

**Antiquities of the Ouachita Valley / by Clarence B. Moore ; report on an additional collection of skeletal remains, from Arkansas and Louisiana (made and presented to the National Museum, in 1909, by Mr. Clarence B. Moore) / by Dr. Aleš Hrdlička.**

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# ANTIQUITIES OF THE OUACHITA VALLEY

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By CLARENCE B. MOORE

REPORT ON AN  
ADDITIONAL COLLECTION OF  
SKELETAL REMAINS, FROM  
ARKANSAS AND LOUISIANA

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By DR. ALEŠ HRDLIČKA



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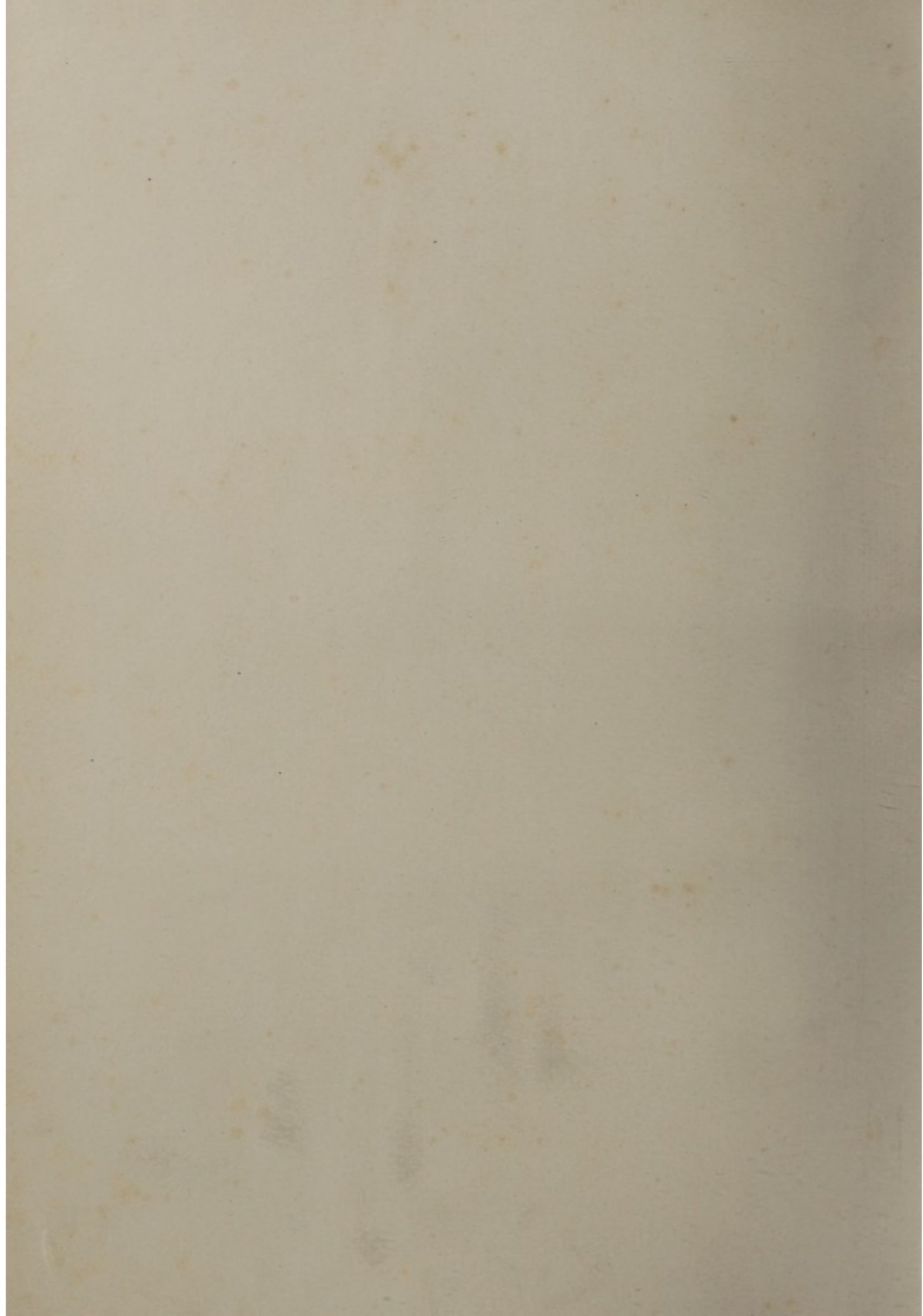
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# Antiquities of the Ouachita Valley

BY

CLARENCE B. MOORE.

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## Report on an Additional Collection of Skeletal Remains, from Arkansas and Louisiana

(Made, and presented to the National Museum, in 1909, by Mr. Clarence B. Moore)

BY

DR. ALEŠ HRDLIČKA

In charge of the Division of Physical Anthropology, United States National Museum

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1909

# WRITINGS ON ARCHÆOLOGY.

BY CLARENCE B. MOORE.

- Certain Shell Heaps of the St. Johns River, Florida, hitherto unexplored. The American Naturalist, Nov., 1892, to Jany., 1894, inclusive. Five papers with illustrations in text, and maps.
- Certain Sand Mounds of the St. Johns River, Florida, Parts I and II. Journal of the Academy of Natural Sciences of Philadelphia, Philadelphia, 1894. Vol. X. Quarto, 130 and 123 pages. Frontispieces, maps, plates, illustrations in the text.
- Certain Sand Mounds of Duval County, Florida; Two Mounds on Murphy Island, Florida; Certain Sand Mounds of the Ocklawaha River, Florida. Journ. Acad. Nat. Sci. of Phila., 1895. Vol. X. Quarto, 108 pages. Frontispiece, maps, plates, illustrations in text.
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- Certain Aboriginal Mounds of the Georgia Coast. Journ. Acad. Nat. Sci. of Phila., 1897. Vol. XI. Quarto, 144 pages. Frontispiece, map, plates, illustrations in text.
- Certain Aboriginal Mounds of the Coast of South Carolina; Certain Aboriginal Mounds of the Savannah River; Certain Aboriginal Mounds of the Altamaha River; Recent Acquisitions; A Cache of Pendent Ornaments. Journ. Acad. Nat. Sci. of Phila., 1898. Vol. XI. Quarto, 48 pages. Frontispiece, maps, illustrations in text.
- Certain Aboriginal Remains of the Alabama River. Journ. Acad. Nat. Sci. of Phila., 1899. Vol. XI. Quarto, 62 pages. Map, illustrations in text.
- Certain Antiquities of the Florida West-Coast. Journ. Acad. Nat. Sci. of Phila., 1900. Vol. XI. Quarto, 46 pages. Maps, illustrations in text.
- Certain Aboriginal Remains of the Northwest Florida Coast, Part I; Certain Aboriginal Remains of the Tombigbee River. Journ. Acad. Nat. Sci. of Phila., 1901. Vol. XI. Quarto, 100 pages. Maps, illustrations in text.
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- Aboriginal Urn-burial in the United States. American Anthropologist, Oct.-Dec., 1904. Plate.
- A Form of Urn-burial on Mobile Bay. American Anthropologist, Jan.-March, 1905.
- Certain Aboriginal Remains of the Black Warrior River [Moundville]; Certain Aboriginal Remains of the Lower Tombigbee River; Certain Aboriginal Remains of Mobile Bay and Mississippi Sound; Miscellaneous Investigation in Florida. Journ. Acad. Nat. Sci. of Phila., 1905. Vol. XIII. Quarto, 206 pages. Maps, illustrations in text.
- Moundville Revisited; Crystal River Revisited; Mounds of the Lower Chattahoochee and Lower Flint Rivers; Notes on the Ten Thousand Islands, Florida. Journ. Acad. Nat. Sci. of Phila., 1907. Vol. XIII. Quarto, 144 pages. Maps, illustrations in text.
- Certain Mounds of Arkansas and of Mississippi (including Doctor Hrdlička's paper on the Crania). Journ. Acad. Nat. Sci. of Phila., 1908. Vol. XIII. Quarto, about 120 pages. Maps, illustrations in text, eight colored plates.

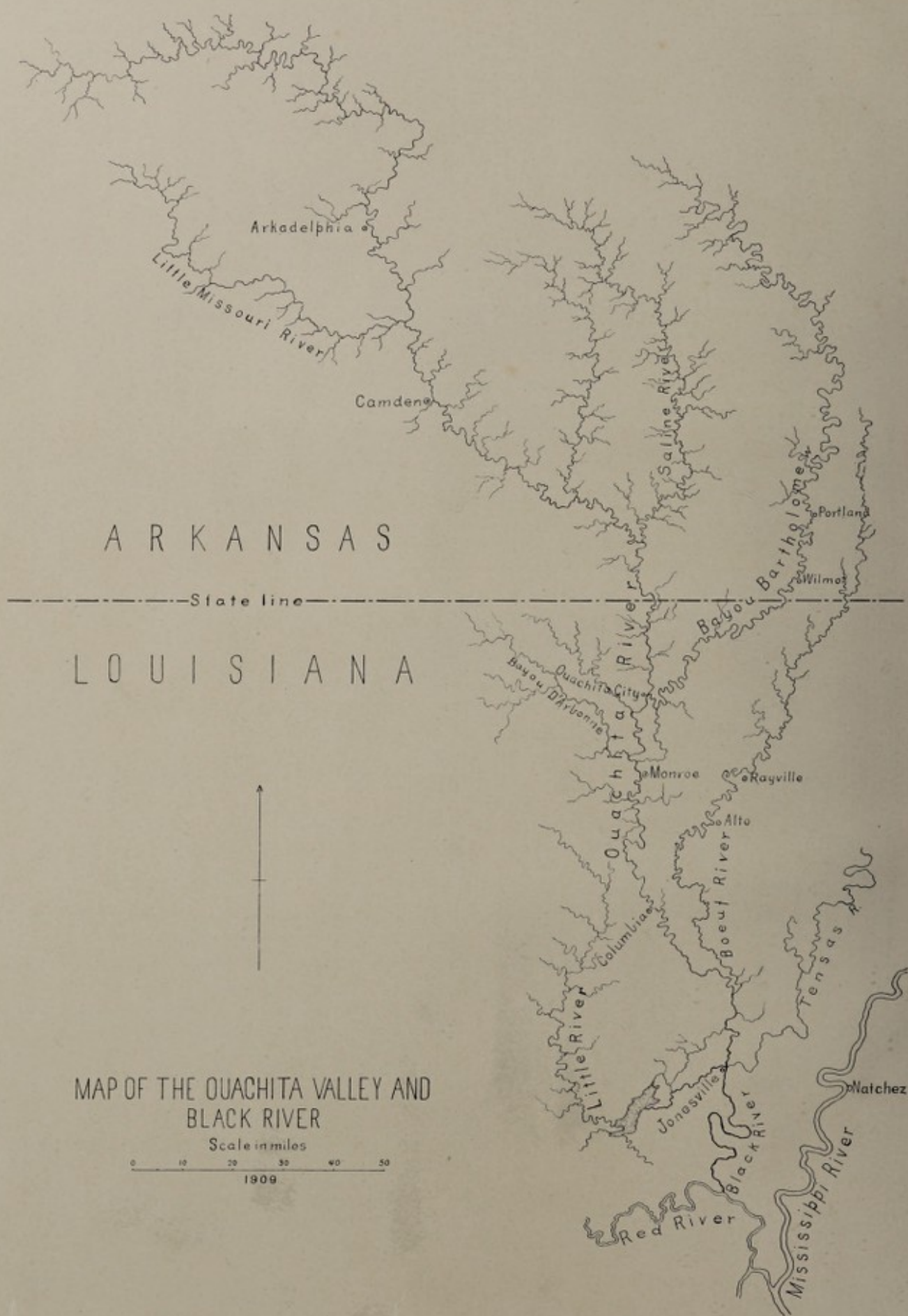
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ANTIQUITIES OF THE OUACHITA VALLEY

BY

CLARENCE B. MOORE.



ARKANSAS

LOUISIANA

State line

MAP OF THE OUACHITA VALLEY AND  
BLACK RIVER

Scale in miles

0 10 20 30 40 50

1909

## ANTIQUITIES OF THE OUACHITA VALLEY.

BY CLARENCE B. MOORE.

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### INTRODUCTION.

Ouachita<sup>1</sup> river has its source in central western Arkansas, and flowing easterly and southeasterly, enters the State of Louisiana, through which it follows a southerly course to its union with the Tensas and Little rivers, where the three combine to form Black river.

Black river is a tributary of Red river which, as the reader is aware, joins the Mississippi on its western side.

The principal affluents of Ouachita river, in order from north to south, are: Little Missouri river, Saline river, Bayou Bartholomew, Bayou d'Arbonne, and Boeuf river.

We have considered Little river to belong to the Ouachita valley, while Tensas river, paralleling the Mississippi, may be regarded as having a drainage basin of its own.

This report has to do with the antiquities of that part of the Ouachita valley which was investigated by us in November, 1908, and in January, February, March, and April, 1909.

We shall now indicate the extent of our season's work, explaining that it is our custom to have Mr. J. S. Raybon, for many years captain of the steamer from which our work is done, examine in advance such territory as it is our intention to explore, that the exact position of mounds and cemeteries may be determined and permission to investigate may be obtained from the owners, previous to our visit. In pursuance of this custom part of the summer and of the fall of 1908 was devoted to this work by Captain Raybon, travelling in a small, covered boat, with a companion, and stopping at each landing and at every other point on the rivers, which gave promise of revealing aboriginal remains. In this way were traversed the navigable length of the Ouachita river, which lies between Camden, Arkansas, and its union with Black river, a distance by water of a little more than 300 miles; the navigable part of Little river, from Georgetown down, about eighty-five miles by water.

<sup>1</sup> Locally pronounced *Washtaw*.



That part of the Ouachita valley afterward explored by us was: Ouachita river up to a point about twenty miles above Camden, or 320 miles by water, approximately; Bayou Bartholomew to Portland, Arkansas, about 134 miles by water, its full navigable length; Boeuf river to Alto, about 100 miles by water; Little river to a point somewhat below Georgetown.

Black river, also, which is about fifty miles in extent, by water, was carefully gone over by us, but nothing of interest was encountered in this overflow region, though considerable digging was done.

At Jonesville (formerly known as Troyville), which is at the union of Ouachita and Little rivers, are, within the limits of the town, a number of mounds in various stages of erosion, which are described in Reports<sup>1</sup> of the Bureau of American Ethnology.

In the lower Mississippi valley, of which the Ouachita valley is a part, but little archaeological work has been done hitherto,<sup>2</sup> and but few objects from this region are in our museums.

In the territory investigated by us aboriginal burials had been made exceptionally in small mounds, occasionally in superficial parts of domiciliary mounds, and ordinarily in dwelling-sites. These dwelling-sites, as a rule, are but slightly above the general level of the surrounding ground, and only about one in ten of these sites contains burials or gives evidence of having done so. Nevertheless, it is on dwelling-sites that the student of the archaeology of the Ouachita valley places his main reliance.

Throughout the overflow land doubtless many dwelling-sites have washed away in some cases and have been covered by alluvial deposit in others. In higher ground many sites have disappeared, or have partly disappeared, through long-continued cultivation.

On all sides we heard from the owners that their plantations had been under cultivation for long periods, some so much as seventy years; and doubtless others of these properties had been tilled for even a longer period.

The soil of the Ouachita valley, containing a proportion of sand, is readily affected by wash of rain, and this wash is particularly destructive in the case of ground that has been loosened by plow and harrow. Each year the loss is appreciable, especially when, as is often the case, the fields lie on a decided slope.

Hence, in the course of time, the soil accumulated through aboriginal occupancy, with any accompanying burials, wholly or in part disappears. Many owners distinctly recall the finding by themselves of human bones and of artifacts years ago in fields which yielded nothing of special interest to our investigation. Often on these fields we saw still remaining fragments of human bones and of pottery, though the layer of midden soil beneath was not sufficiently deep to contain burials.

<sup>1</sup> Twelfth Ann. Rep., p. 250, *et seq.* Twentieth Ann. Rep., p. 103.

<sup>2</sup> See W. H. Holmes, "Aboriginal Pottery of Eastern United States," Twentieth Ann. Rep. Bur. Am. Ethn., pp. 101 and 103.



Incidentally it may be said that our work during the season referred to was confined almost entirely to land that was, or had been, under cultivation. Along Bayou Bartholomew practically all land is cultivated, and along other waters visited by us the same is true of the arable sites.

When the aborigines selected dwelling-sites along rivers subject to overflow they naturally chose high ground; and later, when Europeans selected land to clear for cultivation, they were similarly influenced, especially as much of this ground already had been enriched by aboriginal deposits.

Now we shall consider those dwelling-sites which still remain notwithstanding all the factors that have contributed to their destruction.

A successful quest for dwelling-sites along the Ouachita valley is largely a matter of chance. Obviously one cannot search for them over the whole extent of each plantation one comes to, especially along Bayou Bartholomew, where plantations extend continuously on both sides throughout the length of the bayou. Therefore, one must depend largely on information derived from inhabitants, and from inhabitants of all classes.

Dwelling sites are often encountered near mounds, and most persons living in the vicinity of a mound are able to give information concerning its situation. Having determined the locality of the mound the investigator can search in its vicinity.

Many dwelling-sites, however, are apart from any tumulus, and a large proportion of inhabitants are not acquainted with the various features that indicate the presence of these sites, or perhaps, though familiar with these features, they fail to connect them with particular sites in the neighborhood. Hence one's discoveries depend greatly on the character of the persons one happens to meet, and it is obvious that even the most conscientious investigator in this region must fail to find some of the cemeteries which are situated along his line of work.

All these facts<sup>1</sup> in relation to the Ouachita valley will explain the difficulty of obtaining there a great quantity of desirable material. The investigator of the present time visits that locality many years too late. Nevertheless we unearthed some pottery which is to an extent distinctive and representative of the region, and fills a gap that has existed hitherto.

Perhaps a few words as to our means and method of work in the field may not be out of place.

Our steamer, with captain, pilot, engineer, and a crew of five men, had aboard, in addition, eight men who, with three of our crew, made a force of eleven to dig.

There were also of the party Dr. M. G. Miller, anatomist of the expedition, who has aided in all our field-work since its inception, and in putting through press

<sup>1</sup> Incidentally we may say that in a few cases permission to investigate was withheld or prohibitive conditions were imposed, but fortunately in no case, so far as we could learn, did we suffer these restrictions in connection with sites of importance.

<sup>2</sup> JOURN. A. N. S. PHILA., VOL. XIV.



all reports of our work; and Mr. Arthur W. Clime, who rendered efficient aid as general assistant.

Mr. W. D. Platt, of Ouachita, La., who served as pilot throughout the season, did not confine himself to his duties at the wheel, which his thorough knowledge of all the streams of the region enabled him to perform most satisfactorily, but aided us in every other way that lay in his power.

We have already referred to the work done by Mr. J. S. Raybon, our captain, previous to the starting of our expedition. Later, when Captain Raybon is in command of the steamer, that part of his time which is not devoted to navigation is given largely to the furtherance of our archaeological work.

The warm thanks of the Academy of Natural Sciences are tendered Prof. William H. Holmes for introductory remarks on the pottery described in this report; Dr. Aleš Hrdlička for his paper descriptive of the human remains found and preserved by the expedition; Prof. F. A. Lucas for identification of bones of lower animals; Dr. H. A. Pilsbry and Mr. E. G. Vanatta for identification of shells; Mr. F. W. Hodge for literary revision of this report.

The Academy wishes also to express its gratitude to all owners of plantations and farms along Ouachita, Boeuf, and Little rivers and Bayou Bartholomew, who so generously placed their property at its disposal, and who aided our undertaking in various other ways.

The form of burial in the Ouachita region offers nothing distinctive in the main.

The bunched burial and the burial at length were numerous. The flexed burial was infrequently found, and a variety of urn-burial in two or three instances only.

The flexed burials and the burials at length, according to aboriginal custom in the South, presumably had been made after the skeleton was denuded of flesh, like the bunched burials, but (unlike the bunched burials) when the bones were still held together by ligaments. Often bones in these burials of connected skeletons were found out of place—long-bones reversed as to position, and the like—showing that the skeleton was not in the flesh when the interment was made.

In some burial sites, as will be described later, almost no bones remained.

Thirty-nine cases and boxes of skulls and other parts of human skeletons, resulting from our season's work, were sent by us as a gift to the United States National Museum at Washington. A paper descriptive of this material, kindly prepared by Dr. Aleš Hrdlička, follows this report.

A number of bones showing fractures and pathological conditions, found by us during the season's work, were presented to the Army Medical Museum at Washington. The following determinations made by Dr. D. S. Lamb, Pathologist of the institution, kindly have been sent us by Major T. T. Russell, Medical Corps, U. S. Army, Curator of the Museum.

NOTES ON HUMAN BONES EXHIBITING CERTAIN PATHOLOGICAL  
CONDITIONS.

OUACHITA RIVER.

Myatt's Landing, Ouachita Parish,<sup>1</sup> La. The left tibia; syphilitic hyperplasia.  
Glendora Plantation, Ouachita Parish, La. Burials Numbers 84 and 118, two  
calvaria showing osteitis deformans.

Boytt's Field, Union County, Ark. The right tibia showing osteo-periostitis,  
possibly syphilitic.

Bell Gin Landing, Union County, Ark. The bones of the left forearm, showing  
simple fracture with good repair.

BOEUF RIVER.

Jones' Landing, Franklin Parish, La. The femur, tibia, fibula, and ulna,  
showing osteitis deformans.

Dailey Landing, Franklin Parish, La. A calvarium showing syphilitic erosions.

BAYOU BARTHOLOMEW.

Ward Place, Morehouse Parish, La. Burial No. 12, the right femur and tibia  
showing osteo-arthritis; and from Burial No. 18, a woman, the bones of the pelvis  
and thighs, showing congenital dislocation of femurs.

Bray's Landing, Morehouse Parish, La. A right tibia, showing hyperplastic  
osteo-periostitis, possibly syphilitic.

The pottery of the Ouachita valley which, as we have said, forms part of the  
lower Mississippi province, is most favorably represented by vessels from sites near  
the union of Bayou Bartholomew with the Ouachita river, where a center of culture  
seems to have existed, and where incised decoration was sometimes executed by a  
master hand.

In no other region, however, in which we have worked, have we obtained so  
great a proportion of pottery of inferior ware, of commonplace form, and of rude and  
carelessly executed decoration, and having such sameness of design as we found in  
the lower Mississippi region,<sup>2</sup> although we met with there, in exceptional instances,

<sup>1</sup> The State of Louisiana uses the term *parish* to designate that division of the commonwealth  
which in every other State in the Union is known as a *county*.—C. B. M.

<sup>2</sup> So far as inferior work and rude decoration are concerned. We exclude from this statement  
that class of pottery from Florida known as ceremonial, which was made expressly for interment with  
the dead, and, as might be expected, is of the commonest kind of ware, and has the crudest forms of  
decoration. This pottery is very abundant in Florida.



vessels which, in our belief, in respect to incised decoration, exceed in beauty any discovered elsewhere in the United States.

We note the occasional occurrence throughout the Ouachita valley of what is seldom found on aboriginal pottery in other regions, namely, the extensive use of incised decoration and of color on the same vessel.

We are aware that on pottery from regions to the northward, as well as from the province we are describing and from elsewhere, incised designs were sometimes reinforced by the insertion of color in the lines, but the body of the vessel, in such instances, is not colored with pigment; hence we do not include this class with the one described in advance of it.

It will be noted also by the student of pottery of the Ouachita valley that the use of pigment on large numbers of vessels did not obtain there, the use of any color on vessels having been exceptional; and in this respect the pottery of the lower Mississippi province seems to differ from that of the middle Mississippi valley, where colored pottery is so commonly and abundantly found.

Pottery with black coloring material was not found by us in the Ouachita valley; though such coloring is present occasionally on vessels in the middle Mississippi province, where, however, it has little body, being hardly more than a stain.

The use of white pigment (kaolin), except to intensify the lines of incised decoration, seems to have been infrequent in the lower Mississippi region, though it was abundantly used to the northward. But one vessel was found by us in all this season's work on which white pigment was used to confer a design, namely, a small water-bottle bearing on the body partly interlocked scrolls, alternately of red and of white pigment. This vessel, like the two of the "teapot" variety found by us, exactly resembles vessels found in abundance farther north, and all perhaps are importations.

Red pigment, when occurring on pottery of the Ouachita valley, seems to be more durable and more brilliant than that used on pottery found farther north. A mass of red pigment from the cemetery at the Keno Place has been examined by Dr. H. F. Keller, who says of it: "It is remarkably brilliant, and contains, besides oxide of iron, considerable quantities of clay and quartz fragments."

A bottle in fragments, found by us at Sycamore Landing,<sup>1</sup> was coated with green pigment. This pigment, analyzed by Doctor Keller, proves to "be a mixture of green silicate of iron (glauconite) and white kaolin." Masses of glauconite were found by us with burials at the great prehistoric site at Moundville, Ala.<sup>2</sup>

In relation to the collection of pottery made by our expedition this season, it may be well to explain that a large proportion of the earthenware vessels obtained were in fragments—one in 108 pieces—and that all such vessels are carefully cemented together. Sometimes slight restoration is deemed advisable. This retoration, however, is attempted only when the parts of the vessel in our possession make it clearly apparent what the remaining part must have been.

<sup>1</sup> The Keno Place and the plantation at Sycamore Landing are near together on Bayou Bartholomew, as will be described, later.

<sup>2</sup> See "Certain Aboriginal Remains of the Black Warrior River." *Journ. Acad. Nat. Sci., Phila.*, Vol. XIII., pp. 201, 211.



Restoration of pottery, it may be said, is more often requisite when the ware comes from a region like the Ouachita valley, where the soil contains a large percentage of clay, than it is in the case of earthenware found in sand; inasmuch as in clay the search for fragments with the aid of a sieve is not nearly so successful as it is in sand.

All measurements of earthenware vessels herein given are approximate; and all reductions in size, not only of vessels but of other objects illustrated in this report, are linear.

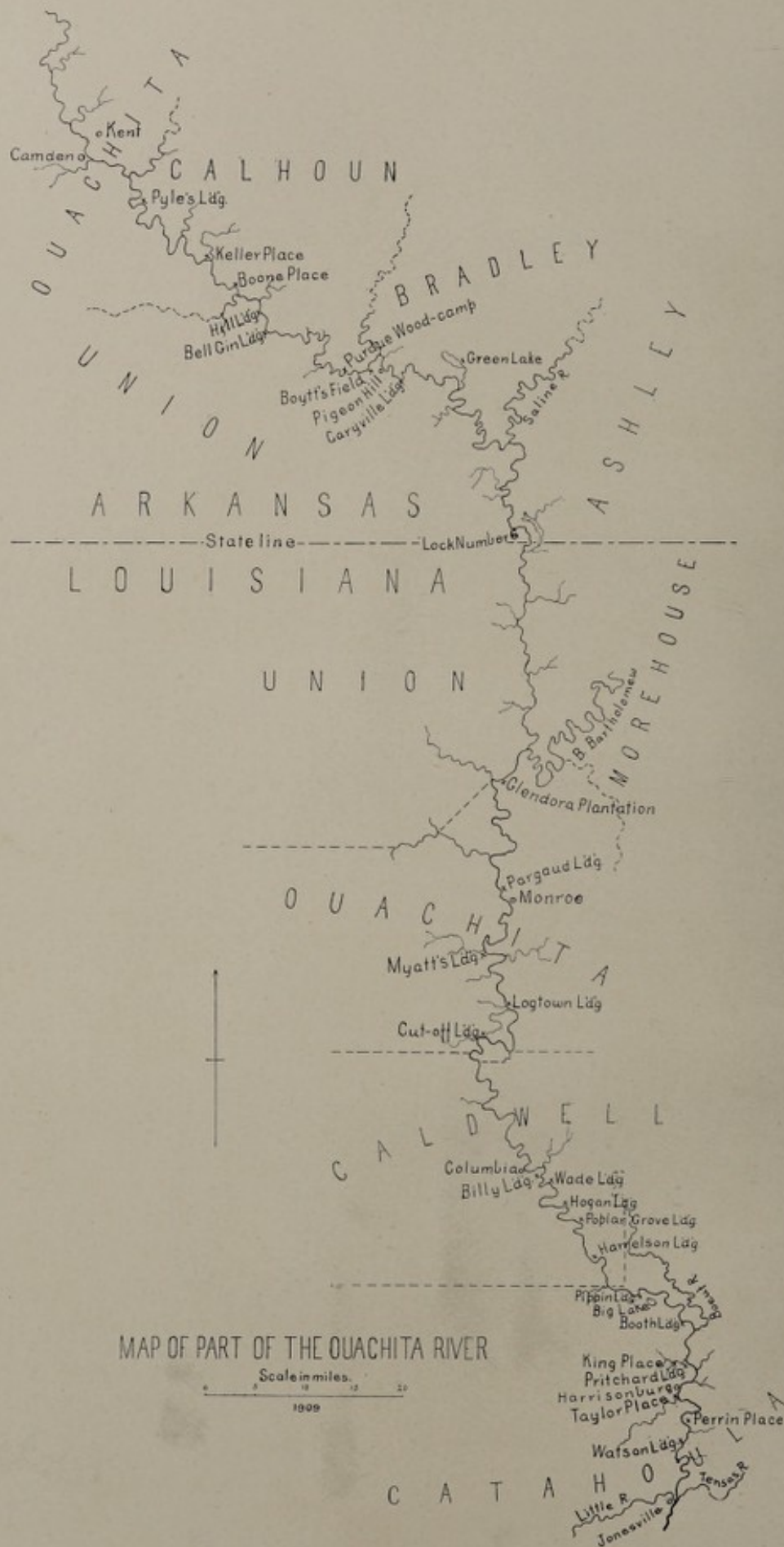
Diagrams of designs are as accurate as it is possible for them to be when these designs are transferred from a curved to a flat surface.

Prof. William H. Holmes has kindly prepared for the Academy the accompanying notice of the pottery found by our expedition in the Ouachita valley.

"Although this collection of earthenware presents many features of interest and illustrates a local culture center not heretofore well represented in our collections, it does not stand apart from the general and well-known culture products of the general region. It embraces features of form and embellishment indicating close alliance with the wares of the middle Mississippi province and of the Gulf Coast, as far east as Florida; but affords no evidence of close relationship with the pottery of the Pueblo region on the West or of Mexico on the South. It bespeaks a special development highly perfected along certain lines by a local tribe or group of peoples; the best examples rise well above the general level of the ceramic products of the region, and, for that matter, much above the general run of the ware of the localities represented. A number of vases belonging to this group are illustrated in the Twentieth Annual Report of the Bureau of American Ethnology, Plates LI and LII.

"In shape many of the vessels are worthy of special note. They range from simple shallow bowls to high-necked bottles, and much skill and taste are shown in the modeling, especially of the formal shapes. In the entire series illustrated by Mr Moore, there is hardly a single one that will not give pleasure to persons of refined taste, and some may well become models for the professional potters of our factories. Complex and compound forms are not common, although the rim and neck of the vases are in many cases modeled to give the appearance of a small cup set into the mouth of the receptacle proper. Life forms are of comparatively rare occurrence, and only one example of the modeling of the human form is seen, this being a rudely constructed figure attached to the rim of a bowl (fragment). Certain specimens have the rim so shaped as to suggest the use of a lid, although no lids have been found. As a rule the base is flattened or gently rounded, and rare specimens are mounted on tripods. One of the choice specimens is a small vase (Fig. 81) surmounted by a cup-like rim piece beneath which the body widens gradually, expanding at the base into four conical projections.

"As a rule the color is the dark gray of the baked clay, a few specimens being finished in red. The surface is smoothly finished and, in cases, well polished. The paste is moderately hard and tenacious, and is tempered in cases, especially in the ruder ware, with pulverized shell.





"The decoration of this ware is even more noteworthy than the forms. It consists, in the main, of incised work, the scroll motive, which takes a multitude of forms, prevailing to a remarkable extent. The treatment is refined and even elegant, and the application of the designs to the diversified forms of the vessels is masterly. This is well illustrated in Figs. 15, 81, 131. The principal band of decoration encircles the body of the vessel, often covering the entire surface. The neck, and especially the rim, of the bowl-forms is in cases occupied by a very much conventionalized and abbreviated band of the same scroll motive. Although highly conventionalized and applied to purely formal shapes, it is clear that this scroll in all its manifestations still carried with it in the mind of the initiated the animal concept, and a limited number of examples are seen in which the scroll units take the place, on animal shaped vessels, of the members of the body. The number of units employed is normally four, but this is not adhered to strictly, the repetition varying with the requirements of the vessel decorated. It is most interesting to note that, as seen in the tracings of designs shown in the illustrations, the scroll unit is repeated from three to six or more times, and that, when viewed from the under side of the vessel, the interspaces take the form of a swastika which has three or more arms according to the number of the scroll units used—the swastika figure being, however, a mere accident, and thus without significance. A noteworthy feature of these designs is the elaboration of some of the scroll work interspaces. A disk-like figure often fills the wider openings, while the narrower are occupied by incised reticulations, which we may assume are conventional suggestions of the body markings of the creature symbolized.

"This treatment of formal elements of animal origin is so universal that we are safe in assuming that, whether the actual decorator of these vessels had the life form in mind or not, the origin of each and every part of the decoration is in a life concept, and doubtless one with which superstitious notions were associated. Considering the simple and graceful forms of the vessels embellished with the scroll work, the elegance and completeness of the designs, and the skill of execution and remarkable adjustment to the vessel forms, these potters of the old-time villages among the Louisiana bayous may claim to have reached the highest mark among all the valley peoples in the esthetic treatment of earthenware."

We shall now take up the detailed account of our season's work, with the explanation that many aboriginal dwelling-sites which we carefully investigated, but in which no burials or artifacts of interest were found, are omitted from our report, and that mounds and sites are described in order, going upstream.

#### OUACHITA RIVER.

The Ouachita, a comparatively narrow stream, is navigable in the Winter and Spring seasons from its union with Black river to Camden, Arkansas, a distance, as we have said, of about 300 miles by water.



Much of the territory bordering the Ouachita is low-lying<sup>1</sup> and subject to inundation, and probably in aboriginal times, as at present, was not occupied for permanent habitation. Consequently it is but in places along the banks of the Ouachita that one can reasonably expect to find places of aboriginal abode.

Our investigation of this river ended about twenty miles above Camden, as we have stated in our introductory remarks.

#### MOUNDS AND SITES.

Mounds at Watson Landing, Catahoula Parish, La.  
 Mound on the Perrin Place, Catahoula Parish, La.  
 Mounds on the Taylor Place, Catahoula Parish, La.  
 Mounds at Pritchard Landing, Catahoula Parish, La.  
 Mounds on the King Place, Catahoula Parish, La.  
 Mound at Booth Landing, Catahoula Parish, La.  
 Mounds near Big Lake, Catahoula Parish, La.  
 Dwelling-sites near Harrelson Landing, Caldwell Parish, La.  
 Mound near Poplar Grove Landing, Caldwell Parish, La.  
 Mounds near Hogan Landing and near Wade Landing, Caldwell Parish, La.  
 Mound near Billy Landing, Caldwell Parish, La.  
 Mound and site near Cut-Off Landing, Ouachita Parish, La.  
 Mounds opposite Logtown Landing, Ouachita Parish, La.  
 Cemetery at Myatt's Landing, Ouachita Parish, La.  
 Mound near Pargaud Landing, Ouachita Parish, La.  
 Cemetery on the Glendora Plantation, Ouachita Parish, La.  
 Mound near Lock Number Six, Ashley County, Ark.  
 Mounds near Green Lake, Bradley County, Ark.  
 Cemetery at Caryville Landing, Union County, Ark.  
 Mounds near Pigeon Hill, Union County, Ark.  
 Cemetery in Boytt's Field, Union County, Ark.  
 Mounds near Purdue Wood-Camp, Calhoun County, Ark.  
 Cemetery at Bell Gin Landing, Union County, Ark.  
 Mounds near Hill Landing, Union County, Ark.  
 Mounds at the Boone Place, Calhoun County, Ark.  
 Mounds on the Keller Place, Calhoun County, Ark.  
 Mound and sites near Pyle's Landing, Calhoun County, Ark.  
 Mound and Cemetery at Kent, Ouachita County, Ark.

#### MOUNDS AT WATSON LANDING, CATAHOULA PARISH, LA.

At Watson Landing, on property of Mr. W. J. Watson, of Jonesville, La., is a group of mounds of moderate size, the largest of which is used at the present time for burial purposes. Nothing was found at this place.

<sup>1</sup> From just above Ouachita City for about seventy-five miles up by water, is an almost uninhabited region.

## MOUND ON THE PERRIN PLACE, CATAHOULA PARISH, LA.

About six miles below Harrisonburg, on the property of Mr. T. W. Perrin of that place, on the right-hand side going up, is a mound partly eaten away by the river, which was not investigated by us.

## MOUNDS ON THE TAYLOR PLACE, CATAHOULA PARISH, LA.

About one mile below Harrisonburg, on property of Mr. A. G. Taylor, of Harrisonburg, is a group of mounds of moderate size, showing the effect of much cultivation. Nothing of interest was found at this place.

## MOUNDS AT PRITCHARD LANDING.

At Pritchard Landing is an interesting group of mounds on the property of Mr. S. R. Oliphant, who resides on the place.

This group, the site of an important center in aboriginal times, is an irregular ellipse in form, but is without the great central mound so often present in large groups of this kind.

Pools of water here and there show whence material for the mounds was taken.

There are believed to be fourteen mounds at this place, most of which, however, are small and have been greatly spread by long cultivation.

Of the five principal mounds of this group, all of which are rectangular and have summit-plateaus, one is small; one seems to have been greatly dug into, presumably to serve a purpose in the Civil War, as it commands the river; and one, twenty-seven feet in height, is so very irregular in outline through wash of rain that measurements of its present dimensions would give no idea of its original size.

The largest mound, which forms part of the ellipse, much eroded by wash of rain, has corners directed toward the four cardinal points. Its height is 40 feet.<sup>1</sup> The present measurements of the basal diameters are, from NW. to SE., 253 feet; from NE. to SW., 236 feet.

The summit-plateau in the same directions, respectively, is 88 feet and 59 feet. In Fig. 1 is a representation of this mound, which serves to illustrate the extent to which mounds sometimes suffer through wash of rain. The picture also shows how inadequate the camera is to convey a just idea of the height of a mound; the one in question having, as we have said, an altitude of 40 feet.

In a SW. by W. direction from the principal mound is one more symmetrical than any of the others, with a height of 31 feet, measured from the north. Its diameter E. and W. is 279 feet; N. and S., 243 feet. Respectively in the same directions the summit-plateau measures 126 feet and 100 feet. The sides of the mound face the cardinal points.

<sup>1</sup> In our measurement of heights of mounds great care is taken to select the surrounding level as a starting point and to avoid ridges and depressions, which are often present in the neighborhood of mounds in the shape, respectively, of artificial causeways and places whence material has been taken.



As the reader is aware, a large proportion of domiciliary mounds (to which the one in question evidently belongs) are without burials, though a few have superficial burials in their summit-plateaus. The latter proved to be the case in this mound, which was the only one in the group where the soil of the summit-plateau was soft, dark, and fitted for cultivation.

A great number of trial-holes sunk by us all over the summit of this mound showed a considerable area from the central to the south-eastern part of the plateau



FIG. 1.—Principal mound. Pritchard Landing.

to be of material much darker than that of the remaining parts, and seven trial-holes in this dark soil at once exposed human remains.

An irregular area somewhat elliptical in outline, with diameters of 48 and 53 feet, which area proved to be in excess of the space containing burials, was dug throughout by us to a depth of from 1 to 2.5 feet where the dark soil came to an end.

The bones, crumbling and in fragments, were in such a condition that determination as to the method of burial was impossible, though in a few cases the burial at length was indicated. In many instances, however, bones lay scattered and in layers, remnants of long-bones lying under or alongside what was left of skulls.

In all, parts of seventy-four skulls were unearthed (eleven in one pit). The remaining bones of the skeletons were far fewer than the complement called for



by the number of crania, but from the condition of the bones which remained it is probable that many others had disappeared through decay.

Such artifacts as were found with the burials are not of a character to inspire enthusiasm in the artistic ability of those who occupied so important a center as this one must have been.

With one burial was a small arrowhead of chert; a polished "celt" 3 inches in length, which was given to Mr. Oliphant, the owner of the mounds; and several large fragments of an earthenware pipe bearing rude incised decoration.

Another burial had with it a single arrowhead of chert.

With human remains was a pipe of earthenware (having a small part missing from the rim) also with rude, incised decoration (Fig. 2).



FIG. 2.—Pipe of earthenware. Pritchard Landing. (Full size.)

Three vessels of medium size were found associated in an interesting way. Immediately over a skull was a bowl of such size as to permit it exactly to cover the cranium. On one side of this inverted bowl, and in contact with it, was a vessel of medium size, while on the other side was another vessel of similar dimensions, one part of the rim of which dipped under the inverted bowl.

With a water-bottle, found in fragments, was a bit of quartz crystal. These objects were not in the immediate neighborhood of human bones, but undoubtedly they had been associated with some that had disappeared through decay or had suffered disturbance.

Fifteen earthenware vessels came from this cemetery, nearly all being found singly, in pairs, or three together, in the neighborhood of skulls. One, however, lay at the hip of what seemed to have been an extended skeleton which had another



vessel near the skull. Several vessels lay apart from bones, but these, no doubt, originally had been associated with them.

With one exception all vessels were broken when found, some being little more than crumbling fragments.

The ware, which is not shell-tempered, is soft and probably insufficiently fired. Decoration, when present, shows little originality, being represented by rude combinations of lines or the ever-recurring scroll. We show one vessel from this place.



FIG. 3.—Vessel No. 16. Pritchard Landing.  
(Height 3.6 inches.)

Vessel No. 16. A cup of somewhat unusual form, having a flat base and a commonplace line and punctate decoration (Fig. 3).

Though considerable prospecting was done by us in the other mounds and in the level ground at Pritchard Landing, no human bones were found and no artifacts, with the exception of several arrowpoints of chert.

At this place no history is preserved of the finding of human remains through years of cultivation or in the digging of numerous post-holes for fences.

A son of Mr. Oliphant described the discovery by himself, while hoeing, of a frog of stone, of life-like appearance, hav-

ing in its back a circular hole of considerable size, doubtless a pipe.

Scattered over the level ground in places are numerous fragments of pottery and of stone, evidences of aboriginal occupancy, and we are unable to account for our inability to find aboriginal cemeteries at this place, unless it is that all trace of them disappeared through long cultivation of the ground, at a period anterior to our visit.

#### MOUNDS ON THE KING PLACE, CATAHOULA PARISH, LA.

At the junction of Rawson and Gaster creeks, about 1.5 mile from Pritchard Landing, are a number of low mounds on the property of Mr. G. F. King, who resides on the place, which have been plowed over for a considerable time. No history of any discovery on this place has been preserved, and our digging had negative result.

#### MOUND AT BOOTH LANDING, CATAHOULA PARISH, LA.

On property belonging to Mr. M. E. Booth, who lives nearby, is a mound 12 feet 4 inches in height and 74 feet across the base. Its shape is a truncated cone, and the material from which it is made is tenacious alluvial deposit, necessitating the use of a pick for removal.



As the mound is a refuge for stock in times of high water, it was not deemed advisable to destroy it, especially as two pecan trees on its summit were valued by the owner.

Owing to the presence of these trees our investigation was restricted to a pit 11 feet by 6 feet, carried down, with almost perpendicular walls, from the summit-plateau to a depth of 12 feet 6 inches, where undisturbed ground seemed to be reached. On this basal part were fragments of river shells and a number of scales belonging to a fish of the gar family.

Human remains were encountered at five levels, respectively 3 feet 6 inches; 4 feet 9 inches; 5 feet 7 inches; 6 feet; 7 feet 5 inches.

The bones were mere moldering fragments, and skulls, eight in number, were identified in seven cases by traces of teeth alone. In the other instance a mastoid process and part of a lower jaw were distinguishable.

No artifacts lay with the remains.

A few arrow- and lancepoints, of chert, and one of quartzite were scattered in the clay, as were several hones of sandstone and a stopper-shaped pebble which may have been utilized by the aborigines.

A few feet from this mound is a small area composed of black soil and fragments of mussel-shells, in which we found the base of a vessel, with nine feet encircling the margin (Fig. 4).



FIG. 4.—Base of vessel. Booth Landing.  
(Diam. 5.3 inches.)

#### MOUNDS NEAR BIG LAKE, CATAHOULA PARISH, LA.

Big Lake, a small sheet of water, and not part of a former course of the river (which sometimes in the South is called a "lake"), is about one mile eastward from Pippin's Landing, on property of Messrs. H. and C. Newman, of New Orleans.

Southwest of the western end of the lake are a number of mounds, some small and some of moderate size. Some are rectangular in outline, and all are flat-topped and evidently domiciliary. A number had been dug into previous to our visit.

These mounds were all investigated by us to some extent, trial-holes being sunk with a view of determining if cemeteries were present in the summit-plateaus. Nothing was found, the clay material of which the mounds were made being compact and of a raw yellow appearance, with no admixture of the organic matter which one expects where burials have taken place.

#### DWELLING-SITES NEAR HARRELSON LANDING, CALDWELL PARISH, LA.

In a field, the property of Mr. C. M. Harrelson, at Harrelson Landing, who resides on the place, are three circular rises in the ground, which evidently had been used as dwelling-sites in aboriginal times.

One of these (A), about 45 feet in diameter, had, through long cultivation, been plowed almost to the level of the surrounding ground. Bits of pottery and a



few fragments of human bones lay on the surface. Careful investigation of this site yielded part of one badly decayed human skeleton, and a skeleton kindly identified by Prof. F. A. Lucas as having belonged to an Indian dog.

Another rise in the ground (B), 63 feet in diameter, was somewhat higher than the one just described. Scattered over its surface in profusion were potsherds and fragments of human bones.

Human remains were encountered by us in nineteen places in this site, but their condition was unsatisfactory, owing to the state of decay in which most of them were, and to the great amount of disturbance, aboriginal and recent, to which they had been subjected. Many burials were just below the surface, and the deepest was but 30 inches down. Several skulls and some other bones were in a condition to save, however.

One burial was a skeleton lying flexed on the left side; five were at full length on the back, two being without skulls; thirteen burials had been disturbed.

No artifacts were present with the dead with the exception of one arrowhead of chert, which lay beneath a femur.

A few arrowheads and lanceheads, of chert, and a drill of the same material lay apart from human remains, as did a piercing implement of bone having the articular part of the bone remaining.

The third elevation (C) evidently had not been used for burial purposes, as a thorough search was unsuccessful.

#### MOUND NEAR POPLAR GROVE LANDING, CALDWELL PARISH, LA.

About one mile east from Poplar Grove Landing, in sight from the road, on property belonging to Mr. Frantz E. Stewart, who lives near the landing, is a mound in the form of a truncated cone, 12 feet in height and 69 feet across the base. As this mound has been used for burial purposes in recent times, a careful investigation was not attempted.

#### MOUNDS NEAR HOGAN LANDING AND NEAR WADE LANDING, CALDWELL PARISH, LA.

Mounds at Hogan Landing and at Wade Landing, being in use as cemeteries at the present time, were not available for investigation.

#### MOUND NEAR BILLY LANDING, CALDWELL PARISH, LA.

On the river bank at Billy Landing, on property of Mr. Philip Barnes, is a small part of a mound, the other part of which, we were informed, had recently fallen into the river. Embedded in the exposed section of the mound there still remained at the time of our visit fragments of a medium sized vessel of earthenware.

Considerable digging in an adjoining field, on the surface of which were a few fragments of pottery and of chert, was without reward.



## MOUND AND SITE NEAR CUT-OFF LANDING, OUACHITA PARISH, LA.

At Cut-Off Landing, on property of Mr. Gilbert Stewart (who lives at Gilbert Stewart Landing, about five miles above, by water), on high ground above the landing and about 200 yards NNW. from it, is a mound about 5.5 feet high, with a basal diameter of 52 feet. This mound, which is of clayey sand, previous to our coming had been trenched in to the center on the southern side and the immediate middle portion had been dug out.

Eleven trial-holes sunk into the mound by us were without result.

A few yards easterly from this mound is an aboriginal dwelling-site, fairly littered with debris left by its former occupants. This site, under cultivation in recent times, but fallow at the time of our visit, had rich black soil, due to protracted occupancy. At one place on the surface lay part of a skull and other human bones.

This place, unfortunately, like so many investigated by us in this region, proved to have been too long under cultivation to have preserved the artifacts and aboriginal burials which undoubtedly at one time it had held. Trial-holes sunk in every portion of the field showed the surface soil left by aboriginal occupancy to have been so washed by rain after cultivation that but little of it was left above the undisturbed clay.

There were gathered from the surface by us: a drill of chert; several knives and small arrowheads of the same material; and an interesting arrowhead or knife, also of chert, shown in Fig. 5.

Prof. W. K. Moorehead informs us that the type last mentioned is rare, a few specimens having been found in Tennessee, Arkansas, and Louisiana, and that similar forms in obsidian from California and from Oregon are in his possession.

An almost exactly similar implement was found by us on the surface of a dwelling-site at Ragland Landing, a few miles below where the first implement was found. The second specimen, however, has a rounded edge as if it had served as a knife.

Also we were shown on a site on Little river, by a man who was camping there, a handsome arrowhead or knife of the type in question, of red chert, and much larger than the specimen found by us.

## MOUNDS OPPOSITE LOGTOWN LANDING, OUACHITA PARISH, LA.

Immediately across the river from Logtown Landing is a cultivated field in which are traces of several small mounds and part of a mound with flat top, probably originally 7 or 8 feet in height, which has been in part under cultivation and has been largely washed away by rain.

In the surrounding field are remains of dwelling-sites, the dark soil of which has been plowed and washed away until undisturbed clay is apparent in places.

As it became evident that time would be spent in negotiations with the owner of this place for even the small amount of investigation we had planned to devote to it, we passed on to more inviting fields of research.



FIG. 5.—Arrow-head or knife, of chert. Cut-Off Landing. (Full size.)



## CEMETERY AT MYATT'S LANDING, OUACHITA PARISH, LA.

At Myatt's Landing, about 15 miles by water below the city of Monroe, is the plantation of Capt. A. Myatt, who resides upon it. On the left of the road leading inland from the landing, is a large cotton field. At the extreme northern corner of this field, adjoining the road, is a restricted area of soil darkened by admixture of organic matter, extending variously from .5 foot to 2.5 feet below the surface, on which were fragments of musselshells, pebbles, and other debris from aboriginal occupancy.

We were informed by Captain Myatt that in work connected with the plantation, and later by the digging of several individuals who visited the place, skeletons, about ten in number, had been unearthed, and that with these skeletons a few earthenware vessels had been found.

This area covered by debris is one of the highest parts of the plantation, and is reached by the river only at periods of exceptionally high water.

The dwelling-site apparently extends across the road (which has cut through it to undisturbed clay) and continues in a northwesterly direction, on which part is the residence of Captain Myatt.

Consequently our investigation was limited to that part of the site lying within the field. A most thorough search of this portion was made by us with the aid of trenches and trial-holes; this and the subsequent work occupying two days and a half with our force of diggers, which, as we have said, consisted of eleven men, and four to supervise.

It was clearly determined that but a small part of the dwelling-site included within the field (that which bordered the fence) had been used as a cemetery, and this part was completely dug through by us.

Thirty-eight burials were encountered in addition to many bones scattered by disturbance in aboriginal times and through the agency of the plow at a later period. It was as a rule easy to determine to which class these disturbances belonged; those arising through cultivation of the soil being more fragmentary and nearer the surface than were the aboriginal disturbances.

No graves were at a depth greater than 2.5 feet.

The form of burial which was determined by us in but seven instances was at full length on the back, with the lower limbs crossed in one case. A number of other burials evidently had been at full length also, judging from undisturbed parts of the skeleton that remained.

There was no fixed orientation, the skulls being directed toward various points of the compass.

A number of skulls and other skeletal parts from this place were saved in fairly good condition, and were sent to the United States National Museum.

In a small pit in this cemetery, in which no bones were found, were a number of musselshells, the best preserved of which proved to be: *Lampsilis hydianus*; *L. purpuratus*; *L. ventricosus satur*; *L. anodontooides*; *Quadrula heros dombeyana*; *Q. perplicata*.

The yield of artifacts from this cemetery was meager.

Near a burial was part of a bone pin, which probably was only midden debris.

With a burial in one instance, and apart from bones in another case, were two objects of shell, each about 1.5 inch in length, cylindrical, having a head about .75 of an inch in diameter, which is somewhat in excess of the remainder of the object—probably ear-plugs of a well-known type.



FIG. 6.—Vessel No. 15. Myatt's Landing. (Height 5.8 inches.)

With the burials were seventeen vessels of earthenware, each found singly near a skull, where the original position could be determined, which it was possible to do in almost every case.



In addition to these vessels, many of which were broken or fell apart on removal, were fragments of vessels, which were probably parts of mortuary deposits that had been scattered by the plow or through disturbance in aboriginal times.

The vessels from this cemetery are of moderate size. Much of the ware is inferior. Shell-tempering is present in some instances. In form the vessels in the main partake of the character of pots. The water-bottle is represented in several instances, and one life-form is among the vessels found.

Few of the vessels are without ornamentation. The decoration, when present—trailed, incised, or punctate markings, as the case may be—is often rude. Red pigment is present in one case, within incised lines.

The following vessels are deemed worthy of special description :

Vessel No. 15. This bottle (Fig. 6), of brown ware, with incised and punctate decoration, rudely executed, is interesting in one particular in that the entire neck is decorated exteriorly, any decoration on necks of long-necked bottles being unusual, except in the case of such vessels from regions to the northward, on the necks of which pigment has been used.

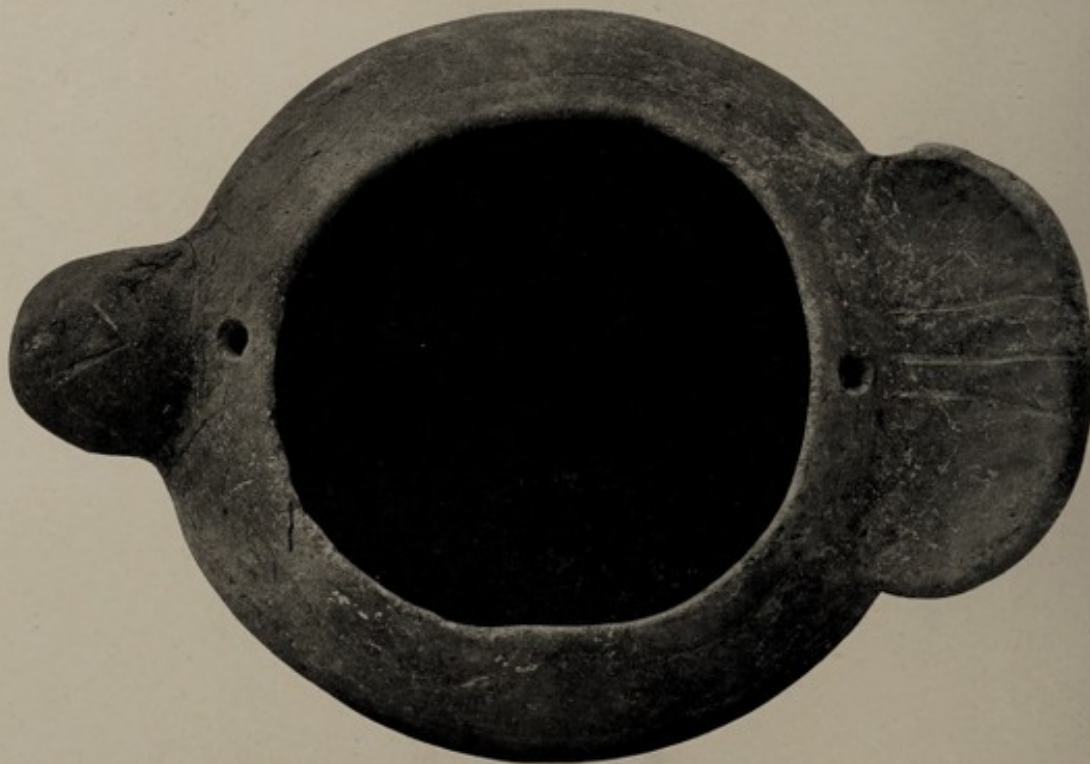


FIG. 7.—Vessel No. 11. Myatt's Landing. (Diam. 8.2 inches.)

Vessel No. 11. This vessel, an attempt at a life-form, presumably represents a bird, the wings possibly being indicated by faint incised markings which hardly appear in the illustration (Fig. 7). That the aborigines at this place were hardly

adepts in the plastic art is evidenced by the fact that in place of a modeled bird's head we find a mere knob with attempts at line decoration upon it.

There are two holes for suspension at opposite ends of the opening.

Farther up the Ouachita, in the cemetery in Boytt's Field, we found somewhat of an improvement on this style of vessel, though in that case also no modeling on the head has been attempted.

In another field, westwardly from the house, is a shell deposit near the bank of a bayou which joins the Ouachita river at Myatt's Landing. In this deposit we found shells as follows: *Quadrula heros dombeyana*; *Q. trapezoides*; *Q. perplicata*; *Q. trigona*; *Q. pyramidata*; *Q. asper*; *Plagiola securis*.

All these species inhabit the lower Mississippi and its tributaries, and with one exception the shells found seem entirely similar to those of the living shell fish. *Q. pyramidata* is about two-thirds the ordinary size, though evidently adult. This probably has no special significance, according to Doctor Pilsbry, who has seen similar dwarf colonies of other species, probably due to local conditions unfavorable to them.

Near the shell deposit, on the surface, are many signs of aboriginal occupancy, and the soil is blackened to a considerable depth. Numerous trial-holes yielded no human remains.

