 1325±110 A.D. for Structure 2, confirms our expectations.

The second date from Structure 2, 1635 ± 120 A.D., was obtained from an interior postmold. The sample was rather small, 4.0gm after cleaning, a fact which may account for the recent date. The postmold from which the sample was taken is not clearly associated with the circular structure; it may have been an interior bench or partition support. It is also possible that this postmold may have been associated with a more recent disturbance. Although great care was taken in the field to insure against contamination, and the location in the interior of Structure 2 seemed appropriate, we are inclined to report this date as erroneous.

Interpretations

Chronology and Intrasite Variation

The southeast sector appears, on the basis of ceramics, to be the earliest at the site. High percentages of typical Alto ceramic types such as Dunkin Incised, Pennington Punctated-Incised, Crockett Curvilinear Incised, and Evansville Punctated, variety *Wilkinson*, place the southeast sector firmly within the Alto focus. However, the southeast differs from the other sectors of the site with regard to frequencies of Bossier focus materials. Significantly lower percentages of Bossier ceramic types occur in the southeast sector than occur elsewhere at the site (Table 37-38). On the basis of these figures, we suggest the southeast sector was occupied before settlement extended to the sandy loam ridges of the northeast and southwest site sectors. But the area of Structure 2 in the northeast sector also yielded portionally few Bossier ceramics, and its totals are omitted from the sector counts in Table 38.

TABLE 37

COMPARISON OF CERAMIC TYPES BETWEEN THE SOUTHEAST AND SOUTHWEST SECTORS

	Alto Types			Bossier Types
	Dunkin Incised	Pennington or Crockett	Evansville var. Wilkinson	Combined Sinner, Bossier/ Plaquemine Brushed, Pease, Belcher Ridged
SE SECTOR	55	35	13	17
SW SECTOR	251	208	35	233

$X^2 = 21.4007$
$v = 3$
$P(X^2) = .9999$

TABLE 38

COMPARISON OF CERAMIC TYPES BETWEEN THE SOUTHEAST AND NORTHEAST SECTORS

	Alto Types	Bossier Types
SE SECTOR	103	17
NE SECTOR (Excluding Structure 2)	782	214

$X^2 = 3.4953$
$v = 1$
$P(X^2) = .9384$

The only structure located in the southeast sector, Structure 3, seems roughly circular in plan. Wilmsen (1960) suggests that circular houses both preceded and followed the development of rectangular houses in the Caddoan area. If he is correct, Structure 3 may be an example of an early circular Alto house. We do not feel completely confident in this suggestion, because the relative dating of the southeast sector is based on the ceramics collected from the entire sector, not just Structure 3. The pottery sample from the structure was not great, and most of the sherds were taken from the test excavations scattered throughout the sector. It is quite possible, therefore, that Structure 3 postdates the period of

most intensive activity in the southeast sector. It is noteworthy that the Carbon-14 date of 1065 ± 205 B.P.: 885 A.D. from the southeast sector was derived, not from a wall post, but from a postmold located just outside the structure. Therefore, the date does not, with total certainty, pertain to the house.

A second problem concerns the low percentages of Coles Creek pottery types in this sector. If, as Webb (1975) maintains, the Coles Creek appearance in the upper Red River drainage precedes and overlaps with the development of Alto, a stronger Coles Creek presence might be anticipated in the earlier site locales. The southeast sector does not, however, reveal these expectations. Very little Coles Creek material was found in the sector. Its absence may be explained as sampling error, since very few Coles Creek sherds were found throughout the site, and the collections of all sherds from the southeast sector were the smallest at the site. However, other unknown factors may be responsible for this distribution.

Ceramics from the southwest sector include significantly higher percentages of Bossier focus ceramic types than the southeast sector (Table 37). Also, the frequency of Bossier focus ceramics from the southwest was much higher than the northeast sector. In Table 39, the ceramics data comparing the southwest and northeast sectors are presented. The chi square value 81.3868 clearly indicates the ceramics differ significantly in the two sectors, and that the relative frequency of Bossier focus ceramic types in the southwest sector is quite high.

The high percentage of Bossier ceramics were unexpected for two reasons. First, Structure 1, located in the southwest sector, is a typical Alto house, rectangular in plan with an extended entranceway to the northeast. We believe this structure was erected earlier than Structure 2, a circular

TABLE 39

COMPARISON OF CERAMIC TYPES BETWEEN THE SOUTHWEST AND NORTHEAST SECTORS

	Alto Types	Bossier Types
SW SECTOR	494	233
NE SECTOR	3674	790

$X^2 = 81.3868$
$V = 1$
$P(X^2) = .9999$

house, located in the northeast site sector, but the higher percentage of Bossier ceramics around Structure 1 argues against our suggested sequence. Secondly, the Carbon-14 dates, discussed above, were earlier in the southwest sector, again contradicting the ceramic evidence.

Examining the excavation data from the southwest sector, several explanations may be offered for the seeming contradiction. In dealing with a small sample of sherds, numerous fragments from a single broken vessel may inflate the sherd count for that type. In one instance in the southwest, for example, a shattered Bossier brushed vessel accounted for about thirty very small sherds. Since none of these could be pieced together, each sherd was counted, thus inflating the Bossier sherd count.

Structure 1 was a rather complex structure with numerous postmolds complicating the wall pattern. Most of these extraneous postmolds and a number of overlapping features were located along the northwestern wall of the structure. This portion of the house appears to have been subjected to considerable disturbance with the several posts, features and burials intruding into former wall posts. For analysis,

ceramics from these disturbed contexts were quantified separately from the remainder of the undisturbed features, posts, and excavation units. Chi square tests significant at the .01 confidence level ($X^2 = 20.184$, $P(X^2) .999$) showed the Bossier ceramics to be concentrated in the disturbed area, whereas the typical Alto ceramics predominated in the remainder of the structure. This evidence strongly points to the construction of Structure 1 during the Alto focus, with subsequent activity at the site occurring after Bossier ceramics were increasing in popularity.

Elsewhere in the southwest sector, Bossier ceramics occurred in quantity only in the vicinity of Structure 5. The area also presented a complex picture of postmolds but with no clear wall patterns discerned. Probably the occupation responsible for the disturbance around Structure 1 accounts for this complex of posts and the occurrence of Bossier ceramics.

Ceramics from the northeast sector clearly point to an Alto focus occupation. Pottery types characteristic of Alto occur in profusion throughout the sector and vastly outnumber all other types.

