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Prehistoric Settlements of Coastal Louisiana.

William Grant Mcintire
Louisiana State University and Agricultural & Mechanical College

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PREHISTORIC SETTLEMENTS IN COASTAL LOUISIANA

A Dissertation

Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Doctor of Philosophy

in

The Department of Geography and Anthropology

by

William Grant McIntire
B. S., Brigham Young University, 1950
June, 1954
MANUSCRIPT THESIS.

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ABSTRACT

The problem foremost in this investigation was to learn more about primitive man and his relationship with the natural setting of Coastal Louisiana. Man has lived on the deltaic plain for approximately two thousand years. During this time his pottery designs gradually changed from one form to another and it is the measurement of these changes that is the basis for delineating time periods.

Over five hundred Indian sites within the survey area were systematically investigated and recorded. Fragments of pottery were gathered, catalogued, and classified into time periods within the Chronology of prehistoric cultures established for the Lower Mississippi Valley. The physiographic base of each site was determined as well as its composing material. During the study, types of vegetation associated with the sites and animal and marine-life remains found within the mound or midden were noted.

Early man followed the master stream and his settlement concentrations in one area and the absence of them in another point out regions that were habitable during a particular time period. By mapping the initial occupation sites for each period throughout the entire survey area, it is possible to discern the relative pattern of the progressive development of the deltaic plain. Younger and older streams and their subdeltas are indicated by the correlation between the cultural remains and the physiographic setting.
INTRODUCTION

This study is an endeavor to learn more about prehistoric man in Coastal Louisiana, and to use his cultural remains as an aid in unravelling some of the geological history of the deltaic plain. Evidence of man's existence is widespread in Louisiana and indicates his numbers and distribution, his culture and through his cultural evolution, the passing of time. In these remains are also many clues to his way of life which contribute additional information to that which is known about his past and the past of his landscape.

The area covered in this study extends from the Sabine River in the west to about the Pearl River in the east (Plate 1). The northern limit is approximately 30° 05' north latitude; the southern limit includes the coast and off-shore island arcs. Approximately 15,000 square miles of near sea-level lakes, marshes, swamps, bayous, and tidal channels were covered. Threaded throughout the area is a network of natural levees with their stream channels active or in various stages of decay. In limited areas salt domes, active and stranded beaches are present. These are the dominant characteristics of a plain otherwise devoid of natural relief. It was on the sanctuary of the natural levee, salt dome and beach that early man lived and died.

As the river extended its deltaic mass and system of levees into the sea, its gradient progressively flattened, thus setting the stage for diversion. When the course was extended and flattened, the stream diverted into a shorter and steeper channel. A new system of levees were built and since the old had lost their fresh water and continual sediment supply, they began to decay. Eventually,
the requirements for human habitation were no longer available on
these natural eminences and man was forced to move. Thus the
history of man in the deltaic plain follows the phases of the
changing stream. As the river changed its course, it built in one
area and buried its past in another. Several abandoned subdeltas are
evidence of the diverging courses of the master stream. Just as the
river left a record of its diversions, so did man leave a record of
his existence and changes in the area.

During a particular and limited time span, man usually
performs his daily tasks in a certain manner. His implements,
utensils, weapons, and clothing help form part of a behavioral
pattern. They are designed and made in ways that reflect not only
man's styles and those of his neighbors but also those used by his
predecessors. Patterns, designs, and ways of manufacture identify
a specific area or group of people through a particular time. The
more recent culture is built upon the older, and each object or idea
is derived from one or more sources. During a specific time span
in history, a culture or a people can be identified by the sum total
of their traits or characteristics. Even though the traits and
characteristics grade imperceptibly into the continuum that include
those that may have preceded, followed, or existed contemporaneously
with them, an arbitrary limit can usually be made to identify a group
at a particular time.

In this area, pottery fragments, or potsherds, are the only
universal cultural remains that have withstood both time and the
elements. Although limited, these artifacts provide a relative scale
when classified, whereby the sequence of time is measured by cultural
change. In order to ferret out the culture changes and consequently apply them to the changing river, archaeological methods have been used to order, collect, and classify the material. However, this treatise is not intended to be an archaeological report and should not be considered as such. A report on the archaeology of the area will appear at a later date. The archaeological data presented in this study will be only those relevant to the central theme of the study.
HISTORY AND BACKGROUND

PREVIOUS WORK

The use of archaeological methods and materials to gain information about prehistoric man and an understanding of the geologic past is not new in Coastal Louisiana. This area is a natural laboratory for understanding the relationship of man to the shifting stream. It is natural that man would settle and inhabit areas rich in flora and fauna where streams provide transportation and migration routes to all parts of the coast and to remote regions inland. Evidence of migration and settlement is reflected in the hundreds of prehistoric sites located on the banks of the streams in Coastal Louisiana (Plate 2). Some of the sites represent known lower-valley cultures, from the earliest to the latest horizons.

Early engineer and survey reports tell of the existence of Indian mounds and shell accumulations made and deposited by the prehistoric inhabitants. In the closing months of 1910 and January and April of 1911, Clarence B. Moore, of the Academy of Natural Sciences of Philadelphia, explored for sites along the Mississippi River from New Orleans north into Tennessee, as part of his archaeological survey of southeastern United States. Between New Orleans and Baton Rouge he found few sites for "...cultivation was rapidly removing nearly all traces of aboriginal remains...." (Moore, 1913, p. 368).

Another survey was made by Moore in the Atchafalaya basin area in which many sites were located and collections taken. His main contributions to the known information about this area were his
accurate descriptions of sites and many excellent plates that were made of this collections and published in the Journal of the Academy of Natural Science (Idem.). He made no attempt to visit and locate every site in this survey but concentrated on those most accessible. On the whole, surface collections of pottery fragments were ignored. As was the vogue during this period of the development of the archaeological discipline, emphasis was placed on skeletal remains and associated burial goods.

The first attempt to organize and systematize the sequence of cultures in Coastal Louisiana was undertaken by Henry B. Collins, now with the Smithsonian Institution, and James A. Ford, now with the American Museum of Natural History in New York City (Jennings, 1952, p. 256). Collins collected and excavated archaeological material on Pecan Island (Plate 1) in 1926 (Collins, 1927, p. 205). The artifacts were later loaned to Ford whose analysis of them was included in the "Tchefuncte Culture," 1945. Ford should receive credit for his systematic chronology of the Lower Mississippi Valley. Early in the formative period of his professional life, Ford recognized not only that the alluvial valley was a fruitful field for archaeological investigation but also understood the complexity of the problem in determining chronological relationships (Ford, 1936, p. 7).

Since the early thirties much work has been done concerning the establishment of Indian chronology throughout the Lower Mississippi Valley. As a result of surveys and excavations done by Ford and Chambers in 1927, Fowke in 1928, Setzler in 1933, and Ford in 1936, Ford worked out the following general chronology from the oldest to
the youngest: 1. Marksville; 2. Coles Creek; 3. Caddoan-
Natchez. This outline was intended to serve only as a guide for
future excavation. In 1938 Louisiana State University through the
Works Project Administration sponsored such an excavation program.
The project offered unequaled opportunities for research in un-
ravelling the prehistoric past and enabled many capable archaeolo-
gists to work in the Lower Mississippi Valley. Each investigator
added his contribution to the unfilled gaps of the above chronology
(Quimby, 1945; Willey, 1940; and others).

A readjustment in the time scale was inevitable and as a result
of excavation in the vicinity of the southeast and northeast shores
of Lake Pontchartrain, an earlier horizon was recognized (Plate 3a,
No. 28 & 30). This was called the Tchefuncte period after the state
park then known by that name (Ford and Quimby, 1945). Later, an-
other division between the Marksville and Coles Creek periods was
recognized and labeled Troyville; still another between Coles Creek
and Natchez became known as Plaquemine. At the present time, the
following periods are recognized for the Lower Mississippi Valley:

Youngest — Natchez

   Plaquemine
   Coles Creek
   Troyville
   Marksville

Oldest —- Tchefuncte

This Lower Mississippi Valley chronology is correlated with the pre-
historic Indian Chronology for the Eastern United States and fits into the over-all schema as represented on Fig. 1. Because of culture connections of the survey area with the neighboring states to the east, the cultures in question are also added to this table.

In 1938 the Southeastern Archaeological Conferences were scheduled in an effort to solve some of the problems accompanying pottery classification and analysis. A unified system of pottery analysis was developed and views were exchanged on previous work as well as that presently being done. As a consequence of these meetings, work in the Southeast was furthered considerably. The results of each conference have been published in a Newsletter that is invaluable to investigators doing research in this area.

In 1936 W. D. Chawner recognized the probability of a relationship between Indian remains and the age of levees in the Catahoula and Concordia parishes. However, the first attempt to correlate physiographic features with Indian pottery in the survey area was made by Fred B. Kniffen in 1935 in St. Bernard and Plaquemine parishes (Kniffen, 1936, pp. 407-422). Fifty sites were either visited or reported on by informants in the area. Pottery fragments were collected, bore holes were drilled in the sites for depths and physiographic association, and measurements were taken. The pottery was classified into like groups and compared to established archaeological work in the area. The result of this study showed that although the cultural remains were imperfect, they could be used as indicators of cultural change. It was also evident that such ceramic remains could be used to illustrate spatial relationships and sequence of development, and therefore be helpful in unravelling the questions
<table>
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</tr>
<tr>
<td>700</td>
<td></td>
<td>Copena</td>
<td>Weeden Isle. I</td>
</tr>
<tr>
<td>500</td>
<td>Marksville</td>
<td></td>
<td>Santa Rosa-Swift Creek</td>
</tr>
<tr>
<td>0</td>
<td>Tchefuncte</td>
<td>Miller I</td>
<td>Deptford</td>
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<td>Orange (?)</td>
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Comparative Chronology Chart

Fig. 1
left by the changing river.

Another survey was carried on by Kniffen in Iberville and Ascension parishes in 1938. Fifty-two sites were visited, and surface collections were made where possible. The results of this study added both to the existent archaeological knowledge of the area and to a better understanding of the recent geology (Kniffen, 1938, p. 189-208).

Kniffen's two studies of prehistoric sites have greatly aided this present project. Many of the sites which he investigated and reported have long since been destroyed by road-metal contractors, washed into bayous and lakes by erosion, or buried beneath recent sediments. The latter is particularly true in Iberville and Ascension parishes. The collections that he made have been reclassified in the light of work that has since been done, but only a few refinements have been added to his original conclusions.

It is upon this earlier research and investigation of the prehistory of the Lower Mississippi Valley that this analysis of the sherd collections in the coastal area has been based. During this survey period nearly five hundred sites were either visited or reported within the area (Plate 2). An earnest attempt was made to investigate every site whether or not it had been previously visited by investigators. This was not always possible and in some cases not always necessary. Kniffen had covered the area in St. Bernard, Plaquemine, Iberville and Ascension parishes (Kniffen, 1936-1938), and as a result of his work it was not always necessary to revisit every site. However, when it appeared that a more critical analysis was necessary, the sites were revisited and combed for additional information.
TYPES OF SITES

In investigating each site there were two main objectives: one, the collection of cultural material from the site; and two, the correlation of the site with its physiographic base. As a rule, any area that indicated continuous human occupation was designated as a site. Those visited can be divided into five groups: earth mounds (Fig. 2), shell mounds (Fig. 3), shell middens (Fig. 4), black-earth middens (Fig. 5), and beach deposits (Fig. 6).

Earth and shell mounds are hillocks intentionally formed and given definite shape by their builders (Kniffen, 1938, p. 190). Within the area of this survey, they vary in size from one to twenty-two feet in height and from twenty-five to over two hundred feet in diameter. The mounds were built primarily as burial or temple monuments and are usually described as conical mounds or truncated pyramids. Conical mounds are cone-shaped with gently sloping sides while the truncated pyramid is a steep rectangular mound with a flat top. Both types are prominent landmarks, not only because of their elevation, but also because they support vegetation vastly different from that of the surrounding marsh.

Earth mounds are usually found in groups of three or four and are arranged in a definite pattern (Fig. 7). The "village site," usually an earth midden was near by and was the actual dwelling area of the early inhabitants (Kniffen, 1938, p. 192). This type of site is often fruitful in supplying surface collections and gives a better picture of daily Indian life than do the mounds. There is usually a deposit of shell, (Rangia cuneata, Ostrea, or Unio) either in layers or scattered throughout sections of the earth mound. Often the earth
Fig. 2 - Earth mound on Pecan Island.

Fig. 3 - Morton shell mound, near Weeks Island.
Fig. 4 - Shell midden along Bayou Petit Caillou.

Fig. 5 - Black-earth midden based on shell-sand-beach matrix in the Grand Chenier complex.
Fig. 6 - Beach deposit along south shore of Grand Lake, Cameron Parish.

Fig. 7 - Earth mounds arranged in definite pattern on Bayou Robinson.
mound is constructed on a shell midden base (Fig. 8).

One problem in dealing with mound groups is whether or not to include all the mounds in the group as one site or to regard each mound as a separate and distinct site. In attempting to ferret out the various stream channels, it was necessary first to determine whether all the mounds were on the same stream course, abandoned or active. If so, the group of mounds was considered one site. Where one or more mounds in a group were located on unrelated levees, then each was designated as a separate site. It can readily be seen that this condition could occur in Coastal Louisiana where subsidence, aggradation, and bifurcation are the norm.

Shell mounds are relatively fewer in number than earth mounds. They are composed mainly of *Rangia cuneata* with some *Ostrea* and *Unio* shell. A more thorough discussion of the shell will be made later in this study.

Middens are formless refuse heaps incidentally accumulated by early inhabitants who resided on the site. The irregular piles are made up of objects used in their daily life. In some instances bayous or lakes have cut through part of the midden and exposed habitation levels and fire pits (Fig. 10 & 11). The midden is the most desirable place to collect cultural remains because it provides the best cross-section of the daily habits of ancient Indian life. Potsherds are usually most abundant and can be taken *in situ* (Fig. 12 & 13).

Shell middens are by far the most numerous of the types of sites in this area (Plate 2). *Rangia cuneata* (a brackish-water clam) makes up the greatest proportion of the composing material and undoubtedly
CROSS-SECTION OF GIBSON SITE
SCALE IN FEET VERTICAL EXAGGERATION = 5 TIMES

CROSS-SECTION OF POSSUM PT. MIDDEN
SCALE IN FEET VERTICAL EXAGGERATION = 5 TIMES
Fig. 10 - Habitation level along Bayou Terre aux Boeufs exposing shell, bones, and pottery fragments.

Fig. 11 - Bayou cutting into shell midden.
Fig. 12 — Shell, potsherds, and iron nodules on west shore of Latania Lake.

Fig. 13 — Shell and potsherds exposed along Bayou Grand Caillou.
played a very important role in the economy of the early peoples. 

*Ostrea* and *Unio* are often associated with the *Rangia* and reflect a different physiographic situation. In some sites stratification occurs and leaves distinct layers of shell (Fig. 14). The *Ostrea* requires more saline conditions while the *Unio* is a fresh-water clam. Therefore, when two or more are present in one site, a change in water salinity is indicated. The shell midden is usually a long ridge-like form along a natural levee or beach. They often extend for several hundred feet in length, are usually fifty to one hundred feet in width, and vary in height from a few inches to a maximum of about twelve feet above the surrounding marsh level. Borings in many of the sites showed that the midden often extended to a depth of seven to ten feet below the marsh surface, indicating subsidence and aggradation.

Black-earth middens are less numerous but of importance in several coastal areas. They are similar to the shell midden as a habitation site, but are identified by characteristic dark humus layers. Decay of organic refuse from the occupation area darkens the soil and is readily discernible from the surrounding alluvium (Fig. 15). Mixed with the humus layer is evidence of fire and assorted artifacts. These middens are found in areas where clams or oysters were not available as food. Therefore, the absence of shell is the only criteria which sets it apart from the shell midden. As a general rule, the black-earth midden is characteristic of the cheniers* of western

---

*"Chenier"* is used in southwestern Louisiana to mean old beaches now stranded in marsh (Russell and Howe, 1935). *"Cheniere"* is used in the southern part of the Mississippi Delta to mean any high ground and ordinarily refers to natural levees of abandoned channels. In both cases the name refers to the oaks, which are dominant among the trees covering such eminences (Russell, 1936, p. 45).
Fig. 14 - Shell stratification exposed at the Miller site. *Unio* shell at bottom, capped by black earth and then *Rangia*.

Fig. 15 - Black-earth midden with potsherds exposed along bayou.
Louisiana and is found less frequently through the remainder of the area.

