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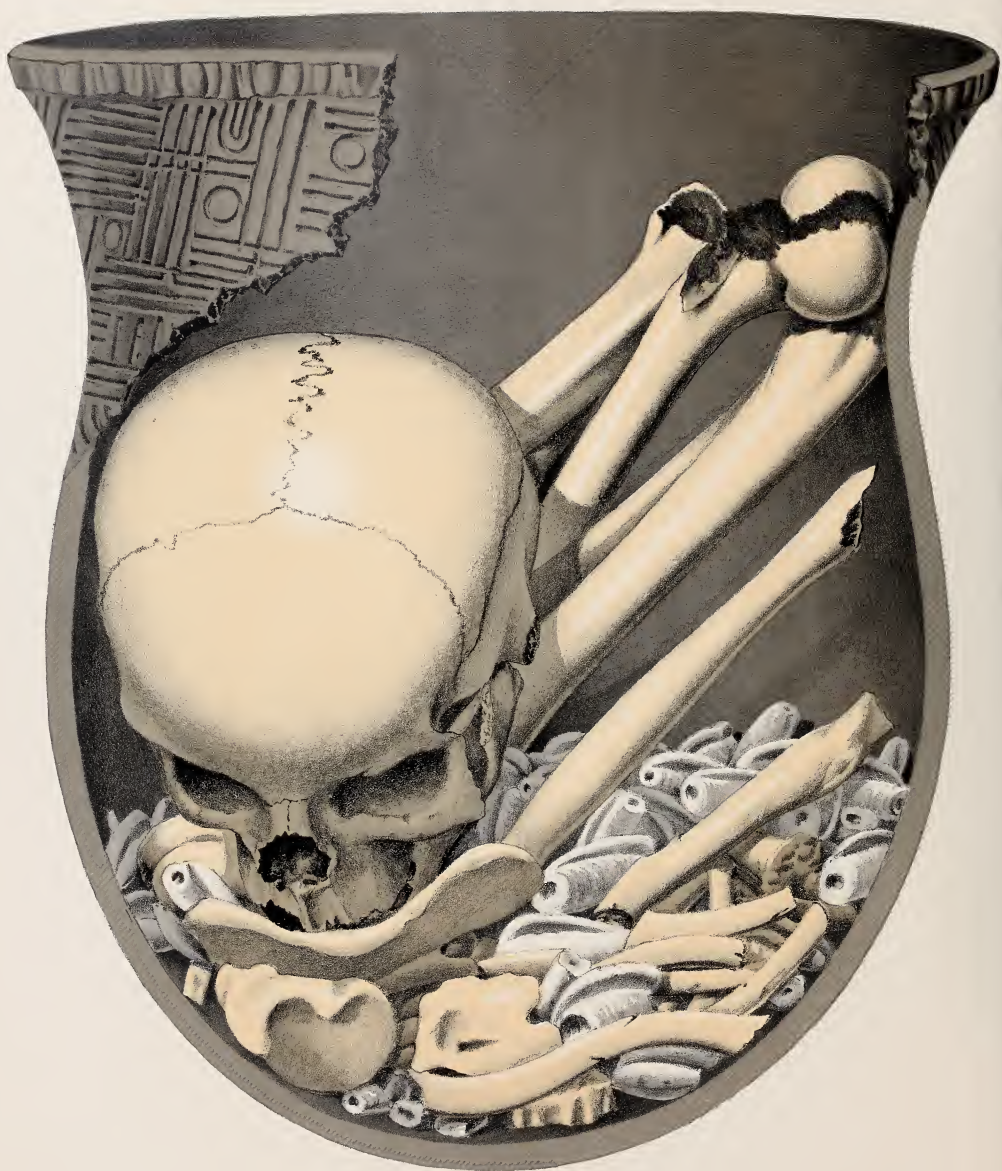
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MOORE: GEORGIA COAST MOUNDS.

VESSEL A (BURIAL NO. 3). MOUND ON ST. CATHERINE'S ISLAND. (TWO-THIRDS SIZE)





CHATHAM

BRYAN

LIBERTY

MCINTOSH

GLYNN

CAMDEN

ATLANTIC OCEAN

MAP OF THE GEORGIA COAST

Scale in miles.

1 2 3 4 5 10

18 97

X indicates a mound

JOURNAL  
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---

CERTAIN ABORIGINAL MOUNDS OF THE GEORGIA COAST.

BY CLARENCE B. MOORE.

Our thanks are tendered for material assistance in this work to the Marquis de Nadaillac, to Dr. E. Goldsmith, and to Professors Putnam, Holmes and Pilsbry. Our acknowledgments are due also for the aid extended by our lamented friend, the late Professor Cope.

Again we have to thank Dr. M. G. Miller for continuous assistance in the field and in the preparation of this report.

June, 1897.

C. B. M.

As the reader is aware, an inland passage by water, parallel to the ocean, enables vessels of light draft to traverse the entire coast of Georgia without venturing to sea or incurring risk greater than the minimum one of crossing certain sounds at a distance from the open water.

This marine highway, shown on ordinary maps, is connected with a net-work of waterways and tributary streams, many appearing on sectional charts alone,<sup>1</sup> enclosing considerable fertile territory suitable for living sites, and great tracts of low-lying marsh.

Fish and oysters are abundant in this region, and were doubtless still more so in early times, but great deposits<sup>2</sup> of oyster shells are not so numerous as on the

<sup>1</sup> U. S. Government Charts, Nos. 156, 157, 158.

<sup>2</sup> The circular enclosure on Sapelo Island and a great causeway on Barbour's Island are the only shell deposits of importance met with by us on the Georgia coast. A considerable shell deposit on St. Simon Island has been reported. We have not seen it.

Florida coast, nor do they compare in size with the great heaps of fresh-water shells so noticeable on the St. Johns River.

Before proceeding to a detailed description of certain coast mounds of Georgia, we wish to point out that it has not been our intention to investigate each mound included within the limits of the entire territory, as we have done on the St. Johns and the Ocklawaha Rivers, Florida, but rather, by demolishing a considerable number, to give a general idea of the aboriginal earth-works of the territory bordering the Georgia coast.

Five months of continual work have been devoted by us to the coast mounds of Georgia, during which time most of the territory has again and again been traversed by steam motive power, so that but little time has been consumed in transit. A few important mounds still remain unexamined, through no fault of ours, however, notably at the north end of Ossabay Island and on the islands of St. Simon and Sapelo.

But little work has been previously done among the mounds of the Georgia coast. The late Col. C. C. Jones, whose interesting work<sup>1</sup> we have largely consulted, occasionally refers to certain objects as derived from coast mounds, but nowhere makes reference to any systematic explorations.<sup>2</sup> The territory is virtually a new one for the archaeologist, though relic hunters have at times left traces of their work in the shape of comparatively small trenches or superficial excavations near the summits of certain mounds.

Before proceeding to a detailed description of our mound work it may be well to make clear to the lay reader certain terms frequently to be used by us.

The "bunched" burial, which we found to predominate in Florida when the condition of the bones made determination possible, is present also in the coast mounds of Georgia, though to a much more limited extent. This method of interment consisted of bunching together a number of bones; sometimes the skull and long bones of one individual with perhaps some of the smaller bones, or in others, taking parts of the skeletons of two or three individuals and burying them in a heap together. The exposure of the dead body until deprived of flesh, prior to inhumation, was a common aboriginal custom. In Fig. 1 we give a representation of a typical bunched burial.



Fig. 1.—A "bunched" burial. (Not on scale.)

In the Georgia coast mounds the burial in anatomical order exceeded all others, though it is not unlikely that many at least of the skeletons had suffered exposure

<sup>1</sup> "Antiquities of the Southern Indians."

<sup>2</sup> See also "A Primitive Urn Burial," Smithsonian Report, 1890, p. 609 *et seq.*, by Dr. J. F. Snyder, in relation to Southern Georgia.



previous to inhumation but were held together by ligaments when placed in the sand. Occasionally, some bone or bones in a position not to be accounted for under the hypothesis of shifting sand, testifies to this.

Of the burials in anatomical order, the "flexed" burial predominates. This form consists in placing the remains usually on the right or on the left side and

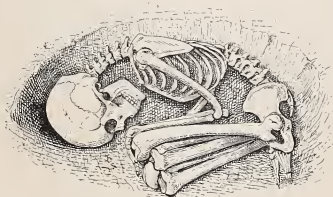


Fig. 2.—A "flexed" burial. (Not on scale.)

drawing the knees and chin well together with the legs drawn up almost parallel to the thighs. The arms occupy almost any position except an extended one. This form of burial doubtless recommended itself through economy of space,—a flexed skeleton calling for a grave not much over three feet in length. Fig. 2 shows a typical "flexed" burial.

In determination of sex there have been consulted the conformation of the forehead, the glabella, the superciliary ridges, the thickness of the outer upper

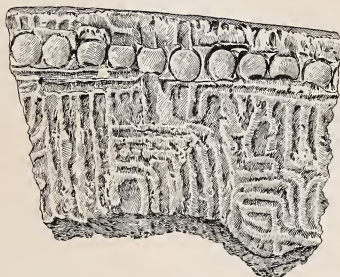


Fig. 3.—Sherd with ornamentation of circular impressions. (Full size.)

margin of the orbit, the character of the facial bones, the muscular marking of the temporal region, size of mastoid process, size of external occipital protuberance and muscular markings in its vicinity, character of lower jaw, size of mental prominences, form of clavicle, size and muscular markings of the bones in general.

## 8 CERTAIN ABORIGINAL MOUNDS OF THE GEORGIA COAST.

Age, when stated, was based upon an examination of the teeth and sometimes of the epiphyses. When not otherwise stated in our descriptions, the skeleton is that of an adult.

All anatomical determinations have been made by Dr. M. G. Miller, who has been present during all our field work in Georgia and in Florida.

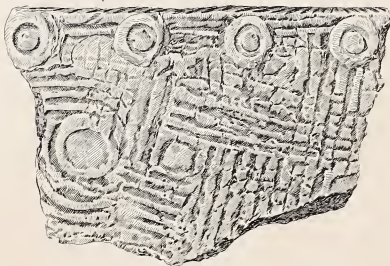


Fig. 4.—Sherd with button-like decoration. (Full size.)

We shall see that burials of infants in some localities, of adults in others, were in large jars made of clay tempered with gravel,<sup>1</sup> almost invariably of the same type, consisting of a rounded base, an almost cylindrical body, a slightly constricted

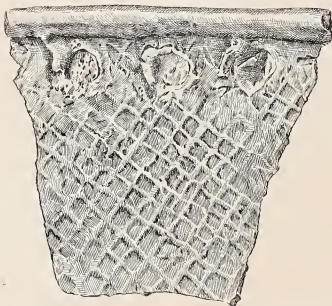


Fig. 5.—Sherd showing loss of decoration. (Full size.)

neck and a flaring rim, whose margin was exteriorly decorated with circular impressions, contiguous or nearly so, doubtless of a section of a reed (Fig. 3), or with button-like ornaments some distance apart, made separately and impressed before baking (Fig. 4), and which sometimes are seen to have fallen from their places, as

<sup>1</sup> Terned gritty ware. This ware forms the majority of that found on the Georgia coast.

shown in Fig. 5; or with an encircling band impressed at intervals (Fig. 6). The decoration of the body and neck of these vessels is usually a complicated stamped pattern so well known in Georgia and in Carolina.

One of these burial jars (various forms were used for cremated remains) is shown in Plate IX.

The late Col. C. C. Jones describes four similar vessels, all containing infant

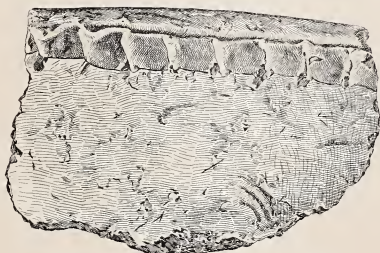


Fig. 6.—Sherd showing band with impressions. (Full size.)

remains, as coming from mounds of the Georgia coast.<sup>1</sup> We shall not again go into a detailed description of this form of vessel, but shall refer to it as the common, or ordinary type.

The reader will observe that considerable care has been taken in referring to, or in describing, vessels of shell or of earthenware, to note whether or not they were imperforate as to the base. This, it may be well to explain to some, has been done in reference to a custom obtaining to a considerable extent in Florida where vessels placed with the dead often had the bottom knocked out, the base perforated, or a hole made in the base at the time of manufacture, presumably "to kill" the vessel to free its soul to accompany that of the dead person. This curious custom has been regarded as peculiar to Florida, but it is interesting to note a possible observance of it to a limited extent in the mounds of the Georgia coast. It is well to note, however, that in cinerary urns, perforation of base is never met with.

#### *Mounds Investigated.*

|   |  |
|---|--|
| Fairview, Camden County (2).              | Crescent, McIntosh County.               |
| Woodbine, Camden County.                  | Walker Mound, McIntosh County.           |
| Owen's Ferry, Camden County.              | Contentment, McIntosh County.            |
| Brunswick, Glynn County (2).              | Broro Neck, McIntosh County (2).         |
| Lawton's Field, Darien, McIntosh Co. (3). | Sapelo Island, McIntosh County (3).      |
| Townsend Mound, Darien, McIntosh Co.      | Bahama, McIntosh County (2).             |
| Cat Head Creek, Darien, McIntosh Co.      | Laurel View, McIntosh County (2).        |
| "The Thicket," McIntosh County (6).       | St. Catherine's Island, Liberty Co. (7). |
| Shell Bluff, McIntosh County.             | Ossabaw Island, Bryan County (9).        |
| Creighton Island, McIntosh County (2).    | Skiddaway Island, Chatham County (3).    |
| Hopkins Mound, Belleville, McIntosh Co.   |  |

<sup>1</sup> "Antiquities of the Southern Indians," p. 456.



## 10 CERTAIN ABORIGINAL MOUNDS OF THE GEORGIA COAST.

### LOW MOUND AT FAIRVIEW, CAMDEN COUNTY.

Fairview, the property of Captain W. F. Bailey, to whom we are indebted for courteous permission to investigate, lies on the bank of Marianna Creek which empties into Kings Bay, Cumberland Sound.

The mound, in a cultivated field, had a diameter of base of 38 feet, a height of 2 feet 8 inches, though a large stump remaining on the mound gave evidence of a loss of about 1 foot additional height through the agency of the plow.

The mound was completely demolished.

The closest examination of the structure of this mound seemed to indicate that the usual pit, made previous to the erection of the mound, was wanting, and that the mound, composed of loamy brown sand and unstratified, had been erected upon the undisturbed level ground.

There were no marginal burials. In addition to fragmentary bones, thrown up by the plow, human remains were met with at seven points.

One and one-half feet from the surface and 10 feet from the northwestern margin of the mound was the flexed skeleton of a child, in anatomical order.

An adult skeleton, showing the same form of burial, lay 2 feet from the surface.

One foot down was a deposit of fragments of calcined human bones beneath a local layer of oyster shells. With the remains lay a sheet copper ornament with repoussé decoration.

A burial, well in toward the center, had seemingly its full quota of bones, and the lower portion of the skeleton lay in anatomical order. The cranium, however, was upside down; the mandible lay on its side, embracing one bone of the forearm and two ribs. In all probability ligaments held together a part of this skeleton at the time of its removal to the mound. Reference has already been made to the custom formerly obtaining with many of the southern Indians, namely, the exposure of the body for a certain time previous to interment. Juan Ortiz, a member of a former expedition, rescued by De Soto, had been accorded by his captors the task of keeping carnivorous wild animals from remains thus exposed.

About 2.5 feet down, just above a thin layer of calcined oyster shells extending several feet beyond, were the bones of a young infant. With them were many shell heads of various sizes.

At another point lay a deposit of calcined bits of bone, some certainly human, all probably so.

Almost in the center of the mound were parts of a skeleton, considerably scattered. A small hole apparently had been dug previously at this point, causing a disarrangement of the bones.

Sherds were limited in number, about one dozen being met with, the majority plain though several bore a complicated stamped decoration.

With the exception of two or three bits of chert the mound yielded nothing farther of interest.

## CERTAIN ABORIGINAL MOUNDS OF THE GEORGIA COAST. 11

### LOW MOUND NEAR FAIRVIEW, CAMDEN COUNTY.

In pine woods, about one-quarter of a mile in a northerly direction from the preceding mound, on property of Mr. Robert H. Frohock, to whom our acknowledgements for permission to dig, are herewith tendered, was a mound 2 feet 5 inches in height and 34 feet across the base.

The northern half was completely dug through. Considerable charcoal and fireplaces lay seemingly on the base.

Several bunched burials and fragments of human bones were met with at various points. Nothing in the way of art relics was encountered with the exception of about one-half of a small and gracefully-shaped vessel of earthenware and several sherds, most of which bore an incised cross-hatched decoration.

### MOUND NEAR WOODBINE, CAMDEN COUNTY.

About three-quarters of a mile in a westerly direction from the town of Woodbine near the Satilla river, is Bedell's Landing. About one-quarter of a mile south of the landing is a very symmetrical mound 4 feet 9 inches in height and 40 feet across the base. A number of large hickories are on the eastern side and these were left standing through a natural desire on the part of the owner of the large plantation on which the mound is situated to preserve the earthwork as a landmark. About two-thirds of the cubic contents of the mound were displaced and subsequently returned, leaving the mound in appearance as we found it.

Our thanks are tendered to Mr. J. K. Bedell, the owner, for full permission to investigate, a courtesy which, considering the proximity of the mound to his homestead, might have reasonably been declined.

The mound was composed of light-brownish sand with a slight admixture of clay. A vertical section of the mound from the summit plateau to where traces of human handiwork came to an end, had a height of 6 feet.

The usual fireplaces and admixture of charcoal with the sand were encountered. The mound had probably at an earlier period lost somewhat in height and had been considerably disturbed within recent years through use as a place for burial. In fact, at the present time, but 35 yards distant, are numerous graves dating from the last half of the present century, and several intrusive burials, doubtless of this period, were discovered in the mound. One skeleton, the bones of which still had a raw appearance, had, near the pelvis, two brass buttons apparently belonging to an old fashioned "dress coat," while another had iron nails, probably belonging to the coffin, in close proximity. The intrusive skeletons were buried at length and considerable care had been bestowed in the arrangement of the bodies, in one instance the hands being folded at the waist.

Original burials numbered about two dozen and were so badly decayed that in the case of some the method of interment was not determinable. When unmistakably identified as to position the bones were found in anatomical order. The bodies had been variously flexed. These interments were found from 1.5 feet from

## 12 CERTAIN ABORIGINAL MOUNDS OF THE GEORGIA COAST.

the surface to a depth of 6 feet. In some cases local layers of sand dyed with the red oxide of iron lay immediately above the bones.

At two points in the mound were pockets made up of fragments of calcined human bones. In the mounds of Florida such pockets are sometimes found though cremation was not, so far as our experience extends, largely practised there. We shall see later to how considerable an extent this form of burial was in vogue among the aborigines of the Georgia coast.

### EARTHENWARE.

Sherds were very infrequent and probably of accidental introduction, none lying with human remains. They were, as a rule, undecorated, though the complicated form of stamp, so well known in Georgia, was present.

No vessels of earthenware were encountered.

In a central portion of the mound, 5 feet from the surface, near human remains, was an undecorated tobacco pipe of earthenware, of a type common to the mounds of the lower thirty miles of the St. Johns river and other sections, where the aperture for the stem rivals that of the bowl in size. We have figured<sup>1</sup> a pipe of this type in our account of the mound at Point La Vista, Duval County, Florida.

### STONE.

A graceful lance-point of chert lay with a skeleton about 4 feet from the surface. Two polished "celts" lay with burials 1 foot and 2.5 feet from the surface, respectively.

A small hammer-stone and a portion of a pebble were with the pipe to which reference has been made.

Loose in the sand was an arrowhead of chert.

### SHELL.

Loose in the sand, throughout the mound, were several conchs (*Fulgur*) and fragments of conchs.

Upon a number of occasions shell beads lay with the burials.

A little over one foot below the surface, over the ribs of the skeleton of a child, was a gorget of shell, irregularly oval in form, 4.5 inches by 5.5 inches. Near the upper margin is a perforation for suspension. A companion to this perforation had apparently been destroyed by a blow from a spade, received at the time of discovery. The concave surface of this gorget shows traces of intricate incised decoration, the exact pattern of which is no longer apparent.

Less than one foot from the surface, with human remains, were two stopper-shaped objects of shell. This form (Fig. 7) so well known in certain sections, is not present in the mounds of the Georgia coast strictly speaking and has not been met with by us in shell in Florida though present in the great deposit of objects

<sup>1</sup> "Additional Mounds of Duval and of Clay Counties, Florida."

of earthenware found by us in the Thursby Mound, Volusia County.<sup>1</sup> These may have served as ear-plugs since we know it to have been an aboriginal custom to wear articles of considerable size thrust through the lobe of the ear.

About 3 feet from the surface, lying near the cranium of a skeleton, were beads of shell, some of considerable size; several stopper-shaped objects of shell; an imperforate drinking cup wrought from *Fulgur perversum*; and an undecorated gorget of shell, 3.75 inches by 4.5 inches, with double perforation for suspension. Almost immediately above these remains and relics was an intrusive burial of recent times, having fragments of clothing and buttons.



Fig. 7.—Stopper-shaped object of shell. Mound near Woodbine. (Full size.)

Other stopper-shaped objects were found associated with a finger-ring of copper, to which reference will be made later.

About 3 feet from the surface was a nest of oyster shells and charcoal.

#### COPPER.

Associated with human remains, 1.5 feet from the surface, was an ornament of sheet copper almost oblong in shape. The margin was beaded,<sup>2</sup> as is so commonly the case with similar ornaments in Florida, and a central concavo-convex boss had its origin in a great number of semi-perforations placed closely together with the aid of some pointed implement. The sheet copper is decidedly thicker than that met with in Florida, more resembling sheet copper we have seen from Ohio. Not far from the center of the margin of the smaller end is a perforation for suspension. Length, 3 inches; maximum breadth, 2.75 inches; minimum breadth, 2.25 inches.

About 1.5 feet from the surface, 2 feet from a skeleton lying at the same level, was a circular ornament of sheet copper, 3 inches in diameter. The usual concavo-convex boss at the center is present, as likewise is the beaded margin. There is one perforation for attachment or suspension.

In the northern slope of the mound, about 2 feet from the surface, with a skeleton, were shell beads, several stopper-shaped objects of shell and, in place on a finger bone, a finger-ring wrought from a band of thin sheet copper (Fig. 8).



Fig. 8.—Finger-ring of sheet copper. Mound near Woodbine. (Full size.)

Prehistoric finger-rings are of extreme rarity in this country.

In the cemetery at Madisonville, Ohio, where are the famous ash-pits, Professor Putnam found on the fingers of one skeleton four rings made from bands of sheet copper, and speaks of such rings as "unique in American archaeology."<sup>3</sup> Professor Putnam does not recall the discovery of similar rings from the date of publication of his report to the present time.

<sup>1</sup> "Certain Sand Mounds of the St. Johns River, Florida," Part I, Fig. 100.

<sup>2</sup> The same beaded margin, so frequently seen on ornaments of sheet copper in Florida, is represented as present on a sheet silver disc from Peru. "Necropolis of Ancon," Reiss and Stübél, Berlin, Part VIII, Plate LXXXI, Fig. 19.

<sup>3</sup> XVI and XVII Annual Reports, Peabody Museum, p. 166.

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It is worthy of remark that similarly shaped finger-rings of metal bands have been found on Peruvian mummies, two such rings being figured<sup>1</sup> in Reiss and Stübel's magnificent plates. Unfortunately, the metal from which the rings are made is not specified, but as they are shown of a deep green shade presumably copper is represented. On ornaments of silver containing copper one is not likely to find so marked and so uniform a deposit of carbonate.

##### MISCELLANEOUS.

The tooth of a fossil shark, about 4 inches in length, apparently unassociated, lay 5 feet from the surface.

Another shark's tooth, 1 inch in length, lay in caved sand. At its base was a perforation possibly for suspension as an ornament, or just as probably for attachment to a wooden handle for use as a cutting tool, such implements having been found by Mr. Cushing in the mud near shell-heaps of the southwestern coast of Florida.

On or just beneath the surface, at a considerable distance from any burial, was a polychrome glass bead which we believe to have been dropped upon the mound subsequent to its completion.

##### REMARKS.

The interesting mound near Woodbine, which we have included here, has nothing in common with the mounds of the coast, being on fresh water and at a considerable distance from the sea. This fact should be borne in mind when the contents of the mound are taken into consideration.

##### MOUND AT OWEN'S FERRY, CANDEN COUNTY.

At Owen's Ferry, on the left hand side of the Satilla river, going down, in full view from the water, on the property of George S. Owen, Esq., of Savannah, is a symmetrical mound apparently uninvestigated previous to our visit. It is picturesquely situated on a bluff sloping to the water's edge and on it grow a number of forest trees. The mound, considered a landmark, is in full view of the Owen house and we deem it an especial courtesy on the part of Mr. Owen to have placed it so readily at our disposition.

In shape the mound resembles an inverted bowl. Its height from the east, which may be considered a fair average, is 6 feet 4 inches; its diameter at base, 52 feet. Over one-half of the mound, the northernmost portion, was dug away and subsequently replaced. The mound was composed of light yellow sand without stratification.

Small fragments of human bone in the last stage of decay, were present at three points.

<sup>1</sup> "The Necropolis of Ancon," Berlin. Part III, Plate XXX, Fig. 14.



## CERTAIN ABORIGINAL MOUNDS OF THE GEORGIA COAST. 15

A few sherds, some plain and some ornamented with the usual diamond or square stamp, lay loose in the sand, as did three arrow-heads of chert, found separately. Well in toward the center was an irregular mass of oyster shells, about 6 feet from the surface.

The result of our examination of this mound surprised us greatly, since it strongly resembled the rich little mound at Woodbine a few miles below.

### TWO MOUNDS SOUTH OF BRUNSWICK, GLYNN COUNTY.

At South Brunswick, opposite the town of Brunswick, about 200 yards in a southerly direction from the railroad wharf, was a mound 2 feet high and 26 feet across the base. It bore no marks of previous investigation. A total demolition of the mound was without result.

About 1.5 miles inland from Fancy Bluff, an abandoned plantation on a creek a short distance from South Brunswick, was a mound 2 feet 3 inches in height, and 28 feet across the base. This mound was investigated so far as a large tree upon its northern portion permitted. No discoveries of any sort were made.

### MOUNDS IN LAWTON'S FIELD, DARIEN, MCINTOSH COUNTY.

The town of Darien, on a branch of the Altamaha river, is about 10 miles distant from the sea in a straight line.

In the northern outskirts of the town is a large field, the property of Mr. P. C. Lawton, an intelligent colored man, who readily placed at our disposal three mounds included within the limits of his field.

*Mound A.* This mound, which had been plowed over for years, had, according to report, lost considerably in height which, at the time of its total demolition by us, was 4 feet 6 inches. Its diameter at base was 46 feet.

Previous investigation was limited to a narrow superficial trench through a portion of the mound.

The mound was composed of yellowish sand with local layers of oyster shells, calcined in one instance, and of sand, brownish in color, probably through presence of foreign material. A layer of brownish sand, about 1 foot in thickness, seemed to mark the lower portion of the mound, as immediately below it was bright yellow sand, undisturbed, and containing no object of artificial origin. At the center, from this bright yellow sand to the highest portion of the mound, vertically, was 6 feet.

A number of fragmentary and disconnected human bones were found in the neighborhood of the trench, left by previous investigators. Undisturbed human remains, which were almost entirely confined to the eastern side of the mound, were eleven in number. The form of burial was that in anatomical order. The skeletons were considerably flexed. Nearly, if not, all had been, to all appearance, wrapped in bark much of which, though badly decayed, still remained.

Sherds were comparatively of infrequent occurrence and were apparently of accidental introduction. The plain, the checked stamp, and the intricate stamp were represented.

The mound was unusually devoid of artifacts. Large shell beads were present with several skeletons, and some small ones with the skeleton of an infant.

With human remains, just beneath the present surface, were two stone hatchets, one very rude; one pebble and one bit of earthenware.

Loose in the sand were a bit of fossil wood, and, in another portion of the mound, a small mass of sandstone, pitted on one side. Unassociated, 5.5 feet from the surface was a very rude implement of stone.

*Mound B.* This mound, about 30 feet south of the preceding one, had a height of 4 feet, a diameter at base of 36 feet. A narrow trench, about 2 feet in depth, had previously been dug through a portion of it.

The mound was completely demolished.

Its composition was almost identical with that of Mound A.

#### HUMAN REMAINS.

Exclusive of certain loose bones, disturbed by previous investigators, 32 burials were noted in the mound. Of these, 30 were in anatomical order and flexed, while two consisted of deposits of charred and calcined fragments of human bones. Above certain skeletons lay small local layers of oyster shells. With one skeleton was a small amount of sand tinged pink with red oxide of iron—its sole occurrence in the mounds of Lawton's field.

With very few exceptions, skeletons were associated with wood or bark, in some cases included above and below and again apparently heaped over with bark or with slabs of wood, in the last stage of decay. Several skeletons were enclosed in cribs or pens of wood, as for instance, one 8.5 feet from the eastern margin of the mound and 4 feet from the surface. The bones lay in a pen composed of logs from 3 to 5 inches in diameter. The longitudinal logs had an average length of 3 feet, that of the transverse ones at the bottom was about 2 feet, at the top about 20 inches. The top was composed of parallel logs running longitudinally. There was no bottom to this pen or, more properly speaking, coop. Within it lay a skeleton flexed on its right side, heading south. The head and body were in line, the head at one end of the pen, the pelvis at the other. The thighs were flexed sharply on the body and the legs on the thighs. The right leg rested between the logs at the side of the pen, the foot projecting; while the left foot extended beyond the end of the pen. The arms lay along the body with the forearms lying between the thighs. We give a representation of this coop in Fig. 9, reproduced from a sketch made to a scale and on the spot. It has been found impossible to convey the decayed and crushed appearance of the wood, but the number and positions of the various pieces are exactly represented. The bones of the feet, held in place by the sand, fell apart when the sand was removed.

In this pen, with the bones, were four small bits of chert, one showing a certain amount of workmanship; one small cube of quartz and a small mass of clayey material.

With another skeleton in a somewhat similar coop, though less well preserved, was a small polished chisel of stone and a diminutive pebble.

Though, as stated, a great majority of the skeletons were buried with wood or bark, there were certain notable exceptions. One burial in the eastern margin, 3.5 feet from the surface, showed no trace of woody material. The cranium of this skeleton was preserved in good condition (A. N. S. Cat. No. 2,159).

Considerably below the level of the surrounding territory, beneath the extreme western margin of the mound, were two graves, distinguished by the dip of the artificially colored brown sand constituting the lowest stratum of the mound, into the undisturbed yellow sand of the field. Neither grave showed any trace of wood or bark.

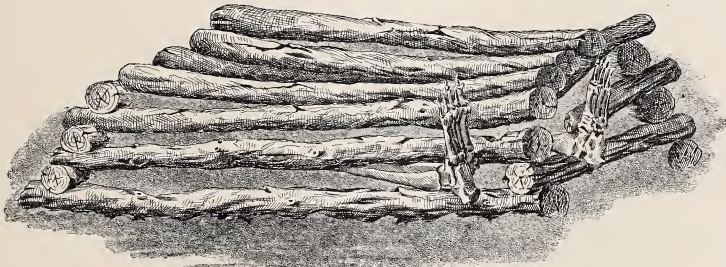


Fig. 9.—Burial pen. Mounds in Lawton's Field, Mound B. (About one-eighth size.)<sup>1</sup>

Grave No. 1 contained a skeleton 5 feet 3 inches from the surface of the mound and 2 feet 3 inches below the bottom of the basal layer of brown sand which at this point extended two feet below the level of the surrounding territory. The mound at this point had a height of 1 foot. No artifact lay with the skeletal remains though, in close association, was the right humerus of an adult bald-eagle<sup>2</sup> (*Haliaeetus leucocephalus*). The bone was in a subfossilized condition. The bones of both forearms of this skeleton were ankylosed at the upper extremity in a position of pronation. They were sent to the Army Medical Museum at Washington. No ankylosis was noted at other points of the skeleton. The cranium, in fairly good condition, was preserved (A. N. S. Cat. No. 2,160). In this skeleton the bones of one hand were missing while the axis rested against the sacrum and a first rib and atlas lay above the pelvis. The lower jaw was back of, and turned from, the

<sup>1</sup> In the cut the feet are incorrectly represented as upright, their true position having been nearly parallel to the logs.