TABLE 40

COMPARISON OF CERAMICS IN NORTHEAST SECTOR, AREA OF STRUCTURE 2, WITH CERAMICS IN THE REMAINDER OF THE NORTHEAST SECTOR

	Alto Types	Bossier Types
Area of Structure 2	2196	554
Remainder of Northeast Sector	1478	236

$X^2 = 29.4757$
$V = 1$
$P(X^2) = .9999999433$

The occupation of this site sector postdates the southeast sector, and possibly postdates the initial occupation of Structure 1 in the southwest sector. Subsequently, the northeast sector was occupied, and, although the ceramics indicate habitation in these two site sectors may have overlapped, we cannot confirm that both areas were occupied simultaneously. The radiocarbon dates indicate a slightly later occupation of the northeast sector. Subsequently, the habitation of the northeast sector around Structures 2, 4, and 6 was the most intensive at the site.

With regard to chronological differences in the northeast sector, the area of Structure 2 may have continued in use after other portions of the northeast were abandoned. Table 40 compares the relative frequencies of Alto and Bossier ceramic types in the area of Structure 2 with the remainder of the sector.

As is clear from the table, ceramic frequencies in the vicinity of Structure 2 differ significantly from the remainder of the sector. Types common during the Bossier focus occur in far greater percentages around Structure 2 than elsewhere in the sector.

The ceramic collection from the entire site is incredibly similar, in terms of frequency percentages, to the ceramics collection from Smithport Landing (Webb 1948, 1963). The ceramics typical of the Bossier focus occur at each site in almost identical proportions, as do typical Alto ceramics. The occurrence at both sites of similar frequencies of Bossier and Alto ceramics could be taken as an indication of contemporaneity of the two sites. Both are assigned to the Alto focus, and the presence of the Bossier sherds simply indicates that the decorative techniques destined to rise in popularity in the following years were known to the Alto peoples. However, these similar percentages may be misleading. We have isolated specific locales at the Hanna site in which the Bossier

ceramics occur in significantly greater frequencies than elsewhere at the site. The disturbed area of Structure 1, and the vicinity of Structure 2, are two such areas. It is our belief that these areas were the loci of the latest activity at the site. We suggest this activity occurred during the transition from Alto to Bossier, at which time Bossier ceramics were increasing in popularity but before they attained their full expression. If these suggestions are correct, ceramic totals for the entire site result in a lumping of the earlier and later materials and obscure intrasite variation.

There are not indications of radical change at the site. Ceramics and house form underwent some change at Hanna, but there is no evidence of major upheaval. The site is an Alto focus site, but by the end of the occupation, the beginning of Bossier seems to have been underway.

We have not formally divided the occupation at Hanna into an early and late component, or early middle and late, both of which directions would have been possible. Ceramically, the distinctions are based on changing percentages of marker types. Although the Hanna ceramic sample is rather large, the collection from several crucial areas is of insufficient size to warrant subdivding established foci.

An interesting but unanswered question concerns the reason the site was abandoned near the beginning of the Bossier focus, at the time settlement preferences were shifting toward the uplands. The reasons for this shift in settlement and the apparently contemporaneous decline of ceremonialism elsewhere in the Valley remain to be explained.

Intrasite Analysis: Activity Areas

In the previous section, intrasite variation in ceramic frequencies was evaluated in relation to the sequence of occupation. In addition, consideration of activity areas was presented in the discussion of each structure. However, since

the site was occupied over a considerable period of time, the localization of specific activity zones has been obscured by shifting patterns of site occupation. Nevertheless, in the following discussion, the various site sectors will be treated as roughly contemporaneous, and the variations seen throughout the site will be evaluated in terms of the probable localization of activities.

Structures: Six structures, including four houses and two problematic complexes of postmolds, were uncovered at Hanna, two in the southwest sector (Structures 1 and 5), three in the northeast (Structures 2, 4, and 6), and one in the southeast (Structure 3). The two principal house types, rectangular with extended entranceway and circular without an extended entranceway, have been interpreted as reflecting slightly different periods of construction within the Alto focus, rather than alternative, contemporaneous house forms. The sequence appears to have proceeded from the earlier rectangular structures to the later circular houses. However, the roughly circular structure in the southeast sector (Structure 3) may have been the earliest at the site.

All of the houses were rather hapazardly constructed with unevenly spaced posts forming roughly circular or rectangular patterns. On the other hand, the rectangular house (Structure 1) differed from the others in that whereas only a few interior pits were present, a large number of pits were located around the exterior. Several large refuse pits and probable cooking pits produced significant subsistence data and apparently received the garbage from a well-kept house interior. The circular structures, on the other hand, were not surrounded by numerous outside pits. A central hearth and a second probable cooking pit were located in the interior of Structure 2. Otherwise, no large refuse pits were found in or around any of the circular houses. As indicated by the presence of middens, the inhabitants of those structures dumped their refuse

at the outside rear of the house and along the exterior southwest walls. In addition, a sizeable midden accumulation inside Structure 2 suggests either refuse was allowed to accumulate inside the house, or the area was used as a dump subsequent to its abandonment.

The two structures for which no coherent pattern of postmolds could be defined, Structures 5 and 6, may have served as outbuildings, special purpose structures, or open, summer houses. However, their form, and the artifacts located within these structures, render problematic any suggestions as to structure function.

Excavations revealed numerous smudge pits filled with charred sweetgum fruits in Structure 2. Similar pits were not located elsewhere at the site, and their presence in Structure 2 was interpreted as evidence for pottery smudging or insect repellent. Two alternative hypotheses, hide smoking and medicinal use, were discussed in the text, but dismissed.

Animal bone and botanical remains were found in all sectors of the site and provide valuable data on the subsistence strategies of this late Alto village. Botanical remains were similar in all site sectors. The quantities were greater in the more productive northeast sector, but all three areas produced the same array of nuts, wild seeds, and cultigens. The faunal remains presented quite a different picture.

The animal remains from the southwest sector, while similar to those from the northeast, indicated a notably greater dependence on fishing. Also, differential treatment of deer bones was noted between the two sectors, with proportionately more meat bones located in features in the northeast and more nonmeat bone located in features in the southwest. Although this latter difference may be the result of sampling error, the relatively different dependence on fishing appears valid. Since the features yielding the majority of the

fish remains in the southwest sector are associated with Structure 1, we suggest that dependence upon fishing was greater during the earlier years the site was occupied. Later, when Structure 2 was inhabited, dependence on fishing diminished.

Horticulture was practiced at Hanna from the time of its initial occupation until subsequent abandonment. However, the extent to which the people relied upon cultivated crops cannot be reconstructed from the small sample recovered. The same is true of the degree of dependence upon wild plant foods.

Positive evidence of pottery manufacture and stone tool production was found at Hanna. In addition to the thousands of potsherds, numerous pottery coils were located at the site. These fragments of raw material from which ceramic vessels were formed substantiate the fact that pottery production took place at the site. Pottery coils were concentrated in three locales, in the southeast near Structure 1, in the northeast near Structure 2 and in the interior of that house, and in several excavation units located about 10m east of Structure 2. These data indicate that the initial stages of pottery manufacture took place in at least four locations at the site.