There were gathered from the surface: two disks of ferruginous sandstone, each with a concavity on either side; a small "celt" which was given to the owner of the plantation; a chisel wrought from a chert pebble; knives and arrowheads of chert; part of an object of bone, probably originally intended for a bead, but which had split in the boring. Prof. F. A. Lucas believes this bone to be from the leg of a deer.

#### MOUND NEAR PARGAUD LANDING, OUACHITA PARISH, LA.

This mound, on the Pargaud Plantation, is the property of Mr. John T. Cole, to whom belongs also the Glendora Plantation, which figures so largely in this report.

The mound, evidently domiciliary, has suffered through wash of rain. It was not dug into by us.

#### CEMETERY ON THE GLENDORA PLANTATION, OUACHITA PARISH, LA.

The Glendora Plantation, about sixteen miles above Monroe, by water, is the property of Mr. John T. Cole, who, as we have said, lives on another plantation belonging to him, which is somewhat nearer Monroe. The Academy is greatly indebted to Mr. Cole for the privilege of investigating the rich cemetery on his place.

Immediately at the landing is a cotton-gin, and almost directly back of this gin was an aboriginal cemetery in ground long under cultivation, believed to be beyond reach of the river.



This ground, planted in oats at the time of our visit, gave no superficial indication of what lay beneath, and was hardly perceptibly above the surrounding level. Its history, however, was widespread, it being generally known that years before, a member of Mr. Cole's family had made a small collection of earthenware vessels from the place which had been brought to his notice through discoveries made by employees while digging post-holes.

Trial-holes sunk by us where the relics had been found came immediately upon traces of human remains and vessels of earthenware. Guided by the results obtained in the holes, a rectangular area 54 feet long by 51 feet wide, the longer dimension running E. and W., was entirely dug through by us, largely with the use of trowels, especially where grave-pits were encountered, the deepest of which extended 38 inches below the surface.

The space dug through, consisting of sandy clay, contained burials in considerable numbers, with the exception of the final seven feet of the eastern end. Subsequently, digging in irregular spaces, amounting to 847 square feet, was done contiguous to the N., S. and W. parts of the area already dug (making the total digging somewhat less than one-tenth of an acre), in order to determine if burials extended beyond.

While some burials were encountered in this latter digging, they were much less numerous in proportion to the space covered than were those in the portion first dug, and it was evident, when our digging was discontinued, that we had reached a tract in which burials were widely apart.

As we have said, the deepest grave-pit found by us had a depth of 38 inches. There were many of almost equal depth. Some were comparatively small and circular, indicating the bunched burial; others, by their shape, showed that the extended form of burial had been employed.

Human remains were encountered at 121 places in the cemetery, and, as a rule, consisted of hardly more than traces of bones—sometimes crowns of teeth only, which were crumbling into dust.

It is impossible to form an estimate of the number of individuals who had been interred, since not only were the remains decayed as we have described, but there had been great aboriginal disturbance in the cemetery, caused by interments cutting through others previously made; and these disturbances had created sad havoc among bones and pottery.

In this cemetery little of interest had been placed with the dead, with the exception of vessels of earthenware. Glass beads were found at six points and ornaments of sheet-brass eighteen times, in connection with human remains.

In some instances the alloyed metal was corroded through and through, traces only remaining; in others, however, the brass was better preserved and was found in the form of small cones; disks of various diameters; tubular beads; wide, annular ornaments which possibly had been worn on the fingers.

We shall now give in detail a description of all objects found with human remains in this cemetery, excepting, however, glass, brass, and vessels of earthen-



ware, unless objects belonging to these classes were found associated with other objects.

Vessels of earthenware, later, will be assigned a place to themselves.

Burial No. 8, only teeth, had with it a brass disk 5.75 inches in diameter, which fell to bits on removal; three fragments of chert; and a large bead, fashioned from a conch (*Fulgur*) by drilling a hole through a part of the shell including a portion of the shoulder, and leaving attached on each side, great wings consisting of portions of the bodywhorl of the shell.

Since visiting the cemetery at Old River Landing on the Arkansas river,<sup>1</sup> we have obtained from that place ten beads exactly similar in type to the one just described, which were found with three others, it is said, with a burial in digging in the garden of the principal dwelling on the place. As these beads are in better condition than the one from Glendora, we show one of them in Fig. 8. Its maximum diameter is 2.25 inches.

Burial No. 19, traces of teeth, had associated with it a discoidal stone of limonite partly coated with hematite, 2.8 inches in diameter; a knife of chert, 2.7 inches in length; two earthenware vessels.

Burial No. 25, remains of a skull, had near it a pebble of chert and three vessels of earthenware.

Burial No. 26, traces of teeth, had nearby: glass beads; two earthenware vessels, one of which was turned over a discoidal stone, while another one lay outside the vessel. These discoidals, one of a hard, fine-grained stone, the other an impure quartz were, respectively, 1.8 inch and 2.7 inches in diameter.

Burial No. 36, fragments of a skull, was associated with a single pebble of chert.

Burial No. 42, a skull in fragments, had nearby a number of small, round pebbles which, presumably, had belonged to a rattle.

Burial No. 58, mere outlines of a skull, had as a mortuary deposit, one flake of chert and two coarsely-made arrowpoints of the same material.

Burial No. 75, small fragments of bones, was accompanied by glass beads; traces of sheet-brass; two chert pebbles; two vessels of earthenware.

Burial No. 77 had, in association, a chert pebble and two vessels of earthenware, under one of which was another chert pebble showing wear.

Burial No. 84, the outline of a skull and fragments of bones so placed that a bunched burial was indicated, had a brass disk 2.5 inches in diameter; another with a diameter of 7.75 inches; a large shell bead; two implements of iron or of steel, badly rusted, each about 9 inches in length, resembling slender lancepoints.

Burial No. 88, bits of bone, had a discoidal, seemingly of fine-grained sandstone, 2.6 inches in diameter.



FIG. 8.—Shell bead from Arkansas.  
(Full size.)

<sup>1</sup> See our "Certain Mounds of Arkansas and of Mississippi," p. 511.



Burial No. 93, remnants of a skull and of other bones of a child, had placed near it four earthenware vessels; two chert pebbles; the remnants of an ear-plug made of shell and wood; and a discoidal of quartz, with a diameter of 2.8 inches.

Burial No. 95, fragments of the skull of a child, was accompanied by shell beads; traces of sheet-brass; a small earthenware bottle.

Burial No. 105, fragments of bone, had an undecorated tobacco-pipe of ordinary pattern, the only pipe met with in the cemetery.

Burial No. 109, fragments of bones, lay with three small cones of sheet-brass, two vessels of earthenware, and a discoidal of fine-grained sandstone, 3.4 inches in diameter.

Apart from human remains, but undoubtedly having been with them originally were: chert pebbles in several instances; fragments of brass; red pigment (oxide of iron); a lancehead of black chert, slightly less than 4 inches in length, with the shank missing; a double-pointed weapon of chert, 7.75 inches in length; two discoidal stones each found with a vessel of earthenware. One of these discoidals, of quartz, is 2.6 inches in diameter; the other, with a diameter of 2.9 inches, is of limonite beautifully coated with a natural deposit of hematite, similar to others we have found previously and like the one described by General Thruston.<sup>1</sup>

Three hundred and twenty-two vessels of earthenware, nearly all badly broken, were found in the cemetery on the Glendora Plantation. Many of these were in disintegrating fragments which indicated, nevertheless, the deposit of entire vessels by the aborigines.

As in aboriginal life vessels of inferior ware and of comparatively crude decoration no doubt predominated, so vessels of this class might be expected to be in the majority in deposits made with the dead; and so it proved to be in the Glendora cemetery.

Nevertheless, from this cemetery came some of the most beautiful vessels it has been our good fortune to obtain in our years of search.

A veritable passion to decorate seems to have possessed the pottery makers of Glendora, the entire bodies and even the bases of vessels from there sometimes bearing decoration. This ornamentation, usually incised, though often faint and rather coarsely done, is sometimes of great beauty both in design and in execution, though, unfortunately, the constant recurrence of the scroll leads us to attribute a lack of originality to the native artist.

Certain of the vessels from this place, mainly bowls, are of thin and finely tempered ware, some brown, some black, often highly polished. There are also among the vessels a few specimens of ware coated with red pigment and, in addition, covered with incised decoration.

Shell tempering, though present at Glendora, is not found in its earthenware of highest grade.

The vessels from this cemetery seem to have been placed in the neighborhood of the head of the dead, as nearly all those found with human remains (many were

<sup>1</sup> "Antiquities of Tennessee," 1897, p. 272.



found apart from bones presumably on account of aboriginal disturbance or because burials had entirely disappeared) lay near remnants of teeth or fragments of skull, sometimes on one side of the skull only, occasionally on both sides of it.

On no occasion were more than five vessels positively determined to have been placed with one burial, though in a single instance it seemed as if two deposits of three vessels each accompanied the same skull; but it is possible that one of these groups (which was somewhat separated from the other) had been placed with skeletal remains that had entirely disappeared.

The method of arrangement of the earthenware vessels in the Glendora cemetery which was unusually diverse, was as follows:

A single vessel resting on its base.

Two vessels standing upright.

A single inverted bowl.

An upright vessel and an inverted one, together.

Three vessels standing; two upright, one inverted.

A vessel resting on its base and another on its side.

Two upright vessels and one on its side.

One upright vessel and two resting on their sides.

An upright vessel covered by a large fragment.

An upright vessel with a vessel inverted over it, sometimes fitting closely.

Two upright vessels, over one of which was a third vessel inverted.

Three upright vessels, one having a vessel inverted upon it.

An erect vessel with another turned over it; with these, a vessel on its side.

An erect vessel and one on its side, each covered by an inverted vessel.

Two upright vessels, over one of which was a third vessel inverted, a fourth vessel inverted completing the group.

Three upright vessels, one of them having a vessel turned over it, a fifth vessel inverted completing the group.

A large vessel turned over three small ones standing erect.

Two vessels standing erect, one covered by part of a large conch-shell (*Fulgur*).

Two upright vessels, one having a third vessel placed upright upon it.

An upright vessel on top of another also upright, an inverted vessel alongside.

Two upright vessels, one containing another also erect.

Two vessels standing erect, within one of them a vessel inverted.

A vessel standing upright within another one which, in its turn, was placed on a vessel standing on its base.

One vessel was inverted over a discoidal stone.

In fifteen vessels were single musselshells in fragments, doubtless having served as spoons.

We append a description of the more noteworthy vessels from this exceptionally interesting cemetery.

Vessel No. 132. An effigy-bowl of yellow ware, coated exteriorly with red pigment of a character much superior to that found in the middle Mississippi region,



though the use of pigment is so extensive there. The tail and the head project from opposite sides. The nostrils, ears, and eyes, and probably the mouth, have been accentuated with white pigment, though the eyes alone still clearly show the material (Plate I). The four legs, one of which (a hind leg) is missing, have been modeled in relief.

In addition to the decoration with pigment, the vessel is completely covered as to the body with beautifully incised scroll-work, the field being irregular disks and evenly made reticulated lines. There are four holes for suspension on opposite sides of the vessel below the head and tail. We believe this vessel to be unique.

We shall now show a series of gracefully shaped bottles from Glendora cemetery, all of excellent brown, or of polished black ware; some flat, some rounded, as to the bases.



FIG. 9.—Vessel No. 30. Glendora. (Height 4.4 inches.)

The necks, which are short, exhibit a peculiar swelling representing a cup placed upon the body of the bottle—a compound form.

Professor Holmes says<sup>1</sup>: “Compound forms are not unusual and consist generally of imitations of two vessels, the one superimposed upon or set in the mouth of another. \* \* \*

<sup>1</sup> Fourth Ann. Rep. Bur. Am. Ethn., p. 417.



ANTIQUITIES OF THE OUACHITA VALLEY.  
GLENORA, VESSEL NO. 132. (FULL SIZE.)











ANTIQUITIES OF THE OUACHITA VALLEY.  
GLENDORA, VESSEL NO. 107. (HEIGHT, 8.25 INCHES.)

"Other specimens may be seen in which there is only a gentle swelling of the neck, but all gradations occur between this condition and that in which forms of two vessels distinctly appear."

We may explain here that several of the vessels figured in this class by us have possessed, in the past, necks of the variety under description, but these necks having been broken in part in aboriginal times, have been carefully smoothed and evened off to enable the vessel to be continued in use.

The decoration on these bottles of compound form from Glendora is usually a combination of the scroll and other minor figures, trailed in some instances, incised in others, in a manner superior to anything of the kind hitherto met with outside the lower Mississippi region.



FIG. 10.—Vessel No. 157. Glendora. (Height 7.75 inches.)

This set of bottles is shown in Figs. 9 to 26, inclusive.

Vessel No. 107. This superb bottle, shown in Plate II, is of the same type as the bottles just described, but has, in addition, an exterior coating of red pigment of superior quality, through which is incised a beautiful combination of disks and running scrolls in a field of parallel lines which seem to lend emphasis to the decoration. In all probability the lines of the incised decoration on this bottle have been accentuated with white pigment, but if such was the case, no trace of the coloring material remains.





FIG. 11.—Vessel No. 187. Glendora. (Diam. 4.8 inches.)



FIG. 12.—Vessel No. 187. Decoration. (About two-thirds size.)



FIG. 13.—Vessel No. 148. Glendora. (Height 7.4 inches.)





FIG. 14.—Vessel No. 66. Glendora. (Height 7.3 inches.)



FIG. 15.—Vessel No. 264. Glendora. (Height 7.8 inches.)





FIG. 16.—Vessel No. 150. Glendora. (Height 8.5 inches.)



FIG. 17.—Vessel No. 1. Glendora. (Diam. 5.7 inches.)





FIG. 18.—Vessel No. 276. Glendora. (Diam. 7.3 inches.)



FIG. 19.—Vessel No. 190. Glendora. (Diam. 6.2 inches.)





FIG. 20.—Vessel No. 253. Glendora. (Height 4.8 inches.)



FIG. 21.—Vessel No. 225. Glendora. (Height 6.5 inches.)





FIG. 22.—Vessel No. 207. Glendora. (Diam. 6.6 inches.)



FIG. 23.—Vessel No. 172. Glendora. (Height 7.8 inches.)





FIG. 24.—Vessel No. 51. Glendora. (Diam. 7.1 inches.)



FIG. 25.—Vessel No. 113. Glendora. (Diam. 6.3 inches.)





FIG. 26.—Vessel No. 154. Glendora. (Height 6.75 inches.)

We shall now refer to some of the bowls from Glendora, most of which are of polished black or of brown ware and nearly all of which bear as decoration incised designs made up mainly of combinations of the scroll or of kindred patterns in connection with minor devices. Occasionally these designs exhibit beautiful types of the swastika. The scrolls at times show notched effects which may refer back to the attributes of the plumed serpent,<sup>1</sup> though eventually, no doubt, the scroll came to be used in relation to all animal forms.

In some instances the incised decoration on these bowls has been emphasized with red pigment, and sometimes with white coloring material, while occasionally we find red pigment in the lines of the upper part of the decoration and white pigment in those of the lower part.

It is interesting to note that a bowl of the class under description, and with red and white pigment in its lines, was found by us a year before, in the mound at Douglas on the lower Arkansas river.

A selection of fifteen of these bowls from the cemetery at Glendora, and their decoration, shown in diagram in all cases but two, where it was not deemed necessary to include it, appear in Figs. 27 to 54, inclusive.

<sup>1</sup> C. B. Moore, "Moundville Revisited," *Journ. Acad. Nat. Sci. Phila.*, Vol. XIII, pp. 372-382, inclusive.



FIG. 27.—Vessel No. 164. Glendora. (Diam. 5.3 inches.)



FIG. 28.—Vessel No. 65. Glendora. (Diam. 5.5 inches.)





FIG. 29.—Vessel No. 21. Glendora. (Length 6.5 inches.)

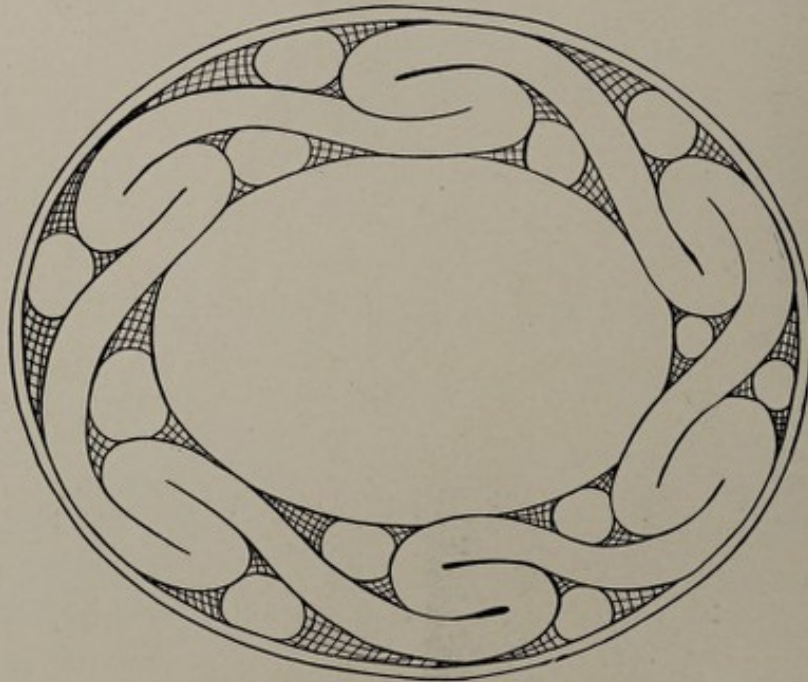


FIG. 30.—Vessel No. 21. Decoration. (About half size.)



FIG. 31.—Vessel No. 247. Glendora. (Diam. 6.75 inches.)

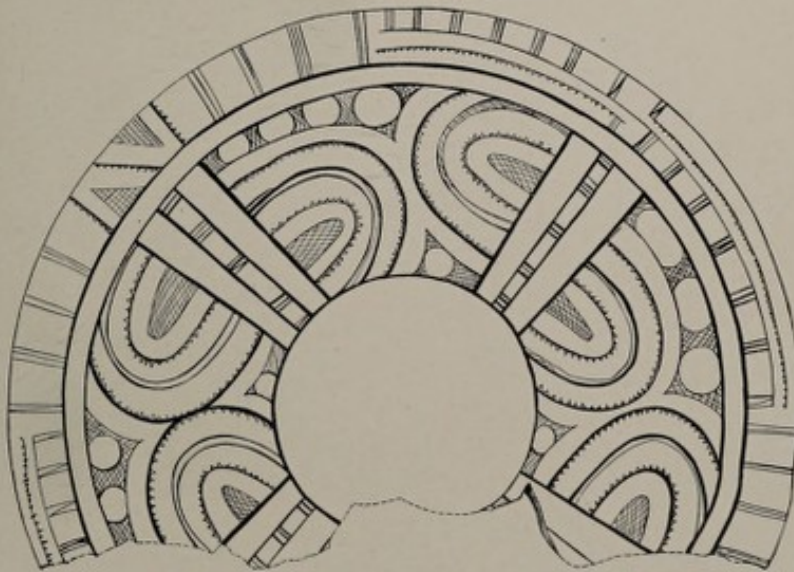


FIG. 32.—Vessel No. 247. Decoration. (About half size.)





FIG. 33.—Vessel No. 71. Glendora. (Diam. 6 2 inches.)

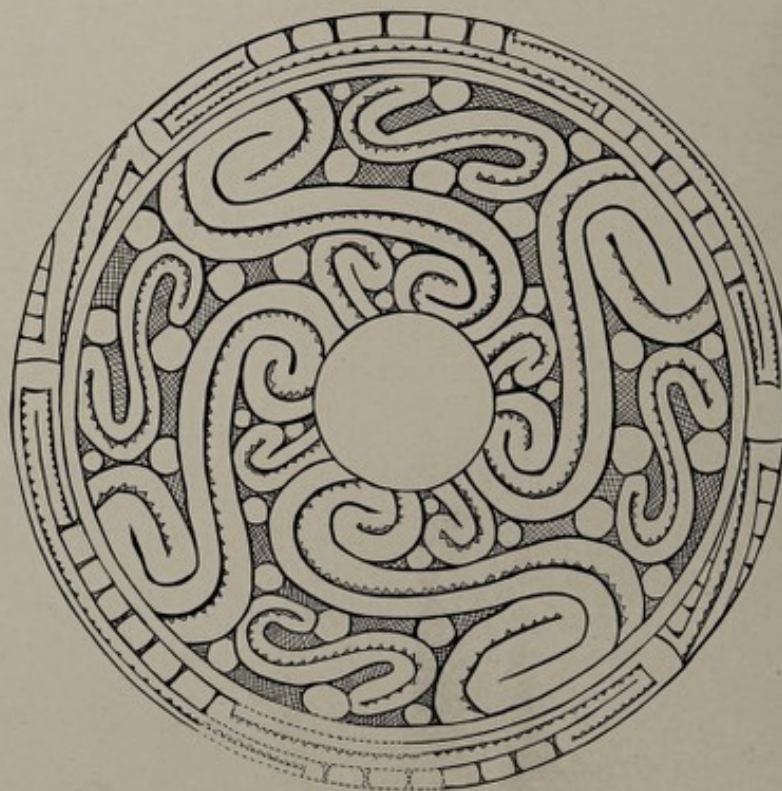


FIG. 34.—Vessel No. 71. Decoration. (About half size.)



FIG. 35.—Vessel No. 130. Glendora. (Diam. 7.75 inches.)

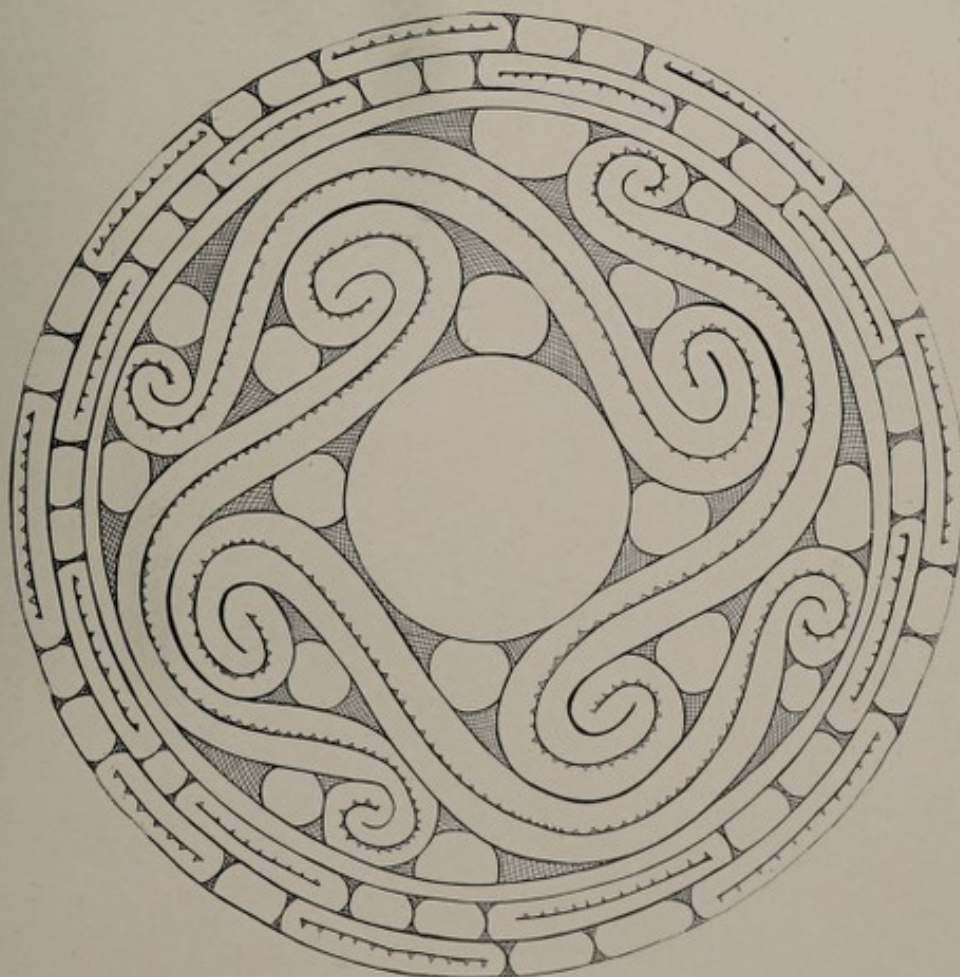


FIG. 36.—Vessel No. 130. Decoration. (About half size.)





FIG. 37.—Vessel No. 13. Glendora. (Diam. 6.9 inches.)

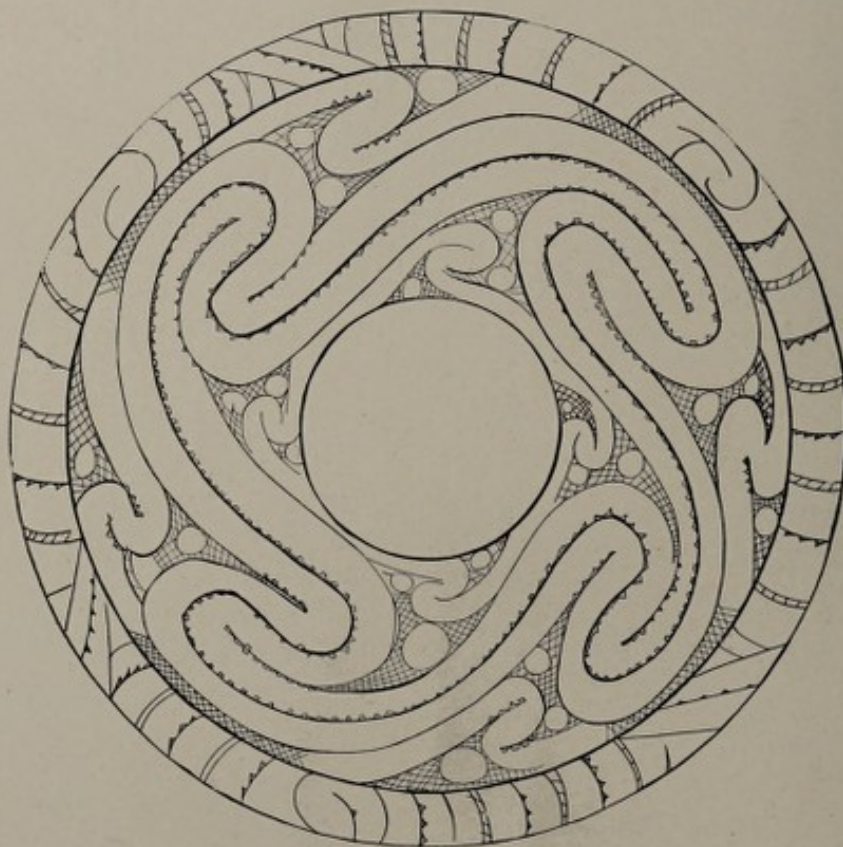


FIG. 38.—Vessel No. 13. Decoration. (About half size.)



FIG. 39.—Vessel No. 307. Glendora. (Diam. 5.7 inches.)

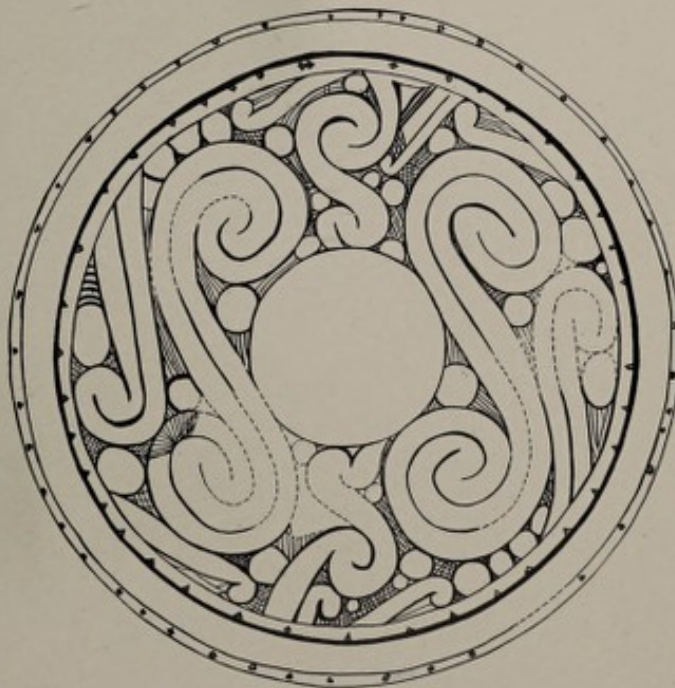


FIG. 40.—Vessel No. 307. Decoration. (About half size.)





FIG. 41.—Vessel No. 111. Glendora. (Diam. 7 inches.)

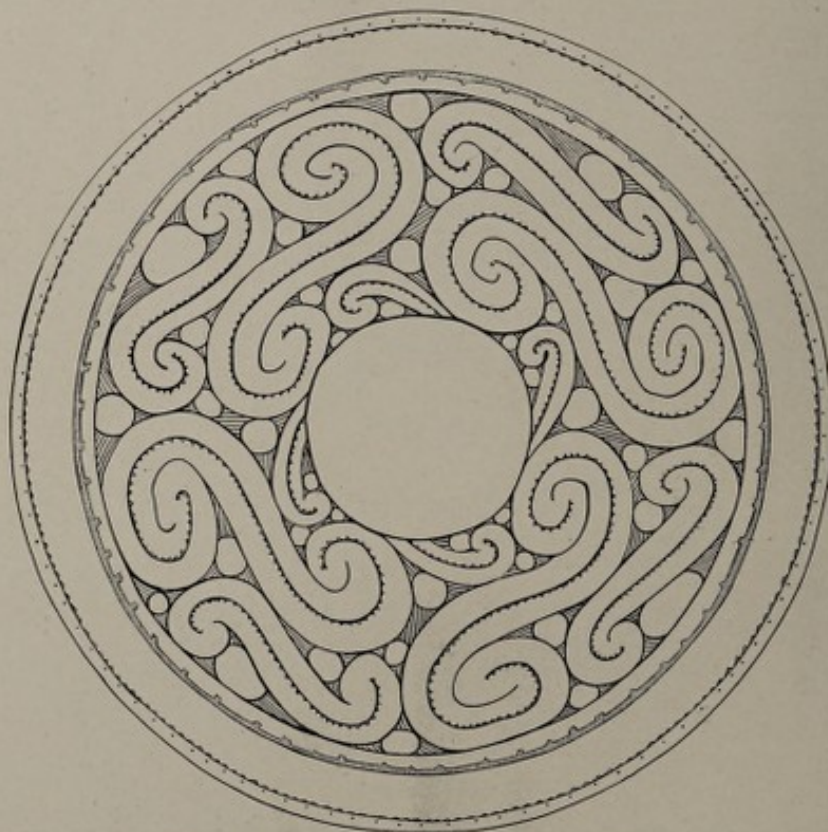


FIG. 42.—Vessel No. 111. Decoration. (About half size.)



FIG. 43.—Vessel No. 276. Glendora. (Diam. 6.1 inches.)

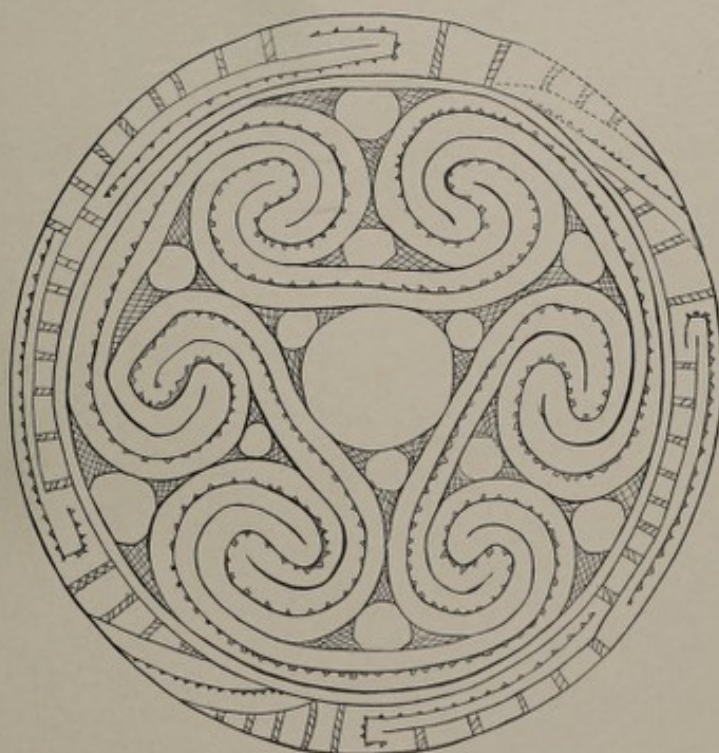


FIG. 44.—Vessel No. 276. Decoration. (About half size.)





FIG. 45.—Vessel No. 273. Glendora. (Diam. 6.5 inches.)

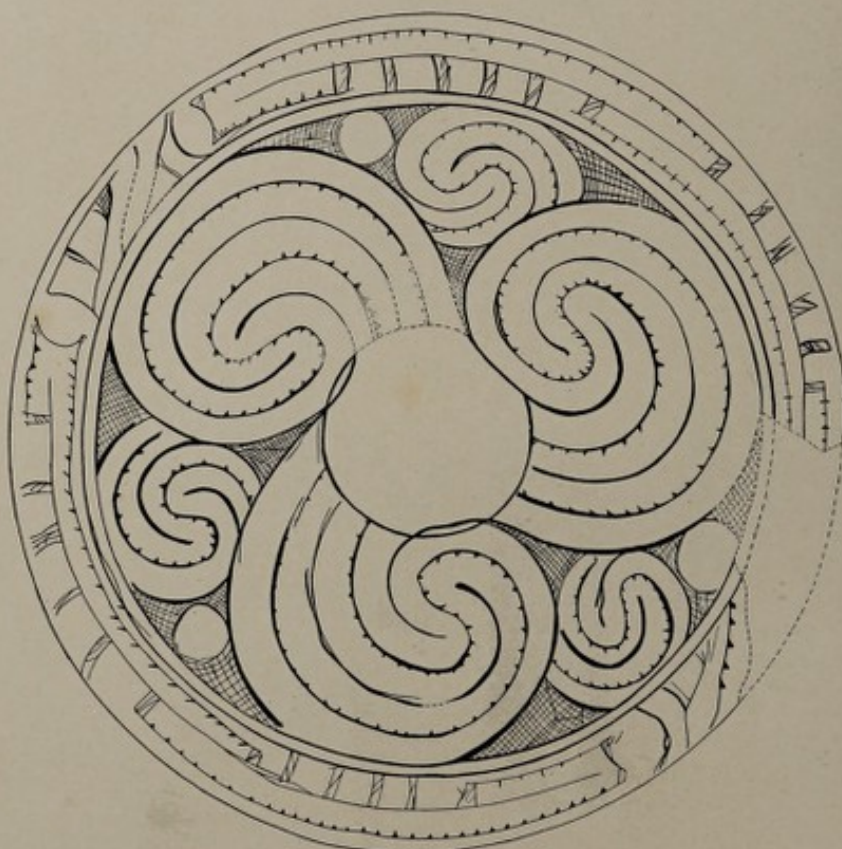


FIG. 46.—Vessel No. 273. Decoration. (About half size.)



FIG. 47.—Vessel No. 257. Glendora. (Diam 6 inches.)

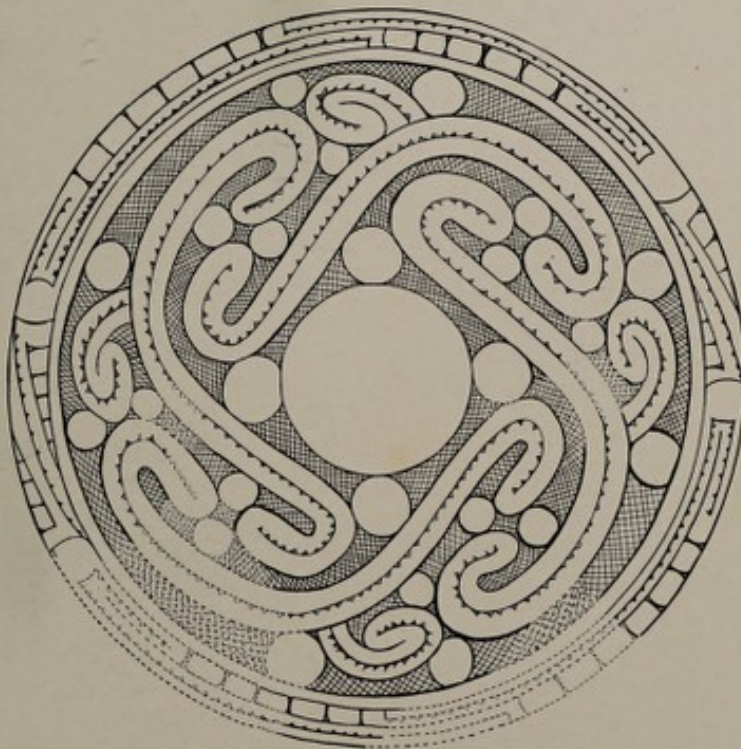


FIG. 48.—Vessel No. 257. Decoration. (About half size.)





FIG. 49.—Vessel No. 142. Glendora. (Diam. 8 inches.)

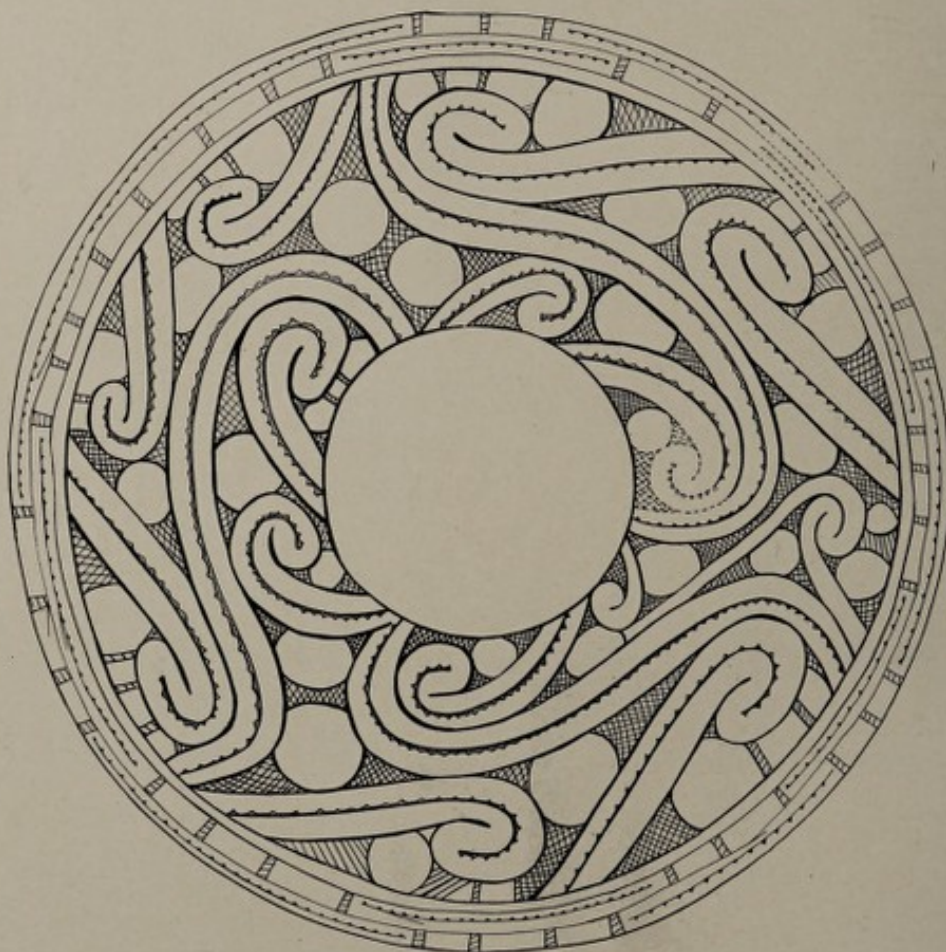


FIG. 50.—Vessel No. 142. Decoration. (About half size.)



FIG. 51.—Vessel No. 89. Glendora. (Diam. 6.7 inches.)

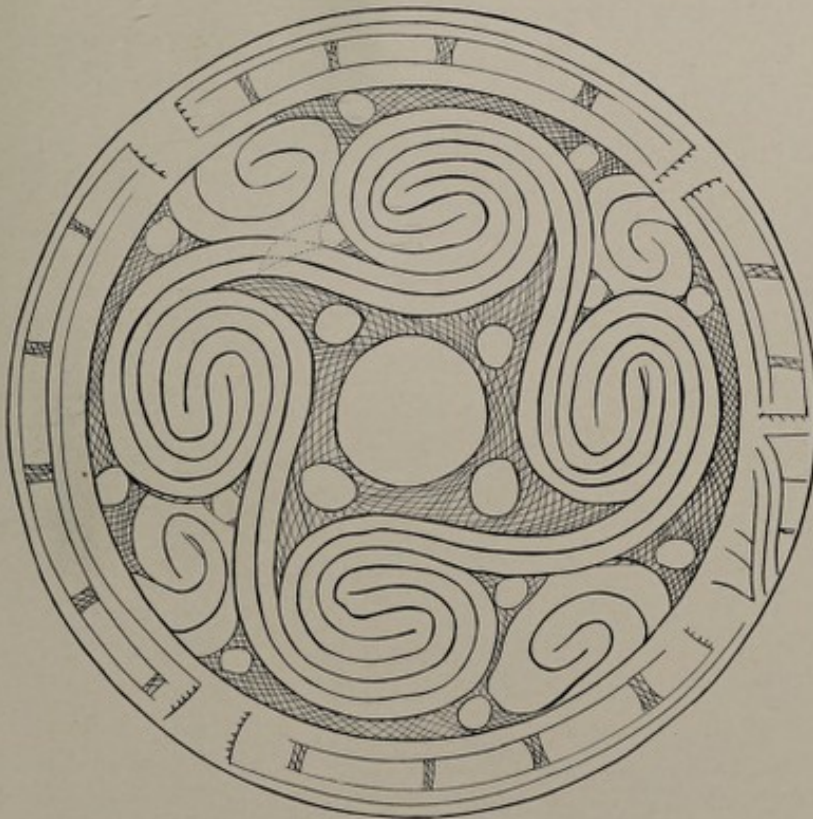


FIG. 52.—Vessel No. 89. Decoration. (About half size.)



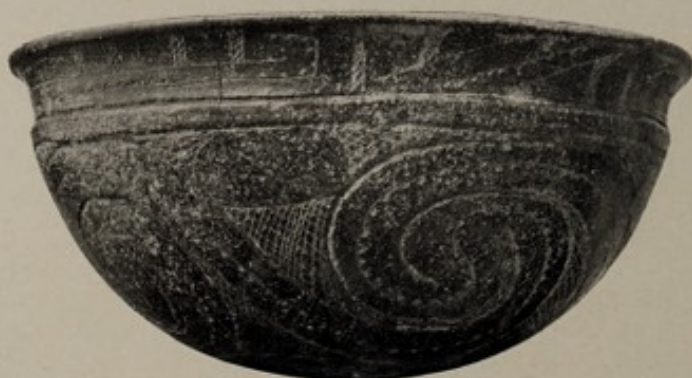


FIG. 53.—Vessel No. 153. Glendora. (Diam. 6.2 inches.)

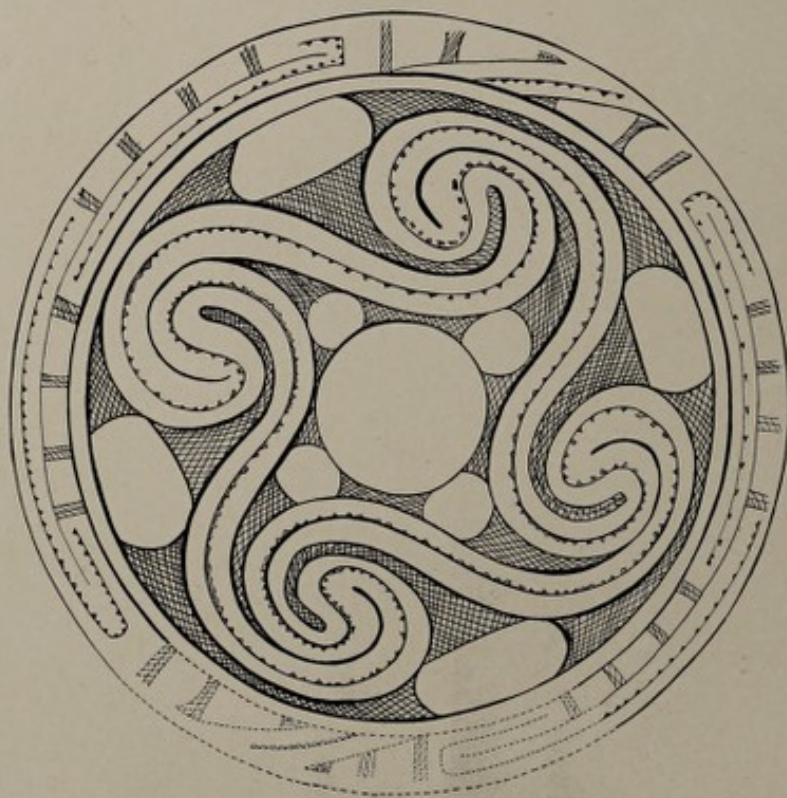


FIG. 54.—Vessel No. 153. Decoration. (About half size.)

Vessel No. 68. A bowl of rather porous, yellow ware, having over the entire exterior a trailed design composed mainly of a beautiful form of the swastika (Fig. 55).

Vessel No. 169. A bowl of brown ware. The scroll decoration shown in Fig. 56 appears three times, and half of it is repeated to fill an otherwise unoccupied space. These scrolls appear in spaces formed by bands vertically placed. The field, in two instances, is cross-hatched; in the other two it is made up of diagonal lines.

Vessel No. 70. This vessel of yellow ware (Fig. 57), with flat base, shoulder, and a low upright neck, belongs to a type fairly common in the Glendora cemetery. The decoration, incised, consists principally of a stepped design (so well known in ancient south-western United States and in Mexico) six times shown, upright and inverted, alternately.

Vessel No. 128. This vessel, of the same type as the preceding one, has a trailed decoration, possibly representing an aboriginal form of the eye (Fig. 58).

Vessels Nos. 2, 166, 220. All these vessels (Figs. 59, 60, 61) belong to the same type as the two vessels just described.

Vessel No. 186. This vessel (Fig. 62), slightly asymmetrical, has a rude, incised decoration around the body and on the base, shown diagrammatically in Fig. 63.

Vessel No. 256. A pot of striking appearance, its dark ware, of excellent quality, bearing trailed designs made up principally of combinations of the scroll, with a field of punctate markings, on the upper part (Fig. 64). There is soot on the body of the vessel.

Vessel No. 183. A pot of excellent, black, polished ware, having on two opposite sides of the neck four holes for suspension (Fig. 65). The design, in the incised lines of which red pigment remains in places, appears four times and is confined to the neck.

Vessel No. 102. This vessel of dark ware, with spheroidal body, flat base, constricted neck slightly flaring at the rim, has a roughly executed trailed design made up of bands of diagonal, parallel lines, the lines in reverse direction in alternate bands (Fig. 66).

Vessel No. 251. A pot of inferior, brown ware, with a flat base and having on the body a trailed decoration consisting largely of concentric circles and parallel lines. Around the neck are parallel, encircling lines, also trailed (Fig. 67).

Vessel No. 114. A cooking vessel, as evidenced by the soot upon it, of brown ware, with two opposite holes for suspension, made through projections originally solid. The design, trailed and punctate, consists mainly of an ordinary scroll combination (Fig. 68).

Vessel No. 96. A short-necked bottle of yellow ware, with flat base, globular body, and constricted neck (Fig. 69), has, by way of decoration, partly interlocked scrolls appearing three times on the body; on the neck is rude, lined decoration.





FIG. 55.—Vessel No. 68. Glendora. (Diam. 4.9 inches.)



FIG. 56.—Vessel No. 169. Glendora. (Diam. 6.2 inches.)



FIG. 57.—Vessel No. 70. Glendora. (Diam. 6.2 inches.)



FIG. 58.—Vessel No. 128. Glendora. (Height 6.8 inches.)





FIG. 59.—Vessel No. 2. Glendora. (Diam. 6.5 inches.)



FIG. 60.—Vessel No. 166. Glendora. (Height 4.1 inches.)



FIG. 61.—Vessel No. 230. Glendora. (Height 4.1 inches.)



FIG. 62.—Vessel No. 186. Glendora. (Diam. 3.7 inches.)





FIG. 63.—Vessel No. 186. Decoration. (About half size.)



FIG. 64.—Vessel No. 256. Glendora. (Height 4.5 inches.)



FIG. 65.—Vessel No. 183. Glendora. (Diam. 5.2 inches.)



FIG. 66.—Vessel No. 102. Glendora. (Height 5.4 inches.)





FIG. 67.—Vessel No. 251. Glendora. (Height 4.5 inches.)



FIG. 68.—Vessel No. 114. Glendora. (Diam. 5 inches.)



FIG. 69.—Vessel No. 26. Glendora. (Diam. 6 inches.)





FIG. 70.—Vessel No. 138. Glendora. (Diam. 6 inches.)







ANTIQUITIES OF THE OUACHITA VALLEY.  
GLENDORA, VESSEL NO. 130. (HEIGHT, 5.6 INCHES)

Vessel No. 138. A bottle of coarse, yellow-brown ware, with flat base and having as decoration on the body a double row of concentric circles connected by parallel, incised lines, vertically and laterally. Around the neck are curious hook-shaped figures of a kind sometimes found on Southern pottery (Fig. 70).

Vessel No. 130. A pot (Plate III) which at one time has been covered with red pigment over the entire exterior and the inner side of the neck, though at present the coloring material is decidedly worn, allowing the yellow ware to show through in places. The decoration consists of a design made up in the main of incised circles and spirals. There are four holes for suspension on two opposite sides of the vessel.



FIG. 71.—Vessel No. 249. Glendora. (Height 8.4 inches.)

Vessel No. 249. A bottle of light-brown ware, with tripod support, a not unusual form in the middle Mississippi region, to the northward. The legs, which are hollow, have been made separately from the body, and fitted on after the completion of the remainder of the vessel. Several small holes have been drilled through the vessel at each of the points of union with the legs to enable the latter to serve as receptacles for liquid, in conjunction with the body of the bottle. There is a rude, incised and punctate decoration (Fig. 71).



Vessel No. 147. A bottle of compound form, of common, porous ware (Fig. 72), representing one vessel with another superimposed. The decoration, rudely incised, on the upper part consists of spirals and on the lower part is made up of a meander partly surrounding disks, perhaps having the eye for motive.

Vessel No. 261. A bottle of black, polished ware (Fig. 73), having on the upper half of the body a decoration consisting of a current scroll in a cross-hatch field in which are small disks; and below, a design which can be better understood from examination of the figure than from verbal explanation.

Professor Holmes,<sup>1</sup> describing a vessel somewhat similar to this one in form, speaks of it as having a "broad, convex, hood-like collar that encircles the neck and spreads out over the body like an inverted saucer."

Vessel No. 22. This pot (Plate IV), coated inside and out with red pigment of superior quality, bears in addition an incised decoration, consisting mainly of meanders and disks. There are four holes for suspension on opposite sides of the body below the neck.



FIG. 72.—Vessel No. 147. Glendora. (Height 8 inches.)

FIG. 73.—Vessel No. 261. Glendora. (Height 8 inches.)

<sup>1</sup> Fourth Ann. Rep. Bur. Am. Ethn., p. 416, Fig. 435.



ANTIQUITIES OF THE OUACHITA VALLEY.  
GLENDORA, VESSEL NO. 22. (FULL SIZE.)





Vessel No. 181. A vessel of dark ware, of the "teapot" variety, which seems to be peculiar to eastern Arkansas and nearby regions. This vessel, 3.1 inches in height, with flat base, one of two found by us in the Ouachita valley (the other coming from the Keno Place, near Glendora), has a volute decoration of trailed lines, recalling that on the "teapot" figured by Holmes<sup>1</sup> as coming from Arkansas.

Vessel No. 230. A bottle of brown ware, 5.5 inches in height, with an incised decoration, rather faintly executed, made up of a design shown herewith in diagram (Fig. 74), which continues around the body of the vessel.

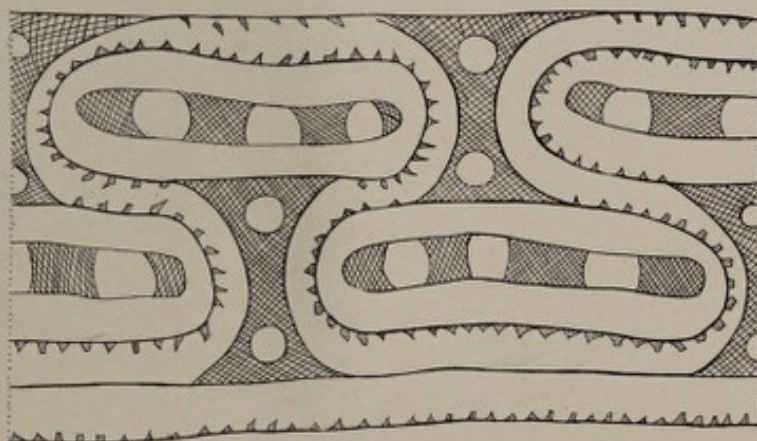


FIG. 74.—Vessel No. 230. Decoration. (About two-thirds size.)

Vessel No. 250. A bowl of porous, yellow ware, 8.4 inches in diameter, coated on the inside with red pigment, which extends also exteriorly about an inch below the rim. This bowl is of a type found in abundance along the Arkansas river.



FIG. 75.—Vessel No. 12. Decoration. (About one-third size.)

Vessel No. 12. A bottle, 5 inches in height, of coarse, yellow ware, having a slight flattening at the base and a swelling at the neck. The decoration, rudely executed, is here reproduced in diagram (Fig. 75).

<sup>1</sup> Twentieth Ann. Rep. Bur. Am. Ethn., Pl. XVIII b.



Vessel No. 312. A bowl of inferior, porous ware, 3.4 inches high, almost entirely covered with incised decoration, rudely done, consisting principally of forms of the stepped design, shown here in diagram (Fig. 76).

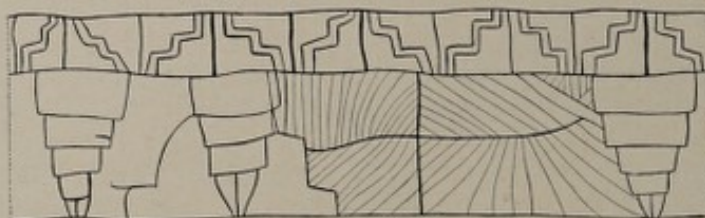


FIG. 76.—Vessel No. 312. Decoration. (About one-third size.)

Vessel No. 83. The body of a bottle of irregularly fired ware, with flat base. The neck is missing. The decoration consists of a five-pointed star made up of incised lines (Fig. 77).

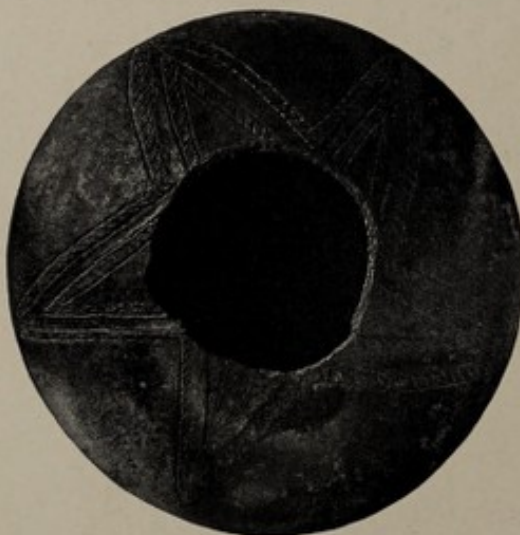


FIG. 77.—Vessel No. 83. Glendora. (Diam. 5.4 inches.)

Vessel No. 314. A human-effigy bottle (Fig. 78) of a type commonly found in regions to the northward of the Ouachita valley, though this particular vessel, in ware and in modeling, is far inferior to most of those from the middle Mississippi region. This type is very unusual in the Ouachita valley.

Vessel No. 289. A bowl of inferior, yellow ware, found in fragments. On opposite sides of the vessel had been two grotesque, seated figures, one of which was missing, though the portion of the bowl on which it had been was recovered. The remaining effigy is shown in Fig. 79.



FIG. 78.—Vessel No. 314. Glendora. (Height 5.7 inches.)



FIG. 79.—Vessel No. 289. Glendora. (Full size.)





FIG. 80.—Vessel No. 184. Glendora. (Height 5.6 inches.)

Vessel No. 184. A wide-necked bottle of brown ware, with flattened base, having on the body a most evenly-spaced and beautifully executed, trailed design, four times shown, consisting mainly of a double series of volutes (Fig. 80).



FIG. 81.—Vessel No. 296. Glendora. (Height 5.75 inches.)

Vessel No. 296. A bottle of excellent, black ware, unique in form, with four projecting lobes, one at each corner of the base, and having a beautifully executed, trailed decoration consisting largely of combinations of the scroll (Fig. 81). This bottle is one of the most striking of the vessels from Glendora, a place long to be remembered for the excellence and artistic beauty of its better class of pottery.