<sup>2</sup> Kindly determined by Dr. R. W. Shufeldt.



cranium and, moreover, gave every evidence of not belonging to the skull. The teeth of the lower jaw showed considerably more wear than those of the upper jaw. In the upper jaw one wisdom tooth showed little sign of wear, while the other had been but recently lost. On the other hand, there had been a loss of both wisdom teeth of the lower jaw with absorption of the alveolar process. Moreover, the teeth of the jaws do not seem to coincide. It is seen that these signs of disturbance can be accounted for only under the hypothesis of exposure of the body previous to interment—a very common practice in some sections—and that the parts not in anatomical order had fallen from the skeleton which otherwise was held together by ligaments. The lower jaw, probably lost or mixed, was intentionally or otherwise, substituted by another.

About 8 feet due south from grave No. 1, 4.25 feet from the surface of the mound, and about 3 feet below the level of the surrounding territory, was grave No. 2, 3.5 feet long, by 33 inches wide, by 1 foot deep. The skull was saved in good condition (A. N. S. Cat. No. 2,155). The tibia and fibula showed inflammatory swelling. With the cranium were three shell pins of familiar type.

## EARTHENWARE.

Sherds were not numerous, a few undecorated or with variously stamped patterns being met with.

Two and one-half feet below the surface of the southern margin, with human

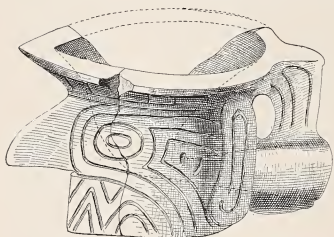


Fig. 10.

Tobacco pipes of earthenware. Mounds in Lawton's Field, Mound B. (Full size.)

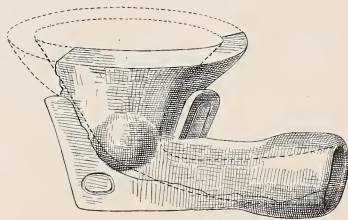


Fig. 11.

remains was an inverted imperforate vessel with flaring rim and encircling band of complicated decoration. The ware is of excellent quality. Height, 4.75 inches; diameter of rim, 4.25 inches; of body, 5 inches (Plate I, Fig. 1).

Two undecorated vessels of poor material, of about 3 pints and 1 pint capacity respectively, lay together about 2 feet distant from a skeleton on the same level. The smaller vessel, irregularly oblong, unfortunately received a blow from a spade. The larger, a bowl of ordinary pattern, was broken by pressure of sand. Both have been completely restored.

Scattered fragments belonging to two earthenware tobacco pipes were recovered some little distance apart, and subsequently reunited as shown in Figs. 10 and 11. One is still coated interiorly with carbonized material, probably tobacco. Tobacco pipes of this type are figured by the late C. C. Jones as coming from a mound on Colonel's Island on the Georgia coast.<sup>1</sup>

## SHELL.

With various burials were five drinking cups of shell (*Fulgur perversum*), two imperforate, three having round and even perforations in the base. These holes were much more carefully made than those made by roughly knocking out a portion, so frequently found in the Florida mounds. This perforation, the reader will recall an aboriginal custom obtaining in Florida though not universally practised. It is supposed to have been done to "kill" the vessel, thus freeing its soul to accompany that of the departed into the other world. We have found no perforation of shell drinking cups north of Darien.

Shell beads were not numerous and were present in but two cases.

Near the margin, together, were seven fresh-water mussel shells (*Unio Cuvierianus*, Lea<sup>2</sup>) and nearby, a number of marine shells (*Littorina irrorata*<sup>3</sup>). These apparently, were not in the neighborhood of human remains.

## STONE.

Ten inches below the present surface of the mound was a beautifully polished little hatchet of plutonic rock,<sup>3</sup> apparently unassociated. Another larger hatchet was found superficially. Several pebbles lay with burials or loose in the sand.

## MISCELLANEOUS.

Beneath the base of the mound, with human remains, was the lower portion of the femur of a bear, evidently separated by a cutting tool.

In a portion of the trench made previous to our investigation, which had been partially filled, were various objects of recent manufacture: a rusty pocket knife; a fragment of glass; the head of an iron hammer; an iron ring, etc. A hasty or unscrupulous investigator could easily refer these objects to the period of construction of the mound.

*Mound C.* In the same field, about 300 feet east of Mound A, was a mound 2 feet 9 inches in height. Its diameter of base was 34 feet.

A small and superficial trench had previously been made through a portion of it. The mound was completely dug through.

Seven entire skeletons were met with in addition to a few loose bones disturbed by the makers of the previously mentioned trench. All skeletons were apparently lying flexed on the side, and all but one were buried with coverings of bark or wood

<sup>1</sup> C. C. Jones, "Antiquities of the Southern Indians."

<sup>2</sup> Identified by Prof. H. A. Pilsbry.

<sup>3</sup> We are indebted to Dr. E. Goldsmith for determinations of rock, included in this report.

which dropped into small pieces upon removal. In some cases the covering of wood was simply thrown over. In one instance, however, in the case of a child buried 2 feet deep beneath the extreme southern margin of the mound which at that point was about on a level with the surrounding territory, the skeleton was covered by a coop 26 inches in length, 14 to 16 inches in breadth, lying northeast and southwest. In this case the top consisted of flat pieces placed transversely and not of logs laid longitudinally as in the case of the coop in Mound B.

Beneath one burial was a thin layer of ashes, while another was surmounted by a layer of oyster shells, 6 to 8 inches in thickness.

No artifacts were present with the burials. A few sherds lay loose in the sand. Superficially and near no human remains was a copper bead apparently of European manufacture.

The curious burials present in Mounds B. and C. in Lawton's field, where skeletons were enclosed in pens, must not be considered as representative of the coast since nowhere else have they been met with by us. We have it on excellent authority that in mounds farther up the Altamaha this form of burial was in vogue.

#### TOWNSEND MOUND, McINTOSH COUNTY.

This mound, about one mile east of Darien, was placed at our disposal by Mr. J. S. Townsend, of Darien, the owner, to whom our cordial thanks are tendered.

The mound, which, it is believed, had sustained no previous investigation, is reported to have been under cultivation in ante-bellum days, and at that time, to have been ploughed over for considerable periods.

Its present height is 3 feet 8 inches; the diameter of its circular base, 42 feet.

With the exception of a few square feet surrounding two live oaks on extreme marginal portions, the mound was completely dug through.

The mound was composed of yellowish-brown sand, without stratification. In various parts were layers of oyster shells. In the central portion was an irregular layer of these shells, 3 feet in thickness at places. Occasionally, near human remains, were pockets of sand dyed pink or red, with hematite.

#### HUMAN REMAINS.

This mound, a perfect charnel house, teemed with skeletal remains from margin to center, human bones being met with at fifty-nine points, and it probable that these interments represented the remains of fully seventy-five individuals.

Interments varied as to depth from .5 of a foot to 4.5 feet from the surface.

Three forms of burial prevailed: cremation, the bunched burial and the burial in anatomical order. Deposits of portions of human bones, charred and calcined by fire, were noted at five points in the mound. Once charred remains lay associated with many bones unaffected by fire. We shall refer to this farther on.

In all, 18 bunched burials were present, some representing parts of but one individual, others being layers of bones in absolute confusion, one such having a

CERTAIN ABORIGINAL MOUNDS OF THE GEORGIA COAST. 21

length of 3.5 feet, a breadth of 22 inches, a thickness of 8 inches. In several of these layers five or six crania were present. With one layer was a mass of calcined human remains to which reference has been made.

In each case burials in anatomical order showed flexion to a certain extent—in certain cases to a much greater extent than in others. No uniformity of direction had been observed as to the positions of the skeletons—crania pointing to every point of the compass. Twenty-six skeletons lay upon the right side, eight upon the left. One lay upon the back with legs flexed to the left; another upon the back, had the face turned to the left. The position of one skeleton in caved sand was undetermined.

The bones in this mound, perhaps owing to the presence of shell, were unusually well preserved, offering a marked contrast to skeletal remains in many Florida mounds from which frequently all intermixture of shell is absent.

In no instance did the remains indicate individuals of unusual size. The linea aspera was not especially defined. One platycnemid tibia had an index of 54, which, as the reader will recall, means that the transverse diameter is .54 of that taken antero-posteriorly. No signs of injury or disease were present with the exception of alveolar abscesses. Three crania were preserved in fairly good condition. Two of these (Cat. Nos. 2,156 and 2,157) are in the collection of the Academy of Natural Sciences of Philadelphia. The remaining one was sent to the Army Medical Museum, Washington.

HUMERI.

|       | Male.       |                 | Female.     |                 | Uncertain.  |                 |
|-------|-------------|-----------------|-------------|-----------------|-------------|-----------------|
|       | Perforated. | Not Perforated. | Perforated. | Not Perforated. | Perforated. | Not Perforated. |
| Right | 4           | 15              | 3           | 2               | 3           | 11              |
| Left  | 6           | 11              | 3           | 1               | 5           | 8               |

Of the 10 male skeletons in which both humeri were recovered in a condition for determination, 7 showed no perforation in either humerus; two skeletons showed the right humerus perforated, the left imperforate; in one skeleton the condition was reversed.

Of the 2 female skeletons recovered, one had the right humerus perforated, the left imperforate; the other, perforation of both humeri.

Of the uncertain humeri but one pair, the left perforated, the right imperforate, belonged to the same skeleton.

ARTIFACTS.

*Earthenware.*—No earthenware vessels were present in the mound nor were sherds associated with human remains. A small number of sherds, probably

accidentally introduced, plain, with the ordinary square stamp, with intricate stamped decoration and in one case, incised, were present.

Eight tobacco pipes, whole or but slightly broken, of the same type as those from the mound at Darien, came from different points in the mound. They lay in immediate association with human remains, as in fact, did all artifacts discovered, save only the sherds. Of these tobacco pipes, two of which we show in Figs. 12 and 13, one had incised decoration while several had encircling bands upon the

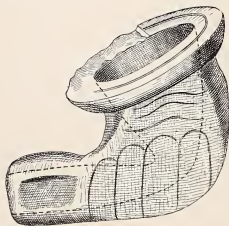


Fig. 12.  
Tobacco pipes of earthenware. Townsend Mound.

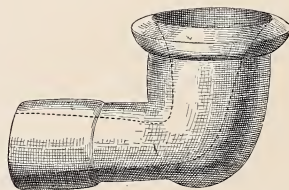


Fig. 13.  
(Full size.)

bowl. All were moderate in size, differing markedly from the great tobacco pipes from the mounds of Duval Co., Florida. In the bowls of some remained carbonized material—doubtless tobacco.

*Shell.*—With numerous burials were shell beads, at times a few only and again in considerable numbers; some minute in size, others—sections of columellæ—over 1 inch in length. Nineteen of these longitudinally perforated sections were found with one burial.

Eleven pins of shell of the familiar type, none over 2.5 inches in length, were with various crania, often with shell drinking cups. These drinking cups were imperforate. One, with the skeleton of a child, was but four inches in length. We have not met with so diminutive a shell drinking cup before.

A number of fresh-water mussel shells (*Unio Shepardianus*),<sup>1</sup> perforated for suspension, lay with other objects near a skeleton.

With a bunched burial 2 feet from the surface, were five implements wrought from columellæ of *Fulgur carica*, ground at the beak doubtless to serve as chisels. In four the spire remained, from the fifth this portion had been removed.

*Stone.*—Three small polished "celts," each about 2 inches in length, two about double that size and a fine chisel 10 inches in length, with a maximum breadth of 3 inches, a maximum thickness of .9 of one inch, lay with human remains.

Two discoidal stones, each about 1.75 inches in diameter, one .75 of an inch in thickness, the other a little over 1 inch, were found separately with human remains. This is the southernmost occurrence of the discoidal stone in our investigations.

<sup>1</sup> Identified by Prof. H. A. Pilsbry.



But one arrowhead came from the mound.

Two bits of soapstone lay separately with burials.

A number of pebbles, each about 1 inch in diameter, were with several skeletons, and a considerable number, each about the size of a pea, doubtless formerly enclosed in a turtle shell to form a rattle, were met with together near a burial.

Several bits of chert, fragments of hatchets and one-half of a good-sized pebble of quartz were variously associated.

*Glass.*—A considerable number of glass beads lay with a burial two feet from the surface.

*Miscellaneous.*—A bit of plumbago, also a mass of bitumen, came from the mound, and ordinary piercing implements of bone were with two interments.

#### ASSOCIATION.

To give an idea of the association of various objects present in the mound we shall describe certain burials and the objects found with them.

One foot from the surface, with a skeleton, were the nineteen large shell beads already referred to; a saw apparently of a diminutive saw-fish and a bit of chert.

Another skeleton, with sand tinged red near the cranium, had five shell pins almost in contact with the skull, and eighteen large beads of shell.

A skeleton having a thin layer of oyster shells immediately above it, had associated several piercing implements of bone and one arrowhead of chert.

With a bunched burial, contiguous to a confused mass of human bones, around the skull, were a few shell beads, many beads of glass, and one minute piece of copper or of brass, of about the area of twice that of the head of a pin. It was carbonated through and through.

With a bunched burial, 2 feet from the surface, were three tobacco pipes, two slightly broken; four pebbles; three piercing implements of bone, and five cutting implements of shell.

The reader will bear in mind that these objects described as associated are not additional artifacts but have previously been referred to separately.

#### REMARKS.

We have noted the presence of glass beads at one point in the mound. The burial with which they lay had no appearance of being intrusive. Unfortunately, the height of the mound was such that one can draw no conclusion as to the period of the burial on account of its comparatively superficial character.

#### PASSBEY MOUND, McINTOSH COUNTY.

This mound, in the yard of Mr. Frank Passbey (colored) is in the suburbs of Darien, about 1 mile northwest of the town proper. It had been under cultivation but no previous investigation was apparent.

Its present height is 5.5 feet; the diameter of its base, 48 feet. The mound was about one-half dug through. It was composed of yellowish-brown sand with

a band of sand about 3 inches thick running about 1 foot below the level of the surrounding territory.

Human remains were encountered at eleven points. In each case but one, where incineration had been practised, burials were in anatomical order, flexed and lying on the right side or on the left side with no uniformity of direction. Several marginal burials were considerably below the blackened stratum, to which reference has been made, and in each case the stratum was disturbed, showing the burials to have been made subsequent to the extinction of the fires.

Several burials in the mound showed partial disturbance, and at these points the sand was less solid than elsewhere, probably through removal of trees when the mound was cleared for cultivation.

With the interments were no artifacts whatever. Loose in the sand were four or five sherds, undecorated or with the usual square or diamond-shaped stamp. The only other object of human origin, present in that portion of the mound excavated by us, was an arrowhead of quartz. This, so far as our experience extends, is the southernmost occurrence of this material in use for a lance-head or for a projectile point.

#### MOUNDS NEAR "THE THICKET," MCLINTOSH COUNTY.

About 5 miles by land, or about 12 by water, in a northeasterly direction from the town of Darien, is a settlement on Peace Creek, having no general name, either locally or on the chart, but, with the exception of certain homes of colored people, it is composed of various estates, each having a name of its own, such as "The Forest," "The Thicket," etc. As the boat landing is situated on the estate known as "The Thicket," we shall, for convenience, give that name to the entire settlement.

About three-quarters of a mile in a westerly direction from the landing at "The Thicket," on the property of Mr. Mansfield, of Darien, are three mounds about one-quarter of a mile apart. All are symmetrical and vary in height from 5 to 7 feet. Two of these mounds were investigated, though not demolished. Their diameters of base are about 40 and 50 feet respectively. They are composed of yellow sand unstratified, and having that raw look indicative of absence of organic matter. The smaller mound yielded absolutely nothing, with the exception of a flexed skeleton near the surface at the margin, which we took to be intrusive, and some charred bones with several small shell beads, two or three inches below the surface.

The larger mound was not excavated in our presence though experienced persons were in charge. Fragmentary human remains were reported as present at two points and these also we take to have been intrusive. With the exception of a few small bits of earthenware and one arrowhead loose in the sand in the larger mound, no artifacts were met with.

Within sight of a road at "The Thicket," on the property of Mr. H. S. Ravenel, of Darien, was a symmetrical little mound of brownish sand, 3 feet 5 inches in height and 30 feet across the base.

It was totally demolished.

In the northwestern margin, 33 inches below the surface which was there just above the surrounding level, was a layer 4 feet by 3 feet by 10 inches thick, of oyster shells and sand completely blackened by an admixture of charcoal. With this blackened sand was considerable other sand dyed red with hematite. This curious layer formed the bottom of a pit as was clearly shown by undisturbed sand of a different color on either side. Closest scrutiny failed to reveal human remains or artifacts in this peculiar pit.

About the center of the mound, 2 feet from the surface, was a bunched burial with two crania and a variety of other bones. In association was a great quantity of powdered hematite scattered among many oyster shells.

Four feet down beneath the central plateau, directly beneath the burial already referred to, was a confused mass of human bones including 27 crania, about 5 feet by 6 feet by 10 inches thick. The oyster shells and hematite lying beneath the bunched burial formed a covering for this mass of bones. With the bones was a small discoidal shell bead and a tubular bead of shell about .75 of an inch in length.

A few sherds lay loose in the sand throughout the mound.

On Mr. Mansfield's property at "The Thicket," about one-half mile in a westerly direction from the landing, on the edge of the road and opposite the church, was a symmetrical mound 2 feet 9 inches in height and 30 feet across the base. No previous investigation was apparent.

It was totally demolished.

The mound, which was composed of yellowish-brown sand, contained no oyster shells. Scattered bits of charcoal and one local layer of charcoal were present.

Human remains were in the last stage of decay. Apparently in all but three cases the bunched burial was represented. One skeleton lay in anatomical order and two pockets of calcined human bones were centrally situated 4 feet from the surface, immediately on a layer of sand blackened by fire and by intermixture with charcoal. In all, fragments of 13 crania were noted in the mound.

Nine inches down apparently near no human remains, were, the shaft of a bone of a lower animal, longitudinally grooved; a number of fragments of columellæ of marine univalves, and a mass of stone of volcanic origin about 2 inches by 1.5 inches by .5 of an inch, deeply grooved on one side and grooved to a certain extent on the other. This stone had, in addition, been used as a hammer as a portion involving the groove, had been split off.

With a skeleton at length, to which reference has been made, near the cranium, was a portion of a disc of copper carbonated through and through. Immediately beneath the cranium were 246 small chips of chert. This skeleton lay 3 feet from the surface.



About nine inches down, with sand colored with hematite, which was present with certain other burials in the mound, were a few small bits of chert; several small shell beads and parts of two copper discs each about 2.3 inches in diameter and having three concavo-convex concentric circles by way of ornamentation. On one side of each was the usual wood or bark.

Reference has been made to a black band of sand running through the mound. This layer .75 of one foot in thickness, was, at the center of the mound, 4 feet from the summit, or 1 foot 3 inches beneath the surrounding level. In close proximity to one of the pockets of human bones which we have noted as lying in this blackened sand, was an imperforate vessel of very thick and heavy ware; length, 8 inches, maximum width, 3.1 inches, height, 1.8 inches, consisting of three compartments joined longitudinally very much in the same style as the vessel figured by us as coming from the Monroe Mound<sup>1</sup> in Florida. Vessels of this character are supposed by some to have been used for paint, the separate compartments holding different colors.

A sheet of mica about 3 by 2 inches was found in caved sand.

A few sherds, possibly half a dozen, were scattered throughout the mound.

An irregularly shaped mound about 5 feet in height, mainly composed of shells, on the property of a colored man named King, was dug into without result.

#### MOUND AT SHELL BLUFF, MCINTOSH COUNTY.

Shell Bluff on Shell Bluff creek, approximately three miles by land and six miles by water, from Crescent, is the property of George E. Attwood, Esq., who kindly placed at our disposition a mound in a cultivated field near his residence.

This mound, reduced by years of ploughing, scarcely rose above the general level. It was distinguished by the paucity of oyster shells upon its surface, which lay more thickly on certain other portions of the field. It being impossible to arrive at any conclusion as to the exact area containing burials, a semicircle was taken with radii of 46 feet converging at a point seemingly the most prominent of the slight elevation. This semi-circle, including what we took to be the eastern half of the mound, was carefully dug through. The remaining portion of the mound apparently had not been used for interments beyond a few feet from the cross-section and after 26 feet of it had been dug through, without material result, the work was abandoned.

The mound was composed of yellowish-brown sand with the usual layer of surface loam above. There was no marked base line nor any stratum of oyster shells in the mound, though several pits containing burials, extending into undisturbed sand, were filled with them.

This mound, Mr. Attwood informed us, had been dug into by him at one spot, the result being a discovery of three vessels of earthenware filled with charred and

<sup>1</sup> Certain Sand Mounds of Duval County, Florida, Plate LXXIII, Fig. 2, Journ. Acad. Nat. Sci., Vol. X.

calcined fragments of human bones and covered with other vessels inverted. Owing to this previous investigation and the obvious reduction in height of the mound, a detailed description of the contents will not be given.

Sherds were not numerous and none with the complicated stamp was met with. Loose in the sand was a large pebble-hammer of circular outline.

The mound, not greatly above the water level, was unusually moist; and human remains, which were encountered 31 times, were, as a rule, when not calcined, in very poor condition. The usual diversity of form of burial was present, including that in anatomical order, the bunched burial, inhumation of parts of skeletons, pockets of calcined remains and cremated fragments in cinerary urns. We append certain burials seemingly worthy of record, including all associated with any artifacts.

Burial No. 8. Nineteen feet east of the point taken as the center, and about 1 foot 9 inches below the surface, was a layer of charcoal and charred wood about 3 inches thick. It was 4.5 feet across and extended in 28 inches. Above a portion of it was a thin layer of oyster shells. Beneath the center of the layer of charcoal, which was entirely unbroken, were the two bones of a forearm of a child, showing no signs of fire. With them was an imperforate drinking cup of shell, so carefully ground exteriorly that all prominent parts had been removed.

Burial No. 12 A. A comparatively small vessel of about two gallons capacity with a checked stamp decoration, crushed into small fragments. It had contained many pieces of calcined human bones. The record of its exact position was overlooked.

Burial No. 14. Sixteen feet E. by N., on the base of a pit containing numerous oyster shells, 16 inches from the surface, was the skeleton of a male flexed on the right side, heading S. by W. The cranium, an exception to the almost universal rule in this mound, was well preserved and showed a marked artificial flattening of the frontal bone. It was sent to the Army Medical Museum, Washington, D. C.

Burial No. 16. Twenty-one feet N. E. by N., 2 feet down, was a partially flexed skeleton of a male on the right side, heading N. W. by W. With it were two pebble-hammers, one, of quartz, about 3.5 inches in length, shows considerable use on one end as a hammer, while the other had been roughly chipped to a cutting edge, a feature new in our mound investigation.

Burial No. 20, B. C. D. E. Fourteen feet E. by N., on the same level, their bases 2 feet 9 inches from the surface, in line, were three vessels. The one to the left (C), imperforate, undecorated, somewhat resembling a bell-jar in shape, was almost intact, and contained to within 6 inches from the surface, a mass of fragments of calcined human bones (Plate II). This vessel, which had a diameter at mouth of about 8 inches, a maximum diameter of 10.5 inches and a height of 10.5 inches approximately, was completely covered by an undecorated jar (B), which fell into small fragments upon removal. In contact with C was a gracefully shaped vessel (D), imperforate, undecorated and entirely intact (Plate III). Approximately, it measured 7.5 inches in height, 7.5 inches across the mouth, and 9.5 inches maximum

diameter. Within it were a certain number of calcined fragments of human bones. In contact with D was a bowl (E) in fragments. It bore the checked stamp decoration, and apparently contained no human remains, though immediately behind it was a small pocket of calcined fragments.

Burial No. 21. Ten feet S. E., skeletal remains disturbed by the plough. Below the chin were several large shell beads in line and a number of small ones.

CREIGHTON ISLAND, MCINTOSH COUNTY.—NORTH END.

Creighton Island, bounded on the north by the Sapelo river, a branch of Sapelo Sound, has on the northern portion, on such parts as were examined by us, great fields long under cultivation. Scattered through these fields are numerous shell-

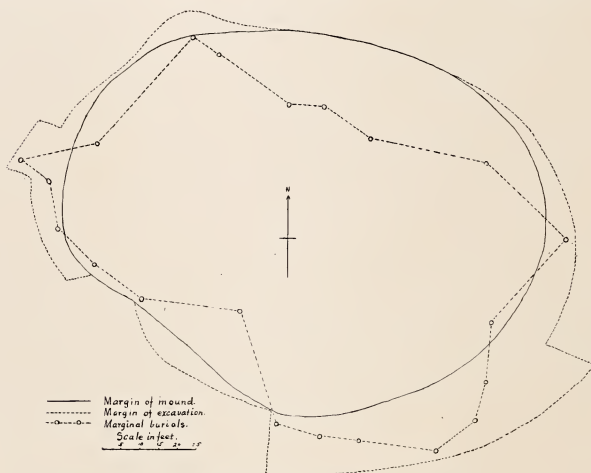


Fig. 14.—Diagram of mound at north end of Creighton Island.

heaps not greatly above the general level. Abundant sherds with incised decoration and with complicated stamp are scattered over the surface in every direction. All this interesting territory was cordially placed at our disposition by George E. Attwood, Esq., of Shell Bluff, near Crescent, Georgia, the owner, whose mound at Shell Bluff has already been described by us.

About one mile S. E. by E. from the landing was a mound, or rather an irregular ridge, extending about N. W. and S. E. a distance of 116 feet. Its maximum width at base was 100 feet approximately. Scattered oyster shells lay over the

surface. Its height,<sup>1</sup> which attained its maximum at the central part, was 34 inches. Disturbed sand at this point extended 38 inches beneath the general level, as we afterwards learned on the total demolition of the mound, which was carefully sliced down and much adjacent level territory dug through. The diagram (Fig. 14) shows the outline of the mound, the outlying territory dug through and the area in which burials were met with, which included, we believe, all having any connection with the mound.

There had been no previous investigation, the nature of the mound being unknown even to the owner.

#### COMPOSITION OF MOUND.

The mound was composed of yellowish-brown sand lying upon undisturbed sand of a bright yellow color. The usual fire places and fragments of charcoal were present at various points. A dark band ran, off and on, through the mound at about the level of the surrounding territory. It presumably marked the base, but was so broken and so irregular that but little could be determined from it.

Oyster shells in layers and in pockets were locally present but so irregular were the deposits that none but a general description of them can be given. The southern half of the mound proper showed no shell save in small local pockets until at a distance of 23 feet from the center in a southerly direction, where a deposit of considerable extent began, continuing about to the center. This deposit was somewhat undulating in shape, at times almost reaching the surface, and again dipping one or two feet below it. Sixteen feet from the center the deposit divided abruptly leaving a space 8 feet broad filled with sand. Shell continued 18 feet to the west and 7 feet to the east of this interruption. The western deposit, reaching to just beneath the surface loam, was 3 feet thick. Its side adjoining the sand was perpendicular. The eastern deposit had an average thickness of 1.5 feet, its western margin, however, contained a considerable pocket of sand extending down from the surface. This division of the shell layer was doubtless caused by a pit dug through it, as several burials were present in the sand. A few feet farther in, the layer reunited, having then a total length of 34 feet. This layer, disappearing toward the center of the mound, gave place to two others in the eastern and western portion of the mound, each of considerable length, which ran out after continuing a few feet toward the north. Other layers of shell in the northern portion of the mound were local and restricted as to size.

About the center of the mound was a pit (see section, Fig. 15), about 5 feet 8 inches in diameter, of the type prevalent among the sea-islands and upon the neighboring mainland. Upon its base, 6 feet 10 inches from the surface (it may be as well to describe the burial in connection with the pit), was a layer of fragments of calcined human bones, 6 inches in thickness, with many large shell beads. Upon this layer were about 2 feet 8 inches of dark yellow sand surmounted by about 3 feet 8 inches of oyster shells. At the western upper extremity of the pit

<sup>1</sup> Long continued cultivation must have considerably impaired the original height.

was a layer of oyster shells, almost superficial, 2 feet in thickness. The eastern upper margin would have contained a similar deposit had it not been that a pit of sand, 2 feet 4 inches across had been let into the shell at that point.

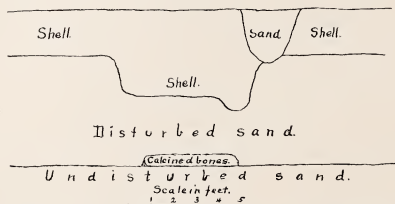


Fig. 15.—Diagram of central pit. Mound at north end of Creighton Island.

While various pits were present in this mound, in no mound investigated by us have they been so difficult to distinguish exactly. This arose partially from the considerable size of some, but mainly from the fact that but few extended into the bright yellow undisturbed sand beneath the base, and that the others in the disturbed sand, having been filled with homogeneous material, offered no distinct line of demarcation.

Beginning in the level ground and extending a considerable distance along the western marginal portion of the mound, was one of those great excavations filled with dark loam and refuse, and containing no burials, so often found in mounds of this type and for whose existence we have no explanation to offer save that possibly great pits made to furnish material for the mound were allowed slowly to fill during the occupation of the territory. The sand and loam filling pits of this class are always far darker than the sand of the mound which they adjoin.

#### HUMAN REMAINS.

In seven cases layers of decayed wood or bark, occasionally showing marks of fire, lay above human remains, and in two cases, above and below. Doubtless similar deposits in many other cases had disappeared through decay. It is interesting to note in this connection that a Yamacraw Indian (the Yamacraws lived near Savannah) dying in London during a visit in 1734, was interred by his companions, strapped between two boards<sup>1</sup>—a survival of an ancient custom.

Human remains were present at every depth in the mound proper, and in certain outlying territory, at 262 points as follows:

- 220 skeletons.
- 10 pockets of calcined fragments of human bones.
- 6 urn-burials of uncremated remains of infants.
- 3 bunched burials.

<sup>1</sup> "Antiquities of the Southern Indians," p. 185.

- 13 parts of skeletons disturbed by aboriginal pits.
- 7 fragmentary skeletons, in caved sand, disturbed by the plow, etc.
- 3 skeletons in the last stage of decay.

*Skeletons.*—Of the 220 skeletons the following subdivision as to sex may be made, prefacing it with the explanation that, under the head of uncertain sex are included such skeletons whose characteristics were not sufficiently marked for determination; and such others, mainly from pits in the damp sand, whose advanced state of decay made a definite conclusion impossible:

|               |                 |
|---------------|-----------------|
| 78 males.     | 16 adolescents. |
| 64 females.   | 12 children.    |
| 47 uncertain. | 3 infants.      |

These skeletons lay in the following positions:

- 166 flexed on the right side.
- 32 flexed on the left side.
- 7 partially flexed on the right side.
- 6 partially flexed on the left side.
- 2 with extremities flexed and trunk on back.
- 2 extended at full length.
- 1 semi-reclining.
- 1 body on back, thighs flexed to either side.
- 3 infants disturbed by our men in digging.