All stages of stone tool production, from the initial reduction of raw material to the fabrication of the finished product, were present at the Hanna site. Further, the evidence suggests that stone tools were manufactured in all sectors of the site and in the vicinity of all structures.

An attempt was made to determine if specific areas of the site were preferred for initial reduction, wherein the unworked nodules underwent their first flake removals. Primary flakes, secondary flakes, and chunks with cortex were lumped into a category reflecting the initial steps in stone tool manufacture. Internal flakes, bifacial thinning flakes, and chunks without cortex were classed as flakes representative of

the more advanced stages of tool manufacture. After numerous trials, it appeared that some variation in the distribution of these broad categories could be discerned in the northeast sector. Three areas exhibited greater frequencies of lithics common to the advanced stage of production: the area of Structure 2, the excavation units just outside and to the east of that structure, and the area of Structure 6. A different pattern was observed in the vicinity of Structure 4, the excavation units located about 10m east of Structure 2, and numerous excavations scattered throughout the northeast sector. All of these latter units evidenced higher frequencies of initial stage lithics. A chi square test (Table 41) showed that these two areal groups in the northeast sector differ significantly with regard to the stages of lithic production represented in each. If raw materials are added to the initial stage category, the X^2 value increases to 83.212, a difference also significant at the .01 confidence level. On the basis of these data, it appears that a significant tendency existed for the initial steps in the manufacture of stone tools to take place around Structure 4, and throughout the majority of the northeast sector. However, Structures 2 and 6 were the

TABLE 41

COMPARISON OF LITHIC PRODUCTION IN AREAS WITHIN THE NORTHEAST SECTOR

	Initial Flakes	Advanced Flakes
Structures 2, 6, and vicinity	3240	3531
Structure 4, excavation units 10 m east of Structure 2, and various scattered pits throughout the northeast sector	1148	927

$X^2 = 57.766$
$v = 1$
$P(X^2) = .99999$

areas in that sector in which slightly more attention was devoted to advanced stages of tool production. Elsewhere at the site, the southwest sector and southeast sector exhibited flake ratios very similar to those of Structure 4 and the remainder of the northeast sector.

In the next stage of the analysis, utilized and worked flakes were quantified similarly to lithics representative of initial and advanced stages of production. These categories, as defined by Wright (this volume), include flakes used as tools and those altered by additional flake removals for use as tools. They represent not a stage in the manufacturing process, but the use of stone in performing other activities. We hypothesized that utilized and worked flakes would tend to occur in those areas where the advanced stages of lithic production were taking place, i.e. areas yielding proportionately high frequencies of bifacial thinning flakes, interior flakes, and chunks without cortex. It was reasoned that the advanced stages of production, involving the removal of bifacial thinning flakes and interior flakes, resulted in

TABLE 42
OCCURRENCE OF UTILIZED AND WORKED FLAKES AND ADVANCED PRODUCTION AREAS IN THE NORTHEAST SECTOR

	Advanced Flakes	Utilized and Worked Flakes
Structures 2, 6, and vicinity	3531	1026
Structure 4, excavation units 10 m east of Structure 2, and various pits throughout the northeast sector	927	380

$X^2 = 23.976$
$v = 1$
$P(X^2) = .9999$

precisely those types of flakes likely to be utilized in specialized tasks. Table 42 presents the results attained when the distribution of lithics typical of the later stages of production was compared to the occurrence of utilized and worked flakes. The test results do not confirm our hypothesis that the distribution of utilized and worked flakes would be similar to the occurrence of advanced flakes. The distribution of the two artifact classes is, as the table shows, significantly different.

In an effort to explain the occurrence of utilized and worked flakes, we ran an additional test comparing these tools with the lithics of the initial production stages, i.e., primary flakes, secondary flakes, and chunks with cortex. As shown in Table 43, the null hypothesis is accepted. There is no significant difference in the distribution of utilized or worked flakes and that of initial production flakes.

TABLE 43
OCCURRENCE OF UTILIZED OR WORKED FLAKES, BIFACIAL TOOLS, AND INITIAL PRODUCTION AREAS IN THE NORTHEAST SECTOR

	Initial Flakes	Utilized or Worked Flakes	Bifacial Tools
Structures 2, 6, and vicinity	3240	1026	127
Structure 4, excavation units 10 m east of Structure 2, and various pits throughout the northeast sector	1148	380	45

$X^2 = .4139$
$v = 2$
$P(X^2) = .1869$

It remains unclear why advance production flakes were clustered around Structures 2 and 6, while initial production flakes and uttilized and worked flakes tend to occur in greater proportion elsewhere in the northeast sector. Perhaps initial reduction was an outdoor task, conducted at convenient locales around the site as raw materials were brought in. The more advanced stages in tool production may have taken place inside the house or in more comfortable locations around the household. Also, Structures 2 and 6 may have been occupied by accomplished knappers, who were more actively engaged in the fabrication of finished tools. Utilized and worked flakes were used as tools, and their use was, quite likely, associated predominantly with outdoor activities. Such activities would have been spaced in a similar manner to initial reduction of raw material. If so, this spacing would explain the co-occurence of initial production lithic debris and utilized and worked flakes.

Bifacial tools, including projectile points, drills, and a variety of amorphous bifacial scrapers or knives, show a similar distribution to worked and utilized flakes (Table 43). The same mechanisms are probably responsible for the distribution of both artifact classes.

As we have indicated previously, the variation in lithics between the three sectors of the site is minimal. The northeast was extremely productive, the other areas less so, but all flake and tool types were represented in all sectors. There appear to be no functional or chronological differences in stone work between the sectors.

Seasonality

The Hanna site was a village occupied over a number of years. However, the length of occupation during any particular year is difficult to determine. Two lines of evidence are appropriate in addressing the problem of seasonality,

ethnographic analogy and the archaeological record.

With regard to the Indians at the time of contact, Swanton (1942) notes that the practice of swidden agriculture reduced significantly the time spent away from the base camp. It was common practice to remain at the base settlement from the time of planting in the spring until the harvest in the summer. In warm areas, some groups were able to get two harvests, thus extending the time engaged in agriculture to early autumn. Seasonal hunts took place during the cool months, when it was not possible to plant new crops. With the approach of winter, a move would be made to temporary hunting camps. This move included most of the villagers including women and older children. Only mothers with very small children, pregnant women, or older members of the community would remain behind in the base settlement. In sum, the historic data indicate that base settlements, after the development of agriculture, were occupied for the majority of the year, and many were occupied by at least a few individuals year round.