Beach deposits are wave-formed accumulations of shell (Kniffen, 1936, p. 409). Intermixed with the shell matrix is usually found broken and wave-washed potsherds and other artifacts. The artifacts indicate that a shell midden or shell mound must have existed nearby, if not on the actual site, and has since been destroyed by the waves. There is a distinction between this type of site, the cheniers, and the lake-shore deposits of shell which are found in some areas of the survey. As a working rule, if artifacts are present, then it is assumed that part, if not all, of the shell was deposited originally by man and it is designated as a site. Surface collections in some areas are abundant, while in other areas only a few pieces of pottery can be gleaned over a wide distance.

In each site that was visited, measurements were taken and borings made to determine depths and the type of material upon which the site was located. Wherever possible, artifacts were collected from the surface, placed in cloth bags, and returned to the laboratory for future study. Site notes were taken describing its composition and any changes in the strata.

Over 40,200 sherds were collected and brought to the laboratory for study. Some sites yielded only a few artifacts while others were more productive. In the bayous and along the coastal areas many of the pieces were wave-washed beyond recognition. Of the five hundred sites visited only one hundred and fifty yielded pottery in quantities suitable for classification. Unless fifty sherds or more were collected on any given site, the material was not used in the
classification. As the work progressed, it became more evident that plain sherds from areas affected by wave erosion could not be used effectively. The constant wetting, sorting, and drying of the sherds along the beaches and bayous leached and discolored many of the sherds until it was impossible to classify the plain ware properly. Because of this condition more emphasis was placed on the decoration and motifs of the sherds, and finally resulted in the use only of the latter. Therefore, the results of this paper are based entirely on decorated potsherds.
LOCATION OF SITES

The Site Distribution map (Plate 2) establishes a definite affinity between the sites and the drainage systems of the deltaic plain. Distribution of these sites and their physiographic relationship reveals in part, the story of the most recent geologic past. The presence or absence of sites along certain streams or bayous, their density in some area and paucity in others are indicative of the natural conditions in which the early inhabitants lived and of the physiographic changes that have since occurred.

Certain minimum requirements were necessary before people could inhabit a locality. First, the stream had to discharge in an area a considerable length of time before the levees had reached suitable heights to be habitable. Second, a permanent fresh-water supply was necessary for occupancy. Third, an adequate food supply was essential. In the survey area mollusks were an important item in the human diet. It is not likely that quantities sufficient to support many people could be transported for great distances; consequently, their village sites had to be in close proximity to the mollusk source. Since it is possible that some of the early inhabitants practiced agriculture to supplement their diet, space for raising maize may also have been a requirement. There has been no definite evidence that Indians did grow maize in the survey area but agriculture was the main source of food in the adjacent areas to the north.

It is in the natural levee that much of the remains of the early cultural history of this area is embedded. These natural ridges are the most characteristic features of flood plain topography and
are prominent landmarks in this area devoid of marked natural relief (Fig. 16). They are built along streams subject to periodic overflow of their banks during high-water stages. As the stream overflows, the velocity of the flood water is reduced and the suspended sediments are accordingly dropped. The coarser sediments drop out first and grade into finer material as the waters progress away from the parent stream. From the crest of the deposited material the slope of the ridge grades into the backswamp or near-sea-level marsh. The resulting pair of ridge-like deposits is known as the natural levee.

The size of the natural levee varies greatly and is directly related to the size of the parent stream, its velocity, and sedimentary load. In the vicinity of Baton Rouge, the levees of the Mississippi River are approximately twenty-five feet in height and slope gradually to Gulf level. When a stream branches into two or more distributaries the volume of water and sedimentary load is divided between the distributaries. The height of the natural levee remains constant but the amount of available sediment for each distributary is reduced; consequently, they are narrower and have a steeper backslope. It might be thought that the levee crests maintain a uniform height throughout, indicating that during high-water stages the banks would be topped at all places with flood waters. Rarely is this the case. Even though levees may be awash for a considerable distance, they are rarely topped at all points. Even under normal conditions of inundation the water depth over levees is usually from a few inches to a foot (Fig. 17).

Higher crests would be selected for habitation sites by the aborigines. These habitation sites could be maintained indefi-
Fig. 16 - Channel of Bayou Matherne essentially filled.

Fig. 17 - Photo of river mouth showing drowned levees during high-water stage near the mouth of the river.
nately, depending upon the intensity and occurrence of extremely high waters. It is difficult to estimate the conditions that would prevail along the present Mississippi River if the artificial levees had not been erected to control the flooding waters. Scarcity of sites along the major river channels may be attributed to general overflow and inundation. However, the fact that there were a few sites on the major channels and more on the distributary channels would indicate that the levees must have been relatively safe and were inhabited for considerable lengths of time. Another point to be considered when dealing with geologic history of Coastal Louisiana is that the youngest drainage system has the highest and most pronounced levees. Abandoned channels no longer keep pace with the aggradation of active streams. Their levees are not only relatively lower but are subject to burial by adjacent aggrading streams and are subsiding beneath the unconsolidated marsh material. R. J. Russell pointed out that, "The relative ages of these old channels and their deltas are clearly indicated by such criteria as degree of channel abandonment and deterioration, stream patterns, natural levee characteristics and other techniques of coastal plain geomorphology." (Russell, 1940, p. 1201).

The river built its deltas for thousands of years before man entered the scene, and many changes have taken place since. It is through the correlation of the cultural remains of man and the physical remains of the river that we may better understand the sequential development of Coastal Louisiana during the most modern period of our geologic history.

Fisk's monumental work on the super-position of the meander

Aerial photos of the survey region, however, indicate a difference in the physiographic expression between streams in the coastal area and streams in the area to the north. In the northern sector, meandering streams, cut-offs, and ox-bow lakes are characteristic features of the flood plain. The super-position of meanders and cut-offs reveals their relative age, and it is by this phenomenon that Fisk has worked out the chronology of the channels (Fisk, 1941). With the exception of Bayou Teche, the head of Bayou Lafourche, Bayou Barataria, and the big bend of Bayou La Loutre, meanders are not found expressed on the surface of the southern locale. Cut-offs and ox-bow lakes are an extreme expression of a meandering river and in the area under investigation, such features do not exist except in tidal channels. The pattern is a labyrinth of braided and bifurcating stream systems in various stages of decay and development. Therefore, the method of dating by super-positions of meandering courses is not effective.

The initial occupancy maps illustrate a concentration of sites in one area and the absence of sites in others. This distribution pattern is directly related to areas that have habitable distributary streams. Sites on the initial occupancy maps do not mark the inception of the stream, but signify that the natural levees were occupied only after they were well-developed. Likewise,
an abandoned system would probably support human occupation for long periods after the main discharge had chosen another channel. The drainage of rain and overflow waters during the high river stage would provide adequate fresh drinking water for a considerable time. This is borne out on the over-all site distribution maps. In many cases where a site was occupied during one of the early periods, later habitation also is represented. In some sites the entire chronological sequence is represented, even though it is known that the stream did not flow during the entire time. There "...was never a time when Indian population was geographically stable. Migration by units of all sizes, from the family to the tribe, was probably routine." (Jennings, 1952, p. 269). It is reasonable to assume that any habitable natural levee would not be devoid of human settlement for many years, especially when high ground was at a premium in the lower deltaic region. Initial settlement on the banks of a stream has a relative chronological relationship with older or younger initial settlements on other natural levees. The distribution and settlement has a direct relationship with active discharge areas (Kniffen and Russell, 1940, p. 1207). Ordering or placing in time sequence of the development of various deltaic units within the lower delta is detected in this manner. With the many previously discussed variables and limitations in mind, potsherds can be used as relative indicators of time.
Coastal Louisiana is a deltaic mass of unconsolidated material that has slowly but perceptibly been sinking throughout most of its history. For many thousands of years, the Mississippi River has been building its deltaic plain and it is believed that coeval with this building process, the deltaic mass has been sinking. Over a million tons of sediment are deposited daily at the mouth of the master stream and this tremendous load is slowly depressing its base (Russell, 1936, p. 162). The fastest rate of submergence is in the proximity of the river mouth and gradually decreases landward. Contemporaneously, the sediments of the deltaic mass compact and mounds and middens located upon them gradually subside. The effects of subsidence are recorded in many physical and cultural features of the area.

Indian refuse heaps and artificial mounds have long been used as a tool for measuring active subsidence. M. Toumey was one of the first to recognize the use of Indian sites to indicate this phenomena. In 1850 he noted that the top of a large shell heap in the marsh near Mobile was below the highest water mark and excavations of ten to twelve feet showed stratification of shell and Indian pottery remains (Toumey, 1853, p. 153).

While doing survey work in the western area of Louisiana in 1875, H. C. Ripley noted that subsidence seemed to be a common thing in the region. He recognized the presence of shell mounds whose bases were below the water level along the Sabine River and Black Bayou (Ripley, 1875, p. 389). In 1891, in a discussion of the Nita Crevasse near Romeville on the Mississippi River (Plate 1),
L. C. Johnson observed that shell heaps had sunk ten to fifteen feet below the shore elevation and cuts made indicated that some sites had subsided to a depth of twenty feet (Johnson, 1891, p. 23).

Smith, Langdon, and Johnson reported that one site near Scranton, Mississippi is "...in a situation where it is not reasonable to suppose human habitations would have been located, if the ground then had been a marsh as it is now." Excavations for a railroad levee near the site "...indicate that the shell-heap was upon the underlying hard bottom, and not upon such a spongy mud as now covers these flats. So much going to imply a previous elevation: the same 'shell-heaps' furnish argument of the recent slow, continuous subsidence." (Smith, Johnson, & Langdon, 1891, p. 45).

A Louisiana Geological Survey report in 1899 contained several sections concerning subsidence of inland sites. On a canal dredged near the northeastern corner of the Belle Isle salt dome (Plate 1), a midden about two hundred feet long was exposed. It was about three feet thick and was covered with marsh deposits indicating that "...subsidence which has been progressing on the Gulf coast for the last period is still going on at a fairly rapid rate." (Harris & Veatch, 1899, p. 229).

In 1935, Howe, Russell, and McQuirt located many sites in the Grand Lake area and determined the amount of their subsidence as well as their physiographic bases (Howe, Russell, & McQuirt, 1935, p. 64-68). Russell and Kniffen continued this correlation in St. Bernard and Plaquemines parishes where borings were made on many Indian middens (Russell & Kniffen, 1936). In Iberville and Ascension parishes they reported that some mounds that were probably
built on levees ten feet above low-water stage have now sunk beneath that datum (Ibid., 1933, p. 14).

As a result of the subsidence measured in the area, it is recognized that Coastal Louisiana is sinking both regionally and locally. Both the regional and local subsidence processes must be recognized and considered when interpreting the physiography of the coast. The same factors are involved in both phenomena. However, regional subsidence involves downwarping of the basement rock while local subsidence involves the compaction of the near-surface unconsolidated sediments and the sinking of local loads.

Regional sinking is apparently related to the tremendous load of sediments being deposited by the Mississippi River and takes place at a much slower rate than does local subsidence. It is believed that sedimentary loading and compaction are important factors in the processes of regional subsidence and that they are among the causes of the coastal area tilting seaward. "While loading is taking place a delta appears not only competent to depress the rocks below but it also drags down a considerable amount of surrounding territory." (Russell, 1940, p. 1223).

Local subsidence is caused by the compaction of sediments and the sinking of a local load over soft unconsolidated material. The thickness of the compacting sediments varies from place to place and has a direct relationship on the amount of local settling. Less compaction occurs in thin layers of sediments, and conversely, greater compaction occurs in thicker sediments. The localized load (e.g. the natural levee or Indian midden) on unconsolidated marsh-type deposits sinks by its own weight. Although local compaction and local load are
probably both responsible for the submergence of levees and mounds in this area, several other localized factors must be considered.

In some areas it is difficult to determine whether the mound or levee has actually subsided or was buried by more recent sedimentation. The most recent examples of aggradation are found along the flanks of the Mississippi River and in the Atchafalaya basin. Some mounds in the Atchafalaya basin that were above the surface of the ground twenty years ago are now buried by several feet of sediments.

In Coastal Louisiana, where salt domes and faulting are common, sub-surface structure is another factor to consider when considering subsidence. In areas where salt domes are at or near the surface, subsidence of former levees and middens is restricted. It is not known to what extent faulting affects surficial recent sediments. Although surface faults are difficult to recognize in the unconsolidated area of Coastal Louisiana, it is evident that if faulting did take place the fault movement would probably alter the subsidence picture. The depth of the base of a measurable feature does not necessarily reflect the amount of subsidence that has taken place, but is only a relative gauge when compared to the present water or land surface. Therefore, the maximum height the levee or shell midden attained above the datum plane is another unknown variant.

There is conclusive evidence from Indian sites that subsidence has occurred and is presently occurring. The many variables listed above make an accurate submergence rate scale improbable but site age-submergence relationships were recorded
during this study and they are shown on Plate 3b. The surrounding marsh was considered the mean datum plane in each locality and depth of each site below the plane is shown in feet on the map.

The oldest sites should show the greatest amount of subsidence but the only location where this relationship occurs is at the La Branche shell midden (Plate 3b, site A). Presumably the site is located on an ancient stream scar and borings indicate that the base of the shell was twenty feet below the swamp surface. The Tchefuncte sites (sites B, C, & D) located on former beaches do not show this amount of subsidence, probably because of their nearness to the Pleistocene terrace.

Although little site age—subidence relationship can be determined from the Marksville sites a more definite pattern is shown by sites of the Troyville period. South of the Teche-Mississippi course five Troyville sites (sites E through I) show about the same submergence depths and are considerably lower than nearby Plaquemine sites (sites J through P). Although the entire record may not be recovered, this contrast indicates a relative site age—submergence difference. More borings in the sites of each period might show a greater trend toward a relative age—submergence scale.
Easily obtainable foodstuffs and a warm sub-tropical climate made daily living easier for the Indian of Coastal Louisiana than for his contemporaneous counterpart in other regions. Indigenous plant, animal, and marine life abounded throughout the deltaic area and the diet of early man varied according to his natural setting. He fulfilled his needs by hunting, fishing, and gathering; in areas where it was possible he may have supplemented his diet with agriculture. Regardless of his mode of attaining a livelihood, he was helped immeasurably by the mild climatic conditions in which he lived.

A changeable, marine-type climate, influenced by subtropical location and proximity to the warmed waters of the Gulf of Mexico generally predominates throughout the survey area. Moist tropical air from the Gulf is carried inland during the summer months by the prevailing southerly winds. These winds are usually accompanied by recurrent thunder showers. Periods of extreme heat and droughts are infrequent and are associated with the westerly and northerly winds. During the winter months the area is subjected to alternate invasions of warm tropical and cold continental air. This results in a changeable type of climate during the winter months.

The Gulf waters, numerous lakes, bayous, tidal channels, and wet, near-sea-level marshes moderate extreme weather conditions invading the area. Mean surface temperatures along Coastal Louisiana range from 61° F. in February to 84° F. in August (Climate and Man,
The Mississippi River also has some effect in altering weather conditions in its immediate proximity. From December to May the water temperature is lower than the air temperature; the average January temperature for river water is $47.5^\circ F$. This temperature contrast is responsible for fogs, particularly when warm southerly winds are blowing. During extreme cold and hot invasions river-water temperatures have a tendency to moderate weather conditions along its banks (Idem.).

Long growing seasons and frost-free days are at their maximum in Coastal Louisiana and are conducive to abundant plant growth. The growing season in the eastern section averages about three hundred and twenty days compared to about two hundred and ninety days for the western area. Although frost can be expected between the end of November and the latter part of February, this region has occasional winters free from frost and below-freezing temperatures. Plants that can withstand periodic temperatures as low as $20^\circ F$ survive the normal winters and flourish in this locale.

The coastal area receives abundant rainfall with more precipitation in the winter than in the summer, and although drought periods occur during the growing season, they are usually of short duration. The mean annual rainfall varies little within the area: New Orleans receives about 57.5 inches (Plate 1); Burrwood, 53.4 inches; Franklin, 64.2 inches; Orange, Texas, 51.9 inches; and Lake Charles 57.33 inches (Louisiana Rainfall, 1952, p. 7).

Coastal temperatures are usually more moderate than those farther inland. There is a small band along the coast where the hottest day rarely reaches $100^\circ F$. The average mean temperature for
New Orleans is 69.7° F.; for Burrwood, 70.8° F.; for Franklin, 69.7° F.; and for Lake Charles, 68.3° F. (The Climate of Louisiana, 1950, p. 7–9 & 11).

Although the average track of large cyclonic storms is north of the coastal area, the region is occasionally visited by intense winter fronts (Climate and Man, 1941, p. 903). More significant, however, are the tropical hurricanes which bring the highest wind velocities recorded on the coast. Fortunately these occurrences are not frequent for they are the most devastating of storms. Records of hurricanes during historic times attest to their tremendous destructive power. In 1856, Isle Derniere (Plate 1), a pleasure resort in southern Terrebonne Parish, was struck by a hurricane. Heavy winds forced destructive depths of water over the Island and everything on it was destroyed. Within a few hours thirteen inches of rainfall fell in New Orleans, approximately fifty miles from the center of the storm (Tannehill, 1941, p. 156–7).