Vessels Nos. 219 and 136. These beautiful bowls, shown on Plate V, covered inside and out with polished, red pigment of an excellence unknown to regions lying northward, though the use of pigment was so extensive there, show no deterioration through lapse of time. The decoration on both, incised, is a combination of the

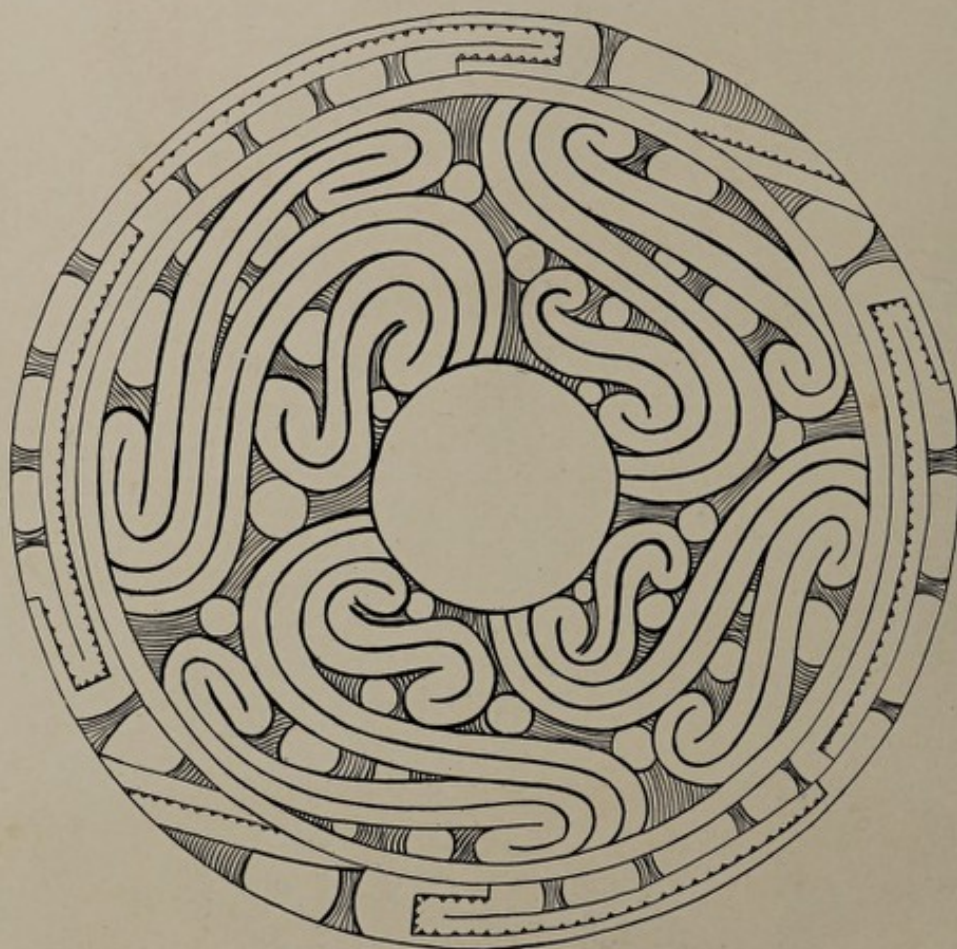


FIG. 82.—Vessel No. 136. Decoration. (About two-thirds size.)

scroll, on a cross-hatch field in the case of the smaller bowl, and in a field of diagonal lines on the larger vessel. Traces of white pigment are evident in the incised lines of the smaller vessel. A diagram bearing the decoration on the larger bowl (Vessel No. 136) is shown in Fig. 82. The decoration on the smaller bowl closely resembles designs already shown as coming from Glendora cemetery.



ANTIQUITIES OF THE OUACHITA VALLEY.  
GLENDDORA, VESSELS NOS. 219 and 136. (FULL SIZE.)





## MOUND NEAR LOCK NUMBER SIX, ASHLEY COUNTY, ARK.

Entering the swamp (in low stages of the river) about one-quarter mile above Lock Number Six, on the right-hand bank going up stream, and keeping a northerly course through the woods for about one mile in a straight line, one reaches, if aided by a skillful guide, a mound on a low ridge on which are pine trees.

The mound, of sand, attains a height of 10 feet 3 inches above the general level and is 93 feet across its circular base. The summit-plateau, also circular, has a diameter of 33 feet. This mound, which has every appearance of belonging to the domiciliary class, was considerably dug into by us, but not demolished. Three burials, much decayed, were found near the surface.

Trial-holes in the level ground near by failed to disclose burials.

About 200 yards in an easterly direction from the mound is a circular rise in the ground, in which eight trial-holes yielded nothing.

## MOUNDS NEAR GREEN LAKE, BRADLEY COUNTY, ARK.

Green Lake, a former course of the Ouachita river, makes in from that river from the right-hand side going up, about six miles by water below Caryville.

About one mile from the landing, on the eastern side of the lake, is the property of Dr. B. H. Green, of Warren, Ark., which, though long under cultivation in the past, was fallow at the time of our visit.

On this property is a group of eight mounds, all of sand, of which the southernmost mound is the only one of considerable size and which alone retains its original form.

This mound, which has never been under cultivation, is 19 feet in height, measured from the southern side. It is practically square, with a basal diameter of about 160 feet. The summit-plateau, which is level, is also square, with a diameter of 80 feet. It was fairly riddled with trial-holes by us in an unsuccessful endeavor to discover a cemetery.

The remaining mounds also were dug into without success, except the discovery in one of two badly decayed human skulls lying together near the surface.

It is likely that these mounds, and the level ground, which also we investigated in places, have in the past yielded what aboriginal relics they possessed, during the long-continued cultivation to which they have been subjected, though there seems to be no history of the discovery of artifacts on this property in comparatively recent time.

On the surface there were few signs of occupancy by aborigines. Here and there was a fragment of chert, and a small "celt," roughened at one end for hafting, was picked up by us.

## CEMETERY AT CARYVILLE LANDING, UNION COUNTY, ARK.

The aboriginal cemetery at Caryville Landing is well known, word of it having reached us far down the river. Unfortunately its reputation is based mainly on the past, the cemetery having been situated on ground which has been gradually



eaten away by the river in recent years, according to the Messrs. Poole Brothers, owners of the plantation, and resident there. During the process of destruction, according to these gentlemen, many human bones, some associated with vessels of earthenware, have been laid bare.

A number of holes were sunk by us in a small area on the river bank, having a deep gully behind it, this area being apparently all that remained of the original cemetery.

Human bones were found in three places—two skeletons at length on the back, and a few fragments of bone, all in the last stage of decay. With the last burial was a pot of moderate size, of porous, inferior ware, with a rude decoration of straight lines and punctate markings.

In an adjacent field were two small dwelling-sites in which a number of trial-holes were dug by us, in addition to a number in other parts of the field, all, however, being of no avail.

#### MOUNDS NEAR PIGEON HILL, UNION COUNTY, ARK.

Pigeon Hill, a settlement on land not subject to overflow, has, behind it, in woods belonging to Mr. W. H. Harry, then living on the place but now a resident of Texarkana, Texas, a great number of low mounds, some circular in basal outline, some irregular.

A number of these mounds were dug into by us and were found to be of clayey sand of a raw yellow color, without admixture of organic matter. No bones or artifacts were encountered. The mounds, presumably, were sites for wigwams, intended to protect them against inflow of rain which is likely to gather in pools on the ground.

#### CEMETERY IN BOYTT'S FIELD, UNION COUNTY, ARK.

Boytt's Field, the property of Mr. W. H. Harry, whose place we have just described, is on the river bank about one mile in a W. by N. direction from Pigeon Hill.

The field, almost exclusively of sand (in which one is so much less likely to break artifacts and bones in digging than is the case in clay), is, we are informed by Mr. Harry, fifty acres in extent and is fractional NW. quarter, Section 32, Township 16 south, Range 12 west.

In the northeastern part of the field are the remains of a mound much spread by cultivation, in which no bones or artifacts were discovered by us.

Members of Mr. Harry's family, however, with considerable shrewdness for persons inexperienced in investigations of the sort, had dug shortly before our arrival, into the level ground about forty yards E. by S. from the mound, where the soil looked darker than elsewhere in the field, and had found there three skeletons in fairly good condition.

Three days and a half were devoted by us to a careful investigation of Boytt's Field, resulting in the discovery of burials here and there, within an area of about



20 by 25 yards, where the skeletons had been found before our coming. Burials also were met with between the mound and this area, as well as a short distance farther east. In addition, several burials were encountered in a few very restricted areas near together, almost at the eastern end of the field.

The burials lay (with the exception of those in a pit to which we shall refer later) none deeper than 32 inches and some at a depth considerably less than that; but none was immediately below the surface, and there was no evidence that the plow had been in contact with any burial.

Boytt's Field is on comparatively high ground, which is seldom submerged, and the part of the field in which the burials were encountered is higher than most parts of the remainder of the field.

Fifty-five burials were discovered by us, not taking into account a considerable number of human bones which had been widely scattered by the aborigines in digging successive graves. It was impossible for us to determine how many individuals were represented by these disturbed bones, but probably eight or ten would be a fair estimate. When parts of a skeleton had been disturbed, but all the bones had not been scattered, the burial is described as an aboriginal disturbance.

The forms of burial were as follows:

At full length on the back, <sup>1</sup> . . . . .	45
Lying partly flexed on the right side, . . . . .	2
Lying partly flexed on the left side, <sup>2</sup> . . . . .	3
Aboriginal disturbances, . . . . .	5

The pit to which reference has been made was 4 feet deep and extended 2 feet below the dark surface soil. The maximum diameter of the pit was 3.5 feet, so near as we could determine. Three skeletons had been disturbed in its making.

Throughout the pit, here and there, were fragments of musselshells, some bearing traces of fire; charcoal; vertebrae and fragments of larger human bones, which showed no marks of fire. In addition, throughout the pit were scattered fragments of human bones, some calcined and some only charred. These fragments were distinctly not a deposit such as one sometimes finds forming a layer of calcined bones when cremation has been practised as a form of aboriginal burial.

The condition of the bones found in Boytt's Field varied greatly. In one locality but few were saved; in other places the condition of the bones was better.

There was no orientation as to the heads of the skeletons.

Burial No. 36, an adult, lying at full length on the back, had the skull turned from the skeleton, in a way to show detachment at the time of interment. In addition, the mandible was missing.

A number of skulls and many other bones of the skeletons from this cemetery were sent to the United States National Museum.

With the exception of earthenware vessels, but few artifacts were discovered in the Boytt's Field Cemetery, and curiously enough, no objects of any sort lay with burials of children.

<sup>1</sup> In two cases the forearms were bent against the upper arms.

<sup>2</sup> In one instance the left arm was raised, with the forearm across the top of the head.



Another exceptional feature is the fact that in one area excavated by us, in which sixteen burials were found, no object of any kind was present with the dead, though earthenware vessels lay with burials in another area not far distant.

Plentiful throughout the sand were pebbles of sizes suitable for use as hammer-stones and pebble-hammers, though none had been so used, as far as appearance indicated.

Eight pebbles, averaging about an inch in diameter, were found in the body of a water-bottle without a neck, which lay with a burial.

One small arrowhead of quartz was near a skeleton, and eight others of chert, all barbed and beautifully wrought, the smallest but .8 of an inch in length, were found scattered in the sand, apart from human remains. There was found also the scale of an alligator-gar. Scales of this fish, according to Du Pratz, were used as arrowpoints in the Mississippi region.

Two tubular beads of shell, each about .5 of an inch in length, lay at the neck of a skeleton.

A "celt" about 3 inches in length, of a rather soft stone, found apart from human remains, was given by us to Mr. Harry, the owner of the cemetery.

Lying beside an earthenware vessel which was with a burial (as were all the vessels found by us in this cemetery), closely associated, were: a pebble; a fragment of red oxide of iron; part of a tine of deer-antler about 1.5 inch in length, cut squarely across at the proximal end.

Singly, apart from human bones, were: a disk of earthenware about 2 inches in diameter, not cut from a fragment of a vessel, but coarsely made by modeling and firing; part of an undecorated tobacco-pipe of earthenware; a fragment of an earthenware vessel, roughly rounded and perforated at the center, the hole being made in an aboriginal way, namely, countersunk on both sides; two well-made, perforating implements of bone, each having the articular part remaining; a bone of a raccoon; the incisor of a beaver, an animal still found in this part of Arkansas; bones kindly identified by Prof. F. A. Lucas as belonging to the Indian dog, and to a large specimen of the Virginia deer; and numerous fragments of carapaces probably belonging to the tortoise.

Twenty-four vessels of earthenware lay with the burials, singly, sometimes a pair, and in one instance three with a single burial.

These vessels were invariably near the head, usually alongside the skull and never farther from it than the shoulder or upper arm.

Several bowls were inverted and one lay on its side. Over one vessel was turned a fragment consisting of the base of a larger vessel. In some of the vessels were musselshells which doubtless had been used as spoons.

With one or two exceptions, the earthenware from Boytt's Field is shell-tempered, and some of it is of excellent quality. Although in some cases red pigment appears in the lines of incised decoration, no coating of color is present on vessels from this place, though a small fragment of pottery picked up in the field has brick-red pigment of excellent quality on each side. In form, the pot, the

bowl, and the bottle are represented—several of the bottles departing somewhat from the usual globular form of the body. The life-form is present in one instance.

The more noteworthy vessels from the cemetery in Boytt's Field will now be described in detail.



FIG. 83.—Vessel No. 1. Boytt's Field. (Height 8.75 inches.)

Vessel No. 20. A small water-bottle of coarse ware, without shell-tempering, having a rude, incised decoration representing interlocked scrolls, on part of which appear markings perhaps representing crests of the winged serpent.

Vessel No. 1. A bottle of compound form (a type in vogue among the aborigines who used the cemetery at this place), having a carelessly executed scroll design on the lower part of the body (Fig. 83).



Vessel No. 9. A bottle, also of compound form, bearing a roughly executed decoration of cross-hatched lines (Fig. 84).

Vessel No. 15. A bottle of dark ware, in shape tending toward the compound, bears on the upper part a faintly executed, incised decoration (Fig. 85).

Vessel No. 2. A bottle of dark ware (Fig. 86), with a well-made, trailed decoration composed of five series of parallel, curved lines forming a star-like figure, below which is an equal number of series of festooned, parallel lines.



FIG. 84.—Vessel No. 9. Boytt's Field. (Height 8.7 inches.)      FIG. 85.—Vessel No. 15. Boytt's Field. (Height 7.7 inches.)

Vessel No. 6. A bottle of hard, black ware (Fig. 87), with an incised, geometrical design on the upper portion of the body, forming a pleasant exception to the scroll so often found on the pottery of the Ouachita valley.

Vessel No. 10. A pot of brown ware, with spherical body, a short, upright neck, and flaring rim. The maximum diameter is 5.2 inches. The incised decoration, twice shown on the vessel, is illustrated in diagram in Fig. 88.

Vessel No. 8. A bottle from which the neck is missing, bearing a decoration (Diagram Fig. 89) appearing three times, consisting mainly of a spiral on which are attributes of the winged serpent. Above are disks, probably sun-symbols, somewhat impaired as to outline through exigency of space.



FIG. 86.—Vessel No. 2. Boytt's Field. (Height 6.8 inches.)



FIG. 87.—Vessel No. 6. Boytt's Field. (Height 9.5 inches.)



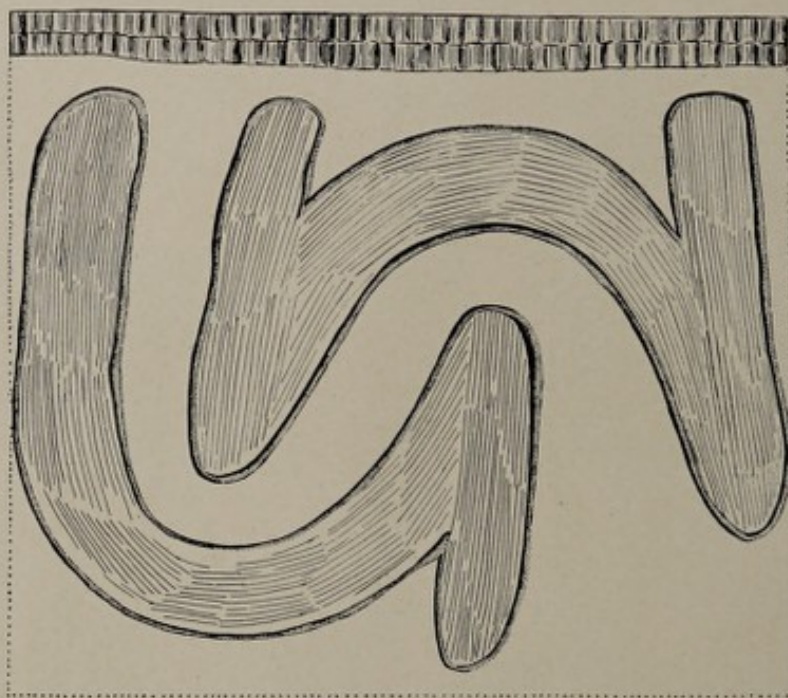


FIG. 88.—Vessel No. 10. Decoration. (About two-thirds size.)

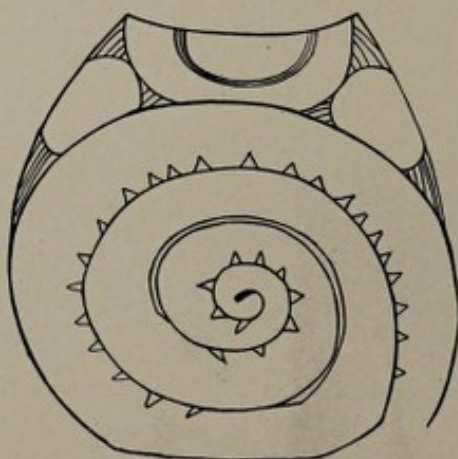


FIG. 89.—Vessel No. 8. Decoration. (About two-thirds size.)

Vessel No. 13. A life-form (Fig. 90) resembling to a certain extent one found in the cemetery at Myatt's Landing, farther down the Ouachita river. Both vessels, as we have explained in our account of that cemetery, have knobs in place of modeled heads of birds. In this vessel, however, extended wings are shown, and there is cross-hatch decoration on wings and tail on the upper and lower sides.



FIG. 90.—Vessel No. 13. Boytt's Field. (Length 9 inches.)

#### MOUNDS NEAR PURDUE WOOD-CAMP, CALHOUN COUNTY, ARK.

In woods said to be on land belonging to the State, about three-quarters of a mile in a NNE. direction from Purdue Wood-camp, is a quadrangular mound about 9 feet high with basal diameters of 80 feet and 67 feet. The summit-plateau is 30 feet by 24 feet. This mound, evidently domiciliary, is partly surrounded by nine other mounds, all low and irregular.

Considerable digging in the mounds and in neighboring level ground, yielded neither bone nor artifact, and showed the soil to be a mixture of sand and clay, of a raw yellow color, with no trace of organic matter.



## CEMETERY AT BELL GIN LANDING, UNION COUNTY, ARK.

Extending back from Bell Gin Landing is a ridge of high ground, flat on the summit, lying between swamp land which is dry in low stages of the river. This high ground, long under cultivation in the past, was fallow when visited by us. The owner, Mr. J. S. Staples, resides about one mile distant, at the town of Champagnolle.

Considerable digging in this territory showed rich soil in places, evidently darkened by aboriginal occupancy. Three burials were unearthed—one partly flexed on the left side, one at full length on the back, one a disturbance, near together and all without artifact of any kind.

Apart from human bones, in the soil, were a small "celt" smoothed only toward the cutting edge, the remainder left rough for hafting, and two implements of bone.

## MOUNDS NEAR HILL LANDING, UNION COUNTY, ARK.

Near Hill Landing, on property of Mr. N. T. Goodwin of Calion, Ark., are various low mounds of irregular shape, probably domiciliary.

About one-quarter mile WNW. from the landing is a field, probably about twelve acres in extent, having at its northern and its southern ends two small mounds, that at the northern end being partly within the field, while the other mound is immediately outside the fence. These mounds, which had been much trampled by stock, were dug into by us without result, the soil having a raw yellow shade. The field evidently had been an aboriginal place of abode, as there lay scattered around: bits of pottery; fragments of chert; part of a quartz crystal, somewhat broken, grooved for use as a pendant; two small "celts," seemingly of sedimentary rock; one chipped cutting implement of chert; four small masses of magnetite, one of which shows considerable grinding down at one end; a number of small arrowheads, some of chert, some of chalcedony, one very neatly made, only .4 of inch in length.

To our disappointment considerable digging in this field yielded no sign of burial, and it became evident that the dark soil showing former occupancy was of little depth in places, while in others it had entirely disappeared. The field, on a slope, probably had lost by long cultivation and wash of rain, the cemetery that presumably once was there.

## MOUNDS AT THE BOONE PLACE, CALHOUN COUNTY, ARK.

At the Boone Place, which has a landing that takes its name from the place, is a mound with an exposed section on the river's bank, a part having been eaten away by the stream.

A photograph of this mound, shown in half-tone reproduction in Fig. 91, illustrates a point to which we have before referred, namely, the inability to give any idea of the height of a mound by the aid of photography, this mound being 12.5 feet above the surrounding level ground.



The picture shows the base line, which was the original surface, running through the mound. The base-line can be seen at the extreme right of the picture, extending below the level ground.

The mound in question, with five others, all domiciliary in appearance, having broad, flat tops, forms an irregular circle or an ellipse.

Many trial-holes were sunk by us into the mound on the river bank without success. The other mounds, however, were not dug into, their owner depending on them as places of refuge for his stock in periods of high water, and fearing that any digging might loosen them in a way to make them less likely to resist the inroads of the river.



FIG. 91.—Mound. Boone Place.

The low-lying ground surrounding the mounds, dry swamp at the time of our visit, but often submerged, was inspected by us and was dug into to a limited extent. But as the soil seemed to be late river deposit, and in addition was covered thickly with dead leaves, we were unable to find any indication of aboriginal burial, and the idea of digging at random over so considerable an area was not entertained.

#### MOUNDS ON THE KELLER PLACE, CALHOUN COUNTY, ARK.

About 300 yards N. by E. from Keller Place Landing, in woods but in sight from the road, is a mound (A) which has been quadrangular. Its height is 13 feet. The diameters of base are 131 feet and 143 feet; and of the summit-plateau, 62 feet and 72 feet.



As this mound evidently was domiciliary, digging into it was confined to the summit-plateau, in an unsuccessful attempt to discover a cemetery there.

In woods, about 175 yards N. by W. from Mound A, was a very symmetrical mound (B) with circular base having a diameter of 52 feet. The summit, also circular, was 19 feet in diameter.

The height of this mound, taken from the level of surrounding territory, slightly exceeded 7 feet. Later, a measurement from about the middle of the summit to what seemed to be undisturbed sand at the base of the mound, showed a depth of 9.5 feet. Presumably there had been a superficial deposit of mold and of sand on the area surrounding the mound, thus diminishing the height.

This mound was completely dug away by us to a depth slightly less than 10 feet from its top, except a very limited portion around a tree at the margin of the mound, which was left standing.

The mound, in which trial-holes came at once upon human remains, was composed mainly of sand containing an admixture of clay—a small proportion in the upper part. In the lower central part, however, the percentage of clay increased until toward the base of the mound the material was almost wholly clay.

Human remains were encountered throughout the mound, beginning almost at the margin, at various depths, from well up toward the summit to the base and even below it.

Skeletal remains in this mound were so badly decayed that even in the burials best preserved only crumbling fragments of the larger bones or of teeth remained. Not a trace of vertebra, small bone, or rib (with a single exception to be noted later), or of the articular parts of any bones was encountered throughout the entire mound. Most frequently skulls represented by decaying fragments of bone or by remains of teeth, were all that remained of the burials.

Fifty-two skulls or traces of skulls were met with in the mound, but as it was customary in this region to bury earthenware vessels near the skull, and as a number of vessels were found apart from human remains, presumably some skulls had entirely disappeared, and hence the original number of burials had been in excess of the number of skulls given in our enumeration.

A small deposit of fragments of bones, all split, none human, lay at a considerable depth in the mound.

Other than earthenware vessels, few artifacts were encountered. A barbed arrowhead and an arrowhead or knife, both of chert, came from the mound, as did a disk, wrought from the base of an earthenware vessel, 3 inches in diameter, with a central perforation.

There were found also a chisel wrought from a chert pebble, about 6 inches in length, having part of the side and edge broken away, and two chisels together, one about 3 inches in length, the other somewhat less, each made from a pebble of chert and having a well ground, convex, cutting edge.



Among the roots of a tree growing from the mound, which were being cut for removal, was a pipe of earthenware of interesting form, the bowl of which received a blow from an axe, but since has been cemented together. The part of the pipe on which the bowl rests is square in section where the stem is intended to enter, and tapers to a blunt point at the other end. The decoration consists of notches on the four edges of this elongated pyramid; incised, encircling lines at both ends; and on two opposite sides below the bowl, rude circles in low relief on an excised field—seven circles on one side and nine on the other (Fig. 92).



FIG. 92.—Pipe of earthenware. Keller Place. (Full size.)



FIG. 93.—Copper-coated ornament of wood. Keller Place. (Full size.)

Near the central part of the base of the mound lay Burial No. 58, consisting of fragments of teeth and a small, flat remnant of bone, probably part of a rib. This fragment had been preserved by the sheet-copper covering of a hollow wooden ornament that lay upon it at such a distance below the teeth as to indicate that its position had been on the chest of the deceased (Fig. 93). This ornament was made in two parts and hollowed out to contain pebbles (which were present in it) to rattle when the object was in motion. The shape of the object when entire is that of the canine tooth of a large carnivore, which, doubtless, it was intended to represent. There is a hole for suspension at one end.

In a stone-grave on a bluff of the Big Harpeth river, Tenn., were found by the late Mr. Edwin Curtis, while conducting explorations under the direction of Prof. F. W. Putnam, two ornaments almost exactly similar to the one in question. These ornaments have been figured and minutely described by Professor Putnam,<sup>1</sup> who believes them to have been ear-ornaments.

<sup>1</sup> Reports Peabody Museum, Vol. III, p. 112 *et seq.*



Fifty-two vessels of earthenware, nearly all of which were badly crushed, were taken from this mound. These vessels were found near crania or else apart from bones—singly, in pairs, and in one case three together.

The ware, without shell-tempering, save in the case of a single sherd, is inferior in quality; the decoration is commonplace as a rule and the patterns lack originality.

Certain of the vessels from this mound are described in detail.

Vessel No. 3. A bottle of compound form (Fig. 94), of inferior ware, rudely modeled. Incised line decoration on the upper part of the body has been attempted, but abandoned almost immediately after inception.

Vessel No. 33. A pot 3 inches in diameter, of brown ware, having a flat base and a short upright neck from which extends horizontally a scalloped margin. The interest in this little vessel is centered in its decoration, which four times shows (Diagram Fig. 95) a symbol, the significance of which is in doubt. This symbol, a familiar one on pottery from parts of Alabama and on stone and on pottery from Arkansas, appears on this vessel in two instances with the poles of the elliptical figure vertical and the interior portion horizontal—the manner in which the symbol usually is represented. In two cases, however, the position of the poles and that of the interior parts are reversed.

Vessel No. 5. A pot of dark ware (Fig. 96), with flat base and slightly flaring neck. Around the rim are imprints showing short, parallel lines. Five vertical rows, each consisting of six protuberances, divide the upper part of the exterior



FIG. 94.—Vessel No. 3. Keller Place.  
(Height 5.1 inches.)



FIG. 95.—Vessel No. 33. Decoration. (About half size.)

of the body into five equal parts, which are filled with decoration of oblique, parallel lines conferred with a tool, though the effect is similar to cord-marking.

Vessel No. 40. This bottle, of dark, inferior ware, (Fig. 97), is without decoration and is shown on account of its rather graceful form.



FIG. 96.—Vessel No. 5. Keller Place. (Diam. 4.9 inches.)



FIG. 97.—Vessel No. 40. Keller Place. (Height 6.2 inches.)



Vessels Nos. 30, 49, and 43. Three bowls, in diameter, respectively, 7.5 inches, 5.6 inches, 4.7 inches. Each bowl, inside and out, is coated with red pigment, and each has a number of incised, parallel, encircling lines below the rim—these lines, in the case of Vessel No. 49, the one of medium size, being interrupted on two opposite sides by series of five incised, festooned lines extending below rudimentary handles, on the top of each of which are two straight, impressed markings, each about .5 inch in length.

Vessel No. 25. A bottle of yellow ware (Plate VI), dark in places through uneven firing, with a coating of red pigment, in part worn away. The vessel has a globular body, and a neck distinguished by an unusual feature on long-necked bottles such as this one is, namely, an endeavor to represent an animal head at the opening. This head, a very crude endeavor, has ears, mouth, and nostrils; the eyes are wanting. The decoration of the body, incised in an irregular way, consists of hour-glass-shaped figures made up of series of lines, four times shown.

Across the road from Mound A and in full view from it, is a circular elevation (Mound C) about 40 feet in diameter and from 2 to 3 feet in height, which was practically dug down by us.

Five burials were encountered, all badly decayed, some represented only by fragments of the skull. Three were of children; one, of a child or of an adolescent; one of an adolescent whose wisdom teeth had not yet erupted.

The form of burial where the skeleton was sufficiently complete to indicate it, was at full length on the back.

A neatly-made arrowhead of chert lay apart from burials in this mound, and a pot with rude ornamentation was near the skull of a child.

In woods, about 65 yards NNW. from Mound A is a circular dwelling-site (Mound D) about 2 feet high and 62 feet in diameter.



FIG. 98.—Pipe of claystone. Keller Place. (Full size.)

Eleven trial-holes failed to come upon human remains but resulted in the finding of a pipe of soft claystone, lying alone (Fig. 98), and some bones kindly identified by Prof. F. A. Lucas as having belonged to an Indian dog; and a bone of a turtle, apparently a moderate-sized snapping turtle.

Various series of trial-holes were put down in the level ground and in small circular elevations in the woods, in an endeavor to discover a cemetery, but with slight success.

In one place human remains were four times encountered, but considerable digging in their vicinity was without return. With one of these burials was a small arrowpoint of black chert.



ANTIQUITIES OF THE OUACHITA VALLEY.  
KELLER PLACE, VESSEL NO. 25. (HEIGHT, 12 INCHES.)





## MOUND AND SITES NEAR PYLE'S LANDING, CALHOUN COUNTY, ARK.

About one-quarter mile in a northerly direction from Pyle's Landing, in a field formerly under cultivation but untilled at the time of our visit, is a symmetrical mound with a circular base, 7 feet 6 inches in height and 80 feet in diameter. The summit-plateau, also circular, is 34 feet across.

As this mound evidently was domiciliary and is said to be the only refuge for stock in times of overflow, we contented ourselves with a number of trial-holes dug into the summit-plateau, which, beyond showing the mound to be of clay with a slight admixture of sand in that part, were without result.

A number of trial-holes were put down by us in the field surrounding the mound, but without success—a result anticipated by us, as this locality is said to be several feet under water each flood season.

## MOUND AND CEMETERY AT KENT, OUACHITA COUNTY, ARK.

In sight of the railroad station at Kent, about two miles above Camden, on property of the Barlow and Kent Company, of Urbana, Ohio, is a quadrangular mound having modern burials in its summit-plateau. This mound, 18 feet 6 inches in height, somewhat irregular in outline through wash of rain, probably at the time of its building was square as to its base and summit-plateau, which at present have diameters respectively of 147 feet and 66 feet.

The sides practically face the cardinal points.

The surrounding area is said to have been long under cultivation, and a tombstone on the mound marks a decease in 1852. At present, however, there is a growth of timber over most of the place.

No attempt was made by us to excavate the mound, which was evidently domiciliary, but as there was knowledge of several aboriginal burials discovered while digging preparatory to the erection of sheds (which are in sight from the mound) for the shelter of stock, we decided to dig in the barnyard, and found one skeleton there.

Immediately south of this barnyard, however, burials were more plentiful, forty-four being found in a comparatively small area, while two others were unearthed near the boiler-house belonging to the Company, which is at some distance from the sheds.

Owing to the previous cultivation of the ground, no doubt, the burials lay near the surface, the deepest being but 15 inches down, and most of them less than one foot in depth.

The condition of the bones was such, through decay, that many evidently had entirely disappeared, and although in some cases skeletons were in place when found, the bones crumbled into minute fragments upon removal. There had been also aboriginal disturbance, grave cutting through grave, and much recent interference through contact with the plow. However, in cases where there remained enough of the skeleton for determination, burial at full length on the back was indicated.



Of twenty-four burials which surely came under the foregoing class, all but two had the heads in an easterly direction—not due east, but easterly. In the two exceptions the skulls were directed N. of W. and WNW.

Little but earthenware was found with the dead. Near the leg-bone of a skeleton were two musselshells, and immediately at the skull of the same skeleton was another—all broken. Each of these shells had a central, circular perforation for the admission of a handle, and doubtless was used as a hoe or scraper.

At the right shoulder of an extended skeleton were two knives and six small arrowpoints, of chert; and a small projectile point of the same material lay near the skull of another skeleton.

A skull belonging to a disturbed skeleton had, in close association, a slender, barbed arrowpoint of chert. Chert pebbles and parts of pebbles, seemingly intentionally placed, were found near bones in several instances.



FIG. 99.—Pipe of earthenware.  
Kent. (Full size.)

Apparently apart from human remains were a number of fragments of earthenware which, when cemented together, formed the bowl of a pipe with a curious loop attachment (Fig. 99). In the base of the bowl are two perforations, each of which connects with the passage intended for the stem, in place of the single perforation usually present.

The proportion of vessels placed with the dead in the cemetery at Kent was comparatively small, but fourteen being found. All these but one were crushed by pressure of the soil, or partly plowed away, or shattered by the spades of our diggers.

Incidentally, it may be said, in reference to breaking of vessels in digging, that the better the condition of the bones, the greater is the number of vessels recovered intact. This may be easily understood when we recall that all bones are carefully removed by hand, and if any part of a well-preserved skeleton, except the skull (near which vessels usually are found), is encountered first by the digger, vessels with the skeleton are exposed to but little risk in removal.

Of the fourteen vessels found at Kent, all but one lay near skulls or parts of skulls—the exception being a bowl found near the pelvis of an extended skeleton.

In one instance a bottle and a bowl lay with a skeleton; all other vessels were found singly. Several bowls were inverted.

The earthenware from Kent is tempered with sand, is fairly good in quality, and in several instances is black and polished. But one vessel is without decoration, all others having incised markings, none of which, however, is of especial interest. One vessel, badly broken by contact with a plow, had borne a coating of red paint, in addition to a decoration consisting of a number of incised, encircling, parallel lines. The more noteworthy vessels are described in detail.

Vessel No. 7, a bowl of black ware, 5.5 inches in maximum diameter, has a conventional tail 4.5 inches in length, and about one inch in width, projecting at



a right angle below the rim. On the opposite side is a circular area where a head (probably that of a bird) has been. Additional decoration consists of five evenly made trailed lines encircling the vessel below the rim, except where the lines curve down and around the spaces devoted to the head and the tail. In these lines has been a thick deposit of red pigment, which still remains in places.

Vessel No. 1. A bottle of porous, dark ware (Fig. 100), with a flat base and a rudely incised decoration.

Vessel No. 13. A bottle of good, dark ware, from which, unfortunately, the neck has been plowed away and lost (Fig. 101). The shape is somewhat unusual, as is the decoration, which consists of incised designs and modeled bands in relief.



FIG. 100.—Vessel No. 1. Kent. (Height 7.9 inches.)



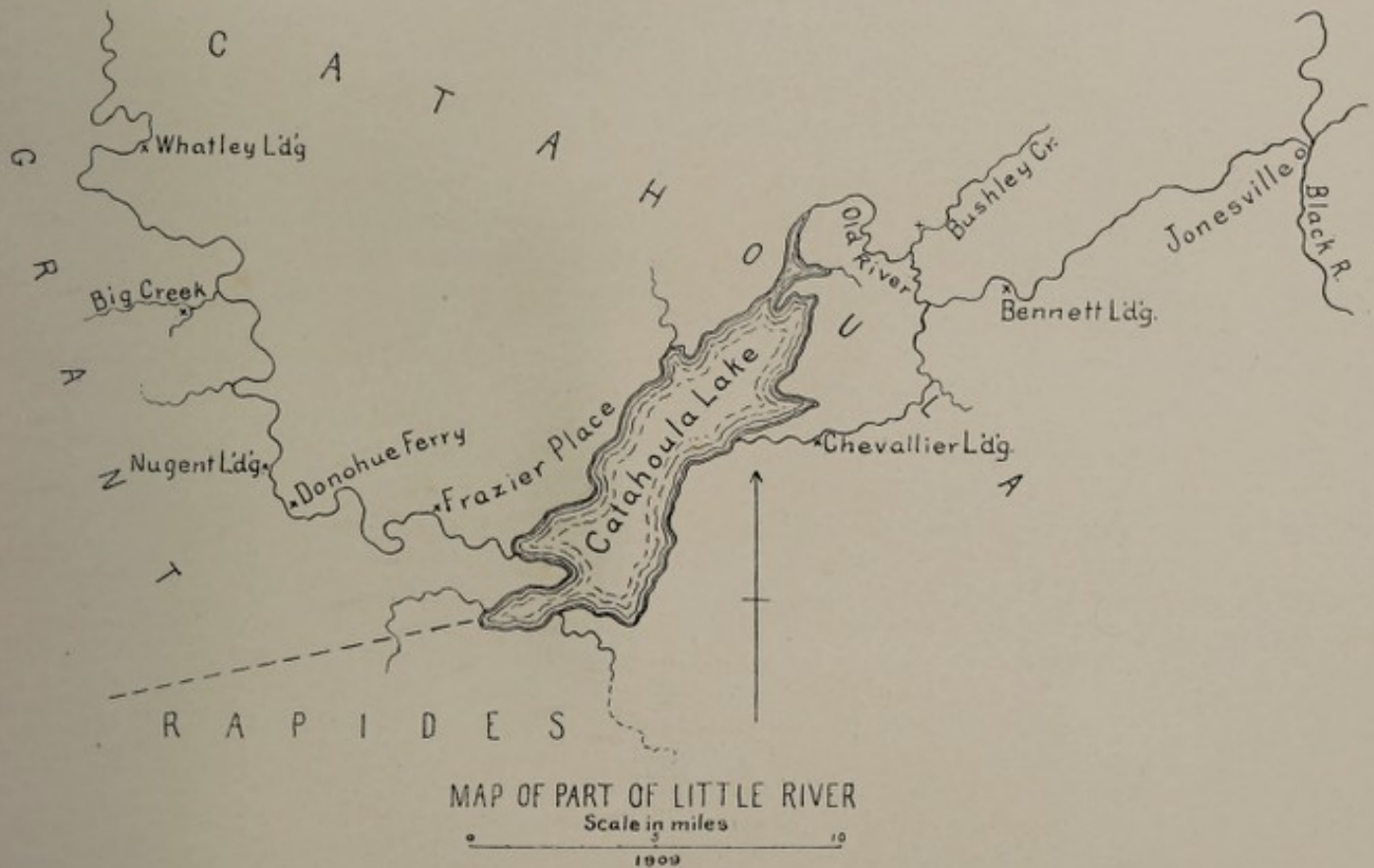
FIG. 101.—Vessel No. 13. Kent. (Diam. 7 inches.)





FIG. 102.—Vessel No. 8. Kent. (Height 6.4 inches.)

Vessel No. 8. A bottle of black ware (Fig. 102), having a flat base and a neck of unusual form. The body has, as decoration, four times shown, series of circles concentric around a dot, with dentate markings extending from the outer circles—presumably sun-symbols. Minor features in the decoration are cross-hatched spaces between the symbols; incised encircling lines above them; and other encircling lines on the terminal portion of the neck, where, in addition, are four equidistant, vertical fillets ornamented with parallel, incised lines on the upper surfaces.



MAP OF PART OF LITTLE RIVER

Scale in miles  
0 5 10  
1909

## LITTLE RIVER.

Little river, as we have said, is navigable to Georgetown, a distance of about 85 miles by water. The portion covered by us was somewhat less.

The navigable part of this stream was carefully searched in advance by our agents.

The territory along that part of Little river visited by us is nearly all subject to overflow, and not one cultivated field along its banks was seen by us which indicated the presence of a cemetery, either by a dark appearance of the soil or by debris of aboriginal occupancy scattered on the surface.

## MOUNDS.

Mounds at Bennett Landing, Catahoula Parish, La.

Mounds on Bushley Creek, Catahoula Parish, La.

Mound near Chevallier Landing, Catahoula Parish, La.



Mounds on the Frazier Place, Catahoula Parish, La.

Mounds at Donohue Ferry, Catahoula Parish, La.

Mounds at Nugent Landing, Grant Parish, La.

Mounds on Big Creek, Grant Parish, La.

Mound near Whatley Landing, Grant Parish, La.

#### MOUNDS AT BENNETT LANDING, CATAHOULA PARISH, LA.

At Bennett Landing, in full view from Little river, in a cultivated field, are two mounds of moderate size, formerly quadrangular, but now much eroded by wash of rain, and, as to their lower parts probably by the river in time of overflow.

Permission to investigate these mounds was accorded, and later withdrawn. The mounds, judging from their outlines and summit-plateaus, belong to the domiciliary class. There is no history of the finding of bones or of artifacts in or near them.

#### MOUNDS ON BUSHLEY CREEK, CATAHOULA PARISH, LA.

At the junction of Bushley Creek with Old river, is a landing. About three-quarters of a mile NNW. from this landing is a large field, long fallow, the property of Messrs. H. & C. Newman, of New Orleans, to whom we are indebted also for permission to investigate their property on the Ouachita river.

In this field are a number of mounds and rises in the ground, and the surface contains much evidence of former occupancy by aborigines.

The principal mound (A), much trampled by cattle, a refuge for which it is in periods of overflow, has a present height of 6 feet; the diameter of its circular base, which evidently has been much extended, is 80 feet.

Ten trial-holes sunk into this mound showed it to be mostly of hard clay with an admixture of sand in places.

Human remains, all badly decayed, were found in four of the holes, consisting of fragments in two places; a skull; and a bunched burial.

In another trial-hole, in which no bones were apparent, was a small, undecorated pot having a square, flat base. With it were parts of another vessel.

As neither bones nor earthenware were met with at a depth greater than one foot, it was evident that burials in this mound had been made superficially.

About 115 yards N. by E. from Mound A is another mound (B), which in the past has had a house upon it, and is greatly dug and washed away. It is covered with fragments of chert, among which were parts of several human bones. On the W. side, adjacent to the mound, has been a garden, around which, except along the part which abuts upon the mound, is a small embankment, or levee, of the same period as the house, to protect the garden in periods of high water.

This mound, about 5 feet high from the S., N., and W., is of much greater height on the eastern side, where, seemingly, the surface of the field has been washed away by the creek.



About 40 yards ENE. from this mound is a pool marking the area whence the earth for the mound was taken.

In addition to careful examination of the sides of a large hole, which was already in the mound, we did considerable digging, but without success.

Careful search also was made over all this promising looking field, and many trial-holes were put down, but without avail.

#### MOUND NEAR CHEVALLIER LANDING, CATAHOULA PARISH, LA.

About half a mile in a southeasterly direction from the landing, on the Chevallier Place, which is the property of Mr. D. D. Chevallier, living nearby, in sight from the landing, is a mound, much of which has been washed away by rain, leaving sections that expose raw-looking clay, but no bones or artifacts. The height of the mound is 21 feet.

Digging into what remained of the summit-plateau brought no return, and trial-holes in the adjacent woods and fields yielded no sign of a place of burial.

#### MOUNDS ON THE FRAZIER PLACE, CATAHOULA PARISH, LA.

About four miles up Little river, after passing through Lake Catahoula, is the Frazier Place, the residence of Mr. L. D. Frazier.

In full view from the river's bank is a fine mound, about 12 feet high measured from the NW., where the ground is high, or more than 16 feet in height when the measurement is taken from the southwestern side, which is about the general level.

The mound, originally a truncated cone, has a basal diameter of 90 feet. It has been somewhat washed away by rain, and has undergone considerable digging in places.

Various parts of the mound were dug into by us, including an excavation 10 feet by 9 feet in the summit-plateau, which yielded a full-length burial, two single skulls, and a bunch of bones without a skull. All these bones were badly decayed. No burials occurred at a greater depth than 1.5 feet, where raw-looking clay was encountered. As we considered the mound to be of the domiciliary kind, with superficial burials, digging was discontinued at a depth of between 3 and 4 feet.

In a cultivated field is a curious platform of earth, of remarkable symmetry, about 150 yards N. by W. from the large mound. The height of this mound in the field is approximately from 2 to 4 feet, depending on the slope of that part of the field whence measurement is taken. It is almost square, with a diameter of 95 feet, the diameter of the summit-plateau being about 75 feet.

There is no exact orientation to this curious mound, which, perhaps, was the first stage in the building of a greater one, the sides being approximately N. by E. and S. by W., and E. by S. and W. by N.

Considerable digging into this mound in the hope of discovering a cemetery, proved fruitless.



## MOUNDS AT DONOHUE FERRY, CATAHOULA PARISH, LA.

On the crest of a ridge overlooking Donohue Ferry, about 300 yards in an easterly direction from the ferry, on property of Mrs. Blanche Walker, of Jackson, La., is a very symmetrical mound, a truncated cone in form, whose dimensions are hard to determine, it being almost impossible to decide where a ridge upon which it stands comes to an end and where the mound begins.

Taken from the S. the mound has a height of 12 feet and a basal diameter of 80 feet; and these measurements will probably answer as well as any others, though the question of the size of the mound must be entirely a matter of individual opinion. At all events, the dimensions cannot be smaller than those given. The diameter of the summit-plateau is 15 feet.

Cropping from the sides of the mound are masses of sandstone, and our digging into the summit and sides came upon similar masses, and nothing else.

A few feet from the large mound was another, 1 foot 9 inches in height and 29 feet in diameter of base. A trench 20 feet long by 6 feet across, running through the center of the mound, was put down to a depth extending below the base, without result, except the discovery of masses of sandstone, smaller than those in the larger mound.

## MOUNDS AT NUGENT LANDING, GRANT PARISH, LA.

In woods, on land belonging to the State, near Nugent Landing, are various low, circular mounds; a mound that had been dug through previous to our visit; and a quadrangular mound, probably domiciliary, about 7 feet in height. Several of these mounds, including the one last referred to, were dug into by us without success.

In a cleared space, in full view from the landing, is a low, irregular mound, composed of very dark soil, evidently a dwelling-site.

Thirteen trial-holes sunk in this site yielded human remains in three places, all near together. Considerable space surrounding these holes was then dug out, exposing other burials, making a total of three skeletons at full length on the back, one being without bones from the knees down; and eight skulls lying among fragments of bones. None of these burials, all of which were badly decayed, lay at a depth greater than 20 inches.

Near one of the skulls was a curious little vessel of earthenware, shown in Fig. 103, and fragments of another vessel of rude design. With these were three flat pebbles, one round in outline and two oblong with rounded corners.



FIG. 103.—Earthenware vessel. Nugent Landing. (Height 3.4 inches.)



## MOUNDS ON BIG CREEK, GRANT PARISH, LA.

On a nameless point extending into Big creek, about one mile above its union with Little river, on the left hand side going up, in view from the water, is a mound about 1.5 feet high and 40 feet across the base. Six trial-holes showed the mound to be of closely-packed sandy clay. Indications of single skulls with fragments of long-bones near them were found in two places. Near one of the skulls was a bowl of inferior ware, in many fragments.

Investigation of other low mounds at this place was without success.

## MOUND NEAR WHEATLEY LANDING, GRANT PARISH, LA.

In woods, about 100 yards in from the water, about one mile above Wheatley Landing,<sup>1</sup> on property of Mr. A. A. Whatley, is a mound about 4 feet in height, irregularly elliptical in shape, with basal diameters of 125 feet and 83 feet; and corresponding diameters of summit-plateau of 104 feet and 55 feet. Beyond showing the mound to be composed of clayey sand, eleven trial-holes were without result.

At this point we decided to abandon work on Little river.

## BOEUF RIVER.

The investigation of Boeuf river, which was not searched for us in advance by our agent, as we have said before, was abandoned by us at Alto, 100 miles<sup>2</sup> by water from the river's mouth, though the stream is navigable 50 miles further.

The land bordering Boeuf river is low-lying, except in places, until Landerneau is reached (see map), after which the banks are somewhat higher.

MOUNDS AND SITES.<sup>3</sup>

Cemetery near Jones Landing, Franklin Parish, La.

Mounds near Dailey Landing, Franklin Parish, La.

Mounds near White Oak Landing, Franklin Parish, La.

Mound at Alabama Landing, Richland Parish, La.

## CEMETERY AT JONES LANDING, FRANKLIN PARISH, LA.

At Jones Landing is a large plantation belonging to Mr. L. Herbert Swayze, who resides there.

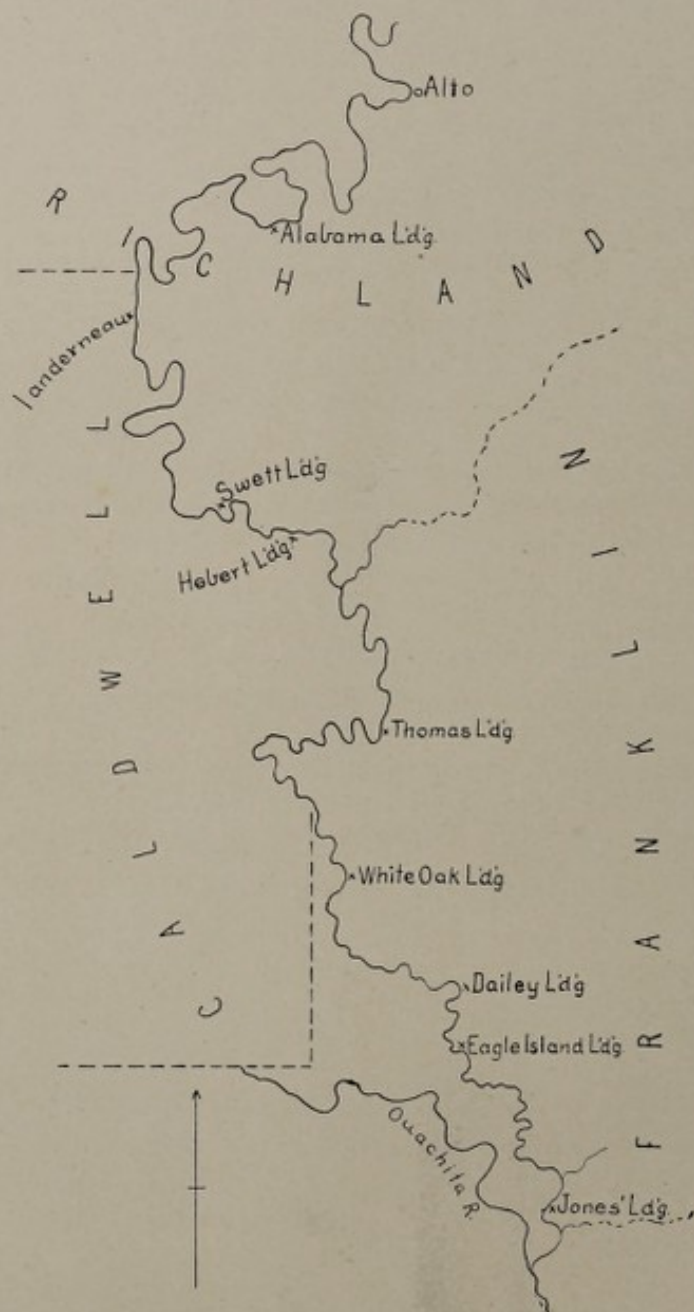
<sup>1</sup> The landing is on the opposite side of the river, in Catahoula Parish.

<sup>2</sup> All information as to distance to towns and as to navigable length of rivers, mentioned in this report, has been furnished us from surveys by the United States Engineer Department having supervision of these streams.

<sup>3</sup> Only mounds noteworthy on account of size and shape, and mounds or sites in which human remains were found, are described in our account of the antiquities of Boeuf river.

Single mounds or groups of mounds are at or near: Eagle Island Landing, on the Desha Place; Thomas Landing, on the Bush Place; Hebert Landing, on the Hebert Place; Swett Landing, on State land.





MAP OF PART OF BOEUF RIVER

Scale in miles

0 4 8 10

1909

Surrounded by cultivated land, on Mr. Swayze's place, are two mounds, low and much spread, on one of which is a dwelling, while the other is occupied by a cemetery containing recent burials. Both these mounds, which had the appearance of having been domiciliary in character, though, at the time of our visit, they had lost all definite form, were dug into by us without success.

Near the mound in which are the recent burials is a pool of water which marks the area whence material for the mound was taken. This pool is nearly surrounded by small, circular dwelling-sites.

The entire plantation was carefully examined by us, with the result that a slight rise in the ground was noted about half a mile SE. from the landing, at the extreme SW. end of the plantation. This elevation, perhaps one foot in height, was of much darker soil than the surrounding plantation, and fragments of human bone lay in furrows made by recent plowing.

Trial-holes at once exposed human remains, and additional digging showed burials in that part of the elevation which was in the plowed field (a part of it, not a large proportion seemingly, was in a cultivated garden beyond a fence) mainly to be confined to an area 20 feet by 30 feet in extent. This area was dug throughout by us at a depth of from a foot to 2 feet, where undisturbed clay was encountered.

Human remains were found in great abundance, but in a poor state of preservation, only two skulls, both broken, and several bones exhibiting pathological conditions being saved.

In certain cases burial at full length on the back was noted; in others, the deposit of skulls and scattered bones. In one instance five skulls lay together.

The yield of artifacts was disappointing.

Placed on the chest of an extended skeleton was the base of an earthenware vessel, lying too deep to have lost its upper part through the agency of a plow.

With scattered human remains, and near the surface, was another base of a vessel.

Also with human bones were several bits of chert and part of a small disk of stone.

An extended skeleton had on one side of the skull a pot of shell-tempered ware, in fragments, roughly decorated; and on the other side a small undecorated bowl. Near the pot were several broken pebbles of chert; within the bowl was a chert fragment.

Another extended skeleton had at the neck sixteen shell beads, roughly barrel-shaped, each about one-third of an inch in length.

A part of a short-necked bottle, the remainder apparently having been carried away by a plow, lay with fragmentary human remains. The decoration of this vessel, neatly executed, had been a scroll combination partly filled in with cross-hatch lines. The ware, though not shell-tempered, is excellent, and the outline of the vessel, when whole, must have been graceful.

Near scattered bones were fragments of an undecorated vessel, and in two instances vessels crudely decorated, with globular bodies and flaring necks, lay near skulls.



Near another skull was half of a pot bearing a coarse, lined decoration.

The yield from the portion of this cemetery investigated by us was not of a nature to encourage us to negotiate with an aged colored man, into whose garden the remainder of the cemetery extended, for the right to continue the search.

On a plantation adjoining that of Mr. Swayze we failed to find bones on the surface, or soil of a color to encourage us to dig, though scattered amid much chert debris were a small, pointed implement of bone, and a piercing implement 2.75 inches in length, made by grinding to a point at its narrower end a chert pebble so shaped as admirably to adapt it to the purpose.

A number of arrowheads of chert were found on this plantation, as well as on the one belonging to Mr. Swayze.

#### MOUNDS NEAR DAILEY LANDING, FRANKLIN PARISH, LA.

About 300 yards W. by S. from Dailey Landing, in a cultivated field forming part of the plantation of Mr. M. P. Dailey, who lives on it, is a mound (A) 14 feet high, with an irregularly circular base 146 feet in diameter. The diameter of the summit-plateau is 47 feet. The upper part of this mound, to a depth of from 2 to 2.5 feet, is of rather loose material and is much darker in shade than the solid and tenacious clay beneath it.

Eight trial-holes were put down in the superficial part of the mound, some of which, coming upon human remains, subsequently were enlarged. Digging was not carried farther, as the mounds on Mr. Dailey's place are his sole reliance in flood-time as a place of refuge for stock, hence digging and a consequent loosening of soil and destruction of roots which hold it in place, meant impairment to the mound; moreover the yield of artifacts was not of an alluring character.

One skeleton extended on the back and six bunched burials were encountered at a maximum depth of 2.5 feet. With one of the bunched burials were three skulls; with another, were two.

All bones were badly decayed.

With burials were six earthenware vessels near crania; in one instance a pair, the rest occurring singly. These vessels, all of which were broken, show no shell-tempering and are undecorated, with a single exception which bears a simple design of straight lines, roughly made. The vessels present no novelty in form.

About 250 yards NNE. from Mound A is a somewhat smaller mound (B), which has suffered considerably through wash of water. Its summit-plateau was of hard, undisturbed clay, light in color.

This mound yielded nothing to our search, nor was it expected that it would do so.

About 80 yards SSE. from Mound A is another mound, much spread through cultivation, which was planted in cotton at the time of our visit. The soil is rich



with admixture of organic matter, but the depth to which this loam extends is little more than one foot. Thirteen trial-holes were without result.

Across a small arm that makes in from the river, in a southerly direction from Mound A, is a mound in woods, in which eight trial-holes were sunk without success; and an equal number were put down into neighboring level ground with like result.

#### MOUNDS NEAR WHITE OAK LANDING, FRANKLIN PARISH, LA.

About 300 yards above White Oak Landing, on the river bank, on land said to be property of the State, is a mound (A) about one foot in height, and probably circular as to circumference in former times, but somewhat eaten away by the river at the period of our visit, when its diameters were 28 feet and 36 feet.

Eleven trial-holes showed the elevation to be of rich loam, containing occasional fragments of musselshells.

Human remains were found in five places and varied in depth from 6 inches to 2.5 feet. In addition to many scattered bones, there were six skeletons lying at full length on the back, one of which instead of having the arms extended at the sides, had the forearms flexed against the upper arms. All bones were in bad condition, the skulls being in fragments.

The yield of artifacts from this place was not encouraging.