With regard to the archaeological record, the zooarchaeological analysis did not result in specific details concerning seasonality, since almost all of the species present could have been obtained at any time during the year. The exception was the occurrence of two migratory waterfowl, which usually arrive in late fall and remain through winter. However, Byrd (this volume) comments that individuals of these species have been sighted in Louisiana during the summer months.

Although the faunal analysis was inconclusive, the botanical analysis by Shea (this volume) produced data pertinent to the reconstruction of seasonal exploitation strategies. Without exception, all of the botanical remains point to activities of gathering or cultivation from spring through late fall. Of all the food sources identified from the

site, only hickory nuts and acorns could have been obtained after October. These nuts could have been gathered between September and December. However, nuts preserve well and could have easily been stored. Therefore, their appearance in the archaeological record does not always indicate a site was occupied during the time the nuts were available. All other plants from the site were available between spring and late fall. Honey locust was available from September through October, pokeweed from July through October, *Vitis* (grape) from August through October, persimmon from October through November, *Rubus* (rasberry, blackberry, dewberry) from April through August, sumac and sweetgum from April through October, wild cherry from June through September. This roster of plants found at Hanna clearly indicates the site was inhabited throughout the summer, and suggests habitation from late spring until the onset of cold weather in late autumn.

The cultigens recovered from the site—corn, squash, and gourd—were planted in spring, with final harvests occurring in late summer. The evidence for cultigens confirms that the prehistoric occupants of the site did indeed practice agriculture, and so must have been present at the site during the spring and summer months. Also, fishing could have extended the time during which the site was occupied. The presence of numerous fish bones at the site indicates that this food resource was of some importance.

During the spring and summer months, it is probable that game was hunted and wild foods gathered in small parties short distances from the village. The uplands are less than 10km away from Hanna, and plants and animals not available in the immediate vicinity of the site were probably abundant in the uplands. Also, temporary camps were probably visited during the winter months, but we have no evidence on this topic. Clarence Webb excavated a site on the

Sabine River in Marshall County, Texas, the Resch site, which he believes was a temporary camp (Webb, Murphy, Ellis, and Green 1969). It is probable that similar camps were utilized in the uplands near the Hanna site during colder months when food was scarce. Before the entire seasonal round can be reconstructed, a number of such temporary camps must be identified. Until that time, our suggestions concerning seasonal abandonment of base camps remains speculative. If long-term hunting expeditions did take place, it is likely that some members of the community remainded behind. Consequently, it is probable that the site was occupied continuously throughout the year, but by varying numbers of individuals with the heaviest occupation occurring during the spring and summer months when planting and harvesting activities were ongoing and when the availability of food at the site was at its peak.

Division of Labor

A wide variety of prehistoric materials was recovered from the site, including pottery, ceramic artifacts, pottery coils, lithics, bone, botanical remains, shell, daub and charcoal. This range of cultural materials associated with the remains of six structures confirms the site was a base camp where activities, primarily of a domestic nature, were performed by both sexes.

Positive evidence that pottery was manufactured at the site was found in the form of numerous pottery coils. In the historic period, this task was specifically performed by Caddoan females (Swanton 1942:163), and there is no reason to assume it was otherwise in the past. A sizeable number of plain or incised pottery sherds was recovered during the course of excavations belonging to utilitarian vessels such as beakers, jars, and deep bowls. Historically, the Caddo manufactured large earthen pots in which they made

atole, kept water, or used for storage and carrying (Swanton 1942:157). The utilitarian vessels represented at the site were assuredly associated with food preparation and storage activities relegated to females among the Caddo. Many of the finer vessels, carinated bowls and bottles with intricate designs, may have been used for eating, drinking, or storage, all of which are activities shared by both sexes and all ages. The fine ceramics were not, however, used in funeral ceremonialism, as all burials lacked any grave goods. Also, the absence of any signs of ceremonialism indicates that most religious activity took place at nearby mound centers, rather than in the village, and that virtually all of the ceramics at the site served utilitarian functions.

Historic Caddoan temples were often furnished with earthenware incense burners (Swanton 1942:158), but no such temples were located at Hanna.

A large number of lithics was found at the site, and represent all stages of stone tool manufacture. The lithics recovered include raw materials, flakes, cores, preforms roughouts, blanks, flake tools, and a variety of bifacial tools, drills, and projectile points. Although we cannot, with assurance, establish that the manufacture of projectile points was a male activity, records indicate that the making of arrows was a male task (Swanton 1942:162), and the use of projectile points among the historic Caddo was largely confined to males. Although not specifically mentioned in the historic documents, it is reasonable to assume that males were responsible for the manufacture of most stone tools, and that males used those tools associated with hunting and defense. However, a variety of stone tools were used in tasks performed by women or both sexes. For example, food processing, hide preparation, and a variety of cutting and scraping tasks were most frequently accomplished with stone tools. Therefore, the occurrence of a variety of tools, perhaps

including the numerous small flake tools, indicates the presence of both sexes at the site.

Wright (this volume) comments that the large amount of pebbles and cobbles found at the site, but not naturally occurring there, indicates that persons unversed in the mechanics of flint-knapping may have been involved in the gathering of raw materials. If so, then not only nonflint-knapping males, but women and children, may have participated in collecting the raw materials for tool production.

An additional feature regarding the sexes is presented in the osteological analysis of the six burials. All of the adults interred at Hanna were females (the subadults could not be sexed), and all were in or just outside houses. No adult males were uncovered at the site.

It is obvious from the many activities represented at the site that Hanna was a base camp, occupied in late Alto times by men, women and children, each performing a variety of tasks.

The Community

The Hanna site was, at its peak, a small village occupied by a few families. The excavations revealed the presence of six structures, only four of which were definitely houses, and all of which were probably not occupied at the same time.

It is not possible to estimate the maximum size of the village because the river has destroyed an unknown portion of the site. However, in the area investigated, it seems likely that four or possibly five additional structures were located at Hanna. This suggestion is based on postmolds that appeared in test excavations. Also, three of the structures occurred in areas of very sandy soil, Structures 3, 4, and 6. Two additional sandy areas that were only minimally investigated may be house locations.

Structures were spaced at varying intervals. Structures 2

and 4, the most closely spaced houses, were set about 20m apart. However, Structure 5, located behind Structure 1, and Structure 6, located behind Structure 2, were only a few meters distant. This close spacing prompts the suggestion that the post clusters of Structures 5 and 6 are probably the remnants of outbuildings associated with the nearby house.

Houses were not placed in any orderly arrangement. The location of each seems to have been a matter of personal preference, although the slightly elevated ridges were clearly selected. Orientation of most houses was to the northeast.