The two skeletons buried at full length on their backs were 2 feet and 2.5 feet from the surface, respectively. The condition of the bones of both was exceptionally good but one cannot base final conclusions upon the state of preservation of bones. The arms of one lay along the trunk, while those of the other were flexed to the pelvis. No aboriginal artifacts were present with either, nor, on the other hand, were buttons, coffin-nails, or any like object, discovered though specially careful search was made.

The direction in which the skeletons headed was as follows: 185 were included between the compass points S. E. and S. W., many being due S. Of the remaining 35—21 headed south of the E. and W. points; 4 headed due E.; 1, E. by N.; 1, E. N. E.; 1, N. E. by E.; 1, N. E. by N.; 2, W. N. W.; 1, W. by N.; while the positions of the 3 infant skeletons inadvertently scattered by our diggers, were not determined.

The bones were in fairly good condition though in nearly every case the crania were badly crushed. No fractures were present, a considerable number of diseased bones were met with. Caries of the teeth, practically absent in Florida from other than superficial skeletons, was met with upon a number of occasions. Muscular attachments indicated less powerful individuals than many interred in Florida mounds. No marked platycnemias or pilastered femurs were present with one marked exception. A pair of femurs from an undoubtedly original burial have indices of about 159, which is greater, we believe, than any ever before recorded.<sup>1</sup> This index is

<sup>1</sup> Dr. Topinard has contributed an interesting note on a femur found by us in the mound at Tick Island, Florida. "Certain Sand Mounds of the St. Johns River, Florida," Part I.



arrived at by dividing the lateral into the fore and aft diameter. A tibia of the same skeleton has an index of 51; that is, its lateral diameter is about half of its fore and aft diameter. One of these femurs and the tibia were sent to the Army Medical Museum, Washington. It may interest the lay reader to know that the lateral flattening of the tibia and marked development of the *linea aspera* of the femur are now known to be the result of muscular action as in walking, running, ascending slopes and the like and not racial characteristics.

*Calined Remains.*—The majority of the 10 pockets of calcined human bones were of moderate size, representing in each instance the remains of one individual. Several, however, were considerable layers and contained in addition numbers of loose bones unaffected by fire.

*Urn-burials.*—Under perfectly level ground, a considerable distance from the slope of the mound, was a vessel of the ordinary type with base perforation (A), upright and capped by an imperforate vessel of the same type, inverted and without a rim (B). Within the upright vessel were the remains of the skeleton of an infant of about 2 years of age. These vessels, both badly crushed, were sent to the Peabody Museum, Cambridge, Mass., where they have been carefully pieced together.

Near the others was a vessel of the same type, a portion of whose bottom was broken, but held in place by sand. It was otherwise intact. In the sand, within the vessel, were particles of bone resembling sawdust, and a portion of the tooth of an infant. This vessel (C) was sent to the Field Columbian Museum, Chicago.

Forty-eight feet E. by S. from the point taken as the center of the mound, was a vessel (D) of the ordinary type, imperforate as to the base, 21.5 inches in height, the maximum ever reported for this type, and having a diameter of mouth of 18.5 inches and a maximum diameter of body of 15 inches. A portion of the rim had been ploughed away and lost. Near the base were certain bones of an infant, judging from the femur. No teeth were present.

Vessel E, of the ordinary type, badly broken by the plow, had a circular piece crushed in, but not removed from the base. It was capped by a decorated bowl (F) crushed to fragments, some of which were held in place by the sand. This vessel has not been included in our list of urn-burials, as the most careful search failed to reveal the slightest trace of skeletal remains; but beyond question, such remains had occupied the urn at an earlier period.

Vessel G had been a bowl of about 4 gallons capacity, with marginal incised decoration surmounting the complicated stamp. Parts had been crushed and carried away by the plow. Beneath it was charcoal. Within it were fragmentary bones of an infant.

Vessel H, imperforate, of the ordinary type, rested upon decayed wood. It contained fragments of bones of a very young infant. Above the body of the vessel, whose rim had been carried away by the plow, were large fragments of earthenware, perhaps the remainder of a surmounting vessel.

Vessel I was represented by the lower portion of the body of a vessel of the ordinary type with base perforation. It contained fragments of diminutive human bones.

Vessel J, of the ordinary type, also had suffered through the agency of the plow. No human remains were discovered though their former presence can hardly be questioned.

The method of urn-burial in this mound presented certain points of similarity to, and of divergence from, that of certain other coast mounds, as the reader later on may remark. All these burial urns lay in the southern and eastern parts of the mound, in which they followed the general custom. They contained the uncremated bones of infants in common with the urn-burials of Ossabaw Island (cremation apart), but differed from the mounds of Sapelo Island where skeletal remains of adults exclusively were in the urns and of St. Catherine's Island where, with but one exception, adult remains were present in the urns.

*Aboriginal disturbances.*—When parts of a skeleton or skeletons were discovered disarranged adjoining a grave it was inferred that the construction of the grave was the cause of the disarrangement. Great care was taken to distinguish these disturbances from bunched burials.

*Canine remains.*—The skeleton of a dog, in the last stage of decay, was found unassociated with any human remains. The interment of dogs in mounds of the sea-islands will receive special reference in our account of Mound D, Ossabaw Island.

#### STONE.

In the mounds of the Georgia coast stone is not abundant. The mound on Creighton Island proved somewhat of an exception to this rule.

*Hatchets.*—Nine hatchets, or "celts," always with skeletons, were present in the mound, the longest somewhat exceeding 7 inches. All were gracefully shaped and tapered into blunt points opposite the cutting edge, a feature characteristic of southern hatchets and still more pronounced in the "celts" of St. Domingo and neighboring islands. The material was mostly volcanic rock, but as mutilation of the specimen is necessary for exact determination, we have not thought it necessary to specify in each case.

*Chisels.*—Eighteen chisels from 1.75 to 5.3 inches in length, having a thin longitudinal section, somewhat convex on one side and usually flat on the other, lay at different points with burials. In addition, were five large chisels of graceful design, one a beautiful specimen, of slate, having a length of 12.6 inches, a breadth at the cutting edge of 2 inches, tapering to 1.1 inches at the opposite end. Its maximum thickness is .7 of one inch (Fig. 16). Another chisel, of banded slate, is 8.75 inches long; another, 9.8 inches; and two somewhat smaller.

*Discoidal stones.*<sup>1</sup>—Twelve discoidal stones, as a rule with burials, the largest 2.5 inches in diameter, came from the mound. Two were of quartz, ten of volcanic or of sedimentary rocks. One of these, unlike the rest, was a pebble, a portion of whose periphery had been pecked away to confer the circular outline. Certain discoidal stones, some of which are considerably larger than any found by us, are


<sup>1</sup> Discoidal stones are treated at length by the late Col. C. C. Jones.

The latest literature on the subject is to be found in Mr. Gerard Fowke's "Stone Art," Thirtieth Annual Report, Bureau of Ethnology.



supposed to have been used in the Indian game of *chungke* and to have been rolled down a level court. Discoidal stones of lava are used in the Hawaiian Islands in the game of *maika*. It is admitted that many discoidal stones, both on account of their size, which is too diminutive, and because their border slopes so as to interfere with rolling, must have served another purpose, probably in a different game. Those found by us show no wear and cannot have been used as smoothing stones or polishers. Discoidal stones have never been met with by us in Florida.

It is a curious fact that discs, roughly shaped from fragments of earthenware vessels, are frequently found in mounds of the Georgia coast<sup>1</sup> and these doubtless saw service in place of their prototypes in stone. It is interesting to note an aboriginal tendency to lighten labor or to supplement a deficient supply by the use of imitations. In neolithic Europe pendants made from canine teeth of large carnivores and pierced for suspension were imitated in horn and in bone,<sup>2</sup> while in



the great Shields Mound,<sup>3</sup> near the mouth of the St. Johns River, we found many canine teeth used as pendants and imitations of them made of shell. At the present time, the natives of Kings Island, Alaska, sew upon ceremonial gloves used in dancing, beaks of a bird, the puffin (*F. arctica*) and with them, reproductions in wood.<sup>4</sup>

<sup>1</sup> Their presence had been noted in other localities. "Stone Art," Thirteenth Annual Report, Bureau of Ethnology, p. 109.

<sup>2</sup> *L'Anthropologie*, July-August, 1896, p. 460.

<sup>3</sup> "Certain River Mounds of Duval County, Florida," *Jour. Acad. Nat. Sci.*, Vol. X.

<sup>4</sup> *Collection, Acad. Nat. Sci.*

Fig. 16.—Chisel of slate. Mound north end of Creighton Island. (Full size.)

*Arrow and lance points.*—Fourteen lance heads and arrow points were found, of quartz, of chert, and of chalcedony. No lance head exceeded 4.5 inches in length. One had a breadth across the base of 2.7 inches. An interesting deposit of six spike-shaped arrowheads, ranging in length between 1.6 inches and 3.1 inches, were together with a burial.

*Miscellaneous.*—Throughout the mound were numerous pebble-hammers, 4 lying with one burial.

One pebble, about 3 inches in length, showed a considerable percentage of loss through use as a smoother or polisher. Several other smoothing stones were variously associated.

Several small fragments of soapstone vessels, without any particular shape, had been deposited with the dead. One had a cross hatch decoration.

Two nests of quartz pebbles each about the size of a pea, lay with human remains. These doubtless formed parts of rattles, the covering having disappeared through decay.

## SHELL.

In no mound in Georgia or in Florida, investigated by us, have shell beads in any way approached in number those present in the Creighton Island mound, nor have we elsewhere found so large a percentage of burials associated with beads.

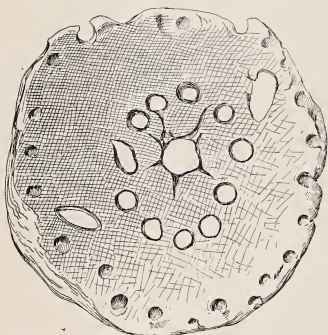


Fig. 17.—Gorget of shell. Mound north end of Creighton Island. (Full size.)

With thirty interments were large beads of shell, while small ones were present with twenty-eight. Certain burials, however, having large and small beads are included in both enumerations. Exclusive of great quantities of small beads of shell of the ordinary pattern, there were present in the mound many hundreds of massive beads having a length of nearly two inches or less. With one skeleton were 63 massive beads, while in a layer of calcined remains, in addition to almost innumerable small beads, were 267 having a diameter of half an inch and upwards.

None of these beads shows trace of fire. Many were large sections of columella probably belonging to *Fulgur*. Others were flat, circular or oval and pierced through their greatest diameter, sometimes a perforation 1.3 inches in length. Beads of this character were known as *runtees* and were highly esteemed by the aborigines.

Many skeletons in the mound had twenty or thirty massive beads each, often on the wrists and ankles, and some were so loaded that the mere weight must have been an inconvenience if thus worn in life.

*Drinking cups.*—Twenty-two shell drinking cups were present in the mound, some inverted, upon crania. All were imperforate. (The northernmost occurrence of base-perforation in the case of drinking cups, in our experience, was at Darien.) The largest cup had a length of 12.5 inches and bore an incised decora-

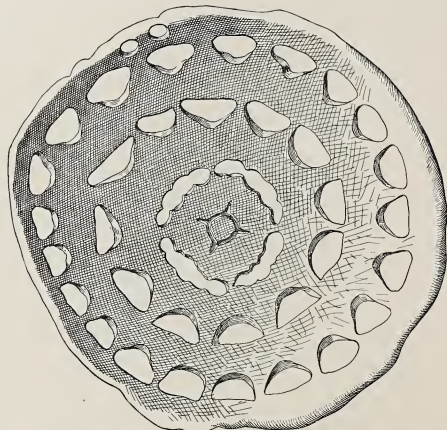


Fig. 18.—Gorget of shell. Mound north end of Creighton Island. (Full size.)

tion, unfortunately almost imperceptible, on a portion of the back. One cup, by the removal of the beak and by external grinding, greatly resembled Tennessee and Missouri vessels of earthenware having the conventional shell form.

*Gorget.*—With the skeleton of an adolescent was a roughly made gorget of shell, irregularly circular, having a maximum diameter of 3 inches. It is decorated with perforations and semi-perforations as shown in Fig. 17.

With the skeleton of a male, having many objects in association, was a circular gorget, concavo-convex, a shape conferred by the form of the body whorl of the shell used in its manufacture, with a diameter of about 3.8 inches. Its decoration consists of three concentric circles of somewhat irregular incisions around a central four-pointed star. It has a double perforation for suspension (Fig. 18).

Another gorget, found with an infant and shown in Fig. 19, has a diameter of about 2.4 inches. Its decoration, carved and incised, is the rattlesnake. A part of the margin was broken by a blow from a spade.

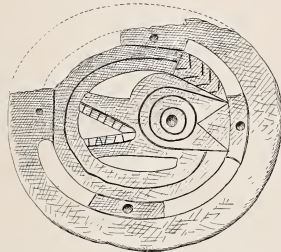


Fig. 19.—Gorget of shell. Mound north end of Creighton Island. (Full size.)

*Chisels*.—Two chisels, made by grinding beaks of *Fulgur* and removing the body whorl, were present in the mound.

*Pins*.—Shell pins, probably used in the hair, as they are invariably found near the skull, were met with to the number of sixteen. In length they ranged from 1 to 3.5 inches.

*Mussel-shells*.—Shells of various species of fresh water mussels were found with a number of interments. In some cases no perforation was present, in others the condition of the shell did not allow determination. In no instance was a perforation found.

*Coral*.—With the cranium of a skeleton was a mass of coral, 14 inches long, smoothed to the form of a "celt," the cutting edge being rudely formed, as also the blunt point of the opposite end.

#### PEARLS.

Nine pearls, some larger than a good sized buckshot, perforated for use as beads, were found with a burial, associated with beads of shell. Col. C. C. Jones<sup>1</sup> has written at length on pearls from southern mounds.

#### BONE.

Several small piercing implements of bone were met with.

With a skeleton was an implement 7.5 inches in length with a flat point, made from a longitudinal section of a long bone of a lower animal with the articular portion removed.

Together, also with a skeleton, were: an implement wrought from the ulna of a lower animal, 6.7 inches long, the articular portion remaining, and having its minor extremity ground to an oblique section, probably for use as a gouge; part of a wing bone of a large bird, with a length of 9.8 inches, the articular portions

<sup>1</sup> *Op. cit.*



removed, having a perforation, through one-half its proximal extremity and around the bone an incised spiral line (Fig. 20); also the upper half of a similar object without decoration.

#### EARTHENWARE.

*Sherds.*—Sherds were not abundant in the mound. The complicated stamp and various patterns of incised decoration were represented. About 1 foot from a skeleton were numerous earthenware fragments representing parts of three vessels. One large fragment was decorated exteriorly with large squares, enclosing good-sized circular spots, in red pigment.

*Smoother.*—A number of masses of roughly baked clay, one-half the area rounded, in size resembling a goose egg, were present in the mound. They had possibly been used to smooth clay in the manufacture of earthenware.

*Hones.*—A curious custom markedly prevalent along the Georgia coast, namely, the use of earthenware to sharpen pointed tools, was fairly represented in this mound. This custom, perhaps induced by a short supply of stone, was carried to such an extent that not sherds alone but certain entire vessels were secondarily used as hones.

*Earthenware discs.*—Certain discs made from fragments of earthenware vessels were found. We have spoken of these curious objects in treating of discoidal discs. They are referred to by the late Col. C. C. Jones.<sup>1</sup>

*Tobacco pipes.*—Nine tobacco pipes, with one exception undecorated, in shape of the type common to the coast were found, usually with burials, but upon several occasions apparently unassociated. Several are fragmentary to a certain extent and a number bear upon the stem or upon the bowl, and sometimes upon both, curious depressions caused by chipping, and equalling in size about one-half the area of one surface of the first joint of a finger. These chippings on pipes, found all along the coast, have, perhaps, some ceremonial significance, or were made to allow a firmer grasp with the fingers. In a number of bowls was a carbonized coating—doubtless tobacco. At first thought one might consider this a proof of recent inhumation, but the indestructibility of carbon is well known.

Near the surface, and unassociated, was a pipe having approximately a height of bowl of 2 inches and a diameter of bowl at the mouth of 2.2 to 2.4 inches. The bowl is strikingly ornamented with knobs, while from the proximal upper margin is a perforated projection. On the opposite side are traces of a similar one (Fig. 21),

<sup>1</sup> *Op. cit.*, p. 348.



Fig. 20.—Object of bone. Mound north end of Creighton Island. (Full size.)

Colonel Jones figures<sup>1</sup> a somewhat similar pipe and describes it as coming from a mound near Macon, Ga.

We show (Fig. 22) another neat little tobacco pipe from this mound.

*Vessels.*—A detailed description of vessels used, or probably used, for interments has been given. Excluding these, there were present in the mound seven vessels of earthenware. With two exceptions, all these, and all the burial jars, were found in the southernmost half of the mound.

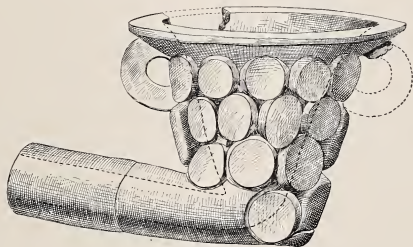


Fig. 21.—Tobacco pipe of earthenware. Mound north end of Creighton Island. (Full size.)

An undecorated bowl, of about one quart capacity with a kidney-shaped section, lay with the body of an infant. It was imperforate as to the base, as were all the seven under description.

With human remains, on the bottom of a grave-pit extending below the base of the mound, were two vessels. The larger, of black ware, had an ovoid body

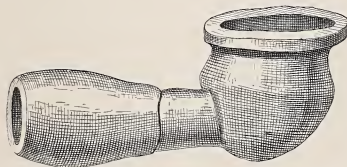


Fig. 22.—Tobacco pipe of earthenware. Mound north end of Creighton Island. (Full size.)

flattened at the base, with an upright neck rising from a slight depression in the body and flaring somewhat toward the margin. This vessel, which fell into many fragments upon removal, was successfully pieced together. Approximate measurements: maximum diameter of body, 5.6 inches; maximum diameter of mouth, 4 inches; height, 6.4 inches; height of neck, 2 inches. A cinerary urn of this type, though much larger, is figured in this Report as from the Walker mound.

<sup>1</sup> *Op. Cit.*



The second vessel, somewhat smaller, of yellow ware, was of the same type, but hopelessly disintegrated.

With human remains was an urn having a globular body, a constricted neck and flaring rim. It was decorated with two encircling rows of button-like prominences. Height, 5 inches; diameter of body, 5.3 inches; diameter of mouth, 5.6

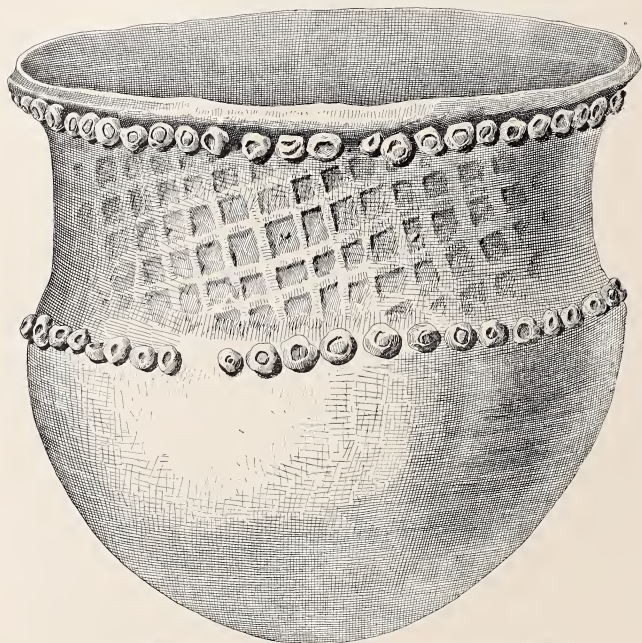


Fig. 23.—Vessel of earthenware. Mound north end of Creighton Island. (Full size.)

inches (Fig. 23). An almost similar vessel, in fragments, came from another portion of the mound.

With human remains was a vessel of black ware, undecorated, having a bowl-shaped body flattened at the base, a wide cylindrical neck with a slight flare at the margin, rising perpendicularly. Diameter of body, 6.1 inches; diameter of mouth, 5.2 inches; height of neck, 3.7 inches (Plate IV).

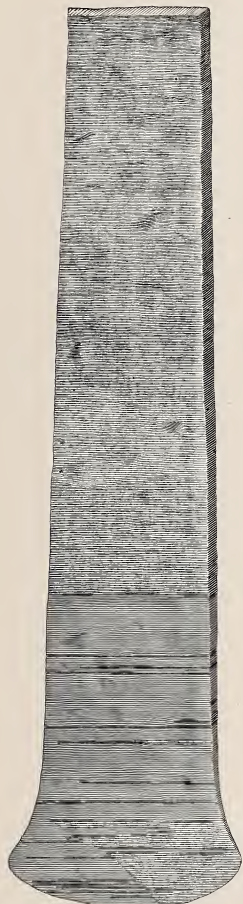


Fig. 24.—Chisel of copper. Mound north end of Creighton Island. (Full size.)

A very rude bowl, faintly decorated with a complicated stamp, lay inverted with the skeleton of a child. Diameter of mouth, 8 inches; height, 3.8 inches.

Several considerable fragments of medium sized, undecorated bowls were met with. It is possible that these, interred whole, were subsequently crushed and portions lost.

*Miscellaneous.*—An earthenware sphere, about .5 of one inch in diameter, lay loose in the sand.

#### COPPER.

In the eastern slope of the mound, 35 feet N. E. by E. from the center, on the base of a pit, 5 feet 8 inches from the surface, on which was an unbroken layer of oyster shells 2 feet in thickness, lay a skeleton in the last stage of decay. With it were various objects, including a chisel of copper (Fig. 24), 7.9 inches in length, with a breadth across the shank of 1.2 inches and 2 inches across the flaring cutting edge. Its thickness is .27 of an inch. It lay between wood or bark thoroughly decayed. Toward the end opposite the cutting edge on either side was a black band about 1 inch in breadth, where, apparently, it had been attached to a handle. A longer chisel of the same type, though much thinner, is figured<sup>1</sup> by the late Colonel Jones as coming from a mound of the Nacoochee Valley, Georgia. This chisel is the only copper found by us among the sea-islands of Georgia. The reader interested in aboriginal copper is referred to our memoir in Part II of "Certain Sand Mounds of the St. Johns River, Florida,"<sup>2</sup> where it is shown that the copper of the mounds is native copper, and far purer than the article produced in Europe during the mound building period.

#### MISCELLANEOUS.

With four skeletons were masses of plumbago, perhaps used as a black pigment.

<sup>1</sup> *Op. Cit.* Plate VI, fig. 2.

<sup>2</sup> *Jour. Acad. Nat. Sci.*, Vol. X.

Small sheets of mica were met with seven times. They bore no particular shape when found, and the chipped and broken edges left any determination doubtful. Certain of these sheets were peculiarly flexible, resembling tin foil, a characteristic, we are informed, conferred by fire.

With numerous burials were masses of red hematite in powder.

#### ASSOCIATION OF ARTIFACTS.

We now proceed to give several typical associations of artifacts, the objects composing which have mostly been individually described.

With a bunched mass of bones were: a large shell drinking cup; small shell beads; sixty-three massive shell beads; nine pearls.

With a skeleton having a layer of fine charcoal covering pelvis and thighs were: fifteen massive shell beads at the neck, small shell beads at the wrist and two pebbles near the thigh.

By the skeleton of an adolescent were: two masses of plumbago; powdered hematite; two shell cups; three discoidal stones; some delicate tubular shell beads; a wedge-shaped arrow point of chalcedony; one pebble; one small sheet of mica.

With the skeleton of a male were: ten cores, spalls and chips of chert; two rude arrowheads, one of quartz, one of chert; a bit of quartz; a number of pebbles;

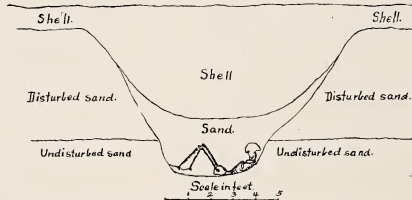


Fig. 25.—Diagram of grave-pit. Mound north end of Creighton Island.

several sherds; small fragments belonging to a soapstone vessel; a rude tobacco pipe of earthenware.

With a male skeleton were: three "celts;" a long chisel of slate; another somewhat smaller; five small chisels; one arrowhead; one smoothing stone; one nest of small pebbles; seventy-seven massive shell beads; small shell beads; a shell gorget; a bone pin, much decayed; an earthenware polisher; mica; hematite.

Let into undisturbed sand, upon the base of an interesting pit, was a skeleton of a male in a semi-reclining position. With the remains were: large and small shell beads; a deposit of small pebbles; a small stone chisel; a "celt;" powdered hematite. From the top of the pit containing this body to the level of the undisturbed sand was 5 feet 10 inches, including 1 foot of shell, there almost superficial. The exact width of the pit could not be determined, as the sand filling it resembled that of the mound. The pit had been filled with sand to the depth of 2.5 feet at

the bottom, and considerably higher around it. Oyster shells had then been poured in, forming a mass 3 feet 10 inches in depth, and 6 feet across where the pit was covered by the layer of shell belonging to that portion of the mound. This interesting grave is shown in section in Fig. 25.

## REMARKS.

The mound on Creighton Island, the largest of its type investigated by us, is full of interest to the student of archaeology. Absolutely nothing in any way indicating white contact was discovered, and we fail to see how, knowing the wide distribution of objects through aboriginal barter, it could have been in use after the coming of the whites and yet contain no object derived from them.

Within view of the landing at Creighton Island was a low mound containing irregular strata of shell, which, though not thoroughly demolished, had a number of trenches dug into it by us, and a portion of the center excavated. Human remains in a layer, some cremated and some unaffected by fire, were encountered at the center of the mound. No artifacts were found with them. In other parts of the mound were many sherds with incised and with complicated decoration. In addition was what remained of a curious little earthenware effigy of a woman, without head, arms or legs (Fig. 26).

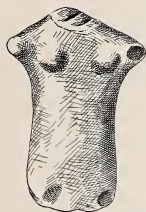


Fig. 26.—Earthenware effigy of female. Low mound at Creighton Island. (Full size.)

Another effigy of a woman, in a like state of mutilation, was shown us by a gentleman living on the mainland a few miles from Creighton Island, who stated it had been washed from a shell bluff on Cedar creek, fronting his residence. This figure tapered gracefully at the waist and bore incised ornamentation front and back.

## HOPKINS MOUND, BELLEVILLE, MCINTOSH COUNTY.

Belleville, on the south side of the Sapelo river, is the landing of the settlement of Crescent about 1.5 miles inland.

In woods, though formerly cultivated land, about 1 mile in a westerly direction from Belleville, is a mound on the property of C. H. Hopkins, Esq., of Meridian, near Darien, Ga., who cordially placed it at our disposition.

The mound had been considerably dug into previously, but no sustained investigation had been carried on. Its height was 13 feet 2 inches; its diameter of base, 76 feet. The ascent of the most uniform side was at an angle of 26°. Investigation showed the mound to begin at about the commencement of its upward slope. A section 50 feet in breadth at the margin of the base, including the S. by W. to the S. E. by E. portion, with fairly oblique sides converging toward the center, was dug into along the base. The mound was made of yellow sand of a lightish color with but little discoloration from organic or foreign matter of any sort. In the central portion were five or six layers of oyster shells each about 4 inches thick,



and separated by a little over one foot of sand. A well-marked black band at about the level of the surrounding territory extended to the center. No great central pit was present in the mound, nor were sub-basal graves encountered. Practically no sherds were met with. Interments, encountered at but ten points, began about 8 feet in from the margin. Flexed burials, masses of bones of various individuals together, an isolated cranium and pockets of fragments of calcined human bones were present. With certain burials was hematite and, with two or three of them, a few shell beads.

#### MOUND NEAR CRESCENT, MCINTOSH COUNTY.

In territory covered with trees of considerable size, though evidently formerly cultivated ground, about one-half mile in a southerly direction from the Hopkins Mound, and about 1 mile from Crescent, was a mound also the property of C. H. Hopkins, Esq., to whom we again acknowledge our indebtedness for permission to investigate.

This mound, which had been dug into to a comparatively small extent, had a height of 7 feet and a diameter of base of 70 feet. The eastern half was completely dug through with the exception of a small portion surrounding a large forest tree.

The mound, so far as our investigation extended, was without stratification and was composed of yellowish-brown sand. A dark layer, from 6 inches to 1 foot in thickness, ran along the base. No oyster shells were discovered, nor were out-lying pits met with. The mound did not extend into level territory beyond the commencement of the slope. Sherds were very infrequent and none bore the complicated stamp. One chert arrowhead and a rough mass of chert, resembling an uncompleted spear head, lay loose in the sand.

Human remains were met with at sixteen points, as follows: 6 small pockets of fragments of calcined human bones; 3 layers of calcined fragments and parts of human bones unmarked by fire; 1 skeleton; 6 isolated bones and bunched burials.

We append in detail the most noteworthy of the above.

A skull and portion of humerus, very badly decayed, were about 18 inches from the surface. Near these on the same level was a pendant of plutonic rock, considerably disintegrated, having an elongated oval, longitudinal section, about 3.25 inches in length. At the base were small nicks or tally marks.

Near the surface were fragments of bones badly decayed, indicating a burial at full length.

On the base, 6 feet 10 inches from the surface, was a layer of calcined and uncremated bones intermingled. In association was hematite and with one skull were six pearls perforated for use as beads.

Five feet from the surface was an isolated cranium. Toward the center of the mound, about 6 feet below the surface, was a considerable mass, mainly of long bones, imbedded in a quantity of powdered hematite.

Occupying a central position in the mound, 5 feet 9 inches down, was a layer

of calcined fragments of human bones mingled with others showing no trace of fire. The dimensions of this layer were 2 feet 6 inches by 1 foot 8 inches by 2 to 3 inches thick.

In line below the above, on or in the base layer, was a layer similar in composition to the one above it, 2.5 feet by 4 feet by 5 inches thick.

The bones in this mound were badly decayed. None was encountered within 15 feet of the margin of the base.

#### WALKER MOUND, McINTOSH COUNTY.

This mound, in "Cooper's Field," may be reached from Sutherland Bluff on the Sapelo river, from which it is about two miles distant, but is more conveniently got at from Contentment, a small settlement on the west side of Broro river, about three quarters of a mile from its union with the Sapelo river. Broro river is a salt water channel joining the Sapelo river and Julianton creek.

The mound, about 1.5 miles in a westerly direction from Contentment, had a height of 5 feet 9 inches. Its diameter of base was 46 feet. It was the property of Mr. James Walker, of Darien, who kindly placed the mound at our disposal, without condition, to do with as we saw fit.

The mound had previously been dug into to an inconsiderable extent. On its northern margin grew a live-oak 5 feet in diameter, 3 feet from the ground. This tree was not removed, though otherwise the mound was totally demolished, being dug through at a depth considerably below the level of the surrounding territory.

The mound was composed of rich, loamy, brown sand with many local layers of oyster shells. The usual charcoal and fireplaces were present. A black layer from 3 inches to 1 foot in thickness, made up of sand mingled with charcoal in minute particles, ran through the mound at about the level of the surrounding territory. At the center of the mound, measurements showed this layer to be 5 feet 9 inches below the surface.

Although of very uneven distribution, human remains were numerous in the Walker mound, being encountered at thirty-six points (see diagram, Fig. 27), to which should be added a certain number presumably beneath the oak tree and probably a few disturbed by previous investigation.