Apart from human remains was half a pebble which had been split longitudinally, with an edge ground at the broader end.

Also away from burials was the larger part of a shell-tempered earthenware vessel which, when whole, had borne as decoration a combination of the scroll.

About 50 yards NE. from the mound on the river bank is a mound from 3 to 5 feet in height, the altitude depending somewhat on the side of the mound whence the measurement is taken. Its circular base has a diameter of 90 feet. Thirteen trial-holes were dug, resulting in the discovery of scattered bones; a bunched burial with three skulls; and three skeletons extended on the back; none more than one foot in depth.

#### MOUND AT ALABAMA LANDING, RICHLAND PARISH, LA.

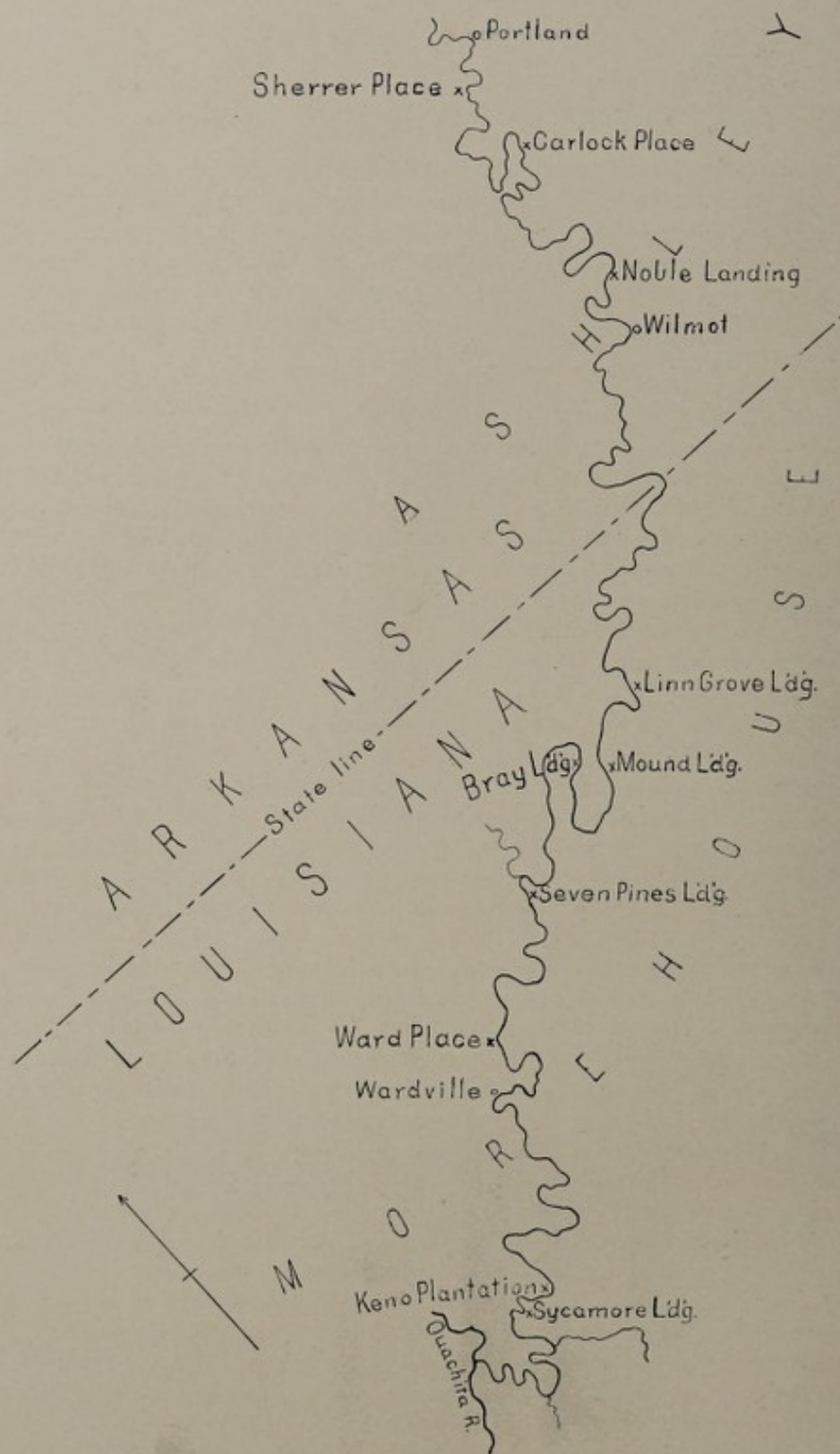
At Alabama Landing, on property of Mrs. M. E. McIntosh, a road which skirts the river passes through remains of an elevation but little above the surrounding level, in which, we were informed, human bones formerly had been found.

Thirteen trial-holes sunk by us came upon human remains in three places, none at a greater depth than ten inches from the surface. These remains, which were badly decayed, had undergone much disturbance.

A skeleton extended on the back had all bones missing below the knees. At the skull was an arrowhead or knife, of chert.

Three other skulls were found with scattered bones.





MAP OF PART OF BAYOU BARTHOLOMEW

Scale in miles  
 0 5 10 15  
 1909

BAYOU BARTHOLOMEW.<sup>1</sup>

Bayou Bartholomew, comparatively deep in the winter season, and narrow so that the traveler on it has the cosy sensation of journeying on a canal, passes throughout between lines of contiguous farms and plantations, all on ground so high that it is almost free from danger of overflow. The bayou escaped the great flood of 1882, though the lower parts of the country bordering it were inundated for a short time in the still greater freshet of 1874, which, however, was due to a special cause.

As we have said, we searched the bayou from its union with the Ouachita to Portland, Arkansas, its navigable length, a distance of 134 miles, by water.

Later, we again carefully investigated the bayou to a point somewhat above the Mound Place, or about half the distance previously covered.

Bayou Bartholomew, as stated in our introductory remarks, was not visited by our agent previous to our coming, but so courteous were the planters and farmers along its banks and so eager to aid us, that our disadvantage through want of advance information was reduced to a minimum.

## MOUNDS AND SITES.

Mound near Sycamore Landing, Morehouse Parish, La.  
Cemetery near Sycamore Landing, Morehouse Parish, La.  
Cemetery on the Keno Plantation, Morehouse Parish, La.  
Cemetery on the Ward Place, Morehouse Parish, La.  
Cemetery near Seven Pines Landing, Morehouse Parish, La.  
Cemetery near Bray Landing, Morehouse Parish, La.  
Mound and cemetery on the Mound Place, Morehouse Parish, La.  
Cemetery at Linn Grove Landing, Morehouse Parish, La.  
Mound near Linn Grove Landing, Morehouse Parish, La.  
Mounds near Wilmot, Ashley County, Ark.  
Mound at Noble Landing, Ashley County, Ark.  
Mounds on the Carlock Place, Ashley County, Ark.  
Mound on the Sherrer Place, Ashley County, Ark.  
Mound near Portland, Ashley County, Ark.

## MOUND NEAR SYCAMORE LANDING, MOREHOUSE PARISH, LA.

About 150 yards E. by N. from Sycamore Landing is a mound with circular base, 11 feet in height and 130 feet in diameter. This mound, which has every appearance of having been plowed over in recent years, seems to belong to the domiciliary class. Its owner was disinclined to permit investigation.

<sup>1</sup> We are unable to say why Bartholomew is called a bayou, and residents along its banks are equally in ignorance as to the explanation. The Saline, rising in Arkansas and joining the Ouachita, as does Bayou Bartholomew, and of no greater size than Bartholomew, is called a river.



## CEMETERY NEAR SYCAMORE LANDING, MOREHOUSE PARISH, LA.

At Sycamore Landing is the plantation of Mrs. Clara Barber, whose place of residence is Pine Bluff, Ark. This plantation, under the management of Mr. Clarence Secrease, of Ouachita City, La., adjoins that on which is the mound to which we have referred, and presumably had the cemetery belonging to that mound.

In a cultivated field in the Barber plantation, about 500 yards in a SE. direction from Sycamore Landing, and in sight from the mound, was an imperfectly defined rise above the general level, where the soil was darker than that which surrounded it. On the surface of this elevation were dwelling-site debris and a small fragment of a human skull.

Trial-holes put down at various points in this ground came upon faint traces of bones and several vessels of earthenware.

Finally, as the result of considerable digging, an area 39 feet by 46 feet was determined, in which, seemingly, the burials had been made. This area was dug throughout by us at depths varying between 2 feet and more than 4 feet, according to the distance to which the graves extended.

Traces of human remains were met with in thirty-eight instances, but it was evident from the number of artifacts that lay apart from bones, that many burials had entirely disappeared. Rarely was a fragment of bone met with that did not crumble at the touch. Skulls were mere outlines in the soil, and all that remained of some burials were decaying crowns of teeth.

Burial No. 20, seemingly a bunched burial, in a pit, lay 4 feet 9 inches down, and consisted of traces of three skulls and of remains of long-bones which had been piled lengthwise one upon another.

Burial No. 4, traces of a skull, 3 feet from the surface, had with it three earthenware vessels and a large pipe of limestone or of phosphate rock (reacting to acid), fairly crumbling into bits, evidently a pipe of the effigy class; a small arrowhead of chert; and a small "celt" of a hard stone, which, in common with other "celts" found here, we have not cared to mutilate for a microscopic slide for exact determination, and as to which we do not wish to follow the usual custom and hazard a guess.

Burial No. 8, represented by remains of a skull, which probably belonged to some fragments of decaying bone a short distance from it, lay 22 inches from the surface. With the bones were a pipe of earthenware, a small "celt," and fifty-six arrowpoints of chert, all barbed and acutely pointed. Most of these arrowheads lay in a small heap, a few being scattered nearby. With the arrowheads were three pebbles; one pebble-hammer; and thirteen flakes of chert.

On one side of the skull belonging to this burial was a discoidal of limestone, 4 inches in diameter, with a few badly decayed shell beads upon it.

On the opposite side of the cranium was a pipe of limestone or of phosphate rock, which strikingly represents the head of an eagle, although, unfortunately, the distal, curved end of the beak has crumbled away (Figs. 104, 105). Height, 3.75 inches; maximum width, 3.1 inches; length, 4.5 inches.





FIG. 104.—Pipe of limestone. Sycamore Landing. (Full size.)



FIG. 105.—Pipe of limestone, other side. Sycamore Landing. (Full size.)



The decoration, now somewhat indistinct, is in higher relief on the left side of the head than it is on the right side, where the eye alone is in relief.

This decoration is shown diagrammatically as accurately as it is possible to do under the circumstances (Fig. 106).

The eye represented on this pipe may give a clue to some of the designs on the pottery from this region.

With the pipe was a "celt," 9 inches long, with neatly-made, rounded point opposite the cutting edge.



FIG. 106.—Pipe of limestone. Decoration. (About half size.)



FIG. 107.—Pipe of sandstone. Sycamore Landing. (Full size.)

In front of the skull was a pipe of earthenware, and an effigy-pipe of sandstone, 4.2 inches in height, 5.6 inches long, and 2.5 inches in maximum width.

The latter pipe, it is believed, was intended to represent a rabbit, judging from the ears, from the hare-lip, and from the general appearance of the figure (Figs. 107, 108).

On the left side of the pipe (Diagram, Fig. 109) the legs and decoration are represented in low relief. On the right side the legs are in higher relief, and in



FIG. 108.—Pipe of sandstone, other side. Sycamore Landing. (Full size.)



FIG. 109.—Pipe of sandstone. Decoration. (About half size.)



front of the legs is an incised cross of the four directions. This cross and similar emblems shown on other pipes from the Mississippi region call to mind the smoking ceremony described by Charlevoix, in which the smoke was blown first to the sky, then to the earth ("above" and "below"), and then around the horizon, or to the four quarters.

Burial No. 11, a few remnants of teeth, lay in a pit at a depth of 3 feet. With it was a large pipe of limestone or of phosphate rock, which evidently had been an effigy-pipe, but which, on removal, partly came to pieces and scaled to such an extent that its original shape was lost.

Burial No. 17, a mere trace of bone, 3.5 feet down, had with it a bowl of earthenware and a small cube of galena. This galena (lead sulphide) bears a coating of carbonate of lead. Lead carbonate is the white-lead of commerce. It was shown by us in the account of our work at the great pre-Columbian site at Moundville, Ala.,<sup>1</sup> that the white-lead paint found by us on ceremonial palettes of stone could readily have been made by the aborigines by scraping this carbonate deposit from masses of galena (such masses were found in the Moundville graves) and mixing the material with bear-grease.

Burial No. 22, traces of a skull and of teeth, had a small "celt" nearby, and two similar implements of medium size lay singly, apart from burials.

Apart from human remains, but evidently having belonged to a burial that had disappeared, were a bottle and a pipe, of earthenware, and a cube of galena in contact with the pipe, one side of which had been colored by the carbonate deposit on the lead sulphide.

Undoubtedly belonging to a burial that had disappeared through decay, there lay in a little heap fifty-four diminutive arrowpoints wrought from pebbles of chert.

Two discoidals of sandstone, rather roughly made, were found singly with earthenware vessels whose associated burials presumably had disappeared through decay.

Several small arrowpoints of chert lay with burials, and a plummet-shaped object of hematite, broken at the end where the means for attachment had been, was found apart from bones.

In all, eleven tobacco-pipes of earthenware came from this cemetery, many of which lay near human remains and all of which probably had accompanied such remains at one time. Seven of these pipes are shown in Figs. 110 to 116, inclusive. Three of the four pipes not included in the list resemble markedly some of those which are illustrated. The fourth pipe has had projecting at a right angle from the base of the bowl an appendage about an inch in diameter at its base, which was not with the pipe when found, and without which the pipe offers no feature of interest.

Professor Holmes<sup>2</sup> figures a number of pipes from Arkansas, which are similar in type to many found by us along Bayou Bartholomew.

<sup>1</sup> See "Certain Aboriginal Remains of the Black Warrior River," pp. 146, 147. *Journ. Acad. Nat. Sci., Phila.*, Vol. XIII.

<sup>2</sup> *Aboriginal Pottery of Eastern United States*, 20th Ann. Rep. Bur. Am. Ethn., Plate XXXIII.



FIG. 110.—Pipe of earthenware. Sycamore Landing. (Full size.)



FIG. 111.—Pipe of earthenware. Sycamore Landing. (Full size.)



FIG. 112.—Pipe of earthenware. Sycamore Landing. (Full size.)



FIG. 113.—Pipe of earthenware. Sycamore Landing. (Full size.)





FIG. 114.—Pipe of earthenware. Sycamore Landing. (Full size.)



FIG. 115.—Pipe of earthenware. Sycamore Landing. (Full size.)



FIG. 116.—Pipe of earthenware. Sycamore Landing. (Full size.)

Seventy-eight vessels of earthenware, lying singly, in twos, and threes, and in one case four together, came from this cemetery. In this last instance there were two bowls upright, one within the other, and two others on their sides, one within the other.

Many of the vessels of this place were apart from human remains when found, though unquestionably, in our opinion, they had been deposited with burials.

The pottery from this cemetery, as a rule, is inferior, is without shell-tempering, thick and unevenly fired. Many vessels were hardly more than pasty fragments when found, though, as there was little originality of form or decoration, the loss is not greatly to be regretted. This marked inferiority of ware is of especial interest in connection with this place, inasmuch as Sycamore Landing is in the immediate vicinity of Glendora Plantation and the Keno Place, where beautiful examples of pottery were found, and one might expect to meet with at least some similar specimens at Sycamore Landing.

A marked flattening of the base of vessels, a specialty of the region, was noticeable in this cemetery also.

Vessel No. 48, represented by parts only, is a bottle of coarse, yellow ware covered exteriorly with green pigment, the analysis of which is given in our introductory remarks on the pottery of this region.

Vessel No. 36, an undecorated bottle, has at one time rested on three supports which were missing when the vessel was found. There was no opening between the body of the bottle and the supports, as there sometimes is in vessels of this kind.



Vessel No. 7. A bowl of black ware (Fig. 117), bearing an incised decoration, rather roughly executed.

Vessel No. 66. A pot of brown ware, having flat base and bearing incised decoration composed mainly of a design of spirals, three times shown (Fig. 118).



FIG. 117.—Vessel No. 7. Sycamore Landing. (Diam. 8.2 inches.)



FIG. 118.—Vessel No. 66. Sycamore Landing. (Diam. 6.4 inches.)

#### CEMETERY ON THE KENO PLANTATION, MOREHOUSE PARISH, LA.

The Keno Place is one of a number of plantations stretching contiguously for miles along the bayou, all belonging to Mr. James G. Sandidge, of Bastrop, La., who has traveled extensively and who takes great interest in archaeological matters.

About one-quarter mile N. by W. from the landing at the Keno Place, in a cultivated field, was an indistinctly defined area hardly appreciably higher than the level of the surrounding field. This slight elevation, we were informed by Mr. Sandidge, had attracted his attention for some time, owing to the large fragments of pottery that had been plowed from it.

The soil of this area, much darker than that of the surrounding field, still had on the surface many fragments of pottery, besides numerous chert pebbles and bits of chert, a mass of fossil wood, a stone pitted on both sides and several sandstone hones.

Those employed on the plantation told of glass beads that had been uncovered by the plow at this place.

Trial-holes in various parts of this area came at once in places upon fragments of human bones and vessels of earthenware.

Next eleven trenches, beginning well out in the level ground and converging toward all parts of the elevation, were continued until an area 82 feet by 86 feet



was defined as seemingly that in which the human remains and pottery were included. This area, which proved to be somewhat greater than necessary on one side, was completely worked through by us, at depths depending on the varying thickness of the layer of dark, loamy clay, which rested upon untouched clay of lighter color, and upon the depth of various grave-pits which extended into undisturbed clay, the deepest of which was 3 feet.

The outer parts where grave-pits were less frequently found, though they were numerous even there, were dug through with spades, but the central portion of the area, 23 feet by 28 feet in extent, where the graves cut through each other and were present almost throughout, was gone through with the aid of trowels alone.

The condition of the human remains in this cemetery was such that not only no bones were saved, but practically all that were found could have been contained in a space considerably less than the size of a bucket and consisted almost exclusively of mere outlines of skulls, crumbling crowns of teeth, and occasional spongy fragments of long-bones.

These traces of human remains were encountered 255 times, from the surface, where they had been disturbed by the plow, down to the bottom of the deepest graves.

This enumeration by us is, of course, no exact indication of the number of individuals originally buried in the cemetery, as it is evident that fragments of bone belonging to the same skeleton, but at some distance apart, might be twice scored, or even more often. On the other hand, many burials unquestionably had disappeared.

It is needless to say that determination as to form of burial was almost impossible, though as many of the grave-pits were small and circular, presumably the bunched form of burial had been in excess of the flexed burial or the burial at length.

However, three burials certainly, and perhaps a fourth, had been of the extended variety. One of these extended burials offered features of interest.

Burial No. 178, the head directed toward the south, lay about 20 inches below the surface, on a substance seemingly bark, which rested on the undisturbed clay at the bottom of the grave. This substance, about an inch in maximum thickness, was from 10 to 11 inches in width.

At the right-hand side of the skeleton, in contact with part of it, was a circular staff or pole, of wood, badly decayed, 3 inches in diameter at the end nearer the head, and 2 inches in diameter near the lower end. The length of the pole was 5 feet 4 inches, when first noticed, but as the feet of the skeleton in question had been cut away by the digger, it is possible that part of the staff or pole also had been removed. No sign of metal was present with the wood, nor was there any trace of strips of hide bound around it. Shafts of spears of modern Indians sometimes were ornamented with hide cut in strips. It is a question, however, considering the condition of the bones in this cemetery, if strips of hide, had they originally been present, would have remained, even in part, to the period of the discovery of the wood. No lancehead was found in association.



At the left side of the skull was a mass of red pigment (iron oxide) and nine gracefully shaped arrowpoints of chert.

At the back of the skull, near the left shoulder, was a vessel of earthenware.

For some cause which we are unable to explain, the condition of the bones of the three extended burials was much better than that of the other bones found in this cemetery, though these burials at length appeared as skeletons only, while undisturbed, and crumbled into fragments on removal.

One other burial in this cemetery was of special interest.

Vessel No. 434, an undecorated bowl 11 inches in diameter, lay over a skull which it almost covered, 34 inches down, at the bottom of a grave. Above it in the pit were partly broken vessels which had been thrown aside when the excavation for the urn-burial was put down through the burial or burials with which these vessels had been.

The covering of the isolated skull by an inverted bowl as a form of burial was practised along the western coast of that part of Florida which belongs to the mainland. Urn-burial, we may say incidentally, was not in vogue in peninsular Florida.<sup>1</sup>

Evidently it had been the custom in this cemetery to place mortuary tributes practically with all interments of human remains, as objects were found with nearly all the burials, and when they were not present, their absence, we think, could be explained through aboriginal disturbance, or the likelihood that some artifact had been with a part of the burial now gone through decay, as many objects lay apart from human remains.

We shall now describe all artifacts found at the Keno Place, except earthenware vessels placed with burials having no other objects in association.

Burial No. 1, fragments of bone, had near it an earthenware tobacco-pipe.

Burial No. 3, remains of teeth. With these were an earthenware vessel; blue glass beads; remains of an ornament of sheet-copper or of sheet-brass, reduced almost to the consistency of paste, which had been wrapped in matting, a part of which remained.

Burial No. 11, fragments of skull having two vessels, one on each side, and a fragment of a sheet-brass ornament with matting on the outer side.

Burial No. 12, teeth, 33 inches down. Fragments of an elliptical ornament of sheet-brass or sheet-copper, corroded through and through. This ornament, which lay near three earthenware vessels, had matting on the outer surface, presumably part of the general wrapping of the burial, and woven fabric on the inner surface. The ornament had been suspended by strands of glass beads, which extended downward. The stringing material had disappeared.

Burial No. 20, teeth. Two vessels of earthenware; one pipe.

Burial No. 25, remains of a skull. A knife of chert, with rounded corners; a double-bladed chisel, perhaps of metamorphic rock, 3 inches in length; a vessel of earthenware.

<sup>1</sup> "Aboriginal Urn-burial in the United States," by Clarence B. Moore, *American Anthropologist*, Oct.-Dec., 1904.



Burial No. 31, teeth. Two earthenware vessels so placed that evidently they had been on each side of a skull; fragments of sheet-copper or sheet-brass, which also had been placed on opposite sides of the skull and presumably had been ear-plugs.

Burial No. 33, teeth. Six tubular beads of sheet-brass, badly corroded, each about two inches in length when found; a small elliptical ornament of sheet-copper; two earthenware vessels on one side of where the skull had been, and one vessel on the other side.

Burial No. 34, traces of bones. Three earthenware vessels; a bone implement much decayed; sixteen small flakes of chert.

Burial No. 37, teeth. Three vessels of earthenware; thirty-eight small flakes of chert; one pebble; one sandstone hone of the class which excites such lively interest in the explorer when first in contact with his trowel and such intense disgust when brought to the light of day.

Burial No. 42, fragments of bone. Three earthenware vessels; a ceremonial axe of sandstone, 7.75 inches in length, 4.1 inches across the cutting edge, and .6 of an inch in maximum thickness (Fig. 119). We consider this axe, which has a perforation to aid in attachment, to have belonged to the ceremonial class on account of the material of which it is made, as it is evident that sandstone with a sharp cutting edge, such as is present on this axe, could withstand but little rough usage.

We are indebted to Mr. C. C.

Willoughby for the information that there are several perforated axes and adzes in Peabody Museum, Harvard University, one of which, of lignite, from a St. Francis river, Arkansas, mound, Mr. Willoughby considers to have been ceremonial, owing to the non-resistant character of its material.



FIG. 119.—Ceremonial axe. Keno Place. (Length 7.8 inches.)



Burial No. 44, fragments of skull, bits of long-bones. Two earthenware vessels; glass beads.

Burial No. 46, fragments of bone. A "celt" of medium size, given to Mr. Sandidge, owner of Keno Plantation.

Burial No. 71, fragments of bone. Three vessels of earthenware and a "celt" 5.5 inches in length.

Burial No. 81, teeth. Four chert pebbles; two vessels of earthenware.

Burial No. 83, fragments of bone. Glass beads; the vessel of the "teapot" variety, coated with red pigment, referred to elsewhere in this account of the Keno cemetery.

Burial No. 90, teeth. Two vessels on one side of where the skull had been, one on the other side; one hundred and fourteen small chips of chert.

Burial No. 93, remains of a skull and part of a clavicle. Corroded brass on the remaining part of the clavicle which, no doubt, the copper salts had preserved.

Burial No. 94, parts of a skull. Two earthenware vessels; glass beads.

Burial No. 97, teeth. Glass beads; a small mass of galena.

Burial No. 99, bone fragments. A disk of brass, 8 inches in diameter, which fell into bits on removal.

Burial No. 104, teeth. One earthenware vessel; nine flakes of chert.

Burial No. 111, bone. One vessel; four flakes of chert.

Burial No. 118, parts of a skull. Four vessels; seventeen chips of chert.

Burial No. 132, parts of ribs. Disk of brass, 4.75 inches in diameter, lying upon the remaining parts of the bones.

Burial No. 145, parts of a skull. Two chisels wrought from chert pebbles, each about 3 inches in length.



FIG. 120.—Hatchet perforated for attachment. Keno Place. (Full size.)

Burial No. 150, parts of a skull. A chisel 1.5 inch in length; a hatchet of a hard rock, possibly metamorphic, about 4 inches in length, 2.5 inches in breadth, .7 of an inch in maximum thickness (Fig. 120). This hatchet, of a rare type, having



a perforation to aid in attachment to the handle, has on one side evidence that the hollow drill had twice been started without accomplishing its purpose, the third attempt, however, having been successful. On the opposite side is a longitudinal groove where an attempt to cut through the stone has been abandoned, owing, probably, to a wish, on second thought, to have the implement somewhat broader.

Burial No. 171, teeth. Three earthenware vessels; glass beads.

Burial No. 172, parts of a skull. Three earthenware vessels; the carapace of a tortoise.

Burial No. 174, parts of a skull. Three earthenware vessels; a pipe of earthenware.

Burial No. 177, teeth. Two vessels of earthenware; nine thin and beautifully wrought arrowheads of chert, some barbed and with serrated edges.

Burial No. 178 has been described (page 121).

Burial No. 179, parts of a skull. Three earthenware vessels; ten delicately wrought leaf-shaped implements of chert, ranging between 1.5 and 2 inches in length.

Burial No. 180, teeth. Four small chips of chert.

Burial No. 206, remains of a skull. One earthenware vessel; glass beads; remains of a brass ear-plug on each side of the head.

Burial No. 210, parts of a skull and fragments of other bones. One earthenware vessel; eighteen beautiful arrowheads of chert; an axe probably of sedimentary rock, 7.25 inches in length, 3.5 inches across the cutting edge (the maximum width of the axe), 2 inches across the opposite end, and 1 inch in maximum thickness. This axe is without perforation.

Burial No. 214, teeth. Two earthenware vessels; a brass ring; a few chips of chert.

Burial No. 215, teeth. Two earthenware vessels; a trace of brass or of copper.

Burial No. 218, teeth. Two leaf-shaped implements of cherty material, with serrated edges, one 8.25 inches in length and 2.3 inches in maximum width, the other 5.75 inches long and 2 inches in greatest breadth; a small chisel wrought from a chert pebble.

Burial No. 223, fragments of bone. An earthenware pipe; five shell beads; an object of chert, not specifically described in our field notes, probably a chisel.

Burial No. 224, teeth and fragments of bones of a child. A small bell, possibly a hawk-bell, of thin sheet-brass; an annular ornament 1.25 inch in diameter, of thick sheet-brass, made by bending over the sides of a strip of the material until they almost joined, thus forming nearly a circular section, and then bringing together the two ends to form a ring; one shell bead; charcoal.

Burial No. 229, fragments of bone. A remnant of a tool of iron or of steel.

Burial No. 233, the urn-burial, has been described elsewhere (page 122).

Burial No. 238, parts of a skull. Two earthenware vessels; a lump of hematite; five flakes of chert, and, a few inches distant, thirty-eight flakes of the same material.

Burial No. 239, parts of a skull. Twenty-seven graceful arrowheads of chert;



three flakes of chert; part of the incisor of a beaver. The arrowheads with this burial pointed in different directions, so it is evident they had not belonged to a bunch of arrows when buried; a few inches from the pile of arrowheads just described was another pile consisting of thirty-eight points, all of chert, the points also directed in different ways; a small mass of hematite, roughly spheroidal.

Burial No. 243, parts of a skull. Glass beads; two disks of brass, each 2.3 inches in diameter, one each side of the head. These disks are without perforation.



FIG. 121.—Brass disk with human hair attached.  
Keno Place. (Full size.)

On one side of one disk are tufts of black hair, preserved by the copper salts, which, so far as Dr. Aleš Hrdlička, and Doctor Miller of the Division of Mammals, United States National Museum, can determine, is human hair (Fig. 121).

Burial No. 246, fragments of bone. A perforated ceremonial axe of limonite, much deteriorated, of the type known as "hoe-shaped," having in places a deposit of hematite, dimensions 7.25 inches by 5.25 inches; one vessel of earthenware.

Burial No. 250, teeth. Glass beads; a pebble of chert.

Burial No. 252, fragments of a skull. Double-pointed spike of iron or of steel, 8.75 inches in length; one shell bead.

Burial No. 253, part of a skull. Two earthenware vessels; a mass of red pigment (oxide of iron).

Burial No. 255, teeth. One earthenware vessel, glass beads.

Apart from human remains (omitting vessels of earthenware not found associated with artifacts of other kinds) there came from the Keno Place cemetery:

Glass beads, one from the surface.

Two handsome leaf-shaped implements of cherty material; one, 7.5 inches in length by 2.7 inches wide; the other, 6.7 inches long and 1.4 inch in width; also one of the same material 2.7 inches long by .75 inch wide.

A "spade-shaped" ceremonial axe, probably of metamorphic rock, 6 inches long by 4.75 inches in maximum width, approximately, with perforation irregularly drilled.

Five "celts," the majority of sedimentary rock, the largest about 6 inches in length.

An elliptical ornament of shell.

A mass a red pigment (iron oxide).

Fragments of corroded sheet-copper or sheet-brass.

One chisel made from a chert pebble.

A pendant of hematite (Fig. 122).

A deposit consisting of twelve small chisels wrought from pebbles of chert;

two beautifully barbed arrowpoints also of chert; a fragment of another arrow-head; two small "celts" seemingly of sedimentary rock.

In all, some with burials, some not associated with human remains (though doubtless, as we have said, all objects from this cemetery had at one time been with burials), eleven pipes of earthenware, some broken, came from the Keno Place, six of which are shown in Figs. 123 to 128, inclusive.



FIG. 122.—Pendant of hematite. Keno Place. (Full size.)



FIG. 123.—Pipe of earthenware. Keno Place. (Full size.)



FIG. 124.—Pipe of earthenware. Keno Place. (Full size.)





FIG. 125.—Pipe of earthenware. Keno Place.  
(Full size.)



FIG. 126.—Pipe of earthenware. Keno Place. (Full size.)



FIG. 127.—Pipe of earthenware. Keno Place. (Full size.)



FIG. 128.—Pipe of earthenware. Keno Place. (Full size.)

Four hundred and eighty-five pottery vessels were found by us in the cemetery at the Keno Plantation. By this we do not mean that this number of vessels were saved—far from it—but that at least the number of vessels given by us had been placed in the cemetery by the aborigines. How many others had been plowed away before our coming or what number had been crushed by aboriginal disturbance into fragments too small for us to recognize as having constituted entire vessels, we are unable to say.

Our enumeration includes all whole vessels, and all broken ones provided sufficient of the vessel was found to indicate its entirety at the time of interment. Great numbers of those regarded as vessels, however, were not in a condition to save, being simply crumbling remains of parts of undecorated vessels of commonplace form; while others included in the enumeration were simply large fragments of undesirable pottery which had been mutilated by the plow.

The condition of the vessels in this cemetery was as a rule deplorable. Mostly of inferior ware, as a rule lacking sufficient tempering to make it durable, and often imperfectly fired, the pottery, after long soaking in water, often crushed into bits or so softened that it fell apart on removal, or in places clung bodily to the surrounding clay (showing the soil to be more tenacious than the ware), was in an almost hopeless state even without superadded conditions for evil. But in addition to all this was the fact that owing to the almost complete absence of bones in the cemetery, we were rarely able to come upon a burial and to follow it up with the trowel, as our custom is (and thus in a fair percentage of cases to come gently upon accompanying pottery), but often reached vessels first with the spade, and in a manner we do not approve.

Furthermore, the tenacity of the clay prevented thorough sifting and consequent recovery of all parts of broken vessels.

So far as could be determined, the vessels in this cemetery had been placed near the head, singly, in pairs, three together, or occasionally in groups of four, sometimes all on one side of the skull, sometimes separated by it. Once a vessel had been placed on top of a skull, its base resting on the bone; and to one side of the cranium was a vessel inverted over another.

Other methods of arrangement of mortuary accompaniments, practised by the aborigines who used the cemetery at the Keno Place, are as follows:

A single vessel standing upright.

Two or three upright vessels together.

One or two upright with one inverted alongside.

One upright, one on its edge, and one inverted.

One or two upright with another on its side.

A vessel standing on its base with two others on their sides.

A single vessel inverted, or sometimes an inverted pair, side by side.

An upright vessel covered with a large fragment of pottery.

An upright vessel having another inverted over it or over part of it, sometimes fitting closely.



The same arrangement with the addition of an upright vessel alongside.

An upright vessel with another turned over it, both covered with a large fragment of another vessel.

Two upright vessels each with another vessel inverted over it.

Three upright vessels, one of them surmounted by another vessel inverted.

An upright vessel protected by two others, each inverted at an angle to bring the upper edges in contact.

One vessel having another inverted over it. With these a vessel on its side with another so tilted that the aperture of the vessel on its side was closed by the base of the other vessel.

A vessel standing vertically, having its opening closed by the base of an upright vessel; alongside of these a vessel standing vertically.

The same arrangement except that the last named upright vessel had another turned over it.

Two or three upright vessels, one within the other.

Two upright vessels, one within the other, with an upright vessel alongside.

Two upright vessels, one within the other, both covered with an inverted vessel.

Two upright vessels, one containing a small inverted vessel, and covered with a large fragment of another vessel.

Three upright vessels together, one containing another upright vessel, and covered with a fragment of pottery.

A vessel on its side, containing another one.

In sixteen instances fragments of musselshells lay within vessels, singly except on two occasions when two shells were present together. Once a musselshell rested on the rim of a vessel. These shells were too badly broken for identification, except in two cases, when each proved to be *Lampsilis purpuratus*.

On several occasions the carapace of the tortoise lay within vessels, one shell being so small that presumably it had served as a spoon, like a musselshell, and not in place of an earthenware vessel, as was usually the case in the Ouachita valley region.

Nearly all vessels of earthenware from the cemetery on the Keno Place were of moderate size. In some groups, found with bones of children, all the vessels were diminutive.

Though, as we have said, the conditions for the recovery of the pottery at the Keno Place were unfavorable, a number of vessels of ware superior to the average were recovered in fragments, and these fragments were subsequently carefully cemented together, and restoration made when necessary and unquestionable. These vessels, together with a few found whole and many large fragments of pottery, show that the proportion of earthenware bearing decoration was greater than that in many cemeteries of the Ouachita region, though in most cases the decoration was very simple and crudely executed. One could wish also that the aboriginal artists had to a less extent confined their endeavor to the scroll and to combinations of the scroll.



Vessels from the Keno Plantation possess several features worthy of note. The length of neck of a number of the bottles is unusual; some of the bottles have a swelling of the neck similar to that of many bottles from Glendora. The flat base characteristic of the pottery of the Ouachita region was not so markedly present at the Keno Place as it was in some other localities.

The presence of a vessel of the "teapot" variety, coated with red pigment, in the Keno Place cemetery, is interesting. But one other vessel of this type was found by us in our season's work. It came from Glendora, as stated in the account of the cemetery there, and bears lined decoration on black ware. We have said in our report on the antiquities of the Arkansas river that vessels of this type are found only in eastern Arkansas and nearby regions, in which latter territory the Keno Place and Glendora are included.

Although, as we have said, vessels of an inferior class predominated in the cemetery at the Keno Place, there were a number of notable exceptions, both as to shape and as to decoration, and these, with some other vessels from the place, less noteworthy but illustrative of the pottery of the region, will now be particularly described.

Vessel No. 430. A bottle of brown ware (Fig. 129), with flat base and swelling neck, and well executed decoration of trailed lines, forming combinations of the scroll.



FIG. 129.—Vessel No. 430. Keno Place. (Height 4.9 inches.)



Vessel No. 310. Another bottle of the type just described (Fig. 130). This bottle, with several others from the Keno Place, is of the same type as many from the cemetery on the Glendora Plantation on the Ouachita river, only about four miles distant.



FIG. 130.—Vessel No. 310. Keno Place. (Height 7.1 inches.)

Vessel No. 474. A bottle of inferior ware, but otherwise resembling some of the bottles from the Glendora cemetery. Part of the neck, after breakage in aboriginal times, has been carefully smoothed to allow continued service for the vessel (Fig. 131).



FIG. 131.—Vessel No. 474. Keno Place. (Diam. 5.5 inches.)

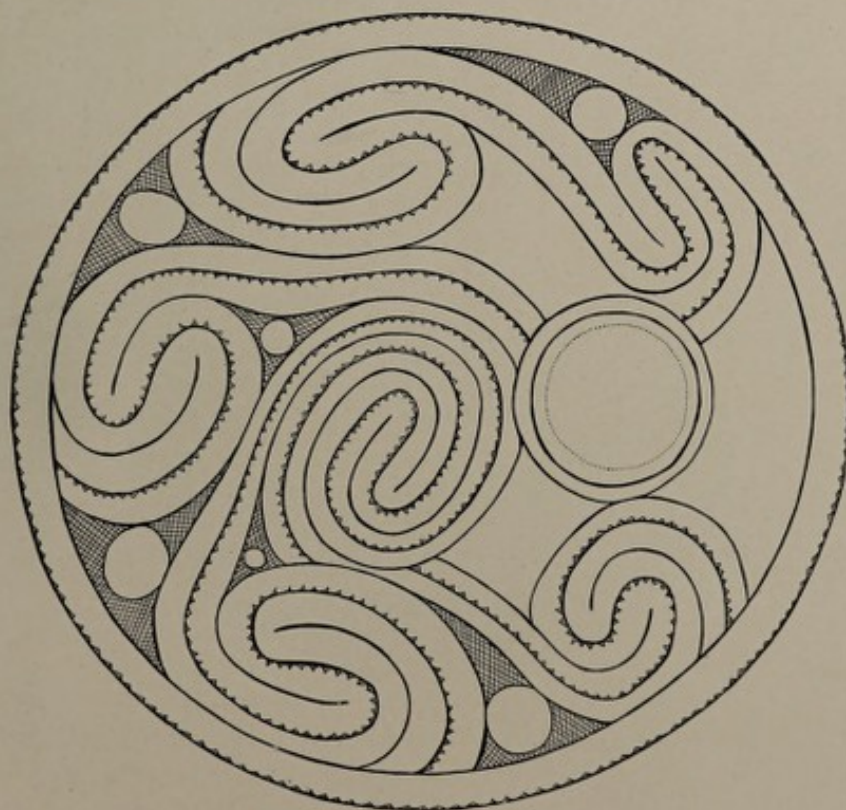


FIG. 132.—Vessel No. 449. Decoration. (About two-thirds size.)



Vessel No. 449. This interesting effigy-bottle, with four legs, a tail, and a neck in place of an animal head (Plate VII), in some respects resembles a vessel from Arkansas figured by Holmes,<sup>1</sup> though the decoration of the Arkansas vessel is confined to the use of red and of white pigment. The bottle from the Keno Place, on the other hand, while covered with beautiful red pigment exteriorly and within the neck, has, in addition, over the outer, upper surface of the body, an incised design consisting of a combination of scrolls and disks in cross-hatch fields, shown in diagram in Fig. 132.



FIG. 133.—Vessel No. 370. Keno Place. (Height 12.6 inches.)

<sup>1</sup> "Aboriginal Pottery of Eastern United States," 20th Ann. Rep. Bur. Am. Ethn., Pl. XLII b.



ANTIQUITIES OF THE OUACHITA VALLEY.  
KENO PLACE, VESSEL NO. 449. (FULL SIZE.)





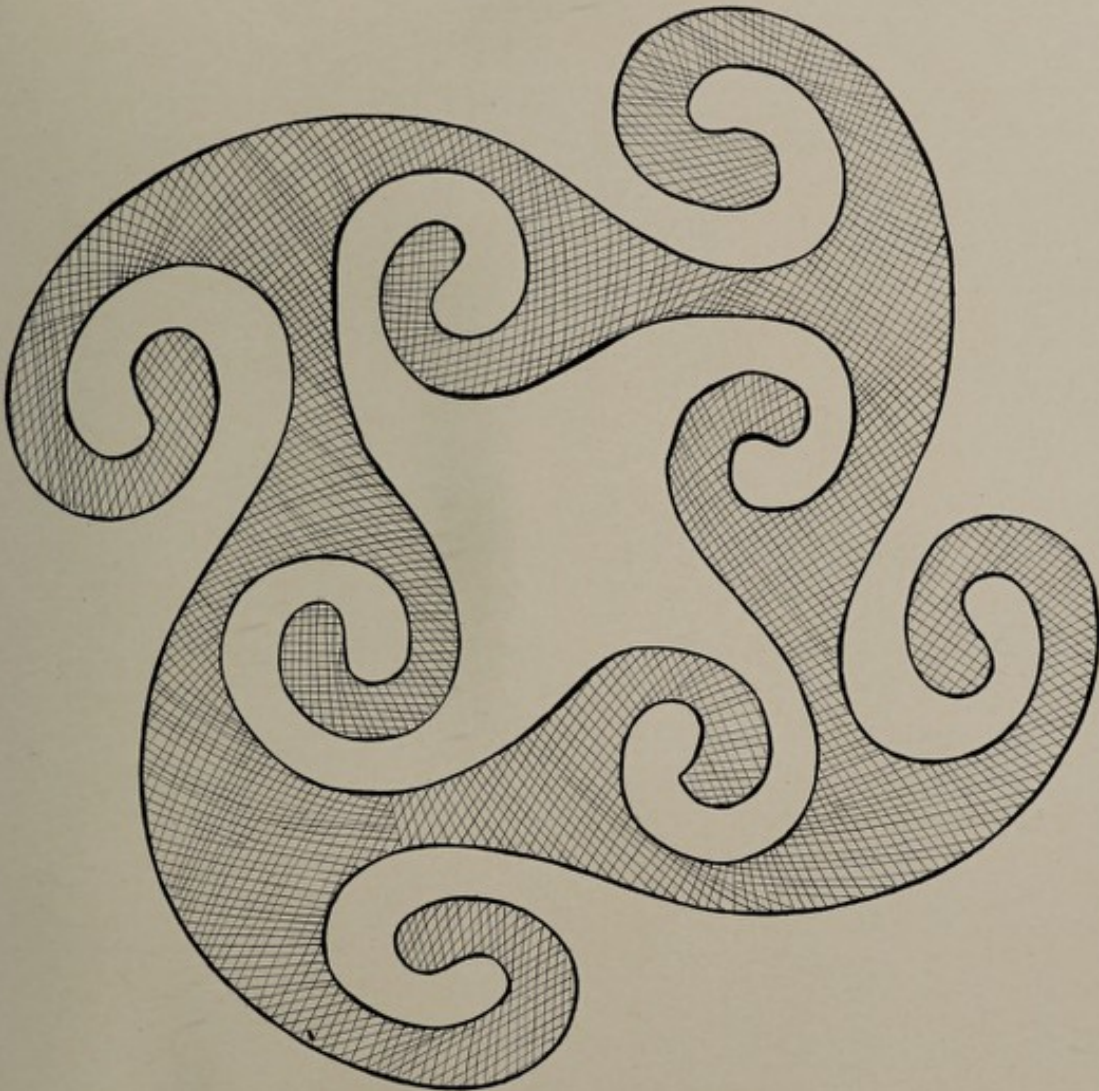


FIG. 134.—Vessel No. 370. Decoration. (About two-thirds size.)

Vessel No. 370. We have spoken of bottles from the Keno Place resembling others from the Glendora cemetery. In Fig. 133 is shown a bottle widely divergent from any found at Glendora, inasmuch as no bottles were met with there having other than short necks, while the neck of this bottle is unusually long, being 8.2 inches out of 12.6 inches, the entire height of the bottle. This bottle, of porous, yellow ware, bears an incised decoration, shown in diagram in Fig. 134, consisting of a scroll arrangement having the effect of a double swastika. The base of this vessel is slightly flattened.





FIG. 135.—Vessel No. 422. Keno Place. (Height 12.25 inches.)

Vessel No. 422. Another bottle, similar to that just described, the neck being 8 inches of the 12.25 inches of the total height of the bottle (Fig. 135). There is a slight flattening of the base. The decoration consists in the main of four series of incised, concentric circles.



FIG. 136.—Vessel No. 427. Keno Place. (Height 7.2 inches.)

Vessel No. 427. A bottle of unusual and interesting form, having a barrel-shaped body and a short, swelling neck indicating the compound shape, the neck representing a cup which has been superimposed (Fig. 136). The decoration consists of a series of meanders. The ware is yellow and not of the best quality.





FIG. 137.—Vessel No. 118. Keno Place.  
(Full size.)



FIG. 138.—Vessel No. 174. Keno Place.  
(Height 8 inches.)

Vessel No. 118. A diminutive bottle of coarse, yellow ware, with a rudely executed scroll decoration (Fig. 137).

Vessel No. 174. A bottle of yellow ware (Fig. 138), having an incised design, five times shown, consisting of two concentric circles in cross-hatch between crescentic figures also in cross-hatch, each series of crescentic figures, above and below, forming a five-pointed star.

Vessel No. 254. A bottle of dark ware, compressed vertically as to the body, to form an equatorial angle. The neck, slightly flaring at first, then contracting, ends in a horizontal lip. The decoration, present on the upper portion of the body, consists of the usual scroll (Fig. 139).

Vessel No. 169. A bottle of common, yellow, porous ware, probably a compound form, with flat base and a fairly-long neck (Fig. 140). The decoration, rudely executed on the middle and upper parts of the body, is made up of mushroom-like figures, erect and inverted alternately, partly surrounded by cross-hatch bands.

Vessel No. 136. The body of a bottle, of brown ware, with an evenly executed scroll decoration (Fig. 141).

Vessel No. 23. A bottle of soft, yellow ware, 4.2 inches in height, having on the body two scrolls of red pigment, and two of white pigment, the red and the white scrolls partly interlocking. The neck is coated with red pigment. This little vessel may well be an importation from the Arkansas river region, where bottles with just such decoration are so abundant.



FIG. 139.—Vessel No. 254. Keno Place.  
(Height 10.5 inches.)



FIG. 140.—Vessel No. 169. Keno Place.  
(Height 10.8 inches.)



FIG. 141.—Vessel No. 136. Keno Place. (Diam. 4.25 inches.)





FIG. 142.—Vessel No. 359. Keno Place. (Diam. 7.3 inches.)

Vessel No. 359. A bowl of polished black ware, bearing an incised decoration shown in Fig. 142.



FIG. 143.—Vessel No. 471. Keno Place. (Height 7.4 inches.)



FIG. 144.—Vessel No. 358. Keno Place. (Height 7 inches.)

Vessel No. 471. A vase, probably unique, of compound form, representing a short-necked bottle imposed upon a vessel of eccentric shape, having a series of four projecting lobes, above and below (Fig. 143). The ware is most inferior. The decoration, faintly and rudely executed, consists partly of the scroll and partly of parallel lines and punctate markings.

Vessel No. 358. A bottle of inferior, light-brown ware, with tripod support, somewhat similar to a bottle found by us in the Glendora cemetery. The legs, which are hollow, communicate with the body of the vessel by means of series of small perforations at the points of union, as in the case of the Glendora bottle. The decoration, coarsely executed, consists of the usual disks and scrolls (Fig. 144).





FIG. 145.—Vessel No. 426. Keno Place. (Diam. 8 inches.)

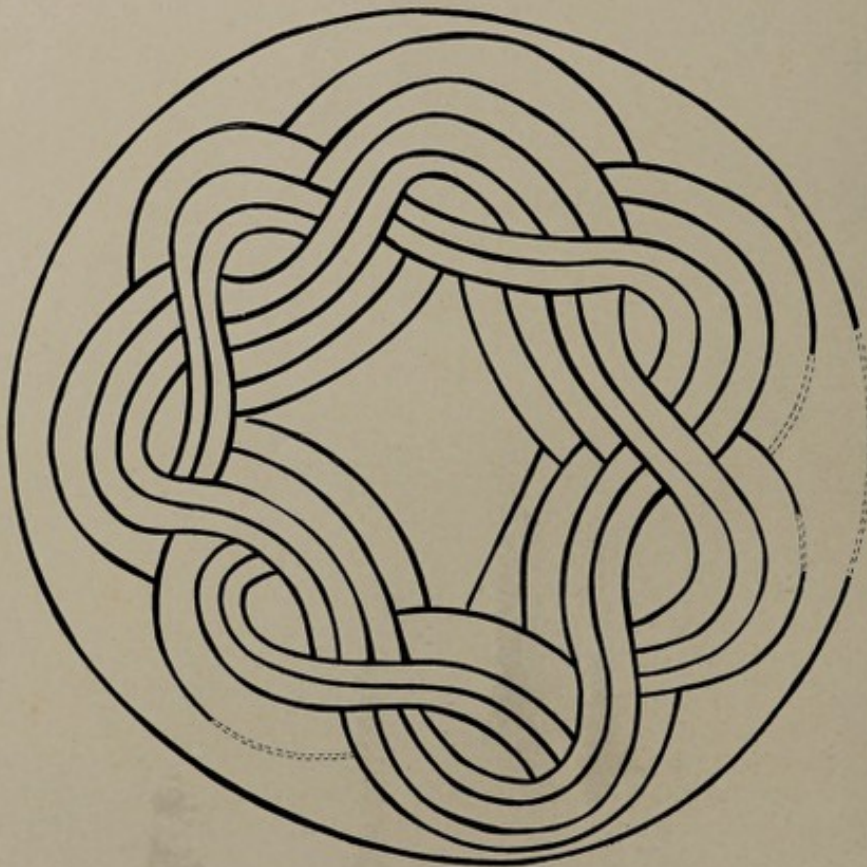


FIG. 146.—Vessel No. 426. Decoration. (About half size.)







ANTIQUITIES OF THE OUACHITA VALLEY.  
KENO PLACE, VESSEL NO. 383. (FULL SIZE.)

Vessel No. 426. A bowl of yellow ware (Fig. 145), with a handsome, traile meander-combination shown in diagram in Fig. 146.

Vessel No. 383. A bottle of good, black ware, ovoid body with flattened base and slight swelling of the neck (Plate VIII). The body of the bottle bears a decoration dividing it exteriorly into four equal parts by a like number of series of three lines each, running vertically. Two opposite series consist of unbroken, parallel lines. The median line of the other two series parts somewhat above the middle of the body, while the including lines extend outward at the same place. All these lines, incised, have at one time contained brilliant red pigment, which still remains in places. In our representation of this bottle the color is shown with slight restoration in the places whence it has disappeared through lapse of time.

Vessel No. 365. A short-necked bottle of soft, yellow ware, 5.2 inches in height, coated over the exterior with red pigment. This bottle resembles in every way many found along the Arkansas river.

Vessel No. 431. A bowl of porous, yellow ware, 6.3 inches in diameter, which has been decorated throughout the interior with crimson pigment, much of which still remains. Beginning at the rim an encircling band of similar pigment extends downward on the outside a distance of 1.75 inch. On two opposite sides of the aperture are projections through which holes for suspension have been made vertically.

Vessel No. 415. A bowl similar to Vessel No. 431, with the exception that the parts devoted to suspension are absent.

Vessel No. 428. A bottle of porous, brown ware, 5.2 inches in height, with a faint incised design four times shown (Diagram, Fig. 147).

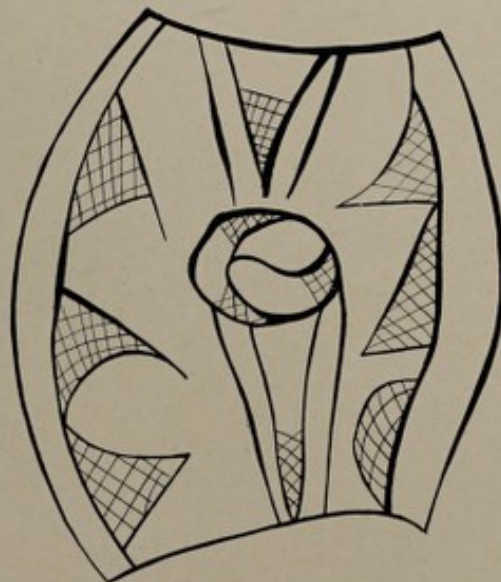


FIG. 147.—Vessel No. 428. Decoration. (About two-thirds size.)



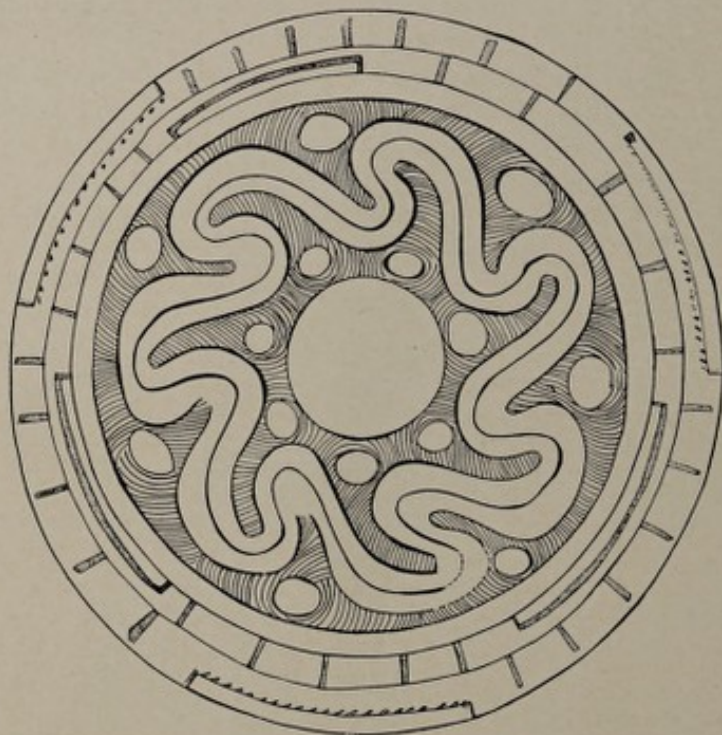


FIG. 148.—Vessel No. 172. Decoration. (About half size.)



FIG. 149.—Vessel No. 175. Keno Place. (Diam. 5.75 inches.)

Vessel No. 172. A bowl about 5.5 inches in diameter, decorated with red pigment inside and out, now worn away in places, has, in addition, handsome incised decoration, mainly the current scroll and disks, in a lined field, shown in diagram in Fig. 148.

Vessel No. 175. A bowl of well-smoothed black ware (Fig. 149), having below the opening an incised decoration consisting mainly of the scroll. A faint trace of red pigment is perceptible in places in the lines.

Vessel No. 198. A vessel of the "teapot" variety, 5.6 inches in height, coated on the outside with red pigment. This "teapot," and one from the Glendora cemetery, as we have said, are the only examples of the type found by us along the Ouachita valley.

Vessel No. 341. A circular platter 6.25 inches in diameter, of yellow ware, decorated interiorly below the margin with two incised, encircling lines. Over the entire exterior is an incised swastika similar to that shown in Fig. 151, save that no cross-hatched lines are present in the design.

Vessel No. 435. A beautiful bowl of fine, polished, black ware and of graceful form (Fig. 150), bears on the outside an interesting combination of the scroll, the lines of which have been accentuated with red pigment.

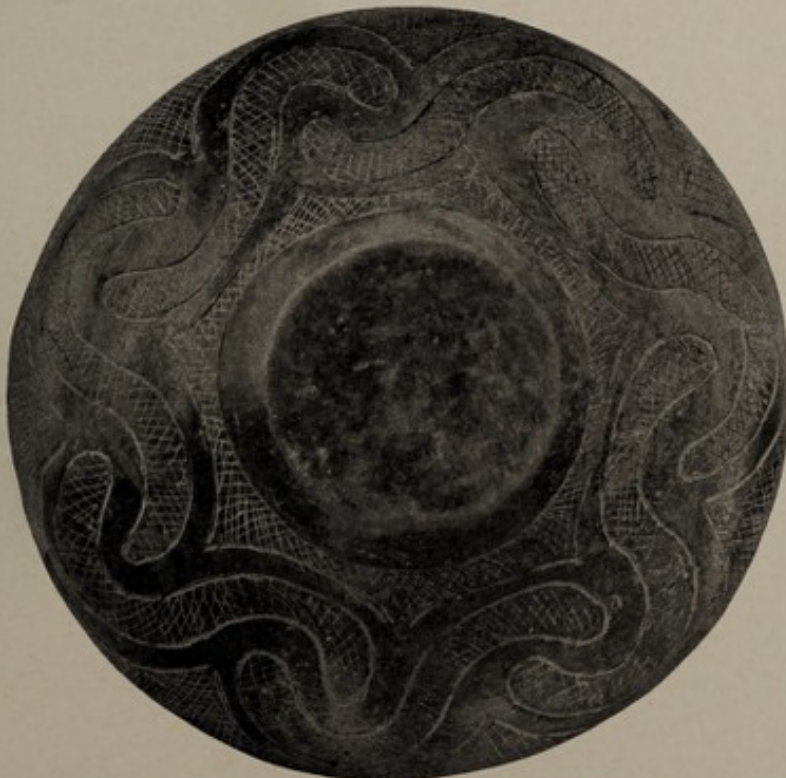


FIG. 150.—Vessel No. 435. Keno Place. (Diam. 5.5 inches.)