No evidence of a common gound or ceremonial area was found. The spacing of the houses was such that the only open area between house groups was the expanse of clay soils between the northeast and southwest sectors. The extent to which this area was utilized by the aboriginal inhabitants could not be determined.

Ceremonialism and Status

The Hanna site was an egalitarian farming, hunting, and gathering community. The artifactual remains confirm that the site was the locus of a wide range of domestic activities. Although utilitarian artifacts were numerous, the archaeological assemblage included no traces of the elaborate ceremonialism evidenced at Alto mound centers such as Gahagan. If the inhabitants of Hanna participated in the widespread politico-religious happenings of the times, they did so as visitors to the ceremonial centers. They neither erected special ceremonial structures or mounds nor did they engage in the manufacture of the religious paraphernalia commonly unearthed at mound centers. No finished objects of copper, finely polished stone, or Gahagan knives, large well-crafted chipped stone bifaces, were found. Also, there was no evidence that any of these types of objects was manufactured at Hanna. It seems clear that these goods were luxury items,

confined to the upper status occupants of the mound centers, and beyond the means of most villagers.

In addition to the absence of special ceremonial structures, and the lack of an industry in luxury items, the burials at Hanna suggest that status differences were minimal. All burials were simple interments with the individuals placed in pits with no accompanying grave goods. No multiple burals, other than the female and child placed together in Burial 1, were found. There were no shaft burials and no evidence of retainer sacrifice.

This lack of status differentiation is reflected in the artifact assemblage. Engraved ceramics, the fancy ware, occurred in extremely low frequencies, whereas incised and plain types were numerous. Otherwise, all artifact classes appear conspiciously similar throughout the site. We had originally hoped to incorporate into the intrasite analysis an evaluation of relative status. However, the lack of materials reflecting status halted these efforts. The higher frequencies of fishbones in the southwest sector, or the greater proportion of bifacial thinning flakes and interior flakes around Structure 2, are not, in our opinion, relevant to status discrimination.

The Hanna site, a small egalitarian community, was occupied contemporaneously with numerous ceremonial mound centers. Gregory (this volume) discusses the types of Alto focus settlements in the Valley and indicates the presence on the floodplain of both mound sites and villages such as Hanna. The occupants of each settlement type must have been aware of the other type, and interaction must have occurred. However, the nature of that interaction could have assumed a variety of forms. On the basis of our excavations, some conclusions may be drawn regarding the relationship between a village such as Hanna and the larger mound centers such as Gahagan.

It seems unnecessary to distinguish between the relative

status of the two settlement types. We assume that the ceremonial centers were "more important," were occupied by individuals of higher status, probably were the seat of political and religious authority, and were the scene of major ceremonial undertakings. The small villages, such as Hanna, may have been dominated by the authority in these centers, or the villagers may have been tied by kinship or other obligations. At present, we are not in a position to evaluate the bonds between the two.

The evidence from Hanna is clear, however, on several issues. First, the villagers were not engaged in manufacturing luxury items, either for their own use or on the behalf of the occupants of the mound centers. The total absence of a luxury goods industry rules out the possibility that the villagers supported the upper status individuals by crafting their symbols of status. Possibly, the mound centers were dependent upon the villagers for labor in mound construction or food, but our data do not address this topic.

A large portion of the luxury goods found in mound centers was obtained in trade, or the raw material for their manufacture was obtained through trade. For example, the honey-colored or gray chert used in the production of Gahagan knives was imported from the Edwards Plateau of Central Texas or the Kiamichi Mountains in southeastern Oklahoma (Webb 1975:98). It is not known at present if these objects were imported as raw material or in finished form, but they definitely are exotic goods. The Hanna site, similar to the Alto village at Smithport Landing (Webb 1963) was not involved in this rather extensive trade network. With the exception of a few L'eau Noir Incised pottery sherds that were brought in from the Lower Mississippi River Valley, there were no trade items at Hanna. Therefore, the hierarchy in the ceremonial centers controlled the trade routes, a fact which explains the presence of these centers in the floodplain

near navigable waters. Their control of the trade was exercised as a means to procure exotic materials utilized as symbols of status. The goods did not function in a redistributive system whereby the trade goods were dispersed among the members of the community.

Many questions concerning the relationship between the villages and ceremonial center remain to be resolved. Until a thorough survey of the floodplain is completed, we will not know the relative density of village sites and mound centers. The spacing of centers may, for example, prove to be rather regular. The location of villages with respect to mound centers may indicate the relative importance of specific centers, and may offer a clue as to the extent of the area under the influence of each center.

A Continuity Model For Caddoan Adaptation On The Red River In Louisiana

H.F. Gregory, Jr.

Alto sites were located in a variety of settings (Fig. 51). Natural levees and blufflands or creek bottoms were ideal field sites. Three sites in Natchitoches and Winn Parish seem to suggest a preference for a sheltered spring branch, with high hills to block the north winds, a flowing water supply which drained into a raft lake, and a wide alluvial area across the stream where fields could be located. One site yielded mounds of cultural debris which seem to correspond to four house areas. How many of these sites exist is not known, but they seem fairly common. They were especially numerous in the Alto period (Caddo I) and may have been occupied later in some cases.

Another favorite Alto site location was on a long "finger,', or ridge, which extended into a swamp or into a raft lake bottom. The Smithport Landing Site, Wilkinson Site, and Allen Plantation Site (Webb 1963, Webb and McKinney

1975, Ford 1936), all fit this description.

A number of Alto sites were located on point bars. One of these, East Point, had a single mound associated with it, but others, such as the Fish Hatchery 2 site and the Kenny Square site near Natchitoches, seem to have been seasonal occupations on active bar deposits. Finds of roof thatch, but no walls, and open hearths filled with fish and crayfish remains, suggest the Fish Hatchery 2 site was a summer camp not a sedentary village site. East Point offers a contrast because it was a permanent residence apparently established on the higher accretion bars.

Some large ceremonial centers (with multiple burial mounds), notably Gahagan (Moore 1912; Webb and Dodd 1939a) and Mounds Plantation (Webb and McKinney 1975) were apparently located on the broad natural levees of the Red River and in both cases near abandoned channel systems. Thomas Ryan (personal communication) has suggested that the location of the Gahagan site was due to the presence of the Honey Bayou lowland and that the site was likely not on the active Red River at the time of occupation.

Other sites, small hamlets such as the Hanna site and Bayou Cognac, were located on natural levees. Alto sites are especially common in the areas along the older Bayou Pierre channel. Some areas, such as Jim's River in Natchitoches Parish, are virtually covered with concentrations of disjunctive midden, most of which is Alto in age, but many areas apparently saw longer occupations.

It can be seen, from this brief discussion, that Alto sites were distributed throughout the valley from high hilly areas along springs and creeks, well out onto the active point bars along the Red River. Some areas, virtually free from seasonal flooding and/or protected from winter winds, were extensively occupied, often for long periods of time.