As will be noted from the detailed account which follows, a deposit of human remains was by no means always limited to those of one individual, and it is not unlikely that the mound originally contained the complement of at least seventy-five skeletons, and probably considerably more. In reading the detailed description of the human remains present in the Walker mound, the reader is referred to the accompanying diagram, where burials are shown with numbers corresponding to those in the text.

1. Skeleton of child about 8 years of age, on back, knees to the right. A considerable amount of charcoal lay above the cranium.

2. Remains of skeleton of male. A fire had been built immediately on the pelvis, which, with some other bones, had been partially consumed. Considerable





Fig. 27.—Diagram of Walker Mound.

charcoal remained. The skeleton lay on the left side. In association was sand, pink from hematite. The remains lay at a depth of 2 feet below the surface of the mound which was here but little above the surrounding level.

3. Skeleton of female on left side. Depth 2 feet 4 inches.

4. Skeleton of male on back. Remains of a fire along the left side. Face-bones and others in contact with the flames, considerably burnt. This skeleton, at the extreme margin, was 3 feet from the surface, or about that depth below the level of the field. It was doubtless a grave, as unquestionably, we think, were the other deep marginal burials in anatomical order.

4a. Twenty-one inches from the surface was an undecorated vessel with inverted rim, intact. Its height is 4.1 inches; its maximum diameter, 10.2 inches; its diameter of opening, 7.5 inches. Within it were the remains or a portion of the remains of the skeleton of an infant, in minute fragments, burnt and calcined.

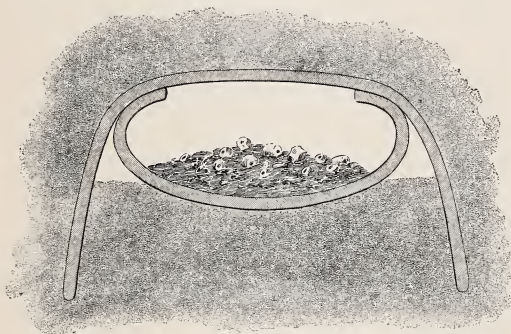


Fig. 28.—Section of vessels with calcined bones. Walker Mound. (One-quarter size.)

With these burnt fragments were a number of shell beads showing no trace of fire—evidently added subsequent to the cremation. This bowl had apparently been placed upright on a small heap of sand in such a manner that a larger undecorated vessel inverted and placed over it, the inside of the bottom of the larger vessel in contact with the top of the small one, prevented all ingress of sand as shown in the section (Fig. 28). The dimensions of this larger vessel are: height 6.8 inches; diameter 13.5 inches. In shape the vessel is about square with rounded corners.

5. Skeleton of female on back. Depth 3 feet.

6. Skeleton of undetermined sex. Depth 22 inches. The position of this skeleton, disturbed by the digger, was not determined. About 2 feet distant were many fragments of a large vessel with stamped decoration.

7. Skeleton of uncertain sex, 31 inches down. Trunk on the back, legs to the

right. On this skeleton was a covering of wood or bark .25 of one inch thick, in the last stage of decay.

8. Skeleton of male, on back, head and knees to the right, 3 feet from surface.

Although the human remains in the Walker mound were, comparatively speaking, in good condition yet the cranium of this skeleton (A. N. S. Cat. No. 2.158) was the only one recovered in fair condition.

9. Skeleton of female, fell with caved sand. Probably lay originally about 3 feet from the surface.

10. Skeleton of female on back, 2 feet down.

11. Skeleton of female, 3 feet from surface, disturbed by workmen, position not determined.

12. Skeleton of uncertain sex, somewhat on the right side. This skeleton, coming from a portion of the mound but little above the level of the surrounding field, was nevertheless 4 feet from the surface and lay at the base of a grave dug into the yellowish sand of the field, and filled with the brownish sand of the mound.

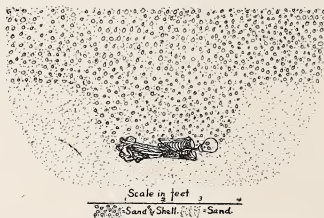


Fig. 29.—Grave containing skeleton 13. Walker Mound.

13. Another grave containing a skeleton of a male on left side. This grave, at the margin of the mound, showed a distinct line of demarcation from the surrounding soil to a height of 26 inches from its base. Above this was a mass of material 2 feet in thickness, similar to the contents of the mound at that place and to that present in the grave. Through this material the line of the grave could not be traced. The surface of the mound at this point was about level with the surface of the field (Fig. 29).

14. Another marginal grave containing a skeleton 4 feet from the surface. This skeleton was too much affected by a fire which had been placed immediately above it to permit determination of sex or position. With the bones were charcoal and fifteen shell beads .5 to 1 inch in length.

15. Skeleton of male with legs to the left and head pushed over on the chest, 3 feet from the surface.

16. Portion of skeleton 1.5 feet down. The body, from the pelvis up, had been removed by a previous investigation.

17. Skeleton of adolescent of about 14 years of age, 3 feet down. It lay on the left side. The skull had rolled on to the chest. Certain epiphyses were separated about 6 inches from their respective shafts.

18. Beginning at one foot below the surface and extending to a depth of from 8 to 10 inches was a confused mass of human remains about 4 feet in length and 3 feet in breadth. At one end were eleven crania together. Immediately above this deposit were four imperforate shell drinking cups and three polished stone chisels having a much flatter section than the ordinary "celt." With the remains were two pins of shell, the larger 4 inches in length.

The entire surface of the mound was covered with oyster shells to an average depth of 6 inches, but above this deposit the shells dipped down into the sand coming in contact with the upper surface of the layer of bones. It was evident that this was a species of grave made after the completion of the mound, though, likely enough, of about the same period, since, as we shall see, similar confused masses of bones were present in the mound at depths clearly showing their original deposit (see section of grave, Fig. 30).

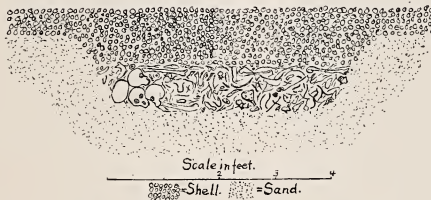


Fig. 30.—Section of grave 18. Walker Mound.

19. A grave similar in style of construction to the preceding. Its depth from the surface was 26 inches. It extended in on the same plane a distance of 5 feet with a breadth at first of 2 feet, broadening to 4 feet and narrowing to 2 feet at the end. It contained a mass of human bones, some calcined, and a few bones of a lower animal unaffected by fire. With the human bones were numbers of shell beads of various sizes.

With the bones was an interesting pathological specimen<sup>1</sup> consisting of a human femur showing material shortening through fracture. This example of bone-setting—or rather the lack of it—by the aborigines is shown in Fig. 31.

This deposit of bones had, on the same plane, contiguous to it a pen or pyre, constructed of logs 3 to 8 inches in diameter, which were charred through and through. The depth of this curious pen was 9 inches; its length, 32 inches; its width was not exactly determined owing to caving of sand. Within this pyre were calcined human remains in fragments.

<sup>1</sup> Now at the Army Medical Museum, Washington, D. C.

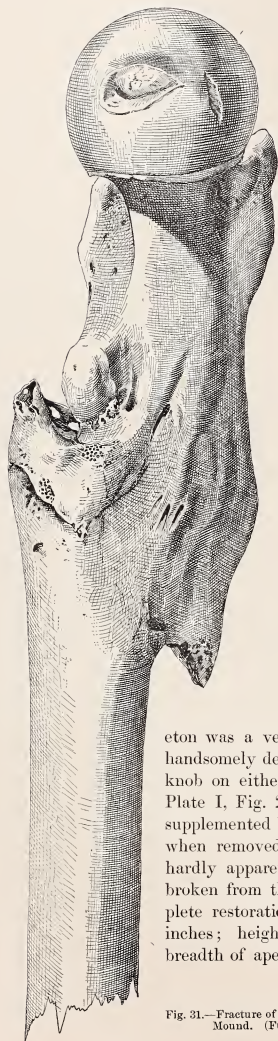


Fig. 31.—Fracture of femur, Walker Mound. (Full size.)

20. Certain human remains, buried in oyster shells at a depth of about 1 foot, fell with caved material before exact data were obtained. Two pairs of femurs were present and the deposit probably included the remains of several persons.

The reader's attention is called to the fact that it is next to impossible to slice down a mound of sand as can so readily be done with a mound of clay. Mishaps through caving sand are of occasional occurrence even in the case of the most careful workers.

21. A deposit of calcined human remains about 1 foot from the surface. In association were the columella of a marine univalve and eight shell beads, each about 1 inch in length.

22. Bones of male in caved sand.

23. Skeleton of male on right side, face to the right. Nine inches down.

24. A cranium unassociated with other bones. Capping it was a handsome drinking cup of shell having on its outer side three incised lines forming a parallelogram with a portion of the margin of the opening as one of the shorter sides.

25. Four crania with other bones and a few shell beads.

26. Flexed skeleton of a female lying on the right side, 10 inches down, immediately above number 25.

27. A bunched burial including approximately the skeletal complement of a male, 18 inches from the surface. With this skeleton

was a vessel of good material, scaphoid in shape and handsomely decorated with a variety of incised designs and a knob on either side, to which justice has not been done in Plate I, Fig. 2. Within the lines, the decoration had been supplemented by red pigment bright and fresh in appearance when removed from the mound in a state of moisture but hardly apparent when dry. A small portion at one end, broken from the vessel, was present with it, permitting complete restoration. Approximate measurements: length, 9.4 inches; height, 5.75 inches; maximum breadth, 7 inches; breadth of aperture, 5.75 inches.



28. A bunched burial 2 feet from the surface, a short distance from 27. With it was a vessel almost the exact counterpart of the one just described, save that the decoration, though on the same lines, is much more elaborate, considerably exceeding in pretension anything met with by us in Florida or elsewhere in Georgia. This decoration is shown diagrammatically in Plate XVI. Certain portions of this vessel, lying with it, were recovered, and were successfully fitted into place.

29. Another grave, 26 inches in depth from the surface. It was filled with oyster shells and contained the skeleton of a male lying on the right side, the right arm under the head.

30. Beneath the roots of a good sized tree, their tops 8 inches beneath the surface, together in a group, all upright, were five cinerary urns each filled almost to the top with a closely packed mass of charred and calcined fragments of human bones. With these bones were a few shell beads showing no trace of fire. The tops of the vessels were covered with large fragments of earthenware belonging to other vessels, which had prevented any entrance of sand. These vessels were of poor material, some especially so, being of slight consistency and held together only by the surrounding roots of the tree above them. Three of the vessels, when the matted mass of roots was removed, fell into pieces so small in size that all hope of restoration was abandoned. The remaining two, though broken into many pieces, were successfully restored. The larger of these two vessels has a height of about 15 inches, a maximum diameter of 15.5 inches and a diameter of aperture of 13.5 inches, approximately. It is ornamented beneath the rim with deep lines incised before baking (Plate V).

The smaller vessel has a globular body with a neck rising from a depression. The ornamentation is of a complicated stamp variety. Approximate measurements: height, 15 inches; maximum diameter, 14.5 inches; diameter of aperture, 6.25 inches (Plate VI). In immediate association with these cinerary urns were eight imperforate drinking cups of shell.

31. Fourteen inches down, in caved sand were the bones of a male.

32. Sixteen inches from the surface, with sand tinged with hematite, was a bunched burial of numerous bones, surmounted by a mass of oyster shells. A large number of shell beads were in association.

33. This interesting grave occupied an almost central position in the mound. Its shape was that of an inverted truncated cone supposing the truncated end to be slightly rounded. The top of the grave, forming a portion of the summit plateau, had a diameter of 8 feet; the depth of the grave, vertically from the surface to the bottom, was 5 feet 9 inches. This grave, after completion, had been lined with a layer of oyster shells about 6 inches in thickness. The bones, present in considerable numbers, had apparently been poured in from the northern side and distributed in a fairly even layer over the bottom and up the northern side to within 2 feet of the top (Fig. 32). On the eastern and western sides were occasional loose bones, but none was present on the southern side, except immediately on the base (Fig. 33). The horizontal distance from the southern margin of the bones on the bottom of the



grave to the northern margin along the side of the pit was 5 feet. The grave was filled with oyster shells and sand distinctly darker than the sand of the mound.

Fifteen crania, more or less imperfect, were present with the other bones, as were certain calcined fragments of human bone. Among the long bones was a

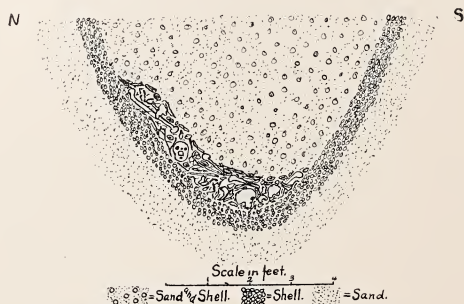


Fig. 32.—North and south section of grave 33. Walker Mound.

femur 19.75 inches in length, indicating a male about 6 feet in height—a stature we believe, greater than indicated by any bones discovered by us in Florida mounds.

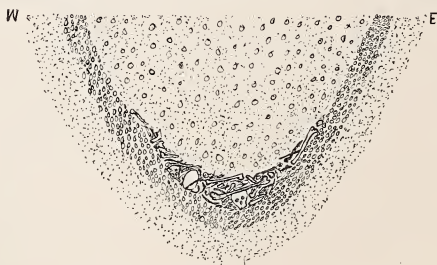


Fig. 33.—East and west section of grave 33. Walker Mound.

34. Immediately beneath the grave just described was a layer of oyster shells, which merged with, and took the place of, the black band running through the mound to which reference has been made. Particles of charcoal were abundantly present in the oyster shells and it would seem that these shells, at this point, 5 feet 9 inches from the surface, were there at the time when the fire was made which caused the black layer running through the mound. Just below the layer of shell,

which was 1 foot in thickness, in dark brown sand totally dissimilar to the yellow sand of the field, which enclosed the grave on either side, was a circular deposit of human bones, having a diameter of about 5 feet. These bones included five crania and with them were numerous shell beads, many tubular; one being over 1 inch in length. In one of the crania was a bright yellow sand differing in shade from any in the mound. Small quantities of this sand were scattered here and there among the bones.

35. A few bones of a male from superficial caved sand.

## HUMERI.

|       | Male.       |                 | Female.     |                 | Uncertain.  |                 |
|-------|-------------|-----------------|-------------|-----------------|-------------|-----------------|
|       | Perforated. | Not Perforated. | Perforated. | Not Perforated. | Perforated. | Not Perforated. |
| Right | 6           | 15              | 7           | 6               | 3           | 6               |
| Left  | 8           | 9               | 5           | 5               | 7           | 10              |

Throughout the mound were the usual loose sherds of accidental introduction. At several points were large vessels of poor material crushed beyond repair. None of these vessels contained human remains.

One small chisel of stone was found loose in the sand.

## REMARKS.

In no one mound investigated by us has there been so well exemplified the various forms of aboriginal disposition of the dead—the burial in anatomical order; the burial of portions of the skeleton; the interment of great masses of human bones; the pyre; the loose deposit of incinerated remains; the burial of cinerary urns.

To a marked extent in this mound are noted, side by side, inhumation and incineration.

## MOUND NEAR CONTENTMENT, MCINTOSH COUNTY.

Contentment, a small settlement of colored persons, is on the bank of the Broto river, a water-way joining Sapelo river and Julianton creek.

In woods on ground probably formerly under cultivation, about one-half mile in a northerly direction from Contentment, was a symmetrical mound in the form of a truncated cone. Its sides, by their steepness, gave evidence that no cultivation on the mound proper had ever been attempted. A comparatively small and shallow excavation was the only trace of digging previous to our own. The mound was kindly placed at our disposal by R. H. Knox, Esq., of Darien, under whose control the property is.

The mound had a height of 9 feet 9 inches, a base-diameter of 76 feet. The

southern half of the mound was dug away leaving a cross-section E. and W. No pits, outlying or in the body of the mound, were met with. A short distance in from the margin, a black band 6 to 10 inches in thickness was noticed extending through the part investigated by us, at the level of the surrounding territory. Apparently there had been considerable general disturbance beneath this band but as the sand of the mound resembled that of the surrounding territory, any exact line of demarcation was difficult to determine. No oyster shells in quantity were present, though the usual fire-places and pockets of charcoal sometimes contained a few scattering shells.

Human remains were encountered 45 times, at all depths, and extending in from the margin. Bones, in the last stage of decay, at times hardly indicating the form of burial. Occasionally burial of skeletons was indicated, while again, isolated skulls or skulls with a few other bones were met with. With some burials were masses of hematite in powder, sometimes extending the entire length of the skeleton. With one were three pebbles, all showing use as smoothing stones. Near human remains was a chert lance-head and with another interment was an undecorated bowl, broken by caving sand. A pebble and certain fresh-water mussel, and clamshells lay near an interment.

Seven pockets of calcined bones, some including fragments entirely unaffected by fire, were met with. Centrally in the mound, 7 feet from the surface, with no pit apparent, was a layer of calcined and uncremated human bones, about 6 inches thick. With it were a graceful barbed arrowhead and a flat mass of gneissic rock about 4.5 inches by 2.5 inches with two parallel longitudinal grooves, probably made by sharpening pointed implements or by grinding shell beads into shape.

A considerable number of vessels, all imperforate, so far as could be determined, and undecorated or with an ordinary check stamp, were present in the portion of the mound investigated by us.

Just beneath the surface was a pot with checked stamp decoration, a rounded base and a somewhat cylindrical body—a common cooking vessel. Its height, and its maximum diameter, which was at its mouth, were 11.75 inches. In common with all the stamped pots encountered in this mound, its body was covered with soot showing its use to have been but a secondary one. It contained the calcined remains of not more than one individual and was surmounted by a considerable number of small and large fragments belonging to an undecorated bowl. It fell into pieces upon removal from the sand.

Eighteen feet east of the center, just beneath the surface and about one foot apart, were two interments in vessels, in all respects similar to the one just described.

Near these was an inverted, undecorated pot somewhat resembling in shape a reversed cone with rounded apex. It covered a few fragments of calcined human bones deposited on the sand. Approximate measurements: height, 7.75 inches; maximum diameter and width of mouth, 10.5 inches.

Closely associated with the foregoing bowl was an inverted, checked stamped vessel similar to those first described, covering calcined remains lying on the sand.

## CERTAIN ABORIGINAL MOUNDS OF THE GEORGIA COAST. 55

Another vessel also bearing the check stamp, half filled with calcined remains, had been capped by a vessel or a large part of a vessel represented by small fragments when found.

In another portion of the mound were the remains of two undecorated vessels in small fragments. One had presumably capped the other, judging by the position. A number of incinerated fragments of human bone were present.

In caved sand from the surface were several other broken vessels with incinerated bone, similar to the foregoing.

Specimens of the earthenware from the mound at Contentment were sent to the Peabody Museum, Cambridge Mass., and to the Davenport Academy of Science, Davenport, Iowa.

### LOW MOUNDS NEAR BRORO NECK, MCINTOSH COUNTY.

Broro Neck, a settlement of colored people, is about 1 mile northeast of Contentment. A mound on the outskirts of the settlement is on the property of Mr. Thomas Grant (colored). Its height is 3 feet 4 inches. It is 55 feet across the base. It was about one-half dug through. At places were great quantities of charcoal and pockets of hematite. A number of deposits of fragments of calcined bones were met with and a few portions of long bones showing no mark of fire. With skeletal remains were: two hammer-stones, one cockle-shell (*Cardium*), one good-sized shell bead.

About one hundred yards from the preceding mound, on the property of Mr. E. W. Paris (colored), is another mound, which has evidently been ploughed over for a number of years. Its present height is 1 foot 8 inches; its diameter of base, 44 feet. The mound was trenched to the center. About 19 inches from the surface was a deposit of calcined human bones with a small, coarse, undecorated earthenware bowl. The surrounding sand was scarlet from admixture of hematite. Nothing else of interest was met with.

### SAPELO ISLAND, MCINTOSH COUNTY. BOURBON.

Sapelo Island, which, with St. Catherine's and Ossabaw, was reserved for their individual use by the Indians, when much of the coast was ceded away,<sup>1</sup> has a settlement at the northern end reached by turning into a small creek from Sapelo sound and continuing up this creek a distance of about 2 miles. This settlement, called "Boobone" by the colored inhabitants, is said originally to have received the name Bourbon from French settlers.

Extending back from the landing is an extensive tract of rich land, undulating with shell deposits, long under cultivation, the property of Amos Sawyer, Esq., of Arlington, R. I., to whom we are indebted for cordial permission to make complete archaeological investigation.

About one quarter of a mile S. E. by S. from the landing was a mound, the

<sup>1</sup> "The History of Georgia," Captain Hugh McCall, 2 vols., Savannah, 1811, Vol. I, page 37.

usual truncated cone in shape and still symmetrical, though rather considerable superficial digging had been attempted.

Its height was 8 feet; its diameter at base, 72 feet. The surface of the mound was covered with shell. With a beginning on the level ground 12 feet beyond the margin of the base, to ascertain the presence of outlying burials, none of which were met with, the entire southern half of the mound was sliced down, leaving an E. and W. cross-section. Next the remaining half was dug away with equal care.

The mound presented no uniform stratification. It was composed of local layers of bright yellow sand dug from beneath the surface loam of the field; of dark sand containing occasional shells, mostly belonging to the oyster; of shells with admixture of dark sand and, at the surface, of a layer of midden refuse made up of crushed shell and loam, varying from 8 inches to 2 feet in thickness and occasionally extending still farther down over burials let in from above. All the shell layers of the mound, some of oyster shells, some of shells of the salt-water mussel, seemed dis-

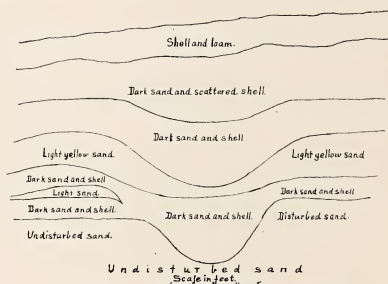


Fig. 34.—Section of pit. Mound at Bourbon.

tinctly to be crushed and packed together as though trampled upon for a considerable period of time which seemed to indicate that the mound had slowly grown for a period of years, during which it was treated as a place of abode.

There was present in the mound no central pit such as is usually found in mounds of the coast, though, beginning a little north of the center was a general dip in the lower layers of the mound over a pit extending 2 feet into undisturbed sand, containing a skeleton at length. This pit had at the base a breadth of 3 feet, its exact length we were unable to determine owing to frequent caving of sand though it must have exceeded 6 feet. The layers above this pit, when of shell, in common with all shell layers of the mound, were compact through tread of feet and seemed to indicate that the pit had been dug at an early stage of the building of the mound and but partially filled and that layers forming afterwards shared in the depression. Fig. 34 gives a lateral section of this pit and of the mound above it.

Though certain other pits were unmistakably present, with two or three exceptions in the marginal portion, we noticed none extending into undisturbed sand below the base, and though, owing to a rainy season, the base of the mound was just above water-level which induced the caving of sand and made exact scrutiny difficult, we believe few, if any, graves escaped us. In such parts of the body of the mound as were made up of yellow sand, burials were not present though many, apparently not in pits, lay in the dark sand. Many more seemed to be just beneath a thickening in the superficial layer of midden refuse while, in numerous cases, grave-pits extending into the dark sand were filled with shell debris from the surface layer.

HUMAN REMAINS.

In the mound, human remains were encountered at 192 points and others, it must be borne in mind, must have been removed by previous digging and by the use of the plow on the lower portions of the mound.

The 192 burials present in the mound, at the time of its demolition by us, may be classified as follows :

|                                 |                             |
|---------------------------------|-----------------------------|
| 115 Skeletons.                  | 8 Calcined deposits.        |
| 11 Aboriginal disturbances.     | 3 Skeletons in urns.        |
| 15 Late disturbances.           | 3 Calcined remains in urns. |
| 31 Decayed and crushed remains. | 4 Not noted.                |
| 2 Layers of uncremated bones.   |                             |

*Skeletons.*—Of those successfully removed there were :

|               |                           |
|---------------|---------------------------|
| 43 Males.     | 5 Adolescents.            |
| 40 Females.   | 11 Children. <sup>1</sup> |
| 12 Uncertain. | 4 Infants. <sup>1</sup>   |

Many of the skeletons lay between decayed wood or bark. Skeletons were as to position as follows :

|                       | Flexed on right side. | Flexed on left side. | At length. | Special. |
|-----------------------|-----------------------|----------------------|------------|----------|
| Male                  | 27                    | 5                    | 6          | 5        |
| Female <sup>2</sup>   | 28                    | 4                    | 2          | 5        |
| Uncertain             | 8                     | 1                    | 1          | 2        |
| Adolescent            | 3                     |                      |            | 2        |
| Children <sup>2</sup> | 8                     |                      |            | 2        |
| Infants               | 3                     |                      |            | 1        |

The skeletons at length were face down and all were below the base, on it, or well down in the body of the mound.

Special positions were as follows :

Burial No. 10, child of about 10 years, flexed with trunk on back.

<sup>1</sup> Eight additional skeletons, badly crushed and decayed, two certainly of children and six of infants, are included with the crushed and decayed remains.

<sup>2</sup> Data as to the side of one flexed female skeleton and of one child are omitted in the field notes.



Burial No. 88, skeleton of infant, crushed and partly calcined. Exact position not determined.

Burial No. 43, skeleton of male in semi-reclining position, head forward on chest.

Burial No. 90, skeleton of male, face down, and extended as far as the knees, with legs drawn back and foot bones almost in contact with the pelvis.

Burials Nos. 99 and 100, skeletons of child and of adolescent, crossing at hips, the child on top. Both skeletons were extended to the knees with legs flexed back.

Burial No. 101, skeleton of female with trunk on back, thighs drawn up toward body but spread apart, with legs drawn back on thighs.

Burial No. 139, skeleton of female on back with lower extremities flexed up on body.

Burial No. 153, female, same position as 101.

Burial No. 154, skeleton of a male at full length, in water, 10 feet below surface, the upper part crushed but showing no trace of fire. The thighs and lower part of the arms with the hands were calcined. This burial might be included among skeletons at length.

Burial No. 158, skeleton of adolescent on back, the thighs partly flexed and separated.

Burial No. 160, a skeleton of uncertain sex in a semi-sitting position, head over on chest. The cranium was saved (Acad. Nat. Sci., Cat. No. 2,163).<sup>1</sup>

Burial No. 168, skeleton of male on back as far down as could be determined, the legs having fallen with caving sand. This skeleton was surrounded by a thin layer of sand, colored red with powdered hematite.

Burials Nos. 173 and 174, part of a skeleton of uncertain sex, face down including the pelvis. At this point another skeleton, beginning with the cranium and including about one-half of the thigh bones, continued in the same direction. Then came thighs, legs and foot bones in anatomical order, probably belonging to the first skeleton. These remains lay at a depth of 4 feet from the surface and were unquestionably an aboriginal disturbance.

Burial No. 177, a skeleton of a female, lying on back to the knees, with legs flexed back on thighs.

Burial No. 186, skeleton of female, trunk on back, thighs and legs flexed to the right.

Not included under the head of special positions, since both were flexed, were burials Nos. 58 and 59, consisting of the skeleton of a female holding between its arms the fragile remains of a very young infant. The crania were in contact.

Of the 115 skeletons, 71 headed between S. E. and S. W., many crania pointing due S.

The remaining 44, with the exception of a woman, a child and an infant which are omitted from our field notes, headed as follows: E. S. E., 3; E. by S., 2;

<sup>1</sup> But one other cranium was in condition to preserve in this mound, namely that from Burial No. 73, a male (Acad. Nat. Sci., Cat. 2,162).

E., 11; E. by N., 1; E. N. E., 1; N. E., 4; N. N. E., 3; N., 5; N. N. W., 1; N. W., 1; W., 4; W. by S., 2; S. W. by W., 2; W. S. W., 1.

*Aboriginal disturbance.*—Aboriginal disturbance includes burials cut through by subsequent interments and possibly parts of skeletons accorded independent burial.

*Late disturbance.*—Under this head we include bones scattered by the plow, by superficial digging previous to our investigation, by caving sand and inadvertent disturbance by our men.

*Decayed and crushed remains.*—We have thus designated all such as seemed to be single skeletons which, through decay and through pressure were past determination as to sex, position and direction. It is not only possible but probable, however, that fragmentary aboriginal burials and small layers of bones of various individuals, badly decayed, have been included.

*Layers of uncremated bones.*—Two such layers unconnected with cremated remains were distinctly present in the mound. With one layer were five crania; with the other, six.

*Calcined deposits.*—Of the eight calcined deposits, the majority had fragments of human bones showing no trace of fire, associated with them. Some contained the remains, or parts of the remains of at least three individuals, while others probably represented but one skeleton.

Burial No. 117 was confined to the cremated remains of a child, a few remnants of whose bones were unburnt.

A small pocket of calcined bones lay upon decayed wood.

We have elsewhere referred to two partially cremated skeletons.

*Skeletons in urns.*—Vessel C, Burial No. 134, 15 feet N. E. by N. from the center of the mound, with its base 20 inches from the surface, its top just beneath the superficial shell layer, there 7 inches thick, was a vessel with incised decoration below the margin and a faint complicated stamp on the body. Decayed wood was above and below it. The vessel, crushed to fragments, was partly held together by sand and shells. It contained the long bones of an adult skeleton, parallel to each other and perpendicular to the base on which lay various smaller bones capped by the skull.

Near the preceding, forming a cluster with it and two other vessels, was a pot, Burial No. 135, Vessel D, on its side, having complicated stamp ornamentation. Decayed wood lay above and below it. Its condition was, if possible, worse than that of the preceding. It contained bones of an adult arranged similarly to those in Vessel C, and two polished stone hatchets, one rude quartz arrowhead, one undecorated earthenware tobacco pipe, and one fresh-water mussel shell, fragmentary through decay.

Vessel F, Burial No. 137, one of the group, had a complicated stamped decoration, but, unfortunately, was as fragmentary as its neighbors. It contained the remains of an adult arranged as in the other vessels and a circular piece of soap-stone with incised decoration, to be described under another heading.

*Calcined remains in urns.*—Vessel A, Burial No. 25, 20 feet S. W. by W. from the center, was a flat-bottomed, undecorated, globular, imperforate vessel of about two gallons capacity, slightly constricted at the neck. It was crushed to fragments. Within were the calcined remains of an adolescent.

Vessel E, Burial No. 136, made the fourth of the group to which reference has been made. It appeared to be of the ordinary type but was crushed to small pieces. It seemed to have been about half full of incinerated human remains.

Vessel G, Burial No. 163, 9 feet N. N. W. from the center, lay in fragments over part of a layer of calcined remains. Its decoration was red bands running laterally. The arrangement of the fragments seemed to indicate a former inverted position for the vessel.

*Not noted.*—Four burials included under this head were interments where full data, though obtainable, are omitted from our field notes.

#### EARTHENWARE.

*Sherds.*—Sherds were of infrequent occurrence, the majority undecorated or cord-marked, though a few had incised decoration. Excluding the burial jars and

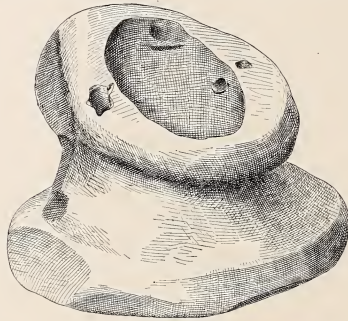


Fig. 35.—Vessel of earthenware. Mound at Bourbon. (Full size.)

one or two sherds believed to be superficial, the complicated stamp was not noted in the mound.

*Vessels.*—We have described certain vessels used for burial purposes.

With Burial No. 26, that of a child about eight years old, was an urn of about three pints capacity with globular body, constricted neck and flaring rim. Beneath the rim on the outside was an encircling row of button-like protuberances which had been modeled and pressed on to the clay before baking. Certain of these had dropped off.