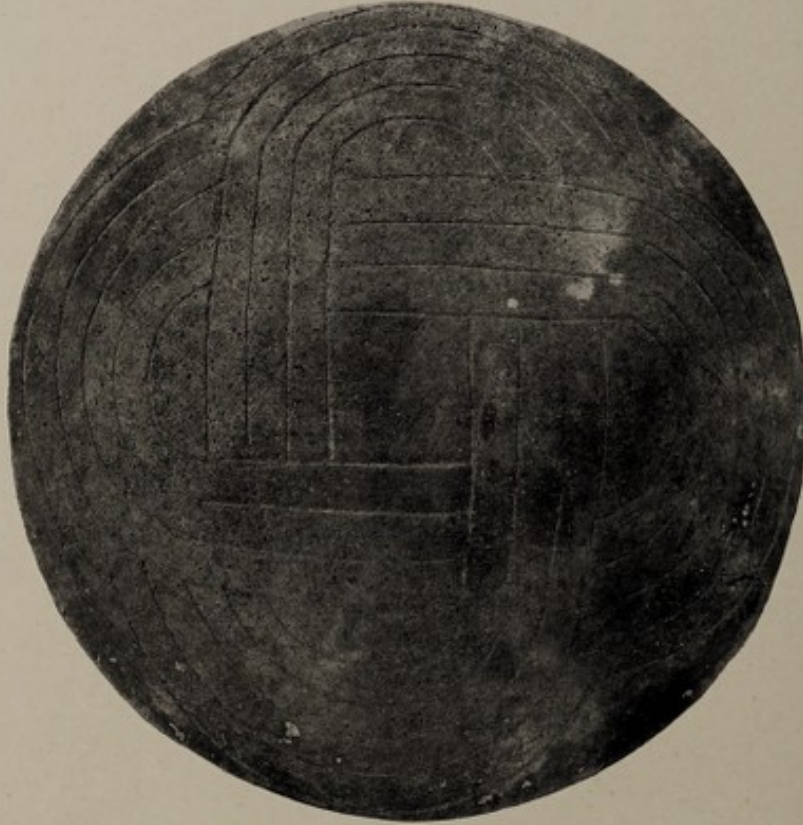


FIG. 151.—Vessel No. 446. Keno Place. (Diam. 7.8 inches.)

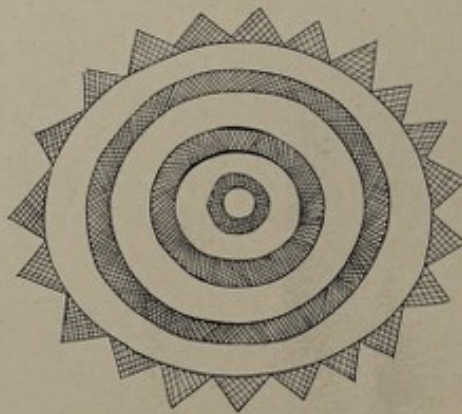


FIG. 152.—Vessel No. 271. Decoration. (About half size.)

Vessel No. 446. A flat bowl of light-brown ware (Fig. 151), bearing exteriorly as decoration a variety of the swastika, partly shown in cross-hatched lines.

Vessel No. 271. A bottle of common, yellow ware, from which most of the neck is missing. The decoration is made up of four similar designs—concentric circles, probably sun-symbols. On the outer circle are dentate markings, possibly crests of the plumed serpent. One of these designs is shown in diagram in Fig. 152.

Vessel No. 479. A vessel 5.9 inches in diameter, with hemispherical body, flattened base, and a short neck, slightly flaring. A coating of red pigment over the exterior of the vessel and on the interior of the neck has largely disappeared. In addition to the pigment, there has been incised decoration exteriorly on the body and on the neck, consisting of the usual disks and scrolls, much of which has disappeared through disintegration. On two opposite sides of the vessel are four holes for suspension.



FIG. 153.—Vessel No. 252. Keno Place. (Diam. 5.1 inches.)

Vessel No. 252. A vessel, much resembling a bottle in form, of porous, yellow ware, bearing incised designs of two patterns, each four times shown, possibly conventional representations of the eye (Fig. 153).





FIG. 154.—Vessel No. 91. Keno Place. (Diam. 6.25 inches.)



FIG. 155.—Vessel No. 421. Keno Place. (Diam. 5.25 inches.)

Vessel No. 91. A vessel of porous, yellow ware, with flat base, and a trailed design three times shown, perhaps representations of a pair of eyes from an aboriginal point of view (Fig. 154).

Vessel No. 421. A vessel resembling a short-necked bottle in form, of coarse, yellow ware, having as decoration on the body, three incised spirals with notched markings, perhaps originally intended to represent attributes of the winged serpent. Around the short, contracting neck are four incised, encircling lines (Fig. 155).



FIG. 156.—Vessel No. 371. Kenó Place. (Diam. 6.7 inches.)

Vessel No. 371. A vase of rather soft, yellow ware, with flat base, having as decoration six neatly-made designs, each consisting of a spiral combination filled in with cross-hatch lines (Fig. 156).

Vessel No. 444. A bowl of coarse, yellow ware, 8.25 inches in diameter, having on one side the effigy of an animal head, perhaps that of a dog, looking inward. The opposite side of the bowl, where a conventional tail probably was, is missing. On the body of the bowl is a rude, lined decoration.





FIG. 157.—Vessel No. 48. Keno Place.  
(Height 4.6 inches.)



FIG. 158.—Vessel No. 437. Keno Place.  
(Diam. 2.1 inches.)



FIG. 159.—Vessel No. 373. Keno Place.  
(Full size.)

Vessel No. 48. An ovoid vessel of inferior, yellow clay, with flat base surrounded by incised lines, between which and similar lines at the apex are three meander designs. There are two holes for suspension (Fig. 157).

Vessel No. 437. This vessel, of soft, yellow ware, with flat base, possibly represents a gourd, though the presence of a double stem is hard to explain (Fig. 158).

Vessel No. 373. This curious little object of unusual form is unlike anything found by us elsewhere in the Ouachita valley (Fig. 159).

The Keno Plantation is but four miles in a straight line from Glendora on Ouachita river. Both these places were important sites; both contained European artifacts; they had, as might be expected, interesting points in common, but, on the other hand, they showed divergent features.

We find in the two cemeteries mortuary deposits of pottery, arranged in great diversity of grouping, and tributes of ornaments of brass and of glass beads, placed



with the dead. The earthenware from both cemeteries has points of resemblance in style of decoration, though artistic workmanship and design greatly predominated at Glendora. A swelling of the neck is common to a number of bottles from both cemeteries.

On the other hand, vessels with markedly long necks, which are so conspicuous a feature of the pottery of the Keno Plantation, were not found at Glendora. In the Keno cemetery were numerous tobacco-pipes; Glendora furnished but one. From the Keno Place came large deposits of exquisitely shaped arrowpoints; but two projectile points, both coarsely made, were found at Glendora. At the Keno Place were types of axes not present at the Glendora cemetery.

#### CEMETERY ON THE WARD PLACE, MOREHOUSE PARISH, LA.

The plantation known as the Ward Place is about two miles in a NE. direction from Wardville. This plantation has been divided in recent times, Mr. T. L. Day owning the southernmost portion, on which he resides.

In the northeastern corner of the cultivated field on Mr. Day's place, in full view from the road and in sight from the bayou, was a slight rise in the ground where the soil was darker than that of the rest of the field. On this rise were strewn various indications of aboriginal occupancy.

Trial-holes almost immediately came upon human remains, and with the aid of considerable digging, an irregular area about 50 feet by 55 feet was found to contain burials. It is possible that other burials lie in the neighborhood, but, if so, they are widely scattered and probably would not repay the extensive digging necessary to find them.

The area to which reference has been made was completely dug through by us, and was found to contain thirty-one burials, none at a greater depth than 2.5 feet, and most of them considerably nearer the surface.

The slight elevation in which the burials lay was composed of dark soil formed by continued occupancy. Below this dark soil was tough red clay. The burials had been placed at various depths in this clay, and the distance at which they were from the surface, of course, depended on the depth they had been let into the clay and on the thickness of that part of the elevation under which they happened to be.

As the presence of human remains at this place was unsuspected previous to our visit, and as the bones lay below reach of the plow, the burials found by us were practically intact, and consisted of thirty skeletons extended on the back, and one aboriginal disturbance.

Of the full-length burials Number 6 had the right foot crossed above the left ankle, and Number 17 had the right forearm flexed, the hand resting on the shoulder, near the skull.

All the extended burials had the heads in a southerly direction (between SE. by S. and SSW.) many due S. The burials lay about parallel to the bayou.

It was evident that the skeletons, all of which belonged to adults, with the exception of three adolescents and two children, had been placed in the ground



when denuded of flesh, as bones were often out of place and small bones, in some instances, were missing.

Apart from burials were found several knives and arrowheads, of chert and a neatly-made piercing implement of bone, round in cross section, about 4 inches in length.

We shall now describe in detail all objects found with burials at this place.

Burial No. 1—a small earthenware vessel near the skull.

Burial No. 2—a vessel, also small, at the right wrist.

Burial No. 3—a small pot, with holes for suspension, at the head; five tines from deer-antler, about one foot from the head, one having a groove around the proximal end, another smoothed exteriorly and hollowed so as to serve as an arrowpoint.<sup>1</sup>

Burial No. 4—an earthenware vessel at the head; near the shoulder a small, ellipsoidal mass of hematite, highly polished, but without groove or perforation; the carapace of a tortoise.

Burial No. 5—two vessels at the left shoulder, one of which had charcoal beneath it; at the right elbow, a musselshell somewhat broken, with a circular perforation for the insertion of a handle.

Burial No. 6—two vessels of earthenware near the skull, one a bowl inverted and covering part of the opening of the other vessel, a pot.

Burial No. 7—a small vessel near the head; a tine of deer-antler, worked at both ends; two musselshells (*Lampsilis anodontoïdes*) near the shoulder and thorax, having each a perforation for suspension near the hinge.

Burial No. 9—a small pot above the right knee.

Burial No. 10—a small pot at the head; two piercing implements of bone at the outer side of the right humerus; a small musselshell (*Quadrula heros dombeyana*) over the left elbow, the shell having a circular perforation for use as a hoe.

Burial No. 11, a child—a pot near the skull.

Burial No. 12—an earthenware vessel near the left shoulder.

Burial No. 13—a pot near the skull; the carapace of a tortoise at the right shoulder; beneath the right humerus, a musselshell hoe.

Burial No. 14—an earthenware vessel at the side of the left knee; at the shin, a rude disk of sedimentary rock, 2.25 inches in diameter.

Burial No. 15—three vessels together, about one foot from the skull.

Burial No. 16—at the left shoulder and head, a heterogeneous collection as follows: one barbed arrowpoint of chert, with the point missing; one chert knife; twelve pebbles and parts of pebbles of chert; one implement of bone with rounded point; eight tines of deer-antler, some cut squarely across at the proximal end; a number of bones belonging to male raccoons, unworked with the exception of three, which have the proximal ends cut off and the other ends carefully worked to sharp points. An implement similar to those in question, except that the proximal end remains on the bone, was lately figured by Mr. Robert F. Gilder,<sup>2</sup> as having been found in eastern Nebraska. Mr. Gilder describes the implement as a fish-hook.

<sup>1</sup> As to antler-points shot into human beings see Anthropological Papers, American Museum of Natural History, Vol. III. "The Lenapé Indians of Staten Island"; by Alanson Skinner, p. 15, Pl. III.

<sup>2</sup> "American Anthropologist," Jan.-March, 1909, plate I-2-fig. a.



In Fig. 160 we show the implements found by us, and one of the unworked raccoon-bones. It will be noted that the angle of the worked bones is hardly such as to hold a fish unless with some added part.

We are indebted to Mr. William C. Mills, M.Sc., whose archæological work in Ohio is so well known, for the information that he considers bones of the kind in question belonging to the raccoon and to the bear, when sharpened at the end, to have been used as awls; and that he obtained at the Baum village-site upward of 125 of these implements, and more than half as many of the same kind at the Gartner village-site.



FIG. 160.—Raccoon bone, and awls made from similar bones. Ward Place. (Full size.)

Burial No. 17—three vessels near the skull.

Burial No. 19—a musselshell hoe and a rude pot of earthenware, near the skull.

Burial No. 20—at the cranium, a shell hoe (*Quadrula heros dombeyana*), better preserved than some.

Burial No. 21—a bowl near the head.

Burial No. 22—a vessel at each side of the head; with these a shell containing a black substance determined by Dr. H. F. Keller as follows: "A mixture of finely divided carbon and carbonate of lime and contains also smaller amounts of phosphate of lime. The

carbon appears very black and lustrous under the microscope, while the carbonate is present partly in pearly scales and partly in an earthy form. It seems probable that the material is the charred remains of bones."

Burial No. 23—a pot near the skull.

Burial No. 24—spread out in a layer beneath the skull, which rested upon them, was a miscellaneous collection as follows: twenty-two tines of deer-antler, squarely cut off at the proximal ends; two arrowpoints of chert, one having lost a barb; three flat masses of sandstone, probably hones; eleven implements of bone, some with rounded points, all with articular parts remaining; ten pebbles of chert; nine flakes of the same material.

Burial No. 25, a young child—at the head, a pot.

Burial No. 26—at the right side of the skull, a pot having its opening covered with the carapace of a tortoise, the concave side uppermost; four small chisels made from chert pebbles, each about 2.5 inches in length, three with highly polished cutting edges.

Burial No. 27—at the left shoulder, a pot so carefully covered with a large fragment of another vessel that no soil had entered.



Burial No. 30—at the left shoulder, a bowl inverted over a pot in which was the carapace of a tortoise.

Burial No. 31—at the right wrist, a musselshell hoe; at the right upper-arm, a large fragment from an earthenware vessel, covering about two-thirds of the thorax. Under this fragment was a highly polished chert pebble and a small amount of charred material. At the right of the skull was an inverted bowl.

Thirty-one vessels of earthenware were found in the cemetery at the Ward Place, the number accidentally coinciding with that of the burials.

The pottery from this place is, with one or two exceptions, shell-tempered. The form usually approximates that of the pot; some vessels with globular or semi-globular bodies, having upright or flaring rims, were encountered. Curiously enough the bottle was not found in this cemetery, if we except a globular vessel which seemingly had been the body of a bottle, but which, having lost the neck, had the margin of the fracture carefully smoothed.

No pigment was found on any vessel, and decoration, when attempted, almost invariably consisted of some combination of the scroll, rudely incised.

A few vessels from this place will be described in detail.



FIG. 161.—Vessel No. 13. Ward Place. (Diam. 6.3 inches.)

Vessel No. 13. This vessel, of hard, yellow ware and of rather interesting shape (Fig. 161), is not completely made plain in the illustration as the upper part of the body extends downward somewhat after the manner of a mushroom. The decoration, incised, consists of a meander surrounding disks above and below, alternately. Faint cross-hatch work has been attempted on part of this decoration.

Vessel No. 3. A bowl of fairly hard, brown ware, with flat base (Fig. 162), having as decoration below the rim, on the outside, six symbols, perhaps representing the eye, one of which, owing to lack of space, is but partly shown. The remainder of the exterior is occupied by a combination of scrolls, the upper ones being filled in with punctate markings, as shown diagrammatically in Fig. 163.



FIG. 162.—Vessel No. 3. Ward Place. (Diam. 6.4 inches.)



FIG. 163.—Vessel No. 3. Decoration. (Almost half size.)



Vessel No. 4. A vessel of yellow ware (Fig. 164), bearing a decoration akin to a considerable number of others found by us in the Ouachita valley region, which we believe may represent the eye. This decoration is shown in diagram in Fig. 165.



FIG. 164.—Vessel No. 4. Ward Place. (Diam. 5 inches.)

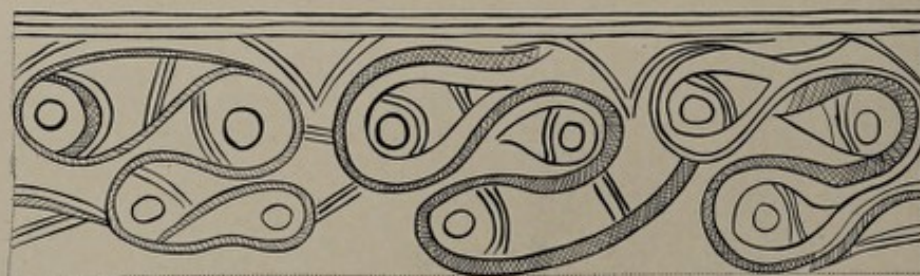


FIG. 165.—Vessel No. 4. Decoration. (About one-third size.)

To the north of the field belonging to Mr. Day is another that formed part of the Ward Plantation at one time, but is now the property of Mr. J. Weinstein, of Bastrop, La. The soil in this field is extremely rich in places, and was so thickly covered with aboriginal debris and artifacts that a collection of more than 80 arrow-points, lanceheads, and knives, all of chert, was made by our party in a comparatively short time.



Many of the points are barbed and are of considerable elegance of form; indeed, over the whole Ouachita valley beautiful projectile points are abundant. Among the points from that region are many of the type described by Mr. Fowke<sup>1</sup> as stemmed, chipped flints, with but one barb, and given by him as coming, among other places, from southwestern Arkansas and Catahoula Parish, La.

The Weinstein Plantation was carefully dug over without finding trace of a cemetery.

CEMETERY NEAR SEVEN PINES LANDING, MOREHOUSE PARISH, LA.

At Seven Pines Landing, otherwise known as Miller Landing, two plantations, are divided by the highroad, that of Mrs. T. O. Leavel, of Brodnax, La., being the northernmore.

On a part of the plantation, fallow at the time of our visit, was much evidence of aboriginal occupancy, and at one place, about one-quarter mile NE. from the landing, which seemed slightly higher than the surrounding field, were many small fragments of human bone.

Trial-holes at once came upon burials, and after much digging of additional holes and converging trenches, an irregular area, 33 feet by 42 feet in extent, was defined as that in which the burials lay. This ground, largely clay in places and having admixture of sand in others, was completely dug through by us, following the line of undisturbed clay beneath.

Human remains, just under the surface at times, were encountered at various depths, the deepest being found in a pit whose bottom was about 3 feet from the surface.

The bones were in such condition, having at times but slightly more consistency than moistened sawdust possesses, that the form of burial was hard to determine. Skulls were found singly or in pairs without long-bones in association, in some cases, while in other instances bones were unaccompanied by skulls. On four occasions burials at length were indicated, and one regular bunched burial was encountered, made up of long-bones which had been piled parallel one with another. No cranium was present with this burial.

One of the full-length burials lay at a depth of slightly less than three feet. Later, a circular pit for a bunched burial had been put down, and this pit had encroached upon part of the earlier grave so that the combination of the two had the appearance of a pot-shaped hole with a trough extending from it—the latter part being what remained of the grave of the earlier, or full-length burial.

The bunched burial in this combination consisted of three skulls: one, badly crushed, at the bottom of the pit; one just above it, inverted but having the lower jaw below it, and partly surrounded by three femurs placed diagonally and by fragments of other bones; the third skull lay at some distance from the others.

No other burials were determined, though altogether bones were encountered in forty-two places. No skeletal remains were saved.

<sup>1</sup> "Stone Art," Thirteenth Ann. Rep. Bur. Am. Ethn., fig. 218, p. 156.





FIG. 166.—Ornament of claystone. Seven Pines Landing. (Full size.)



FIG. 167.—Pipe of earthenware. Seven Pines Landing. (Full size.)



FIG. 168.—Pipe of earthenware. Seven Pines Landing. (Full size.)



FIG. 169.—Pipe of earthenware. Seven Pines Landing. (Full size.)



FIG. 170.—Pipe of earthenware. Seven Pines Landing. (Full size.)

Exclusive of pottery, but little in the way of artifacts was present with burials.

With fragments of bone was a chisel 3 inches in length, neatly chipped from a chert pebble, having an edge beautifully ground. Two earthenware vessels lay with this burial.

With another burial was a chisel of a fairly hard, fine grained stone, 3.5 inches in length.

Burial No. 34, an extended skeleton, had two vessels at the head; an earthenware pipe at the left of the pelvis; an ornament (Fig. 166), probably of claystone, having a part extending horizontally at one end, and a decoration consisting of three faint, parallel, encircling lines at the opposite extremity. This ornament, badly broken when found, has since been cemented together.

Four pipes of earthenware came from this cemetery, three certainly associated with burials and the fourth probably having been with human remains at one time. All are shown in Figs. 167 to 170, inclusive.

The vessels of earthenware from this place, thirty-nine in all, lay with burials in most instances, and when they did not, their position was presumably a result of disturbance or was owing to bones formerly with them having disappeared through decay. Their position was usually near the skull, sometimes singly, never more than two together. Several were inverted; in one was the carapace of a tortoise, in fragments. Hardly a vessel was recovered entire, and the great majority not only were crushed into fragments, but also were so disintegrated that they were impossible to preserve. The ware, shell-tempered in most cases, had been insufficiently kneaded, so that the distribution of the tempering material was uneven, and later, presumably, the paste had been insufficiently fired.

Many of the vessels were without decoration, while the ornamentation of others was unambitious in design and rude in execution.

The following vessels are the most noteworthy from this place:

Vessel No. 21, a bottle of dark ware and having a flat base (a characteristic of nearly all the vessels from this place), undecorated, is 11.5 inches in height. The neck, converging somewhat toward the opening, is 6 inches in length.

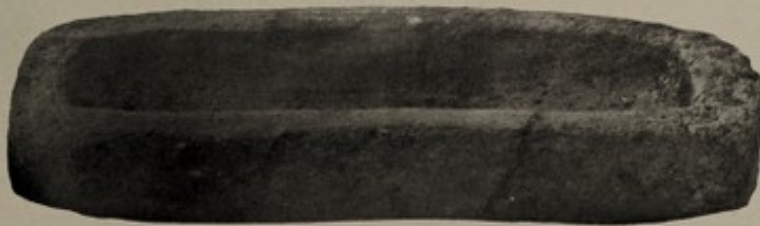


FIG. 171.—Vessel No. 20. Seven Pines Landing. (Length 6.6 inches.)

Vessel No. 20. A trough-shaped vessel of thick, porous, yellow ware, shown in Fig. 171.





FIG. 172.—Vessel No. 15. Seven Pines Landing. (Height 4.5 inches.)



FIG. 173.—Vessel No. 14. Seven Pines Landing. (Diam. 5.6 inches.)

Vessel No. 15. A pot of inferior, dark ware, with flat base, having on the upper part of the body an incised, intertwining meander, and around the neck, bands of chevrons, also incised (Fig. 172).

Vessel No. 30. A pot almost the counterpart of the foregoing with the exception that the one in question somewhat exceeds the other in size.

Vessel No. 14. This vessel, of inferior, yellow ware (Fig. 173), has an incised decoration similar to that on several vessels figured as coming from the Ward Place and elsewhere in the Ouachita valley, and which we shall consider to represent the eye, until something better is suggested.

Several other places on Mrs. Leavel's plantation, which, judging by debris on the surface, were likely to prove places of burial, were carefully dug into by us but without success.

About 1.5 mile, following the road from Seven Pines Landing, is the farm of Mr. T. E. Hudson, who resides nearby.

A field about ten acres in extent, forming part of the property of Mr. Hudson, was acquired by him some years ago from Mr. V. N. Brodnax, living near Brodnax, La.

This field, long under cultivation, has been celebrated for years for its yield of plummet-shaped pendants of hematite, a number having been found by Mr. Brodnax, and at least a dozen by Mr. Hudson, according to his statement—all having been turned up by the plow. There is no history of the finding of human bones on the site, though a cemetery may have been there in the past, the bones having been destroyed through cultivation, the hematite pendants remaining.

One of these pendants, received from Mr. Hudson by Mr. S. J. Harrell, of whom we shall have occasion to speak again in connection with exploration on his property, kindly was presented to us by Mr. Harrell. The specimen, neatly made, 3.5 inches in length, has a countersunk perforation at one end. Another pendant of the same sort was obtained by us from the son



FIG. 174.—Pendants of hematite. Brodnax.  
(Full size.)

of Mr. Hudson. These pendants are shown in Fig. 174.

Much digging in this field was without positive result.

#### CEMETERY NEAR BRAY LANDING, MOREHOUSE PARISH, LA.

In a cultivated field forming part of the extensive plantation of Mr. S. J. Harrell, who resides near Mound Landing, and of whom mention has just been made, is a hardly perceptible elevation about one-half mile SSE. from Bray Landing.



Mr. Harrell, who had visited us while we were working at a neighboring plantation and had become acquainted with our methods, heard from employes on his plantation of the finding of bits of bone and of pottery on the elevation to which reference has been made.

Assisted by a friend, Mr. Harrell caused to be dug in this place an excavation about 6 feet by 8 feet in extent, finding numerous skeletal remains, including eight skulls which crumbled upon removal. With these skulls were several pots in small fragments, and a vessel, oblate-spheroidal in shape, having as decoration, incised interlocked scrolls made with a tool causing somewhat the effect of cord-marking. This vessel Mr. Harrell generously offered us, and, in addition, a small "celt" found with some of the bones.

Having ascertained, with the aid of many trial-holes, the area in which human remains were to be found, a circular space about 46 feet in diameter was surrounded by our men and completely dug through, the digging being carried on through sandy clay darkened with organic matter, to a depth where undisturbed yellow clay was encountered. At times this undisturbed clay was but 18 inches down, but occasionally pits from 2 to 3 feet in depth were encountered.

The area excavated included slightly more than the aborigines had devoted to purposes of burial and, of course, surrounded that part of the elevation already dug by Mr. Harrell.

The condition of the bones in this cemetery varied considerably, most of them being badly decayed, while a few were fairly well preserved. Many of the bones, especially the skulls, in addition to the ravages of decay, had suffered through breakage.

The majority of bones in the mound were not in any particular connection, but were scattered throughout, skulls being found with a few bones lying near them and often on them, hence the breakage. Other skeletal remains often lay alone or in small aggregations apart from any skull. Presumably these bones were not held together by ligaments at the time of burial and hence were interred in no particular order, for though some of the bones in this cemetery had been disturbed through cultivation, and some had been scattered by aboriginal disturbance, yet many were found at too great depth for the plow to have reached, and no disturbing graves extended below them.

The bunched burial, or rather the symmetrical bunched burial, where long-bones were piled lengthwise, had not been attempted.

Owing to the bad condition of most of the bones and to the disarrangement to which reference has been made, it was impossible to take exact account of the various burials. However, seventeen burials were exactly noted, all of adults, with two exceptions—but these were a small proportion of the interments present in the mound.

Of the fifteen adult burials, thirteen lay at full length on the back and two were extended, face down.

The heads of all the adult burials were in a southerly direction with the exception of three, which pointed ENE.



At the bottom of a pit in the central part of the cemetery lay Burial No. 16 (the skeleton of a male, we are informed by Dr. Hrdlička), extended on the back. The state of preservation of the bones of this skeleton was excellent, which is the more remarkable considering the condition of many of the bones in this cemetery. The left radius was somewhat out of place. All the bones of the right hand and some of the bones of the left hand were missing.

Near the skull were many fragments of charcoal and some bits of burnt shell and of calcined bones, which latter have been determined probably to be not human, but to belong to the deer.

A tobacco-pipe lay at the left side of the jaw of this skeleton. At the left shoulder was a bottle; and over the right hip, a bowl. Both the earthenware utensils and the pipe were in an excellent state of preservation, as were the bones of a skeleton lying in the same pit with Burial No. 16, but somewhat above it.

In the soil in this cemetery, sometimes near burials, were pebbles, pebble-hammers, and a small arrowpoint of chert.

A scale of the alligator-gar, probably used as an arrowhead, lay near human remains.

Usually with burials, and often in contact with the skull (though in several instances their exact position was not noted, owing to their falling in masses of soil), were eleven pipes of earthenware, eight of which are shown in Figs. 175 to 182, inclusive.

One of these pipes has two perforations; of the four orifices two are in front of the base on which the bowl rests and one on each side. These perforations have no connection with the hollow part through which the smoke passed, but undoubtedly were used to attach ornaments of some sort to the pipe.

Another of the pipes in this lot has the bowl and the portion intended to receive the stem resting upon a thin platform projecting on all sides. The part of this platform which projects beyond the opening for the stem is a restoration which was made because a corresponding part of the platform extends beyond the bowl.

There were found in this cemetery twenty-six vessels of earthenware, of which only two were intact. We came upon also a number of parts of vessels that had been broken and scattered by disturbance, recent or aboriginal. The vessels were all associated with human remains, and in every case but two, were in proximity to crania.

The vessels, as a rule, were found singly, and never exceeded two with a single burial. The ware of these vessels, some of which had shell-tempering while some were without it, was, as a rule, inferior and readily acted upon by the dampness of the ground in which they lay. Many were disintegrated beyond repair.

In form the vessels had flaring necks as a rule, and without exception, we believe, had flattened bases. A single bottle was found. No pigment had been used on the vessels, and when decoration was present it was, as a rule, incised and of uneven execution, the designs being the scroll, concentric circles, and commonplace arrangements of parallel, straight lines.





FIG. 175.—Pipe of earthenware. Bray Landing. (Full size.)



FIG. 176.—Pipe of earthenware. Bray Landing. (Full size.)



FIG. 177.—Pipe of earthenware. Bray Landing. (Full size.)



FIG. 178.—Pipe of earthenware. Bray Landing. (Full size.)



FIG. 179.—Pipe of earthenware. Bray Landing. (Full size.)



FIG. 180.—Pipe of earthenware. Bray Landing. (Full size.)



FIG. 181.—Pipe of earthenware. Bray Landing. (Full size.)



FIG. 182.—Pipe of earthenware. Bray Landing. (Full size.)





FIG. 183.—Vessel No. 25. Bray Landing. (Height 5.25 inches.)

Vessel No. 13. A hemispherical vessel of porous, yellow ware, having a flat base, and a circular aperture about one inch in diameter, near which is an incised circle with a diameter of .25 of an inch. This vessel represents a gourd, the circle showing where a stem is supposed to have been detached.

Vessel No. 11. A vessel of coarse, yellow ware, 2.7 inches in height, much resembling a gourd-form and similar to one from the cemetery on the Keno Plantation, with the exception that the vessel under description is covered with a rude, lined decoration and has had a base of some kind, now missing.

Vessel No. 25. A bottle of gray ware (Fig. 183), with flat base, rather roughly decorated with encircling, alternate ridges and depressions, similar, though inferior, to a vessel from Missouri, figured by Dr. Evers.<sup>1</sup>

#### MOUND AND CEMETERY ON THE MOUND PLACE, MOREHOUSE PARISH, LA.

In a large cultivated field, in sight from Mound Landing, on property of Mr. J. Howard Michie of Mer Rouge, La., is a mound 22 feet in height, evidently domiciliary.

The mound, about 140 feet square, at the base, has a summit-plateau 50 feet square, approximately.

<sup>1</sup> "Archæology of Missouri," Pl. III, Fig. 210.



The sides of the mound, two of which are parallel with the bayou, do not face the cardinal points nor are the corners of the mound directed toward them.

Eleven trial-holes in the summit-plateau yielded neither bone nor artifact.

About 75 yards east of this mound is a small pool of water which, no doubt, marks the site of an excavation made at the time of the building of the mound.

In sight, in a northerly direction from the mound, is a ridge ending in an eminence about 7 feet in height, which evidently has been greatly spread by continued cultivation. Thickly scattered over this ridge were fragments of pottery (including parts of several earthenware pipes), seventeen small arrowheads of chert, chert chips and other debris. A considerable number of trial-holes in this ridge were without return.

Much digging was done by us in other parts of the field surrounding the mound, but without success except in one instance. Immediately beside the fence which separates the field from the highroad, about 100 yards N. by W. from the principal mound, was the remainder of a dwelling-site that had been mainly cut away by the road. The part which remained had been so greatly spread by long-continued cultivation that it was but little above the level of the field.

Trial-holes at this place came at once upon burials and pottery, and the small, irregular area adjoining the fence was then completely dug out.

Much disarrangement was apparent in burials found near the surface, and many skeletons, no doubt, had been entirely plowed away. Of fragmentary remains no account is taken in our enumeration.

Thirteen skeletons were found, all of adults, all extended on the back, the heads directed toward various points. In addition, there were two layers of bones, and a bunched burial formed from the skeleton of one individual. The layers contained respectively fourteen and sixteen crania. In the larger number are included four skulls not immediately placed with the rest, but lying somewhat above them in the same pit.

Also were found singly several skulls unconnected with other parts of the skeleton, and with two or three of these skulls were earthenware vessels. Some of the crania were at a depth too great to have been disturbed by cultivation. Possibly the position of these skulls was the result of aboriginal disturbance.

All burials, seemingly had been made in pits, the deepest of which was 46 inches.

The condition of the bones was such that none was preserved with the exception of part of a cranium.

Burial No. 11, an extended skeleton, had, at the skull, a collection of objects more numerous than interesting, as follows: twenty pebbles; one bit of earthenware; three flakes of chert; a flat mass of sandstone; a small, flat fragment of sedimentary rock, apparently; a small, oblong mass of petrified wood.

An arrowhead or knife, of chert, lay apart from human remains.

With the burials were fourteen vessels of earthenware, all in fragments, with two or three exceptions. The vessels, as a rule, lay near skulls, though one was



at the right knee of a skeleton and one at the upper part of a left femur. In another instance two vessels with a skeleton lay one at the right shoulder and one at the right knee.

The ware, with one exception, is without shell-tempering; and no decoration in color is present save in a single instance.

At this place, except in one case, there was little departure from the commonplace, in either form or decoration of earthenware vessels.

Certain of these vessels will now be particularly described.

Vessel No. 1, the body of a bottle from which the neck has been removed through contact with a plow. The ware is coarse and unevenly fired. The base is flat. The decoration consists of a five-pointed star, rudely modeled in relief, having a diameter of about 6.5 inches.

Vessel No. 7. A bottle of gray ware, having a flat base and a most unusual shape of body—possibly a compound form (Fig. 184). The decoration consists of series of curved trailed lines above the spaces in the lower part of the body.



FIG. 184.—Vessel No. 7. Mound Place. (Height 8.4 inches.)

Vessel No. 3, a pot 7.2 inches in diameter, badly broken. The decoration, incised with a tool but having somewhat the effect of cord-marking, consists of vertical, parallel lines below the neck, under which are series of eight concentric, festooned lines and figures of triangular outline, each made up of parallel, horizontal lines, decreasing in length toward the apex.

In a field adjacent to the one in which were the mound and cemetery we have described, a number of trial-holes were put down, resulting in the finding of one skeleton at full length on the back, the head directed NE. The skull, in good condition, was sent to the National Museum.

#### CEMETERY AT LINN GROVE LANDING, MOREHOUSE PARISH, LA.

In a cultivated field at Linn Grove Landing, near the road which borders the bayou, on property of Mr. N. H. Huff, living nearby, are many evidences of aboriginal occupancy. A number of trial-holes put down at this place yielded nothing. It was apparent that much of the dark soil in which burials might be found had disappeared through cultivation and wash of rain, and we were assured by Mr. Huff that in the past many human bones had been plowed up at this place.

Immediately outside a fence enclosing that part of the field where the cemetery is said to have been was a small space covered with grass, between the fence and the highroad. Here we found one extended skeleton and a number of human bones considerably scattered.

#### MOUND NEAR LINN GROVE LANDING, MOREHOUSE PARISH, LA.

Following the road leading out from Linn Grove Landing, about 1.5 mile, one comes to a mound in full view from the road, on property of Mr. A. K. Watt, who resides on his plantation nearby.

This mound, about 8 feet in height and 65 feet across its circular base, built largely of clay, had been greatly dug into previous to our visit. Considerable digging by us in such space as remained, and careful examination of parts where previous work had been done, yielded no indication that the mound had been used for burial purposes.

#### MOUNDS NEAR WILMOT, ASHLEY COUNTY, ARK.

Two mounds of medium size, evidently domiciliary, one said to contain modern burials, and both apparently much dug away previous to our visit, one near Wilmot, the other on the river bank somewhat above, were not investigated by us.

#### MOUND AT NOBLE LANDING, ASHLEY COUNTY, ARK.

Between the highroad and the bayou, in full view from the water, at Noble Landing, on property of Mr. T. A. Barnes, who lives on the place, is a mound 4.5 feet in height and 42 feet across its circular base. This mound, mainly of clay, was dug out centrally by us, and, in addition, was trenched from the margin inward without encountering bone or artifact.



## MOUNDS ON THE CARLOCK PLACE, ASHLEY COUNTY, ARK.

On the roadside which borders the bayou is a symmetrical mound on the Carlock Place, 12.5 feet high and 90 feet across its somewhat irregularly-circular base. As this mound had been used as a cemetery in recent times, the owner, Mr. T. A. Jackson, of Hamburg, Ark., preferred that it be not disturbed. Mr. Jackson, however, placed at our disposal all the level ground of the plantation, on which was an extensive dwelling-site thickly strewn with bits of musselshell, fragments of pottery, and other debris.

A large number of trial-holes, sunk in all parts of this site, showed the superficial, loamy soil to be without burials at the present time.

In the field, in view from the road, is a small mound of clay, which also contains modern burials.

## MOUND ON THE SHERRER PLACE, ASHLEY COUNTY, ARK.

The Sherrer Place, belonging to Dr. F. M. Sherrer, of Portland, Ark., is about two miles in a straight line WSW. from Portland, but on the opposite side of the river.

Behind the dwelling, which is on the road bordering the bayou, are the remains of a low mound of clayey sand, over which cultivation has been carried on for many years. In addition to the plowing, which has reduced the mound almost to the general level, the mound has been largely dug into in the past.

Ten trial-holes, which were greatly extended later so as to take in almost the entire mound, were put down by us. In a number of places bones, including five or six skulls, were encountered, some fragmentary through decay, some through recent disturbance. With these bones were no artifacts.

Apart from human remains was a small bowl with a flat base, coarsely made and without decoration, which fell into fragments on removal.

## MOUND NEAR PORTLAND, ASHLEY COUNTY, ARK.

About one-half mile from Alligator Point on the bayou, whence one can reach the town of Portland by following the road one mile approximately, is a mound in a field, in sight from the point.

This mound, small and evidently belonging to the domiciliary class, judging from its shape, had been dug into centrally to a considerable extent before the time of our visit, by a seeker after treasure, it was said. The mound, which is made of raw, yellow clay, was not investigated by us, some reluctance having been shown by the owner to grant us permission to dig, and but little pains having been taken by us to induce him to do so after we had inspected the mound.

REPORT

ON AN

Additional Collection of Skeletal Remains,  
from Arkansas and Louisiana

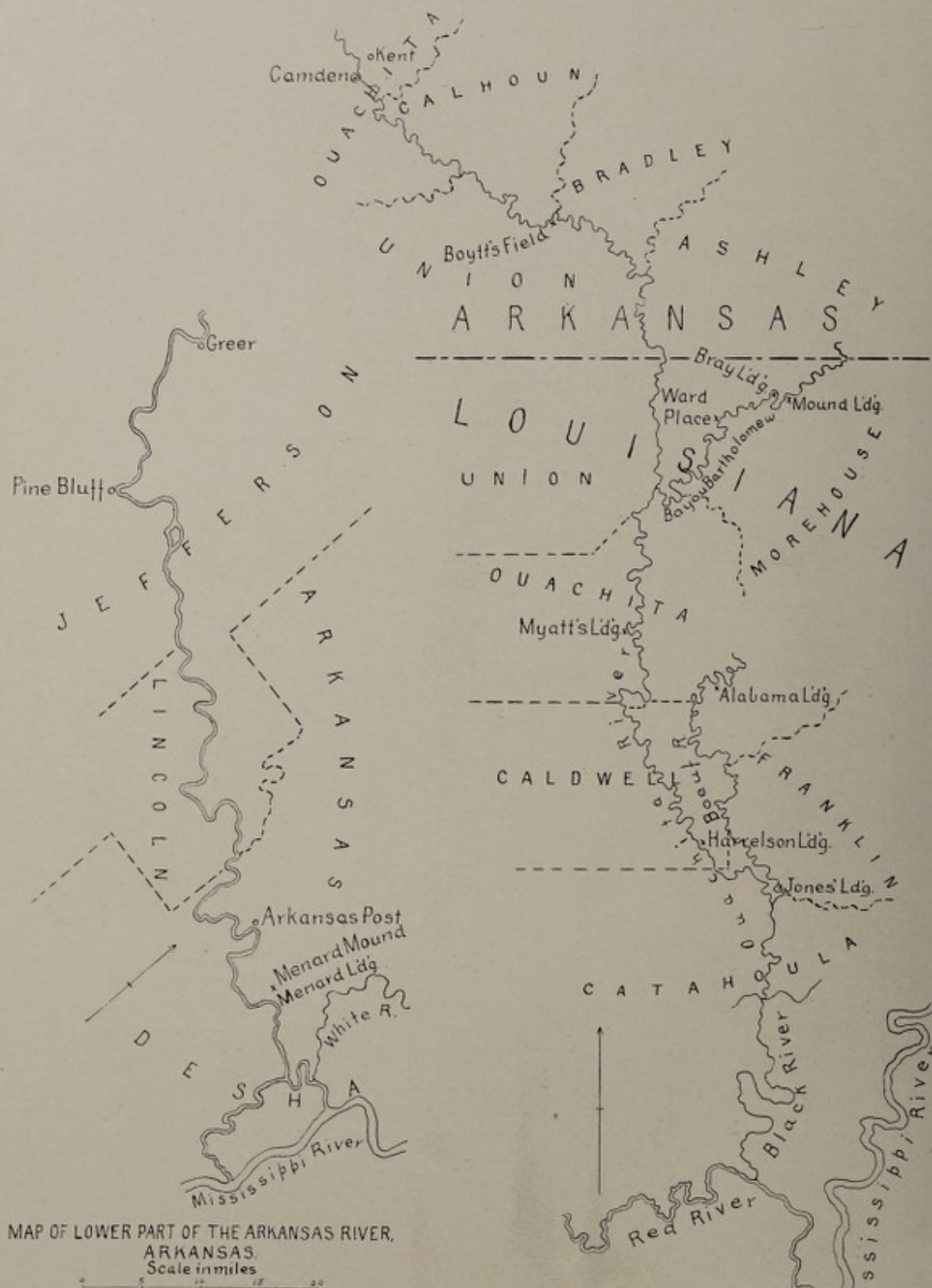
(Made, and presented to the National Museum, in 1909, by Mr. Clarence B. Moore)

BY

DR. ALEŠ HRDLIČKA

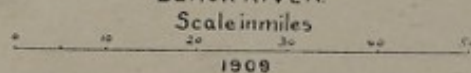
In charge of the Division of Physical Anthropology, United States National Museum





MAP OF LOWER PART OF THE ARKANSAS RIVER,  
ARKANSAS.  
Scale in miles

MAP OF PART OF THE OUACHITA VALLEY AND  
BLACK RIVER.



1909

REPORT ON AN ADDITIONAL COLLECTION OF SKELETAL REMAINS, FROM  
ARKANSAS AND LOUISIANA.

(Made, and presented to the National Museum, in 1909, by Mr. Clarence B. Moore.)

By DR. ALEŠ HRDLÍČKA.

In charge of the Division of Physical Anthropology, United States National Museum.

I.

The material to which this report applies consists of 58 crania, and of numerous bones from the same as well as from other skeletons. In all there are ninety-one lots, thirty-seven of which are from Arkansas, and fifty-four from Louisiana. Those from Arkansas come from a single burial place, while the bones from Louisiana were gathered from seven different localities. Details concerning these places, the modes of burial, and the archaeology of the graves, are given in the preceding Memoir by Mr. Clarence B. Moore. The localities in which the skeletal remains were found are shown on the accompanying sketch map, which gives also those from which came the skeletal material described by the writer in Mr. Moore's last year's report<sup>1</sup> and to which frequent reference will be made in this paper.

The skulls and bones show various states of preservation, but for the greater part they are more or less imperfect. None of the specimens is mineralized, or much devoid of animal matter. All, with one exception, are plainly Indian; the exception, a skull of a female about fifty years of age, with moderate "flat-head" deformation, is negroid. This skull, in all probability, is that of a negro-Indian mixed-blood, and will not receive further consideration.

The majority of the crania, both from Arkansas and from Louisiana, exhibit artificial deformation. The deformation represents both of the two varieties, namely, occipital flattening or cradle-board compression,<sup>2</sup> and fronto-occipital flattening ("flat-head" deformation). The forms occur together in some of the localities, but owing to some insufficient method practised to produce the fronto-occipital flattening, they are not always clearly distinguishable. Each variety of deformation predominates in, but is not limited to, a certain type of people, indicating adoption of customs in this regard by some of the groups.

As to anthropological identifications, there is, notwithstanding the comparatively large number of specimens, little evidence on which conclusions can be based. The crania that had been artificially altered in form are to a large extent useless

<sup>1</sup> "Report on a Collection of Crania from Arkansas." Journ. Acad. Nat. Sci., Phila., 1908, XIII, pp. 558-563.

<sup>2</sup> See writer's article on "Artificial Head Deformation," Handbook of American Indians, Bull. 30, Bureau of Amer. Ethnol., Wash., 1907, Part 1, p. 96.



for this purpose. Fortunately there are also skulls that exhibit only slight deformation, and a small number of wholly normal ones. These indicate, for the region covered, two distinct types of Indians.

The predominating type is that of the brachycephals, known partly from the previous report. These people, it appears from the material last collected, ranged in stature from moderate to well-developed, with good though not pronounced muscular development. They were probably the people among whom prevailed, and who communicated to their neighbors, the intentional fronto-occipital deformation.

The other type, less well represented, indicates Indians of stature and strength similar to those of the people just mentioned, but with oblong, mesocephalic to dolichocephalic skulls. They were, in all probability, remnants of a relatively large local strain of dolichocephals mixed with the more numerous round-headed people. They exhibit the occipital, cradle-board head-flattening, but they practised also fronto-occipital compression. The physical characteristics of these people, so far as they can yet be isolated, approach, on one hand, those of the more northerly tribes of Missouri, Illinois, and parts of Tennessee and Kentucky, and, on the other, those of more westerly and southwesterly tribes, represented in northern Texas and especially by the oblong-headed type among the Pueblo Indians. The prevalent occipital flattening of the skull would point likewise to a connection with the southwest and the northeast. However, no great weight can be placed on this latter feature alone, for it represents a custom which could be communicated from one tribe to another, rather than a fixed, organic, hereditary condition.

In addition to the collections referred to, there were found, on examination of the older gatherings from Arkansas and Louisiana in the National Museum, a few crania which resemble very closely the sub-type of the eastern Algonquians.

Barring the element last mentioned, the tribal mixture under consideration, in all its more important characteristics, is closely related to the people of Arkansas and Jefferson counties, Arkansas, whose skeletal remains Mr. Moore uncovered during his investigations of the year before. The short-headed type is doubtless identical in both series.

Numerous long-bones and several of the skulls in Mr. Moore's collection of 1909 give manifest signs of a constitutional disease, seemingly syphilis. Other specimens from the collection, now partly in the National Museum and partly in the Army Medical Museum, show osteo-arthritis, marginal exostoses, and effects of fractures or dislocations; there are two tibiae with abnormal curvature, and four bones with lesions indicating localized suppurative processes. However, notwithstanding the specimens last mentioned, there appear no definite signs of rickets or of tuberculosis, and no instance occurs of bone tumor or of necrosis of bone.

On account of the varied character of the material, the detailed report which follows must necessarily deal with the specimens by localities only. It gives numerous results of measurements and observation, both interesting and important, which have not been touched upon in the preceding remarks and which show the value of Mr. Moore's most recent collection.



Nevertheless, the data, even when supplemented with those bearing on the older collections in the National Museum, from this part of the country, fall far short of covering the territory of the two States, and allow but little perspective in point of time. They afford, however, a substantial step toward the elucidation of the anthropology of Arkansas and Louisiana, and should stimulate further careful collection of the skeletal remains of the aboriginal inhabitants of these regions.

## II.

## ARKANSAS.

Mr. Moore's collection from Arkansas in 1909 was made at Boytt's Field, Union county, and comprises the list of specimens given below.

Sexual recognition offers, as usual, some difficulties, but owing to the presence in many cases of long- and other bones, it is possible to carry the identification to within a very small margin of possible error. In age estimates, the uncertain "approximate age in years," such as was employed in last year's report, is replaced by references to defined periods of life, determinations of which are safe and scarcely less serviceable.

## SKULLS AND BONES FROM ARKANSAS.

Locality	Specimen	Original No.	Museum No.	Sex	Period of Life*
Boytt's Field, Union Co.	Bones	A	255.133	Female	Adult
"	"	"	.133a	Male	"
"	Skull and bones	2	.123	"	Young adult
"	"	3	.125	"	Middle-age adult
"	Skull	4	.152	"	"
"	Skull and bones	5	.124	"	"
"	Skull	6	.144	Female	"
"	Bones	7	.132	Male	Adult
"	Skull and bones	8	.122	Female	Middle-age adult
"	"	10	.121	Male	"
"	Bones	10	.121a	"	Adult
"	Skull	11	.130	Female	Young adult
"	Skull and bones	12	.143	"	Middle-age adult
"	"	13	.127	Male	Near adult
"	Bones	14	.139	"	Adult
"	Skull and bones	17	.126	"	Young adult
"	"	18	.129	Female	Middle-age adult
"	"	19	.141	Male	Aged adult
"	Bones	20	.134	"	Adult
"	"	21	.138	"	"
"	"	21	.138a	"	"
"	Skull and bones	22	.120	Female	Middle-age adult
"	Bones	23	.131	Male	Adult
"	Skull	24	.145	"	Middle-age adult
"	Bones	28	.142	"	Adult
"	"	32	.140	"	"
"	"	33	.136	"	"
"	"	34	.135	"	"
"	Skull	36	.151	Female	Middle-age adult
"	Skull and bones	37	.119	Male (?)	Young adult
"	Bones	40	.137	Female	Adult
"	Skull	41	.147	"	Middle-age adult
"	"	43	.149	Male	"
"	Skull and bones	52	.128	"	Young adult
"	Skull	53	.146	Female	Middle-age adult
"	"	54	.150	Male	"
"	"	55	.148	Female	Aged adult

\* "Young adult" = 25-40 years of age; basilar suture closed; eruption of permanent teeth finished; wear of teeth slight to moderate; no synostosis externally in the normal sutures of the cranial vault.

"Middle-age adult" = 40-55 years of age; teeth worn off moderately to medium; various, generally minor, grades of synostosis externally in the sutures of the vault.

"Aged adult" = exceeding 55 years of age; teeth worn off considerably; synostoses in sutures advanced or complete.



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As seen from the table, the specimens represent 24 male and 12 female full-grown individuals. The predominance of males may be accidental.

Of crania, 13 males and 10 females are represented. Among the male skulls, 3 are normal, 6 show slight to pronounced occipital and 4 slight to considerable fronto-occipital flattening; while among the females 3 also are normal, 2 show occipital flattening, and 5 fronto-occipital compression. Additional details regarding the deformations will be found in the first table of measurements.

Five of the crania and numerous bones show indications of syphilis, arthritis, or other pathological conditions; an itemized account of these forms is given in a succeeding chapter.

There are only a few anomalies of a more important nature, even if the teeth and dentition are included in the consideration. In male skull No. 255.119 the basilar process shows on the right side a pronounced lateral fissure to within 0.8 cm. of the median line. In male skull No. 225.124 the right nasal bone, triangular in shape, reaches only a little above the middle of that on the left, its absence

CRANIA FROM ARKANSAS—MEASUREMENTS RELATING TO FORM  
MALES

Museum No.	Deformation	Diameter antero-posterior maximum	Diameter lateral maximum	Basion-bregma height	Cephalic index	Height-length index	Height-breadth index
255.119	.....	cm. 16.7	cm. 14.7	cm. 14.1	88.0	84.4	95.9
.126	.....	17.6	14.8	14.0	84.1	79.5	94.6
.149	.....	17.3	14.3	13.5	82.7	78.0	94.4
.121	Considerable occipital compression	(15.7)	(15.2)	(13.7)	?	.....	.....
.123	Moderate occ. comp.	(16.9)	(14.6)	?	(Probably mesocephal)	.....	.....
.124	Medium fronto-occ. comp.	(16.4)	(15.7)	(14.3)	?	.....	.....
.125	Slight occ. comp.	(17.3)	(14.2)	(13.8)	Meso- or low brachycephal	.....	.....
.127	Traces of frontal with considerable occ. comp.	(15.9)	(15.4)	(14.6)	?	.....	.....
.128	Medium fronto-occ. comp.	(16.2)	(15.9)	?	?	.....	.....
.141	Moderate occ. comp.	(17.6)	(15.1)	(14.8)	(Nearly brachycephal)	.....	.....
.145	Pronounced occ. comp.	(17.3)	(15.7)	?	Probably mesocephal	.....	.....
.150	Moderate lateral occ. comp.	(17.7)	(14.8)	(14.3)	Meso- or low brachycephal	.....	.....
.152	Pronounced fronto-occ. comp.	(16.9)	(16.1)	(14.5)	?	.....	.....

farther up being compensated partly by the left nasal and partly by the nasal process of the right superior maxilla. In male skull No. 225.141 the glenoid fossæ, especially the right, are unusually narrow antero-posteriorly.

Dental and numerous other minor anomalies will be referred to later.

In their anthropological characteristics the bones from Boytt's Field do not show differences, either in proportions or in form, clearly enough to enable separation into more than one type. Yet the skulls are not homogeneous. All the normal crania, and a number of those the shape of which has been artificially altered, belong clearly to the brachycephalic type of people known already from the Menard and Greer cemeteries. A number of the deformed skulls, however, show distinctly that, were it not for the artificial shortening, they would have to be classed as mesocephalic or even as dolichocephalic. It is these skulls which remind one so forcibly of the cranial type known from some of the Pueblos. In the further treatment of the material it would be desirable to separate these skulls and the related bones from the crania and bones of the brachycephals; but, as the identification of these specimens, and particularly of the bones from the skeletons where no skull is present, is uncertain, and as there are probably also present intermediate forms due to admixture, such separation is not practicable.

*Measurements.*—The data obtained by measuring the skulls have been separated, as in last year's report, into several convenient groups. The tables (pp. 176, 177) present those that relate more directly to the form of the skull.

CRANIA FROM ARKANSAS—MEASUREMENTS RELATING TO FORM  
FEMALES

Museum No.	Deformation	Diameter antero-posterior maximum	Diameter lateral maximum	Basion-bregma height	Cephalic index	Height-length index	Height-breadth index
		cm.	cm.	cm.			
255.120	.....	16.7	13.9	? (fair)	83.2	?	?
.143	.....	16.8	13.8	13.6	83.1	80.9	98.5
.148	.....	17.0	14.4	13.6	84.7	80.0	94.4
.122	Moderate fronto-occ. comp.	(16.3)	(15.0)	?	?	.....	.....
.129	Moderate occ. comp.	(16.6)	(about 14.3)	(about 14.5)	(Meso- or dolichocephal)	.....	.....
.130	Slight frontal with moderate occ. comp.	(15.8)	(14.6)	(13.6)	?	.....	.....
.144	Slight frontal with pronounced occ. comp.	(15.4)	(15.3)	(13.6)	?	.....	.....
.146	Slight fronto-occ. comp.	(16.1)	(14.6)	?	(Probably brachycephal)	.....	.....
.147	Slight fronto-occ. comp.	(16.9)	(14.7)	(12.7)	?	.....	.....
.151	Slight occ. comp.	(16.6)	(14.7)	?	?	.....	.....



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The non-deformed skulls, it is seen, besides being rounded, are all relatively high, in which respect they further resemble those from Arkansas and Jefferson counties, described in last year's report; and there can be no doubt that they belong to the same general group of people. From additional material in the National Museum, it appears that the same type prevailed also in Drew and Mississippi counties, Arkansas.

The deformed specimens show varying grades of compensation in breadth and height for the artificially diminished length, the skull acting under the process much like an elastic bag filled with liquid. The several deformed crania which permit the discernment of a more oblong type represent doubtless a mixture of the above, dominant, with a strong additional tribal element. Similar oblong heads occur also in parts of Drew and Mississippi counties. Furthermore, from Pecan Point, and from near Bardstone, in the latter county, there are extant individual non-deformed skulls, of an unknown period, presenting the type of the eastern and southeastern Algonquian crania.

*Size.*—The principal dimensions of the crania from Boytt's Field agree fairly well with those observed in the skulls from the Menard and Greer cemeteries, but

MEASUREMENTS OF THE ARKANSAS CRANIA RELATIVE TO THEIR SIZE.