Mound centers, such as the Belcher site proper (Webb

TABLE 44
A MODEL FOR CADDOAN SETTLEMENT PATTERNS IN THE LOUISIANA PORTION OF THE RED RIVER VALLEY

Culture Period/Focus	Site Form/Size	Ecological Setting	Functions	Examples
CADDO I				
Alto-Gahagan	Multiple mounds, village-associated	Natural levee near older channel	Ceremonial Exchange center	Gahagan Mounds Plantation
Maize Horticulture Purslane(?) Cucurbits	Isolated or single mound and village	On point bar or abandoned channel	Ceremonial Living area	East Point Lake End Melrose Plantation
	"Hamlets" with no mounds, associated cemeteries	On quaternary or tertiary ridges running into the alluvial valley, often out into raft lake bottoms	Living areas	Smithport Landing Wilkinson Allen Plantation
	Hamlet, no mounds, isolated burial outside houses	On natural levee near active stream	Living/burial area	Hanna site Bayou Cognac
CADDO II				
Haley-Bossier	Single mounds. with villages	Natural levees near active channel	Living and ceremonial areas	Vanceville Belcher
No data available	Hamlets with isolated burials	On natural levees of old channels or on creeks in the hills	Living area	Pease Sinner Port de Luce
	Dome-shaped mounds with village area	On bluffs overlooking raft lakes or creeks	Burial/living areas	Bistineau Chee-Chee Bay

TABLE 44
A MODEL FOR CADDOAN SETTLEMENT PATTERNS continued

Culture Period/Focus	Site Form/Size	Ecological Setting	Functions	Examples
CADDO III Belcher	Single truncate mound with village area	On natural levee	Ceremonial/living areas	Belcher Mounds Plantation
	Hamlets	On bluffs at edge of escarpment	Living areas	Saline Bayou Boot Neck Connally
Maize Horticulture	Villages or "linked" hamlets	On quaternary deposits fingering out into the lowlands	Living/burial (?) areas	Sportsman Lodge
	Saltworks	On salt flats on Saline Creek and Bistineau	Salt production	Drake's Lick Little Cedar Lick
	Hamlets	On the natural levees of interior creeks	Living areas	Calvin
	Camps	On knolls or older mounds in backswamp	Hunting camps (duck, deer)	Frederick's 2 site
CADDO IV Glendora (Historic)	Hamlets with small cemeteries	On bluffs overlooking lowlands	Living areas	Fish Hatchery Lawton
Maize, Trade		On bluffs near forts	Trading areas	Southern Compress Settle's Camp
	Saltworks	On salt flats	Salt-making	Drake's Lick Little Cedar Lick

1959), were most often in alluvial situations. Caddo II sites (Bossier-Haley foci) are commonly in the hills. The Bossier sites show a preference for the creek bottoms which flow into the floodplain. Some areas, such as Lake Bistineau and the Loggy Bayou drainage, have a plethora of such small hamlets, and the interior drainages of Cypress Bayou, Dorcheat, Corney, and other large creeks show a number of these sites. Mounds were seldom well-developed, and, although a few do exist, most sites were small hamlets. Apparently, late Alto preferences for sheltered hill areas carried over strongly into Bossier times, and, by Belcher times, the preference for more agricultural land had led to shifting of village site locations.

In the Belcher focus (Caddo III), sites are less randomly distributed. A stronger preference for natural levees and bluff areas seems to be expressed, but there is evidence that the early Belcher people periodically occupied point bars. At the Fish Hatchery 2 site, located on a point bar, Belcher ceramics were coming into vogue, while typical Alto ceramics continued in use: Belcher Ridged was clearly associated with Pennington Punctated and Crockett variants—all of it sealed under 1.2 meters (four feet) of sterile alluvium. Belcher peoples also moved away from the river and occupied the interior drainages.

At Rodemacher Lake, a former raft lake on the western escarpment, Alto influences were strongly present (House 1973). Later Caddoan occupations of that area and the hills north of there are strongly influenced by Belcher focus peoples; ceramics are scarce in the hill sites, but several sites show Alto types, with a later Bossier-Belcher components in them. One of these hill sites, Cunningham's Brake Site, was tested as part of the U.S. Forest Service salvage program. Several rock-lined hearths were present, and a shallow midden approximately 12-14cm in depth covered about an acre of the "second bottom" or higher levee adjacent to Bayou

Luce. Pennington Punctated and Dunkin dominated the decorated ceramics; some sloppy brushed sherds were reminiscent of later Bossier or Plaquemine Brushed types. These very small sites are typical of the uplands west of the river.

Caddoan sites seem to disappear in the southern portion of the valley and east of it. At about the latitude of Boyce, Louisiana, the last major Caddoan sites appear. East of Red River, in areas such as the Iatt and Nantachie lakes or along Bayou Rigolets in Grant Parish, most occupations are Coles Creek sites. Some of these sites, such as Fox Squirrel Ridge on Iatt Lake, are pure Coles Creek middens; others, on Bayou Rigolets, are likely different phases of that culture.

The Coles Creek occupations east of the river seem to be there in lieu of Caddoan occupations. Mounds are virtually absent south of Natchitoches, Louisiana. A single truncated mound stands on the natural levee of Old River near Melrose, Louisiana, but it has yielded so little material that it cannot safely be assigned either to Caddoan periods or to Coles Creek or Plaquemine peoples.

Webb (1961) commented on the need to clarify Coles Creek-Caddoan relationships on the lower Red River. To date, little more can be said, but certainly there is good indication at Mounds Plantation (Webb and McKinney 1975) that Coles Creek occupations were moving that far north and that they may be earlier than Caddo I developments at the site. Webb has suggested that the Coles Creek-Alto transition took place on Red River and that it prefaced later developments (Webb and McKinney 1975:124). Certainly, any number of sites show occupations by both Coles Creek and Caddoan peoples, a situation somewhat parallel to that in the Great Bend near Texarkana. However, the thick crude ceramic complex dubbed Fourche Maline in Arkansas, and the early Coles Creek-Alto transition termed Lowland

Fourche Maline seem mainly without equivalents on the lower Red River. Webb and McKinney (1975:90-91) report sherds typical of Williams Plain, a Fourche Maline type marker, from Mounds Plantation. The closest neighbor to yield such sherds was the Two Creeks site east of Minden, Louisiana, where *Poole* pipes were also present, along with some Coles Creek-Alto sherds.

In general it seems safe to say that, although classic Coles Creek has been found widely in the valley, pure Coles Creek sites are reported only as far north as Natchitoches. There Smith (1975) found a classic Coles Creek component in the Young's Bayou drainage. Sherds of Coles Creek var. *Coles Creek* were present and associated with *Colbert* points, first identified at the Smithport Landing site (Webb 1963).