Vessel B, an undecorated bowl with rounded base and slightly inverted rim,

has a diameter at mouth of 10 inches; a maximum diameter of body of 11.75 inches; a height of 8 inches. It contained a certain amount of decayed wood and a small quantity of material resembling sawdust—perhaps the last vestige of human remains.

With Burial No. 92, a child about seven years old, was a globular, undecorated pot of about one quart capacity.

With Burial No. 93, probably an aboriginal disturbance, was a curious vessel of earthenware, perforated for suspension at either side of the opening (Fig. 35), having a height of 2.5 inches; a maximum diameter of 3 inches. Its use is not apparent though it strongly recalls that numerous class of fantastically shaped mortuary vessels of earthenware found in many tumuli of Florida. A hole had been knocked through its base, the only case of base-perforation noted by us in the mound though certain of the burial jars were too fragmentary for determination as to this point.

In caved sand were several fragments of an oblong vessel having upright sides and inverted margin. The vessel, or rather such parts as were recovered, have on the base and sides—an unusual occurrence—an intricate incised decoration. Its height must have been 1.1 inches; its breadth of body, 2

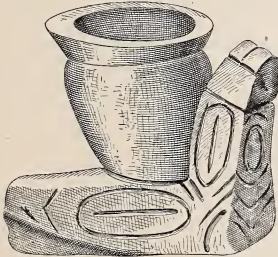


Fig. 36.  
Tobacco pipes of earthenware. Mound at Bourbon. (Full size.)

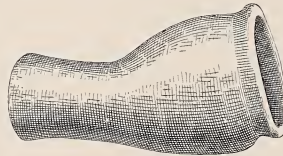


Fig. 37.  
(Full size.)

inches; of opening, 1.5 inches. Its original length is not obtainable as a part is missing.

With Burial No. 113, a male, was a cord-marked bowl of about one quart capacity.

Burial No. 154 had with it a small bowl in fragments bearing the checked, stamped decoration.

One of the most interesting pieces of earthenware ever met with by us lay with Burial No. 33, a mass of mingled calcined and unburnt bones, and consisted of a dish 12.2 inches in length, 7.7 inches across and 4.5 inches in height. Beneath the rim, exteriorly, is a row of large protuberances and, in addition, the dish bears traces of ornamentation by the use of red pigment. From either end project handles, one horizontal the other perpendicular—a curious feature. This interesting piece is intact (Plate VII).

*Tobacco pipes.*—Thirteen tobacco pipes were present in the mound—several somewhat fragmentary. But two showed any serious attempt at ornamentation. One of these (Fig. 36) has a height of 2 inches, a diameter of bowl of 1.5 inches and a diagonal length of 2.8 inches, approximately. The bowl is supported by a figure probably representing a bird. Part of the body and tail served for the

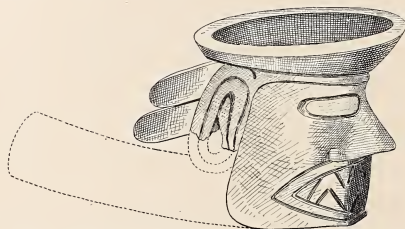


Fig. 38.—Tobacco pipe of earthenware. Mound at Bourbon. (Full size.)

reception of the stem. Found with this pipe was a small undecorated one shown in Fig. 37. The bowl forms an unusually obtuse angle with the remainder of the pipe.

In caved sand was a pipe representing a human head. The mouth is open showing the teeth and a curious head dress projects from the back of the head. A

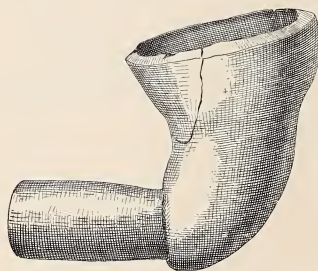


Fig. 39.—Tobacco pipe of earthenware. Mound at Bourbon. (Full size.)

portion of this pipe is wanting. Height and diameter of bowl, each 1.9 inches (Fig. 38).

An undecorated but rather gracefully shaped tobacco pipe (Fig. 39) lay with a burial.

A tobacco pipe of the poorest material and rude in form, apparently sun-dried, was recovered in pieces of hardly any consistency, though after drying it was fairly



well put together. Diagonal length, 5.5 inches; diameter of bowl and height, each 3.3 inches; diameter of stem, 2 inches; orifice for stem, 1 inch.

## SHELL.

*Cups.*—Thirty-four shell drinking cups, none remarkable for size or finish, were taken from the mound, ten forming one deposit. All were imperforate and three varied from any yet found by us in Florida or in Georgia, we believe, in that they were wrought, not from *Fulgur perversum*, whose opening is to the left, but from a right handed *Fulgur (canaliculatum)*.

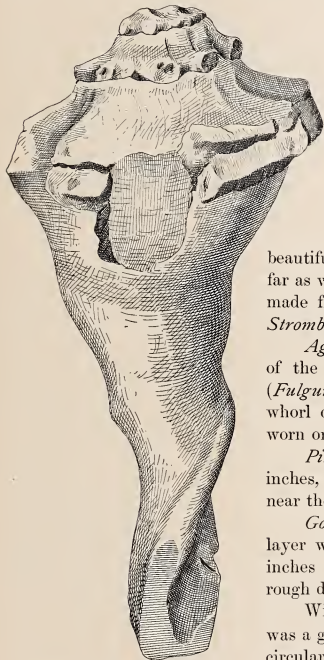


Fig. 40.—Chisel of shell. Mound at Bourbon. (Full size.)

*Chisels.*—Eighteen shell chisels were associated with human remains. These rather rough-looking implements, one of which we show in Fig. 40, made by grinding the beak to a cutting edge and removing the body whorl from the axis, must not be confounded with certain beautiful shell chisels found in Florida but not, so far as we know, on the Georgia coast, which are made from the lip of the great marine univalve, *Strombus gigas*.

*Agricultural implements.*—Two specimens of the right handed, heavy form of the conch (*Fulgur carica*), with perforation in the body whorl opposite the aperture and with the beak worn or chipped down, came from the mound.

*Pins.*—Twelve pins, the largest about 4.5 inches, lay with skeletal remains practically always near the head.

*Gorget.*—In midden refuse composing a shell layer was a circular gorget of shell of about 2 inches diameter, having carved in the center a rough diamond-shaped figure (Fig. 41).

With Burial No. 92, a child of about 7 years, was a gorget near the head. This gorget, nearly circular, with a diameter of about 1.7 inches, bore the well-known design of the rattlesnake.

*Beads.*—Beads of shell were fairly numerous though in no wise comparable in size, number or state of preservation to those in the Creighton Island mound, with the exception of a fine tubular bead, 4 inches in length, having a diameter of .6 of one inch. To drill a bead of this sort longitudinally



dinally must have required considerable time. We are told by Adair,<sup>1</sup> "Formerly four doe-skins was the price of a large conch-shell bead, about the length and thickness of a man's fore-finger; which they fixed to the crown of their head as an high ornament—so greatly they valued them."

With one burial were a number of discoidal beads, each about one inch in diameter, perforated in the center through the minor axis. These beads must not be confounded with *runtées*, which have their perforation edgewise.



Fig. 41.—Gorget of shell. Mound at Bourbon. (Full size.)

*Mussel shells.*—Great numbers of fresh-water mussel shells, all Georgia species, some perforated for suspension, others not, were present with human remains. With one burial were many shells (*Unio Shepardianus*), some decayed and broken, though 33, all perforated, were recovered in fairly good condition.

#### PEARLS.

One pearl, perforated as usual, was met with.

#### STONE.

"*Celts.*"—Eleven polished "*celts,*" most of them of volcanic rock, from 3 to 6.5 inches in length, were present in the mound. It has not been thought necessary to mutilate them for exact determination as to material. Several, probably of green-stone, were badly decayed through contact with water.

*Pebble-hammers, hammer-stones, etc.*—The mound was rich in these objects. One hammer-stone was apparently a portion of a celt. One pebble-hammer, with a length of 6.25 inches, had also seen use as a smoothing-stone. Certain ones, smoothed on four sides, presented an interesting appearance.

*Arrow and Lance points.*—Five arrow and lance points of chert, of chalcedony and of quartz, all of ordinary type, were found during the investigation.

*Discoidal stones.*—Four small discoidal stones were met with. One of micaceous sandstone was in a friable condition.

*Soapstone objects.*—With caved sand, near human remains, was a portion of a vessel of soapstone—a large vessel, as shown by the slight concavity of the inner surface. It is about 4 inches square and has on the margins a rude and irregular decoration.

With Burial No. 50, a male, was a bit of a soapstone vessel, rudely decorated with incised lines on either side and on two of its three margins. With it was a circular ornament of soapstone having the margin divided by five incisions. Height, .5 of an inch; diameter, 1.2 inches (Fig. 42).



Fig. 42.—Ornament of soapstone. Mound at Bourbon. (Full size.)

<sup>1</sup> "History of the American Indians," page 170. Cited by C. C. Jones.

With Burial No. 137, in vessel F, was an imperforate, irregularly circular piece of soapstone 2.3 inches by 2 inches by .5 of one inch thick. On one side was a rough incised design representing the serpent (Fig. 43); on the other a cross-hatch decoration (Fig. 44).

With Burial No. 45, was a curious little piece of soapstone 1.8 inches in height roughly wrought into the semblance of the upper portion of the human figure.



Fig. 43.  
Engraved tablet of soapstone. Mound at Bourbon. (Full size.)

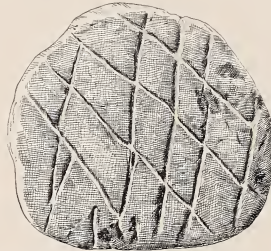


Fig. 44.

The arms are plainly apparent, as is the mouth. The upper portion of the head seems to be wanting through breakage or through omission (Fig. 45).

Several unworked bits of soapstone pots were present with burials.

*Miscellaneous.*—A number of flakes of chert, probably used as cutting implements, lay with burials or loose in the sand. With a skeleton was a small nodule of black jasper.



Fig. 45.—Effigy of soapstone.  
Mound at Bourbon.  
(Full size.)

BONE.

*Piercing implements.*—Piercing implements, some probably hair pins, were fairly numerous. Many were decayed and broken. Some piercing implements retain the articular portion of the bone at the blunt end.

A curious feature, not before noticed by us, was the presence in this mound of sections of bone pins with burials, not broken but apparently intentionally divided by cutting. With one burial were no less than seven of these fragments. A less number were found at several other points in the mound.

*Miscellaneous.*—With human remains were the jaws of a small carnivore and part of a lower jaw of a much larger one with the lower portion, including the roots of the teeth, ground away, leaving a flat surface. We shall again refer to this curious aboriginal custom in connection with jaws similarly treated from mounds on St. Catherine's and Ossabaw Islands.

## MISCELLANEOUS.

The carapace of a tortoise, somewhat fragmentary, with two perforations, was found with a burial. The lower part of the shell was probably absent through decay. In the mound at Bourbon were several tortoise shells in the last stage of decay, usually surrounding nests of small pebbles; once or twice, flakes of chert; once, small square pieces of shell, probably originally destined for beads, and a number of the teeth of the drum-fish. We have, in other mounds, met with deposits of drum-fish teeth which doubtless had remained after the enclosing tortoise shells had decayed.

Plumbago, perhaps used as black paint, was present with one burial.

Many burials throughout the mound were associated with the red oxide of iron in powder.

A small bead of blue glass was found by a digger engaged on the surface layer. This bead, in view of the absence of glass beads with burials in the body of the mound, we took to be a relic of later Indians who, we know, inhabited Sapelo Island until a comparatively recent period.

## ASSOCIATION OF OBJECTS.

With Burial No. 31 were: two pebbles; a flat mass of undetermined stone; two fragments belonging to a pot or pots of soapstone; a pebble worn down as a smoothing implement; a shell chisel; three badly-decayed bone piercing implements; a flat fragmentary smoothing-stone and one large pebble-hammer.

With Burial No. 33, a mass of calcined and unburnt bones, were two stone hatchets; two earthenware tobacco pipes and the earthenware dish already described.

There lay with Burial No. 73, a male, shell beads at the wrist; five tobacco pipes, some with portions missing; two pebble-hammers; one pebble; two freshwater mussel shells; one shell chisel; one discoidal stone with a concavity on one side; one small quartz arrowhead; one portion of a columella of some large marine univalve; one decayed turtle shell containing drum-fish teeth, etc.; one shell drinking cup; one bone pin; one discoidal stone.

## SAPELO ISLAND, McINTOSH COUNTY. LOW MOUND AT BOURBON.

About 150 yards in a southerly direction from the large mound at Bourbon, was one having a diameter of base of 38 feet, a height of 3 feet 4 inches. Upon it lay the trunk of a large oak tree, which, with the root, interfered with complete investigation. Somewhat over one-half the mound was dug away, with the courteous permission of Amos Sawyer, Esq.

The mound at marginal portions was thickly covered with oyster shells, the layer gradually decreasing in thickness toward the center. The body of the mound was composed of black loamy sand. The presence of water near the base impeded investigation.

Human remains were met with at twelve points. Three skeletons lay at full length, two on the back and one face down in sub-basal graves under water. Other

remains, all inhumations of single bodies, were in various positions, flexed, semi-sitting, reclining. There was no uniformity of direction nor any preponderance of a southern direction as a choice for the head. With one skeleton was hematite; with another, a few shell beads.

SAPELO ISLAND, McINTOSH COUNTY. MOUND IN DUMOUSSAY'S FIELD.

Dumoussay's Field, taking its name from a French owner, deceased on the island in 1794, as his headstone sets forth, is a considerable tract formerly under cultivation but now overgrown with underbrush and small trees. It is studded with shell-heaps. It is distant somewhat over one mile in a straight line from Bourbon—N. N. W.—and may also be reached by water through a branch of the creek on which Bourbon is situated.

About one-quarter of one mile in a northwesterly direction from the landing, which is only a harder portion of the marsh, was an irregular rise in the ground much reduced in height and spread out by cultivation. Its maximum height was 18 inches; its exact diameter was difficult to determine. Probably a circumference with a diameter of 50 feet would have included all portions above the general level of the field. It was dug through by us by permission of Amos Sawyer, Esq., to whom we are indebted for the privilege of opening the neighboring mounds at Bourbon.

Through what we took to be the center of the elevated part of the mound, a line 90 feet in length was drawn running east and west. Taking this line as a chord, a semi-circle with radii of 45 feet, including the southern portion of the mound, was marked out and completely dug through. Evidences of disturbance in the soil were met with about 29 feet from the central point, the first interment, however, being 23 feet S. E. by S.

Next, the northern half of the mound was dug through starting with a diameter of 53 feet and gradually converging to a line 32 feet N. of the central point where all disturbance in the sand seemed to cease, and a considerable number of feet beyond an interment. On the limits of the mound were the pits so often found with coast mounds, in this case about 3.5 feet deep and covering a considerable area. As usual, they were filled with sand black with organic matter much darker than the sand of the mound, but contained no burials.

The mound, which had evidently lost much of its original altitude through cultivation, had upon its surface but a few scattered oyster shells and contained practically none. There was no central grave, unless a broad area of disturbed sand near the middle, extending into the bright yellow sand beneath the base and containing a number of burials may be so regarded. Pits similar to this, though smaller, were present elsewhere in the mound.

Skeletal remains were met with at fifty-one points in the mound, excluding scattered fragments from near the surface. These burials were distributed as follows as to form: skeletons, 42; late disturbance, 1; bunched burials, 2; isolated cranium, 1; uncremated remains in vessels, 3; cinerary urn with calcined remains, 1.

Of the skeletons: 20, were of males; 12, of females; 6, of uncertain sex; 3, of adolescents; 1, of a child.

Of these 42 skeletons all but one were flexed<sup>1</sup> on the right side and all but the same one headed in a southerly direction, 17 being due south. The one exception lay flexed on the left side with the head pointing E. N. E.

We append all burials of interest and all associated with any artifacts.

Burial No. 2, 23 feet S. E. by S. from the center, at the bottom of a pit, 3 feet 6 inches from the surface, extending 1 foot 3 inches into undisturbed sand, was a skeleton of uncertain sex flexed on the right side, head S.

Burial No. 5, 21 feet S. E. by S., 2 feet 4 inches down, was a skeleton of a male, flexed on the right side, head S. With it was a tobacco pipe with portions of the rim missing, representing a human face and differing somewhat from the one from Bourbon, where the teeth are shown continuously, while in this specimen, which recalls the one from Darien, they are represented on either side only (Fig. 46).

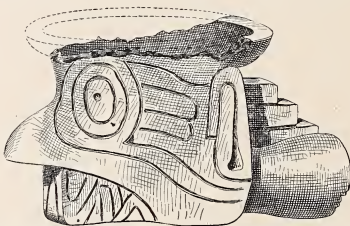


Fig. 46.—Tobacco pipe of earthenware. Mound at Dumoussay's Field. (Full size.)

Burial No. 8, 16 feet S. E. by E., 1 foot down, a skeleton of an adolescent, flexed on the right side, head S. by E. Above the skeleton was a layer of charcoal about 6 inches thick, with burnt shells and sand. In this layer were fragments of calcined human bones having no connection with the skeleton below, and a calcined shell pin.

Burial No. 13, 12 feet E., 2 feet 10 inches down—a bunched burial, the skull face up, the lower jaw under it and turned from it, one humerus above and one beneath, the cranium. Ribs heaped over upper humerus. No other bones except two vertebrae.

Burial No. 14, Vessel A, 11 feet S. E. by S., a vessel in fragments, probably broken by the plow. With it were scattered fragments of calcined human bones and a discoidal stone.

Burial No. 16, 7 feet E. by S., skeleton of female, flexed on the right, head S., on the bottom of a pit, 4 feet 7 inches from the surface. The pit extended 1 foot 9 inches into undisturbed sand. Diameter of pit as it entered undisturbed sand, 4 feet 3 inches. In the upper part of the pit was powdered hematite.

<sup>1</sup> One of these was a partial flexion.



Burial No. 26, male, flexed on the right side, head S. by W. Associated, were: two undecorated tobacco pipes, with parts missing; the lower half of a chert arrow-head; a bit of soapstone pot; two bone pins badly decayed.

Burial No. 30, 3 feet W. S. W., 3 feet down, a skeleton of an aged female, flexed on the right side, heading S. by E. At the neck were small beads and near by were: six imperforate marine shells (*Dosinia discus*)<sup>1</sup>; three pebbles used as smoothing stones; one attractive pebble-hammer of quartz; and two rectangular dishes, the smaller inverted within the larger, each with rounded corners and slightly converging sides, having, in addition, an inward slope toward the middle of the longer sides. On the base of the smaller vessel and extending somewhat over on one side, is a curious incised decoration shown diagrammatically in Fig. 47.

Professor Holmes considers it to be "most certainly representative of some life form or forms."

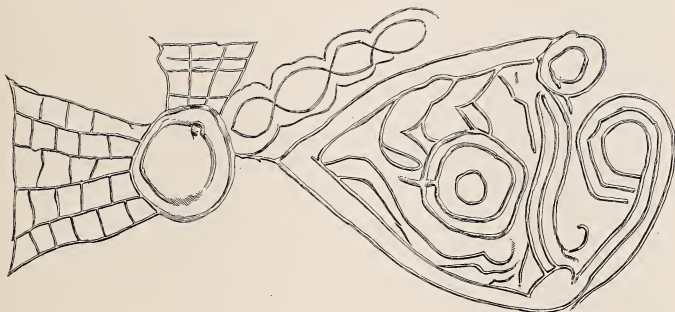


Fig. 47.—Incised decoration on dish. Mound at Dumoussay's Field. (Full size.)

Professor Putnam thus writes of it:—"As to the figure carved on the oblong dish from the Sapelo Island mound, both Mr. Willoughby and I find ourselves unable to reduce it to its elements. It is probably a conventionalized figure, which in time will be traced back to its realistic form."

The approximate measurements of the larger vessel, in which we noticed hematite, are as follows: length, 9 inches; breadth, 4.5 inches; height, 1.5 inches. The smaller dish was approximately 7 inches long, 3.25 inches wide, and 1.5 inches high.

Burial No. 32, Vessel B, 4 feet W. Just below the surface, was an undecorated imperforate bowl in fragments containing bits of unremated bones of a young infant. Nearby were: an undecorated imperforate vessel with globular body, constricted neck and flaring rim, of about 3 pints capacity; one shell drinking cup and one conch shell.

Burial No. 34, 13 feet E. by N., a skeleton of a male, flexed on the right side, head S., having in association a mass of powdered hematite.

<sup>1</sup> Determined by Professor Pilsbry.



70 CERTAIN ABORIGINAL MOUNDS OF THE GEORGIA COAST.

Burial No. 35, 6 feet N. W., 3.5 feet down, skeleton of a child, flexed on the right side, head S. W. by S. At the neck were eight massive beads of shell, the largest 2 inches in length, and a number of small beads. On the chest was a rattle made from the shell of a tortoise, very badly decayed, having within many little pebbles; a gorget of shell with part of the rim missing, having a diameter of 2.6 inches, bearing the design of a rattlesnake.

Burial No. 36, Vessel C, 7 feet N. W. by W. A few inches below the surface was a badly crushed, undecorated, imperforate vessel held in place by sand, 17.75 inches long with a maximum width of 12 inches. The orifice is 14 inches in length and 9.5 inches wide. The height varies from 6 inches at the middle of the side to 7 inches at the end. In shape the vessel resembles the larger one described with Burial No. 30. At the bottom of the vessel were small shell beads in numbers, while powdered hematite was present in it in places. The top was covered or partly covered by fragments of earthenware, not representing any entire vessel. This oblong vessel, which, pieced together, is shown in Plate VIII, enclosed a lower jaw; arm bones on either side and in the middle, ribs; part of the sternum and a few vertebrae. These bones were not in anatomical order.

In the sand immediately below the vessel were the skull without the mandible; the pelvis with the left lower extremity in anatomical order and flexed. The bones of the right leg were parallel to, and alongside of, those of the left leg, while the right thigh was about one foot away. Scattered phalanges and vertebrae lay about and the portion of the sternum not contained in the vessel was present. With these bones were massive shell beads and a shell drinking cup. This burial we consider the most interesting of any it has been our fortune to encounter.

Burial No. 41, 10 feet N. W. by N., 1 foot 2 inches below the present surface, was a bunched burial, having: the bones of the lower extremities with one tibia reversed from its femur, the long bones parallel; the pelvis on top; the ribs mingled; one humerus; no forearm bones; no cranium and but one vertebra.

Burial No. 46, 17 feet N. N. E., 2.5 feet down, a skeleton of uncertain sex, flexed on the right, heading S. With it was a shell drinking cup and one pebble.

Burial No. 48, 16 feet N. N. E., 2 feet 3 inches down, was the skeleton of a male, on right side, head S. by E. In the grave with the skeleton, 2 feet west of it, were two vessels, each of about 2 quarts capacity, of the type described as found near Burial No. 32, each on its base but tilting toward the other, so that a part of the rim of one lay in the aperture of the other. The interior of one was coated with red pigment. Near the knee of the skeleton were fragments of a cord-marked bowl of about three quarts capacity, not together, but spread out at some distance one from the other. This bowl, when pieced together, showed a base-perforation. Below the upper margin, on either side of a crack, were two perforations placed to permit the passing through of a cord or sinew to hold together the parts on either side. Below the skeleton and the two vessels first described was a continuous layer of decayed wood or bark.

Burial No. 49, 22 feet N., just beneath the surface was the skeleton of a male,

partly flexed on the right side, heading S. With it were hematite and a rude pendant wrought from a section of the columella of a marine univalve, grooved at one end for suspension.

Burial No. 50, Vessels D and E, 24 feet N., just beneath the surface, was a badly broken vessel of the ordinary type with a perforated base. The rim had been ploughed away. Within were fragments of bones of an infant so young that the milk teeth had not erupted. Above this vessel was an inverted bowl in fragments, undecorated save for a row of small knobs beneath the exterior margin.

Burial No. 51, 25 feet N. by W., nine inches down, a skeleton of a male, flexed on the right side, head S. by E. Associated was a nest of small pebbles, doubtless formerly included within a tortoise shell.

With a number of burials not especially noted was decayed wood or bark. In the mound, loose in the sand, was a somewhat fragmentary undecorated tobacco pipe. Sherds, undecorated, cord-marked and with check and complicated stamp, were present. A portion of an undecorated vessel which, while whole, had also seen service as a hone, showed five grooves, a part of one of which had been on the missing portion.

#### ABORIGINAL ENCLOSURE AT SAPELO HIGH POINT, SAPELO ISLAND, MCINTOSH COUNTY.

On Sapelo High Point, near the northwest end of Sapelo Island, overlooking Sapelo Sound and, at periods of storm, washed by the waters of Big Mud river (the southernmost fork of the sound) which had laid bare a section of the walls, is an almost circular aboriginal fortification or ceremonial enclosure. This enclosure (see plan, Fig. 48), which we examined by permission of Amos Sawyer, Esq., upon whose property it is, has a diameter, including the walls, of somewhat over 300 feet. The walls have an average height of from 5 to 7 feet, and a thickness of about 50 feet at the base. They are flattened on top where at present they have an average width of from 10 to 15 feet. They are covered with forest trees, and are composed exclusively of shells, mainly those of the oyster, with the usual midden refuse intermingled, such as fragments of bone, bits of earthenware, and the like.

Those most familiar with the history of Southern Georgia have failed to find any allusion to this work in chronicles or histories, nor does any local tradition attach to it.

That the work is aboriginal is, in our opinion, beyond the shadow of a doubt since a fortification made by Europeans would be of sand found on the spot and not from shells gathered here and there from small deposits at a distance. On one side of the mound only are shells within sight, and these consist of circular deposits not over 18 inches in height, from which no shells have been taken. There is no question then but this is one of those symmetrical works of the aborigines made by piling shell through a period of time to form some definite shape such as a great ridge on Barbour's Island not far from Sapelo, or at Enterprise, Florida, or the great oblong mound of shell lying in the swamp near Volusia, Florida, with no shell surrounding it, a full description of which we have given in the *American Naturalist*.<sup>1</sup>

<sup>1</sup> "Certain Shell Heaps of the St. Johns River, Florida," January, 1893.

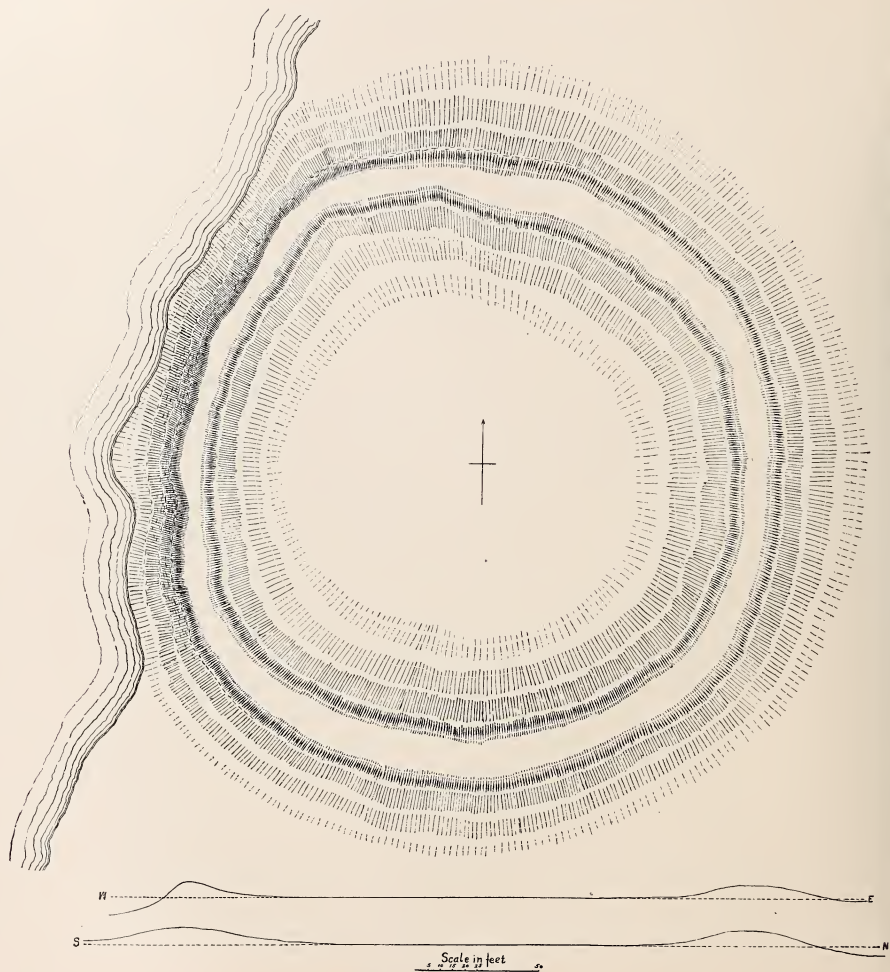


Fig. 45.—Plan of "Indian fort," Sapelo Island.

Excavations made within the enclosure gave varying results. At one point yellow, undisturbed sand was reached about 1 foot beneath the surface. Another excavation went through loam and midden refuse to a depth of 2.5 feet. Earthenware in fragments, shattered bones of the deer and a fragment of a temporal bone from a human skull were met with.

In a description of this enclosure, appearing in a report of the Smithsonian Institution,<sup>1</sup> reference is made to two circular enclosures in the vicinity. One is at present indistinct and has by no means the height assigned to it. The other escaped our attention.

Near the center of Sapelo Island is a mound of considerable size, the property of a Mr. Keenan, or Kennon, with whom we were unable to come to terms.

The Island of Blackbeard, called after the famous pirate of that name, lies to the northeast of Sapelo. We are indebted to the courtesy of Dr. Edward Giddings for permission to make any investigation we saw fit upon the island. Unfortunately, we were unable to locate any aboriginal works upon it though "Money Old Field," a tract formerly under cultivation, seemed to offer a likely situation. This field has been fairly riddled by seekers after mythical treasure, and it is owing to this foolish idea of buried gold that scientific investigators meet with hindrance from the ignorant.

#### MOUNDS AT BAHAMA, MCINTOSH COUNTY.

Bahama,<sup>2</sup> situate at the union of Barbour's Island river and South Newport river, has a wide expanse of cultivated fields, many of which, by the presence of numerous low shell heaps, give evidence of aboriginal occupation. A careful search upon two occasions was accorded to this promising site with but meagre result. Two small mounds, each but little above the general level, were met with. These mounds were not completely demolished, though the central parts were dug out, with considerable additional trenching. In each case no interments were discovered save in a central pit.

In one mound the pit, filled to the surface with oyster shells, contained a confused mass of human remains, including three crania unaffected by fire. With these bones were fragments of calcined human remains and one piercing implement of bone.

In the second mound, upon which only scattered oyster shells were visible, was a pit about 3.5 feet deep, roughly circular and about 7 feet across at the top. The sides of the pit, which converged, were coated with a layer of oyster shells, about 6 inches thick. On the base was a deposit of remains similar in character to those in the other mound, including six crania. A certain amount of hematite was in association.

<sup>1</sup> 1872, page 422 *et seq.* "Mounds in Georgia," William McKinley.

<sup>2</sup> The post-office at this point has, we believe, lately been given the name Lacey.

## MOUNDS AT LAUREL VIEW, LIBERTY COUNTY.

Laurel View is a high bluff on the south side of the Medway river. About 1 mile south of the bluff was a very symmetrical mound of white sand, 7 feet high and 38 feet across the base. It was on the property of Mr. McClosky of Augusta, Georgia. Prior to our visit a large trench had been dug completely through the mound and a portion of one side had been dug away. The remainder of the mound was totally demolished by us. A number of pockets of calcined human bones—



Fig. 49.—Diagram of mound near South-end Settlement.

about twenty—some associated with pink sand, were met with, also several solitary skulls very badly decayed.