A hurricane whose center passed between Lake Pontchartrain and Lake Maurepas struck the New Orleans area in September, 1915. Winds reached a maximum five-minute velocity of one hundred and twenty-four miles per hour; the highest recorded velocity was one hundred and forty miles per hour. "The storm waters were carried over southeastern Louisiana and the depth was more than twelve feet on the shore of Lake Pontchartrain and ten to eleven feet on the Louisiana and Mississippi coasts." (Cline, 1926, p. 262). New Orleans suffered extensive damage and in Leeville, sixty miles to the south, only one out of one hundred homes remained standing.

There have been at least thirteen tropical storms of
hurricane velocity in Louisiana since 1900. This is an average of a major storm every four years. Each left a path of destruction in the fields and cities over which it passed. Such storms must have been devastating to the aborigines who lacked the efficient warning system, protection, and rehabilitation facilities of our modern age.
Favorable climatic conditions, profuse vegetation, and abundant sea and animal life offered many inducements to early man to settle in Coastal Louisiana. He made his home on the most secure ground and took advantage of the many natural food resources abounding in the area. Wild fruits and grains were gathered and utilized by nearly all Indian groups and many depended heavily on sea food as their basic mode of subsistence. In some regions cultivated fields apparently supplemented early man's diet and added a degree of security to his existence.

Cultural remains that exist in the mounds and middens of this area do not give precise evidence of the types of plant life eaten by the Indian. Historical records shed some light on the food habits of native tribes during the exploration and settlement period of south Louisiana. In addition to the data from historical sources it is also relatively certain that indigenous edible plants existing today were probably growing at least during part of the prehistoric period. These two methods of obtaining data are both imperfect, and a complete plant-food list is impossible to compile. In this study neither the historical nor field sources were exhausted and it is likely that much more information is available.

Father Zenobius Membre, who accompanied La Salle on his first voyage down the Mississippi in 1631, was one of the earliest Europeans to record data about the native tribes. He notes that during the month of May, "whole forests of mulberries" were producing fruit and that plums and wild beans were both available (Historical Collections of La., 1852, Vol. IV, 165-185).
Paul du Ru, chaplain for Iberville's second expedition during 1699, relates that apparently Iberville's men relied quite heavily upon Indian corn for sustenance. "We have fallen back upon the sagamite, that is to say good meal of Indian corn soaked in the water of the Mississippi." (Butler, 1934, p. 13). Other than corn, pumpkins and tobacco were cultivated by the tribes du Ru visited.

In 1778, William Bartram, an English botanist, visited the Lake Pontchartrain and Bayou Manchac area and noted that strawberries and plums were available. Of the plum he said, "There is a native species grows in this island, which produces its large oblong crimson fruit in prodigious abundance; the fruit, though of a most enticing appearance, is rather too tart, yet agreeable eating, at sultry noon, in this burning climate...." (Van Doren, 1928, p. 337). Bartram observed no "...new vegetable productions, except a species of Cleome (Cleome lupinifolia); this plant possesses a very strong scent, somewhat like Gum Assafetida, notwithstanding which the inhabitants give it a place in soups and sauces." (Van Doren, 1928, p. 339).

During the early part of the nineteenth century William Darby was doing survey work in Louisiana and noted existing vegetation types in his journals. He found the muscadine grape vine growing along the Teche and described a native cranberry growing in the Mermentau area (Darby, 1816, p. 152-53). This reference to the cranberry is questionable for no such plant has been recognized during modern botanical work in the region.

In his study of the Indian tribes of the Lower Mississippi Valley, John R. Swanton compiled much of the available data from early historical sources. Referring to the Chitimacha west of Bayou Lafourche he says, "In their aboriginal state the tribe supported themselves
mainly by vegetable food; ... the women had to provide for the household by collecting pistaches, wild beans, a plant called kupimu and another called woman's potatoes, the seed of the pond lily (akta), grains of the palmetto, rhizome of the common Sagittaria, and that of the Sagittaria with the large leaf, persimmons." (Swanton, 1911, p. 346).

Although many of the plants mentioned in historical records can easily be identified as indigenous to the survey area, some references did not give enough descriptive information to make recognition possible. Aside from plants mentioned in the early records and their corresponding indigenous counterparts, there are many edible plants that are also native to the area. There is no positive evidence, but we can probably assume that they were consumed by the Indian.

An attempt will be made to correlate the plants mentioned by the early chroniclers with those native to the area and wherever possible their genus and species will be noted. The plant group will be separated into fruits, vegetables, grains, and nuts for the purposes of this discussion.

The mulberry (*Morus rubra*), which was referred to several times in early records, is widely distributed in Louisiana as is the red plum (*Prunus americana*). Although there were both red and white plums growing in the area during the time of the early explorers, only the red species has been identified. Of the strawberry vines (*Fragaria*) Bartram says, "They had no fruit on them but the inhabitants assured me they bore fruit in their season, very large, of a fine red colour, delicious and fragrant." (Mark Van Doren, 1928, p. 341). Strawberries have been found growing in Washington and St. Tammany parishes and are believed to have had a wider distribution at one time. (Brown, 1942, p. 174).
There are several references by early writers about wine being made from native grapes (Vitus) by Europeans. Several species of grapes have been recognized scattered throughout the woods and thickets but little has been done to differentiate between them. Persimmons (Diospyros virginiana), according to these early accounts, were located on the levees of the bayous. During this study they have been found on several Indian sites. The historians often mention the planting and growing of melons and peaches, but since they fail to mention their origin it is believed that they were first introduced by Europeans.

To this list must also be added the blueberry or huckleberry (Vaccinium), dewberry (Rubus trivialis, sons), blackberry (Rubus abundiflorius, louisianaicus), elderberry (Sambucus canadensis), and mayhaw (Crataegus opaca). Although the huckleberry and mayhaw are more abundant in the pineland regions, they are also growing in the alluvial plain and probably were available to the Indian. The other berries noted above are widely distributed throughout the survey area.

Wild vegetables are varied and include many different types. The wild bean mentioned by many of the early writers was probably the same one (Strophoslyles helvola) that has been identified in recent botanical studies. In addition to numerous other historical references, Cathcart says, "I found an indigenous bean here which grows upon a vine and spreads a considerable distance...." (Prichard, Kniffen, Brown, 1945, p. 80). Three kinds of native corn have been indicated, white, yellow, and blue or black. Corn was apparently widely dispersed and in some areas was the major food staple. The pumpkin (Curcurbita pepo) that has been identified as indigenous by recent study, probably is one of
the types referred to by the explorers. It is found in the woods and thickets and along river banks. Although tobacco is not found growing throughout the area today, there are numerous historical references to its cultivation and its use by the Indian. Pipes found in several sites are additional indicators that the use of tobacco was widespread. Cleome (Cleome spinosa), called the Spider Flower, grows in waste places and was used for seasoning by the historic tribes.

The potatoes eaten by the Indian were probably the wild potato (Ipomoea pandurata) and the ground or Jerusalem artichoke (Helianthus tuberosus) both of which are native to the region. The wild potato was known as the "woman's potato" to some of the tribes. Since botanical studies have shown no indigenous sweet potatoes for this region, it is thought that they were introduced into the area by Europeans (Post, 1933, p. 581).

Other tuberous and bulbous plants eaten by the Indians were the white pond lily (Castalia odorata or tuberosa) (Fig. 18), wild onions (Allium canadense), the paddle weed or delta potato (Sagitaria lancifolia & platylla), and the Indian turnip (Arisaema triphyllum). These plants are widely distributed throughout the region and were known to have been utilized by the historic Indians. The fungi plants (Kniffen, 1935, p. 5) such as the mushroom (Agaricus) and the tuckahoe or Indian bread (Poreia cocos) were apparently also used as food. The sclerotium, a compact mass of threadlike filaments which form the vegetative portion of the fungi, was ground into flour from which bread was made.

Yaupon (Ilex vomitoria) was used to brew a black beverage, that if strong enough, acted as an emetic (Brown, 1945, p. 165). According
to du Ru, a herb, called l'apaly by the Indians, was used to treat wounds. Robert Usher, former librarian of Howard Memorial Library, identified l'apaly as yaupon. The French use sassafras (*Sassafras albidum*), swampbay (*Persea palustris*), and redbay (*Persea barbonia*), which grow wild in the region, for gumbo seasoning. Sassafras is also presently used for making tea and may have been utilized in the same way by the Indian. It is likely that the Indians also used the other plants in their foods for they have a wide occurrence throughout the area. The cactus (*Opunta*) (Fig. 19) has a wide distribution in the survey area. In many instances it is associated with Indian habitation sites and historic Indians were known to have used it as food (Gatschet & Swanton, 1932, p. 11). The banana lily (*Castalia mexicana*) is found in many sections of fresh water marshes and since its fruit is edible may also have been used by early man.

Grains and nuts were varied and apparently quite plentiful in the coastal area. The palmetto (*Arecaceae*) (Fig. 20), which is abundant in the survey area, grows best in regions protected from periodic flooding and brackish water. Its seeds were utilized as food by historic Indians and probably by the earlier inhabitants.

The variety of wild rice (*Zizania aquatica*) so important in Indian economy in the Great Lakes region is scarce in Coastal Louisiana. However, the water millet cut grass (*Zizaniopsis miliacea*) may be the species mentioned by early explorers who called it reeds, or marsh rice (Prichard, Kniffen, Brown, 1945, p. 80). Peniacaut may have been referring to this grain when he said, "...we entered some tall reeds, or canes, which bear a grain very much like oats, from which the savages make a quite tasty bread and also a soup...." (McWilliams, 1953, p. 14).
Fig. 18 - White pond lily in shallow lake.

Fig. 19 - Cactus and fruit.
It is found in most parts of the area but is most abundant along the bayous and in fresh-water marshes. The water chinquapin (Nelumbo lutea), also known as the grain a voulet, or duck acorn, was apparently a favored food of the early inhabitants. The seed of this plant is said to taste like a hickory nut when roasted (Swanton, 1911, p. 345).

Father Membre says the Indian had a "great variety and an infinite store" of nuts. They used them as we do, pounded them into flour to make their bread or broth and used them to mix with their hominy. Bartram tells us they were extravagantly fond of hickory milk which was "as sweet and rich as fresh cream." To make it, they first "pound the nuts to pieces upon a stone thick and hollowed out for the purpose," and then "cast them into boiling water which, after passing through fine strainers preserves the most oily part of the liquid." (Van Doren, 1928, p. 38).

Many trees produced nuts that were incorporated into the economy of the Indian. The live oak (Quercus virginiana) (Fig. 21), the swamp hickory (Carya leioderma), the shagbark hickory (Carya ovata), and the pecan (Carya illinoensis) are all indigenous to the area (Brown, 1945, p. 43, 49, 52, & 72). Prior to European colonization, the native range of the live oak was south of Baton Rouge and Opelousas on the high ground of the flood plain. Trees growing north of this area have probably been planted by later inhabitants. Those growing in the survey area have a close affinity with Indian sites and there seems to be a good possibility that they were dispersed by the Indians. The fact that the live oak is not found on post—Indian beaches and natural levees seems to substantiate this
Fig. 20 - Palmetto

Fig. 21 - Live oak and Spanish moss.
possibility.

Spanish moss (**Dendropogon usneoides**), which is almost always associated with the live oak tree, was derisively called Spanish beard by the early French. The Spanish in turn called it French wig (McWilliams, 1953, p. 18). Although it is not a food, it played an important part in the economy of the Indians for it was used as a product of barter as well as a covering for the body. Dyer notes that the Atakapas, a tribe in the western sector, exchanged Spanish moss for stones and flints with their northern neighbors. It was also utilized for other expediencies: "The infant was removed from its cage twice daily, fresh moss being placed between the legs to absorb the natural discharges." (Dyer, 1917). According to Penicaut, other Indians had additional uses for the moss, "...the girls wore a single hank of moss which passed between their legs and covered their nakedness, the rest of their bodies being quite nude." (McWilliams, 1953, p. 18).

Penicaut singles out what appears to be the pecan from the remainder of the indigenous nuts and says: "But the best are scarcely bigger than one's thumb; these they call pacanes." (McWilliams, 1953, p. 84). Pecan trees are generally found as forest trees in moist bottom lands and were quite extensive in lower Louisiana according to Harold Hume, "...although heretofore not regarded as a native of the eastern gulf region outside of the Mississippi and Yazoo deltas. Groves of full-grown trees, which must have been in existence before the arrival of the first white settlers, are remembered by very old inhabitants." (Hume, 1912, p. 19).
Although the products of the vine and tree were apparently plentiful and varied, the coastal Indian did not exist on them entirely. Animal and bird life of many kinds were also abundant and indications are that they played an important role in Indian economy. In addition to available information from historical records and from the study of present day indigenous land fauna, bones found in Indian sites throughout the area testify to the extensive use of animals for food. However, the record is no doubt incomplete and additional study will probably add much to available knowledge.

In both the Penicaut Narrative and the Journal of Paul du Ru, mention is made of Indian use of various types of mammals and fowls. According to Penicaut, carpenter for Iberville in his first voyage to Louisiana, Isle-aux-Chats (Cat Island) was named for the many raccoons found on it; Isle-aux-Chevreuils (Deer Island) was named because a 'crocodile' ate one of the company dogs there. When the ship stopped at Isle Surgers (Ship Island), the men "...killed a prodigious quantity of wild geese, locally called bustards, which are once again bigger than the geese we have in France." (McWilliams, 1953, p. 3). Penicaut records that the Indians used bows and quivers made of the skins of the otter and the fox, but whether they used more than the skins is not known. Pointe-aux-Chenes was referred to as a fine place to hunt because of the abundance of pheasants, bustards, ducks, and teal in the area (Ibid., p. 10).

Early in the 1700's, Butel Dumont de Montigny spent twenty-five years in Louisiana and wrote many letters and articles
about his experiences. When writing on the mammals of the area he said, "Of all the terrestrial animals which live in this Province the most important and the most useful to the country are the Bears and the wild Oxen." (The Fur Animals of La., 1931, p. 35).

Bear (Ursus americanus) were apparently plentiful and were utilized in many ways in the daily life of the Indian. The flesh was dried and eaten, the oil or fat was often used in food preparation, and of course the skin served as various types of covering. In addition to historical testimony, utilization of the bear by prehistoric people is attested to by the numerous bear bones found in many sites throughout the survey area.

The wild oxen mentioned by Dumont was the buffalo referred to by earlier writers, notably Penicaut and du Ru. Near the Pearl River, du Ru records, "We have discovered a herd of buffalo and our men are practically surrounding them." (Butler, 1934, p. 64). Penicaut reports, "On our way upstream we paused at the Manchacq where we killed about fifteen buffaloes. Again on the following day we went ashore to hunt. We killed eight buffaloes and just as many deer." (McWilliams, 1953, p. 116).

The penetration of the buffalo into the deltaic plain is not definitely known but Dumont writes, "The Bayou Terre Boeuf section of St. Bernard and Plaquemines parishes was named the French equivalent of "Land of the Beeves" because of the great number of buffaloes, members of what is known as the Southern Herd, that spend the winter months in the lush-green pastures of these reknown marshes." (The Fur Animals of Louisiana, 1931, p. 35). Buffalo indications have not been found in Indian sites during this study, but their remains were located
during excavation for salt on Petit Anse (Avery Island). These remains were in proximity to cultural artifacts and suggest that the buffalo played some part in the economic life of the coastal Indian.

References to deer and wild turkey are found in most of the early records of the area. The deer (*Odocoileus virginianus*), which is still quite abundant, was apparently one of their most dependable food sources. Bones of the deer have been found *in situ* with Indian cultural remains and verify extensive use. Many deer bones were fashioned into tools by early man.

Great quantities of wild turkeys (*Meleagris*) were available in the area and were not difficult to hunt. Penicaud says that near Lake Pontchartrain the wild turkeys perched in the trees at night and "I can say in all truth that I have never seen such big ones in France, for these weighed as high as thirty pounds when ready for the spit." (McWilliams, 1953, p. 15).

The raccoon (*Procyon lotor*), for which the French named Isle-aux-Chats, as well as many other small animals played an important role in the food habits of early man. The squirrel (*Sciurus*), oppossum (*Didelphis virginianus*), otter (*Lutra canadensis*), rabbit (*Sylvilagus sp.*), fox (*Urocyon*), wild cat (*Felis*), dog (*Canis familiaris*) (Ford, 1945, p. 43), and the muskrat (*Ondrata*) were all apparently utilized.