Museum No.	Sex	Deformity	Capacity*	Cranial module (mean diameter)	Circumference (above supra-orbital ridges)	Nasion-opisthion arc	Thickness of left parietal (above squamous suture)
			c.c.	cm.	cm.	cm.	mm.
255.119	Male	None	1475	15.17	50.1	35.0	4-6
.126	"	"	? (fair)	15.47	50.9	35.0	5
.149	"	"	? (submedium)	15.03	49.0	35.0	4-6
.121	"	Occipital flattening	1310	14.87	48.5	?	4-6
.123	"	"	? (medium)	?	49.1	36.2	4-6
.124	"	Fronto-occ. flattening	1480	15.37	49.3	34.1	4-6
.125	"	Occipital flattening	1315	15.10	49.3	35.7	4-6
.127	"	Fronto-occ. flattening	1455	15.30	48.0	34.4	4-6
.128	"	"	? (fair)	?	49.3	?	4-6
.141	"	Occipital flattening	1670	15.83	52.7	37.3	5-6
.145	"	"	? (medium)	?	52.3	?	4-6
.150	"	"	1470	15.60	50.1	35.5	5-7
.152	"	Fronto-occ. flattening	? (fair)	15.83	51.3	34.3	5-7
.120	Female	None	? (medium)	?	47.5	33.3	4-6
.143	"	"	"	14.73	47.7	35.0	5-7
.148	"	"	? (fair)	15.00	49.6	35.1	4-6
.122	"	Fronto-occ. flattening	? (medium)	?	48.2	32.7	5
.129	"	Occipital flattening	"	15.13	49.0	35.2	5-7
.130	"	Fronto-occ. flattening	"	14.67	47.7	34.0	4-6
.144	"	"	"	14.77	48.3	?	5-7
.146	"	"	"	?	48.5	?	4-6
.147	"	"	"	14.77	49.5	34.2	4-6
.151	"	Occipital flattening	1280	?	48.8	?	(6-7)
Averages (with minima and maxima)	Males	.....	7)† 1455 (1310-1670)	10) 15.36 (14.87-15.83)	13) 50.0 (48.0-52.7)	10) 35.2 (34.1-37.3)	13) 5 (4-6 to 5-7)
	Females	.....	.....	6) 14.84 (14.67-15.13)	10) 48.5 (47.5-49.6)	7) 34.2 (32.7-35.2)	9) 5.3 (4-6 to 5-7)

\* Measured with dry mustard-seed in accordance with the writer's method described in *Science*, N. S., xvii, June 26, 1903, pp. 1011-1014.  
† Number of cases.

there are also a few that are more capacious. Only one of the specimens, however, can be termed large, namely that of 1670 c.c. capacity. In 15 additional Arkansas crania in the National Museum, in which it could be determined, the capacity ranges in 9 males from 1360 to 1600 c.c., and in 6 females from 1180 to 1395 c.c.

The capacity of the skull generally bears a relation to the stature of the individual, and the stature can be judged approximately from the long-bones, particularly the humerus and the femur. One or both of the femora are present in five of the males with known skull capacity. Their length and relations to the capacity are as follows:

RELATION OF SKULL CAPACITY TO STATURE			
Male Skull No.	Cranial Capacity	Bicondylar length of right femur of same individual	Femoro-cranial index (= c. c. of skull capacity per 1.0 cm. of femoral length)
255.121	c. c. 1310	cm. 45.7	28.7
.125	1315	43.3	30.4
.127	1455	42.1	34.6
.124	1480	46.0	32.2
.141	1670	48.2	34.6
Averages	1446	45.1	32.1

These interesting data unfortunately apply to too few specimens to be of great value, particularly for type comparison. It may be stated, however, that the average bicondylar length of the right femur in the white American male of the Eastern states approaches 45.0 cm., and the cranial capacity 1500 c.c., which would give an average femoro-cranial index of about 33.3, a figure slightly higher than that in these Indians.

The average module (mean diameter of the skull), the greatest horizontal circumference above the ridges, and the nasion-opisthion arc, all show in both sexes slightly lower averages than in whites. The thickness of the parietal bone is not excessive, but it will be noticed that it averages slightly more in the females than in the males, even if we omit the unusually thick skull No. 255.151. This is not general among Indians, although rather thick female crania are met with in all the larger Indian skeletal collections.

The relation in the two sexes, of the average module, and of the circumference and antero-posterior arc, is almost identical for the three measurements, being as 96 (females) to 100 (males) for the module, and as 97 to 100 for both the other measurements.

For capacity, however, the difference in the relation would be larger.

*Facial parts.*—It is regrettable that the facial parts of many of the skulls, including nearly all the females, are imperfect or wanting. Nevertheless, those that remain show a number of features of considerable interest. In the first place the facial measurements, and especially the indices, are considerably alike throughout the series, notwithstanding evident diversity in the form of the crania. Sec-



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only, both the upper and the lower facial index are perceptibly lower than in the series of Arkansas skulls described in Mr. Moore's last report. This is due to the generally lesser height of the face, *i. e.*, the height of the alveolar point to nasion line, in the present series.

The lower jaw also is relatively low, so that the average index of the upper face is slightly more leptoprosopic than that of the face as a whole.

The breadth of the face is quite moderate throughout the series. In two of the males a deformation of the vault has a decided effect on the bizygomatic diameter and consequently on the facial indices. These measurements and indices are bracketed in the accompanying table.

MEASUREMENTS OF THE ARKANSAS CRANIA WITH REFERENCE TO THE FACIAL PARTS

Museum No.	Sex	Deformity of vault*	Total height of the face	Alveolar point-nasion height	Diameter bizygomatic maximum	Facial index, total	Facial index, upper	Nose: height (mean of that from nasion to the nasal notches)	Nose: breadth (maximum)	Nose: index	Orbits: height,† right left	Orbits: breadth,† right left	Orbits: index, right left	Palate: external length‡	Palate: external breadth‡	Palate: index‡			
255.119	Male	—	cm. 11.6	cm. 6.9	cm. 13.8	84.1	50.0	5.0	2.55	51.0	cm. 3.45	cm. 3.60	cm. 4.00	cm. 3.95	86.2	91.1	5.5	6.2	112.7
.126	"	—	12.2	7.3	14.3	85.3	51.0	5.2	2.8	53.8	3.50	?	4.10	?	85.4	?	(6.2)	?	?
.149	"	—	11.3	6.9	13.7	82.5	50.4	4.7	2.4	51.1	3.15	3.30	4.00	4.00	78.7	82.5	5.4	6.1	113.0
.121	"	o. c.	?	6.9	(14.2)	?	(48.6)	4.9	2.6	53.1	3.45	3.50	3.90	3.90	88.5	89.7	5.3	6.5	122.6
.123	"	o. c.	12.0	7.1	?	?	?	4.8	2.45	51.0	?	?	?	?	?	?	5.3	6.5	122.6
.124	"	f-o. c.	?	7.1	14.0	?	50.7	5.0	2.45	49.0	3.80	3.70	4.00	3.95	95.0	93.7	6.0	6.7	111.7
.125	"	o. c.	11.8	7.2	13.9	84.9	51.8	4.9	2.6	53.1	3.50	3.50	4.20	4.10	83.3	85.4	5.8	6.3	108.6
.127	"	f-o. c.	11.7	6.9	13.3	88.0	51.9	4.8	2.35	48.9	3.10	3.15	3.90	3.75	79.5	83.7	5.4	6.7	124.1
.128	"	f-o. c.	?	?	?	?	?	?	2.35	?	?	?	?	?	?	?	5.6	7.1	126.8
.141	"	o. c.	11.5	6.8	13.6	84.6	50.0	4.85	2.45	50.5	3.65	3.55	4.00	4.05	91.2	87.8	5.8	6.5	112.1
.145	"	o. c.	?	?	?	?	?	?	?	?	?	?	?	?	?	?	5.8	7.1	122.4
.150	"	o. c.	11.7	7.3	14.1	83.0	51.8	5.35	2.5	46.7	3.30	?	4.10	?	80.5	?	5.5	6.3	114.4
.152	"	f-o. c.	12.0	7.2	(15.2)	(78.9)	(47.4)	5.25	2.8	53.1	3.70	3.80	4.10	4.10	90.2	95.1	5.5	6.7	121.8
255.120	Female	—	11.2	7.0	12.5	89.6	56.0	4.8	2.5	52.1	?	?	?	?	?	?	?	?	?
.143	"	—	10.9	?	?	?	?	4.4	2.6	60.0	?	?	?	?	?	?	?	?	?
.148	"	—	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
.122	"	f-o. c.	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
.129	"	o. c.	11.9	7.3	?	?	?	4.9	2.7	55.1	3.40	3.25	3.90	3.90	87.2	83.3	6.0	6.7	111.7
.130	"	f-o. c.	11.1	6.5	?	?	?	4.7	2.5	53.4	?	?	?	?	?	?	5.3	6.2	117.0
.144	"	f-o. c.	?	?	13.2	?	?	?	?	?	?	?	?	?	?	?	?	?	?
.146	"	f-o. c.	?	?	?	?	?	?	2.2	?	?	?	?	?	?	?	?	?	?
.147	"	f-o. c.	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
.151	"	o. c.	?	?	?	?	?	?	?	?	?	3.35	?	3.65	?	91.8	?	?	?

\* O. c. — occipital compression; f-o. c. — fronto-occipital compression.

† Broca's method.

‡ Turner's method.

The nasal index is mesorhynic in the main, but reaches to slight platyrrhyny. The females appear to be somewhat more platyrrhynic than the males, due principally to a lesser height of the nose. In the skulls from the Menard and Greer cemeteries the nasal index is almost invariably lower, due to a greater height of the nose, accompanying the greater height of the upper face. In so far as the breadth of the nose is concerned, the last year's series of crania and those now under consideration are much alike.

In the nasal dimensions and index there is no perceptible difference between the oblong and the rounded skulls from Boytt's Field.

The orbital measurements present nothing extraordinary. The indices show rather a wide range. This is probably due in part to the existence of the vault



deformations which, when present in a high degree, are not without effect on the shape of the orbits. The measurements and indices of both orbits are given in the present report for the purpose of showing the very frequent differences in the same observed in, but by no means limited to, the Indians. These differences are somewhat characteristic, in that the left orbit is frequently the higher and narrower, giving an index greater than in the right; but there are also cases in which the condition is reversed. A similarly great variation in the orbital index is noticeable in the skulls from Arkansas described in the last report.

The palate again shows predominantly brachyuranic. As in the case of all the other facial measurements, there can be isolated no distinct types corresponding to the separate forms of the skull.

*Other Measurements.*—Special attention has been given to the determination of prognathism, and as it is important to show separately the alveolar slanting, an additional measurement used in the series described last year, namely, a diameter from basion to the middle of the nasal notches, has been employed.

The total facial angle, or more properly, the basi-facial angle—the angle between the basion-alveolar point line and the line from alveolar point to nasion—ranges in ten of the male skulls (the only ones in which it could be determined) from  $66^{\circ}$  to  $74^{\circ}$ . The alveolar angle, or that between the basion-alveolar point line and the line from the alveolar point to the middle of the nasal notches (the inferior boundary of the nasal height), differed in the same individuals between  $48^{\circ}$  and  $67^{\circ}$ . The variation in the latter, it is seen, is perceptibly greater than in the former, showing that the inclination of the upper alveolar process in this series depends more on that of the facial parts behind and above it than on any causes inherent in itself or in the teeth.

No similar measurements are as yet available for comparison with whites;<sup>1</sup> but it is certain that both the facial and the alveolar average prognathism is in the Indians somewhat greater than in the whites, though less than in the American or African negro, or in the Melanesian.

Measurements of the frontal bone show that the diameter frontal minimum is not considerable. It ranges in the thirteen males from 8.7 to 10.2 cm., with the average of 9.6 cm., while in the ten females it measures from 8.6 to 10.2 cm., the average being 9.3 cm. The sex differences are not very material. It was furthermore noticed that this measurement shows but little direct relation with the breadth of the skull; *i. e.*, the breadth of the skull and the breadth-length index.

The diameter frontal maximum is of service only in the non-deformed skulls, being more or less altered in all cases in which either fronto-occipital or occipital compression is present.

The main diameter of the foramen magnum ranges from 3 to 3.5 cm. in six of the males where it could be measured, and from 3 to 3.3 cm. in three of the females.

The lower jaw shows only moderate dimensions. The bigonial diameter varies in nine males from 9.9 to 11.2 cm. and in seven females from 9.5 to 10.7 cm. The average height of the symphysis is 3.65 cm. in the males (3.2 to 3.9 cm.), and 3.45 cm. (3.1 to 3.6 cm.) in the females. The angle shows very little difference in the

<sup>1</sup> A large series is, however, promised by Dr. Rivet, who arrived independently at measuring the basi-facial angle in a similar manner. See "*L'Anthropologie*," XX, 1909, 35 *et seq.*, and 175 *et seq.*



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two sexes, averaging 120° (107° to 128°) in ten males, and 122° (110° to 128°) in eight females. It is clear that the lower jaw, except for its slightly smaller dimensions, is of little use for sexual identification in this series of skulls.

*Observations on the Crania.*

The descriptive notes concerning the Arkansas skulls present so many similarities to those bearing on the skulls from Louisiana that the two can be treated together. They will therefore be found reported on in the section following that dealing with measurements of the Louisiana crania.

The same applies also to the long-bones and the other bones of the skeletons, which will be described together in a later section.

ADDITIONAL MEASUREMENTS OF THE ARKANSAS CRANIA WITH REFERENCE TO THE FACIAL AND OTHER PARTS OF THE SKULL

Museum No.	Sex	Deformation of vault	PROGNATHISM *						FRONTAL BONE			FORAMEN MAGNUM	LOWER JAW			
			Basion-alveolar point diameter (a)	Basion-nasion diameter	Angle between a and alveolar point-nasion line	Basion-middle of nasal notches diameter	Height from alveolar point to middle of nasal notches (b)	Angle between a and line b	Diameter frontal minimum (a)	Diameter frontal maximum (b)	Percental relation of a to b ( $\frac{a \times 100}{b}$ )	Mean diameter	Diameter bigonial	Angle right left	Height at symphysis	
255.119	Male	—	cm. 10.0	cm. 10.2	degrees 71	cm. 8.9	cm. 2.05	degrees 51	cm. 10.2	cm. 12.2	83.6	cm. 3.3	cm. 10.5	degrees ?	cm. 119	cm. 3.6
.126	"	—	10.7	11.0	72	9.7	2.25	56	10.0	12.1	82.6	?	11.2	121	120	3.9
.149	"	—	10.0	10.2	71	9.2	2.3	62	8.7	11.3	77.0	?	9.9	127	128	3.9
.121	"	o. c.	10.2	10.3	71	9.2	2.1	55	9.3	?	?	?	?	?	?	?
.123	"	o. c.	?	?	?	?	?	?	9.8	?	?	?	?	117	?	3.7
.124	"	f-o. c.	10.4	10.0	66	9.0	2.3	48	9.8	?	?	3.3	?	?	?	?
.125	"	o. c.	9.9	10.1	70	8.8	2.4	55	9.3	(11.8)	.....	?	10.9	124	?	3.6
.127	"	f-o. c.	9.8	10.1	72	9.2	2.1	67	9.7	(12.4)	.....	3.0	9.9	127	126	3.5
.128	"	f-o. c.	?	?	?	?	?	?	9.6	(12.9)	.....	?	?	?	?	?
.141	"	o. c.	10.3	10.7	74	9.1	2.2	50	9.8	(12.9)	.....	3.5	10.2	107	112	3.5
.145	"	o. c.	?	?	?	?	?	?	9.9	(12.4)	.....	?	10.4	125	?	3.9
.150	"	o. c.	10.1	10.6	73	9.0	2.1	53	9.6	(11.6)	.....	3.4	10.6	119	119	3.2
.152	"	f-o. c.	10.4	10.6	71	9.3	2.1	53	9.4	(12.8)	.....	3.3	11.1	?	112	3.6
.120	Female	—	?	?	?	?	2.3	?	8.7	11.0	79.1	?	9.5	122	119	3.6
.143	"	—	?	9.5	?	?	?	?	8.6	11.0	78.2	3.0	9.6	127	127	3.5
.148	"	—	?	10.2	?	?	?	?	10.2	11.8	86.4	3.3	?	?	119	3.5
.122	"	f-o. c.	?	?	?	?	?	?	9.3	(12.2)	.....	?	?	?	?	?
.129	"	o. c.	?	?	?	?	2.5	?	9.1	(11.9)	.....	?	9.8	?	124	?
.130	"	f-o. c.	?	9.9	?	?	1.85	?	9.0	(11.6)	.....	3.1	10.5	126	125	3.1
.144	"	f-o. c.	?	?	?	?	?	?	9.3	(12.0)	.....	?	10.7	128	127	3.6
.146	"	f-o. c.	?	?	?	?	?	?	10.0	(11.9)	.....	?	9.6	121	?	3.5
.147	"	f-o. c.	?	9.7	?	?	?	?	9.1	(11.6)	.....	?	9.6	110	113	3.5
.151	"	o. c.	?	?	?	?	?	?	9.4	(12.2)	.....	?	?	?	?	?

\* Certain errors due to the employment of the sliding compass having crept into the determinations of the facial angles and sub-nasal height of the skulls from the Menard and Greer cemeteries described last year, those determinations are here repeated with corrections:

Museum No.	Angle between a and alveolar point-nasion line	Height from alveolar point to middle of nasal notches (b)	Angle between a and line b
249.915	degrees 74	cm. 2.3	degrees 60
.921	71	2.2	51
.922	72	2.4	58
.916	64	2.9	54
.923	73	1.7	52
.924	66	2.45	51
.925	70	2.1	56

## III.

## LOUISIANA.

Mr. Moore's collection from Louisiana in 1909 came from several localities which are given with the list of specimens in the table below.

LOUISIANA SKULLS AND BONES					
Locality	Specimen	Original No.	Museum No.	Sex	Stage of life of person *
Harrelson Landing, Caldwell Parish	Skull and bones	1	255.094	Female	Aged adult
" "	Bones	7	.099	Male	Adult
" "	"	10	.098	"	"
" "	Skull and bones	11	.095	Female	Young adult
" "	Bones	12	.096	"	Adult
" "	"	13	.097	"	"
Bell Gin Landing	Bones	—	.100	Male	"
" "	"	—	.100a	"	"
Myatt's Landing, Ouachita Parish	Skull and bones	A	.102	"	Young adult
" "	Bones	A	.102a	"	Adult
" "	Skull	9	.118	Female	Middle-age adult
" "	Bones	15	.108	"	Adult
" "	Skull and bones	19	.111	"	Young adult
" "	Skull	20	.113	"	Middle-age adult
" "	"	21	.117	"	Near adult
" "	"	22	.116	"	Young adult
" "	"	23	.115	Male	Aged adult
" "	Skull and bones	24	.106	"	Middle-age adult
" "	Bones	26	.110	"	Adult
" "	Skull and bones	27	.105	Female	Middle-age adult
" "	Bones	29	.109	Male	Adult
" "	Skull and bones	30	.104	"	Middle-age adult
" "	"	31	.103	Female	"
" "	"	32	.112	"	Aged adult
" "	"	36	.107	Male	Young adult
" "	Skull	38	.114	"	Middle-age adult
Jones Landing, Franklin Parish	Skull	—	.153	Female (negroid)	"
" "	"	—	.154	Male	"
Bray Landing, Morehouse Parish	Skull and bones	16	.201	"	"
" "	Skull	—	.202	Female	Young adult
" "	"	—	.203	Male	Aged adult
" "	"	—	.204	"	Middle-age adult
" "	Bones (a lot)	—	.205	Males and females	All adults
Mound Landing, Morehouse Parish	Skull and bones	1	.207	Female	Middle-age adult
Ward Place, Morehouse Parish	Skull and bones	1	.217	Male	Aged adult
" "	"	2	.218	"	Middle-age adult
" "	Bones	4	.227	Female	Adult
" "	"	5	.226	"	"
" "	Skull and bones	6	.219	"	Middle-age adult
" "	"	7	.211	Male	"
" "	"	8	.210	"	"
" "	"	9	.216	Female	Young adult
" "	"	10	.220	"	Middle-age adult
" "	"	12	.215	Male	"
" "	"	13	.213	Female	Young adult
" "	"	14	.209	Male	Middle-age adult
" "	Bones	15	.222	"	Adult
" "	"	16	.221	"	"
" "	"	17	.224	"	"
" "	"	18	.225	Female	"
" "	"	19	.223	Male	"
" "	"	20	.214	Female	"
" "	"	22	.212	"	"
" "	Skull	31	.208	"	Middle-age adult

\* For explanation of terms used, see the similar table pertaining to Arkansas, page 175.



There are seventeen male and eighteen female skulls. Including all the bones, however, thirty male and twenty-eight female individuals are represented.

With a single exception, these specimens are in a state of preservation similar to that of the Arkansas skeletal remains. The exception noted is the bones from Harrelson Landing, which are more resistant, and darker in color.

Deformations are again frequent. Of the male skulls, six are of normal shape, nine show various grades of occipital and two of fronto-occipital compression; among the skulls of females, six are non-deformed, eight have occipital flattening and four fronto-occipital compression.

An interesting fact is that the fronto-occipital deformation occurs in only one locality, namely, Ward Place, La. Its absence in several of the other localities may be merely accidental, due to the small number of specimens from these places. But in the fairly large series from Myatt's Landing, only occipital compression is detected. Notes regarding the grades of deformation are included with the first table of measurements.

Several of the skulls show evidence of disease; details of these are given in Section VI. Syphilis was undoubtedly present, as likewise were other pathological conditions, known already from the skeletal remains of Arkansas.

*Anomalies* of importance, as in the crania from Arkansas, are limited in number. In male skull No. 255.106 the basilar process shows a deep lateral fissure on the left side and a similar condition in a lesser degree on the right (Fig. 4, y); the same specimen shows also a small medio-basilar or "pharyngeal" fossa. Male skull 255.154 exhibits a very pronounced occipital torus, with a marked depression above its middle for a ligamentous or tendinous insertion. Male skull 255.203 shows an epactal or "interparietal" bone, 6.7 cm. broad and 4.5 cm. high. Male skull 255.218 has a pronounced semilunar occipital crest, and a depression of good size in the median line above it. Female skull 255.094 shows a marked bilateral depression extending antero-posteriorly over three-fifths of the surface of each parietal, between the temporal ridges and the sagittal region, due to senile diminution of nourishment of these portions and their consequent absorption. In female skull 255.118 there is a large third condyle with an articular facet; and in female skull 255.103 we find on the right a paramastoid process, 0.9 cm. high and equally stout, which articulated with the atlas. On the left side of female skull 255.212 there is a large wedge-like, separate ossicle, 2.2 cm. in length by 0.5 cm. in average breadth, between the wing of the sphenoid and the glenoid portion of the temporal bone. This separate piece includes the sphenoid spine (spinous process). Female skull 255.213 shows a pronounced depression, 3.3 by 3.0 cm. in extent, above inion; it is of the same character as the depressions in crania 255.154 and 255.218, and as those of a number of skulls in the Arkansas collection of 1908, and no doubt served for a ligamentous or tendinous attachment. In female skull 255.214 there is a marked non-articular tubercle immediately back of each occipital condyle. Finally, the lower jaw of female skull 255.220 shows on each side an abnormally large and cleft-like dental foramen.

Other minor anomalies are enumerated under "Observations" (page 197).

## MEASUREMENTS OF THE LOUISIANA CRANIA WITH REFERENCE TO THEIR FORM

Museum No.	Locality	Sex	Deformation	Diameter antero-posterior maximum	Diameter lateral maximum	Basion-bregma height	Cephalic index	Height-length index	Height-breadth index
255.094	Harrelson Landing	Female	—	cm. 17.6	cm. 14.4	cm. ? (good)	81.8	?	?
.095	"	"	—	17.6	14.1	14.5	80.1	82.4	102.8
.107	Myatt's Landing	Male	—	18.2	15.1	? (good)	83.0	?	?
.114	"	"	—	18.2	14.3	14.4	78.6	79.1	100.7
.102	"	"	Moderate occipital compression	(17.2)	(14.0)	?	.....	.....	.....
.104	"	"	Slight occ. comp.	(16.5)	(14.8)	(14.1)	(brachycephal)	.....	.....
.106	"	"	Pronounced occ. comp.	(16.0)	(15.5)	(14.6)	.....	.....	.....
.111	"	"	Slight occ. comp.	(16.6)	(14.3)	?	(brachycephal)	.....	.....
.115	"	"	Moderate occ. comp.	(16.9)	(14.7)	(14.3)	.....	.....	.....
.113	"	Female	—	16.6	14.7	14.1	88.5	84.9	95.9
.116	"	"	—	16.6	13.8	13.6	83.1	81.9	98.5
.103	"	"	Moderate occ. comp.	(16.0)	(14.3)	(13.5)	.....	.....	.....
.105	"	"	Slight occ. comp.	(17.6)	(14.5)	(13.8)	(brachycephal)	.....	.....
.112	"	"	Slight occ. comp.	(16.8)	(14.6)	(14.3)	"	.....	.....
.117	"	"	Slight occ. comp.	(16.3)	(14.9)	(14.1)	"	.....	.....
.118	"	"	Moderate occ. comp.	(16.6)	(14.2)	(14.6)	(meso- or slightly brachycephal)	.....	.....
.154	Jones Landing	Male	—	18.3	14.2	15.3	77.6	83.6	107.7
.203	Bray Landing	Male	—	17.6	14.3	14.8	81.2	84.1	103.5
.204	"	"	—	17.3	15.1	15.0	87.3	86.7	99.3
.201	"	"	Slight occ. comp.	(17.7)	(15.2)	(14.5)	(brachycephal)	.....	.....
.202	"	Female	Moderate occ. comp.	(16.5)	(15.0)	(14.0)	(brachycephal)	.....	.....
.207	Mound Landing	Female	—	16.2	14.5	14.3	89.5	88.3	98.6
.211	Ward Place	Male	—	18.1	14.5	14.5	80.1	80.1	100.0
.209	"	"	Moderate occ. comp.	(16.8)	(15.5)	?	(brachycephal)	.....	.....
.210	"	"	Moderate fronto-occ. comp.	(16.5)	(14.7)	?	.....	.....	.....
.215	"	"	Lateral mod. fronto-occ. comp.	(17.7)	(15.1)	(14.2)	(probably brachycephal)	.....	.....
.217	"	"	Moderate occ. comp.	(17.1)	(14.6)	(14.8)	.....	.....	.....
.218	"	"	Moderate occ. comp.	(16.3)	(15.1)	?	.....	.....	.....
.213	"	Female	—	16.6	13.6	13.6	81.9	81.9	100.0
.208	"	"	Slight fronto-occ. comp.	(16.5)	(13.9)	(12.5)	.....	.....	.....
.212	"	"	Pronounced occ. comp.	(15.7)	(14.6)	(13.6)	.....	.....	.....
.214	"	"	Slight frontal with pronounced occ. comp.	(15.5)	(14.9)	(13.7)	.....	.....	.....
.216	"	"	Slight frontal with pronounced occ. comp.	(16.6)	(14.9)	(13.4)	.....	.....	.....
.219	"	"	Slight frontal with moderate occ. comp.	(16.1)	(14.5)	(13.2)	.....	.....	.....
.220	"	"	Medium occ. comp.	(15.5)	(14.5)	(14.0)	.....	.....	.....



*The Form of the Louisiana Skulls.*—In form the Louisiana crania show a predominance of the same brachycephalic type as that of the majority of skulls from Arkansas; but there are likewise some more oblong heads, which are similar in their turn to those of like form from Arkansas. The longer forms appear among the non-deformed Louisiana skulls, and are suspected also in several of the deformed crania. Besides these two types there are undoubtedly also intermediate forms resulting from admixture.

The height of the skulls for the greater part is quite considerable, as is the case with the skulls from Arkansas.

The principal measurements with reference to the form of the crania are given on p. 185.

Two features shown by the preceding table, which deserve special notice are the height-length and height-breadth indices. The former index averages 82.7 in the males, and 84.3 in the females; the latter 102.2 in the males, and 99.1 in the females. All of these averages, but particularly those of the height-length index, are extraordinarily high and are met with even among the Indians only in certain restricted areas.

*The Size of the Louisiana Skulls.*—In size there is again a fair agreement between the crania from Louisiana and those from Arkansas. A number of the male skulls and one female specimen show, as seen from the following table, very fair capacity (between 1500 and 1600 c.c.); but there are also crania, both male and female, of but very moderate capacity. In the case of female skull 255.208 the capacity is decidedly small, though such examples are not uncommon in the American race. The average capacity of the twelve male crania is 1460 (1350–1580) c.c.; that of the 7 female skulls, 1310 (1130–1390) c.c. In comparison with this, all the available Arkansas crania the capacity of which could be determined, comprising 19 males and 14 females, give an average of 1455 (1260–1670) c.c. for the males and 1255 (1140–1395) c.c. for the females. The differences between the two areas are not very material, but, so far as they obtain, they favor Louisiana. They are noticeably more pronounced in the females than in the males. This interesting condition may be incidental to the small number of specimens, particularly in the series from Louisiana; yet it deserves attention. Similar differences are noted in all the measurements bearing on the size of the vault in the two series of skulls.

The percental relation between the capacity of the female and that of the male crania, the latter being taken as 100, amounts in Louisiana to 89.7, in Arkansas to 86.3. This shows that the female skulls in these groups are not only absolutely larger in Louisiana than in Arkansas, but that they are also relatively larger, when compared with the males, than they are in the other State. This rather strengthens the possibility that the high average capacity of the Louisiana female skulls is accidental.

The percentage of difference between the capacity of the male and female crania is higher than that shown by any other of the principal external measurements of the vault. This will be shown more clearly in the succeeding pages.



MEASUREMENTS OF THE LOUISIANA CRANIA WITH REFERENCE TO THEIR SIZE

Museum No.	Locality	Sex	Deformity *	Capacity	Cranial module (= mean diameter)	Circumference maximum (above supra-orbital ridges)	Nasion-opisthion arc	Thickness of left parietal (above squamous suture)
255.094	Harrelson Landing	Female	—	c. c.	cm.	cm.	cm.	mm.
.095	"	"	—	1370	15.40	50.8	36.9	4-5
.107	Myatt's Landing	Male	—	?	?	51.7	36.4	4-7
.114	"	"	—	1545	15.63	51.7	36.0	4-6
.102	"	"	o. c.	?	?	?	?	4-6
.104	"	"	"	?	15.13	49.3	33.6	5-7
.106	"	"	"	1420	15.37	49.7	34.3	4-7
.111	"	"	"	1390	15.23	48.5	34.8	5-7
.115	"	"	"	1350	15.30	49.3	34.7	5-7
.113	"	Female	—	?	15.13	49.7	36.0	4-5
.116	"	"	—	?	14.67	48.7	35.0	3-6
.103	"	"	o. c.	?	14.60	48.0	33.2	3-5
.105	"	"	"	1410	15.30	52.2	36.2	5-7
.112	"	"	"	1390	15.23	50.3	35.0	5-7
.117	"	"	"	?	15.10	49.3	33.8	3-5
.118	"	"	"	?	15.13	49.3	36.8	4-7
.154	Jones Landing	Male	—	1560	15.93	51.6	38.5	5-7
.203	Bray Landing	Male	—	?	15.57	50.1	?	4-5
.204	"	"	—	1580	15.80	51.2	35.9	5-6
.201	"	"	o. c.	1570	15.80	52.3	37.2	5-6
.202	"	Female	"	?	15.17	50.0	35.7	4-5
.207	Mound Landing	Female	—	?	15.00	47.9	33.3	4-6
.211	Ward Place	Male	—	1470	15.70	51.0	35.6	4-7
.209	"	"	o. c.	?	?	50.9	34.2	4-6
.210	"	"	f-o.c.	1420	?	48.8	?	4-5
.215	"	"	"	1400	15.67	51.2	36.0	5-8
.217	"	"	o. c.	1440	15.50	49.5	34.4	4-7
.218	"	"	"	1350	?	49.6	?	5-6
.213	"	Female	—	1215	14.60	47.2	34.3	5-7
.208	"	"	f-o.c.	1130	14.30	47.0	33.4	4-5
.212	"	"	o. c.	1330	14.63	47.3	33.3	4-6
.214	"	"	f-o.c.	1390	14.70	47.6	33.3	4-5
.216	"	"	"	1325	14.97	48.0	33.5	4-6
.219	"	"	"	?	14.60	47.1	?	4-6
.220	"	"	o. c.	?	14.67	47.7	?	3-4

\* O. c. = occipital compression; f-o. c. = fronto-occipital compression.

The relation of the capacity to stature, the latter represented by the length of the femur, was determinable in 7 of the male and 5 of the female skulls from Louisiana, and the results are given in the following table. The relation, it is seen, is not without its variations, but it should prove of considerable interest when established in large series of skeletons.

The number of Indian specimens available is not satisfactory for a comparison of the capacity-stature relation with that in whites; nevertheless, by including the data on the Arkansas skulls given in the previous section and accepting 33.3 as the approximate average femoro-cranial index in white males, it is found that of twelve male Indian skulls only three show an index greater than that of whites of the same sex, while in nine it is lesser. In all probability a lesser femoro-cranial index than that of whites exists throughout among the Indians, though there will be individual exceptions. This means that the well known lower average cranial capacity of the Indian is not due to smaller stature.

The cranial module (mean diameter) and the measurements of circumference



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RELATION OF SKULL CAPACITY TO STATURE			
Skull No.	Cranial Capacity	Bicondylar length of right femur	Femoro-cranial index (= c. c. of skull capacity per 1.0 cm. of femoral length)
Males	c. c.	cm.	
255.218	1350	45.0 (left)	30.1
.111	1390	44.7	31.1
.210	1420	43.1	32.9
.106	1420	43.0 (left)	33.0
.217	1440	44.7	32.2
.211	1470	44.6	33.0
.201	1570	45.5	34.5
Females			
255.213	1215	42.0	28.9
.216	1325	40.6	32.6
.212	1330	43.1	30.9
.214	1390	41.4	33.6
.112	1390	41.2	33.7

maximum and of the nasion-opisthion arc are given next to show their relative value in comparison with the capacity. Reference to the tabulated data shows that the measurements most closely expressing or representing the size of the skull, after capacity, are the cranial module and the circumference, the nasion-opisthion arc offering greater variability. The necessity of measuring the thickness of the cranial vault in each case where the actual capacity can not be determined is apparent. This measurement, as taken in this series, *i. e.*, along a line 1.0 cm. above the temporo-parietal suture, is not perfect, but it has the advantage that it can be taken with the compass used for other skull measurements. It would be preferable to determine the thickness of the parietal along a line running from before backward nearer or at its middle, but this would require a special instrument.

Results of considerable interest are obtained by comparing the averages of the principal external measurements of the skull which relate to its size, in all the available collections from Arkansas and Louisiana, and by contrasting them in the two sexes. According to these averages, which also are given in the next table, the Louisiana crania, of both males and females, show the largest external dimensions, while those from the Menard and Greer cemeteries in Arkansas show the smallest. This result agrees in the main with the determinations relating to the internal size of the skulls. The differences, however, on the whole are very moderate, and it is quite probable that in at least some of the groups they are accidental, due to the small number of specimens.

The average thickness of the skulls is in every series except that from Boytt's Field, Arkansas, noticeably smaller in the females than in the males. The male crania from the Menard and Greer cemeteries show the highest average thickness, but they are represented by only three specimens; the female skulls from that locality are not exceptional. The next in thickness are the male skulls from Louis-

COMPARISON OF THE AVERAGES OF PRINCIPAL CRANIAL MEASUREMENTS RELATING TO THE SIZE OF THE SKULL, EXCLUSIVE OF CAPACITY.

Locality	MALES					FEMALES					MALES		FEMALES							
	Num- ber of speci- mens	Average cranial module (mean diameter)	cm.	Num- ber of speci- mens	Average di- stancce (maxi- mum, above supra- orbital ridges)	cm.	Num- ber of speci- mens	Average nasion-opis- thion arc	cm.	Num- ber of speci- mens	Average cranial module	cm.	Num- ber of speci- mens	Average circum- ference (maxi- mum, above supraorbital ridges)	cm.	Num- ber of speci- mens	Average thickness of parietal 1 cm. above tempo- parietal suture	mm.	Num- ber of speci- mens	Average thickness of parietal 1 cm. above tempo- parietal suture
Arkansas: Menard and Greer cemeteries, Jeff- erson and Mississippi counties	3	15.47 (15.28-15.83)		3	50.8 (49.9-51.8)		3	34.5 (33.8-35.2)		7	14.82 (14.40-15.07)		7	48.0 (46.3-49.1)		7	6.0 (4-6 to 6-7)		7	5.0 (3-4 to 6-7)
Arkansas: Boytt's Field, Union county	10	15.36 (14.87-15.83)		13	50.0 (48.0-52.7)		10	35.2 (34.1-37.3)		6	14.84 (14.67-15.13)		7	48.5 (47.5-49.6)		13	5.0 (4-6 to 5-7)		9	5.3 (4-6 to 5-7)
Arkansas: Earlier National Museum material from Drew and Mississippi counties	16	15.54 (15.10-16.07)		21	50.2 (48.3-53.0)		21	35.6 (32.6-37.9)		11	14.81 (14.53-15.20)		9	48.1 (47.3-49.9)		22	5.0 (3-4 to 5-8)		13	4.5 (3-4 to 5-8)
Louisiana	12	15.55 (15.13-15.93)		16	50.4 (48.5-52.3)		13	35.5 (33.6-38.5)		17	14.90 (14.30-15.40)		16	48.8 (47.0-52.2)		17	5.5 (4-5 to 5-8)		18	4.85 (3-4 to 5-7)

RELATION OF AVERAGES IN FEMALE AND MALE SKULLS (MALE SKULLS = 100).

Locality	Cranial module	Circumference	Nasion-opisthion arc	Locality	Cranial module	Circumference	Nasion-opisthion arc
Arkansas: Menard and Greer cemeteries, Jef- ferson and Mississippi counties	96	94.5	96	Arkansas: Earlier National Museum material from Drew and Mississippi coun- ties.	95.5	96	96
Arkansas: Boytt's Field, Union county	96	97	97	Louisiana	96	97	98



MEASUREMENTS OF THE LOUISIANA CRANIA WITH REFERENCE TO THE FACIAL PARTS

MEASUREMENTS OF THE LOUISIANA CRANIA WITH REFERENCE TO THE FACIAL PARTS																					
Museum No.	Locality	Sex	Declivity of vault	Total height of face	Alveolar point-nasion height	Diameter baryg-nasion to mum	Facial index, total	Facial index, upper	Nose, height (mean from the nasal notches)	Nose, breadth-maximum	Nose, index	Orbits, height		Orbits, breadth		Orbits, index		Palate, external length	Palate, external breadth	Palate, index	
												right	left	right	left	right	left				
255,004	Harrellson Landing	Female	—	cm., 12.8	cm., 7.4	cm., 12.8	84.3	50.7	cm., 4.85	cm., 2.3	?	cm., 3.6	cm., 3.5	cm., 3.9	cm., 3.8	?	?	cm., 5.4	cm., 6.0	?	
106	Myatt's Landing	Male	—	11.3	6.8	13.4	84.3	50.7	4.85	2.3	47.4	3.6	3.5	3.9	3.8	92.5	92.1	5.4	6.0	111.1	
114	"	"	—	12.8	7.4	?	89.5	55.2	5.2	2.35	45.4	?	?	4.05	4.1	91.4	87.8	5.7	6.4	112.3	
102	"	"	0. C.	11.5	7.9	14.3	83.9	51.8	5.4	2.6	48.1	3.7	3.6	4.05	4.1	91.4	87.8	5.8	6.6	113.8	
104	"	"	0. C.	?	?	14.1	?	?	5.1	2.7	52.9	?	3.6	3.6	?	?	100.0	100.0	?	?	112.7
106	"	"	0. C.	?	?	?	?	?	5.1	2.7	?	3.5	3.6	3.9	?	?	89.7	?	?	?	?
111	"	"	0. C.	?	?	?	?	?	4.5	2.6	57.8	?	?	?	?	?	92.8	95.1	5.7	6.8	119.3
115	"	"	0. C.	?	7.9	14.5	?	54.5	5.2	2.5	48.1	3.85	3.85	4.15	4.05	?	?	?	?	?	
113	"	Female	—	11.2	7.2	?	?	?	5.2	?	?	?	?	?	?	?	?	?	?	?	?
116	"	"	—	12.2	7.3	?	?	?	5.3	?	?	?	?	?	?	?	?	?	?	?	?
108	"	"	0. C.	?	?	?	?	?	5.15	2.6	50.5	?	?	?	?	?	?	?	?	?	?
105	"	"	0. C.	?	?	13.1	?	?	4.85	2.5	51.5	3.4	3.4	3.75	3.8	90.7	89.5	?	?	?	
112	"	"	0. C.	?	?	13.4	?	?	4.8	2.7	56.2	3.3	3.4	3.9	3.8	84.6	89.5	?	?	?	
117	"	"	0. C.	11.7	6.9	?	?	?	4.85	2.45	49.5	?	?	?	?	?	?	?	?	?	?
118	"	"	0. C.	?	?	?	?	?	4.9	2.6	53.1	3.45	3.55	4.0	4.0	86.2	88.7	5.7	6.7	117.5	
154	Jones Landing	Male	—	?	?	?	?	?	5.1	2.5	49.0	?	?	?	?	?	?	?	?	?	?
203	Bray Landing	Male	—	?	?	?	?	?	5.1	2.5	?	?	?	?	?	?	?	?	?	?	?
204	"	"	—	13.4	8.0	?	?	?	5.1	2.5	?	?	?	?	?	?	?	?	?	?	?
201	"	"	0. C.	11.9	7.0	14.6	81.5	47.9	4.95	2.7	54.5	?	?	?	?	?	?	?	?	?	?
202	"	Female	0. C.	11.0	6.6	13.6	80.9	48.5	4.75	2.35	49.5	3.3	3.4	3.8	3.7	86.8	91.9	5.6	6.6	117.9	
207	Mount Landing	Female	—	11.3	6.8	?	?	?	5.0	2.5	50.0	?	?	?	?	?	?	?	?	?	?
211	Ward Place	Male	—	12.7	8.0	14.6	87.0	54.8	5.5	2.75	50.0	3.4	3.5	4.4	4.2	77.3	83.3	6.1	6.8	111.5	
209	"	"	0. C.	?	?	?	?	?	5.05	2.4	47.5	3.65	3.75	4.0	3.9	91.2	96.1	5.5	6.5	118.2	
210	"	"	0. C.	12.1	7.4	13.4	90.3	55.2	5.05	2.4	47.5	3.65	3.75	4.0	3.9	91.2	96.1	5.5	6.5	118.2	
215	"	"	0. C.	12.0	7.4	14.4	83.3	51.4	4.9	2.6	53.1	3.4	3.4	3.9	3.8	87.2	89.5	6.0	6.5	108.3	
217	"	"	0. C.	?	?	?	?	?	5.45	2.75	50.4	3.75	3.7	4.2	4.0	85.3	92.5	?	?	?	
218	"	"	0. C.	?	?	?	?	?	5.45	2.75	50.4	3.75	3.7	4.2	4.0	85.3	92.5	?	?	?	
218	"	Female	—	11.7	7.5	14.6	90.0	51.6	5.3	3.0	56.6	3.6	3.65	4.0	4.1	90.0	86.6	?	?	?	
213	"	"	0. C.	?	?	?	?	?	5.3	3.0	56.6	3.6	3.65	4.0	4.1	90.0	86.6	?	?	?	
208	"	"	0. C.	10.6	6.6	13.8	79.7	49.6	4.8	2.7	56.2	3.4	?	3.75	3.65	90.7	?	5.4	6.1	113.0	
212	"	"	0. C.	?	6.6	13.8	79.7	49.6	4.8	2.7	56.2	3.4	?	3.75	3.65	90.7	?	5.4	6.1	113.0	
214	"	"	0. C.	?	6.9	13.6	83.6	53.7	4.85	2.85	48.0	3.65	3.85	3.8	3.75	85.7	87.0	4.9	6.2	126.5	
216	"	"	0. C.	11.2	7.2	13.4	83.6	53.7	4.9	2.85	48.0	3.65	3.85	3.8	3.75	85.7	87.0	5.1	6.5	127.4	
219	"	"	0. C.	?	6.5	13.5	?	48.1	4.85	2.7	54.5	3.5	3.5	3.7	3.75	94.6	93.3	5.6	6.8	121.4	
220	"	"	0. C.	?	?	13.4	?	?	4.65	2.85	60.0	3.45	3.45	3.95	3.8	87.4	90.8	?	?	?	

iana; this has a bearing on their relatively large external size, as compared with the other groups of crania, with only a slightly larger capacity.

The percental relation of female to male averages of the principal external measurements of the vault presents considerable likeness in the four localities, and is much alike in the separate measurements. Larger numbers of specimens would doubtless reduce further some of the irregularities. As already alluded to, these sexual indices exceed considerably the similar indices of cranial capacity. This is due partly to the relatively great thickness of the female skulls and partly to other conditions. It will be of importance to determine these relations with respect to other groups of American aborigines as well as to other races.

#### THE FACIAL PARTS.

*Facial Dimensions.*—In the majority of the Louisiana crania the facial parts unfortunately are injured, yet enough remains to show that in this series the face is somewhat higher and broader than is the case with the skulls from Boytt's Field, Arkansas: it more nearly approaches the specimens from the Menard and Greer cemeteries. The relative proportions of the face, *i. e.*, the facial indices, show much similarity in all these groups, as is evident from the table on page 190. Nevertheless, the facial indices, especially the upper, are perceptibly lower in the crania from Boytt's Field than in the others, and in addition the averages of all the facial measurements of the skulls from this locality are lower than those of the other series. This relative smallness of the face of the former inhabitants of the Boytt's Field region was probably a local peculiarity.

COMPARISON OF FACIAL DIMENSIONS OF MALE SKULLS FROM LOUISIANA AND ARKANSAS

Locality	Number of Cases	Average total facial height	Number of Cases	Average upper facial height	Number of Cases	Average diameter bizygomatic maximum	Number of Cases	Average total facial index	Number of Cases	Average upper facial index
Louisiana (a)	7	cm. 12.35 (11.5-13.4)	10	cm. 7.55 (7.0-8.0)	9	cm. 14.2 (13.4-14.6)	6	86 (81.5-90.3)	8	53 (51.4-55.2)
Arkansas (b): Menard and Greer cemeteries	1	12.4	1	7.7	2	14.55 (14.5-14.6)	1	85	1	53
Arkansas (c): Boytt's Field	9	11.75 (11.3-12.2)	11	7.05 (6.8-7.3)	8	13.85 (13.3-14.3)	7	85 (81.5-90.3)	8	51 (47.9-55.2)
Arkansas (d): Drew and Mississippi counties	3	12.5 (12.1-13.1)	11	7.6 (7.0-8.2)	10	13.95 (13.5-14.6)	2	86 (84.2-88.3)	7	54.5 (52.1-60.7)

(a) The average height of the upper face in 13 female skulls from Louisiana is 6.88 cm.; in 5 from Arkansas (b), 7.35 cm.; in 5 from Arkansas (c), 6.93 cm.; and in 5 from Arkansas (d), 7.06 cm.

The average proportions and the index of the *nose* in the several groups of skulls from Louisiana and Arkansas bear close resemblance; nevertheless it will be noticed from the following table that there are certain local differences. These are due particularly to the unequal average height of the nose, which in turn is owing largely to differences in the height of the upper face. Thus the greatest average



height of the nose occurs in crania from the Menard and Greer group and in the male skulls from Drew and Mississippi counties, Arkansas, and these two series show also the lowest average nasal index. On the other hand, the lowest nose with the highest nasal index is found in the Boytt's Field crania, in which the face, as has been previously mentioned, also was exceptionally low. The average breadth of the nose differs less than the height in the various groups of skulls under consideration.

As to sexual differences, the three larger groups of crania show, as is usual in Indians, a lower average nasal index in the males than in the females. Similar difference exists also in whites and in other races, and is due to the fact that the height of the upper face is relatively less in the females, as compared with males, than its breadth.

COMPARISON OF NASAL DIMENSIONS

Sex and Locality	Number of individuals	Nose : average height	Nose : average breadth	Nasal index: average
Males				
Louisiana	13	cm. 5.16 (4.5-5.5)	cm. 2.62 (2.3-3.0)	50.95 (45.4-57.8)
Arkansas: Boytt's Field	11	4.98 (4.7-5.35)	2.54 (2.35-2.8)	51.05 (46.7-53.8)
Arkansas: Menard and Greer cemeteries	2	5.22 .....	2.62 .....	50.25 .....
Arkansas: Drew and Mississippi counties	13	5.49 (5.05-5.80)	2.69 (2.45-2.95)	49.40 (45.6-54.5)
Females				
Louisiana	15	4.87 (4.65-5.3)	2.56 (2.3-2.85)	52.65 (46.9-61.3)
Arkansas: Boytt's Field	4	4.70 (4.4-4.9)	2.57 (2.5-2.7)	54.80 (52.1-60.0)
Arkansas: Menard and Greer cemeteries	5	5.15 (4.9-5.3)	2.50 (2.4-2.6)	48.55 (45.3-51.0)
Arkansas: Drew and Mississippi counties	7	4.96 (4.7-5.2)	2.61 (2.45-2.70)	52.70 (49.0-57.4)

The *orbital* height in the Louisiana skulls ranges from 3.4 to 3.85 cm., and the breadth from 3.6 to 4.4 cm. In the females the variations are: height 3.3 to 3.65 cm., breadth 3.55 to 4.0 cm. The index varies from 77.3 to 100.0 in the male skulls, and from 84.6 to 97.3 in the female crania. The majority of the specimens are megaseme; but the value of the orbital dimensions and indices in many of the artificially deformed skulls is problematic. It is certain that in some cases of fronto-occipital compression the deformation has the effect of heightening and possibly also of narrowing the orbits. The simple occipital compression is less influential; nevertheless, when of a higher degree, it is not without an effect on the orbital measurements.

In some cases both the measurements and the indices of the two orbits differ quite appreciably, and in a majority of these instances the index of the left orbit is the larger. Thus, of the eighteen crania in which the index could be determined, it was equal in two, larger on the right side in four, and larger on the left side in twelve. Similar differences were noted in the measurements of the Arkansas series; they exist also among Indians elsewhere, and have been found in whites.

The *palate* in the Louisiana skulls is in the males predominantly mesuranic, in the females mainly brachyuranic. Its average indices are brachyuranic, and



show, as do the average measurements, considerable likeness to those of the three other series of skulls available for comparison. The higher indices in the female than in the male crania of the Louisiana group are apparently exceptional. The locality differences, shown in the following table, are so irregular that no definite significance can be attached to them.

PALATE: COMPARISON OF AVERAGE MEASUREMENTS AND INDICES

Sex and Locality	Number of specimens	External length of the palate (Turner), averages	Greatest external breadth of the palate, averages	Palatal index, averages
<b>Males</b>				
Louisiana	10	cm. 5.75 (5.4-6.1)	cm. 6.65 (6.2-7.3)	116 (108.3-122.2)
Arkansas: Boytt's Field	12	5.57 (5.3-6.0)	6.56 (6.1-7.1)	118 (108.6-126.8)
Arkansas: Menard and Greer cemeteries	1	5.80 .....	6.90 .....	119 .....
Arkansas: Drew and Mississippi counties	7	5.75 (5.6-5.8)	7.02 (6.55-7.40)	122 (113.0-128.6)
<b>Females</b>				
Louisiana	9	5.35 (4.9-5.6)	6.50 (6.0-6.8)	122 (111.1-127.4)
Arkansas: Boytt's Field	2	5.65 .....	6.45 .....	115 .....
Arkansas: Menard and Greer cemeteries	5	5.71 (5.35-6.2)	6.80 (6.55-7.1)	119 (114.5-127.1)
Arkansas: Drew and Mississippi counties	5	5.44 (5.1-5.7)	6.37 (5.95-6.75)	117 (104.4-133.9)

*Additional Measurements of the Facial and Other Parts of the Skull.*

The individual data are here given, as in the case of the Arkansas crania, in a separate table, in order to facilitate their possible use according to secondary localities or other standards. Thus presented they will also render easier the study of the effects of deformation on some of the measurements, particularly the diameter frontal maximum (see page 194).

*Prognathism.*—For the Louisiana series of skulls the measurements pertaining to facial and alveolar prognathism give an average basi-facial angle in each sex of 70°, with an average alveolar angle of 55.5° in the males and 52° in the females. The alveolar process in the females is somewhat more slanting, but it either does not increase or it increases but little the total facial protrusion. As will be seen in the next table the measurements and angles relative to this feature show a close similarity to those obtained on the Arkansas series, particularly the skulls from Boytt's Field. The basi-facial angle presents remarkably small variation, both within the individual series and in the separate groups.

*The Frontal Bone.*—As in some of the Arkansas specimens, the smallest frontal breadth is decidedly low in some of the Louisiana skulls, and it never exceeds moderate dimensions.

The averages given below show, as usual, a perceptibly larger diameter frontal minimum in the males than in the females; and there is a close similarity in the measurement of the Louisiana series and the crania from Boytt's Field, Arkansas.



ADDITIONAL MEASUREMENTS OF THE LOUISIANA CRANIA PERTAINING TO THE FACIAL AND OTHER PARTS OF THE SKULL.