To the east of Natchitoches on Saline Bayou, the Lemoine Plantation site seems to indicate a very early Coles Creek entrada. French Fork var. *Sicily Island* (John Belmont, personal communication) suggests the sherds indicate a very early Coles Creek component. Alto sherds are wholly missing, and 90 percent of the surface collections (over 500 sherds) are plain, most similar to Baytown Plain. To the south, almost parallel with the Bayou Cognac site, is the Hunter McNeely site. Coles Creek varieties *Hunt* and *Stoner* (Phillips 1970) comprise 10 percent of over a thousand sherds and are the only decorated materials. Again, Alto ceramics are wholly missing.

Although Coles Creek and Alto pottery types seem to have different distributions, projectile points overlap. At Lemoine, a confused model of Friley and Catahoula is present. The upturned barbs typical of Friley (Webb 1963) are present on only one side of the point. Typical Catahoulas, Frileys, and small Gary points round out the point variation. At McNeely, Friley points and an elongated variety very much like the Hayes point are present, but there is little else. These sites

suggest exchanges in male equipment, notably projectile point styles. Point manufacture on these sites was attested by lithic debris; preforms and processual breaks are common in the collections from both sites. Friley points appear to occur in greater frequency to the north and west, judging from over a hundred site collections from northeast and central Louisiana. These points, therefore, are more significant as markers for cultural exchange than are ceramics. The points are now clearly associated with Coles Creek ceramics in southwestern and northwestern Louisiana, and it may be that Alto peoples were receiving them via that source. However, they are much less frequent as the Lower Mississippi Valley province is approached. In the Tensas Basin, and at the mouth of the Red River, Catahoula, Scallorn, and Colbert points are more common. To the west, Friley, Alba, and a number of Hayes variants tend to be more frequent.

In sum, there is a considerable number of cases of attribute mixture and exchange in projectile point modes within the valley. None of these data clarifies the complicated Coles Creek-Caddo relationships, but they can provide rough geographical data to sketch out contact.

Ecological data are not very good for the Coles Creek sites. Only two, McNeely and Fox Squirrel Ridge, have had any adequate evaluation. At McNeely, surface mapping as the site was initially cleared of forest showed four houses, located about a horseshoe-shaped plaza opening to the south. The plaza was completely clear of refuse, but mussel dumps and midden were carefully concentrated near the round structures. Most of the faunal materials were deer, but fish, mussels, and small game were well represented. At least one bear, some turtle, and alligator were present in the samples. The general impression is that this site was a "backwater hamlet", where emphasis was upon swamp resources, a situation common in the Tensas and Catahoula basins to the

east (Gregory 1965, 1969). With the exception of the large numbers of Friley points, this site would fit neatly with the Coles Creek culture.

The Bayou Cognac site, only a few miles to the northeast, is definitely an Alto site. Coles Creek contact, if any, seems to have been negligible.

On the basis of present knowledge, site locational preferences, settlement size, and function of both Coles Creek and Alto sites seem to be very similar. The Young's Bayou site and Fox Squirrel Ridge site duplicate the situation seen at Smithport Landing and Allen Plantation, all of them being on a finger running out into the lowland or raft lake. McNeely and Lemoine, both Coles Creek sites, located on abandoned Red River channel systems. are clearly on natural levee deposits. They are directly comparable to the Bayou Cognac and Hanna sites.

Hinterland Coles Creek sites are scarcer, however, than Alto or later Caddo sites. While Coles Creek ceramics appear in sites located along the escarpment, near the raft lakes, and on the alluvium, there is little evidence of Coles Creek in the hills proper. This distribution could be the result of sample error, since the forested uplands have not been adequately surveyed. But, on the basis of present data, the Coles Creek occupations can be seen to be more frequently oriented towards riverine or lacustrine environments.

By Caddo II (Bossier-Haley) times, hamlets were well established in the interior drainages and around larger raft or other lakes (Webb 1948). Bossier sites are practically everywhere on the creeks but tend to follow a southeast-northwest trend into central Louisiana. The intense exploitation of the Little River and Catahoula Basin by Plaquemine Period groups seems to have precluded Caddoan movements in that direction, and Bossier-Belcher ceramics are rare there. It appears that Bossier peoples moved north

and south along the Dugdemona River, Castor Creek, Dorcheat, Bistineau and Corney Creek bottoms. Isolated homesteads are present in spring branches north of Saline-Clear-Black Lakes, located in the "hollers." Moundbuilding seems to have lost popularity in Bossier times, a striking contrast to elaborate truncate mound centers erected by their Plaquemine counterparts in the Little River and Tensas drainages. Webb (unpublished notes 1970) has noted some mounds at Bossier sites, but these are not very impressive. One mound, Vanceville, covered a large structure, likely a community center, but it seems almost without parallel in other areas. The large ceremonial centers apparently declined in Haley times or early Bossier. They returned in Belcher times (Caddo III), only to flourish briefly and disappear again in historic periods.

In Belcher times, there was a return to older Alto-Gahagan patterns. Large truncate mounds served as house bases, probably the residence of priest-chiefs, and multiple burials suggest the practice of *suttee* in a least one site (Webb 1959). In addition to the ceremonial sites, many small hamlets were scattered throughout the hill country continuing a trend that began in the Bossier focus or period. Belcher Ridged sherds, type markers of the Belcher focus, occur as far to the southeast as LaSalle Parish but as low frequency trade wares (Gibson 1966). Interior drainages such as Grand Bayou, Bistineau and Loggy Bayou in Red River Parish, Saline Bayou in Natchitoches and Winn Parishes, and the raft lakes were the loci of sizable Belcher hamlets. The raft lake situations were common at least as far south as Rodemacher Lake in Rapides Parish (House 1973), where salvage excavations delineated at least one Belcher hamlet. Since this area is about 20 miles south of the southern extension of the historic Caddo, it is tempting to project a maximum distribution of Caddo culture in the Belcher focus. However,

the distribution is congruent with the earlier distribution of Alto sites; the major difference seems to be the large numbers of small "hill country" hamlets in the Belcher focus. It seems wholly realistic to postulate a growing population, beginning in Alto times and continuing to spread throughout the Caddoan sequence, until it "peaked" in late Belcher times. The concomitant "breakdown" in mound construction has been attributed to any number of cultural and ecological factors. About all that is certain is that there were "highs" and "lows" in the construction of monumental earthworks. (Woodall (1972:86) suggests that earlier Caddoan sites were larger and more nucleated, while the later ones were smaller. He attributes this trend towards smaller hamlets to a "wearing out" of spoils by cropping. His model would now appear to be based on a biased site sample, in short, on inadequate data. The decline in mound construction seems more a function of changing demography and was likely due to an expansion of the traditionally more egalitarian hill communities. This condition can be seen to exist in Caddo I and II times as well as later.