The muskrat species (*Ondrata Zibethicus rivalicius*) living in Louisiana today is probably not the same as the one which was used by prehistoric people. Preliminary comparisons between the lower jaw bones of the two types show differences which suggest that they may be separate species.

Bones of all the aforementioned animals were found in sites through-
out the survey area and seem to be associated with all the periods in the chronological time scale.
Marine life has always played an important role in the economy of Coastal Louisiana. Numerous and extensive shell heaps as well as the remains of various other forms of aquatic life testify of their importance to the early inhabitants. Many references are found in early journals to the use of water life by the historic Indians and the early explorers. Penicaud records that at Isle Surgers they took "...such an abundance of fish and oysters in the shell that the crews of the two ships became upset from overindulgence." (McWilliams, 1953, p. 3).

In his treatment of the Atakapas between 1817 and 1820, Dyer suggests that at least this group lived almost entirely on marine life. He tells that the shark was the buffalo of the coastal tribe "...for it supplied skin, flesh, oil, sinews, bones, fins, and bile, all of which integral parts found a use in the everyday life of the clan...." (Dyer, 1917). Fish oil was used as a food and as a lubricant for the body. Bunches of small fish were dried or smoked and used as barter with the inland tribes. All kinds of shell fish were used by the Atakapas as well as the tail of the alligator. Alligator oil was "...served as a delicacy and placed in jugs for future uses; an essential one was for body imnction, which kept off mosquitoes and gnats, prevented the terrible "water sunburn" of the body, and lastly was believed to render the swimmer more buoyant. The alligator oil was used in their lamps; as torchwood was often scarce or wet." (Idem.).

Alligator (Alligator mississippiensis) and fish bones found in refuse heaps throughout the area testify to their being an important source of food. The most common fish bones collected were those of the black drum (Pogonias cromis), spade fish (Chaetodipterus), catfish
(Ameiuridae), and the alligator gar (Lepisosteus spatula Lacepede). Worked garfish scales indicate their probable use as hunting points.

Mollusks were the most important of all marine life in the regions where they were abundant. In 1938 and in 1941 a study was made of the food habits of the Houma Indians who "...inhabit the coastal bayous and lowlands of Terrebonne and Lafourche parishes..." (Speck & Dexter, 1946, p. 34). This study showed that the Houmas subsist primarily on sea foods and that the following mollusks are commonly eaten: the fighting stromb snail (Strombus pugilus), the rock snail (Thais floridana & floridana haysae), and the pear conch (Busycon perversum). They also eat the hard-shell clams (Venus mercenaris & campechiensis) as well as the oyster (Ostrea) and brackish-water clam (Rangia) (Idem.).

Evidence in prehistoric sites shows that early inhabitants had similar food tastes. Excepting the Ostrea and Rangia, the above-mentioned mollusk remains are a minor part of the shell heaps, but they are often found and must have been utilized. The Unio, Ostrea virginicus, and Rangia cuneata are the major types of shells found throughout the survey area.

The Unio, a fresh water clam, is more abundant in the northern sections of the survey area. The greatest accumulation of this type of shell is in the Atchafalaya-Grand River drainage basin north of the Teche-Mississippi course. Although a few Unio shells are found in sites throughout the survey area, the greater part of the shell heaps are made up of Rangia. No living Unios were found during this study and although they have a wide distribution in streams throughout southeastern United States they are not as abundant in the coastal area as
the Bangia and Ostrea.

The Ostrea requires more saline water conditions than either the Unio or the Rangia and is presently found living in the seaward limits of the coastal area. Its shell is found in middens throughout the area in considerably smaller quantities than the Rangia, and becomes even less frequent in inland sites. Dyer says that the Atakapa obtained oysters "...from the salt water lagoons, being dragged from the shell bottoms with rakes made of two strong poles, curved at the ends and interlaced with strong vines. The drag brought up clumps of live oysters, fastened to the shells of former generations. The old shells were always detached and thrown into a mound in the village, upon which stood the lodges of the head man and of the shaman."
(Dyer, 1917).

Rangia is the dominant shell found in Indian middens throughout the survey area and must have been the most important mollusk in Indian economy. Because of its dominance and importance it will be treated in more detail than any other type of marine life. Two species now exist in the survey area: the Rangia cuneata, which is the most abundant, and the Rangia flexuosa, which is sub-generically distinct from the cuneata. The flexuosa is found along the beaches and requires more saline conditions than the cuneata, which lives in inland brackish waters.

Although little ecological work has been done on the Rangia, it was recognized by many of the early writers but was erroneously referred to as the Gnathodon. W. H. Ball, who has done more work on this clam than any one else initially called it the Gnathodon but later corrected his error. He limits the distribution of the Rangia to
"...the Gulfs of California and Mexico, in shoal quiet water varying from salt to fresh..." (Dall, 1895, p. 89). It was first found in Miocene deposits and extends through recent geologic periods to the present (Ibid., p. 91). Harold W. Harry is inclined to doubt the validity of the California record of the genus from Tertiary times, which was "...based on poor material, from a single collection at a single locality." (Harry, 1954*). Living *Rangia* are generally limited to the Gulf coast from Texas to Florida, and probably do not exist in the Antilles (Idem).

Large shell accumulations indicate that there were times when the *Rangia* may have been more abundant than at others. Between Bayou Du Large and the Atchafalaya River, south of the Teche-Mississippi course, there are many large deposits of *Rangia* shell. The deposits average twelve feet in thickness and several hundred feet long (Plate 5a). Subsidence and aggradation have buried these shell ridges to an average depth of twelve feet below the surrounding marsh. The oldest culture found is of the Troyville period, with habitation remains extending through the Plaquemine period. It is possible that the cultural picture is not complete and that when additional information is recovered from the buried middens, even older cultural sequences may be recorded.

In contrast to these large deposits of shell are the shallow layers of *Rangia* found in the adjacent eastern area. Along the distributaries from Bayou Du Large (Plate 1) to Bayou Lafourche

* Personal communication.*
the shell accumulations are from one to two feet thick and of short length. The cultural remains from the shell heaps have been identified as Plaquemine period.

Additional study on the *Rangia* may provide some of the answers to the questions arising regarding the distributional inequality of *Rangia* deposits. It is believed that the clam grows in brackish water and the saline conditions of the water may have been one of the influences in its abundant growth. Harry says that "I think the larval stages, rather than the adult, may be limited by salinity, because we were able to keep adults in the laboratory at Grand Isle in much higher salinities than those where the clams came from. But laboratory tests of tolerance usually show much broader ranges than what field records indicate, for organisms in general." (Idem.). Temperature changes may also be a factor in the reproduction of the mollusk and may have geological implications. Harry suspects "...a brief period of reproduction, perhaps in the cooler times of the year. If this were so one might be able to predict "past" temperatures (Climate) as well as salinity from a study of recent *Rangia." (Idem.).

Salinity change is shown in several sites in the area where stratification of *Rangia* and *Unio* or *Ostrea* shell is found in one midden. The base of the Patterson site (Plate 62, no. 13) is composed of from six inches to a foot of *Unio* shell and grades into and is replaced by *Rangia*. Apparently there was either a change from fresh water to brackish water in the nearby lakes, or for some reason the Indians replaced the *Unio* with *Rangia* in their diet. Since this illustration is repeated in several sites, it is more likely that the
change in water environment was the cause. The same relationship between the Ostrea and the Rangia occurs in sites seaward, again suggesting a change in the environment of the mollusks.

Salinity change has probably been at least partly responsible for early man changing his food habits. As the Rangia became scarce and the Unio became more abundant, or vice versa, man utilized the food that was available. Kniffen explains that in the Atchafalaya—Grand River region this substitution was probably caused by "... a changing environment for the Lower Grand River area..." and adds "The oldest site, Goddel Ridge is composed entirely of Rangias. The lowest and oldest identified stratum of the Miller site is composed entirely of Unios, which in turn are overlain by a black-earth layer, and the latter capped with Rangias." (Kniffen, 1938, p. 205). Kniffen indicated during his study that live Rangia were available in nearby Lake Verret. During this present investigation, Goddel Ridge (no. 6, Plate 4a) and the Miller site (no. 12, Plate 5a) were revisited and it was discovered that salinity conditions have changed to the degree that Unio are now reportedly found in nearby lakes.

The same procedure holds true with the other natural produce of the area. When one food became scarce for any reason, another was necessarily substituted for it. This abundance or paucity of various types of food tends to explain the food habits of people in different areas. In the black-earth middens of the cheniers of western Louisiana there was obviously a different food emphasis than in the coastal area to the east. With the exception of Chenier du Fond (Plate 1), very little shell is found in the refuse heaps. A quantity of small animal and deer bones was found, suggesting that the inhabitants
lived off their hunting skills. They may have supplemented their diet with agriculture as well as available wild fruits and vegetables. Small shell middens are found along the Mermentau River as far south as Grand Chenier, and indicate that along this stream the mollusks were available in limited quantities and were utilized by man.

Shell and animal bones both gradually diminish in quantity and variety in the earth mounds toward the inner limits of the area. The local inhabitants must have depended more heavily upon agriculture and what produce they could gather from the surrounding vegetation.
In addition to favorable climatic conditions and an abundance of vegetable, animal, and marine life, the Indian in Coastal Louisiana also had access to sufficient quantities of salt. There are two chief sources of this mineral in the survey area: the water from the Gulf of Mexico and the salt domes of the Five Islands. A record of the historic Indians reveals that they obtained necessary salt supplies by boiling sea water (Swanton, 1911, p. 346). Kniffen also refers to this method of obtaining salt as well as suggesting that it was obtained from the Five Islands (Kniffen, 1935, p. 5).

The Five Islands were apparently the source of the block of salt mentioned by du Ru in 1700, "I returned the visit of the Chitimacha chief. He gave me baked Indian corn to eat, and shared with me a little block of salt which he had on his plate. It was some of what the savages dig from the ground. I tasted it and thought it to be a little sharper than ours." (Butler, 1934, p. 51-52).

There is more evidence that salt was obtained from Petit Anse (Avery Island) than from any other island in the group. When Eugene W. Hilgard visited the island in 1871 he noted "...Indian hatchets, arrow heads, rush baskets, but above all, an incredible quantity of pottery fragments, have been extracted from the pits. The pottery fragments form at some points veritable strata three to six inches thick;..." (Hilgard, 1871, p. 14-15). Professor Joseph Henry delivered a paper before the Chicago Academy of Sciences in which he discusses Mr. T. F. Cleu's contribution of a fragment of
Indian basket work to the Smithsonian Institution. This specimen was found on Petit Anse "...near the top of the salt, and fourteen feet below the surface of the soil." (Cope and Kingsley, 1895, p. 393).

From the foregoing historical references, it seems apparent that aboriginal inhabitants knew of the existence of a brine spring on Petit Anse and perhaps of the rock salt as well. Indian cultural remains and quantities of animal bones indicate that both early man and animals utilized this natural deposit.
INTRODUCTION AND ANTIQUITY OF AREA

Man has been living in Coastal Louisiana for a short time compared to the thousands of years that the Mississippi River has been alluviating its plain. Russell says that 'recent' alluviation has been taking place for the last twenty thousand to thirty thousand years (Russell, 1940, p. 1202). According to the best information available, Indian habitation in the survey area has covered less than two thousand years. The record of man during this period is far from complete. Since much of the evidence that exists is rapidly being destroyed by submergence, alluviation, erosion, and by man himself, it is probable that a complete record will never be obtained.

Research in the area is comparatively recent, but investigation has at least outlined a general plan for continued study. The chronology set up for the Lower Mississippi Valley, although not completely adaptable for the survey area, was the guide followed for this investigation. Culture periods cover roughly the last two thousand years (Fig. 1). Gradually gaps in man's prehistorical record are being filled with clues or facts concerning his activities, as well as his natural setting.

A few general conclusions can be drawn about the early inhabitants of the area. They were apparently widespread throughout Coastal Louisiana as indicated by abundant evidence of former settlements (Plate 2). In general, Indian sites indicate the regions within the area where settlements were possible during a particular time. Sites generally follow the shifts of the streams, and site maps for each period show, at least tentatively, habitable areas.
It is doubtful if there has ever been a time in the pre-history of the Indian when tribes were geographically stable over long periods. However, in areas where abundant and constant food supplies were available, semi-permanent settlements were possible. Throughout the Southeast agriculture was extensively utilized to supplement the bounty of nature and may have been a factor inducing semi-sedentary villages. In Coastal Louisiana, where a mild climate, profuse vegetable, animal, and marine life, made the business of living fairly simple for early man, agriculture may not have been practiced to any great extent. References are made to the limited use of agriculture by early recorders but no direct evidence was found during this survey. The presence of an abundance of mollusks appears to have been the stabilizing element in Indian settlements in the survey area.

The chronologic base of reference for this study was the time periods recently outlined for the Lower Mississippi Valley. The dates assigned to each cultural period are estimated and according to Ford, Phillips, and Griffin, "We stand before the threat of the atom in the form of C\textsuperscript{14} dating. This may be our last opportunity for old-fashioned uncontrolled guessing." (Phillips, Ford, & Griffin, 1951, p. 455). Aligned with the chronology of the Lower Mississippi Valley are the chronologies established for Alabama and Tennessee, and the Florida Gulf coast (Fig. 1). These additional periods are included to show existing relationships between the periods in the survey area and those in eastern areas.

Ceramic remains of the Indian populations are the time key used throughout this investigation and their limitations should
be kept in mind. No thorough discussion of pottery or pottery types will be made in this report. Where it seems relevant to the study limited treatment will be given. The limitations of using pottery as a basis for this type of work have already been discussed. In addition to these limitations, it was discovered that the chronology, which is so well established for the Lower Mississippi Valley, is not completely adaptable to Coastal Louisiana. However, the shortcomings may not be in the established chronology but rather in the way it was utilized during this study.

The correlations between cultural remains and the physical setting will be presented in order from the earliest to the latest periods. Initial occupation sites in each period will be discussed and compared to both the over-all distribution for the period and the physical setting. Two maps will be used in each period discussion: the Initial Occupation map and the Over-all Distribution map. Specific initial occupation sites are numbered on the map and will be referred to by number.

The oldest isolated culture recognized in the survey area is the Tchefuncte period. It has been theorized that the Archaic or non-pottery horizon also exists but no definite evidence was found during this study. However, as a foundation to the general period discussions to follow, a treatment of the antiquity of the area will be included.

Geographical distribution of the Archaic or non-pottery horizon is widespread in southeastern United States. As Jennings says, "In any discussion of the pre-pottery horizons of the southeast it must first be realized that from Nova Scotia to Corpus Christi along the Atlantic Coast, as well as in the Caribbean and on all the important interior
water courses, the Archaic peoples once lived." (Jennings, 1952, p. 257).

In Haag's discussion of this early horizon he emphasises
"...the lower portions of the accumulations are notably devoid of
pottery, sherds usually being confined to the upper one or two feet."
There are several middens in likely locations whose lower strata are
without pottery and there are possibilities that further research in
the area will uncover information about the Archaic period. Haag points
out the antiquity of the non-pottery horizons and separates it into two
phases: the cultural remains, which are similar to the Folsum-Yuma of
the western United States, and which are of considerable antiquity; and
the widespread shell-heap horizon, which is of lesser antiquity (Haag,
1942, p. 219, 21). It is this shell-heap horizon that would concern
investigators in Coastal Louisiana.

Before expecting too much in the way of evidence of the
period, however, there are several limiting factors which should be
pointed out. In this area of unconsolidated sediments there is both
local and areal subsidence. The sheer weight of the denser material
of the natural levee, beach, mound or midden, compresses the less-dense
sediments deposited by the Mississippi River distributaries. Aggrada-
tion has also been taking place over various parts of the delta area,
at least until the artificial levees were constructed. Therefore,
sites with the greatest antiquity would have the least chance of sur-
vival above the surface. Any site that did survive is probably associ-
ated with more-stable ground.

Subsidence is not the only limiting factor in the search for
the Archaic period. As was pointed out earlier, the emphasis on pottery
as the basis for establishing the chronological scale in Coastal
Louisiana is restrictive. Throughout the area and especially in places where the mollusks were abundant, there is an absence of pottery. In some geologically 'modern' areas it would be unreasonable to assume that pre-pottery Archaic people were necessarily responsible for all scarcity of pottery in midden deposits.

There are several extensive middens in the survey area where pottery remains are scarce. Although a few pieces can be found their quantity is not in proportion to the size of the shell deposits. There might have been people whose economic pursuits did not require extensive use of pottery even though it was more common with their neighbors. Another explanation might be found in Dyer's discussion of the Atakapas. He specifically mentions the purposeful piling of shells "...in a mound in the village, upon which stood the lodges of the head man and the shaman." (Dyer, 1917). In many of the sites the shells are very clean and free from soil or refuse-heap deposits and it seems possible that the people lived in one area and piled their shells in another. Later after the shell-heaps had been 'fixed' by an accumulation of soil and vegetation they would have been more suitable as home sites. Several sites are found with a stratum of three or four feet of clean shell topped by habitation layers where cultural remains, shell, and soil are intermixed.