Museum No.	Locality	Sex	Defor- mation of vault	PROGNATHISM					FRONTAL BONE					FORAMEN MAGNUM	LOWER JAW		
				Basion- alveo- lar point- diam- eter (a)	Basion- alveo- lar diam- eter	Angle between a and alveolar point- nasion line	Basion- alveo- lar point- diam- eter	Height from middle point to middle notches (b)	Angle between a and line b	Diam- eter frontal min- imum (a)	Diam- eter frontal max- imum (b)	Per- centage ratio of a to b	Mean diameter		Diam- eter height mm	Angle	
																right	left
255.094	Harrison Landing	Female	—	cm. 10.2	cm. 10.7	degrees 75	cm. 8.9	cm. 2.25	degrees 50	cm. 9.9	cm. 12.0	82.5	cm. 3.15	cm. 10.7	degrees 134	degrees 118	cm. 3.7
.095	Myatt's Landing	Male	—	cm. 11.0	cm. 11.1	degrees 69	cm. 9.8	cm. 2.6	degrees 56	cm. 9.2	cm. 12.3	85.6	cm. 3.15	cm. 10.2	degrees 134	degrees 118	cm. 3.5
.107	"	"	—	cm. 10.1	cm. 10.6	degrees 73	cm. 9.3	cm. 2.1	degrees 61	cm. 9.3	cm. 12.7	82.0	cm. 3.5	cm. 11.3	degrees 118	degrees 118	cm. 4.0
.114	"	"	—	cm. 10.2	cm. 10.2	degrees 73	cm. 9.3	cm. 2.1	degrees 61	cm. 9.3	cm. 12.7	82.0	cm. 3.3	cm. 9.5	degrees 124	degrees 129	cm. 3.7
.104	"	"	—	cm. 10.2	cm. 10.2	degrees 73	cm. 9.3	cm. 2.1	degrees 61	cm. 9.8	cm. 12.3	82.0	cm. 3.35	cm. 11.0	degrees 131	degrees 129	cm. 3.5
.106	"	"	—	cm. 10.2	cm. 10.2	degrees 73	cm. 9.3	cm. 2.1	degrees 61	cm. 9.8	cm. 12.3	82.0	cm. 3.35	cm. 11.0	degrees 131	degrees 129	cm. 3.5
.111	"	"	—	cm. 10.2	cm. 10.2	degrees 73	cm. 9.3	cm. 2.1	degrees 61	cm. 9.8	cm. 12.3	82.0	cm. 3.35	cm. 11.0	degrees 131	degrees 129	cm. 3.5
.113	"	"	—	cm. 10.2	cm. 10.5	degrees 70	cm. 9.1	cm. 2.75	degrees 58	cm. 9.8	cm. 11.9	82.0	cm. 3.5	cm. 9.9	degrees 131	degrees 127	cm. 3.3
.116	"	Female	—	cm. 9.9	cm. 9.7	degrees 77	cm. 9.1	cm. 2.75	degrees 58	cm. 9.8	cm. 12.4	79.0	cm. 3.05	cm. 10.3	degrees 127	degrees 118	cm. 3.2
.103	"	"	—	cm. 10.2	cm. 10.2	degrees 77	cm. 9.1	cm. 2.75	degrees 58	cm. 9.0	cm. 12.0	75.0	cm. 3.35	cm. 11.3	degrees 120	degrees 118	cm. 3.3
.105	"	"	—	cm. 9.9	cm. 9.9	degrees 77	cm. 8.2	cm. 2.75	degrees 58	cm. 9.8	cm. 11.4	82.0	cm. 3.0	cm. 9.5	degrees 122	degrees 117	cm. 3.3
.112	"	"	—	cm. 10.0	cm. 10.0	degrees 77	cm. 9.0	cm. 2.75	degrees 58	cm. 9.8	cm. 12.5	82.0	cm. 3.15	cm. 10.2	degrees 122	degrees 117	cm. 3.4
.117	"	"	—	cm. 9.9	cm. 9.9	degrees 77	cm. 9.1	cm. 2.75	degrees 58	cm. 9.8	cm. 12.2	82.0	cm. 3.5	cm. 10.2	degrees 118	degrees 122	cm. 3.6
.118	"	"	—	cm. 10.2	cm. 10.2	degrees 77	cm. 9.1	cm. 2.75	degrees 58	cm. 9.2	cm. 11.9	81.5	cm. 3.3	cm. 10.4	degrees 117	degrees 116	cm. 3.7
.154	Jones Landing	Male	—	cm. 11.0	cm. 11.0	degrees 77	cm. 9.1	cm. 2.75	degrees 58	cm. 9.2	cm. 11.7	78.6	cm. 3.3	cm. 10.7	degrees 117	degrees 116	cm. 3.4
.203	Bray Landing	Male	—	cm. 10.4	cm. 10.4	degrees 73	cm. 9.0	cm. 2.15	degrees 57	cm. 10.2	cm. 12.8	79.7	cm. 3.4	cm. 10.7	degrees 115	degrees 112	cm. 4.4
.204	"	"	—	cm. 10.5	cm. 10.5	degrees 68	cm. 9.1	cm. 2.15	degrees 57	cm. 10.2	cm. 12.7	78.6	cm. 3.3	cm. 11.4	degrees 112	degrees 113	cm. 3.8
.201	"	"	—	cm. 10.5	cm. 10.5	degrees 68	cm. 9.1	cm. 2.15	degrees 57	cm. 9.8	cm. 12.4	78.6	cm. 3.15	cm. 9.5	degrees 119	degrees 112	cm. 3.8
.202	"	Female	—	cm. 10.4	cm. 10.4	degrees 73	cm. 8.3	cm. 2.1	degrees 49	cm. 9.2	cm. 11.7	83.0	cm. 3.05	cm. 10.2	degrees 121	degrees 112	cm. 3.8
.207	"	Female	—	cm. 9.5	cm. 9.5	degrees 68	cm. 8.3	cm. 2.1	degrees 57	cm. 9.8	cm. 11.8	83.0	cm. 3.45	cm. 9.9	degrees 112	degrees 112	cm. 3.8
.211	Mound Landing	Male	—	cm. 10.8	cm. 10.8	degrees 68	cm. 9.7	cm. 2.55	degrees 57	cm. 9.5	cm. 12.5	83.0	cm. 3.45	cm. 10.6	degrees 109	degrees 115	cm. 3.6
.209	Ward Place	"	—	cm. 10.8	cm. 10.8	degrees 68	cm. 9.7	cm. 2.55	degrees 57	cm. 9.5	cm. 12.5	83.0	cm. 3.45	cm. 10.6	degrees 109	degrees 115	cm. 3.6
.210	"	"	—	cm. 10.6	cm. 10.6	degrees 68	cm. 9.0	cm. 2.7	degrees 48	cm. 9.6	cm. 12.4	83.0	cm. 3.6	cm. 10.4	degrees 118	degrees 120	cm. 3.8
.215	"	"	—	cm. 10.6	cm. 10.6	degrees 68	cm. 9.0	cm. 2.7	degrees 48	cm. 9.6	cm. 12.4	83.0	cm. 3.6	cm. 10.4	degrees 118	degrees 120	cm. 3.8
.217	"	"	—	cm. 10.5	cm. 10.5	degrees 68	cm. 8.7	cm. 2.7	degrees 48	cm. 9.8	cm. 12.1	83.0	cm. 3.7	cm. 11.0	degrees 118	degrees 126	cm. 3.4
.218	"	"	—	cm. 9.7	cm. 9.7	degrees 69	cm. 8.5	cm. 2.3	degrees 53	cm. 9.8	cm. 12.1	83.0	cm. 3.7	cm. 11.0	degrees 118	degrees 126	cm. 3.4
.213	"	Female	—	cm. 9.7	cm. 9.7	degrees 69	cm. 8.5	cm. 2.3	degrees 53	cm. 8.3	cm. 11.3	73.5	cm. 3.15	cm. 9.1	degrees 121	degrees 121	cm. 3.7
.208	"	"	—	cm. 9.2	cm. 9.2	degrees 71	cm. 8.3	cm. 1.85	degrees 52	cm. 9.1	cm. 10.8	73.5	cm. 3.05	cm. 9.1	degrees 125	degrees 125	cm. 3.3
.212	"	"	—	cm. 9.3	cm. 9.3	degrees 71	cm. 8.3	cm. 1.85	degrees 52	cm. 9.2	cm. 11.9	73.5	cm. 3.15	cm. 9.1	degrees 125	degrees 125	cm. 3.3
.214	"	"	—	cm. 9.4	cm. 9.4	degrees 72	cm. 8.4	cm. 2.15	degrees 57	cm. 9.2	cm. 12.2	73.5	cm. 3.15	cm. 9.9	degrees 117	degrees 115	cm. 3.4
.216	"	"	—	cm. 10.1	cm. 9.8	degrees 66	cm. 8.9	cm. 2.35	degrees 52	cm. 9.1	cm. 11.6	73.5	cm. 3.25	cm. 10.5	degrees 124	degrees 125	cm. 3.4
.219	"	"	—	cm. 9.7	cm. 9.7	degrees 71	cm. 8.5	cm. 2.35	degrees 52	cm. 9.5	cm. 11.7	73.5	cm. 3.25	cm. 10.5	degrees 124	degrees 125	cm. 3.4
.220	"	"	—	cm. 9.6	cm. 9.6	degrees 71	cm. 8.5	cm. 2.35	degrees 52	cm. 9.5	cm. 12.4	73.5	cm. 3.4	cm. 9.4	degrees 116	degrees 115	cm. 3.4

COMPARISON OF AVERAGE MEASUREMENTS AND INDICES RELATING TO PROGNATHISM

Sex and Locality	Number of specimens	Average basion-alveolar point diameter	Average basion-nasion diameter	Average basion-middle of nasal notches diameter	Average height from alveolar point to middle of nasal notches	Average basifacial angle (between basion-alveolar point-nasion lines)	Average alveolar angle (between basion-alveolar point-nasal notches lines)
Males.		cm.	cm.	cm.	cm.	degrees	degrees
Louisiana	7	10.5 (10.0-11.0)	10.6 (10.4-11.1)	9.3 (9.0-9.8)	2.5 (2.1-2.75)	70 (68-73)	55.5 (48-61)
Arkansas: Boytt's Field	10	10.2 (9.8-10.7)	10.4 (10.0-11.0)	9.1 (8.8-9.7)	2.2 (2.05-2.4)	71 (66-74)	55 (48-67)
Arkansas: Menard and Greer cemeteries	1	10.7 .....	11.4 .....	9.8 .....	2.3 .....	74 .....	60 .....
Arkansas: Drew and Mississippi counties	5	9.95 (9.5-10.5)	10.35 (10.0-10.7)	8.9 (8.5-9.5)	2.3 (2.0-2.5)	71 (67-73)	57 (56-58)
Females.							
Louisiana	6	9.7 (9.3-10.2)	9.8 (9.5-10.7)	8.5 (8.3-8.9)	2.2 (1.95-2.4)	70 (66-75)	52 (49-57)
Arkansas: Boytt's Field	4	?	9.8 (9.5-10.2)	?	?	?	?
Arkansas: Menard and Greer cemeteries	4	10.1 (9.4-10.6)	10.06 (9.9-10.2)	9.0 (8.5-9.3)	2.3 (1.7-2.9)	68 (64-73)	53 (51-56)
Arkansas: Drew and Mississippi counties	3	9.6 (9.4-10.0)	9.7 (9.5-9.8)	8.4 (8.3-8.6)	2.0 (1.85-2.15)	69 (66-71)	51 (49-53)*

\* Two specimens.

This similarity extends, in all probability, to the Arkansas skulls collected in 1908, though the small number of specimens in the latter collection give somewhat unequal averages.

The diameter frontal maximum, which can be considered in only the undeformed specimens, averages perceptibly less in the female crania from both Louisiana and Arkansas than it does in the male skulls, but this is due merely to the smaller size of the female head. The average percental relation between the smallest and greatest frontal diameters is alike in the two sexes, though there appears a slight tendency toward a lower index in the female crania. The proportion between the two measurements is also very similar in the different localities.

*Foramen Magnum.*—In all the groups of skulls here considered the mean diameter of the foramen magnum shows a higher average in the males than in the females; and in both sexes it is slightly higher in the Louisiana crania than in either of the groups from Arkansas. So far as the sexes are concerned, these differences are due probably to the difference in stature, for this factor has a decided effect on the size of the foramen.

*Lower Jaw.*—In this series of skulls again, as in that from Arkansas, the lower jaw is of moderate dimensions throughout; yet the averages indicate that it is slightly higher than the lower jaws from Arkansas.

Both the breadth and the height of the lower jaw are, as may be expected, perceptibly less in the females than in the males, but there are individual exceptions in both sexes.



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FRONTAL BONE—FORAMEN MAGNUM—AVERAGE PROPORTIONS AND THEIR COMPARISON

Sex and Locality	Number of specimens	Average diameter frontal minimum (a)	Number of specimens	Average diameter frontal maximum (b)	Number of specimens	Average percental relation of a to b	Number of specimens	Foramen magnum: average diameter
Males		cm.		cm.				cm.
Louisiana	17	9.6 (8.5-10.2)	6	12.1 (11.7-12.8)	6	80 (74.8-83.0)	10	3.45 (3.3-3.7)
Arkansas: Boytt's Field	13	9.6 (8.7-10.2)	3	11.9 (11.3-12.2)	3	81 (77.0-83.6)	6	3.3 (3.0-3.5)
Arkansas: Menard and Greer cemeteries	3	10.0 (9.8-10.15)	1	12.3 .....	1	18 .....	2	3.25 (3.15-3.35)
Arkansas: Drew and Mississippi counties	23	9.45 (8.4-10.7)	11	12.05 (11.4-13.3)	11	79.5 (73.7-84.9)	14	3.33 (3.05-3.7)
Females								
Louisiana	17	9.4 (8.3-9.9)	6	11.7 (11.1-12.0)	6	79 (73.5-85.6)	14	3.18 (3.0-3.5)
Arkansas: Boytt's Field	10	9.3 (8.6-10.2)	3	11.3 (11.0-11.8)	3	81 (78.2-86.4)	3	3.13 (3.0-3.3)
Arkansas: Menard and Greer cemeteries	7	9.2 (8.8-9.85)	4	11.9 (11.5-12.4)	4	77 (74.5-79.1)	5	3.15 (2.9-3.3)
Arkansas: Drew and Mississippi counties	13	9.15 (8.1-9.5)	7	11.5 (11.2-12.0)	7	79 (76.3-82.6)	8	3.14 (3.0-3.3)

LOWER JAW—AVERAGE DIMENSIONS AND COMPARISON

Sex and Locality	Number of specimens	Average bigonial diameter	Number of specimens	Average angle	Number of specimens	Average height at symphysis
Males		cm.		degrees		cm.
Louisiana	11	10.7 (9.5-11.6)	13	118 (109-131)	11	3.75 (3.4-4.4)
Arkansas: Boytt's Field	9	10.5 (9.9-11.2)	10	120 (112-128)	10	3.65 (3.2-3.9)
Arkansas: Menard and Greer cemeteries	1	10.9 .....	1	116.5 .....	1	3.40 .....
Arkansas: Drew and Mississippi counties	8	10.7 (10.0-11.9)	8	118 (108-126)	7	3.65 (3.2-4.0)
Females						
Louisiana	13	10.0 (9.1-11.3)	14	121 (109-134)	12	3.40 (3.2-3.7)
Arkansas: Boytt's Field	7	9.9 (9.5-10.7)	8	122 (110-128)	7	3.47 (3.1-3.6)
Arkansas: Menard and Greer cemeteries	4	9.95 (9.8-10.1)	3	125 (121-129)	3	3.30 (3.15-3.5)

The angle of the lower jaw, which was measured whenever possible on both sides, was found—taking the Louisiana skulls of both sexes—equal on the two sides in two, larger on the right in six, and larger on the left in eight cases. Taking all the available specimens together, it was equal in five cases, larger on the right in twelve, and larger on the left in seventeen. These results seem to indicate that there is a slight tendency toward a larger angle on the left side.

The sexual differences are again very slight. In the averages the female lower jaws of all the groups show a slightly wider angle, but, as an aid in sexual identification in individual cases, that proportion in this particular region is of little value.

## IV.

## OBSERVATIONS ON THE ARKANSAS AND LOUISIANA CRANIA.

*Cranial Vault.*

The conformation of the vault differs, naturally, in accordance with the type of the skull. As to the non-deformed brachycephalic specimens, practically the same description will apply as was given in last year's report on the Menard and Greer crania: the forehead in these skulls is usually well built, though rather narrow in front; the sagittal region is either uniformly rounded from side to side or shows a small to moderate elevation along the sagittal suture; the parietal and occipital regions are uniformly convex, without any special protrusion of the parietal bossæ or of the mid-occipital region.

The temporal ridges, while usually fairly well marked, are in no case exceptional nor do they in any case approach near the sagittal line. On the occiput several of the specimens, mentioned specially in the paragraph on anomalies, show a pronounced, more or less extensive, torus. A number of skulls, including some of those with a torus, exhibit also a marked (in one case a very decided) depression in middle at and above the inion. This fossa is characteristic and is not accidental. It is observable in the Arkansas crania and occurs with greater or less rarity in Indian skulls from other parts of North America. It apparently served for an attachment either of a ligament (extreme part of the lig. nuchæ) or of portions of the trapezius muscle.

The more oblong Louisiana skulls are characterized: by a sagittal elevation more pronounced and broader than that occurring in the brachycephals, and this crest extends occasionally forward to the frontal bone; by the greater frequency of a low forehead; by lesser convexity of the parietal regions but greater distinctness of the eminences; and by more or less protrusion of the occiput.

*Supra-orbital Ridges.*

Compared with what may be regarded as the average in whites, the supra-orbital ridges in the two series of skulls under consideration appear as follows:<sup>1</sup>

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Small	4	6	2	6
Moderate	1	4	3	11
Well developed (about as medium in white males)	8	1	8	1
Pronounced	0	0	4	0

It is seen that of the male skulls (of the sexual determination of which there

<sup>1</sup> In 23 male and 13 female Arkansas skulls from the old collections in the National Museum, the condition of the supra-orbital ridges is: None, M. 0, F. 1; small, M. 3, F. 10; moderate, M. 8, F. 0; well developed, M. 10, F. 2; pronounced, M. 2.



can be no doubt in more than perhaps one instance) there are a number that show lack of development in these features, while on the other hand there are several female crania in which the ridges reach moderate dimensions, and two in which they approach closely in extent to what would be regarded as masculine. The rather limited development of the ridges in some of the males agrees with what has been observed in the 1908 series of skulls from Arkansas.

#### *Mastoids.*

As in the case of the Menard and Greer skulls, the mastoid processes in both the Arkansas and the Louisiana series often show only a moderate development in the males, while in the females they frequently exceed the average determined in the same sex in whites and in Indians from other regions. In detail the conditions, compared with white male and female standards respectively, are as follows:<sup>1</sup>

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Small	1	0	5	0
Moderate to medium	11	2	6	11
Above medium	1	8	6	7

The rather strong development of these processes in the Arkansas and Louisiana females no doubt bears relation to a good development in this sex of the sterno-cleido-mastoid muscles, the growth of which was probably favored by the habitual carrying by these women of heavy jars and other burdens on their heads.

#### *Sutures.*

*Serration.*—The serration of the cranial sutures in Indians is generally less complicated than in the whites, and the Arkansas and Louisiana skulls here dealt with form no exception. The conditions are actually as follows:<sup>2</sup>

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Near medium in whites	3	0	5	0
Sub-medium (2-3 Broca)	6	7	10	11
More or less simple (1-2 Broca)	4	3	1	6

It is interesting to observe that the only skulls in which the serration approaches the approximate average in whites are those of males, and that, on the

<sup>1</sup> In 23 male and 12 females Arkansas skulls of the earlier National Museum collections, the mastoids are (male compared to male and female to female standards): Small, M. 6, F. 0; medium, M. 16, F. 8; above medium, M. 1, F. 4.

<sup>2</sup> In 22 male and 13 female Arkansas skulls from the earlier collections in the National Museum, the condition of the serration of sutures is: Near medium, M. 1, F. 0; sub-medium, M. 14, F. 8; more or less simple, M. 7, F. 5.



other hand, the simpler forms of the sutures are more frequent in the females in both of the groups. No regular relation has been observed between the grade of serration of the sutures and the size of the skull, though all the specimens in which the serration is best developed are large. Perhaps a very large series of skulls might produce more definite results.

*Pterions.*—In all the crania, with one exception, the pterions are of the H type, *i. e.*, the articulation is spheno-parietal. The exception occurs in female skull 255.213, from Louisiana, where on the left side the temporal squama forms a narrow articulation with the frontal. No relation is apparent between the width of the spheno-parietal articulation and the sex or the size of the skull. As to locality, the male skulls from Louisiana average broader pterions than those from Arkansas, but the female crania from the two localities present approximately the same conditions. The details are as follows:<sup>1</sup>

ARKANSAS			LOUISIANA	
Pterion H-form	Males	Females	Males	Females
Broad	1	2	6	2
Medium	6	4	10	11
Narrow	3	1	0	2

*Occlusion.*—The order of external synostosis in the cranial sutures shows a number of interesting features as well as numerous irregularities. (See table, pp. 200, 201.)

The details show that, dorsally, synostosis begins in the majority of these crania in the coronal suture, and is followed in a short time by a similar process in the sagittal, temporo-occipital, and nasal sutures. The process next manifests itself in the greatest degree in the spheno-parietal and spheno-frontal articulations, and lastly in the lambdoid suture. The temporo-parietal articulation was found patent in all the specimens.

The table shows that there are numerous individual irregularities in the appearance and progress of the synostoses. In this particular series these irregularities are doubtless augmented by the effect of the artificial deformations.

As to localities in the different sutures at which synostosis begins, it was noticed that in the coronal it is almost invariably in the portions below and at the temporal ridges, following which points of obliteration appear along the median third of the suture; in the sagittal the most frequent points of beginning of the obliteration are the obelion and the summit; in the lambdoid it begins at various points in the median third and advances downward on each side; in the temporo-sphenoidal the parts that co-ossify earliest are the inferior portions; and in the nasal suture obliteration usually begins at its distal extremity. This fairly agrees with the results of observations on American crania from other localities.<sup>2</sup> The order of

<sup>1</sup> In 19 male and 11 female Arkansas skulls from the old collections in the National Museum, the condition of the pterions is: H-Form—Broad, M. 0, F. 2; medium, M. 6, F. 5; sub-medium, M. 10, F. 3; Narrow, M. 2, F. 1; K-Form—None.

<sup>2</sup> See the writer's "Contribution to the Physical Anthropology of California," Berkeley, 1906, University of California Publications, Vol. 4, No. 2, table 5.





## SYNOSTOSES: CONTINUED

## LOUISIANA—MALES

	None	None Some about obe- lion	None Traces	? None	? None	? None	? None	? None
255.102	None							? Lower third
.104	Traces on left below tem- poral ridge	Slight about obe- lion	Traces	"	"	"	"	? None
.106	None	None	None	"	"	"	"	None
.107	None	Nearly all	Traces	Inferior half of each	Inferior half of left	Inferior half of left; all of right	Inferior half of left	Lower third
.111	All	Most	None	Inferior half of left	Inferior half of left	Inferior half of left	Inferior half of left	Distal fourth
.114	All below ridges, some above	"	Most of me- dian two- thirds	Inferior third of left; all of right	Inferior third of left	Inferior third of left	Inferior third of left	All
.115	All below ridges, some above	"	Middle third	Inferior three- fifths of each	Inferior three- fifths of each	Inferior three- fifths of each	Inferior three- fifths of each	? None
.201	All	All but posterior fifth	None	? None	? None	? None	? None	Some None
.203	Below the ridges	At numerous points	None	Some in right	Some in right	Some in right	Some in right	None
.204	None	None	Median two- thirds	Some in each	Some in each	Some in each	Some in each	? None
.209	Most	All	At numerous points	Inferior half of left	Inferior half of left	Inferior half of left	Inferior half of left	All
.210	Below the ridges	"	Most	All	All	All	All	"
.211	All	Nearly all	At some points	Inferior two- thirds of left	Inferior two- thirds of left	Inferior two- thirds of left	Inferior two- thirds of left	Inferior fourth
.215	Below the ridges	At summit and obelon	Median three- fifths	Inferior three- fourths of each	Inferior three- fourths of each	Inferior three- fourths of each	Inferior three- fourths of each	Some
.217	None	None	None	None	None	None	None	None
.218	"							

## LOUISIANA—FEMALES

	None	Some None	None	None	? None	? None	? None	? None
255.094	None							? None
.095	"	"	"	"	"	"	"	The tip
.103	On left below temporal ridge	"	"	"	"	"	"	None
.105	Below the ridges and in points above	About the summit	"	Inferior three- fourths of left	All	All	All	All
.112	None	On the summit	Superior two- thirds of right side	Inferior two- thirds of right	Both	Left fully; right patent	Left fully; right patent	None (partly broken off)
.113	None	All	None	None	None	None	None	? None
.116	"	None	"	Inferior fourth of left	Both all	Parts of each	Parts of each	None
.117	"	"	"	None	None	None	None	None
.118	Below the ridges	"	"	None	"	"	"	? None
.202	Advanced below ridges, especially on right	"	"	Traces in both	? None	All	All	All
.207	None, middle three- fifths	Middle four-fifths	Traces	Middle third of each	None	None	None	Larger part
.208	None	None	None	None	"	"	"	None
.212	"	"	"	None	"	"	"	The tip
.213	"	"	"	Middle half of left	"	"	"	None
.214	"	"	"	None	"	"	"	Some
.216	"	"	"	"	"	"	"	"
.219	"	"	"	"	"	"	"	"
.220	"	"	"	"	"	"	"	"



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occlusion among whites, according to data obtained by Hamy, Broca, and Topinard,<sup>1</sup> is sagittal, coronal below temporal ridges, lambdoid, coronal about bregma, and, finally, temporo-parietal. In all probability obliteration of the frontal suture commences earlier and advances more rapidly in the Indian than in the whites; however, the precise differences in these respects between the two races remain to be determined by further observation. According to the writer's experience there exist many individual variations in regard to suture occlusion in the whites also.

*Sutural Bones.*—If we except a few specimens, sutural bones are scarce in both the Arkansas and the Louisiana crania. The same was observed in the series of Arkansas skulls described in 1908, and is evident in the collections of crania from Arkansas and Louisiana already in the National Museum from other sources. In three of the Arkansas and six of the Louisiana skulls of the present series no Wormian or other sutural bones at all are present.

The sutural ossicles are not only few in number but they are generally small. They are found most frequently in the lambdoid, next in frequency being the temporo-occipital sutures and the squamo-mastoid angle. In two cases a sutural ossicle is present in the posterior extremity of the sagittal. In male skull 255.119, Arkansas, a small sutural bone exists between the two nasals; and in male skull 255.203, Louisiana, there is an epactal. In only two instances are there small epipteries.

## FACIAL FEATURES.

*Orbits.*

On the whole the orbits show nothing extraordinary. They differ quite widely in individuals, as shown in the measurements of height. There are no cases of very massive or of square orbits.

*Nasal Bones. Upper Maxillæ.*

The *nasion depression* as a rule is fairly well marked in the males and more or less shallow in the females, being in both quite comparable with that in whites.

The *nasal bones* usually have fair breadth. An exception to this, accompanied with an abnormality of the right bone, has been mentioned (page 176), and there are two other cases in which the breadth of the bones is sub-medium.

The *nasal bridge* averages moderate height. There are no high noses, and in three of the skulls the bridge is rather low.

The *inferior nasal border* (that of the notches) is prevalently more or less dull, as seen from the following details:<sup>2</sup>

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Border sharp as average in whites	5	3	2	5
Somewhat dull	1	3	5	9
Dull	5	3	7	3

<sup>1</sup> Topinard, P., *Éléments d'Anthropologie Générale*, Paris, 1885, p. 645.

<sup>2</sup> In 14 male and 7 female Arkansas skulls of the old National Museum collections, the condition of the inferior nasal border is as follows: Border sharp, M. 7, F. 4; somewhat dull, M. 1, F. 0; dull, M. 5, F. 2; slight to moderate sub-nasal fosse were present in M. 6 and F. 0.



In four additional cases the border is more or less dull on one side and sharp on the other. In one Arkansas male, one Arkansas female, and six Louisiana male crania, the dullness of the border is accompanied by small to well-marked sub-nasal fossæ; and in one Arkansas female and two Louisiana male skulls there are sub-nasal grooves or gutters. In an additional Louisiana male skull (No. 255.215) a slight sub-nasal fossa occurs on the right, and a moderate groove on the left. These two manifestations are doubtless only modes of the same structural tendency.

The *nasal spine* on the whole is less developed in Indian crania than in those of the whites, and the skulls of the series under consideration form no exception to this rule. They exhibit this feature as follows:<sup>1</sup>

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Well-developed nasal spine (about average in whites)	1	0	4	3
Sub-medium height as well as protrusion (= length)	8	7	7	9
No height and sub-medium protrusion	4	2	3	4

*Prognathism* has been treated under "Measurements." The protrusion of the alveolar processes ranges from what would be regarded as approximately medium in whites to that which is decidedly above such medium but does not equal the protrusion in the skulls of most members of the black races. In general the alveolar processes in the Arkansas and Louisiana skulls are regularly arched. There are no diastemæ, and, on the other hand, in a few cases only is there any crowding. (See under *Teeth*, page 208.)

*Sub-orbital Fossæ*.—By this term the writer designates the entire large depression extending over the anterior surface of the superior maxilla beneath the orbit and particularly beneath that portion of the malar bone which forms part of the lower border of the orbit. This depression, known imperfectly as the "canine fossa," is of some racial importance, since in some peoples it is generally much less developed than in others, and may even be wholly wanting, as in the case of many of the Eskimo. In Indians it often shows less depth than about the average in whites; yet there are also localities from which some of the Indian crania, at least, show sub-orbital fossæ of fair depth. As will be seen from the table (p. 204), this is somewhat the case in both the series of skulls under consideration.<sup>2</sup>

<sup>1</sup> In 13 male and 7 female Arkansas skulls from the old collections in the National Museum, the condition of the nasal spine is: Well developed, M. 4, F. 0; sub-medium height as well as protrusion, M. 6, F. 6; no height, sub-medium protrusion, M. 3, F. 1.

<sup>2</sup> In 13 male and 7 female skulls of the old National Museum collections, the condition of the sub-orbital fossæ is as follows: Well marked, M. 3, F. 5; sub-medium, M. 4, F. 1; shallow to absent, M. 6, F. 1.



	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Well-marked	3	1	2	9
Sub-medium	3	3	4	6
Shallow to absent	5	3	6	2

*The Lower Jaws.*

The *lower jaws* are generally of moderate dimensions, and all have a moderate to fairly well-marked prominence of the chin. In the skulls of seven of the Arkansas males, three of the Arkansas females, seven of the Louisiana males, and seven of the Louisiana females, the chin is more or less square. The bone is generally of good strength, but in no case very massive. The angles show a pronounced eversion in one case only, the lower jaw of female skull 255.103, Louisiana.

*Malar Bones. Zygomæ.*

The *malar bones*, in both the Arkansas and the Louisiana series, generally show moderate to good development, and very few unusual features. The malar tuberosity, or torus is well marked in a few cases, and the same is true of the processus marginalis. None of the malar bones shows division, and there is not even a case of a marked fissure in the processus temporalis.

The *zygomæ* present nothing extraordinary.

*Base of the Skull.*

About the base of the skulls there are several features of racial significance to which attention has been directed by the writer already in several instances. These are, principally, the relative depression of the petrous portions of the temporal bones (as seen when the upturned skull is examined from above), and the size of the middle lacerated foramina. They are related to the development of the brain, vary, in general, directly with the mental activities of the individual, and their differences extend to entire groups of people.

In a man or woman of the white race who has been well educated and has been well above the average in mental activity, the development of the brain has affected the skull in such a manner that the more yielding parts surrounding the petrous portions have been pressed outward, leaving the petrous portions themselves in a decided depression; and as such skulls have also grown in breadth and length more than is usual, while the petrous portions remained unaltered, the middle lacerated foramina have become more spacious. In individuals in whom extraordinary mental activity, with consequent brain growth and skull expansion, has not been realized, the depression of the petrous portions and the size of the middle lacerated foramina remain small. In the child there is no depression of the former, and the

size of the latter is insignificant. In people belonging to races not characterized by extraordinary mental activity, such as the negroes and the Australians, the inferior surface of the petrous portions is either level with or but slightly below both the neighboring surfaces of the basilar process and the sphenoid bone, and the middle lacerated foramina range from very small to small. Occasionally in these cases a flattened portion of the apex of the petrous part extends clear over on to the body of the sphenoid, leaving but a small lateral aperture representing the middle lacerated foramen. In the anthropoid apes, even those whose skulls are best developed, the inferior surface of the petrous portions is slightly *raised* (as seen from above in the upturned skull) above the basilar process and the sphenoidal parts, while the foramina lacerata media are either insignificant or entirely absent. Finally, in the lower monkeys and in quadrupeds there is a still more pronounced portion of the inferior part of the petrous wedge clear above (in upright position of the skull, below) the neighboring bone surfaces.

It is thus seen that these two features, namely, (1) the depression of the petrous portions within the other structures of the base, and (2) the grade of depression and the size of the middle lacerated foramina, are of significance and always worthy of attention. In the Indian they range in general from what would be about medium in whites to approximately the average in the African negro; but they differ somewhat according to locality. In the Arkansas and Louisiana crania of the present series, the conditions regarding these two features are as follows:<sup>1</sup>

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
<i>Petrous Portions</i>				
Level or almost level with the neighboring surfaces	3	3	0	8
Slightly depressed	4	4	7	7
Moderately depressed	4	2	6	3
Well depressed	0	0	1	0
<i>Middle lacerated foramina</i>				
Small	4	5	3	11
Moderate	4	4	8	3

The smaller Arkansas group does not clearly show sexual differences, but in the Louisiana series the female skulls indicate a decidedly inferior character, that is, extraordinary brain development is exhibited less frequently than in the males. Somewhat similar differences exist, according to the writer's observations, also in the white race.

The *styloids* are more often imperfectly developed or wanting altogether in the Indians than in whites; but there are individuals in whom the styloids reach proportions that would be regarded as average or well developed in whites, and the number of such individuals may be larger in some localities than it is in others. In the Arkansas and Louisiana crania the conditions are as given in the table (p. 206).

*Paramastoids*.—A slight to moderate, non-articular, irregular elevation, between

<sup>1</sup> In 15 male and 11 female Arkansas skulls from the old collections in the National Museum, the condition of the petrous portions is: Level, M. 1, F. 1; slightly depressed, M. 7, F. 9; moderately depressed, M. 5, F. 1; well depressed, M. 2, F. 0.



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the distal end of the jugular process and the condyle, in the region of the insertion of the rectus capitis lateralis muscle, is frequently met with in Indian crania, and those of the series under discussion form no exception. On the other hand, a large cylindrical and articular process, while by no means unknown in the Indians, is of rare occurrence. Regarding the present series, two of the male and one of the female skulls from Louisiana show moderate non-articular paramastoids, while one cranium (female No. 255.103) has on the right side an articular process 0.9 cm. high and of equal diameter.<sup>1</sup>

The *posterior condyloid foramina* are less often absent or diminutive in the Indian skulls from Arkansas and Louisiana than in those of whites. There are in all 28 skulls in which these structures can be examined, and of these they are normal

CONDITION OF STYLOIDS.\*

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Styloids approximately as well developed as in average whites of same sex	5	3	9	5
Sub-medium	3	2	1	5
Small	0	1	1	4
Rudimentary or absent (in latter case only a small base being visible)	2	5	2	2
Special	1 Right rudimentary; left sub-medium 1 Right medium; left rudimentary	—	1 Right sub-medium; left only base 1 Right very small; left moderate 1 Right base only; left medium 1 Right sub-medium; left medium	1 Right moderate; left only base 1 Right only base; left rudimentary

\* In 20 male and 11 female Arkansas skulls from the old collections in the National Museum, the condition of the styloids is as follows: Medium, M. 8, F. 1; sub-medium, M. 5, F. 0; rudimentary or absent, M. 4, F. 6. Special: Males, 1—right, medium, left only base; 1—no trace of even the bases; 1—right rudimentary, left medium; Females, 1—no trace of even the bases; 1—right rudimentary, left medium; 1—right sub-medium, left medium; 1—right rudimentary, left base only.

in 23, or 82 per cent. Of the remaining 5 skulls, one of the canals is wholly occluded in two and partly occluded in three. The obliteration occurs in male as well as in female skulls; it is present twice on the right side and three times on the left.

The *jugular foramen* is found, as in whites, to be more frequently larger on the right side, as will be seen by the following table:<sup>2</sup>

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
About equal	1	1	3	3
Right larger	5	2	9	10
Left larger	3	2	2	1

<sup>1</sup> In 12 male and 10 female Arkansas skulls from the old collections in the National Museum, the condition of the para-mastoids is as follows: Moderate non-articular elevation on each side; M. 0, F. 2.

<sup>2</sup> In 20 male and 11 female Arkansas skulls from the old collections in the National Museum, the condition of the jugular foramina is: About equal, M. 0, F. 0; right larger, M. 18, F. 10; left larger, M. 2, F. 1.

The *spinous processes* in the collection under examination offer numerous irregularities, being sometimes unusually developed. The variations in this particular structure, though of no great importance, will well repay a separate thorough study.

A feature of frequent occurrence in skulls of Indians, as well as of whites, is the projections of bone arising on one side from the spinous process or the vicinity thereof, and on the other from the superior or inferior part of the external pterygoid plate. Occasionally these processes join and give rise to a pterygo-spinous or pterygo-sphenoidal foramen. The significance of these structures, notwithstanding the fact that they have long been well known to anatomists, and are recognized as being formed by ossification of fibrous bands connecting the different points, is not yet so clear as might be desired.

In the Arkansas and Louisiana crania a greater or lesser tendency toward the formation of the inferior pterygo-spinous foramen was observed, but other conditions, as indicated below, were likewise noted.

PTERYGO-SPINOUS FORAMINA.*				
	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Tendency to superior pterygo-spinous foramen, both sides	3	0	0	0
Tendency to inferior pterygo-spinous foramen:				
Right	1	0	1	3
Left	1	0	0	1
Both sides	0	0	2	5
Inferior pterygo-spinous foramen from three-fifths to nearly complete	255.119, right ?; left four-fifths	0	255.115, right half; left nearly complete	255.095, right nearly complete; and tendency also on each side to superior foramen
	255.141, right three-fifths; left four-fifths		255.211, right three-fifths; left three-fifths	255.105, right nearly complete; left nearly complete
	255.152, right ?; left nearly complete		255.215, right nearly complete; left nearly complete	
			255.217, right two-thirds; left nearly complete	
Inferior foramen complete	255.127, right complete; left nearly complete	255.143, pterygo-sphenoidal complete on left (tendency on right)	255.201, pterygo-spinous complete on left (slight tendency on right)	0
			255.218, pterygo-sphenoidal complete on each side	

\* In 14 male and 7 female Arkansas skulls from the old collections in the National Museum, the condition of the pterygo-spinous foramina is as follows: No trace, M. 3, F. 1; tendency to superior, M. 2, F. 1; tendency to inferior, M. 9, F. 4; inferior complete, M. 1, F. 0; inferior lateral (pterygo-sphenoidal) complete, M. 0, F. 1.

*Defects of ossification in the floor of the auditory meatus.*—Of such defects, or dehiscences (Hyrtl), which are very frequent and often large in the case of Indians



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in some parts of the Western Hemisphere, particularly in Peru, the skulls from Arkansas and Louisiana show the following instances:<sup>1</sup>

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
No defects	12	7	14	11
With defects	1	2	3	7

Of the 22 skulls from Arkansas, defects in the floor of the meatus are present in three (= 14 per cent.); of the 35 skulls from Louisiana, such defects are found in 10 (= 29 per cent.).

Taking into consideration the 10 Arkansas skulls described last year, and the 30 additional skulls in the National Museum collections—a total of 62 from that State—a unilateral or bilateral dehiscence is present in 10, or 16 per cent.

Unfortunately there are only 4 additional skulls from Louisiana in the Museum. Adding this number to those above given, it is found that of the 39 skulls from that State, 10 show a defect in the floor of the meatus, on one or both sides, or in 26 per cent. of the total. These figures indicate an excess of the abnormality in the Louisiana crania.

As to sex, the abnormality is more frequent in the females. Of the 30 male skulls in the present series it occurs in 4, or 13 per cent.; while of the 27 females it exists in 9, or 33 per cent. Taking all the available skulls from both Arkansas and Louisiana, aggregating 60 males and 47 females, 7 of the former, or approximately 12 per cent., and 12 of the latter, or nearly 26 per cent., exhibit the condition. These results illustrate that, at least in Arkansas and Louisiana, the defects of ossification in the floor of the auditory meatus are more than twice as common in the skulls of females as in those of males.

#### Teeth.

The condition of the *dentition* is shown in the table on page 209.

There is only a single instance of a supernumerary tooth (see under *Abnormalities of Teeth*); and there are no pronounced defects in the form of the teeth remaining and in condition for examination.

In *size* the teeth in every case are moderate, not exceeding the average in whites. This applies to all except the third molars, which occasionally are small. (See the details following.)

More or less *wear* is exhibited in the teeth of all the skulls. It is evident that this process commences early in adult life, and occasionally before. No case of extreme wear came to notice. In a number of the crania the wear of the teeth is not uniform over the whole denture.

<sup>1</sup> In 22 male and 10 female skulls from Arkansas of the old collections in the National Museum, such defects are as follows: No defects, M. 19, F. 8; small to moderate defects, M. 3, F. 2.

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Dentition complete above; (below ?)	2	0	2	1
Complete below; (above ?)	0	2	2	1
Complete above and below	8	2	6	7
Defects	255.123, upper third left molar never erupted; below complete	255.129, upper complete; lower third molar never erupted	255.104, upper third right molar never erupted; lower complete	255.113, upper third left molar never erupted; right ?
	255.128, upper complete; lower third molars never erupted	255.147, upper ?; lower third right molar never erupted	255.210, upper third right molar never erupted; lower ?	255.216, upper third molars never erupted; lower complete
	255.152, upper third molar never erupted; lower complete			

The *upper incisors*, when present and well preserved, show generally the shovel-like, sharply outlined ventral concavity so characteristic of these teeth in the Indians, and to which attention has hitherto been called by the writer.

The number and the morphological characters of the *cusps* on the molars, when the latter are sufficiently preserved to permit observation, resemble those in whites. The number of cusps on the different molars is as follows:

CUSPID FORMULÆ OF THE MOLARS													
	Museum No.	UPPER						LOWER					
		Right			Left			Right			Left		
		1st	2d	3d	1st	2d	3d	1st	2d	3d	1st	2d	3d
Arkansas Males	225.124	4	3½*	3	4	4	?			?			
	.126	4	4	3	?	?	?	5	4	4½	5	4	4½
	.127	4	4	3	4	4	?	5	4½	6	5	4½	?
	.145	4	3½	3	4	3½	3	5	?	?	5	?	?
	.150	4	3½	3	4	3½	3	5	4	4½	5	4	4½
Arkansas Females	255.130	4	3	3	4	3	3	5	4	4½	5	4	3½
Louisiana Males	255.107	4	3½	3	4	3	IRREG-ULAR	?	?	?	?	?	?
Louisiana Females	255.116	4	3	?	4	3	"	5	4	4	5	4	4
	.117	4	4	?	4	4	"	5	4	3½	5	4	4½
	.202	4	4	3	4	4	?	5	5	?	5	5	?

\* Cusps designated by halves are those decidedly smaller than the regular cusps, yet clearly marked. The upper figure in each case expresses the number of these small cusps.

*Abnormalities of the teeth* are in detail as follows:

In male skull 255.121, Arkansas, both upper third molars are, as indicated by the alveoli, small in size.

In male skulls 255.123, 255.145, and 255.150, Arkansas, the upper front teeth show slight crowding.

In male skull 255.149, Arkansas, the right upper third molar is small.

In female skull 255.129, Arkansas, the right upper second bicuspid has a tri-lobe root.



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In female skull 255.130, Arkansas, both upper third molars are of sub-medium dimensions.

In male skull 255.107, Louisiana, the upper third molars are sub-medium in size.

In male skull 255.115, Louisiana, there is a moderate crowding of the upper front teeth.

In male skull 255.210, Louisiana, the right lower third molar points forward and upward, while the left upper third molar is of sub-medium size.

In female skull 255.116, Louisiana, the right upper third molar is diminutive.

In female skull 255.202, Louisiana, the upper third molars are sub-medium in size.

In female skull 255.216, Louisiana, there is a supernumerary tooth between the right upper lateral incisor and canine; it is smaller than the incisor, but much like it in form.

*Diseased Teeth.*—Decayed teeth, while not very common or numerous, are nevertheless quite frequent in the Louisiana crania, and in even a greater degree the same is true of teeth lost during life, doubtless due to caries in the great majority of cases. The conditions in this respect, so far as could be ascertained, are as follows:

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Skulls with no teeth decayed or lost during life	7	1	5	3
Skulls with one or more teeth decayed or lost during life	6	7	11	15

It was not possible in all cases to determine the sequence of the decay; it is nevertheless plain that among the people of both Louisiana and Arkansas, the first teeth affected by caries, both in frequency and time, were the molars, then the bicuspids, lastly the more anterior teeth. Regarding the latter, only one case of caries was observed in the canines, and the incisors that remain are all healthy, but in many instances the loss of one or more of these teeth makes the observation incomplete.

## V.

## MEASUREMENTS AND DESCRIPTION OF THE BONES.

*Bones other than Skulls.*

The measurements and observations concerning the Arkansas and Louisiana bones will be most conveniently presented together, as are the descriptive notes on the crania of the two series. Like the skulls, they present many similarities. There are slight differences here and there, but on the whole the data regarding both the



long and the other bones serve to strengthen the conclusion that we are dealing with two groups of the same people, or rather of the same mixture of people.

The separation of the bones pertaining to individuals respectively with rounded and with oblong skulls would have been desirable, but, for reasons already given, this has not been feasible.

On the whole the specimens show all the characteristics exhibited by Indian bones, though some of these characteristics, such as platynemy, are less pronounced or are less general than in the case of bones from other localities.

Many of the bones are diseased; these are dealt with in the final section of the report. Arthritic conditions are common, and inflammatory lesions, which in all probability can be ascribed to syphilis, also are frequent.

As to anomalies, those of an important nature rarely occur in the Arkansas series. The fifth lumbar vertebra of male skeleton 255.127 shows a defect in fusion of the laminae. And the right patella of male skeleton 255.141 is characterized by an unusually pronounced vastus externus notch (Fig. 9 d).

Among the Louisiana bones the left female humerus 255.108 shows a peculiar irregular exostosis back of the lower third of the deltoid ridge (Fig. 5, e). Right tibia of male skeleton 255.100 shows a pronounced popliteal ridge 16.0 cm. long. The right innominate bone of male skeleton 255.210, and the right and left innominate bones of female skeleton 255.105, have the medio-iliac foramen. The sacrum of 255.217, male, shows a considerable enlargement of the right transverse mass of its first segment and a large irregular facet thereon, by which it articulates with the enlarged lateral process of the last lumbar vertebra (Fig. 8). The seventh cervical vertebra of male 255.215 shows a foramen 5 by 2.5 mm. (defect of fusion in its spinous process), slightly distad from the middle (Fig. 9 a).

The first dorsal of 255.212, female, shows a peculiar lateral process on the left side, appearing like an anchylosed accessory rib, though both regular costal articular facets are present (Fig. 9 b). Finally, the fourth lumbar of 255.219, female, shows a separation of the posterior part of its neural arch, and its articulation with the pedicles by a very irregular facet on each side; both the third and fifth lumbar being normal (Fig. 9 c).

#### *The Humerus.*

The total number of paired humeri is 92, representing 28 males and 18 females. Their average length ranges in the males from 32.6 to 32.7 cm., and in the females from 29.8 to 32.0 cm., almost exactly the averages obtained by the writer from observations on 378 male and 133 female white Americans from eastern United States.<sup>1</sup> The relation between the female and male arm-bones is approximately as 92 to 100, which also is equal to that in whites. This length of humerus would correspond, according to Manouvrier's standards, to a stature average of about 166 cm. in males and about 154 cm. in females. This point will be dealt with again under *Femur* (page 215).

<sup>1</sup> This and additional material which will be here referred to is in preparation for special publication.



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The dimensions of the shaft at the middle show an average lateral diameter<sup>1</sup> very nearly as large as in the whites; but the average antero-posterior diameter<sup>2</sup> is decidedly smaller. This is best shown in the percental relation of these two diameters, or index of the shaft at middle. This in the writer's series of 304 white American males averages on the right 81.6, and on the left 83.9; and in 97 American females, on the right 78.8, and on the left 79.6. In the Indians under consideration, the same index averages 74.4 (Arkansas) and 76.8 (Louisiana) on the right, and 75.4 (Arkansas) and 77.8 (Louisiana) on the left in the males; while in the females it is 69.8 (Arkansas) and 73.1 (Louisiana) on the right, with 73.1 (Arkansas) and 73.9 (Louisiana) on the left. These proportions show that the humeri of the Arkansas and Louisiana Indians are both weaker and flatter than those of the average white Americans. In both the white and the Indian, and in both sexes, the left humerus shows a higher index of the shaft than the right bone; this is due to the fact that its lateral diameter is smaller, as compared with that of the right humerus, while the difference is less in its antero-posterior dimension on the two sides.

HUMERUS—LENGTH: DIMENSIONS AND INDEX AT MIDDLE. RADIUS—LENGTH: RADIO-HUMERAL INDEX

Sex and Locality	Side	Number of specimens	Average length (maximum)	Number of specimens	Average diameter lateral at middle	Number of specimens	Average diameter antero-posterior at middle	Number of specimens	Average index of shaft at middle	Number of specimens	Average length (maximum) of radius	Number of specimens	Average radio-humeral index
Males			cm.		cm.		cm.		cm.		cm.		
Arkansas: Boytt's Field	Right	9*	32.7 (29.5-34.2)	10	2.3 (2.0-2.6)	10	1.70 (1.55-1.85)	10	74.4 (69.4-83.7)	3	25.0 (24.4-25.7)	3	75.6 (75.3-77.9)
	Left	9	32.6 (29.4-34.2)	10	2.2 (1.95-2.35)	10	1.67 (1.5-1.8)	10	75.4 (72.7-80.9)	3	24.7 (24.1-25.5)	3	75.0 (74.2-79.0)
Louisiana	Right	19	32.7 (30.6-35.2)	18	2.3 (1.85-2.7)	18	1.76 (1.35-1.95)	18	76.8 (64.6-90.7)	10	25.3 (24.1-26.5)	9	77.8 (74.6-80.1)
	Left	19	32.7 (30.2-35.8)	18	2.2 (1.85-2.7)	18	1.74 (1.35-2.05)	18	77.8 (68.1-89.1)	10	25.1 (22.9-26.5)	9	77.6 (72.9-80.5)
Females													
Arkansas: Boytt's Field	Right	2	28.9 (27.6-30.2)	5	2.05 (1.8-2.2)	5	1.4 (1.3-1.6)	5	69.8 (66.7-72.7)	—	—	—	—
	Left	2	28.9 (28.0-29.9)	5	2.0 (1.75-2.2)	5	1.4 (1.15-1.6)	5	70.3 (65.0-80.0)	—	—	—	—
Louisiana	Right	13	30.2 (28.3-32.0)	13	2.05 (1.8-2.2)	13	1.5 (1.35-1.6)	13	73.1 (67.5-80.6)	14	22.7 (21.9-23.7)	6	76.2 (74.2-78.6)
	Left	13	29.8 (28.1-32.0)	13	2.0 (1.9-2.2)	13	1.5 (1.3-1.6)	13	73.9 (63.4-84.2)	14	22.6 (21.6-24.1)	6	77.4 (75.2-80.6)

\* Applies to pairs only.

<sup>1</sup> Parallel with the anterior surface of the bone.<sup>2</sup> At right angles to its anterior surface.

The shape of the shaft in cross-section at middle approaches, for the greater part (as will be seen from the details given below), the prismatic, or a prismatic with a broadening of the anterior border into a fourth surface. There is also a fair percentage of plano-convex humeri which represent the juvenile form.

HUMERUS—SHAPE OF SHAFT AT MIDDLE (*a*).

Types of Shape	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Number of specimens examined	11	11	5	6	21	21	19	18
Types:								
1 or near 1 ( <i>b</i> )	3	4	3	1	9	9	17	12
2 or near 2 ( <i>c</i> )	0	0	0	0	1	2	0	2
4 or near 4 ( <i>d</i> )	5	4	1	1	4	9	1	3
p. c. or near p. c. ( <i>e</i> )	3	3	1	4	7	1	1	1

*a* See, in this regard, as well as in connection with the same item under other headings, Hrdlicka, A., Typical Forms of Shaft of Long Bones, Proc. Ass. Amer. Anat., 14th Sess., 1900, p. 55 *et seq.*

*b* Ordinary prismatic.

*c* Lateral prismatic.

*d* Anterior border at and below middle is broadened into a fourth surface.

*e* Plano-convex.

The torsion was found, barring a few individual exceptions, to be moderate.

The deltoid eminence, while generally well marked, is pronounced only in the humeri of one skeleton, namely, female 255.130, Arkansas.

None of the humeri examined bears more than a trace of the supra-condyloid process.

The articular extremities show the usual sex differences.

The septum between the coronoid and the olecranon fossæ is defective in a large proportion of these humeri. These defects appear to be more common in the Arkansas series than in that from Louisiana, and, as usual, they are decidedly more frequent in the females than in the males. As to the sides, there is in these series a slight preponderance of the defects on the right, which is contrary to the rule, and is probably accidental. As in other cases the perforation is often found on both sides of the body. The relatively great frequency of these defects, which are formed principally during childhood, by physiological absorption of the bone composing the septum, will be noted from the fact that, among 2371 humeri of whites of both sexes, examined by the writer, such defects existed only in 99, or 4.2 per cent. In the following table are presented the details in regard to this peculiarity in the humeri under consideration.



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HUMERUS—DEFECTS OF THE SEPTUM								
Defects	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Total number of specimens examined	11	12	4	6	18	23	20	17
Defects: pin-point	—	1	—	—	2	—	—	—
small	3	2	1	—	—	2	—	4
medium	—	3	2	3	—	3	7	6
large	2	1	—	1	1	1	1	2
special	—	—	—	—	—	1 (a)	—	—
Total defects	5	7	3	4	3	7	8	12
Percentage of bones with defects	45%	58%	75%	67%	16.5%	30%	40%	71%
Percentage of bones with defects according to locality	Arkansas, 58%				Louisiana, 38.5%			
Percentage of bones with defects according to sex	Males, 34.5%				Females, 57.5%			
Percentage of bones with defects according to side	Right, 57.5%				Left, 41.2%			

(a) Shows two perforations.

*The Radius.*

As with the humerus, the dimensions of the radius are quite similar in the Arkansas and Louisiana skeletons; and, as in whites, the bone averages slightly longer on the right side. In strength and curvature the radii of both groups are generally moderate.

The principal interest of the radius lies in the comparison of its length with that of the humerus, or in the so-called radio-humeral index. This proportion is decidedly greater in Indians than in whites, showing that the Indian forearm is relatively longer, a feature common to the less advanced races. The examination of the bones of 526 white males and 212 white females gave the writer an average radio-humeral index of 73.6 for the former and 72.8 for the latter. In the Indians, as is seen in the above table, the index averages approximately 75.3 for the Arkansas and 77.7 for the Louisiana males, with 76.8 for the Louisiana females. Both in whites and in Indian males it is slightly higher on the right than on the left; the small group of female skeletons from Louisiana form an exception.

*The Ulna.*

The average dimensions of the ulna are given in a table in the section on *Fibulae* (page 220). There are only 39 ulnae in condition to permit measurement.

The bones of the right side exceed perceptibly in length those of the left side, in both the males and the females. The curvature is usually fairly well marked. The pronator quadratus ridge is generally well developed, and occasionally, as in female ulna 255.219, Louisiana, is pronounced. The shape of the shafts of the ulnae is given in the next table. The shafts, it is seen, are chiefly prismatic; but there are also numerous cases in which there are four instead of three distinct surfaces, due to duplication of the posterior plane, and many instances in which one or more of the surfaces are pronouncedly concave.

ULNA—SHAPE OF SHAFTS AT MIDDLE								
Types of Shape	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Number of specimens examined	6	9	2	1	16	14	19	17
Types:								
1 (a)	4	4	1	1	4	4	7	9
3 (b)	2	2	—	—	2	5	3	1
3a (c)	—	—	—	—	—	—	2	2
3b (d)	—	2	1	—	1	—	1	1
4 (e)	—	1	—	—	7	4	6	3
Unclassified	—	—	—	—	2	1	—	1

a Prismatic or near prismatic.

b Flexor surface concave.

d Both flexor and extensor surfaces concave.

c Extensor surface concave.

e Four surfaces well defined.

*The Femur.*

The length of the femur in the Arkansas and Louisiana groups shows slight differences, but as these are unequal in the two sexes, they are probably without significance. The length of the female femur is to that of the male approximately as 92 to 100, the same relation as with the humeri. In most of the subdivisions the left bone is of very slightly greater average length than the right, a phenomenon observed also in whites and in other races.

Additional measurements of the femur pertain to the sub-trochanteric flattening, which in the whites has been studied principally by Manouvrier.<sup>1</sup> Of this

<sup>1</sup> Manouvrier, L., *La Platymérie*. 46. The same, *La Platymérie*. C.-R. du Congr. intern. d'Anthrop., Paris, 1889. 47. The same, *La Platymérie*. Rev. mens. de l'École d'Anthrop. de Paris, 1892. 51. The same, *Étude sur les variations morphologiques du corps du fémur dans l'espèce humaine*. Bull. de la Soc. d'Anthrop. de Paris, 1893.

See also, for additional bibliography and observations: Klaatsch, H., *Die Wichtigsten Variationen am Skelet der Freien Unteren Extremität des Menschen und ihre Bedeutung für das Abstammungsproblem*. Ergebnisse der Anatomie und Entwicklungsgeschichte, X, Wiesbaden, 1900, p. 599, *et seq.*



flattening, which is more pronounced in Indians than in whites, two measurements were taken, namely, the greatest lateral and the smallest antero-posterior diameter. The percental relation of these dimensions gives the index of the flattening. This index, it is seen, is lower in the females than in the males, showing that the female femur is the flatter at this point. As to the two sides, it differs but little. In the two areas under consideration, the index of flattening is perceptibly higher in the femora of the Arkansas males than in those of Louisiana. The female groups show an opposite condition, but this may be due to the small number of specimens obtained.

FEMUR—LENGTH: MEASUREMENTS AND INDEX OF SUBTROCHANTERIC FLATTENING

Sex and Locality	Side	Number of specimens	Average bicondylar length of femur	Number of specimens	Average minimum breadth at subtrochanteric flattening (a)	Number of specimens	Average minimum thickness at subtrochanteric flattening (b)	Number of specimens	Index of platynery $\left(\frac{b \times 100}{a}\right)$
Males			cm.		cm.		cm.		
Arkansas : Boytt's Field	Right	14	45.6 (42.0-48.8)	15	3.2 (2.75-3.65)	15	2.5 (2.15-2.75)	15	76.7 (70.4-84.6)
	Left	14	45.6 (42.1-48.7)	15	3.2 (2.8-3.5)	15	2.5 (2.2-2.75)	15	76.6 (72.1-80.8)
Louisiana	Right	19	44.1 (39.9-48.3)	23	3.3 (3.0-3.6)	23	2.4 (2.0-2.7)	23	74.2 (65.6-86.7)
	Left	19	44.2 (39.8-48.4)	23	3.3 (2.9-3.6)	23	2.4 (2.0-2.7)	23	74.6 (64.7-83.3)
Females									
Arkansas : Boytt's Field	Right	4	41.0 (38.9-42.4)	6	3.2 (3.15-3.35)	7	2.2 (1.75-2.45)	6	69.5 (54.7-75.4)
	Left	4	41.2 (39.2-42.8)	6	3.2 (3.05-3.3)	7	2.2 (1.70-2.45)	6	70.2 (53.1-78.7)
Louisiana	Right	12	41.25 (38.8-43.1)	13	3.05 (2.8-3.3)	13	2.2 (2.05-2.4)	13	72.9 (62.1-81.1)
	Left	12	41.3 (38.4-43.3)	13	3.05 (2.85-3.3)	13	2.2 (2.0-2.35)	13	72.2 (63.5-81.0)

The relation between the length of the humerus and the length of the femur, or humero-femoral index, approaches 72 in this series, or nearly the same as is observed in whites.

The shaft is massive and generally well developed.

The linea aspera, as will be seen by the following notes, is in numerous cases exceptionally high, giving the so-called pilasteric character to the shaft; but this feature is plainly a compensatory one, for a more than ordinarily greater backward bending of the shaft, about or above its middle, is present in these bones.

The shape of the shaft predominantly approaches the prismatic, but pure types of this form are rare. Next in frequency is the elliptical shape, followed by the plano-convex. It is interesting to note that the plano-convex shaft is found only in the males. A somewhat similar condition prevails in the case of the round shaft, while, on the other hand, the elliptical form is much more frequent in the female femora.

FEMUR—LINEA ASPERA								
Condition of Linea Aspera	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Number of specimens examined	16	17	7	6	28	23	16	18
Medium	5	5	7	6	13	17	13	14
High	7	9	—	—	11	3	3	4
Very high	4	3	—	—	4	3	—	—

FEMUR—SHAPE OF SHAFT AT MIDDLE								
Types of Shape	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Number of specimens examined	14	16	7	6	25	21	17	17
Types:*								
<i>l</i> or near <i>l</i>	8	9	4	2	14	12	10	8
<i>e</i> or near <i>e</i>	—	1	1	2	3	3	6	8
<i>r</i> or near <i>r</i>	1	1	—	1	5	2	—	—
<i>d</i> or near <i>d</i>	—	—	2	1	1	2	1	1
<i>p. c.</i> (6) or near	5	5	—	—	2	2	—	—

\* *l* Ordinary prismatic.

*e* Elliptical.

*r* Round.

*d* Anterior surface divided by a vertical ridge into two surfaces.

*p. c.* (or 6) plano-convex.

As will be seen in the next table, gluteal tuberosities, or third trochanters, are fairly numerous, particularly in the bones from Louisiana. This process is also slightly more frequent in this series among the females than among the males. The oblong form is decidedly more numerous than the rounded one.

Individual specimens that deserve separate notice, in addition to those mentioned in Section VI, are as follows:

Male femora 255.121, 255.128, 255.141, Arkansas: Angle of neck of these specimens on both sides is very obtuse.

Right male femur 255.124, Arkansas: Exceptional grade of torsion.

Female femur 255.130, Arkansas: The shaft shows on the antero-external surface, upper third, a smooth, bony elevation, 2.3 cm. long, 0.4 cm. high, and 1.4 cm. broad.

Right male femur 255.205, Louisiana: Torsion pronounced; left bone?



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Female femora 255.105a, Louisiana: Both show marked torsion.

Female right femur 255.112, Louisiana: The gluteal tuberosity is 4.0 cm. long and 1.0 cm. high.