A chert arrowhead lay loose in the sand and another was found unassociated with a cranium. A piercing implement of bone, of the ordinary type, lay with calcined remains.

About 100 yards northwest of the mound just described was a small one, intact as to previous investigation but much reduced in height by the plow. Its altitude



was 22 inches; its diameter of base, 30 feet. It was totally demolished, being dug through at a depth considerably lower than the level of the surrounding territory.

Human remains were met with at eight points, some at a depth of 3 feet. At one point was a solitary skull unaffected by fire. Seven pockets of calcined bones comprised the remainder of the human remains in the mound, with the exception of one femur showing no trace of fire, which lay immediately beneath one of the masses of calcined bones.

Several local streaks of bright sand colored with hematite were present in the mound and scarlet sand was occasionally with human remains.

Five or six sheets of mica, with one of the pockets of burnt bones, were the only artifacts present in the mound.

#### ST. CATHERINE'S ISLAND, LIBERTY COUNTY. MOUND NEAR SOUTH-END SETTLEMENT.

About three-quarters of one mile in a northerly direction from the South-end Settlement, in a field long under cultivation in former times but fallow at the time of our visit, was a rather symmetrical rounded mound 3 feet in height and 68 feet across the base, the outline of which was almost exactly circular, though, as the reader may see by consulting the diagram (Fig. 49), burials and artifacts were by no means included beneath the slope of the mound but extended to the east and south-east in perfectly level ground.

There had been no previous investigation.

The mound was dug through, including considerable outlying territory. Throughout the mound proper there ran, commencing at the beginning of what we took to be the original slope (for the external lower portions of the rise seemed to have been ploughed down from above), a dark band not on one level, as in many mounds we have investigated, but extremely irregular, often continuing a considerable distance into the pits which were numerous in certain portions of the mound. In default of a better theory, we believe that these pits were dug and but partly filled previous to the erection of the mound; that the field continued to be a dwelling site, and that the deposit of offal, debris, charcoal and the like, created a black surface layer in the depressions as well as on the level ground.

The mound was composed of dark loamy sand resting upon undisturbed yellow sand. Local layers of oyster shells were present, and the central portion of the mound was made up of a deposit of oyster shells about 2 feet thick—not midden refuse but loose as though brought there at one time and deposited. This deposit extended in some directions about 10 feet from the center, in others 20 feet, while to the N. W. it continued, tapering off in thickness, to the very verge of the mound. From the highest point of the mound to the level of the black base-line, was a perpendicular distance of just 3 feet.

The following is a detailed description of burials to be used in connection with the diagram.

Burial No. 1, 51 feet, E. S. E., from the center of the mound proper, beneath perfectly level ground, lying at the bottom of a pit, 2.5 feet from the surface, were fragments of a human skull badly decayed.

Burial No. 2, 42 feet, S. E. by E., on undisturbed sand, at the bottom of a pit of undetermined limits, 32 inches from the surface, was the skeleton of an adult, much decayed, apparently flexed on the right side, heading S. E. With the bones were: a pebble-hammer; a lot of red paint made from red oxide of iron, as was shown by chemical determination; a flake of chert; a small bit of a soapstone pot and twenty-three quartz pebbles each about the size of a pea, lying closely together—the remains of a rattle.

Burial No. 3, Vessel A. To the S. W. of Burial No. 2, in contact with its base, resting on undisturbed sand, 36 inches from the surface, entirely intact, was a vessel of the ordinary type (see introductory remarks as to this type at the commencement of this Report). Height, 15.5 inches; maximum diameter of body, 11.5 inches; diameter of mouth, 13.5 inches. Within this vessel, which was unprotected by an imposed vessel or by fragments, were a number of human bones of an adult, probably representing an entire skeleton. Long bones together were upright against the side, while the cranium lay face down with ribs and other bones beneath, as shown sectionally in the frontispiece, in which, however, all the long bones are not distinguishable, certain ones being in rear of others. The skull and long bones are represented exactly as found, never, in fact, having been removed from the vessel, but treated in place with numerous coats of shellac to impart durability. The fragmentary smaller bones and the beads were removed with the sand and subsequently replaced, but not exactly in their former position. Most of the beads lay on top of the mass of bones at the base of the vessel.

Burial No. 4, Vessel B. To the north of, and in contact with, Vessel A, was an imperforate one of similar type somewhat crushed. Within it were the bones of an adult, not in anatomical order and very much decayed. The vessel was sent to the Ontario Archaeological Museum.

Burial No. 5, Vessels Ca., b., 44 feet E. S. E., in a pit of uncertain limits, having its base 3.5 feet from the surface and extending 22 inches into undisturbed sand, was a vessel of the ordinary type, imperforate as to the base, having the rim badly crushed. It contained the much decayed bones of an adult, probably male, not in anatomical order, with 34 large shell beads. Capping this vessel, inverted, was an imperforate bowl, undecorated save for an encircling row of knobs some distance apart, about 1.5 inches below the rim. The material, gritty ware, was fairly good in this case and had resisted pressure with the exception of a part of the rim and a portion below it, which were recovered. Diameter of body, 16 inches; of mouth, 14.5 inches; height, 9.5 inches. Ca. and Cb. were sent to the Peabody Museum, Cambridge, Mass., where they have been carefully put together.

Burial No. 6, 46 feet E. by S. was a pit 4.5 feet long, having its base 38 inches from the surface. It extended 17 inches into undisturbed sand and was filled with oyster shells and black loam apparently from a local superficial layer. On the base was a skeleton, flexed on the right side, head S.

Burial No. 7, Vessel D., 48 feet E. S. E., just beneath the surface, upright, with the rim and upper portion broken by the plow, was a vessel of the ordinary type, having

a large intentional perforation of the base. The vessel was partly filled with oyster shells, though none was present on the surface at that part of the mound. On the base of the vessel was the skeleton of a child three or four years of age, flexed to such an extent that the head was almost in contact with the legs.

X. 55 feet S. E., a layer of charcoal and sand, the upper margin 6 inches below the surface, 4 inches thick at the start and 4 feet 2 inches across. It extended inward 5 feet 3 inches, tapering off somewhat in thickness.

Burial No. 8, 38 feet E., in the bottom of a small pit, 26 inches from the surface and extending into undisturbed sand, was the skeleton of an aged female, flexed on the right side, head S. E.

Vessel E, 39 feet S. E. by E., 2.5 feet from the surface, was an imperforate undecorated boat-shaped vessel, entirely intact. At either end was a small perforation for suspension. This vessel apparently contained no remains of any sort, nor did it seem to be in the vicinity of a burial. Maximum diameter of mouth and length, each 7 inches; maximum diameter of body, 9 inches; minimum diameter of mouth, 4.1 inches; minimum diameter of body, 5.3 inches; height, 4 inches.

Burial No. 9, 38 feet S. E., on undisturbed sand, on the side of a large pit of undetermined limits, was a skeleton of uncertain sex, much decayed, flexed on the right side, head S.

Burial No. 10, 42 feet E. by S. This skeleton of a female, flexed on the right side, head S., lay on undisturbed sand, 1.5 feet down. Oyster shells from the surface lay with the loam around it. Beneath the chin was a shell pin of ordinary type.

Burial No. 11, 27 feet N. E. by E., on the bottom of a pit, 3 feet 9 inches from the surface, 2 feet of which was into undisturbed sand, and having a diameter of 5.5 feet where it entered the undisturbed sand, was a badly decayed skeleton, probably male, flexed on the right side, head S. E.

Burial No. 12, 37 feet E. S. E., 2 feet 8 inches down, just above the bottom of the pit, were traces of bones in powder. Three bits of chert and several small flakes of mica lay with them.

XX. 15 feet N., a pocket of charcoal in the sand, 15 inches across at the start and 3 inches thick, tapering into the mound 9 inches.

Burial No. 13, 32 feet E. by S., a flexed skeleton of a female, on the right side, head S., let into undisturbed sand, 2 feet from the surface.

Burial No. 14, 32 feet E. S. E., 1 foot 6 inches from the surface, were a few crumbling fragments of bone, having with them two small polished chisels of stone; one graceful arrow point of chert and a nest of small pebbles formerly belonging to a rattle.

Burial No. 15, 27 feet S. E. by E., 2.5 feet from the surface, on the bottom of a pit let 8 inches into undisturbed sand, was the skeleton of a male, on the right side, partly flexed, the knees being at right angles to the body, head S. With the remains were: a nest of small pebbles, several small fragments of a soapstone vessel and three undecorated earthenware tobacco pipes of ordinary type, one against the skull, the others loose in the sand, 13 inches and 15 inches, respectively, above the

bones. One was partly filled with carbonized tobacco. These two pipes may have been contributions from bystanders during the filling of the grave.

Burial No. 16, 25 feet E. by S., a grave 5.5 feet long, extending 2 feet to undisturbed sand. On the bottom, 3 feet 9 inches from the surface, was a skeleton of a male, on the right side, head S. With it were: a small undecorated tobacco pipe of earthenware; a discoidal stone about 2 inches in diameter and 1 inch in thickness and a small ball of resinous material.

Burial No. 17, 22 feet E. S. E., 28 inches down, lying on the line of undisturbed sand, with no especial grave discernible but in generally disturbed material, was a pile of human bones in disorder with long bones on top of, and along side, the skull.

Burial No. 18, 8 feet N. W. by N., 4 feet down, in a small pocket were the greatly decayed remains of a very young infant, so crushed together that no determination as to position was possible. Associated were a number of shell beads.

Burial No. 19, 19 feet E. by S. A grave extending 1 foot 10 inches into undisturbed sand, the base 3 feet 7 inches from the surface, with a maximum diameter of 6.5 feet. On the bottom was the skeleton of a female, flexed on the right side, head S. On the trunk was hematite. Under the arm was a number of beads roughly wrought from sections of columellæ, each about 1 inch in length.

Burial No. 20, 16 feet E. by N., 4 feet 10 inches from the surface, on the bottom of a grave 6 feet across where it entered undisturbed sand into which it extended 2 feet 8 inches, was the skeleton of a child about 6 years of age, flexed on the right side, head S.

Burial No. 21, 7 feet N. N. W. A grave having its base 2 feet 3 inches from the surface, the lower 1 foot extending into a layer of oyster shells. On the bottom of the grave, which had a length of 22 inches, was the skeleton of an infant, badly crushed, with the head S. W. Shell beads were in association.

Burial No. 22, 17 feet S. E., on the base of a grave, 2.5 feet from the surface and extending about 1 foot 9 inches into undisturbed sand, was the skeleton of a male, flexed on the left side, head S. With it were large shell beads and an undecorated earthenware tobacco pipe of ordinary type lying near the skull.

Burial No. 23, Vessel Fa. b. Let into the yellow sand, with its base 3 feet 4 inches from the surface, was a burial jar (Fa.) of the usual type, imperforate, upright and very badly crushed. Within it were bones, probably belonging to a female, the long bones on end, side by side, near the skull, the other bones beneath. This jar, about 18 inches high, had been capped by an inverted bowl (Fl.) of black ware, with a decoration of small knobs, similar to the one previously referred to. This bowl, also crushed, was sent with the other vessel to the Museum of Natural History, New York.

Burial No. 24, 13 feet S. E., 3 feet from the surface, in a pit of undetermined limits, was a skeleton of a female, flexed on the right side, head S.

Burial No. 25, disturbed by the burial of No. 24, a little to the north of it on the same level, was the skeleton of a child, interred with an imperforate shell drinking cup, into which certain of the bones had been crushed.

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Burial No. 26, 12 feet N. E. by E., was the skeleton of an infant, 1 foot 9 inches down, head S. E. The bones were too badly crushed for determination as to position, etc.

Burial No. 27, 11 feet E. S. E., on the bottom of a pit having a diameter of 2.5 feet where it entered the clear yellow sand into which it extended 1 foot 2 inches, and 3 feet 10 inches from the surface, was the skeleton of a child about three years of age, flexed on the right side, head S.

Burial No. 28, 8 feet N. E., 4 feet 10 inches down, let 14 inches into undisturbed sand, was an infant's skeleton somewhat disturbed, probably by the digger.

Burial No. 29, 8 feet E. by S. was another badly-decayed skeleton of an infant, disturbed in excavation. It lay 5 feet 3 inches from the surface in a deep pit.

Burial No. 30, 12 feet W. N. W., in the superficial layer of oyster shells, somewhat disturbed by the plow, was a deposit of calcined fragments of human bones, the only evidence of the practice of cremation present in the mound. Scattered throughout the deposit were numerous shell beads of different sizes, including thirteen fine specimens some over 1.5 inches in length, probably wrought from columellæ of the conch (*Fulgur*). These beads were in a much better state of preservation than others in the mound, which we attribute to their being among oyster shells. Above the deposit was an inverted, imperforate drinking cup of shell (*Fulgur perversum*) and on the outer edge a discoidal stone of about 2 inches diameter.

Burial No. 31, 15 feet W. N. W., an infant's skeleton much decayed, 3 feet 3 inches from the surface in a small pit extending 1 foot 3 inches below the base of the mound.

Burial No. 32, N. W. by N., 5 feet, lying on the undisturbed sand, 5 feet from the surface, at one end of a large pit running 26 inches beneath the base, was the skeleton of a male, flexed on the right side, head S.

Burial No. 33, 5 feet E, in a pit, 5 feet from the surface, were the badly-decayed remnants of the skeleton of a child. Lumps of charcoal lay near by.

Burial No. 34, 12 feet S. E., a skeleton of a female, flexed on right side, heading S. W., in a pit, 3.5 feet from the surface.

Burial No. 35, 18 feet W. N. W., a skeleton of an infant, just beneath the surface, disturbed by the plow. A shell pin was in association.

Burial No. 36, 41 feet S. S. E., on the bottom of a small pit, 32 inches from the surface, were the remnants of a skeleton in the last stage of decay. Apparently it was flexed on the right side, head S. W.

Burial No. 37, 38 feet S. S. E., a skeleton of a female, with trunk on the back, knees flexed to the right, head S. E.

Burial No. 38, 11 feet W. N. W., a skeleton of a male, on bottom of a pit extending into yellow sand, flexed on the right side, head S.

Burial No. 39, 16 feet W. by N., 3.5 feet down, in a small pit was the skeleton of a female, flexed on the right side, head S. E.

Burial No. 40, 6 feet S. by E., in a pit, 4 feet 10 inches down, was the skeleton



of a child, head S. W., too much decayed for exact determination as to position, but a flexed burial on the right side was indicated. At the neck were beads of shell.

Burial No. 41, 12 feet S. E. by S., 3.5 feet down, with the skull resting on the mouth of an imperforate shell drinking cup, was the skeleton of a child from six to seven years of age, flexed on the left side, the head S. E. Small shell beads were at the neck and larger ones at the wrist.

Burial No. 42, 16 feet W., on the base, flexed on the right side, heading E., was the skeleton of an infant about 2 years old. Shell beads were on the legs and neck, a shell pin at the back of the head and a shell drinking cup nearby.

Burial No. 43, 18 feet S, 2 feet 8 inches down, in a large pit was the skeleton of a female, flexed on the left side, head S. E.



Fig. 50.—Pendant of soapstone. Mound near South-end Settlement. (Full size.)

Burial No. 44, 13 feet S. S. W., in a pit extending 1 foot into undisturbed sand, 3.5 feet from the surface, was the skeleton of a child about 5 years of age, flexed on the left side, head E. In association were: shell beads; two fragments of soapstone, from a pot or pots, one wrought into a rude pendant, roughly incised and grooved (Fig. 50); lumps of hematite; a rough arrowpoint; a bone piercing implement, badly decayed.

Burial No. 45, 16 feet S. W., in a pit, 4.5 feet from the surface, was the skeleton of a male, flexed on the left side, head S. E. This pit was filled with a mixture of oyster shells and surface loam.

Burial No. 46, in the same pit, southwest of, and in contact with, No. 45, on the same plane, was a number of bones not in anatomical order, probably belonging to a female. A femur lay partly on the skull, while some of the long bones were out of position and reversed.

Burial No. 47. In contact with No. 46 were a cranium, a femur and a humerus, belonging to a male.

Burial No. 48, 22 feet S. by W., a skeleton badly decayed on the bottom of a pit, 4.5 feet from the surface, heading E. As nearly as could be made out, the skeleton was flexed on the left side.

Burial No. 49, 22 feet S. W., a skeleton of a female on the bottom of a large pit, 3 feet 8 inches down, flexed on the right side, head S. E. Immediately above the bones was a thin local layer of oyster shells.

Burial No. 50, 26 feet S. W., a skeleton of a female, flexed on the right side, head S., on the bottom of a pit, 3 feet 3 inches from the surface.

A number of sherds, undecorated, cord-marked, and adorned with a complicated stamp, were met with throughout the mound.

Among the oyster shells was a piercing implement of bone.

Loose in the sand were several fragments of pebble-hammers and one rude arrowhead of quartz.

In caved sand, probably from a skeleton, were three small polished stone chisels.

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In the mound near the South-end Settlement we note the absence of a great central pit and the presence of cremation at but one point; also that the great majority of burials were flexed on the right side and headed in a southerly direction, quite in keeping with the usual custom. All urn-burials of uncremated remains, with but one exception, were of adults, coinciding with the custom as practised on Sapelo Island. On the other hand, the reader will recall that infants alone were thus buried at Creighton Island, and will see further on the urn-burial of infants at Ossabaw Island.

### ST. CATHERINE'S ISLAND, LIBERTY COUNTY. MOUND NEAR MIDDLE SETTLEMENT.

In a large field formerly under cultivation, but at present covered with scrub and timber of small size, about one-half mile in a southwesterly direction from the Middle Settlement, is a mound which has been ploughed over in former times and has been dug into to a considerable extent. Its height is 5 feet; the diameter of its base, 54 feet. It was trenched in various directions, and portions of the center were dug out without result. It was composed of yellowish-brown sand, unstratified, and may have been used for domiciliary purposes.

### ST. CATHERINE'S ISLAND, LIBERTY COUNTY. MOUND IN KING'S NEW GROUND FIELD.

This mound, or what remained of it after years of cultivation, lay in a field within sight of the ocean, about one mile and three-quarters in a southeasterly direction from the main landing at St. Catherine's Island. Numerous low shell deposits were in the vicinity, though on the surface of the mound were scattered oyster shells only.

The mound had a height of 22 inches above the general level, which altitude agreed with observations taken at the completion of a cross-section.

Beginning far out in the level ground, trenches were run in, in all directions, until evidence of disturbance in the sand was met with. The usual great outlying pits, filled with rich, black loam, were present, but containing no burials, so far as our excavations went.

Through a point taken as the center of the mound proper, a straight line was drawn extending 51 feet to the northwest and 45 feet to the southeast. Connecting these two terminal points an irregular semi-circumference was taken, having a maximum distance from the center of 57 feet, as shown in diagram (Fig. 51), which included, it is believed, all the outlying pits and burials belonging to the southern and western half of the mound. This portion was carefully dug through to a depth at times of over 6 feet. The eastern and northern parts of the mound were not investigated. Throughout portions of the mound ran a black band from 6 inches to 1 foot in thickness, whose upper surface, as a rule, agreed with the general level of the field. But this band was sometimes absent over undisturbed sand, while, on the other hand, it often seemed thicker and darker over pits and graves. We have no solution to offer for this.

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Though the usual great central pit was represented in this mound by a very moderate deposit of bones, yet in no other mound have we found so many grave-pits of such size as in this one.

Beginning 40 feet W. S. W., from the center, was a pit extending in 15 feet and having a breadth of 25 feet<sup>1</sup> and a maximum depth of about 6 feet. In this grave-pit were Burials Nos. 1, 7, 8, 12, 13, 15 and 22. The black band of which we have spoken was distinctly present above this entire pit at a depth of about 2 feet below the surface of the mound, while at either side at the same level, over undisturbed sand, it was entirely wanting for some distance.

There were present a few local layers of oyster shells and one mainly of fresh-water mussel shells (X), 13 inches by 10 inches thick. Its upper margin was 9 inches below the surface.



Fig. 51.—Diagram of one-half of mound in King's New Ground Field.

Sherds found by us were coarse and either undecorated or cord-marked. The complicated stamp was absent.

We give detailed descriptions of burials in connection with the diagram, omitting, as a rule, the size of pits:—

Burial No. 1, 33 feet S. W. from the center, 2.5 feet down, skeleton of female, head E. S. E., at full length on back, 5 feet 10 inches as it lay with feet partly extended.<sup>2</sup> Right humerus parallel to body, with forearm up and across chest. Left humerus along trunk, with left forearm flexed upward with hand to shoulder. Right ankle crossing left.

<sup>1</sup> These and kindred measurements are, of course, approximate.

<sup>2</sup> These measurements of skeletons at length do not indicate individuals of unusual size. The bones were not so closely in contact as in life, the shifting of the sand causing more or less separation.

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Burial No. 2, 30 feet S. W. by S., 2 feet 8 inches down, skeleton of female at full length on back, head S. E., face to the right, 5 feet 4 inches as it lay with feet partly extended. Right arm and forearm parallel to body. Left upper arm along body with forearm crossing to pelvis. A few long bones lay loose in the sand about 1 foot above this burial.

Burial No. 3, 42 feet W., 2 feet 9 inches down, skeleton of aged male, head S., in semi-reclining position on left side. Incisor stumps only remaining in lower jaw. Alveolar process of other teeth absorbed. This especially marked in upper jaw. Signs of inflammatory disease in tibia, fibula and clavicle.

Burial No. 4, 25 feet S. by W., 2 feet down, head W. S. W., trunk on back, legs drawn up, knees somewhat to the left. A few bits of earthenware, perhaps by accident, lay with the bones.

Burial No. 5, 25 feet S. by E., 4 feet 4 inches to the bottom of a pit filled with black loam and oyster shells, extending 2 feet 6 inches into undisturbed yellow sand. Over this pit the black band continued, though dipping somewhat. Three feet 8 inches down in this grave was a bunched burial, probably of a male. Long bones were on either side of the skull, while two clavicles, together, lay somewhat apart from it. Certain bones were missing. The spinal column and ribs were in order, indicating partial union by ligaments. One ulna and one clavicle sent to Army Medical Museum, Washington, D. C., had false joints, results of former fractures.

Burial No. 6, 27 feet S. S. W., 3 feet 10 inches down, skeleton of a child between 8 and 10 years old, at length on face, chin toward left shoulder, 4 feet 4 inches as it lay, with feet extended, head E. by S. Both upper arms parallel to body; right forearm crossing under pelvis; left forearm not found, probably thrown back by digger.

Burial No. 7, 39 feet W. S. W., 4 feet 2 inches down, skeleton of female at full length on back, head S. E. by S., 5 feet 8 inches from head to heel as it lay. Upper extremities parallel to body.

Burial No. 8, 33 feet S. W. by W., 3 feet 10 inches down, skeleton of male at full length, face down, head E., 5 feet 6 inches from head to foot. Right and left arms parallel to body, forearms passing under pelvis.

Burial No. 9, 25 feet S. S. E., 4 feet 8 inches down, skeleton of male at full length on back, 5 feet 10 inches long with feet extended, head E. by N., chin to left shoulder. Right upper extremity along side of body. Left upper arm along thorax with forearm crossing to pelvis.

Loose in the sand, about 6 inches above No. 9, was the femur of an adult.

Burial No. 10, 28 feet S. E. by S., 6.5 feet down, on the bottom of a pit, 7 feet by 10 feet and extending 2 feet 10 inches into undisturbed sand, was a skeleton of a male at full length on the back, measuring 6 feet 6 inches as it lay, with feet extended, head E. N. E., chin turned toward left shoulder. Arms parallel to body. Sand colored with hematite lay near the skull. The black basal band lay above this pit.

Burial No. 11, at the same level, but a little farther in than skeleton No. 6,

was a female skeleton on the left side, with the thighs partially, and the legs completely, flexed. The right upper extremity was parallel to the body, the left was down and under. The skeleton measured 3 feet 10 inches as it lay.

Burial No. 12, 38 feet W. by S., 5 feet down, a number of human bones not in anatomical order.

Burial No. 13, just below No. 12, on the bottom of the great pit, lying on undisturbed sand, was an ordinary flexed burial of uncertain sex, on the left side, head N. W., 5 feet 9 inches down.

Burial No. 14, 36 feet W., 2 feet 4 inches down, on the bottom of a well-defined pit apparently dug from the surface and filled with black loam and oyster shells, though oyster shells on the surface at the time of opening the mound were few and scattering, was a flexed burial of a male on the right side, head S. S. W.

Burial No. 15, 29 feet W. S. W., 4 feet 5 inches down, the skeleton of a child, about 10 or 11 years old, measuring 4 feet 1 inch as it lay, on the right side, the thighs somewhat drawn up, the knees bent, head E. S. E. Right upper extremity along body, the left crossing to pelvis.

Burial No. 16, 23 feet S. W. by S., 2 feet 9 inches down, measuring 5 feet 3 inches as it lay, with feet partly extended, was the skeleton of a woman on the right side with thighs bent slightly forward, legs down from thighs. Right upper arm a little out from body, with forearm returning to trunk. Left upper arm parallel to body, with forearm crossing the pelvis. Head E. by S.

Burial No. 17, 24 feet S. S. W., 5 feet down, skeleton of a child about 5 years old, full length on back, chin toward left shoulder, measuring 3 feet 4 inches as it lay, with feet somewhat extended. Right upper arm along chest, forearm removed by digger. Left humerus along chest, forearm crossing to pelvis.

Burial No. 18, 25 feet S. E. by S., 4 feet down, skeleton of female on right side, partly flexed, head N. E. by N. Right upper arm out a little with forearm returning toward pelvis. Left upper arm parallel to body, with forearm crossing to pelvis.

Burial No. 19, 20 feet S. S. E., 3 feet 10 inches down, female flexed on right side, head N. E.

Burial No. 20, 18 feet S. by E., 4 feet down, skeleton of female, full length, face down, measuring 5 feet 3 inches from head to heel, head E. N. E. Right arm akimbo. Left arm parallel to body. Left heel resting on right ankle.

Burial No. 21. 23 feet S. W. by S., 3 feet 8 inches down, were two burials on the same plane, diverging from the knees with the heads 2 feet apart. One, a male, lay at full length on face, and measured 6 feet 3 inches as it lay with feet extended, head S. E. Upper extremities parallel to body. The other, a female, head E. S. E., at full length on back, measured 5 feet 11 inches, with outstretched feet.

Burial No. 22, 28 feet W. S. W., 4 feet 9 inches down, skeleton probably female, full length on back, 5.5 feet long with feet extended, head E. by S. Right upper arm along body with forearm crossing pelvis. Left upper extremity parallel to trunk.



Burial No. 23, 30 feet N. W. by W., 4 feet 9 inches down, skeleton of male, at full length on back, head S. E., 5 feet 4 inches from head to heel. Upper extremities parallel to body.

Burial No. 24, 23 feet N. W., 3 feet 9 inches down, skeleton of female, partially flexed on the right side, with head N. E. by E.; thighs at right angle to body, legs flexed sharply back on them.

Burial No. 25, 19 feet S. E. by S., 5 feet down, skeleton of female, at full length on back, 5 feet 10 inches long with feet outstretched, head E. by S. Upper extremities parallel to body.

Burial No. 26, 17 feet S. W. by S., 2 feet down, beneath the outer margin of a local shell layer, was a skull with the inferior maxillary wanting and a portion of one rib. The local shell layer was 7 inches thick, and extended inward a number of feet.

Burial No. 27, 24 feet W. S. W., 3 feet 4 inches down, skeleton of male, flexed on the right side, measuring 2 feet 10 inches as it lay, the head pushed up at right angle to the body by lack of space in a pit. Head N. W. On the glabella was the mark of a severe blow.

Burial No. 28, 13 feet S. E. by S., skeleton of uncertain sex, 2.5 feet down, in a sort of sitting position, facing S. W.

Burial No. 29, 15 feet S. by E., 4 feet down, skeleton of female, at full length on back, head S., arms parallel with body, measuring 6 feet as it lay, the feet fully extended.

Burial No. 30, 26 feet W., 4 feet down, skeleton of female, at full length on face, 5 feet 2 inches from head to heel; head S. by W. Right upper extremity parallel to body. Left humerus parallel, forearm crossing to pelvis.

Burial No. 31, 19 feet W. by N., 1 foot 6 inches down, flexed skeleton of female, in crouching position, head N., face looking upward.

Burial No. 32, 11 feet S. S. E., skeleton of female, at full length, face down, head N. N. E. Legs and feet cut off by digger. Right upper extremity along body. Left humerus a little out with forearm crossing under pelvis.

Burial No. 33, 3 feet below No. 32. Skeleton of female, full length on back, head N. E. by E., 6 feet 6 inches as it lay. Arms parallel to body.

Burial No. 34, 15 feet S. E. by S. Skeleton of female, at full length on back head E. S. E., measuring 6 feet 2 inches, slanting into a pit with the head 1 foot 9 inches below the feet.

Burial No. 35, 19 feet W. Skeleton of male, in crouching position, head S., 1 foot 9 inches down.

Burial No. 36, 18 feet W. N. W., 1 foot 6 inches down, skeleton of adolescent, much flexed on right side, head E. On the skull were eight parallel rows of small shell beads, in close contact. Under the chin were small perforated marine shells (*Olivella*). The epiphyses of this skeleton were unattached. Both humeri showed considerable perforation.

Burial No. 37, 8 feet S. E. by S., skeleton of very young child, at full length,

head S. E., too badly crushed for farther determination. With it was the base of a cord-marked vessel of clay.

Burial No. 38, 6 feet W. by N., at the start just beneath the surface and slanting down to a depth of 1 foot 5 inches, was a confused mass of human bones about 7 inches thick, 4 feet wide and tapering inward a distance of 2 feet 9 inches. At one extremity of this deposit were a few fragments of calcined human bones, so near the surface that probably the major portion had been scattered by cultivation. With this deposit were: hematite; a few shell beads; two small, imperforate clay bowls, the smaller inverted within the larger; and a marine shell (*Pecten nodosus*) in two fragments.

In this mound, so far as investigated, though burials at length predominated, we note a considerable diversity of forms, a contrast to a neighboring mound in the Greenseed Field.

The paucity of artifacts is notable.

#### ST. CATHERINE'S ISLAND, LIBERTY COUNTY. MOUND IN THE GREENSEED FIELD.

This mound, in a field long under cultivation, about 1.5 miles in a southerly direction from the main landing, was but little, if any, above the general level. A few scattered oyster shells were lying upon the surface. In order to include any possible pit or outlying burial, a circle with a diameter of 84 feet was dug through which included considerably more than that part of the territory devoted to interments, the most remote of which proving to be 31 feet from the center. Evidence of human handiwork was apparent at a considerably greater distance. As in the case of certain other mounds, a black band, apparently a basal line, was present at places, occasionally cut through by pits, and again following the line of excavation down almost to the upper margin of the bones.

In this mound, which extended some distance below the surface, were no grave-pits let into undisturbed sand and, with two or three exceptions, separate graves in the body of the mound were not determinable.

The mound was composed of yellowish-brown sand with practically no shell except in a central pit, roughly bowl-shaped, having a maximum diameter of about 9 feet. This shell deposit, beginning less than one foot below the surface, with a thickness of about 18 inches, attained a depth of nearly two feet in the center of the pit, measured from its upper surface to the surface of the mound. The thickness of the deposit at this point was about 2.5 feet. Beneath this mass of shell was Burial No. 28, which, with other interments, is shown on the diagram (Fig. 52).