The emphasis in this study is on ceramics, and other phases of the Indian culture are of necessity neglected. Also, the paucity of other artifacts limits the available knowledge about the wider aspects of the Archaic culture. Only a few stone implements have been found in the region, probably because of the local lack of raw material. Implements made of bone are diagnostic characteristics in other areas,
but in the coastal region where they are subjected to disintegration by the elements, an adequate number of samples for effecting a classification was unobtainable. To detect Archaic cultures in such a natural setting is extremely difficult, especially when results are so dependent upon surface collections.

On cheniers or stranded beach ridges in both the western and eastern sections of the survey area, Archaic sites may possibly be found in the future. The close proximity of these ridges to the more-stable Pleistocene terraces is probably one of the reasons why they have remained exposed. They also represent some of the oldest features in Coastal Louisiana. The cheniers in the west are least affected by the over-all subsidence phenomena, and remain higher in elevation. They are characterized by a series of ancient beaches truncated by more-modern ridges. It is difficult in many cases to make a definite ridge-site association because of the complexity of the situation.

The Copell site (Collins, 1927, p. 204) (Plate 3a, No. 9), located on the back ridge of Pecan Island, is a good example. In addition to resting on the back ridge, the site is in close proximity to older truncated beaches; therefore it is difficult to determine its actual ridge association. It is a non-pottery site but is thought to be early Tchefuncte because of the relationship with other cultural material of the period (Ford, 1945, p. 17). Additional work in the area may result in significant ridge correlations with possible Archaic sites.

Stranded beaches in the vicinity of Lake Pontchartrain and east to Mississippi are largely submerged below the surrounding marsh.
The Big Oak Island midden (Plate 3a, no. 28), a conspicuous landmark in this near-sea-level area, rests on an ancient beach. The lower strata of this midden are devoid of pottery as are several other sites in this region.

Although no Archaic culture evidence was found during the course of this study it is possible that with more investigation some of the sites may prove to be of greater antiquity than the Tchefuncte culture. If Archaic sites still remain in Coastal Louisiana they are likely to be found in association with the stranded beaches or Pleistocene terrace material in eastern or western Louisiana.
TCHEFUNCTE PERIOD

Tchefuncte is the oldest culture isolated in Coastal Louisiana. According to Ford and Quimby "...is a complex of traits, products of the behavior of some Indians who lived during an interval of time called by us the Tchefuncte Period." (Ford and Quimby, 1945, p. 1). Jennings says this period "...can best be understood as a late Archaic or, better, a transition from the generalized Archaic base to the more specialized patterns of life which ensued." (Jennings, 1952, p. 259). He believes that at the end of the Archaic period a new group of people arrived on the scene and brought the idea of burial mounds and pottery making with them. "In any event the new folk and the complex of new ideas seem to have appeared simultaneously." (Ibid., p. 260).

It seems likely that tobacco was introduced into the aboriginal way of life during this period. Only a few clay pipes were found during this study, but Ford's excavation of Tchefuncte sites near Lake Pontchartrain uncovered many tubular clay pipes. Although no direct evidence was found, there is a possibility that agriculture also played a part in the economy of the Tchefuncte people.

Both the western and eastern portions of the survey area show culture evidences of Tchefuncte period populations. The central region of the area is generally void of this complex, probably because of its location on the flood plain. Subsidence and the destruction or burial of Tchefuncte sites by the more-recent shifts of the major streams has likely obliterated the record. On the Initial Occupation map (Plate 3a), the sites of this period reveal a close
relationship to the cheniers noted in the previous discussion.

Tchefuncte sites in the western section are mainly associated with stranded beaches or Pleistocene terrace material. This association does not indicate the age of Pleistocene features but merely that the Tchefuncte people took advantage of available living areas.

Sites east of Calcasieu Lake (no. 1 & 2) and those in the Mallard Bay region (no. 14 & 15) are located upon Pleistocene terrace material. Along Bayou Lacassine (no. 5 & 7), at Nigger Point (no. 16), and at Latania Lake (no. 6) sites are all based on cypress-covered Pleistocene deltaic material (Howe, Russell, McGuirt, 1935, p. 65). All of these sites except the one at Latania Lake and one (no. 5) along Bayou Lacassine have been destroyed by dredging operations.

Alligator mound (no. 11), on Chenier du Fond along the southern shore of Grand Lake, was a conspicuous landmark in the area until its destruction by road-metal contractors in the mid-thirties. The artificiality of this mound "...is clearly evident in its symmetry and shape, simulating the form of an alligator, the nicety of curvature along the axis, the almost perfect symmetry of cross-section, and by the fact that potsherds were encountered throughout the vertical extent of the mound." (Ibid., p. 66). The major portion of the shell making up the mound was Rangia and some Ostrea. No Unios or other fresh water shells were evident. Kniffen, who accompanied the investigating group believes "Environmental conditions have so changed that it would be impossible for a primitive people to duplicate the building of the Alligator Mound." (Ibid., p. 67).

All that presently remains of the alligator effigy mound is the beach-washed shell along the chenier (Fig. 22). Indian artifacts
Fig. 22 - Chenier du Fond, former location of Alligator mound.

Fig. 23 - Chenier shell-sand-beach matrix.
were collected along the beach but since no stratigraphic information
was available, there is no way of knowing whether the makers of the
oldest pottery found were responsible for the construction of the
mound. Two Tchefuncte shell middens (no. 10 & 11) near the Alligator
mound are located on the same chenier. These have been essentially
destroyed by wave erosion but were probably associated with the
Alligator mound complex. The shell midden on Catfish Bayou (no. 8)
and the one on Collican Lake (no. 13) are based on natural levees.
They are both rather small middens and have therefore not attracted
dredging crews.

South of Chenier du Fond are several sites which rest on
stranded beach ridges of the Grand Chenier complex. Tchefuncte
association begins with Little Chenier (no. 3 & 4) and continues east
to Little Pecan Island (no. 9). The discontinuous ridge trends east
to Pecan Island, where the sites (no. 17, 18, & 19) are associated
with the back ridge of the complex. As was pointed out in the Archaic
horizon discussion, the truncation of older ridges complicates this
specific ridge association. The sites are black-earth middens
averaging a foot in thickness, and are based directly on the marine
shell-sand matrix of the chenier (Fig. 23). The shells of edible
mollusks are scarce in these sites with the exception of small shell
accumulations along the Mermentau River.

Two of the few sites (no. 20 & 21) resting on natural levees
are located on Bayou Cypermort. The Bayou Cypermort channel apparently
extended its delta across Vermilion Bay, and the shell midden (no. 20)
on the south shore of the bay marks the continuation of the bayou.
This ancient channel scar trends generally westward and is truncated
by younger stranded beaches extending in a northerly direction from Chenier au Tigre. The Morton mound (no. 22) just north of Weeks Island is located on the natural levee of Weeks Bayou. It is similar in form to the Alligator mound and is one of two effigy mounds in the survey area (French, 1952, p. 4). The mound has not been dredged but is being eroded rapidly by wave action caused by boat traffic in Weeks Bayou. The cultural remains are similar in many ways to those found on Alligator mound, and future investigation and excavation could probably add much to the knowledge of the early effigy-mound complex. The stream system connection of Weeks Bayou is not certain, but it follows the general trend of Bayou Cypremort and may have been derived from the same source.

There is another concentration of Tchefuncte sites in the eastern section of the survey area. It was in this sector that Ford and associates identified the period. The sites (no. 24 through 23, 30 & 31) are peripheral around the southern, eastern, and northern shores of Lake Pontchartrain, and are probably located upon former beaches of the lake. According to Ford, "The open-water condition of the Pontchartrain area in Tchefuncte times is manifested by the beach beneath the Tchefuncte site near Mandeville and the probability of beaches under the sites in the Little Woods area." (Ford, 1945, p. 18).

In addition to the sites located by Ford, several new middens were found in this area during the survey. The data gathered there substantiated Ford's theory that Lake Pontchartrain was in existence during this period. Even more proof is found around the northern shore of the lake where stranded beach ridges and middens are located. At Little Oak-Pine Island (no. 29) the beach material is considerably coarser than that around Lake Pontchartrain and is similar to the
stranded beaches that extend eastward into Mississippi. The existence of coarser beach material on Big Oak and Pine Island complicates the correlation and at the present time no definite ascertainment can be made.*

Although the evidence is not convincing, Lake Borgne may have been in existence at this early time. At Shell Beach (no. 33) Tchefuncte period pottery was found in small quantities. This site appears to be on an old lake beach but the correlation is not definite. There are several abandoned stream scar sites upon them which have not yielded enough pottery for identification. To further complicate the picture, wave erosion around the shores of the lake is destroying both the stranded beaches and the levees thus making a definite correlation between cultural remains and the physical base unlikely.

The Tchefuncte period reveals very little about the location of the contemporaneous Mississippi subdelta. Near La Branche on Bayou Trepagnier there is an extensive Tchefuncte midden (no. 23) presumably located on a natural levee. A canal was dredged through this area at right angles to the beach, generally following the course of the bayou. For about one-half mile along the spoil bank of the canal artifacts were collected amid midden debris by Roger Saucier.** Aerial photos indicate a stream scar that may be connected with the ancestral Mississippi. Borings were made in the site showing that the shell midden begins four feet below the surrounding swamp

* Master's thesis being written by Leon Hunt of L.S.U.
** Personal Communication, 1953.
level and extends at least sixteen feet in thickness. This site is the only definite indication that the Mississippi distributaries might have been flowing through the area during Tchefuncte times.
MARKSVILLE PERIOD

During the Marksville period, the basic trends of earlier people continued with relatively few new ideas being introduced. However, a distinct transformation was brought about by the elaboration and extension of the Tchefuncte period culture. Ford says, "Most distinctive of all of the new traits of the Marksville period is the pottery. It is of better construction and firing than that of the Tchefuncte period." (Ford & Willey, 1941, p. 338). Agriculture and burial-mound building also continued and were improved. The conical-shaped mounds of this period are found in groups of two or more and are usually constructed adjacent to the dwelling area.

The Marksville period Initial Occupation map (Plate 4a) manifests the widespread distribution of sites of this period over the survey area. Sites along the Sabine (no. 1, 2, & 3) and Calcasieu rivers (no. 4) in western Louisiana show occupancy during the period, but it is not definite that Marksville was the initial culture. Extensive dredging for shell along both rivers has eradicated much of the evidence and heavy boat traffic has resulted in bank erosion. Sites that formerly existed along the original passage have been destroyed by wave action.

Limited initial chenier occupancy during this period was confined to the same ridge-trend where Tchefuncte sites are found. Only one initial Marksville site (no. 6) was located along this trend and has no significant correlation with either younger or older ridges.

The over-all distribution of Marksville sites (Plate 4b) indicates that although there were not many initial occupation sites.
in the cheniers for this period, the Marksville people utilized the same living areas inhabited by Tchefuncte populations. The sites may have been continuously occupied from one period to another, or may have been re-inhabited by Marksville period occupants.

The only Marksville sites found on abandoned stream scars in the western region are on the eastern shore of Collican Lake (no. 5) and on the northwestern shore of Marsh Island (no. 7). The Collican Lake site is associated with the Pleistocene terrace material. The site on Marsh Island is probably associated with a former distributary of Bayou Cypremort. In addition to these two initial Marksville sites, the Tchefuncte sites on Bayou Cypremort and on Weeks Bayou also show Marksville occupation.

Cultural remains of the preceding period give little definite information about the location of the master stream, but Marksville sites in the flood plain show more-definite correlations. Russell established that the Mississippi River occupied the Teche-Mississippi channel (Russell, 1940, p. 1202) prior to its diversion to the eastern side of the alluvial valley. After the master stream abandoned the Teche-Mississippi course, the Boeuf-Red (Russell, 1940, p. 1205) occupied the old entrenchment and therein built its levees. Without doubt, the Mississippi River flowed down the Teche-Mississippi course before it shifted to the eastern side of the flood plain. Likewise, there is no question regarding the presence of the Boeuf-Red in the channel formerly occupied by the master stream. The major problem is one of dating. The Gibson site (no. 10) located on the Teche-Mississippi course seems to furnish evidence as to the approximate time that the Boeuf-Red was occupying the channel. As
is the case with many sites investigated during this survey, the
Gibson site appears to be a mound complex of a late period. However,
borings show that the mounds were built upon an older shell midden
base and pottery recovered from the midden is classified as Marksville.
The midden material extends to approximately twenty feet below the
ground level and is intermixed with red sediments. (Fig. 8). This
indicates that the Mississippi was no longer flowing within the
Teche-Mississippi entrenchment during Marksville times but rather that
the Boeuf-Red was occupying the channel.

There are two additional sites of the Marksville period
associated with the Teche-Mississippi near Houma. Both are near the
Mandalay Plantation (no. 11 & 12) about a mile south of Bayou Black.
Unfortunately, the collections from these sites were not taken in situ,
but were gathered from adjacent cultivated fields during the early
thirties.* Many years of intensive farming have destroyed any structure
of the former sites and an authentic connection between them and the
Boeuf-Red phase of the Teche-Mississippi history is unlikely to be
established. However, the fact that Marksville pottery was found on
the same stream strengthens the Gibson case. At Houma the old
Teche-Mississippi course was buried by more-recent sediments and the
cultural relationship is obscure. However, distribution of Marksville
sites (no. 8, 9, 13 through 21) along the flanks of the present
Mississippi clearly shows that the river had left the Teche-Mississippi
course prior to Marksville time.

In the Grand River area the master-stream connection is vague.

* This collection was made by Randolph Bazet of Houma
Marksville sites here are associated with old stream scars whose connection is obliterated by recent sedimentation and submergence. "Goddel Ridge (no. 9) lies a difficult quarter mile from Goddel Bayou, a part of the lower Grand River system, but it lies on the remnant natural levee of a larger stream ancestral to the present Lower Grand." (Kniffen, 1938, p. 202). The site on Grand Bayou (no. 8) appears to be associated with the Bruly St. Martin Crevasse, but there is an older scar from the Grand River area that complicates the correlation. It is probable that the site is associated with the older stream.

Southeast of Lac des Allemands (Plate 1) are two Marksville sites (no. 13 & 14) located upon a natural levee remnant of unknown origin. These sites are examples of the burial-mound building that Ford says is characteristic of this period. One site (no. 13) is composed of four mounds grouped around a plaza or central living area; the second site (no. 14) has an undetermined number of mounds oriented in the same manner. Recent crevassing off the Mississippi River has obliterated the picture by sedimentation. However, aerial photos manifest a remnant stream scar from the direction of the Grand River drainage basin and it is likely that the ancestral stream source was in the Grand River area.

The oldest known site (no. 15) associated with the ancestral Metairie-Mississippi (Russell, 1940, p. 1209) is on a distributary that formerly flowed into Lake Pontchartrain. The levees of this distributary are truncated by the encroaching shores of Lake Pontchartrain, and the site is gradually being destroyed. This is one of the few sites of any period that has been associated with the Metairie-Mississippi.
East of New Orleans Marksville period site locations continue. The Scarsdale site (no. 16) and the site on the southwest shore of Lake Borgne (no. 17) are located on distributaries of the ancestral stream. The sites are now but island remnants in a much younger alluviated area.

There are two other relict levee islands supporting Marksville sites. The site (no. 18) on the eastern shore of Lake Borgne and the Magnolia mound (no. 19) near the big bend on Bayou La Loutre are both on levees of unknown origin. Several mound complexes north of Magnolia, not shown on Plate 1a may prove to be of this period.

The Magnolia site (Fig. 24 & 25) is a mound complex based on a shell midden which in turn is based upon a natural levee. Test pits were dug in both the mound and the midden material. The mound pit showed later Plaquemine period pottery in the top few inches but sterile soil below. The pit dug in the midden indicated two layers of cultural habitation: Plaquemine very near the surface and Marksville directly beneath extending to a depth of about three feet. Indications are that the site was initially occupied by Marksville people, later abandoned, and still later reoccupied by Plaquemine period cultures which altered the features of the Marksville complex.

Two separate collections (no. 20 & 21) of pottery were gathered on the Chandeleur Islands in the extreme eastern limits of the survey area. These were obtained several miles apart along the beaches of the Islands. Both collections were badly wave-washed but identification was possible from some of the potsherds. Marksville-type ceramics were recognized from both artifact groups, and indicates that the island arcs were land-connected during Marksville time and were probably part
Fig. 2h - Magnolia mound.

Fig. 25 - Relict channel into Magnolia site.
of an ancient subdelta extending at least to the island limits.