It is tempting to suggest here that a social model, such as Sahlins' (1968:187-203) model for the segmentary lineage as a predatory organization, might fit a Caddoan sequence more adequately than Woodall's interpretation. In short, there may have been a cyclic increase and decrease of power attributed to a warrior-priest-chief lineage, depending upon the ecological conditions at the time. This concentration of authority (as evidence by "cult" centers), could have been a response to Coles Creek or other alien pressures in Alto times. The lineage or organization certainly had a more male orientation, with military overtones, at both Mounds Plantation and Gahagan. Ceremonial offerings included celts and spuds, projectile points, knives, male frog pipes, male human effigy pipes, and the so-called "Long'nose God"

ornaments, all of which seem to point to a warrior-priest group. These militaristic elements are replaced in Belcher times by offerings of household equipment, and, although projectile points and pipes are still buried with the dead, they too seem to represent more utilitarian objects. *Suttee*, mound construction, and the use of Mississippian cult symbols such as the swastika, yin-yang or "wind," and quadrated circles is continued. Still, there are some shifts in this pattern, and it may be more realistically related to a shifting social structure than to drastic sociological changes. Certainly the *Xenesi*, *Tama*, and regional *caciques*, or chiefs, documented for the historic Caddo (Swanton 1942), suggest that the warrior group persisted among the *Xenesi* and that regional hamlets were pulled together when the need for cooperation arose, this being the function of the *Tama*, who went from hamlet to hamlet.

Among contemporary Caddo in Oklahoma, the *Tama* still exists, and the scattered hamlet (kin-based) with churches and cemeteries in association persists. Ceremonial precincts now represent the various factions, and consist mainly of dance grounds, isolated from the living areas and maintained by old traditionalists. This situation would seem to mirror that of the Caddo IV (Glendora focus) settlements in the lower Red River area. Whether there were dance grounds apart from the villages is still undetermined, but it seems probable. Hamlets, each covering a few acres and with its own cemetery, were the earliest historic Caddoan settlement types. A number of these sites have been excavated: The U.S. National Fish Hatchery at Natchitoches (Walker 1935) and the Lawton and Southern Compress sites (Webb 1945).

The existence of similar hamlets and saltworks can be projected directly back into the Belcher focus. Tests at the Drake's and Little Cedar Licks (Gregory 1973) suggest that the maximum utilization of those areas by the Caddo began in

Belcher times and continued well past white contact. Gregory (1973) has modeled an elaborate Caddoan trade interaction, likely first based on salt and Osage Orange bow wood and expanded to livestock and deerskins after contact. He further suggests that early European trade patterns were directly based on Caddo precedents and that, with the single exception of settlements near the French and Spanish trade centers, there were strong similarities between the Caddo and later European settlement patterns. Hamlets persisted, and consolidated villages apparently did not exist. Local chiefs retained their autonomy, and tribal names were more like geographic band names than anything else: Natchitoches meaning "Paw-Paw Place", Yatasi meaning "Those Other People", and similar names for places or people actually became translated into tribal names. French and Spanish colonials actually continued the Caddo practice of using tribal names and place names interchangeably, a habit that has confused several generations of Louisiana historians and ethno-historians.

In summary, this model of the settlement succession in the Caddoan portion of the Lower Red River Valley has been one of continuity. Change was continuous, but structural shifts were not major, and some, like mound construction, were cyclic and in response to certain inter-or extra-necine pressures. European contact was of a wholly peaceful nature and did not interrupt traditional Caddoan developments of egalitarian hamlets. Once the Europeans were integrated into the Caddoan trade network, there was no need for the "rise" of the priest-warrior-chief and concomitant mound center. Had later contacts in the American Period not been dominated by French traders, followed by the Removal, the Caddo might have returned to consolidated, tightly structured villages. However, Removal truncated that normal response, and, after generations of wandering, the Caddo restructured

their settlements as best they could in the hills and on the creeks of south central Oklahoma. From Alto to the present, the Caddoan patterns remain basically intact. Sites like Hanna and Bayou Cognac are among the oldest, and most persistent, expressions of Caddoan culture.

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Appendix I

POLLEN

Seven soil samples collected for palynological analysis were sent to Vaughn M. Bryant at Texas A&M University. Six of the seven samples did not contain sufficient fossil pollen to conduct an analysis. In the seventh sample, pollen preservation was very poor, but Dr. Bryant was able to recover and count the fossil grains. The results of his analysis were communicated to us in October of 1977. Portions of Dr. Bryant's letter are quoted below:

ANALYSIS OF POLLEN SAMPLES FROM SITE 16RR4*

Sample #	Provenience	Pollen types present
1	Feature 51, corncob pits	Several compositae grains, two grass, one alder, several fungal spores and charcoal flecks

2	NW corner of hearth in Stratum 2	Three grass, two pine, one high-spine compositae, one oak, one pecan or hickory, few fungal spores
3	Burial #5	Two pecan or hickory, one grass, one low-spine compositae
4	Test Pit 5, Stratum 5	One compositae, one oak, many fungal spores
5	Test Pit 5, Stratum 3	(See below)
6	1201496 Test Pit 24, Stratum 3	Two pine, one oak, two unknown, one malvaceal
7	1221506 Test Pit 8, Stratum 2	One walnut, one oak, two grass, few fungal spores

*All samples had an absolute pollen frequency lower than 1000 pollen grains per grain of dried sediment. In most cases, the pollen frequency was less than 100 pollen grains per grain of dried sediment.

Sample #5	Pollen Present	Percent
Pine	28	15.9
Pecan and/or Hickory	12	6.8
Compositae (sunflower group)	5	2.8
Compositae (ambrosia group)	4	2.2
Compositae (dandelion type)	2	1.1
Grass	116	66
Evening primose	1	.6
Alder	1	.6
Mormon tea	1	.6
Oak	3	1.7
Umbellifereae	1	.6
Unknown	2	1.1
TOTAL	176	100 %

This sample contained only marginal amounts of pollen, and that is why I was able to recover and count only 176 grains, instead of the usual 220+ grains per sample.

There is not really much that can be said as to the paleoenvironment based solely upon this single sample. A single isolated sample of this kind is much like finding a single artifact at an archaeological site. One could not interpret the whole site on the basis of one artifact. What pollen is present suggests that the regional environment at the time of deposition probably contained a high degree of grassland near the site. On the other hand, the high percentages of grass pollen may reflect some cultural use of grass by the people who occupied the site. Without additional samples, it is difficult to determine which answer may be more nearly correct.

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