The usual outlying pits, in this case two in number, were present in this mound. Both were filled with black loam and scattering oyster shells. One began 42 feet from the center, was 21 feet across and extended inward 18 feet. Its maximum depth was 3 feet 7 inches. The second pit began 47 feet out, was 23 feet across and extended inward 15 feet. Its average depth coincided with that of the other. As usual, no burials were present in them.

In the sand of the mound were two arrow heads and a number of rude sherds.



Fig. 52.—Diagram of mound in Greensend Field.

Two, from one vessel, however, were of good quality. No example of the complicated stamp was met with.

Human remains were encountered at 31 points. Of these, 25 were skeletons from which comparatively full data were obtained. The bones of four infants, badly crushed, were present in addition, and two layers of bones, some calcined, others unaffected by fire.

Of the 25 skeletons: 7 were of males; 5 were of females; 8 were uncertain; 2 were of adolescents; 2 were of children; while the skeleton of one adult was not determined owing to decay.

Twenty-three lay full length, face down, while two lay at full length on the back. The faces of the prone skeletons occasionally were turned to the side. As a rule the upper extremities were parallel to the body.

There seems to be no uniformity of direction in which the skeletons lay. The upper portion of one skeleton was missing through aboriginal disturbance. The other 24 headed as follows: E., 2; E. by N., 1; E. N. E., 2; N. E. by E., 1; N. E., 2; N. E. by N., 2; N. N. E., 1; N., 3; N. by W., 3; W., 1; W. S. W., 1; S. by W., 1; S. S. E., 1; S. E., 1; E. S. E., 1; E. by S., 1.

Burial No. 11, 15 feet N. E. by E., 3 feet 3 inches down, was a layer of calcined fragments of human bones, 23 inches across at the start and 6 inches thick. Eight inches in it had tapered to a width of 16 inches, though keeping the same thickness. It converged and disappeared 15 inches from the start. Uncremated bones were mingled throughout.

Burial No. 28. On the undisturbed yellow sand beneath the central shell deposit was a layer of bones of numerous individuals, inextricably mixed, having a thickness of about 8 inches. It extended in 4 feet 9 inches, and was about 28 inches across. At the western extremity were a few fragments of calcined bones and numbers of tubular shell beads, the largest 2 inches in length. In addition, were a piercing implement of bone, and several considerable portions of lower jaws of large carnivores, having their lower parts, including much of the roots of the teeth, ground away, thus widening and squaring the bases, as we have already described in this Report, and shall have occasion to refer to again in relation to specimens from a mound on Ossabaw Island. Professor Putnam informs us that jaws similarly treated—human and of lower animals—from the mounds of Ohio are in the Peabody Museum, Cambridge, Mass.<sup>1</sup>

It has been suggested that this method of treatment originated in a desire to loosen the teeth to facilitate extraction, but this seems hardly likely, for, as a rule, teeth treated this way are present in the jaws when found, and we have never seen single teeth pierced for suspension, whose bases showed evidence of grinding. Jaws treated in this way have been considered by some to have been used as ornaments.

There is in the collection of the Academy of Natural Sciences a rough wooden effigy or mask, from Alaska, representing the head of a dog or of a wolf. Set in this mask are jaws imitated in bone, squared off at the base somewhat like the

<sup>1</sup> See also "Primitive Man in Ohio," Moorehead, page 227, *et seq.*

jaws from the mounds, and, as the wide-spread prevalence of aboriginal customs is well known, we think it not unlikely that the jaws from the mounds, in former times, saw service in masks of wood, which have disappeared through decay. Professor Cushing lately found in Florida numbers of wooden masks with other aboriginal articles of wood preserved beneath mud, and it is our opinion that the aborigines of the sand mounds inhaled numbers of articles of wood which have not lasted until the present time. In fact, our own researches in Florida mounds have brought to light wood preserved by contact with copper.

A few beads, hematite and fragments of uninteresting vessels, represented all additional articles met with in the mound.

ST. CATHERINE'S ISLAND, LIBERTY COUNTY. MOUND NEAR THE LIGHT-HOUSE.

In the border of the woods, in view of the sea, about one-half mile in a southeasterly direction from the landing, near the site of the projected light-house, was a fairly symmetrical mound entirely of sand, having a height of 3 feet, a diameter at base of 56 feet.

Much of the mound was dug through. At places were bits of decayed human bones near the surface, and, near the center, just below the surface, a pocket of calcined fragments of human bones belonging to at least two adults and one adolescent.

About 6 feet from the center, in a grave beneath the base, was a badly-decayed skeleton on its back with knees flexed against the thighs. Near it lay another.

One arrowhead of chert lay loose in the sand.

ST. CATHERINE'S ISLAND, LIBERTY COUNTY. LOW MOUNDS AT THE NORTH-END.

In pine woods, about 1 mile in an easterly direction from the main landing are two mounds about 50 yards apart, the larger having a diameter of 42 feet, a height of 3 feet; the smaller, a diameter of 36 feet, a height of 14 inches. There had been no previous examination. Each of these mounds was excavated as to the central portions and was thoroughly trenched. A few fragments of a decaying human cranium were met with in the smaller mound, while the investigation of the larger was without result.

In the vicinity of these mounds was a somewhat larger one which, being a valued land mark, we did not touch.

Careful attention was paid to numerous low shell-heaps studding the island of St. Catherine's. In some, results were negative, while from others came sherds incised and with the complicated stamped decoration in use in the best class of the burial mounds of the coast.

OSSABAW ISLAND, BRYAN COUNTY. MIDDLE SETTLEMENT, MOUND A.

About half way from either extremity of the western side of Ossabaw Island, on a small creek about five miles from the main channel, are a few cabins tenanted exclusively by colored people, and known as the Middle Settlement.



Near this settlement are a number of aboriginal mounds on property controlled by Mr. C. H. Harper of Rome, Georgia.

In a field long under cultivation, at the southern outskirts of the settlement, was a low mound, probably much reduced in height by the plow, which, in addition, had been impaired for complete archaeological investigation by the hauling away of a considerable quantity of oyster shells from the central portion. The depression thus made was clearly apparent, and nowhere extended through the layer of oyster shells with which all but the marginal portion of the mound was covered. However, as no artifacts or burials were found by us entirely in the shell layer, and as the marginal portion of the mound seemed to be intact, it would appear that no material injury had been done. Nevertheless, the colored man who had superintended the removal of the shell previous to our work, referred to skeletons and earthenware pots containing bones, found by him, so the result of our investigation must not be regarded as complete.

The mound was dug through at a depth much below the general level, during the latter part of November, 1896.

The mound, with a height of 18 inches and a diameter of base of about 45 feet, was composed of a rich loamy sand of a dark brown color, extending much below the level of the surrounding territory to undisturbed bright yellow sand. There was no mistaking the artificial portion of the mound. The thickness of the highest remaining part was 28 inches, or 18 inches above the general level and 10 inches below it. The deposit of oyster shells, to which reference has been made, was of irregular thickness, averaging, perhaps, 16 inches. Throughout this interesting mound were great numbers of sherds and many vessels of earthenware of poor material—clay mixed with coarse sand—gritty ware, as it is called. Owing to the inferiority of the material comparatively few were recovered in good condition though nearly all had been interred apparently intact—save perforation of the base in some cases—and not broken or with essential portions missing, as they were often buried by the thrifty Florida Indians. The ordinary form of mortuary ware encountered in this mound had the rounded base and almost cylindrical body contracted slightly at the neck beneath a flaring rim, often with a beaded margin, to which we have often referred as the ordinary type.

Besides numerous sherds there were found in the mound, loose in the sand, two large beads of shell, one pebble-hammer and a mass of stone about two-thirds the size of a clenched fist, probably a portion of a hammer-stone.

We proceed to a detailed description in conjunction with the diagram (Fig. 53).

Burial No. 1, 24 feet S. of a point supposed to occupy a central position on the surface of the mound, 1 foot from the surface, was the skeleton of a child about 5 years of age, head E.

Burial No. 2, 22 feet S. by E., skeleton of a female, head S., cranial sutures open, well defined Inca bone. Cranium preserved in good condition (A. N. S. Cat. No. 2,164). Body on back with lower extremities flexed to the right. A small layer of charcoal, with minute fragments of calcined bones intermingled, lay over the lower portion of the trunk. This skeleton was 1 foot 10 inches from the surface.



Fig. 53.—Diagram of Mound A.

Burial No. 3, Vessel A, 21 feet S., 1 foot from the surface to its upper margin, upright, as were all the mortuary vessels in this mound, was a bowl of about four gallons capacity, crushed into fragments. The vessel, imperforate, was filled with sand. On its base was the skeleton, or parts of the skeleton, of a child about six years of age, unaffected by fire, which apparently had been doubled and thrust in. The pelvis and bones of one leg were not discovered.

Vessel B, 19 feet S. Just below the surface was a vessel of the ordinary type, having an intentionally-made perforation in the base. No covering protected the vessel and no bones or remnants of bone were discovered, though beyond question, in our opinion, the skeletal remains of a small infant had disappeared through decay.

Vessel C, 18 feet W. of S.<sup>1</sup> About 1 foot from the surface was a layer about 2 feet long, composed of scattered fragments of large vessels.

Vessel D, 23 feet S. E., 19 inches down (all measurements of depth in our account of this mound are given to the upper margin of objects), was a vessel of the ordinary type though with unusually distinct decoration. Its base had been intentionally perforated. Portions crushed from the rim have been, with one small exception, recovered and fastened in place. No skeletal remains were found in the sand with which this vessel was filled, and doubtless here again the work of decay had been complete. Approximate measurements: height, 17 inches; diameter of mouth, 14 inches; maximum diameter of body, 12 inches (Plate IX).

Vessel E, 20 feet S., 20 inches from the surface. This vessel is not farther referred to in our notes and was probably in a very fragmentary condition.

Burial No. 4, Vessel F, 24 feet S. E., vessel of the ordinary type, 12 inches from the surface, containing on the bottom, which was perforated, the bones of a child, in no apparent order and greatly decayed. This vessel was badly broken. Nearby in the sand was a small chisel of polished volcanic rock—*Dolerite* or *Diorite*.

Burial No. 5, just north of Vessel D, loose in the sand, were a patella and a fibula of an adult.

Vessel G, 22 feet S. E. A globular vessel of about 1 gallon capacity, having the bottom knocked out. Incised decoration surrounds the upper portion. Parts of the rim are missing.

Burial No. 6, Vessel H, 23 feet E. S. E. A large vessel 16 inches down, crushed into small fragments. With it were a few bits of calcined human remains.

Vessel I, 22 feet S. E. Two feet from the surface was a globular vessel with flaring rim and incised decoration (Plate XIII, Fig. 2). An attempt to knock out the base had involved a part of the side and of the rim. Many portions were missing. Approximate measurements: diameter at mouth, 5.5 inches; maximum diameter, 7 inches; height, 6.5 inches.

Vessel J, 22 feet E. by S., a globular, undecorated, imperforate vessel, 2 feet down. Rim broken off and missing. Maximum diameter, 5 inches.

<sup>1</sup> West of south and corresponding terms, though not points of the compass, are used by us to allow a somewhat wide latitude in indicating position on the diagram.

Burial No. 61, Vessel K, 21 feet E. by S., 2 feet 5 inches down, a vessel crushed to small fragments, among which lay bits of calcined human bones.

Vessel L, 21 feet S. E., 2 feet down, just below a local layer of oyster shells, was an imperforate, undecorated dish, with a maximum diameter of 4.5 inches, a height of 2.1 inches. This little vessel, a flattened cone in shape, was entirely unassociated.

Vessel M, 22 feet S. by E., a large undecorated vessel in small fragments.

Burial No. 7, Vessel N, 18 feet S. by E., a somewhat broken vessel of the usual type, with perforated base, containing the bones of an infant, unaffected by fire, apparently in anatomical order. Just above the skull (the bones lay at the bottom of the vessel) was a large fragment of earthenware not sufficient in size, however, to prevent the entrance of sand. This vessel was sent to the Museum of the University of Pennsylvania.

XX, 21 feet S. E., a layer of oyster shells calcined to a white powder, 3 feet by 7 feet and 4 to 5 inches thick. At one point were bits of charcoal. The outer margin of this layer was 20 inches from the surface. A gradual slope carried its terminal margin to a level 1 foot higher.

Burial No. 8, 23 feet S. of E., skeleton of a young person, flexed on the right side, head S.

Vessel O, 26 feet E., a vessel of the ordinary type, extremely rotten and fragmentary.

Vessel P, 21 feet S. of E., an imperforate vessel of the common type, but of rather better and thicker material than usual, though crushed to fragments. This vessel, which had doubtless held an infant's skeleton (though no remnants were apparent) was capped by a number of large fragments which had formed parts of an undecorated bowl. These, with the fragments of Vessel P, were sent to the Peabody Museum, Cambridge, Mass., where they have been carefully put together.

Burial No. 9, Vessel Q, 29 feet N. E. by E., 1 foot 4 inches from the surface, a vessel of the usual type, imperforate, containing decaying remnants of an infant's skull. The body of the vessel was crushed to small fragments.

Burial No. 10, Vessel Ra, 29 feet N. E. by E., a vessel of the usual type, 18 inches from the surface, 17 inches of which was the unbroken layer of oyster shells. It ran 14 inches into the undisturbed yellow sand (the reader will recall that the depth given is taken from the upper margin), where an excavation had been made to receive it. Its base contained a small, neatly cut perforation large enough to admit the first joint of the little finger. In the sand at the bottom there remained one deciduous tooth.

Above Ra, inverted, was a bowl of black ware (Rb) somewhat broken, the upper part having incised decoration; the lower, intricate stamped decoration (Plate X). Approximate measurements: diameter, 12.75 inches; diameter of opening, 12 inches; height, 5.75 inches.

Burial No. 11, Vessel Sa, 19 feet E., a vessel of the usual type, badly crushed and broken. At the bottom were fragments of human bone so decayed as to

resemble sawdust. Two bits, larger than the rest, belonged to a child of tender years. No fire had been used in connection with these remains, and the reader will bear in mind that when cremation had been employed, the fact will be distinctly stated. This vessel, lacking certain portions, was sent to the Davenport Academy of Natural Science, Davenport, Iowa.

Sa was capped by a bowl of black ware (Sb) undecorated, save for an encircling row of projections somewhat below the margin (Plate XI). It was practically intact. Approximate measurements: maximum diameter, 13.75 inches; diameter of aperture, 12.75 inches; height, 6.25 inches. From the upturned base of this bowl to the surface of the mound was a distance of 2 feet 2 inches.

Burial No. 12, Vessel T, 28 feet N. E., 1 foot 5 inches from surface, a vessel of the usual type, almost intact. In the sand at the bottom were minute fragments of bone with two deciduous teeth and the cap of another. A small hole had been knocked through the base. Approximate measurements: height, 18.5 inches; maximum diameter of body, 13.5 inches; diameter at aperture, 16 inches.

Burial No. 13, beginning 14 feet E., just below the surface was a layer of calcined human remains, at first 22 inches wide, gradually increasing to 5 feet. Its thickness, 2 inches at first, was 6 inches at its terminal limit. It extended in toward the center of the mound, a distance of 4.5 feet, where it was 2 feet below the surface. With the fragmentary bones were found two shell pins and one small bead of shell.

Vessel U, 12 feet E., portions of a vessel of black ware, 3 feet from the surface. Its only decoration was a row of knobs around and below the margin.

Vessel Va, 13 feet E., a vessel of the common type, was intact save for two small pieces missing from the rim. In the base was a small perforation, above which was the bottom of a pot tightly fitted in. Upper portions of this pot, which was incomplete, lay within it. Va was capped by large sherds seemingly belonging to one vessel, perhaps placed there in a less fragmentary condition and subsequently crushed by weight of sand. No human remains were found in Va, though there can be but little doubt as to their former presence.

Burial No. 14, in a grave, 3 feet from the surface, 3.5 feet in length, dipping 1 foot into the yellow sand, almost in contact with the vessel Va, which, however, was not within the limits of the grave, was the skeleton of a person about eighteen years of age, with epiphyses of femurs and tibiae unattached and one wisdom tooth showing. The skeleton lay on the right side, the legs flexed, head S. The cranium (A. N. S. Cat. No. 2,165) was preserved in good condition. Above this grave the layer of oyster shells on the surface was intact.

Burial No. 15, 20 feet N. E., a bunched burial of the bones of a child about 6 years of age, 2 feet from the surface.

Burial No. 16, 12 feet N., a layer of calcined fragments of human bones, 16 inches from the surface. Its maximum thickness was 2 inches; its length, 2.5 feet; its breadth, 2 feet.

Burial No. 17, Vessel Wa, 14 feet N. by E., 1 foot 6 inches from the surface,



in the brown sand and just beneath the layer of oyster shells, was a gourd-shaped, undecorated vessel of black ware, intact save for a small crack on the side. This vessel was filled almost to the top with fragments of calcined human bones some of which at least had belonged to adults, and, in common with all we have encountered containing calcined bones, was imperforate as to the base. Approximate measurements: height, 8.5 inches; maximum diameter, 10 inches; diameter of orifice, 5 inches.

Superimposed upon the orifice of Wa, inverted, was a small vessel (Wb), with everted rim somewhat broken, though capable of almost complete restoration.

Burial No. 18, Vessel X, immediately behind Wa, 15 inches from the surface was a vessel of the ordinary type in use for infant inhumation, imperforate, filled to the top with calcined fragments of human bones. Approximate measurements: height, 15 inches; diameter of body, 11 inches; diameter of aperture, 13 inches. This vessel was sent to the Carnegie Museum, Pittsburgh.

Twenty feet E. of N. E., the brown sand of the mound made a dip into the undisturbed yellow sand to a depth of 21 inches. From the level of the yellow sand to the surface of the mound was 27 inches, so that the bottom of this excavation, which was beneath an unbroken layer of oyster shells on the surface, was 4 feet deep. At the very base of the excavation were several good-sized fragments of earthenware but no human remains or anything to suggest a reason for its construction.

Burial No. 19, Vessel Y, 17 feet N. by E., 14 inches from the surface was an imperforate vessel of the usual form with stamped ornamentation on the body but having the constricted portion and the rim undecorated. This vessel, which was filled with fragments of calcined human bones, was crushed to pieces though held in place by sand. It was pieced together with the exception of a few small bits. Approximate measurements: diameter of orifice, 9 inches; of neck, 7 inches; of body, 8 inches; height, 9.5 inches.

Burial No. 20, 13 feet E. N. E., a pocket of fragments of calcined human bones, 5 feet 9 inches by 4 feet 6 inches, from 2 to 5 inches in thickness. With the remains at several points were large pieces of earthenware representing perhaps a fourth of a vessel. They were distinctly not fragments of an entire vessel crushed through pressure.

Burial No. 21, Vessel Za, 16 feet N. E., an imperforate vessel of the common type having a height of about 1 foot, with rim and portions of the body crushed but lying beside it. It was filled with fragments of calcined human bones. Across the opening were large fragments of a portion of another vessel. Za was sent to the Peabody Museum, Cambridge, where it has been almost entirely pieced together.

Burial No. 22. Together, practically in contact, were four cinerary vases each filled to the top with fragments of charred and calcined human bones, with which were numerous shell beads showing no trace of fire, placed in an excavation made in the yellow sand (CC), and filled around with brown sand (BB) to the level of the rims, or rather to where the rims had been previous to breakage, and covered from

the tops up with oyster shells (AA), which dipped to the upper margin of the vessels as shown in Fig. 54. These vessels are represented by the following:

Vessel AA (Plate XII), of red ware, imperforate, with upright neck and slightly flaring rim. The usual complicated stamped decoration is present. This



Fig. 54.—Deposit of cinerary urns. Mound A. (Not on scale.)

vessel has been pieced together from a very fragmentary condition, with several portions wanting. Approximate measurements: height, 16 inches; maximum diameter, 14 inches; diameter of mouth, 10.5 inches. Over its mouth was part of the bottom of an earthenware vessel.

Vessel BBa, of the usual model, though of black ware, was capped with a dish of red ware (BBb). Both, though held in place, were in fragments.

Vessel CC was a large undecorated bowl of earthenware holding within it, in an upright position, a vessel (DD) of the usual type, covered as to its orifice with pieces of earthenware. Both vessels, though held in place, were very badly crushed.

Vessel EE, a vessel of the usual type, its mouth covered with fragments of earthenware. The rim was badly crushed and portions of it were not recovered. This vessel was sent to the Ontario Archaeological Museum, Toronto, Ontario.

Under perfectly level ground, adjacent to the mound and beginning at that portion of the margin included between N. E. and S. W.  $\frac{1}{2}$  W., were outlying burials as shown in diagram Fig. 55. The ground seemed to have suffered a general disturbance at the period of the inhumations and individual pits were difficult to determine though several were unquestionably met with.

Vessel FF, 27 feet S., a vessel of the ordinary type, upright, its base 31 inches below the surface. It was badly crushed. Though no trace of human remains was present it had doubtless contained the skeleton of a very young infant. The fragments were sent to the Peabody Museum, Cambridge, Mass.

Burial No. 23, Vessel GG, 27 feet S. S. E., a vessel of the ordinary type, imperforate, with the entire upper portion crushed away. Minute fragments of bone were present.

Burial No. 24, 28 feet S. by W., 30 inches from surface,<sup>1</sup> extending somewhat into undisturbed sand, was the skeleton of a child three to five years of age, flexed on the right side, head S.

Vessel HH, 33 feet E. by N., an imperforate, undecorated vessel, globular as to its body, with constricted neck and flaring rim, apparently unassociated and intact

<sup>1</sup> Depths of vessels and of skeletons in the outlying part of Mound A, were taken from the under margins.



but for a small breakage of the rim. Approximate measurements: diameter of mouth, 5.5 inches; of body, the same; height, 4.5 inches.

Burial No. 25, 29 feet S., 25 inches down, skeleton of child about five years of age; flexed on right side, head S.

Burial No. 26, 32 feet E. S. E., part of a skull and of a clavicle, near the surface.

Burial No. 27, 31 feet E., 2 feet 6 inches down. Remains of a child, very much decayed, apparently flexed on the right side, head E.

Vessel II, 33 feet S. by E., an imperforate bowl, apparently unassociated, with a maximum diameter at its mouth of 7.2 inches and a height of 3 inches, decorated with incised lines below the exterior margin (Plate XIII, Fig. 1). No trace of human remains was discovered.

Burial No. 27½, Vessels JJ and KK. Vessel JJ, a bowl with a faint stamped decoration, imperforate, in fragments but held in place by sand. Its outline was somewhat that of an inverted, truncated cone. Approximately it measured 12.5 inches maximum diameter and diameter of mouth. Its height was 7 inches. This bowl had been placed over the mouth of a vessel of the ordinary type (KK), but was not inverted as usual but let into the opening in an upright position. From the upper margin of JJ to the surface was 11 inches. KK, a vessel of ordinary type, 14 inches in height, was badly crushed. Its base, which had a perforation, was below the water level, 27 inches down. It contained deciduous human teeth.

Burial No. 28, 34 feet S. by E., a skeleton of a female, flexed on the right side, head S. W., 2 feet from the surface. With it was an imperforate bowl (LL) with handle projecting from upper margin at one side, and interestingly decorated, as shown in Plate XIV, Fig. 1. Approximate measurements: diameter of mouth, 6 inches; maximum diameter of body, 6.2 inches; height, 2.8 inches.

Burial No. 29, Vessel MM, 34 feet S. S. E., a vessel of the ordinary type, with base-perforation, the rim and part of the body ploughed away and lost. Human remains were represented by one deciduous molar.

Burial No. 30, 32 feet S. E. by S., skeleton of female, flexed on right side, head S. E. by S., 2 feet 10 inches down.

Vessel NN, 42 feet E., a vessel of the ordinary type, with base perforation, rim and part of body ploughed away. The infant's bones, which this vessel at one time doubtless contained, had disappeared.

Burial No. 31, Vessel OO, 39 feet E. by S., a vessel of the ordinary type with the upper portion ploughed away. On the base were bones in powder and the lower jaw of an infant. The base proper showed no perforation, but on one side vertically about 2 inches above the base, was a hole, carefully made, somewhat over 1 inch in diameter. This is a departure from the general rule.

Burial No. 32, 40 feet S. by E., in all probability the skeleton of a female. The glabella was practically wanting and the supra-orbital ridges were but slightly developed. The general frame, however, indicated a fairly muscular person—probably a powerful female. A number of small shell beads, one shell pin, and part of another, lay near the head.

Burial No. 33, 36 feet S. E. by S., 13 inches down, skeleton of adolescent, flexed on right side, head S. S. W.

Burial No. 34, 38 feet S. E. by E., human bones disturbed by plow.

Burial No. 35, 37 feet S. E. by S., 2 feet 11 inches down, skeleton of adolescent, flexed on right side, head S.

Burial No. 36, 43 feet S. E., at the bottom of a distinct pit, 2 feet 5 inches from the surface, were the remains of a skeleton too much decayed for determination.

Burial No. 37, 54 feet S. S. E., 20 inches down, skeleton of a dog.

An interesting feature in Mound A was the discovery of portions of a vessel of red ware of aboriginal type and decoration, interiorly glazed in places. Earthenware regularly glazed would indicate European contact. Professor Putnam writes as follows of these fragments:

"After consultation with Professors Jackson and Hill of the Chemical Department [Harvard], I am more than ever convinced that the glazing on a portion of the jar from the Georgia mound is entirely accidental. When you come to study the pieces you will find that the whole interior of the jar has apparently been coated with ashes mixed with water. Now suppose such a jar was heated on the inside by putting in hot coals of wood; the potash in the coating of ashes and the potash contained in the wood, mixed with the slight silicious matter in the clay, would make an accidental glazing.

"It does not seem possible that this glazing is formed by lead or salt, for the slight burning of the pottery is not sufficient to form a glazing of either of these substances; much more heat would be required.

"Professors Jackson and Hill were sure that it would be useless to analyze the glazing, as we should have to scrape off nearly all there is to get enough to make a good analysis, and we should probably get only negative results. I therefore consider that this was simply an accidental case of partial glazing caused by some special burning of the pottery. The fact that the glazing is confined to one portion of the lip of the jar and to a part just below the lip on the bulge indicates that the hot coals were in contact with that portion only. If the jar was inverted over hot coals for the purpose of heating the inside (as was evidently common in ancient times), it might easily have fallen over in the fire and the coals have tumbled into this portion of the jar."

The various forms of burial and their distribution in Mound A are worthy of attention. It will be noticed that in no part of the mound, outside of calcined remains, among which were parts of adult skeletons seemingly belonging to males, were skeletal remains of adult males—the skeletons being exclusively those of women, adolescents, children and infants—and that in one portion of the mound burial vases exclusively contained skeletons of infants, unaffected by fire, while in other portions cinerary urns were present filled with fragments of calcined human skeletons. Again we see pockets of calcined human remains and skeletal remains of woman and of children unaffected by fire and not included in vessels of earthenware.



100 CERTAIN ABORIGINAL MOUNDS OF THE GEORGIA COAST.



Fig. 56.—Plan of Mound B.

About 68 yards in a N. E. direction from Mound A is the remnant of a shell heap nearly all of which, above the general level, has been carted away for lime. A small portion still remaining shows the height of the heap to have been somewhat over 2 feet. The diameter, difficult to determine at present, was probably about 50 feet.

This shell heap was trenched around the margin and in several directions toward the center. No human remains were encountered nor any indication that the heap had been used for sepulchral purposes. Sherds were abundant. One, with an average diameter of 4 inches, showed a number of grooves made by sharpening pointed tools. From different parts of the mound came three discs of earthenware cut from fragments of vessels, each about 1.5 inches in diameter.

OSSABAW ISLAND, BRYAN COUNTY. MIDDLE SETTLEMENT, MOUND B.

This mound, in a cultivated field, lay somewhat over one-half mile in a N. E. direction from the Middle Settlement.

Its height above the level of the field was a trifle over 7 feet, and a measurement taken from the surface at the center of the mound to the base-line, when the mound was half dug through, showed a corresponding altitude. The diameter of the mound at the base, we took to be about 46 feet, but as portions of the margin were covered with a thick deposit of oyster shells, it is not unlikely that in places the extreme outlying portions escaped us.

The mound, covered with undergrowth and small live-oaks, showed no sign of previous investigation, although a considerable excavation made into the shells of the margin, to obtain material for lime, was apparent.

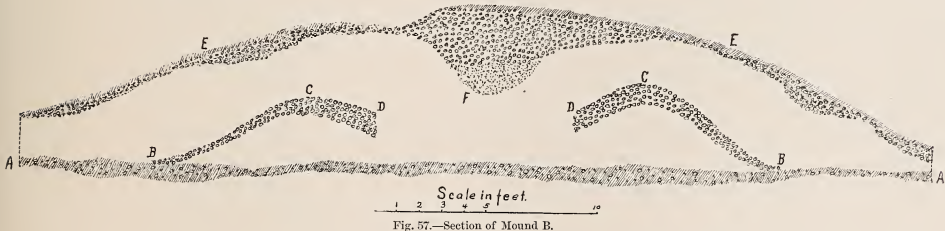


Fig. 57.—Section of Mound B.

The mound, with the exception of certain marginal portions, was dug through as shown in the diagram (Fig. 56) at a level much below that of the surrounding field that no grave or pit might pass unnoticed. At the level of the field there ran through the mound a dark layer, AA (see section, Fig. 57), varying from a few inches to one foot in thickness, composed of crushed oyster shells, small bits of charcoal, and earth blackened by admixture of organic matter. This we took to be the original surface of the ground upon which the aborigines were living previous

to the inception of the mound. Beneath, and sometimes through, this layer there ran down at places into the clear yellow sand, masses of dark disturbed sand filled with organic matter and bits of charcoal, of which portions of the mound were composed. These evidently had been pits, and while the purpose of those containing human remains was evident, the cause for the digging of others containing no skeletal remains is unexplained.

Rising from the base-line at BB was a layer of oyster shells (CC) varying in thickness from 2 or 3 inches to 1 foot. This layer, after a downward slope, terminated abruptly at DD, when within 4.5 feet of the center of the mound, up to which point, however, it had been a continuous layer. The shells of this layer lay loosely together and were not crushed and packed, leading to the belief that they had been placed there intentionally at one period and were not midden refuse due to surface habitation. Beneath this layer (CC) the sand reaching to the base-line was of a yellow color much resembling that below the base though it contained in addition occasional oyster shells and particles of charcoal, not present in the sub-basal sand. Above the layer CC, and dipping to the base-line between the terminal points of the layer, was sand of a dark brown color extending to the superficial layer of oyster shells (EE) which covered the entire mound. This layer (EE) varied greatly as to thickness, at some places disappearing almost entirely, at others attaining a thickness of from 1 to 2 feet. It was filled with midden refuse, bones of lower animals, sherds, charcoal, etc., and was unquestionably a gradual deposit made by the use of the mound as a dwelling site. Around certain portions of the margin of the mound, where doubtless the shell had been carried and thrown, the deposits had a thickness of almost 4 feet and extended below the surface of the field, which we accounted for under the hypothesis that sand removed for the construction of the mound had left hollows subsequently filled by shell. Above the upper layer of oyster shells was a deposit of black surface loam, several inches in thickness. The pocket of shell (F) shown in the diagram, is referred to in our detailed description as Burial No. 37.

From a careful study of the mound it was suggested to us that its original construction had been a circular ridge of light sand, about 3 feet in height, sloping up on all sides from the level of the field, and enclosing a sort of basin, and that this ridge had been intentionally coated with oyster shells. That the central portion corresponding to the area between the terminal points of the stratum (CC) had been subsequently dug out, thus accounting for the abrupt termination of the shell stratum, and that later the entire ridge and basin had been covered with sand, brown in color or made so through percolation, extending on all sides considerably beyond the surface of the ridge, and that the mound thus formed had for a period been used as a place of abode. The reader, however, must bear in mind that conclusions of this sort are by no means final.

Several small local layers of hematite were present near the base.