The Tchefuncte period gave little evidence as to the location of the master stream but the picture becomes a little clearer during Marksville times. Marksville sites in the Grand River drainage basin and those extending eastward to and including the two beach deposits on the Chandeleur Islands, show a definite correlation with a former distributary system.

From previously cited evidence, it seems obvious that the master stream had left the Teche-Mississippi course by Marksville time and the presence of Marksville sites from the Grand River region to the Chandeleur Islands suggests that the river had extended its deltaic mass into the eastern area. The exact location of the master stream is not known but it seems likely that it was probably associated with the ancestral Metairie-Mississippi. The subdelta formed appears important enough to deserve a distinct name from those previously used to designate the general area. The term, St. Bernard subdelta, which is now accepted for the easternmost area, will be divided for the purposes of this paper and will hereafter be referred to as Early and Late St. Bernard subdelta. Early St. Bernard subdelta will apply to the Marksville period extension; Late St. Bernard subdelta will refer to the subdelta of Plaquemine period age.
TROYVILLE PERIOD

The Troyville period was set up in the sequence of the chronological time scale by Ford to better delineate the early part of Coles Creek and the later part of the Marksville period. Ford explains his purpose in adding the new period, "Some of the ignorance that makes such a neat and "air-tight" classification possible has now been dispelled, and the expanded list of period names can be presented as nothing more than convenient labels for short segments of a continually changing culture history... This is an arbitrary set of culture chronology units, the limits of each of which are determined by historical accident, and which are named to facilitate reference to them." (Ford, 1951, p. 13).

There is not complete agreement among archaeological authorities as to the acceptance nor need of the Troyville period. Jennings believes that "Troyville, considered by Ford and Willey to possess the dignity of a full cultural phase, will finally be considered, I think, nothing more than a transition site where new traits moving west from Florida and east from Texas in a leisurely fashion were in part adopted by what was probably a late Marksville group. It must again be pointed out that, as a period, Troyville exists only as a pottery complex; moreover, it is a pottery complex which is often difficult to distinguish from the closely related Marksville complex." (Jennings, 1952, p. 26f).

One of the main changes in cultural history that indicated a need for a new 'label' was the changing types of mounds being built in the Lower Mississippi Valley, as well as a change in pottery type. Mounds that were square or rectangular in shape and were used as
temple edifices were introduced, though the older conical burial-
mounds remained. In the survey area, however, no mounds of this
new type were found associated with Troyville period pottery. The
mounds found during this investigation may have been built in
accordance with the accepted Troyville pattern, but remodeled by
later occupants. Since excavation was not attempted, no concrete
knowledge about the original size or shape of the mounds was
obtained.

In the Troyville ceramics collected in the survey area,
a definite influx of outside ideas is evident. The general source
of the sherd variations seems to be from the direction of Florida.
A more complete discussion of the pottery relationships for the
Troyville and Coles Creek periods in the survey area will be made
in the following section.

It is apparent from the Troyville Initial Occupation
map (Plate 5a) that Coastal Louisiana supported indigenous peoples
over a wide area. During this era there were three major groupings
of settlements: 1. the western cheniers; 2. the central area of
the Grand River drainage system; and 3. south of New Orleans on the
flanks of the present Mississippi River.

Two Troyville period sites on the cheniers are significant
in showing the relative development of the more-southerly ridges that
exist in the western area. North Island (no. 4) and Chenier Perdue
(no. 2) were habitable by this period. The collections came from
cultivated fields and were limited in quantity as well as in size.
However a preponderance of Troyville ceramic remains points out the
later relative age of the ridge when compared to the Tchefuncte
pottery found on Little Chenier to the north.

Even though there are only two initial Troyville period sites in the cheniers, the Over-all Distribution map (Plate 5b) indicates that chenier settlements of this period were more numerous. The habitable areas formerly occupied by Marksville and Tchefuncte populations were among the better camp sites available in the region and Troyville people naturally settled upon them.

A mound complex located on Little Chenier (Plate 3a, no. 3) is probably of this period. Several conical mounds are grouped along the ridge but are not in any recognized orientation. During the process of road building on the ridge, one of the mounds was cut, exposing several feet of beach matrix, pottery, and bones. Considerable pottery was collected and a high percentage of it was of the Troyville period.

Pecan Island shows no initial occupation by Troyville people but sites of older cultures indicate Troyville habitation. There are two mound complexes (Plate 3a, no. 17 & 18) on the island that are of the same type as the mounds found on Little Chenier. Surface pottery collections suggest that the mounds are of Troyville period and that they supported people for a considerable length of time. As is true of the majority of chenier sites, few shells of edible mollusks were found as midden material and indications are that this form of marine life played a very small part in the economy of these early inhabitants.

In the central area of the Grand River drainage system there are several initial occupation sites that reveal active streams during this period. The shell midden (no. 10) located on the east
bank of Little Goddel Bayou and the Miller site (no. 12) on Belle River are astride the natural levees of their respective distribu-
taries. Both sites show continuous occupation throughout the Coles Creek and Plaquemine periods. There are two Troyville sites on Big Bayou Pigeon (no. 9 & 10) and one on Bayou Sorrel (no. 8). Both streams probably are distributaries of the ancestral Grand River complex. The initial distribution of several identified sites in this area seems to suggest that the stream system is an ancient one and it is complicated to the extent that the cultural remains give no clues as to its origin.

The above-mentioned sites were all classified by Kniffen as of the Bayou Cutler complex which was coeval with the Coles Creek period. Since Kniffen's study in this area, the Troyville period has been introduced into the chronology scale for the Lower Mississippi Valley, and it replaced the earlier phase of Coles Creek period. The artifacts collected by Kniffen have been restudied during this investigation and many of them fit into the Troyville classification.

South of the former Teche-Mississippi course in the central area, initial Troyville occupation sites extend all the way from Franklin to Houma. The Troyville site (no. 7) on Possum Point is located on a relict natural levee (Fig. 9). Aerial photos suggest that this levee trends northeastward, but the scar soon disappears below the marsh. It is further complicated by the Intracoastal Canal dredged along the same general axis. This site is a good example of the subsidence that has taken place in the area. Only a small portion of the midden extends above the marsh level but
bore holes show a thickness of seven feet.

The shell midden on Bayou Bartholomew (no. 5) is located on a former distributary off Bayou Teche. The midden is now submerged below marsh level; recovered pottery was gathered from material dredged during construction of the Intracoastal Canal. At Charenton Beach there is a large deposit (no. 6) of shell along the shore line of Grand Lake. The physical association is not definitely determined but there is a highly oxidized layer of silty clay beneath the shell, which is indicative of a natural levee. Bayou Teche accretion scars extend into this area and further complicate the midden and its basic relationship.

West of Houma there appears to have been a diversion in either the former Teche-Mississippi system or in the later Boeuf—Red course. There are three sites (no. 20, 21, & 23) of Troyville period located on buried levees whose origin is unknown. However, the surface expression of the former distributaries points to a central location, indicating a possible bifurcation area.

The Teche-Mississippi course becomes progressively more indefinite east of Gibson and at Houma it can no longer be seen on the surface. The levees slope gradually eastward and disappear below more-recent sediments which were deposited by Bayou Black when it reoccupied the Teche-Mississippi course. "Bayou Black followed a southerly course as far as Houma, where it encountered the main Teche-Mississippi channel. Unable to cross this barrier, Bayou Black adopted it, reversed its direction of flow, and followed it as far as Lake Ridge." (Russell, 1940, p. 1208, 1209). The three sites mentioned above indicate possible diversions off of this old
course (Plate 5a). The earth mound (no. 20) on Marmande Ridge (Plate 1) at first appears to rest upon recent levees off a distributary of Bayou Du Large. Additional investigation however, proved that the mound had been built on a previous shell midden (Fig. 26). The midden material extends for a depth of twelve feet below the surface of the ground and is resting on an ancient levee. Between this mound and Houma, paralleling Bayou Du Large, is another extensive shell ridge. The surface of the ridge is barely discernible above the ground but extends in depth over twelve feet. The general strike of the shell ridge is in the direction of the mound on Marmande Ridge and indicates that they may have been based on the same natural levee. An additional shell ridge about a mile and one-half north of this site was reported but not personally investigated. The presence of these three sites lined in a general axis substantiates the theory of the writer that a former stream paralleled what is now Bayou Du Large. It seems likely that this stream was a diversion or distributary from the Teche-Mississippi or the Boeuf-Red which later occupied the Teche-Mississippi channel. Since no red sediments were found beneath the shell, the former thesis is more probable. The relative age of the pottery is Troyville, but the depth of the midden material suggests that the pottery picture is probably not complete.

West of Bayou Du Large there is a line of sites (no. 14 through 19) which may be based on either former lake beaches or natural levees. They are extensive elongated accumulations of shell with sparse Indian cultural remains found in some sections. The shell is predominantly Rangia with few Ostrea or Unio present. Two
Fig. 26 - Marmande Ridge mound
of the mounds cited above (no. 13 & 19), reportedly about sixteen feet in elevation, have been destroyed by dredging crews. One mound (no. 14) still remains because it was the cemetery of early European settlers and is protected by its present owners. During the dredging operation Randolph Bazet of Houma, gathered, catalogued, and stored the pottery until such time as it could be studied. Except for the efforts of Mr. Bazet the record would be quite incomplete in this area. These sites are similar in composition and in their depths to the sites in the Marmande Ridge region and it is possible that they may be associated with the same or a related distributable river system.

Southwest of New Orleans on Lake Salvador is a prominent landmark of Indian vintage known as the Temple mound (no. 26). This Troyville site consists of a conical mound based on a large shell midden, the latter approximately one hundred yards long by fifty yards wide, and attaining an elevation of about five feet above the lake. Above the surface of the midden the mound rises to an approximate elevation of twelve feet, and has a diameter of about fifty feet. Both the mound and the midden are composed primarily of Rangia but contain little pottery. There are several other large accumulations of shell along the western shore of the lake that are almost equal in magnitude to the Temple mound site. These accumulations have yielded even less ceramic remains than the Temple site. A small midden along Bayou des Allemand (no. 25) has also produced little evidence concerning its prehistory.

The cluster of sites in the Bayou Barataria and River aux Chenes region indicates the active extension of streams in this area.
The location of the Indian habitation sites suggests that there may have been several distributaries from the Mississippi into this area. The diversion area appears to be in the vicinity of New Orleans (Plate 5a).

In 1935 Kniffen approached the problem of correlating the streams of St. Bernard and Plaquemines parishes with Indian remains. During the study he recognized two pottery complexes for the area. The oldest (which has previously been discussed) he called Bayou Cutler, after the bayou of the same name, and the youngest, Bayou Petre, after the site at the junction of Bayou La Loutre and Bayou Petre. A correlation was made between the two pottery complexes and those that were established by Ford. The Bayou Cutler complex is considered to be coeval with parts of Troyville and Coles Creek periods and the Bayou Petre complex is thought to be coincident with the Plaquemine period (Kniffen, 1936, p. 410-422).

On Bayou Barataria and its extension, Bayou Cutler, there are five sites of this period (no. 27, 29, 30, 31, & 33). On distributaries from Bayou Barataria there are two additional sites (no. 28 & 32). The Bayou Cutler site (no. 33) was the type site for Kniffen's classification of Bayou Cutler complex. The most northerly site (no. 27) is an earth mound based upon a shell midden. The remainder of the sites are all shell ridges, some of which are comparable in size to those west of Bayou Du Large.

East of the master stream on River aux Chenes are two sites (no. 35 & 36); further east, near Lake Machias (Plate 1), four more are located. The latter group is located on a former distributary that plunges beneath the marsh. The middens and the contrasting
vegetative growth are the only indicators of the former stream now expressed at the surface. This nameless relict bayou once discharged its waters into the area of Breton Sound just east of Lake Machias.

Shell midden material was dredged from a depth of three feet below the surrounding marsh level at the site north of Lake Iery (no. 34). It is apparently located on a submerged levee of a stream of unknown origin flowing from the northwest.

From an over-all observation of all the periods and their corresponding sites, it appears that the Rangia accumulations are more extensive during the Troyville period than at any other time. This assumption is based on available site evidence, but since many sites may not give complete records of their existence, the data may be insufficient for such theorizing.
COLES CREEK PERIOD

The Coles Creek period was first recognized from a small village site located on the east bank of Coles Creek about twelve miles from Fayette, Mississippi. The first discussion of the period in print concerned the excavations at Deasonville, Mississippi, and was undertaken by Henry B. Collins. From present evidence, it would seem that Coles Creek relates to a time period containing certain artifacts and cultural relationships between younger and older periods. Again there is not complete agreement between students of the field. Griffin says, "It is difficult to tell whether Coles Creek is a time period, a ceramic complex, or both, and suitable criteria for its differentiation and recognition are lacking." (Griffen, 1946, p. 81). Jennings seems to agree in part and believes, "There is no doubt as to the validity of the sequence of material objects, but the full content of some of the complexes ... will continue to be drastically questioned and revised." (Jennings, 1952, p. 256).

The mound complex and the ceramic features of Coles Creek period are generally continuations and elaborations on the Troyville period. Ford says that in the Troyville and Coles Creek period "formalization had developed in the ceramic tradition." (Ford, 1951, p. 93). This formalization resulted in many similarities of pottery types between earlier, later and the Coles Creek periods in the survey area. For example, the Churupa Punctated and the Mazique Incised designs, both of which are characteristic of the Troyville period pottery, were used by both Coles Creek and Plaquemine pottery makers. Changes were made but they were not always definite enough to make period distinctions possible. As a result the two designs
were not individually used as period indicators. When the assemblage of pottery gathered from any one site contained either of these types and a more definitely diagnostic Troyville type they were included in the general conclusion. The necessary exclusion of several otherwise accepted types narrowed the possible number of diagnostic pottery designs for both the Troyville and Coles Creek periods.

Two main diagnostic types were generally used in this study as the pivotal point for the Troyville period; these were the Yokena Incised and the French Fork Incised. Of the two designs, French Fork Incised made up the greatest percentage and many Troyville classifications are based on it. It is obvious that this design is related to the pottery types of northwest Florida and indicates a movement of ideas or/and people (Haag, 1939, p. 11). The relative position of the French Fork Incised comes late in the Troyville period according to Ford. "The time position of the maximum of French Fork well illustrates the artificiality of the time periods and, consequently, of the division of the types. The French Fork falls exactly on the line that has been drawn between Troyville and Coles Creek. It might have been listed just as logically with the types of the later period." (Ford, 1951, p. 49).

The fundamental pottery type in the Coles Creek period is the Check Stamped design. This pottery design also has a direct relationship with the Florida area. The Check Stamped type was used because of the general absence of pottery types that are diagnostic of this period in other areas, and because of the formalization between many other types of ceramic designs. The Check Stamped and French Fork designs were often found in association with each other.
and some correlation seems evident. Although the French Fork type probably appeared first, the Check Stamped pottery was not far behind. A study of the pottery distribution maps of the two types will show a similarity between their relative locations (Plate 6a & b).

The lack of diagnostic types of pottery other than the ones mentioned above and the absence of temple mounds in the same form described for this period elsewhere seem to indicate that in the coastal area the time periods set for the Troyville and Coles Creek periods are inadequate. The pottery classification in the area showed no well-defined nucleus of either period. From the writer's point of view, Kniffen's Bayou Cutler complex, divided into an early and late phase, would better fit the Troyville-Coles Creek periods in the survey area. However, the chronology and pottery classification types as set up for the Lower Mississippi Valley was the initial basis for the survey and the pottery classification was completed before its inadequacy became apparent. Therefore, it seemed inadvisable to change to the Bayou Cutler terminology for this discussion.

The distribution pattern for the Coles Creek initial occupation period is approximately the same as that of the Troyville period. A study of Plate 5a and Plate 7a will show the unequal distribution of the same period. The paucity of initial Coles Creek occupation sites is directly related to the ceramic problem discussed above.

The natural setting of the Coles Creek period is but an extension and elaboration of the former period. During this time in the eastern area, the streams were filling the inter-levee basins and
were extending the subdeltas of the former period. In the western sector the trend was from the older beaches in the north to the younger beaches gulfward. The Front Ridge of Grand Chenier was apparently habitable by this time and there are two sites along this beach (no. 3 & 4). There are no conspicuous mounds on the ridge; most of the pottery obtained was collected from plowed fields and much of the former evidence has been destroyed. A similar correlation is evident on the Front Ridge of Pecan Island, where one Coles Creek period mound is situated (no. 5). Although there are several other mounds nearby, this particular site is the only one on the ridge with an initial Coles Creek occupation base.

Two Coles Creek sites are located on the Vermilion River in the vicinity of Vermilion Bay. One site (no. 6) near the mouth of the river was destroyed during dredging for the Intracoastal Canal. Potsherds and shell are strewn along the spoil bank and good collections were made. The second site (no. 7) is a shell midden about three feet thick which is astride a natural levee of a former Vermilion channel. The midden is in situ and the preliminary test pit dug showed only Coles Creek and Plaquemine pottery. About six miles north of Abbeville potsherds were picked up along the banks of the Vermilion River and show the same period types.