FEMORA—THIRD TROCHANTER, OR GLUTEAL TUBEROSITY								
Variety of Third Trochanter	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Number of specimens examined	13	15	7	6	27	21	17	19
Small rounded	—	1*	—	1	1	2	—	—
Small oblong	2	—	4	2	6	6	5	5
Medium rounded	1	—	—	—	1	—	2	1
Medium oblong	1	1	—	1	4	4	1	4
Pronounced rounded	—	—	—	—	—	—	—	1
Pronounced oblong	—	1	—	—	2	1	4	1
Absent	9	12	3	2	13	8	5	7
Percentage of bones with third trochanter, all grades and variations	31%	20%	57%	67%	52%	62%	71%	63%
Percentage of bones with third trochanter, according to locality	Arkansas, 36.5%				Louisiana, 61%			
Percentage of bones with third trochanter, according to sex	Males, 55%				Females, 65%			

\* Three moderately rounded tubercles.

### The Tibia.

The length of the tibiae, like that of the femora, averages slightly greater in the male skeletons from Arkansas than in those from Louisiana; as to the females, the bones from Arkansas are too few in number to be of value for comparison. The right tibia averages slightly longer than the left. The relation of the length of the tibia to that of the femur, *i. e.*, the tibio-femoral index, which ranges in whites from about 80 to 81, is perceptibly greater in the skeletons under consideration, especially those from Louisiana. It is a curious local peculiarity that this index, in both males and females, is somewhat higher in Louisiana than in Arkansas. The sexual differences, as in whites, are quite immaterial; and nothing definite appears from the series as to differences on the two sides of the body.

In addition to its length, the tibia was measured also as to its two principal

diameters at the middle of the shaft. These diameters,<sup>1</sup> as determined by the writer in nearly 2000 normal adult bones of whites,<sup>2</sup> produce for the antero-posterior dimension in the males an average of 3.13 cm. on the right, and 3.14 on the left; while in the females it is 2.72 cm. on the right and 2.57 c. m. on the left.

TIBIA—LENGTH; DIMENSIONS AND INDEX AT MIDDLE; TIBIO-FEMORAL INDEX

Sex and Locality	Side	Number of specimens	Average length (greatest length less spine)	Number of specimens	Average diameter antero-posterior at middle	Number of specimens	Average diameter lateral at middle	Number of specimens	Average index of shaft at middle	Number of specimens	Average tibio-femoral index
Males			cm.		cm.		cm.				
Arkansas: Boytt's Field	Right	7	38.5 (36.4-41.6)	9	3.45 (3.2-3.85)	9	2.2 (1.95-2.45)	8	63.7 (51.9-81.7)	5	82.1 (79.8-85.2)
	Left	7	38.3 (35.9-41.6)	9	3.5 (2.85-3.8)	9	2.2 (2.0-2.35)	8	63.6 (52.6-82.3)	5	82.6 (79.0-85.4)
Louisiana	Right	13	37.10 (34.4-40.3)	17	3.3 (2.8-3.7)	17	2.2 (1.9-2.6)	17	68.45 (58.6-78.6)	9	84.2 (79.8-88.6)
	Left	13	37.08 (34.5-40.3)	17	3.3 (2.9-3.7)	17	2.2 (1.85-2.6)	17	68.5 (56.8-79.3)	9	84.3 (81.1-86.6)
Females											
Arkansas: Boytt's Field	Right	2	33.15 (33.1-33.2)	4	2.8 (2.75-2.9)	4	1.95 (1.85-2.05)	4	68.7 (63.8-73.2)	2	82.7 (80.1-85.4)
	Left	2	33.15 (32.7-33.4)	4	2.8 (2.7-2.95)	4	2.0 (1.8-2.3)	4	69.8 (66.1-78.0)	2	82.0 (80.5-83.7)
Louisiana	Right	10	34.8 (32.2-37.8)	9	2.9 (2.6-3.05)	9	1.9 (1.65-2.05)	9	64.5 (55.0-70.2)	6	84.3 (81.9-88.2)
	Left	10	34.7 (32.3-37.6)	9	2.9 (2.65-3.1)	9	1.85 (1.55-2.05)	9	63.9 (55.3-71.7)	6	83.5 (80.8-86.5)

The lateral diameter of the tibia averages in white males, on the right side 2.24 cm., on the left 2.20 cm.; in the females, on the right 2.05 cm., and on the left 1.86 cm. This dimension gives a breadth-height index of the shaft of the tibia of 71.1 in the white males and 71.9 in the white females. In the Indians the antero-posterior diameter in all the series is somewhat superior to that in whites, while the lateral dimension averages equal or smaller. This gives rise to a smaller index of the shaft, expressing greater platynemy in the Indian. Comparisons as to locality, sex, and side, in the two Indian series, are not satisfactory, due to the small and irregular number of specimens.

As to the shape of the shaft of the tibia, the ordinary prismatic is found to prevail, but lateral prismatic shafts are also quite numerous. A large proportion of the tibiae, however, show a shaft characterized by pronounced concavity of the external surface in the region of the tibialis anticus muscle, while numerous others

<sup>1</sup> The antero-posterior diameter is the maximum measurement, the lateral diameter being that at a right angle to the antero-posterior axis of the bone. The latter is taken in such a way that the anterior border of the tibia lies on the rod of the sliding compass in the middle of its opening.

<sup>2</sup> See "Study of the Normal Tibia," *The American Anthropologist*, October, 1898, p. 307 *et seq.*; also *Proc. Assoc. Amer. Anatomists*, 11th Annual Session, New York, 1898.



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are of type 4, which distinctly shows four instead of three surfaces, the additional plane resulting from a duplication of the posterior surface by a ridge which follows the line of the septum between the flexor longus digitorum and the tibialis posticus muscles.

TIBIA—SHAPE OF SHAFT AT MIDDLE								
Types of Shape	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Number of specimens examined	14	13	4	6	20	22	12	12
Types: 1 or near 1 (a)	2	4	2	4	5	9	5	4
2 or near 2	1	1	2	2	4	3	1	3
3 or near 3	3	3	—	—	6	4	2	1
4 or near 4	7	4	—	—	5	6	2	3
5 or near 5	1	—	—	—	—	—	2	1
6 or near 6	—	1 (b)	—	—	—	—	—	—

(a) 1 Ordinary prismatic.

2 Lateral prismatic.

3 External surface markedly concave.

4 Posterior surface divided into two distinct surfaces by a vertical ridge.

5 Posterior surface concave, external border indistinct.

6 Lateral prismatic, with postero-lateral and antero-lateral surfaces markedly convex and anterior border very dull.

(b) Specimen 255.138a was partly fused with tibia, which may account for this exceptional shape in an Indian.

The inclination of the head of the tibia was, in no case, very pronounced.

#### *The Fibula.*

The proportion of fibulae available for measurement is rather small, though fragments are numerous. The measurements of length show practically equal averages for the bones of the two sides.

The shape approaches most frequently the ordinary or the lateral prismatic.

In female skeleton 255.097, Louisiana, both the fibulae are unusually flat.

#### *The Clavicle.*

The collection contains 31 clavicles that can be measured. These bones show nearly the same dimensions in the two areas from which the material was gathered. They also show that the left clavicle is on the average somewhat longer than the right. A similar condition exists, as we know from the studies of Pasteau<sup>1</sup> and others, in whites and in other races.

<sup>1</sup> Pasteau, E. Recherches sur les proportions de la clavicule dans les sexes et dans les races. Thèse. Paris, 1879.

The curves of the clavicle are moderate in all but two cases (male 255.123 and male 255.127, Arkansas), in which they are very marked.

None of the bones is massive.

Rhomboid impression or facet is present in slight to moderate form in all, and is pronounced in male 255.123, Arkansas.

Female clavicle 255.095, Louisiana, shows a very prominent conoid tubercle.

## ULNA; FIBULA; CLAVICLE—LENGTH

Sex and Locality	Side	Number of specimens	Average length (maximum) of the ulna	Number of specimens	Average length (maximum) of the fibula	Number of specimens	Average length (maximum) of the clavicle
Males			cm.		cm.		cm.
Arkansas: Boytt's Field	Right	5	27.3 (25.4-29.3)	3	36.2 (35.6-36.6)	4	15.1 (13.2-16.4)
	Left	—	.....	—	.....	4	15.7 (14.0-17.1)
Louisiana	Right	7	26.9 (25.9-28.1)	4	36.75 (35.3-39.2)	7	15.2 (13.6-16.1)
	Left	7	26.6 (25.1-27.8)	4	36.7 (35.3-39.1)	7	15.5 (14.1-16.3)
Females							
Arkansas: Boytt's Field	Right	2	24.1 (23.8-24.5)	—	.....	1	14.0
	Left	—	.....	2	32.4 (32.0-32.8)	—	.....
Louisiana	Right	9	24.4 (23.8-25.4)	4	34.7 (34.2-36.3)	4	13.5 (12.9-14.1)
	Left	9	24.3 (23.4-25.3)	4	34.7 (34.0-36.3)	4	13.7 (13.1-14.5)

## FIBULA—SHAPE OF SHAFT AT MIDDLE

Types of Shape	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Number of specimens examined	2	4	—	1	16	11	6	5
Types: 1 (a)	1	2	—	1	5	1	—	1
2 or 2a (b)	—	—	—	—	5	8	3	2
3 or 3a (c)	—	1	—	—	3	2	1	—
3b (d)	1	—	—	—	—	—	1	1
4 (e)	—	1	—	—	3	—	1	1

a Ordinary quadrilateral, approaching prismatic.

b Approaching lateral prismatic.

c External or internal surface concave.

d Both external and internal surfaces concave.

e Five distinct surfaces (formation by a vertical ridge of two planes from the external surface).



*The Sternum.*

From Arkansas there are two bodies and four manubria, and from Louisiana four bodies and seven manubria. In none of these cases is the manubrium attached to the body. The bodies vary considerably in all dimensions.

*The Scapula.*

Of the scapulæ there are but few fragments, and three imperfect pieces that could be measured. All of these are from Louisiana. In descriptive features they exhibit nothing of special interest.

MEASUREMENTS							
Sex	Number	Side	Height : inferior to superior angle	Height: inferior angle to inter- section of spine and median border	Breadth (Broca)	Breadth-height index total	Breadth-height index inferior
Male	255.201	Right	cm. 16.0	cm. 11.7	cm. 10.5	65.6	89.7
Male	.106	Left	?	11.0	10.7	?	97.3
Female	.095	Left	13.5	11.0	?	?	?

*The Vertebrae.*

The dimensions of the vertebrae are generally moderate, the bones being never very large or massive. The principal anatomical features are similar to those in whites. As to variations in number, little can be determined on account of the incompleteness of the sets.

The principal anomalies of the vertebrae are mentioned at the beginning of this section.

A peculiar feature is the very frequent occurrence of more or less marked lateral asymmetry of the bodies of the dorsal vertebrae, without indication of disease.

*The Pelvis.*

There are in all 14 pelves, 4 male and 10 female, on which measurements are possible. Owing to the small number of specimens in the individual groups, the data are not useful for comparison, and must remain simply as so many records to be utilized with additional material in the future.

The general index of the pelvis averages higher in the male skeletons from the two sections, as well as in the female skeletons from Louisiana, than it does in the whites, thus showing relatively great breadth. The average index of the inlet, which in whites ranges from 79 to 80, is likewise greater in most of the Indian skeletons.

In addition to the pelves, there are present a number of single ossa innominata, the measurements of which are given in the table (p. 223). The figures give some interesting indications, but the number of specimens is too small for definite deductions.

## PELVIS—DIMENSIONS AND INDICES

Sex and Locality	Number of specimens	Average maximum height (a)	Average maximum breadth (b)	Average index of pelvis $\left(\frac{a \times 100}{b}\right)$	Number of specimens	Average greatest breadth of the inlet	Average depth (diameter antero-posterior) of the inlet	Average index of the inlet
Males		cm.	cm.			cm.	cm.	
Arkansas : Boytt's Field	1	20.2	27.0	134	1	11.8	.....	.....
Louisiana	6	21.3 (20.8-22.2)	27.9 (26.3-29.6)	130.6 (119.5-135.8)	6	12.1 (11.4-13.3)	11.0 (9.7-12.6)	91.6 (75.2-107.0)
Females								
Arkansas : Boytt's Field	2	20.6 (20.2-21.0)	26.7 (26.2-27.2)	129.6 (129.5-129.7)	3	13.0 (12.4-13.8)	10.9 (10.3-12.1)	84.1 (81.2-87.7)
Louisiana	4	19.5 (18.2-20.3)	27.6 (26.7-28.6)	141.4 (136-152.7)	3	13.5 (12.9-14.3)	10.4 (9.2-11.5)	77.5 (69.7-89.1)

*The Sacrum.*

The total number of sacra that could be measured is 13, but some additional specimens are available for observation. The indices are all lower than in the whites, showing that the sacrum is relatively high, as in the negro.

## OSSA INNOMINATA; SACRUM—AVERAGE MEASUREMENTS AND INDICES

OSSA INNOMINATA								SACRUM				
Sex and Locality	Side	Number of specimens	Average height (maximum) (a)	Number of specimens	Average breadth (between superior iliac spines) (b)	Number of specimens	Average breadth-height index $\left(\frac{b \times 100}{a}\right)$	Sex and Locality	Number of specimens	Average height (in middle) (a)	Average breadth (maximum) (b)	Average index $\left(\frac{b \times 100}{a}\right)$
Males			cm.		cm.			Males		cm.	cm.	
Arkansas : Boytt's Field	Right	2	20.0 (19.8-20.2)	—	.....	—	.....	Arkansas : Boytt's Field	2	11.55 (11.0-12.1)	11.7 (11.5-11.9)	101.6 (95.0-108.2)
	Left	2	19.9 (19.8-20.0)	--	.....	—	.....					
Louisiana	Right	2	22.05 (22.0-22.1)	2	16.05 (15.4-16.7)	2	72.8 (70.0-75.6)	Louisiana	4	11.8 (11.4-12.4)	11.7 (10.7-12.5)	99.1 (93.9-107.0)
	Left	2	22.15 (22.1-22.2)	2	15.85 (15.3-16.4)	2	71.6 (69.2-73.9)					
Females								Females				
Arkansas : Boytt's Field	Right	2	20.6 (20.2-21.0)	1	15.4	1	73.3	Arkansas : Boytt's Field	1	12.1	12.8	105.8
	Left	2	20.6 (20.2-21.0)	1	15.7	1	74.8					
Louisiana	Right	2	20.1 (20.1-20.1)	2	15.0 (14.8-15.2)	2	74.6 (73.6-75.6)	Louisiana	6	11.1 (9.6-12.3)	11.8 (11.1-12.4)	106.9 (100.8-115.6)
	Left	2	20.1 (19.9-20.3)	2	15.45 (15.3-15.6)	2	76.9 (75.4-78.4)					



As to the number of segments composing the sacrum, it is found that in three-fourths of the cases the bone has five, and in the remainder of the specimens, six. In addition there is a tendency in one case (Fig. 8) to assimilation of the last lumbar.

Of the extra segments one is lumbar and four are coccygeal.

The curvature is more often accentuated in the females than in the males, as in whites. As will be seen from the details presented in the next table, it also begins high more frequently in the females than in the males.

The neural canal is defective for the greater part from the fourth, or from below the fourth, spinous process downward. This also is most frequently the case in whites.

SACRUM—CHARACTERISTICS				
	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
<i>Segments: 5</i>	3	—	6 (1 tending to assimilation of last lumbar)	5
6	—	1	2	2
<i>Extra segment is</i>	—	1 coccygeal	1 lumbar 1 coccygeal	2 coccygeal
<i>Curvature:</i>				
small	—	—	2	—
moderate	3	—	5	2
good	—	2	2	5
<i>Curvature begins with</i>				
first segment	—	1	3	5
second segment	3	1	3	2
third segment	—	—	1	—
fourth segment	—	—	1	—
<i>Neural canal exposed from</i>				
below third spinous process	—	1	2	—
at fourth	—	—	1	4
below fourth	3	—	3	2
at fifth	—	—	1	1
below fifth	—	1	—	—

#### *The Patellæ.*

The patellæ of the Arkansas and Louisiana skeletons are, as will be noted in the measurements given below, generally of moderate dimensions, with an average breadth slightly exceeding the height. There is very little difference in the bones from the two localities. The patella in the female is smaller in all proportions than that in the male; the breadth-height index is quite similar. The right and left bones differ but slightly.

PATELLA—AVERAGE DIMENSIONS AND BREADTH-HEIGHT INDEX

Proportions	ARKANSAS							
	MALES				FEMALES			
	Number of specimens	Right	Number of specimens	Left	Number of specimens	Right	Number of specimens	Left
Breadth (maximum), cm.	6	4.35 (4.15-4.7)	5	4.2 (4.0-4.65)	3	3.8 (3.6-4.15)	—	—
Height (maximum), cm.	6	4.25 (4.05-4.5)	5	4.3 (3.9-4.65)	3	3.8 (3.6-3.95)	—	—
Thickness (maximum), cm.	6	2.0 (1.7-2.2)	5	1.9 (1.8-2.15)	3	1.8 (1.7-1.85)	—	—
Breadth-height index $\left(\frac{\text{breadth} \times 100}{\text{height}}\right)$	6	102.5 (92.1-105.8)	5	98.1 (95.4-100.0)	3	100.6 (91.1-109.2)	—	—

Proportions	LOUISIANA							
	MALES				FEMALES			
	Number of specimens	Right	Number of specimens	Left	Number of specimens	Right	Number of specimens	Left
Breadth (maximum), cm.	5	4.35 (4.15-4.6)	5	4.4 (4.1-4.65)	4	3.9 (3.75-4.1)	4	3.9 (3.75-4.0)
Height (maximum), cm.	5	4.3 (3.9-4.85)	5	4.2 (3.95-4.75)	4	3.8 (3.7-3.85)	4	3.8 (3.8-3.85)
Thickness (maximum), cm.	5	2.0 (1.9-2.1)	5	2.0 (1.9-2.1)	4	1.8 (1.75-1.85)	4	1.8 (1.75-1.9)
Breadth-height index $\left(\frac{\text{breadth} \times 100}{\text{height}}\right)$	5	101.1 (85.6-112.8)	5	104.2 (91.6-113.4)	4	103.6 (100-110.8)	4	102.3 (97.4-105.3)

An interesting feature in regard to the patella is the occasional presence of the vastus externus notch, *i. e.*, a more or less marked defect in the border of the bone in the locality of the vastus externus insertion. This notch, which is seen rather frequently in Egyptian bones, and is also met occasionally among the whites, is present in more than half the male specimens and in more than a third of the patellæ of females. It is, however, seldom pronounced, the majority of the bones showing only traces of the feature.

The patellæ of male skeletons 255.111 and 255.222, Louisiana, show each an extraordinarily developed apex.



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## PATELLA—THE VASTUS EXTERNUS NOTCH

	ARKANSAS				LOUISIANA				TOTALS			
	Males		Females		Males		Females		Arkansas	Louisiana	Males	Females
	Right	Left	Right	Left	Right	Left	Right	Left				
Number of specimens examined	7	6	3	—	8	10	8	7	16	33	31	18
Notch absent	4	3	1	—	2	5	6	6	50%	58%	45%	72%
Trace	1	2	2	—	1	3	1	1	31%	18%	23%	22%
Small	1	—	—	—	4	1	1	—	6%	18%	19%	6%
Moderate	—	—	—	—	1	1	—	—	—	6%	6%	—
Pronounced	1	1	—	—	—	—	—	—	13%	—	6%	—

*The Os Calcis.*

There are 23 pairs of these bones sufficiently preserved to be measured. Their dimensions, as well as their breadth-height index, differ but slightly in the two localities. The bones also differ very little on the two sides, the right bone being on the average very slightly the larger. The female bones, however, are decidedly smaller than those of the males.

The measurements and indices form an interesting basis for future comparison.

## OS CALCIS: AVERAGE DIMENSIONS AND BREADTH-HEIGHT INDEX

Proportions *	ARKANSAS							
	MALES				FEMALES			
	Number of specimens	Right	Number of specimens	Left	Number of specimens	Right	Number of specimens	Left
Length (maximum), cm.	6	8.05 (7.4-8.45)	6	8.05 (7.3-8.5)	1	6.9	1	6.9
Breadth (minimum at middle of body), cm.	6	2.7 (2.5-2.95)	6	2.7 (2.55-2.9)	1	2.4	1	2.4
Height (maximum at middle of body), cm.	6	4.0 (3.7-4.3)	6	3.9 (3.6-4.1)	1	3.55	1	3.4
Breadth-height index $\left(\frac{\text{breadth} \times 100}{\text{height}}\right)$	6	67.7 (60.5-72.4)	6	69.5 (63.4-73.0)	1	67.6	1	70.6

\* Pairs only.

OS CALCIS—CONTINUED								
Proportions *	LOUISIANA							
	MALES				FEMALES			
	Number of specimens	Right	Number of specimens	Left	Number of specimens	Right	Number of specimens	Left
Length (maximum), cm.	11	8.0 (7.45-8.4)	11	7.95 (7.5-8.25)	5	7.4 (7.25-7.65)	5	7.4 (7.05-7.65)
Breadth (minimum at middle of body), cm.	11	2.75 (2.5-2.9)	11	2.8 (2.6-3.0)	5	2.45 (2.35-2.6)	5	2.5 (2.3-2.6)
Height (maximum at middle of body), cm.	11	4.0 (3.85-4.2)	11	3.95 (3.65-4.2)	5	3.5 (3.2-3.7)	5	3.5 (3.2-3.7)
Breadth-height index $\left(\frac{\text{breadth} \times 100}{\text{height}}\right)$	11	68.4 (61.9-74.0)	11	70.8 (67.5-73.4)	5	69.4 (64.9-75.0)	5	70.8 (68.7-78.1)

\* Pairs only.

In 72 specimens from both sexes in which the facets for the astragalus can be examined, there are two of these facets in 21 (29 per cent.) and three in 51 cases (71 per cent.). These proportions are almost identical in the skeletons from the two regions: 2 facets in 32 per cent. of the bones from Arkansas, and in 29 per cent. of the bones from Louisiana.

As to sexual differences, two facets exist in 26 per cent. of the males and in 37 per cent. of the females, showing a perceptible preponderance for the latter.

The sustentaculum tali generally shows fair to marked projection. The peroneal spine is frequently well marked. In the more pronounced cases it shows an articular-like surface for the play of the tendon on its under side. The internal tubercle often shows anteriorly, at the insertion of the flexor brevis digitorum, slight to moderate exostoses.

The left os calcis of male skeleton 255.106, Louisiana, presents a rough semi-lunar notch or defect antero-interiorly in the margin of the foremost astragalus facet and the adjoining border.

#### *Astragalus.*

The number of clearly-separated articular facets for the os calcis on the astragalus does not by any means correspond with the number of those on the heel bone. Thus, a clear separation by an interval of an anterior and a lateral astragalus facet is present in only four of the 43 specimens, or approximately 10 per cent.

Os trigonum was not found.



*The Scaphoid.*

Of this bone only a few are present, and among these there is but one that shows any peculiarity. This is from female skeleton 255.096, Louisiana, and the peculiarity consists of a rather pronounced pointed process which rises from the middle of the inferior surface of the bone and anteriorly has an articular facet. The same specimen shows also a small cuboid facet.

*The Cuboid.*

This bone, of which a fair number of specimens are in hand, shows, as a rule, an elevated or an unelevated facet for the sesamoid in the tendon of the peroneus longus.

*The First Metatarsal.*

This bone is generally of ordinary form and of moderate dimensions. None of the specimens shows any special features. Their length, given below, indicates close similarity with respect to the two areas from which they came.

FIRST METATARSAL: DIMENSIONS								
	ARKANSAS							
	MALES				FEMALES			
	Number of specimens	Right	Number of specimens	Left	Number of specimens	Right	Number of specimens	Left
Average length (maximum), cm.	4*	6.2 (5.8-6.8)	5	6.2 (5.8-6.5)	1	5.65	2	5.65 (5.55-5.75)
	LOUISIANA							
	MALES				FEMALES			
	Number of specimens	Right	Number of specimens	Left	Number of specimens	Right	Number of specimens	Left
Average length (maximum), cm.	5	6.0 (5.7-6.2)	4	6.3 (6.0-6.5)	2	6.0 (5.6-6.4)	1	5.7

\* Not pairs.

*Phalanges. Hand Bones.*

Only a few of these bones were recovered, and, beyond some pathological lesions, referred to under Section VI (p. 229), they show nothing of special interest.

## VI. PATHOLOGICAL OBSERVATIONS. DETAILS.

## ARKANSAS.

*Males.*255.119.<sup>1</sup>*Vertebrae*: moderate marginal exostoses on one lumbar.*Phalanges*: the first right terminal phalanx of the foot has moderate excrescences on its plantar surface.255.121.<sup>2</sup>*Femora*: right—moderate inflammatory changes about linea aspera, middle fourth;

left—moderate inflammatory changes with augmentation in size at inner lip of linea aspera, below middle, on adjacent bone, and on shaft, posteriorly, below the third fourth of the same from above.

*Tibiae*: right—moderate inflammatory changes over large part of surface of shaft.*Clavicles*: right—inflammatory changes on distal end.*Vertebrae*: one cervical and two lumbar have marginal exostoses; the former shows also roughened (arthritic) articular surfaces on the processes.*Os calcis*: right ankylosed with astragalus (Fig. 7, c).*Cuneiform*: right middle fused completely with the metatarsal of the second toe (Fig. 7, b).255.121a.<sup>3</sup>*Tibiae*: left—slight inflammatory changes on shaft.255.123.<sup>4</sup>*Skull*: A gumma (in all probability), hollow in frontal, 3 cm. above nasion and near median line; also a scar, probably of similar origin (*i. e.*, syphilitic), 5.5 cm. above nasion, in median line.*Femora*: right—inflammatory changes posteriorly, above lowest fourth, and trace of such anteriorly, over lowest fifth;

left—inflammatory changes over lowest third, above condyles.

*Tibiae*: left—moderate inflammatory changes over shaft.*Sternum*: entire bone shows irregular hyperplasia of anterior surface, and thickening.*Clavicles*: right—shaft shows thickening and inflammatory changes.<sup>1</sup> Healthy: skull, both humeri, both radii, both ulnae, both femora, both tibiae, both clavicles, sacrum and parts of pelvic bones, left patella, both calcanea.<sup>2</sup> Healthy: skull, both humeri, both radii, both ulnae, left tibia, left clavicle, sacrum, both patellae, left os calcis.<sup>3</sup> Healthy: left humerus, right patella.<sup>4</sup> Healthy: both humeri, left ulna, right tibia, right fibula, left clavicle, pelvis, vertebrae, right patella, left os calcis.



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255.124.<sup>1</sup>

*Skull*: The meatus auditorius on each side narrowed by a hyperostotic ridge rising from what was once the posterior free extremity of the tympanic ring (= *tr* exostosis).

*Femora*: left—inflammatory changes on posterior surface, lowest fourth, also next to external lip of linea aspera at middle.

*Tibiæ*: right, slight; left, considerable inflammatory changes over shaft.

*Fibulæ*: left—slight inflammatory changes over shaft.

*Clavicles*: right—old fracture in middle.

*Vertebræ*: fourth and fifth lumbar show marginal exostoses.

*Os calcis*: right—some inflammatory changes over surface.

*Phalanges*: of body. Several of hands show inflammatory changes.

255.125.<sup>2</sup>

*Femora*: right—moderate inflammatory changes posteriorly above internal condyles.

255.126.<sup>3</sup>

255.127.<sup>4</sup>

*Skull*: A limited area of increased porosity on the postero-superior portion of each parietal, above the lambdoid suture.

255.128.<sup>5</sup>

255.131.<sup>6</sup>

*Tibiæ*: right—inflammatory changes above popliteal ridge.

255.132.<sup>7</sup>

255.133a.<sup>8</sup>

255.134.<sup>9</sup>

255.135.<sup>10</sup>

255.136.<sup>11</sup>

*Tibiæ*: in both traces of inflammatory changes on surface of shaft.

255.138.<sup>12</sup>

*Astragalus*: left—the whole upper articular surface, top and sides, changed through disease—flattened, rough, and irregular (Fig. 9, g).

<sup>1</sup> Healthy: right humerus, left radius, left ulna, right femur, right fibula, left clavicle, sternum, right innominate, left patella, left os calcis.

<sup>2</sup> Healthy: skull, left humerus, left radius, left ulna, left femur, right innominate, left os calcis.

<sup>3</sup> Healthy: skull, both humeri, both radii, right ulna, both femora, right tibia, both clavicles, pelvis, vertebræ, right os calcis.

<sup>4</sup> Healthy: both humeri, both femora, left tibia, pelvis, vertebræ.

<sup>5</sup> Healthy: skull, both femora, both tibiæ, left patella.

<sup>6</sup> Healthy: both femora, left tibia, both calcanea.

<sup>7</sup> Healthy: both humeri, both ulnæ, both femora, right tibia, both clavicles, right patella.

<sup>8</sup> Healthy: both femora.

<sup>9</sup> Healthy: both humeri, right radius, both femora, both tibiæ, both clavicles, vertebræ, both calcanea.

<sup>10</sup> Healthy: both humeri, left radius, left ulna.

<sup>11</sup> Healthy: left femur, left fibula, right os calcis.

<sup>12</sup> Healthy: both humeri, left radius, both ulnæ, both femora, both tibiæ, both clavicles, vertebræ, right patella, right os calcis.

255.138a.

*Tibiæ*: left—synostosis (without previous fracture or other visible injury of either bone) with fibula by one strong bony septum, 6.5 cm. long, and another small one, slightly lower, 2.5 cm. above lower articular surface.

255.139.<sup>1</sup>255.140.<sup>2</sup>

*Tibiæ*: right—inflammatory changes above popliteal ridge.

*Bones of the foot*: on right the first metatarsal, internal and middle cuneiform, and scaphoid, are fused into one mass, apparently since early stage of growth (Fig. 7, d).

255.141.<sup>3</sup>

*Sternum*: arthritic condition of articular surfaces of first rib.

*Vertebrae*: fourth lumbar shows moderate marginal exostoses.

*Os calcis*: left—region of attachment of ext. brevis digitorum muscle rough and porous.

255.142.<sup>4</sup>255.145.<sup>5</sup>255.149.<sup>6</sup>255.150.<sup>7</sup>255.152.<sup>8</sup>

## ARKANSAS.

*Females.*255.120.<sup>9</sup>

*Femora*: left—smooth bony swelling, 1.2 cm. long by 0.7 cm. broad and 0.3 cm. high, internally, slightly below middle.

*Vertebrae*: all lumbar show marginal exostoses.

255.122.<sup>10</sup>

*Scaphoid*: suppurative depression on articular surface for internal cuneiform near distal edge.

255.129.<sup>11</sup>

*Vertebrae*: cervical—fourth and fifth show marginal exostoses and roughening of lateral articular surfaces;

lumbar—marginal exostoses, and in last three also excrescences about lateral articular surfaces.

<sup>1</sup> Healthy: both femora, both tibiae.<sup>2</sup> Healthy: left tibia, left fibula, left patella, both calcanea.<sup>3</sup> Healthy: skull, both humeri, both radii, both ulnae, both femora, both tibiae, both clavicles, both patellae (right anomalous. See Fig. 9, d), right os calcis.<sup>4</sup> Healthy: right patella, both calcanea.<sup>5</sup> Healthy: skull.<sup>6</sup> Healthy: skull.<sup>7</sup> Healthy: skull.<sup>8</sup> Healthy: skull.<sup>9</sup> Healthy: skull, both humeri, both radii, right femur, both tibiae, left fibula, pelvis, right patella, both calcanea.<sup>10</sup> Healthy: skull, both humeri, right femur, left tibia, left fibula, both clavicles, two vertebrae, right patella, both calcanea.<sup>11</sup> Healthy: skull, both humeri, both ulnae, both femora, both clavicles, pelvis, right os calcis.



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255.130.<sup>1</sup>

*Vertebrae*: fourth lumbar diseased in posterior third of upper surface of body; nature of pathological condition (?) (Fig. 9, e).

255.133.<sup>2</sup>

*Tibiae*: right—slight inflammatory changes on internal surface, above middle.

255.137.<sup>3</sup>

255.143.<sup>4</sup>

*Vertebrae*: lumbar show marginal exostoses (moderate).

255.144.

*Skull*: A shallow depression, 3.0 by 4.5 cm., in the left parietal, near the lambdoid and reaching to the sagittal suture.

255.146.<sup>5</sup>

255.147.<sup>6</sup>

255.148.<sup>7</sup>

255.151.

*Skull*: All bones, vault and face, thickened, but no irregularities or scars.

LOUISIANA.

*Males.*

255.099.<sup>8</sup>

255.100.<sup>9</sup>

255.100a.<sup>10</sup>

255.102.<sup>11</sup>

255.102a.<sup>12</sup>

255.104.<sup>13</sup>

*Vertebrae*: lumbar—slight marginal exostoses; lateral articular facets show arthritic changes.

255.106.<sup>14</sup>

*Tibiae*: right—effects of suppurative condition anteriorly, on lower end.

255.107.<sup>15</sup>

*Vertebrae*: lumbar—marginal exostoses; lateral articular facets of one show arthritic changes.

<sup>1</sup> Healthy: skull, both humeri, right radius, right ulna, both femora, both tibiae, pelvis, right patella, right os calcis.

<sup>2</sup> Healthy: left humerus, left radius, both femora, left tibia.

<sup>3</sup> Healthy: both femora, both tibiae.

<sup>4</sup> Healthy: skull, both humeri, left radius, both femora, right clavicle.

<sup>5</sup> Healthy: skull, four vertebrae.

<sup>6</sup> Healthy: skull, two vertebrae.

<sup>7</sup> Healthy: skull.

<sup>8</sup> Healthy: both humeri, right radius, right femur, both clavicles.

<sup>9</sup> Healthy: both humeri, right tibia, right fibula.

<sup>10</sup> Healthy: left fibula.

<sup>11</sup> Healthy: skull, both humeri, left radius, both ulnae, both femora, both clavicles, two vertebrae.

<sup>12</sup> Healthy: right ulna, right femur, right clavicle.

<sup>13</sup> Healthy: skull, both humeri, both tibiae, nine vertebrae.

<sup>14</sup> Healthy: skull, both humeri, left radius, left ulna, both femora, left tibia, left fibula, right clavicle, pelvis, sixteen vertebrae.

<sup>15</sup> Healthy: skull, right humerus, right radius, right ulna, six vertebrae.

255.109.<sup>1</sup>*Vertebrae*: lumbar—slight upper marginal exostoses.255.110.<sup>2</sup>255.111.<sup>3</sup>*Tibiae*: left—inflammatory changes about the middle fourth of internal border.*Vertebrae*: fifth, sixth, and seventh cervical, twelfth dorsal, show arthritic changes, and all lumbar vertebrae have marginal exostoses.255.114.<sup>4</sup>

255.115.

*Skull*: *tr* exostoses in both meatus auditorii, nearly occluding the right.255.154.<sup>5</sup>255.201.<sup>6</sup>*Femora*: right—a small exostosis from anterior surface of great trochanter; left—moderate marginal exostoses about lower articular surface.*Vertebrae*: lumbar—marginal exostoses.*Os calcis*: right—an exostosis, or a fusion of a separate small bone, in front of the insertion of the external brevis digitorum.*Patellae*: left—marginal exostoses and an arthritic spot (Fig. 9, h).255.203.<sup>7</sup>255.204.<sup>8</sup>255.205.<sup>9</sup>*Tibiae*: .205 (3), left—moderate swelling about internal border at middle and lower third;

.205 (4) left—slight inflammatory changes on upper fourth of shaft;

.205 (5) left—inflammatory changes over most of shaft;

.205 (6) right—moderate inflammatory changes on internal surface, below middle.

255.209.<sup>10</sup>*Vertebrae*: last dorsal and all lumbar show marginal exostoses.*Os calcis*: left—moderate lesion just posterior to anterior astragalus facet (nature?).<sup>1</sup> Healthy: left humerus, left radius, both ulnae, both femora, both tibiae, both fibulae, eight vertebrae, both patellae.<sup>2</sup> Healthy: right radius, right ulna, both femora, both tibiae, both fibulae, pelvis, six vertebrae, both patellae.<sup>3</sup> Healthy: skull, both humeri, right tibiae, both clavicles, pelvis, fourteen vertebrae, both patellae.<sup>4</sup> Healthy: skull.<sup>5</sup> Healthy: skull.<sup>6</sup> Healthy: skull, both humeri, both radii, both ulnae, both tibiae, both fibulae, pelvis, nineteen vertebrae, left os calcis, right patella.<sup>7</sup> Healthy: skull, three cervical vertebrae.<sup>8</sup> Healthy: skull, four cervical vertebrae.<sup>9</sup> Healthy: eight humeri, five radii, four ulnae, twelve femora, seven tibiae, two fibulae, two clavicles, one pelvis.<sup>10</sup> Healthy: skull, both humeri, right radius, right ulna, both femora, both tibiae, both fibulae, both clavicles, pelvis, eighteen vertebrae, right os calcis.



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255.210.<sup>1</sup>

*Vertebrae* : lumbar—marginal exostoses.

255.211.<sup>2</sup>

*Vertebrae* : cervical—fifth, sixth, and seventh show arthritic changes;  
lumbar—marginal exostoses and arthritic changes.

255.215.<sup>3</sup>

*Vertebrae* : cervical—third, fourth, and fifth with arthritic changes;  
lumbar—fifth with arthritic changes.

*Patellæ* : left—arthritic changes on articular surface.

255.217.<sup>4</sup>

*Femora* : in both slight inflammatory changes externally above outer condyle.

*Vertebrae* : cervical—all below atlas show arthritic changes (roughening,  
increased porosity, and irregular enlargement of most lateral and  
also body articular surfaces);

dorsal—arthritic changes on first and second;

lumbar—marginal exostoses.

*Patellæ* : right—articular surface shows arthritic changes.

255.218.<sup>5</sup>

*Tibiæ* : on both slight inflammatory changes over shaft.

*Vertebrae* : lumbar—one (the only one present) shows marginal exostoses.

255.221.<sup>6</sup>

255.222.<sup>7</sup>

*Vertebrae* : cervical—arthritic changes on body and articular surfaces, fourth  
to seventh;

dorsal—marginal exostoses on two lowest.

255.223.<sup>8</sup>

*Tibiæ* : left—a sharp exostosis of moderate size below external tuberosity,  
at about the insertion of flexor communis.

255.224.<sup>9</sup>

<sup>1</sup> Healthy : skull, both humeri, both radii, both ulnæ, both femora, both tibiæ, both fibulæ, right clavicle, pelvis, twelve vertebrae, left patella.

<sup>2</sup> Healthy : skull, both humeri, both radii, both ulnæ, both femora, both tibiæ, both fibulæ, both clavicles, eleven vertebrae, left patella.

<sup>3</sup> Healthy : skull, both humeri, both radii, both ulnæ, left femur, left tibia, both fibulæ, right clavicle, pelvis, seventeen vertebrae (seventh cervical anomalous; see Fig. 9, a).

<sup>4</sup> Healthy : skull, both humeri, left radius, both ulnæ, right tibia, right fibula, sacrum (anomalous articulation with fifth lumbar; see Fig. 8), ten vertebrae.

<sup>5</sup> Healthy : skull, both humeri, both radii, both ulnæ, both femora, both clavicles, fifteen vertebrae, left patella.

<sup>6</sup> Healthy : both humeri, left radius, both ulnæ, both femora, both tibiæ, both fibulæ, both clavicles, sacrum, twenty-one vertebrae, right patella.

<sup>7</sup> Healthy : both humeri, both radii, both ulnæ, both femora, both tibiæ, both clavicles, one cervical and four dorsal vertebrae.

<sup>8</sup> Healthy : both ulnæ, both femora, right tibia, both patellæ.

<sup>9</sup> Healthy : both humeri, both radii, both ulnæ, both femora, both tibiæ, right clavicle, pelvis.

## LOUISIANA.

*Females.*255.094.<sup>1</sup>

*Skull*: Surface of frontal bone irregular over middle, approaching low-nodular.

*Humeri*: both show advanced inflammatory changes; surface irregular.

*Radii*: both present inflammatory changes.

*Ulnæ*: right—probably an old fracture above lowest third;

left—inflammatory changes over shaft.

*Clavicles*: both show inflammatory changes on shaft.

*Vertebræ*: cervical—atlas, axis, and fourth show arthritic changes, with some marginal exostoses;

lumbar (two present)—marginal exostoses.

255.095.<sup>2</sup>

*Vertebræ*: lumbar—third, fourth and fifth with marginal exostoses.

255.096.<sup>3</sup>

*Ulnæ*: right—fracture above lowest third, non-union, irregular articulation.

*Tibiæ*: right—some inflammatory changes over surface of middle third.

*Vertebræ*: dorsal—slight marginal exostoses on twelfth;

lumbar—marginal exostoses on all.

*Astragalus*: right shows results of healed suppurative condition about head (Fig. 9, f).

255.097.<sup>4</sup>

*Radii*: right—fracture at middle.

*Ulnæ*: right—fracture below middle third.

*Vertebræ*: marginal exostoses on eleventh dorsal, and second, third and fourth lumbar.

255.098.<sup>5</sup>

*Radii*: right—fracture above lowest fourth.

255.103.<sup>6</sup>

*Vertebræ*: marginal exostoses on lumbar, and bodies of all these moderately and irregularly flattened.

*Scaphoid*: right shows slightly incomplete old fusion with internal cuneiform.

<sup>1</sup> Healthy: four vertebræ.

<sup>2</sup> Healthy: skull, left humerus, both radii, both ulnæ, right fibula, right clavicle, seventeen vertebræ.

<sup>3</sup> Healthy: both humeri, right radius, both femora, left tibia, both clavicles, pelvis, five vertebræ.

<sup>4</sup> Healthy: both humeri, left ulna, both femora, both tibiæ, both fibulæ, one dorsal vertebra and one lumbar vertebra, left patella.

<sup>5</sup> Healthy: both humeri, both femora, right fibula, left patella.

<sup>6</sup> Healthy: skull, both humeri, right radius, both femora, both tibiæ, both fibulæ, both clavicles, sacrum, nine vertebræ.



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255.105.<sup>1</sup>

*Tibiæ* : in both, pathological curvature backward at middle, and inflammatory changes over middle third.

*Fibulæ* : left—inflammatory changes over shaft.

*Vertebræ* : several lower dorsal and one (the only one present) lumbar show marginal exostoses.

255.108.<sup>2</sup>

*Humeri* : left—moderate exostosis a short distance posteriorly to lower third of deltoid ridge.

255.112.<sup>3</sup>

*Clavicles* : left—arthritic changes, sternal end.

*Vertebræ* : cervical—slight roughening of articular surfaces of bodies of third to seventh ;

dorsal—marginal exostoses on several lower ones ;

lumbar—slight to moderate upper marginal exostoses on all.

255.113.<sup>4</sup>

*Skull* : A large patch of irregular, scarry, hardened surface on postero-superior part of right parietal.

255.116.<sup>5</sup>

255.117.<sup>6</sup>

255.118.<sup>7</sup>

255.202.<sup>8</sup>

*Skull* : A small superficial scar in middle of forehead.

255.205.<sup>9</sup>

*Radii* : A pair, .205 III, show inflammatory changes over shaft.

*Ulnæ* : A pair, probably from same skeleton as above radii, show inflammatory changes over shaft.

*Femora* : A pair, probably from same skeleton as above ulnæ and radii, with inflammatory changes over surface of lowest third of shaft.

*Tibiæ* : A pair, showing, especially the right, an abnormal curvature backward and somewhat inward at middle, and inflammatory changes over most of the surface. Belongs probably to the same skeleton as the above.

*Fibulæ* : right—shaft shows inflammatory changes ; probably of the same skeleton as the above.

<sup>1</sup> Healthy : skull, both radii, right ulna, both femora, pelvis, eight vertebræ.

<sup>2</sup> Healthy : right humerus, both radii, left femur.

<sup>3</sup> Healthy : skull, right humerus, both radii, both ulnæ, both femora, six vertebræ.

<sup>4</sup> Healthy : three cervical vertebræ.

<sup>5</sup> Healthy : skull.

<sup>6</sup> Healthy : skull, two cervical vertebræ.

<sup>7</sup> Healthy : skull.

<sup>8</sup> Healthy : six cervical vertebræ.

<sup>9</sup> Healthy : seven humeri, four radii, one ulna, five femora, four clavicles.

255.207.<sup>1</sup>

*Femora*: left—an exostosis, 1.2 cm. long and 0.7 cm. high, scale-like, pointing mediad, just below minor trochanter.

255.208.<sup>2</sup>255.212.<sup>3</sup>

*Vertebrae*: cervical—the lower articular surface of body of fifth and the upper of that of sixth show arthritic changes;  
lumbar—marginal exostoses on fifth.

255.213.<sup>4</sup>

*Femora*: left—a hardened oblong swelling, of moderate size, on external border above middle.

*Sacrum*: moderate marginal exostoses along free border of body of the first segment.

*Vertebrae*: cervical—left corresponding lateral articular facets of axis and third, and articular surfaces of body of fourth, show arthritic changes;  
lumbar—marginal exostoses.

255.214.<sup>5</sup>

*Vertebrae*: lumbar—slight marginal exostoses on third, fourth, and fifth.

255.216.<sup>6</sup>

*Femora*: both show moderate diffuse inflammatory changes over surface of shaft.

*Tibiae*: right—slight inflammatory changes over shaft;

left—slight inflammatory changes about popliteal ridge and over shaft.

*Vertebrae*: lumbar—marginal exostoses on fourth and fifth.

255.219.<sup>7</sup>

*Tibiae*: in both, but especially in right, some inflammatory changes over shaft.

*Vertebrae*: lumbar—marginal exostoses on third, fourth, and fifth.

*Patellae*: left—arthritic changes on articular surface.

255.220.<sup>8</sup>

*Vertebrae*: lumbar—one (two present) shows marginal exostoses.

<sup>1</sup> Healthy: skull, both humeri, both radii, both ulnae, right femur, both tibiae, both clavicles, four cervical vertebrae, right patella.

<sup>2</sup> Healthy: skull.

<sup>3</sup> Healthy: skull, both humeri, right radius, both ulnae, both femora, both tibiae, both fibulae, both clavicles, sacrum, nineteen vertebrae (first dorsal anomalous; see Fig. 9, b), right patella.

<sup>4</sup> Healthy: skull, both humeri, both radii, both ulnae, right femur, both tibiae, left fibula, left clavicle, left os innominatum, twelve vertebrae, both patellae.

<sup>5</sup> Healthy: skull, left humerus, left radius, both ulnae, both femora, left clavicle, pelvis, twelve vertebrae, both patellae.

<sup>6</sup> Healthy: skull, both humeri, both radii, both ulnae, both clavicles, pelvis, nine vertebrae.

<sup>7</sup> Healthy: skull, both humeri, both radii, both ulnae, both femora, right fibula, both clavicles, eleven vertebrae.

<sup>8</sup> Healthy: skull, right humerus, both radii, both ulnae, both femora, both tibiae, left fibula, both clavicles, nine vertebrae, both patellae.



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255.225.<sup>1</sup>

*Vertebrae*: dorsal—slight marginal exostoses on several lower ones;  
lumbar—slight upper marginal exostoses on all.

255.226.<sup>2</sup>

*Vertebrae*: lumbar—marginal exostoses.

255.227.<sup>3</sup>

*Ulna*: left—inflammatory changes over shaft.

*Tibiae*: right—considerable inflammatory changes over shaft.

## BONES EXHIBITING PATHOLOGICAL CONDITIONS: RÉSUMÉ\*

	Total number of specimens, from both States	Healthy	Inflammatory changes in	Marginal exostoses in	Arthritic changes on articular surfaces in	Fractures in	Exostoses other than marginal in	Abnormal curvatures in	Various in
Skulls†	58	49	6	—	—	—	2	—	1
Humeri	115	113	2	—	—	—	—	—	—
Radii	90	84	4	—	—	2	—	—	—
Ulnæ	86	80	3	—	—	3	—	—	—
Femora	122	105	15	1	—	—	1	—	—
Tibiae	97	67	28	—	—	—	1	2	1
Fibulae	47	44	3	—	—	—	—	—	—
Clavicles	70	64	4	—	1	1	—	—	—
Sterna	11 bodies and 7 manubria	10 bodies and 5 manubria	1 body	—	2 manu- bria	—	—	—	—
Scapulae	3	3	—	—	—	—	—	—	—
Pelves	15	15	—	—	—	—	—	—	—
Ossa innominata	3	3	—	—	—	—	—	—	—
Sacra	9	8	—	1	—	—	—	—	—
Vertebrae: cervical	182, from 46 individuals	144	—	38, from 12 individuals (mainly arthritic changes)	—	—	—	—	—
“ dorsal	380, from 48 individuals	362	—	18, from 9 individuals (mainly marginal exostoses)	—	—	—	—	Body asymmetric in numerous specimens
“ lumbar	194, from 45 individuals	87	—	106, from 33 individuals (almost wholly marginal exostoses)	—	—	—	—	1
Patellæ	49	45	—	1	3	—	—	—	—
Calcanea	70	65	—	—	1	—	—	—	4
Other tarsal bones	97	90	—	—	3	—	—	—	4
Metatarsals and Phalanges	9	5	3 (1 individual)	—	—	—	—	—	3

\* With these should be borne in mind the specimens now in the United States Army Medical Museum, so far as the latter pertain to the skeletons under consideration. They are: two femora of a female subject, No. 255.225, from Ward Place, Louisiana, showing bilateral upper congenital dislocation; right femur and tibia, from subject 255.215, same locality, with signs of osteoarthritis; two stray right tibiae from Boytt's Field, Arkansas, and Bray's Landing, Louisiana, with inflammatory changes on shaft; and the fractured radius and ulna from the left forearm of subject No. 255.100, Bell Gin Landing, Arkansas.

† Exclusive of pathological conditions due to the teeth.

<sup>1</sup> Healthy: both humeri, left ulna, both fibulae, seven vertebrae, right patella.

<sup>2</sup> Healthy: both humeri, both radii, both ulnae, both femora, left tibia, pelvis, nineteen vertebrae, left patella.

<sup>3</sup> Healthy: right humerus, right radius, right ulna, both femora, seven vertebrae, both patellæ.

## NOTES.

*"Inflammatory Changes."*—Under this heading are included pathological changes which first affect limited areas of the surface of the shaft, or body of the bone, and in more advanced cases cover most or all of the surface of the shaft, or body of the bone and involve more or less its walls. In the earlier stages the changes are apparently due to slow inflammatory conditions originating in the periosteum and accompanied by more or less perceptible osteophytic deposits. Later, as the inflammatory process progresses, the surface of the shaft becomes more or less irregular and nodular, and the pathological alteration extends to the interstitial parts of the bone, causing considerable thickening, with increase in weight of the shaft of the bone. It affects most often the tibiæ; the vertebræ and pelvic bones appear to be immune. In all probability this process indicates syphilis; but there are instances in which it is impossible to decide whether the changes should be ascribed to this disease or to that systemic condition which results in arthritic changes in various articulations. In the majority of the cases in which such inflammatory changes have occurred in one or more bones of an individual, the skull has been found normal.

*"Marginal Exostoses."*—These are characteristic excrescences of a definite though as yet somewhat obscure significance, occurring with great frequency, indeed quite generally, in older subjects, both among whites and among the Indians. These excrescences may form about the articular surface of long bones, but are most common about the surfaces of the bodies of the lumbar vertebræ. They begin along the upper margin of the last three lumbar, then appear along the upper margins of the two superior vertebræ of that region and possibly along those of one or two of the last dorsals, and then develop along the lower borders of the same bones. They frequently involve the free border of the uppermost segment of the sacrum, and occasionally accompany arthritic changes in cervical or other lateral articulations. On the whole they bear close etiological relation with the systemic condition that results in osteoarthritis. In advanced stages these marginal exostoses are always accompanied with roughening and other inflammatory changes of the articular surface about which they occur, and in the end the result is a fusion of the adjacent vertebræ. In extreme cases whole regions of the spine, and even the entire spine, as well as the pelvic bones, become consolidated through this change. The beginnings of the condition may be observed in middle-aged adults, but it is especially a feature accompanying old age. It may coëxist with other slow inflammatory conditions of the bones, in which case a diagnostic separation of the processes may be very difficult.

*"Arthritic Changes on Articular Surfaces."*—These changes begin generally in augmented porosity of the articular surface, followed by increased roughness and irregularity of the same. They are most commonly observed on the lateral articular surfaces of the cervical vertebræ, but are occasionally seen on those of the upper dorsal or some of the lumbar vertebræ, on the sacro-iliac surfaces, and even on the articular facets of the long and other bones. As above mentioned, these changes



occur also on the superior and inferior surfaces of the bodies of the vertebræ. They generally involve both of the articular surfaces in apposition, and in the vertebral column lead ultimately to ankyloses. They are frequently accompanied by marginal exostoses along the border of the affected articulations. The two processes, in fact, are closely related and probably are due to the same general causes.

"*Fractures.*"—The fractures observed in this collection are comparatively few, fewer than would be found in a similar number of bones of modern whites. It is further noteworthy that all but one of the fractures are in the bones of the forearm, the exception being one in a clavicle. There is no fracture of the bones of the lower extremities. The healing, barring the case in which union did not take place (Fig. 7, a), is of good character in all the specimens, though attended with more or less marked effects of original displacement of the fragments (see Fig. 6).

"*Exostoses other than Marginal.*"—The majority of exostoses pertaining to this class are formed at the insertion of muscles, or on ridges, such as the popliteal, or within the intermuscular septa. Some of them doubtless stand in causal relation with the marginal exostoses and arthritic changes. Others, particularly those in the intermuscular septa, are manifestations *sui generis*, the cause of which, particularly in young subjects, is not clearly understood. In the series of bones under consideration, the exostoses other than marginal are few, and, with one exception, unimportant. The exception applies to the bony septum found to connect, without sign of injury or disease, the left tibia and the fibula of male skeleton No. 255.138 a from Arkansas (Fig. 5).

"*Abnormal Curvatures.*"—Curvatures slightly to moderately above the average, but without reaching a degree which can be considered pathological, are common in the femora of this collection, and also in some of the bones of the forearm. In the femora such curvatures are generally noticeable at or about the middle of the shaft, the upper part of the bone being bent backward, and are usually compensated for by an especially high posterior femoral ridge (*linea aspera*). Specimens of the so-called "pilasteric femur" generally indicate cases of this nature. In two instances only do curvatures occur which can be regarded as pathological. They are both in the tibia, and may be due to a mild degree of rachitis, although there are no signs of this disease on the remaining parts of the skeletons.

"*Various.*"—The only subject requiring particular mention under this heading is the frequently observed asymmetry of the bodies of the dorsal vertebræ. This unevenness relates only to the contour of the bodies, not to their vertical dimensions. In no case is the particular cause discernible.





FIG. 1.—Non-deformed crania from Arkansas: *a*, *b*, and *c* = No. 255.119; *d* = No. 255.149.



FIG. 2.—On left, two views of non-deformed male skull, 255.126, Arkansas. On right, female skull, 255.094, Louisiana, showing senile parietal depressions above the temporal ridges.







FIG. 3.—a, b, and c = non-deformed female skull, 255,095, Louisiana; d = male skull, 255,210, Louisiana, showing moderate fronto-occipital compression.





FIG. 4.—*x* = male skull, 255.115, Louisiana, showing intraauricular exostosis, and also a well-marked supraauricular fossa (another seen on Fig. 3, *d*); *y* = male skull, 255.106, Louisiana, showing lateral fissures in the basilar process.



FIG. 5.—255.108, Louisiana, left female humerus, showing a peculiar exostosis at *e*; 255.138a, Arkansas, left male tibia and fibula, showing a synostosis by means of two exostoses.





FIG. 6.—Bones showing healed fractures.



FIG. 7.—*a*.—Right ulna, from female skeleton 255.096, Louisiana, showing lack of union after fracture; the two segments form an irregular articulation.  
*b*.—From male skeleton 255.121, Arkansas, showing old fusion of the metatarsal of the right second toe and middle cuneiform.  
*c*.—Specimen from same skeleton as *b*; shows old, slightly incomplete fusion of os calcis and astragalus.  
*d*.—From male skeleton 255.140, Arkansas, showing old fusion of right first metatarsal with internal and middle cuneiform and scaphoid.





FIG. 8.—Sacrum and fifth lumbar vertebra from male skeleton 255,217, Louisiana, showing, on right, overgrowth of the lateral mass of the sacrum and its irregular, as well as partly arthritic, articulation with the also enlarged lateral process of the last lumbar vertebra ("partial assimilation of the last lumbar").



FIG. 9.—*a*.—Seventh cervical of male skeleton 255.215, Louisiana, showing a defect of fusion of the two parts that compose the spinous process.  
*b*.—Peculiar anomaly of the first dorsal of female skeleton 255.212, Louisiana; there are two well-developed articular facets for ribs.  
*c*.—Fourth lumbar of female skeleton 255.219, Louisiana, with a separation of the posterior part of the neural arch; the articular surfaces between the pedicles and laminae are very rough and irregular.  
*d*.—Right patella of male skeleton 255.141, Arkansas, showing a large vastus externus notch.  
*e*.—Fourth lumbar of female skeleton 255.130, Arkansas, showing diseased condition of upper articular surface of the body.  
*f*.—Right astragalus of female skeleton 255.096, Louisiana, showing results of a healed suppurative condition about the head.  
*g*.—Left astragalus of male skeleton 255.138, Arkansas, showing results of disease.  
*h*.—Left patella of male skeleton 255.201, Louisiana, showing marginal exostoses and arthritic spot on the articular surface.  
*i*.—Right scaphoid and internal cuneiform of female skeleton 255.103, Louisiana, showing an old, nearly complete, fusion.



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