Near the head of Vermilion Bayou are two sites which were not personally investigated but which were reported by a reliable informant.* The first site (no. 8) is located on the flood plain between the Teche-Mississippi and the Pleistocene terrace to the

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*Gasper Varvaro, geologist at Southwestern Louisiana Institute.
west. The second mound (no. 9) is on a natural levee of a Boeuf—
Red crevasse east of the Teche-Mississippi. The mounds are both 
based on red sediments which suggests that the occupation was post 
Boeuf-Red. It is not definitely known whether the first site is 
located on an old scar of the Vermilion River on on a crevasse off 
the Boeuf-Red.

The shell midden (no. 11) located on Bayou Chene is 
apparently associated with the Butte La Rose drainage system in 
the Atchafalaya basin. These are several other sites further north 
on Butte La Rose, but collections were not obtained from these 
locations. The Atchafalaya basin is rapidly being filled by recent 
sedimentation and sites that were above ground fifteen or more years 
ago are now buried several feet below the surface.

The oldest identified pottery found at the Burns site 
(no. 12) on Bayou Sale was of Coles Creek period. Since Bayou Sale 
appears to be related to the Teche-Mississippi, it is possible that 
additional investigation may reveal pottery much older than Coles 
Creek. About two miles northwest of Patterson on Bayou Teche is a 
Coles Creek site (no. 13) based on Boeuf-Red material. A very sharp 
contact with shell and red sediments is evident at this site. The 
shell is fresh-water type and is not intermixed with alluvium. No 
accretion has occurred on the flanks of the shell midden since its 
accumulation and indications are that the Boeuf-Red had either 
abandoned the course or was diminishing when the midden was built.

North of the Patterson site in the Grand River area there 
are three shell middens (no. 15, 16, & 19) astride levee scars of 
former distributaries. The latter site is a beach deposit along
the eastern shore of Lake Verret. The original midden was destroyed by wave erosion and a scattering of potsherds among the shell is all that remains.

In the eastern section of the survey area, sites show lateral movements from the streams of the former periods. East of the Mississippi River there are two sites near the north and south shores of Lake Lery (no. 21 & 22), which are located on remnant levees of former streams from the northwest. The two sites (no. 23 & 24) on Terre aux Boeufs are based on natural levees, assumed to be younger than the levees of River aux Chenes and those to the east where Troyville sites were located.

Two sites (no. 25 & 26) in the northeast section of the late St. Bernard subdelta are further indications of the general extension of streams into the northeast during this period. Both sites are now only beach deposits, for the original middens have been eroded and inundated by the waters of the Gulf.

The Over-all Distribution map of the Coles Creek period (Plate 7b) indicates that there were more aboriginal settlements in Coastal Louisiana during this time than in any previous period. A comparison between the paucity of initial Coles Creek sites (Plate 7a) and numerous older-period sites reoccupied during this time seems to indicate that even though streams had changed since the original populations, many of the old sites were still habitable. Aboriginal populations seem comparatively large during this period and most habitable stream banks were occupied. Although the sites are found from the western limits of the survey area to the eastern boundary, concentrations of initial occupation sites exist in three
general areas: the western cheniers, the central area of the Grand River drainage system, and the flanks of the present Mississippi River. These areas correspond closely to the areas inhabited during the Troyville period.
PIAQUEMINE PERIOD

The Plaquemine period is an additional step in the refinement of chronological periods for the Lower Mississippi Valley. As more investigation was completed it became obvious that it was necessary to subdivide the original Coles Creek period into Troyville, Coles Creek, and Plaquemine periods. Plaquemine period is an outgrowth of Coles Creek and is characterized by the same general aspects. For the purposes of this study it extends from Coles Creek to historic times and includes the Natchez period shown on Fig. 1. The Natchez period is considered by some students to be the latter phase of prehistoric cultures. As yet it is difficult to isolate it from the Plaquemine period in the coastal area and hence it is not treated as a separate period. The Plaquemine period is the last period in the prehistoric chronology discussed in this report.

Temple and burial-mound building and agriculture were both continued by Plaquemine people. However, in the coastal area evidence of agriculture was not found and mound building was limited to a few areas. The mounds are concentrated on the distributaries of the Lafourche-Mississippi, on the Late St. Bernard subdelta, and along the flanks of the Mississippi River south of New Orleans to Buras.

During the Plaquemine period more detailed information is available about the active distributary channels of the master stream. Recent streams leave the most distinct records and correlations between cultural remains and the natural setting are more easily determined. However, there are limiting factors involved.
Although the opening and closing dates of the period are reasonably established, lack of refinements within the period make precise cultural, spatial, and time correlations difficult. Just as aggradation has buried much of the history of older periods, so has it destroyed evidence concerning the Plaquemine period. This may partially explain the scarcity of Indian sites along the major rivers.

There are four main areas in Coastal Louisiana where clusters of Plaquemine period sites are found: 1. the chenier region of western Louisiana; 2. the Lafourche-Mississippi region (Russell, 1940, p. 1208); 3. the Late St. Bernard subdelta; and 4. Plaquemines subdelta.*

In western Louisiana there are four locales where early people inhabited stranded beaches nearer the Gulf than those of former periods. An exception is the site (no. 1, Plate 8a) near Johnson Bayou where fragments of pottery from an Indian burial ground and from the levees of a small bayou were found. This ridge is the most northern of the stranded beaches in the Johnson Bayou complex.

About two miles east of Cameron a bulldozer crew uncovered Plaquemine-type sherds in a black-earth midden between the present shore line and the front ridge (no. 2). The midden, which is based on shell-matrix, extends over an area of about one hundred feet long by fifty feet wide. The sherds were near the surface of the midden and in situ.

*Named after Plaquemines Parish to facilitate handling in this study.
Along the beach between Rollover and East Constance bayous badly wave-washed sherds were collected (no. 6) but only a partial classification was possible. The original base of the midden from which the sherds came was not determined and no definite former stream channel or levees have been located in the proximity.

On Chenier au Tigre (Plate 1) sherds were collected from plowed fields (no. 3), with no visible mounds present. The chenier is located south of Pecan Island and is the youngest in the Pecan Island chenier complex. Trending north from the chenier are several older ridges that seem to be a continuation of the older ridges truncated by Pecan Island. This ridge arc probably outlines a former embayment.

The Over-all Distribution map shows numerous Plaquemine settlements on the cheniers (Plate 8b). Most of the sites inhabited during this time had been formerly inhabited by people of earlier complexes. The people during this period, similar to their predecessors, depended heavily upon fish and game. Fish and animal bones are found more frequently in the sites in this region than elsewhere in the area. Not many mollusk shells are found in the midden material with the exception of a few small sites along the Mermentau River. Although no direct evidence was found during the survey, it is possible that agriculture was important to the occupants of the cheniers.

On the Lafourche-Mississippi there are twenty-three Plaquemine occupation sites which produced the designated minimum number of potsherds for classification (no. 8 through 30). These sites when mapped show a line-settlement pattern along the natural levees
of the distributaries. With a few exceptions, the shell accumulations in this area are smaller than those of other regions. The shell strata in these sites range from one to two feet in thickness; average depths of shell in regions to the west and east are three to twelve feet. During high-water stages the tops of many of these accumulations are submerged. At low stage most of the shell layer is exposed.

There are two earth mounds of considerable size on Bayou Grand Caillou. One of them (no. 7) is twenty-two feet high, one hundred feet long and one hundred feet wide; the other (no. 11) is eighteen feet high with about the same width and length dimensions as the former site. Both structures appear to be the flat-topped pyramidal type characteristic of temple mounds. Few ceramic fragments were found on the mounds or in the adjacent fields. The fields have been cultivated for many years however, and existing pottery has likely been destroyed.

South of this mound group, two other mound complexes are found (no. 12 & 13), both of which are of the burial type. The two burial mound complexes are being rapidly destroyed by stream erosion. In contrast to the temple mounds upstream, these sites yield considerable quantities of pottery.

Mound complexes are present on nearly every bayou in the Lafourche-Mississippi distributary system. Both pyramidal and conical mounds are found and vary in size and quantity. Most of the mounds are composed primarily of earth with little shell intermixed. During the Plaquemine period in this particular area there seems little doubt as to the use and construction of both temple and burial mounds.
The site on Bayou Vacherie (no. 23) is a large midden about twelve feet high and extends along both banks of the bayou for several hundred feet (Fig. 27). Pottery was located in the first four feet, with clean, sterile shell below. The source of Bayou Vacherie is unknown, but it may be older than the known Lafourche distributaries. Bayou Vacherie is bisected through the midden by Bayou Matherne (Fig. 28), which is a known distributary off the Lafourche-Mississippi. Indications are that the shell was deposited on the banks since the bisection.

The lateness of the cultural remains on the Lafourche-Mississippi and its distributaries presents a chronological problem. It is believed by many students of the area that the Lafourche-Mississippi was the first course occupied by the master stream after it left the Teche-Mississippi channel. Russell believes that the Mississippi River first diverted at Plaquemine and occupied what he terms the Plaquemine-Mississippi channel. After it left the Plaquemine-Mississippi, he believes that the master stream then entered the Lafourche entrenchment (Russell, 1940, p. 1206-08).

The cultural evidence recovered during this survey is not compatible with the foregoing beliefs. It is obvious that there is a conflict between pottery periods and the proposed age of this distributary system. If the Lafourche-Mississippi was the first course below Plaquemine to be occupied by the master stream and was still receiving overflow water during historic time, then it must be assumed that the course was: 1. Open to continuous, or overflow water throughout the entire period from its inception; 2. it was closed during part of the time and later was reopened; or 3. it is the result of a crevasse.
Fig. 27 - Midden along Bayou Vacherie.

Fig. 28 - Bayou Vacherie bisected by Bayou Matherne.
The pottery recovered and subsequently classified does not indicate that any of the above possibilities are either right or wrong. The results merely suggest that something is out of order. The limiting factors of relying on cultural remains alone is apparent, particularly in a delta where aggradation and subsidence are the norm. It is not the intention of the writer to adhere to the thesis that this important diversion was later than presently believed. The information recovered during this study is not of sufficient strength nor magnitude to make such claims. All that is possible is the suggestion that additional investigation is necessary to work out the relative movements of the Mississippi River.

Although there are several large accumulations of _Rangia_ on the shores of Lake Salvador, the cultural remains are scarce. Recovered sherds appear to be Plaquemine period but were badly wave-washed, and little definite evidence could be determined. The shell accumulations are some of the largest in the entire area for any period. The Temple mound, which is in this area, has been classified as of the Troyville culture and it is likely that the other large accumulations are related in time.

North of Grand Isle there is a series of stranded beaches that are high and dry during low-water stages. However, during high-water periods all except the higher crests are inundated. It appears that these stranded ridges are related to the Lafourche-Mississippi distributary system and are similar to those at the mouth of the Sabine River. Several shell middens (no. 28 & 29) are located on the stranded beaches and although the accumulations are not large they indicate that the _Rangia_ must have been rather abundant at this time. Plaquemine
occupation sites in the Lafourche-Mississippi subdelta are logical since the historic record indicates that this distributary system was receiving overflow water well into historic times.

The over-all distribution (Plate 8b) of Plaquemine sites in the central area shows numerous older sites inhabited during the period. Good collections of Plaquemine pottery types, as set up by the Lower Mississippi Valley investigators, were obtained throughout this central area. In addition to the pottery types referred to above, several types (Plate 9a & b) that apparently had their origin in Florida and Alabama were introduced into this region. The central area is about the western limit for the Florida and Alabama types and specimens of these pottery complexes become considerably more numerous eastward.

The third main concentration of Plaquemine period sites is in the Late St. Bernard subdelta. Many mounds and middens of the Plaquemine period (no. 31 through 36) are located on Bayou La Loutre and its distributaries. It was in this area that Kniffen identified the Bayou Petre complex which is coeval with Plaquemine period. "The sites classed as Bayou Petre compactly dominate the northeastern-most portion of St. Bernard Parish...." (Kniffen, 1936, p. 112 & 113).

Many of the sites in this area were beach deposits and either did not yield enough pottery for classification or the sherds were too worn for recognition. The Late St. Bernard subdelta apparently extended to the Chandeleur Islands, for Plaquemine pottery is found there.

A more extensive spread of Plaquemine sites can be seen on the Over-all Distribution map (Plate 9a) and Alabama (Plate 9b) influence in pottery types is more discernible in this region than elsewhere in
the survey area. Nine out of ten sherds recovered from sites in
the Late St. Bernard subdelta show this eastern influence.

The fourth group of sites is on a subdelta southeast of New
Orleans on the flanks of the present Mississippi River in Plaquemines
Parish. This subdelta is almost entirely within the parish boundary
and in order to facilitate handling in this report it will be called
Plaquemines subdelta. The sites are located on ancestral distribu-
taries that were part of the network of braided streams forming the
base of the present river channel. The northernmost sites of these
distributaries (no. 37 & 45) are earth mound complexes. The first is
located on Bayou Grand Cheniere; the second is near Pointe a la Hache.

Both sites are small conical mounds and yield little cultural remains.

Another earth mound group (no. 38) is based on an unnamed relict levee
near Buras (Fig. 29). One of the three mounds of this complex is
located on a shell midden base (Fig. 30). The shell is about four feet
thick and is barely discernible above the marsh. A beach deposit
(no. 39) marks the most southern extent of Indian culture remains. The
sherds were collected along the beach in the vicinity of a truncated
levee. No visible evidence of the site is present and indications
are that it was located gulfward from the present beach and was destroyed
by wave action. Absence of sites below this point indicate the recency
of the region and that it was probably not habitable during prehistoric
Indian times. On Bayou Robinson (Fig. 31) and the beaches along Cheniere
Ronquille there are five sites (no. 40 through 44) of this period that
are extensions of the above-mentioned distributaries. Although in a
lesser degree than in the Late St. Bernard subdelta, influence from previ-
ously discussed eastern pottery types is also obvious in the collections
made in this area (Plate 9a & b).
Fig. 29 - Mounds on relict levee near Buras - contrast between mound and marsh vegetation.

Fig. 30 - Buras earth mound located on a shell midden base.
Fig. 31 - Mound complex on Bayou Robinson.
SUMMARY

During this study the aim has been to learn more about both the early inhabitants of Coastal Louisiana and the natural setting in which they lived. Although other 'tools' were used to recover data, the emphasis was on cultural remains from Indian habitation sites. Such variable factors as subsidence, aggradation, existing natural vegetation, and the remains of animal life all played an important role in the search for the elusive and far-from-conclusive evidence presented in the foregoing pages. Historical records were utilized wherever possible but since relatively little study has been conducted in the area, help from this source was limited. These factors are all merely aids in unravelling some of the complexities of the geologic past in the survey area.

A summary of the findings of the present study have been recorded on an Over-all Initial Site Occupation map (Plate 10) and on a Comparative River Sequence chart (Plate 11). The map shows all initial occupation sites of periods previously discussed. The streams associated with various sites are drawn in their relative positions and do not represent their courses in complete detail. The chart indicates the relative sequence of either areas or streams determined by different students of the area. Although all investigators have not used the same terminology to designate certain streams or areas, the symbols on the chart are the same for each stream or area to facilitate cross-checking. The numbers opposite the section devoted to Fisk's work represents his proposed sequence of river stages during the last two thousand years (Fisk, 1934, p. 37). The approximate dates of the pottery chronology correspond with the numbers Fisk has set up for the river stages and
for the following discussion references only to the culture periods will be made.

Little prehistoric cultural investigation has been done in the cheniers of western Louisiana. Collins excavated an aboriginal cemetery located in a grove of orange trees on the Copell plantation in 1926 (Collins, 1927, p. 205) but aside from his work very little cultural study has been conducted. During this survey a long record of habitation and a definite site age-chenier relationship was indicated. As is shown on Plate 10 the remains of older periods are located on ridges farthest inland and younger-period sites are on the stranded beaches nearer the Gulf. Tchefuncte period sites are located on the beach series of Little Chenier and Little Pecan islands and although no initial Marksville sites were found on the ridge, Marksville occupation was apparent on the older Tchefuncte habitation sites. Troyville period remains are located on Chenier Perdue and North Island, gulfward from Tchefuncte and Marksville sites. The presence of Coles Creek period sites on Grand Chenier and on the Front Ridge of Pecan Island mark another sequence in the chenier complex. The most-seaward beaches are the youngest stranded beaches in the vicinity and have Plaquemine period occupation sites. The correlation between older culture periods and older beach features seems evident and it appears likely that as the younger beaches became habitable they were occupied by folk of a later period.

Many investigators have worked in the deltaic plain in an effort to solve the complicated and obscure geological problems and several students of the field have turned their attention to the historical development of the streams and their subdeltas. During the two
thousand years that man is believed to have lived in Coastal Louisiana, the master stream has changed its course several times. There is no definite agreement among investigators as to the location of the Mississippi River during the early culture periods. Fisk suggested that the master stream occupied the Teche-Mississippi course during a period which corresponds with the first three or four hundred years of the cultural chronology of the region. Although no evidence of Indian occupancy during this early period was found on the Teche-Mississippi, two Tchefuncte sites on Bayou Cypremort and one on Weeks Bayou may be located on Teche-Mississippi distributaries. The sites on Bayou Cypremort testify that the levees of the bayou were at least habitable by Tchefuncte time and indicate that there was land connection across Vermilion Bay during this period. Marksville pottery recovered from the Cypremort Tchefuncte site as well as on Marsh Island suggests that the land connection existed into the Marksville period.

After the master stream left the Teche-Mississippi course, the Boeuf-Red occupied the channel and built its own system of levees. There is some agreement between the previous work done by Fisk and the results of this survey on the time element involved in the Boeuf-Red period of the Teche-Mississippi. According to Fisk, the Red River (Boeuf-Red) occupied the Teche from the latter part of the Tchefuncte period to the closing of the Marksville period. Cultural remains found during this study and red sediments intermixed with midden material at the Gibson site (Fig. 3) indicate that the stream was active during the Marksville period. Several Coles Creek sites upstream rest on red sediments and suggest that by Coles Creek period the Boeuf-Red
had either ceased to flow in the Teche-Mississippi channel or it was in its decadent phase. What may prove to be distributaries of the Teche-Mississippi were indicated at the base of the Indian mound on Marnande Ridge (Plate 1). The mound is located on a shell midden that extends twelve feet in depth below the surface of the ground and is based on an ancient natural levee. More work is being done in the area and additional information may soon be available.

The Grand River drainage area seems to have a long and continuous history. There is a wide distribution of sites from the Marksville period to the Plaquemine period and many cultural data were recovered. However, since little original information has been added to the work done in the area by Kniffen in 1938, no summarisation will be made.

There is less agreement on the time position of the Lafourche-Mississippi than for any channel discussed thus far. Fisk says that when the master stream left the Teche-Mississippi entrenchment it occupied a position along the eastern wall of the flood plain and flowed into the Lafourche-Mississippi course. Late Tchefuncte through late Coles Creek periods correspond to the river stages outlined by Fisk for the active Lafourche-Mississippi. Russell dates the Lafourche-Mississippi by the Bayou Cutler complex which includes parts of the Coles Creek and Troyville periods (Russell, 1940, p. 1209). Ford is of the opinion that the Lafourche-Mississippi and Plaquemine-Mississippi were both "...too early for prehistoric settlement...." (Ford, 1945, p. 19). The present study correlates the Lafourche-Mississippi with late Coles Creek and Plaquemine periods. In addition to the numerous mounds and middens mentioned in the Plaquemine discussion of this study,
there is evidence that a distributary of the Lafourche-Mississippi is younger than the Marksville site at Gibson (Fig. 8). Presumably more recent sedimentation caps the Marksville midden material and it is believed that it was deposited there by Bayou Black when it entered the Teche-Mississippi near Houma, reversing the previous direction of flow. Bayou Black sedimentation measures from three to six feet in thickness before the shell midden is reached (Fig. 8). This indicates at least a relative age difference between the Marksville period and later sedimentation of the Lafourche-Mississippi. Aside from physical and cultural correlations shown in the cross-section of the Gibson site, several other cultural indicators were recovered and show a trend toward later occupancy of the levees of the course.

The pivotal pottery types used for the Troyville and Coles Creek periods were not found on distributaries of the Lafourche-Mississippi. French Fork and Checked Stamp pottery designs (Plate 6a & b) are widespread throughout the entire survey area and yet are not found on known distributaries of the Lafourche-Mississippi. It seems unlikely that these two types would be found on both sides of the Lafourche-Mississippi area and yet not be recognized in the many sites within the area. However, Bayou Lafourche was receiving overflow waters well into historic times and it is possible, but not probable, that all older period sites have been covered by more-recent sedimentation. It is also possible that data recovered in the area are not adequate to interpret a site-age relationship between cultural remains and the time of Lafourche-Mississippi flow. Additional study on the rates of retreat of the coastline between this area and other areas, on meander patterns, and on sub-surface material will be needed
before any final interpretations can be made.

There is little agreement on the earliest course taken by the Mississippi River in the eastern area during 'modern' times. Russell terms the earliest recognized course, which diverted from an older course about ten miles west of New Orleans and flowed between the south shore of Lake Pontchartrain and the present Mississippi River, the Metairie-Mississippi (Russell, 1940, p. 1209). On the basis of Indian artifacts that were dredged from Lake Pontchartrain, Russell dates the Metairie-Mississippi with the Coles Creek period. Additional information on the pottery from the floor of Lake Pontchartrain will be discussed later in this section. Fisk's dating for the Metairie-Mississippi channel roughly corresponds with the first three hundred years of the Plaquemine period, while Ford believes that the Metairie-Mississippi is associated with the Tchefuncte culture.

Cultural evidence found during this survey indicates that the master stream had flowed into the eastern area at least long enough by Marksville times to establish levees suitable for habitation. The possibility that the Early St. Bernard subdelta extended to the Chandeleur Islands has never been suggested before this study, but several beach deposits containing Marksville period pottery located on the north and south islands of the Chandeleur arc indicate that at one time the islands were land-connected.

In addition to the Chandeleur sites, there are four Marksville sites on relict remnants of natural levees east of the present Mississippi River. The general orientation of these ancient natural levees suggests that they were once on distributaries of the master stream whose head-of-passes was in the vicinity of New Orleans. It appears
that these sites, as well as the one located on Lake Pontchartrain, are on distributaries associated with ancestral Metairie-Mississippi.

After the master stream left its eastern course its distributaries flowed into the Forts subdelta region on the flanks of the present Mississippi River. The Forts subdelta, which is associated with the distributaries of Bayou Barataria, River aux Chenes, and an unnamed distributary east of Lake Machias (Plate 1), was identified and labeled in 1936 through investigation by Russell and Kniffen. Indian pottery and its subsequent classification was largely responsible for the delineation of the previously unrecognized subdelta. Although Fisk shows River aux Chenes with an earlier beginning date than Bayou Barataria, his dating of both of them corresponds with the middle of the Plaquemine period. The unnamed bayou is not included on his river stages, therefore cannot be included in the correlation with his work. Essentially, the findings of both Kniffen and Ford are based on Kniffen's isolation of the Bayou Cutler pottery complex which approximates the Coles Creek and Troyville periods. Although they approached the problem independently, Russell and Kniffen arrived at the same conclusions regarding the age of the subdelta and their findings are incorporated on the comparative chart.

Pottery recovered during the present survey is of the Troyville period and although there may be differences in the estimated beginning and ending dates that the streams in the Forts subdelta received discharge waters, the general dating between this study and Kniffen's 1936 investigation are approximately the same. The head-oftakes common to Bayou Barataria, River aux Chenes, and the unnamed bayou was probably in the same approximate location as it was...
during the ancestral Metairie-Mississippi stage of the river, with a general shift to the south and southeast indicated. There seems to be good evidence to support the theory that the master stream did not shift abruptly from one major area of deposition into another but rather moved gradually into distributaries which provided the shortest courses with the steepest gradients to the Gulf. Eventually one distributary gained the advantage over the others and although it may not have carried the master stream's full load of water, it became the major course.

During the time that the river was forming the Forts sub-delta, it is likely that none of the distributaries carried the full load of the master stream. Bayou Barataria, River aux Chenes, and the unnamed bayou probably had their inception at approximately the same time. From a study of aerial photos, the three bayous show a contrasting physiographic expression on the surface which appears to suggest that River aux Chenes and the unnamed bayou are older in age than Bayou Barataria since their levees are more deteriorated and are submerged beneath the marsh level in many places. However, the drowned condition of the two streams may not indicate a greater age but rather a difference in the amount and time extension of active deposition. The cultural remains collected from sites in the area of these three streams are all of the Troyville period and indicate that all three stream banks were habitable at approximately the same time. Shell middens, pottery, and animal bones recovered are all similar and must have been left by inhabitants of the same period.

In contrast to River aux Chenes and the unnamed bayou
Bayou Barataria has larger levees and a well-defined meander pattern. Bayou Barataria levees have submerged below marsh level only in the lower reaches of the stream and some of the levee system is high enough for present-day habitation. Bayou Barataria must have gained the advantage over the other distributaries and, although it may not have carried the full load of the river, it received sufficient water over a long enough period of time to build a more-extensive levee system than did River aux Chenes and the unnamed bayou. This same process of deltaic building appears to be characteristic throughout the area, including the delta of the present Mississippi River.

Distributaries in the eastern and northeastern area again gradually gained control of the major portion of river flow and the Late St. Bernard subdelta became the active region of deposition. During its maximum extension the Late St. Bernard subdelta apparently projected its distal sections at least to the Chandeleur Islands. Plaquemine period pottery found on the islands bears out the theory that the subdelta is of a comparatively late age. The major debouchment of the master stream generally followed the course of Bayou La Loutre and diverted into several distributaries toward its seaward extent. Fisk does not consider the entire subdelta in his river stages but fixes the La Loutre distributary earlier than River aux Chenes and Bayou Barataria (Forts subdelta) and places it in the first one hundred years of the Plaquemine period. In general, Russell, Kniffen, and Ford agree with each other in the time sequence of the Late St. Bernard subdelta and base their conclusions on the previously discussed study of Russell and Kniffen. The Bayou Petre pottery complex (Plaquemine period) was identified during the investigation...
and shows a marked age difference between the Forts and the Late St. Bernard subdeltas.

The same general conclusions were indicated by the present study. Although the majority of sites were of the Plaquemine period, there are two clusters of late Coles Creek sites in the region. One group of the Coles Creek sites shows a lateral movement of the stream into the inter-levee basin between the unnamed bayou and River aux Chenes. The other cluster of sites marks the extension of streams east of the big bend on Bayou La Loutre and are but island remnants of an older alluviated plain. The two clusters of Coles Creek sites indicate the transition or gradual shifting of the master stream between the maximum extent of the Forts and the Late St. Bernard subdeltas.

The same process of deltaic growth that was indicated between the Forts and Late St. Bernard subdeltas is apparent between the Late St. Bernard and the Balize subdeltas. The system of anastomosing streams which flank the present river south of English Turn indicates the growth of the Plaquemines subdelta which formed the base of the master stream. Eventually, one of the distributaries gained control over the major portion of the river flow and evolved into the present river channel. The term Plaquemines subdelta is used in this study to differentiate the area of active deposition between the Late St. Bernard and Balize subdeltas. Fisk has referred to one of the major streams in the Plaquemines subdelta area as Bayou Cheniere and his dating corresponds with the cultural dating recovered during this study.

The lower reaches of the Plaquemines subdelta extend into
the upper area of the Balize subdelta and mark the southern boundary of aboriginal habitation. The Balize subdelta is too young to have supported prehistoric Indian populations. Numerous sites were found containing late Plaquemine period pottery and mound complexes of the same period are associated with several distributary streams. Some of the distributaries of the period apparently occupied channels formerly associated with the Forts subdelta. River aux Chenes either received continuous discharge waters or was reoccupied during this period. Possibly the levees beneath the Buras mound were associated with the early subdelta. The late Plaquemine period mounds of the Buras site are based on a shell midden extending to a depth of four feet below the marsh level. No pottery was recovered from the shell midden and therefore no definite age correlation can be ascertained.

The disagreement among investigators as to the relative ages of the major stream channels in the deltaic area also exists in regard to the development of Lake Pontchartrain. Although Fisk does not speculate as to the time of the formation of the lake, he has described the cause of its formation. He believes that the lake is bounded by faults of the Red River-Lake Borgne fault zone and that the fault zone has had a long and continuous existence (Fisk, 1944, p. 32). Russell states that Metairie-Mississippi alluviation filled in the embayment around New Orleans and terminated the open-water conditions. Lake Pontchartrain then became an alluviated plain and supported Indian habitation. After the deposition was terminated, downwarping lowered the area to a minimum of fourteen feet. Pottery was found in shell material dredged from the lake bottom five miles south of Mandeville Point and was classified as Coles Creek period
On the basis of Tchefuncte sites located on ancient beaches on the south and northeast shore of Lake Pontchartrain, Ford believes that the lake must have been in existence by Tchefuncte times (Ford, 1945, p. 13). He correlates the Metairie-Mississippi with the Tchefuncte period.

Cultural remains recovered and borings drilled into the base of Indian middens around the lake during this survey substantiates the open-water conditions during the Tchefuncte period. However, old stream scars presumably of the Metairie-Mississippi indicate that at one time Lake Pontchartrain was receiving a considerable amount of discharge waters. The Tchefuncte period site at La Branche is an extensive shell midden about one-half mile long. Borings show a thickness of sixteen feet with an undetermined base. However, the site is not parallel to the lake beach but its strike is on a right angle from the beach. Indications are that it was originally based on an ancient levee probably of an ancient distributary of the Mississippi. In addition to this evidence the Marksville sites extending to the Chandeleur Islands suggest that the Mississippi was flowing into the eastern area during Tchefuncte time.

It is possible that the lake was receiving enough deposition to build an alluviated plain sufficient to support Indian occupation sites. Coles Creek and Troyville sites are located along the distributary stream scars and suggest that alluviation could have taken place by Coles Creek time. In addition to the Coles Creek pottery found in the dredging operation mentioned by Russell, other reports from engineers have indicated cultural remains intermixed with shell material dredged between Lake Maurepas and Lake
Pontchartrain. Ford questions the possibility of Coles Creek sites found in dredged material fourteen feet below the water level and eight or nine feet below the base of the Tchefuncte site located five miles away. This is a logical deduction and although Coles Creek remains on the lake bottom are questionable, it is possible that faulting, local compaction, or downwarping of sufficient magnitude could lower the region to considerable depths. The greatest amount of subsidence recorded during this survey is indicated by the La Branche site which shows a depth of twenty feet. Additional information from borings on a north-south line in Lake Pontchartrain (which cannot be quoted at the present time) indicate a general downwarping pattern toward the center of the lake. No other explanation seems feasible or accounts for Coles Creek pottery found at lower levels than the Tchefuncte period sites on nearby beaches. Before any final conclusion can be made on this problem, additional information will be necessary.

The relationship of the aboriginal population of Coastal Louisiana and the physiographic features they inhabited is indicated from the numerous and widespread occupation sites throughout the region (Plate 2). Many sites in one area and the paucity of sites in others indicate the areas in Coastal Louisiana where habitation was possible for any one period. When the requirements for human living were no longer available man was forced to move. By mapping the concentrations of man's dwelling sites through each period, we are able to partially follow the phases of the changing stream. The Over-all Distribution map indicates that during the two thousand years man has lived in Coastal Louisiana, almost every area has been
inhabited during one period or another. By comparing the Initial Distribution maps with the over-all pattern, the areas that were habitable during each period become discernible.

The mounds and middens located in the survey area testify to the type of food and living conditions that were utilized by primitive man. Not only do the Indian sites reveal information about man and his habits, but they also contain clues as to the natural resources that abounded in the region. In the black-earth middens on the cheniers, mollusk remains are few and indications are either that they were not popular as food or they they were not abundant. Sites in the central and eastern parts of the region show extensive accumulations of shell and attest to their abundance and popularity with early man in the area. The black-earth middens in the northern section of the survey area show a paucity of fish and animal bones and an absence of mollusk shell. Apparently the people living in this section were more or less dependent upon agriculture or the natural vegetation available. Changes in water salinity are also evident from Indian cultural remains. Earth mounds of later periods are built on earlier shell midden bases and it seems apparent that the mollusk was no longer available in quantity in the sector. Cultural remains and the cultural evolution of early man have provided many clues regarding his existence as well as furnishing additional suggestions concerning the natural setting of Coastal Louisiana during aboriginal times.


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William Grant McIntire was born in Price, Utah, on June 28, 1918. After completion of elementary and high school in Price, he attended the University of Utah in Salt Lake City, Utah, for two years. He entered the armed forces in January, 1941, and was discharged five years later. He attended the University of Southern California, Los Angeles, California, for one year, later transferring to the Brigham Young University, Provo, Utah, where he received his B. S. in June, 1950. He was admitted to Louisiana State University for graduate study in Geography in September, 1950.

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EXAMINATION AND THESIS REPORT

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Major Field:  Geography

Title of Thesis:  Prehistoric Settlements of Coastal Louisiana

Approved:

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Date of Examination:

May 11, 1954