Throughout the mound, but principally in the midden refuse, were fragments of earthenware vessels. These, with several exceptions found at the base, were of

gritty ware, while all were either undecorated, cord-marked, basket-marked, or stamped with the well-known square impression. To the best of our knowledge, none bore any variety of the complicated stamped decoration present in the low neighboring mounds.

In various parts of the mound were pebbles of different sizes, and from the midden refuse of the base, unassociated, came a bone pin with incised decoration around the head. A disc of earthenware, irregularly circular, with a diameter of about 3.5 inches and a thickness of .5 of 1 inch, lay by itself 7 feet from the surface. This disc had been fashioned and baked and not cut from part of a vessel as were certain earthenware discs present in other mounds of the coast. Though, owing to the considerable quantity of oyster shells in the mound, one might have looked for human remains in a fairly good state of preservation, their condition was not such as to warrant their removal, the crania in particular being decayed and crushed. No fractures were noticed in the bones or any pathological condition of importance.

We shall now proceed to a detailed description of certain features present in the mound and of the interments. Unless otherwise stated, depths of skeletons are given from the surface to the uppermost portion of the skeleton, a measurement of which we disapprove, preferring the vertical distance to the plane upon which the remains were deposited, a method which we have followed in most of our other descriptions in this Report.

1.—34 feet E. from center, 6 inches from the surface, in the shell debris, which at that part covered the slope of the mound to a considerable depth, were the skull of an adult, part of a clavicle, and portions of a pelvis and of a humerus.

2.—24 feet E. by S., just below the surface, in the shell, were a portion of a femur and two fragments of smaller long bones. With these was a bit of chert,

while near by, though perhaps having no connection with them, lay a tobacco pipe of soapstone, absolutely intact, still bearing marks of the maker's tools (Fig. 58).

3.—18 feet W. of S., bunched burial of adult male, 22 inches from the surface.

4.—1.5 feet W. of No. 3, bunched burial of adult male, 3.5 feet down.

5.—35 feet E. by N., 3.5 feet down, just beneath the marginal shell layer, were a fragment of scapula and six phalanges scattered over a small area. The mound had suffered no disturbance at this point.

6.—24 feet S. E., a grave dug through the superficial shell layer into the yellow sand of the field at a point where the upward slope had just begun. From the surface of the shell

layer to the bottom of the grave-pit was 4 feet. The pit proper, whose depth was

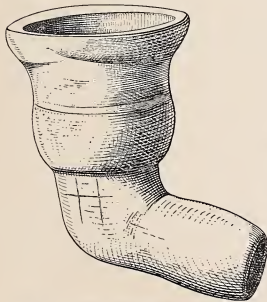


Fig. 58.—Tobacco pipe of soapstone. Mound B. (Full size.)

23 inches, was filled with brown sand mixed with oyster shells showing that at least a certain portion of the superficial shell deposit was present when it was dug. Above the pit were 17 inches of shell deposit surmounted by 8 inches of black surface loam. At the bottom of the grave was a bunched burial of an adult, probably female.

X.—35 feet E. by N., a fireplace 2 feet 4 inches down.

XX.—18 feet S., a fireplace 10 inches from surface—a narrow band of charcoal 6 feet in length.

7.—19 feet S. by W., 2 feet from surface, skeleton in anatomical order, probably female, head S., body on right side and badly twisted, knees drawn up toward side of head, legs flexed on thighs, left arm over head, right arm down along body with forearm flexed upward. With this skeleton was a bit of chert. The black base-layer at this point was 5 inches thick and 3 feet 3 inches from the surface.

8.—17 feet S. by E., 2 feet down, below the unbroken surface of loam and of oyster shells was a portion of a flexed skeleton, the skull, with the exception of half of the mandible, being absent. Upper part of trunk to the east on left side. Upper portion of each humerus absent, but remaining portions of upper extremities in anatomical order and in proper relation to remainder of skeleton present. Fragments of clavicle and ribs in sand near upper part of trunk. Vertebrae of trunk in order, also pelvis and bones of lower extremities, with exception of parts adjacent to, and comprising, knees, which were absent. About 1.5 feet distant were half of a lower jaw, a piece of a rib, and of a clavicle, doubtless belonging to the skeleton which had been dug through at a period prior to the formation of the shell deposit for the burial of No. 9.

9.—1 foot immediately below No. 8 was a bunched burial of an adolescent, lying on the black base-line.

Y.—27 feet E., a layer of sand, cherry colored through admixture with hematite, 3 feet 10 inches from the surface. This layer was about 3 inches above the black band marking the base of the mound, was from .5 of 1 inch to 1 inch in thickness, had a length of 1 foot 10 inches, and extended inward 2 feet.

10.—16 feet S. E., 10 inches down, lower extremities flexed in anatomical order, part of one humerus and two-thirds of the bones of its lower arm. All other portions of the skeleton absent, doubtless a comparatively recent disturbance.

Z.—19 feet E. S. E., 3.5 feet down, just below the black base-line, was a nest of fragments of various vessels, filling a little pocket.

11.—18 feet E. by S., 2 feet from surface, lying on the black base-line, with surface layer of oyster shells unbroken, was a skeleton of a female in a sitting position, facing S. of E. The head was forced down between the thighs and legs as shown in Fig. 59. Behind the skeleton was a marine mussel shell filled with powdered hematite.

12.—15 feet S. S. E., bones probably belonging to a female, in caved sand.

13.—16 feet E. by S., a grave containing an adult skeleton of uncertain sex, in a crouching position, trunk bending forward on thighs, and supported by the lower



extremities of legs and heels. Above the bones were 18 inches, vertically, of oyster shells and around them 25 inches, vertically, of brown sand mingled with oyster shells.

14.—14 feet S. E., a grave extending through the black line of the base and filled with brown sand. Surface to bottom of grave, 7 feet; to bones, 6 feet; to broken line of base, 4 feet; diameter of grave, 4 feet. A flexed burial on left side, head N. E., as nearly as could be determined. Unusual decay. Sex undetermined.

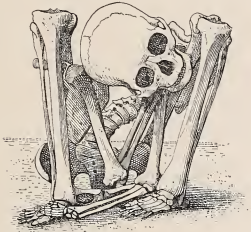


Fig. 59.—Burial No. 11. Mound B. (Not on scale.)

15.—13.5 feet S. E., flexed skeleton of male on right side, 6 inches from surface, head S.

16.—12 feet S., just below the upper layer of oyster shells and immediately above the second layer to which reference has been made, 2 feet from the surface, were the crushed bones of an infant. With them were an imperforate, undecorated vessel of about one pint capacity, having a portion missing from the side and rim (A), and an undecorated imperforate cup (B), elongated at one end and terminating in an extension for a handle, resembling in shape and size a type found in Florida. Its capacity is somewhat less than one pint.

17.—20 feet E. by S., a grave having its base 5 feet 4 inches from the surface and extending 1 foot 4 inches into undisturbed sand below the base. The mouth of this grave was impossible to determine. The superficial shell layer above it was intact and there was no unusual admixture of oyster shells. It was therefore of a period prior to the making of the shell layer. At base of grave was the skeleton of a male, head N., flexed, with body facing down. Thighs flexed up along body with legs flexed back upon them. Right elbow in toward body; left, somewhat extended.

18.—23 feet E., a grave, from surface to bones, 5 feet 4 inches; to bottom of grave, 6 feet 3 inches; depth below broken base of mound, 2 feet 3 inches. Thickness of unbroken surface layer of shell at this point, 2 feet. In the grave, in a semi-sitting position, facing S. W., was the skeleton of an adult male with right arm extended from the side; left arm along side, forearm crossing body. Right thigh, with leg flexed against it, at right angle to body; left thigh, with leg bent against it, flexed upon body.

19.—17 feet E. of S., skeleton of male in sitting position, head S; and pressed forward, chin on chest. Thighs at right angle to body, with legs flexed back parallel to them. Feet against pelvis. Right arm along chest, forearm across body; left arm out from side with forearm crooked from body. This skeleton lay in a pocket filled with oyster shells, 15 inches down.

20.—1 foot S. of No. 19, upper portion of skeleton of male, about 1 foot below

the surface, head S. Trunk above pelvis and cranium alone remained, the rest having been cut away by Burial No. 19.

21.—A burial, 3 feet below No. 20, lying on the black basal layer, was much massed together, the greater part of the bones being in anatomical order, others, however, being out of place. An astragalus and its os calcis, separated, lay on the skull. The left humerus was across the skull with no forearm bones in connection. The mandible was separated from the cranium. This burial (sex not determined) had evidently been partially held together by ligaments when, after previous exposure, it was interred in the mound.

22.—12 feet E. by S., crushed skeletons of three children with shell beads and a few small shells (*Olivella*) longitudinally perforated. The remains lay in the surface shell layer 1 foot down.

23.—19 feet N. of E., 3 feet down on the black base-layer, a skeleton of a male in the position of one who, crouching, had fallen forward. Right arm along side, forearm across and under body; left arm along side, forearm extending from body. Thighs flexed sharply along side of trunk, with legs flexed back along thighs, throwing feet under pelvis.

C.—1 foot N. of No. 23, on same level was a large portion of a cord-marked bowl filled with black loam many shades darker than the surrounding black sand, and containing the bottom of a vessel stamped in small squares. This base had a sort of projection at one end, possibly made intentionally and may have served as a dish.

24.—21 feet N. of E., skeleton of adult male, 3 feet from surface, practically in the same position as No. 23, head S. E., 3 feet from surface.

25.—23 feet N. E., a grave filled with oyster shells, running through the brown sand to base of mound, a vertical distance of 3 feet. This grave may have been dug while the shell layer was in process of formation. The surface showed no depression. Resting on the base of the grave was the skeleton of an adult male, in a sitting position, facing N. E.

26.—A grave 23 feet N. E., 4 feet in depth from the surface and 2 feet 6 inches from the bottom of the shell layer. The grave went through and extended beyond the black line of the base, a distance of 14 inches. On the bottom was a skeleton of uncertain sex, head N., an ordinary flexed burial.

27.—19 feet N. by W., a grave two feet across. Surface of mound to bottom of grave which extended 10 inches below the base line, 4 feet 9 inches. This grave, filled with brown sand without oyster shells, contained skeleton, probably female of about 20 years of age, in a sitting position, facing S. W.

28.—6 feet S. of E., skeleton of uncertain sex, 1 foot down in shell, head N. A portion of this skeleton fell in caved sand.

29.—22 feet E. by N., skeleton of female, head N.; an ordinary flexed burial, 4 feet beneath surface on the base of a grave composed of dark brown sand, which ran into the yellow sand 9 inches below the bottom of the black base layer, which, at this place, was 9 inches thick.

30.—17 feet E., a skeleton of an adult male, 3 feet from the surface, on back,

head N., arms along side, forearms across body, thighs flexed up to right, legs parallel to thighs. In association were a core of chert, and part of a *Fulgur*, filled with sand dyed a bright red with hematite.

31.—3 feet S. E., 1 foot down, in shell, flexed skeleton of a male on back, head W.

32.—17 feet N. of E., 2 feet 3 inches down, skeleton of adult male, seated, leaning back, head facing W. and forced over on chest, legs drawn up, right humerus extended from side at right angles to body, forearm flexed and parallel to side of body, left humerus against body with forearm across trunk.

33.—10 feet E., 9 inches down, 2 skeletons: female below, on face, head S.; male on plane above. Caving sand interfered with detailed examination. Beneath these skeletons, which were covered by an unbroken layer of shell, was the skeleton of a dog. Not far distant from No. 33, was a layer of charcoal and oyster shells showing marks of fire, 4 to 5 inches in thickness, covered by fragments of calcined human bones. This layer, 28 inches in length, caved previous to a complete examination.

34.—18 feet S. S. W., 2 feet down, skeleton of youth facing S. S. W., in a kneeling position, leaning forward.

35.—25 feet E. by N., 2 feet 9 inches down, skeleton of female, on face, head E., thighs turned to left side, projecting from body, legs flexed sharply on thighs, right arm along body, forearm crossed on body, left arm extended out, running between thighs.

36.—A grave, 17 feet E. by N., 16 inches below upper margin of base-line, at that point about 9 inches thick. Surface to skeleton, 5 feet. Skeleton of male on back, head W., arms akimbo, the thighs flexed to right angle to body and turned to right, legs sharply flexed back on thighs.

37.—A grave at center of mound having the shape of an inverted cone with rounded apex, 4 feet in height. Diameter of opening 9 feet. At the bottom a layer of calcined human bones having a maximum thickness of 1 foot 6 inches. Among the calcined bones were a great number of shell beads of various sizes and shapes and a curious pendant of shell (Fig. 60), which, unlike the beads, showed exposure to fire. In addition, were many imperforate teeth of a dog or of a wolf and a number of human phalanges unaffected by fire. This grave was filled with oyster shells and it was impossible to say at what stage of the shell deposit above it was constructed. It is shown on the cross section.

Fig. 60.—Pendant of shell, Mound B. (Full size.)



38.—At the center of the mound, 1 foot 8 inches down, in the shell covering grave 37, was the skeleton of an adult male disarranged by caving of surrounding oyster shells.

39.—25 feet E. by N., 4 feet 8 inches down, in a semi-sitting position much resembling that of skeleton No. 11, was a male skeleton facing S. With it were: a cannon bone of a deer; a bit of chert; a few shell beads; a portion of a

pebble and a tooth of a fossil shark, 4.25 inches in length with portions cut from either side of the base for convenience in hafting (Fig. 61). Portions were split from either side of the point showing hard usage. We have before met with large fossil teeth of sharks in mounds of Florida and of Georgia, but none bore marks of service or of workmanship of any kind. We have seen also small teeth of fossil sharks, which came from

These teeth had a perforation at the base and were used either as pendants or as knives, like sharks teeth of the present geological period—found by Mr. Cushing during his recent investigations—which were pierced and fastened to small handles.

40.—22 feet N. E., a grave, in which was a skeleton sitting in about the same position as No. 13, facing N. E. Right humerus along body, right forearm flexed on humerus, left humerus along body with forearm across and outside of legs. Back of the skeleton, on the pelvis, with the spinal column directly in front, was a cord-marked bowl or a large part of one, crushed to fragments. This grave, the bottom of which was 4 feet from the surface, extended through the black base-layer of the mound, there 8 inches thick, and continued 1 foot beyond. The grave was filled with brown sand containing some oyster shells, and it is probable that it was made at a time when the surface layer of oyster shells was in process of formation.

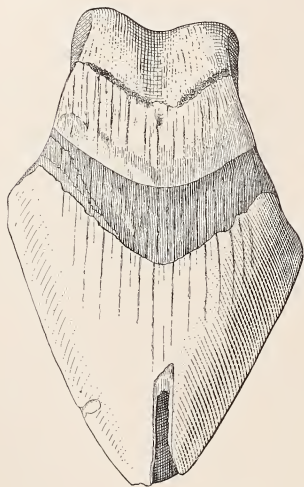


Fig. 61.—Tooth of fossil shark, used as an implement.  
Mound B. (Full size.)

41.—12 feet S. by W., skeleton of male on left side, head S. Right humerus across body, forearm extended. Left humerus under body, forearm partly flexed. Thighs flexed on body, legs back and parallel to thighs.

42.—22 feet N. by E., 3 feet down, skeleton probably male, much flexed on right side, head N. W.

43.—18 feet W. by S., 4.5 feet down including 1 foot 3 inches below the line of the base of the mound, was the skeleton of a dog.

44.—11 feet N. E., 6 feet from the surface, was the skeleton of a woman, lying on back in an unusually extended position for this mound. Head S. E. Thighs out from body and raised to an angle of 45 degrees. Legs down at same angle. Right humerus along body, forearm across trunk; left humerus and forearm parallel with body. This skeleton measured 3 feet 9 inches as it lay.

45.—In the center of the mound, on the base, was a fire place approximately 3.5 feet by 3 feet, with a mass of calcined human bones and bones unaffected by fire, having an average thickness of about 7 inches. Much of the material, at least, had not been calcined on the spot, as bones showing no trace of fire, lying on the fire place, had above them a layer of calcined fragments. A great number of shell beads showing no trace of fire lay scattered through the remains. Numerous fragments of earthenware were present.

XXX.—A little W. of the center was a layer of calcined earth and lime presumably from oyster shells, showing intense and prolonged heat. Its length was 11 feet; its breadth about 6 feet. It had an average thickness of about 1 foot. This curious layer, whose upper surface was 6 feet from the surface of the mound, upon careful examination seemed not to have been subjected to fire upon the spot, since oyster shells, bits of deer horn, bones of lower animals, etc., showing no trace of fire, were scattered through it.

This mound differed considerably in shape and in contents from a number of neighboring mounds which were lower and which contained various forms of urn-burial. In it moreover, as we have stated, earthenware with complicated, stamped decoration was absent. It is possible that Mound B was of a different period from that of some of its neighbors.

#### OSSABAW ISLAND, BRYAN COUNTY. MIDDLE SETTLEMENT, MOUND C.

In the verge of the woods bordering the field to which reference has been made, about 300 yards in a northerly direction from Mound B, was one of much the same type as Mound B, having a height of 8 feet. It had undergone but little previous investigation. The center of the mound, a peak of shell, was easily discernible.

The diameter of the mound was difficult to determine, as it did not rise directly from a general level but in a series of irregular slopes caused by occupation of the surrounding territory as a dwelling site, resulting in a deposit of oyster shells and debris. Portions of the outlying territory were thickly covered with oyster shells while other parts, consisting of dark loamy sand, had oyster shells and sherds to a depth of several feet.

The lower portions of the mound had been under cultivation in former times as deep furrows were plainly visible, though at the time of our investigation (1897) the mound was thickly covered with undergrowth and with small trees. It being impossible to determine just where the mound proper merged with midden refuse, a diameter of 68 feet was selected, which, on the side where oyster shells were absent, brought the circumference somewhat beyond the apparent base of the mound. We are of opinion, however, that in the case of this mound, certain outlying burials escaped us.

At the base of the northern portion of the mound was a thick deposit of oyster shells presumably having no direct connection with the mound but thrown there during the period of occupation of the territory as a dwelling site. Much of this was not included in our investigation.



The entire northern half of the mound was dug down leaving a cross-section almost E. and W. Subsequently the central portion of the remaining half was dug out. The remainder of the mound was not investigated.

Upon the light yellow undisturbed sand beneath the mound, but below the outer portions only, was a dark band, averaging 1 foot in thickness, composed of black loam, fragments of oyster shells and bits of charcoal. Farther in, this band was replaced by a layer of oyster shells from 6 inches to 1 foot in thickness which continued through the mound. This black band and shell deposit we regarded as marking the original level of the ground. The deposit of oyster shells, however, divided in places and, coming together again, enclosed masses of dark yellow sand, about 1 foot in thickness and 3 to 4 feet in length. Supposing the layer of shells to be the base line, we are at a loss to account for the presence of the sand.

While the height of the mound was but 8 feet above the immediately surrounding level, the perpendicular distance from its apex to the upper margin of the black band was 10 feet. This apparent discrepancy, we suppose, may be accounted for under the hypothesis that a deposit of midden refuse, made subsequent to the completion of the mound, had surrounded it to a height of 2 feet and over.

The body of the mound was composed of yellow sand darkened by the presence of much organic matter. This sand was irregularly streaked in places and contained here and there local layers of shell, and of sand reddened with admixture of the oxide of iron.

Though there was no general deposit of oyster shells covering the surface, as was the case with Mound B, a great central pit, filled with oyster shells was present with an out-cropping through the immediately central parts of the mound. The dark yellow sand of the body of the mound was covered with an irregular layer of rich black surface loam.

We have referred to a deposit of shell contiguous to the mound. This deposit joined the mound and included that part of the margin lying between E. by N. and N. N. E., and had a breadth of 27 feet converging from a small beginning at either end to a depth of 7 feet 10 inches. Four and one-half feet in from the margin of the mound as taken by us, the deposit had a breadth of 12 feet, and, instead of solid shell, as before, was from the surface down:

|                |                 |                      |          |
|----------------|-----------------|----------------------|----------|
| Shell . . . .  | 3 feet 7 inches | Dark sand . . . .    | 3 inches |
| Brown sand . . | 1 foot 2 inches | Light brown sand . . | 6 inches |
| Shell . . . .  | 1 foot 6 inches | Undisturbed sand.    |          |

The black band, to which we have referred, cut through by this curious combination, was visible at either side, its upper margin being 2 feet 6 inches below the surface. The deposit disappeared a few feet farther in from the point where the measurement was taken.

Sherds were of frequent occurrence. With the exception of 2 or 3 from the immediate surface, all were undecorated or cord-marked—the latter predominating. The reader will recall that in Mound B also no ware with the complicated stamp was discovered.



Fig. 62. Piercing implement of bone. Mound C. (Full size.)

Several sherds were singly or doubly grooved, showing use as hones.

One fragment of earthenware from a large vessel had a thickness of .9 of 1 inch.

An imperforate vessel of about 1 quart capacity with a rough checked-stamp decoration came from caved sand.

In caved sand was an undecorated vessel in shape somewhat like a modern gravy-boat. The bottom had been intentionally knocked out. Length, 7.3 inches; width, 4.7 inches; height, 3 inches.

A globular, undecorated vessel lay in caved sand. Diameter at mouth, 4.3 inches; maximum diameter, 5.5 inches; height, 4.3 inches.

Two bowls, one badly crushed, were in caved sand.

Throughout the mound were several deposits of fragments of pots, placed upon each other. As usual, these nests were composed of pieces belonging to different vessels.

A number of pebble-hammers and fragments of pebble-hammers were found separately in midden refuse and unassociated with human remains.

From the basal layer came a silicified astragalus of a large mammal, which had seemingly been in use as a hammer as portions from one end were split off, as by blows.

Mostly from the midden refuse came numerous fragments of bone pins, while at a considerable depth in the sand was found an ulna of a lower animal, fashioned into a highly polished piercing implement 7.8 inches in length (Fig. 62).

In the surface loam was a section of a long bone .7 of 1 inch in height, with diameters of .6 of 1 inch and .8 of 1 inch respectively. On either side, between the upper and lower margins is a groove. The bone is polished, and at one place slightly stained with copper. This object may be of a period later than that of the mound.

Apparently not in immediate association with remains, together, were ten agricultural implements of shell (*Fulgur carica*).

Though human remains in Mound C were, as a rule, fairly well preserved, no unbroken crania were met with. No evidence of disease was present on the bones and but one fracture was found, that of an ulna which had united with much less deformity than has been the case with some fractures we have met with. Though careful notes of all burials were taken, yet, owing to similarity of form to interments in Mound B, we deem it unnecessary to go into detail.

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Mound C, like Mound B, was riddled with pits in which lay a majority of the skeletons. Burials were noted to the number of 92, though this figure conveys no idea of the exact number of individuals represented, since at times only portions of the skeleton were present, while on the other hand, several skeletons, buried in conjunction, have been included as one interment. Pockets of calcined human bones were five times encountered, two being met with south of the cross-section while digging out central portions of the mound.

As was the case in Mound B, no urn-burials of any sort were present.

With thirteen burials were artifacts: pierced *Olivella* shells; bone pins; shell beads; fresh-water mussel shells; pebble-hammers; sandstone hone; shell drinking cup; small imperforate bowl; two conchs (*Fulgur carica*), pierced for use as implements.

Occupying a central position in the mound was a pit, roughly circular, clearly dug down from the surface where it had a diameter of about 13 feet. Eight feet below the surface it had converged to a base about 3 feet across. The pit had been filled with sand mingled with midden refuse and had been capped with a solid

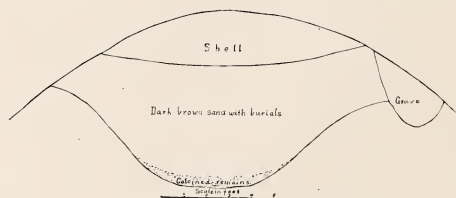


Fig. 63.—Section of central pit. Mound C.

deposit of oyster shells having a maximum thickness of 2.5 feet. The upper eastern portion of the pit had been cut through by a grave (see diagram of pit Fig. 63), and at different points the pit itself contained skeletal remains placed there at the time of the filling. On the bottom of this pit and extending up on the sides, was an irregular deposit of fragments of calcined human bones, having an average thickness of about 5 inches and a diameter of 7 feet measured across between the margins extending upward (Burial 82). Mingled with the calcined fragments was a curious medley as follows: a great number of shell beads of various shapes, some tubular, one having a length of about 3 inches, mostly unaffected by fire but some showing calcination; 8 pearls, pierced, one showing traces of fire; 8 chert spalls together; 14 chips of chert together; 53 quartz pebbles, intimately associated, each about the size of a pea; great numbers of sherds, including one circular in shape, with a central perforation; a considerable number of bone pins, one 7.5 inches long with a perforation (Fig. 64). In addition to this diverse collection was the body of the lower jaw of some carnivore, and parts of other jaws, with the lower portions ground away as we have described in the account of the mound at Greenseed Field.

CERTAIN ABORIGINAL MOUNDS OF THE GEORGIA COAST. 113

OSSABAW ISLAND, BRYAN COUNTY. MIDDLE SETTLEMENT, MOUND D.



Fig. 64.—Piercing implement of bone. Mound C. (Full size.)

This mound, in the same cultivated field as Mound B and distant from it about two hundred yards in a southwesterly direction, had a height at the time of our visit (December, 1896) of 3 feet 9 inches. It was evident from the appearance of the mound that long cultivation had materially decreased the height of central portions, carrying down the material to its marginal parts. As the beginning of the slope is no sure indication of boundary among the low mounds of the sea-islands of Georgia, especially those long subject to the plow, pits were dug and tentative trenches run in from a considerable distance out, in a vain endeavor to locate the presence of that dark layer corresponding to the original surface, so frequently present. Finally, taking a certain thickening of the surface soil as an indication, a circle with a diameter of 82 feet was drawn; the highest portion of the mound, a peak of shell, forming the center.

The mound was sliced down with the utmost care, those digging, where it seemed necessary, going as much as 8 feet below its surface. Of the many mounds it has been our fortune to investigate, none has offered more difficulty in the description of the limits of its component parts. The undisturbed sub-sand was light yellow, at times almost white. Above this came darker yellow sand somewhat discolored by the presence of organic matter and showing a certain amount of disturbance discernible by the presence of streaks, bits of charcoal, etc., but no distinct dark line marking the base was anywhere apparent. Over this layer came a final one of dark brown sand, which, like the disturbed yellow layer, locally varied in thickness so that no general data were obtainable. Moreover, the dark brown layer and the yellow layer below it, so merged together that a line of division was indistinguishable even to the most careful and most experienced observers. At the central portion of the mound was a layer of shell at first beneath the surface and having at the beginning but the thickness of a single shell, increasing gradually toward the center and merging with a second layer of shell which made its appearance several feet farther in, all around, until, at the immediate center of the mound, it appeared at the surface and extended to a considerable depth below the base, forming the great shell pit shown in the cross-section (Fig. 65). This shell layer had probably an average diameter of 30 feet. The portion exposed at the surface was about 15 feet in diameter as shown in the cross-section. The shells comprising these layers, while mainly of the oyster, included also those of the clam, the conch (*Fulgur*), various marine mussels, the "cockle" (*Cardium*) and numerous smaller salt water shell-fish.

The mound, as the detailed description will show, was riddled with pits, the lower parts of which were clearly distinguishable when extending into undisturbed sand. The parts of the pits in the body of the mound, having been filled with the sand removed during their excavation, resembled so closely the sand surrounding them, that the exact limits were impossible to define. These pits, it was quite evident, were of the period of the mound, many showing no admixture with the dark sand of the upper layer or of shell, though a layer or layers of shell often lay above them. Some, however, showed dark sand in places, but these also at times were underneath undisturbed shell and were doubtless made prior to the completion of the mound. In almost no case could we distinguish the exact beginning of a pit.

Skeletal remains, so numerous in this mound (we have reference to those outside the mortuary vessels), were in a fairly good state of preservation compared to many we have encountered elsewhere, though with one exception, which is particularly noted in the detailed description, no crania were saved, owing to their crushed condition.

In following the detailed description, whose numbering corresponds with that of the diagram (Fig. 66), the lay reader must not confuse the three forms of un-

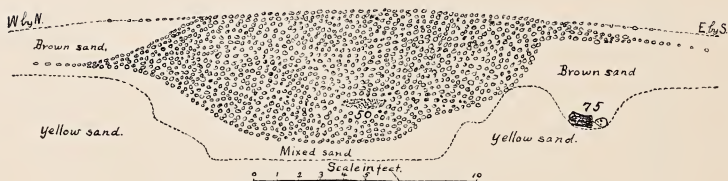


Fig. 65.—Section of central portion of Mound D.

burial present in this mound; namely, skeletal remains of infants, unaffected by fire; the remains of single individuals, which had undergone cremation, and urns filled with a confused mass of fragments of calcined human bones belonging to individuals of all ages. Where fire had been employed it is distinctly stated.

Two arrowheads or knives of chert, several bits of chert and pebble-hammers, some fragmentary, lay loose in the sand, as also the lower part of a broad chisel of ferruginous shale, having a thin section and a sharp cutting edge.

Burial No. 1, a pit, or grave, located 24 feet W. by N. from the point taken as the center of the surface of the mound, as are all other similar measurements of superficial distance in our detailed account, was in a portion of the mound where the central shell layer had not begun, the shell layer X shown in the diagram and in Fig. 67, which gives an accurate idea of the grave, being of a purely local character. In the bottom of this grave, which extended into the undisturbed

<sup>1</sup> The "yellow sand" in the section is undisturbed sand.





Fig. 66.—Plan of Mound D.

yellow sand, one immediately above the other, were the skeletons of two males, similarly interred, heads N., flexed on right side. With one was an undecorated bone pin or piercing implement which fell to pieces during removal.

X.—A local shell layer extending above these burials. It began 34 feet a little N. of W. and extended inward 13 feet. Its thickness at the outside margin was 2 feet (all such measurements are approximate) increasing to 28 inches above the grave from where it tapered sharply to 2.5 inches at its inner limit.

Burial No. 2, Vessel Aa, 24 feet E. by S., a practically intact vessel of the common type, with base perforation, upright as usual. Its base was 12 inches above the undisturbed yellow sand which, at this point, was 3 feet 4 inches from the surface. The height of the vessel is 16 inches, its upper margin therefore was 1 foot from the surface.

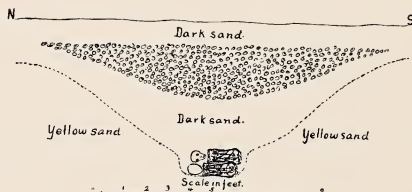


Fig. 67.—Section of grave I. Mound D.

About half-way down, inside of Aa, was an inverted, imperforate bowl of black ware having stamped complicated decoration (Ab). Portions of the rim were broken and missing. On the bottom of Aa, were the skull of an infant in fragments and other bones, including several ribs. These vessels were sent to the National Museum, Washington, D. C.

Burial No. 3, upon a local shell layer (XX) 30 feet S. by E., 22 inches down, was the flexed skeleton of a child just starting on its second dentition. Head S.

XX.—A shell layer beginning immediately under No. 2, extending inward 6 feet 10 inches. Breadth at outer margin, 4 feet, 3 feet at termination; 1 foot 8 inches thick at the beginning, decreasing to 6 inches, increasing to 1 foot and then tapering away.

Vessel B, 35 feet S. E., a vessel of the ordinary type, 14 inches in height, resting on undisturbed yellow sand 2 feet 10 inches from the surface. The base had a portion intentionally knocked out. The entire side was crushed in and broken into small fragments. Over the opening had been placed several large pieces of earthenware, but with that lack of care distinguishing the makers of the mounds at Ossabaw from those of the Walker mound, these pieces had been allowed to slide over somewhat during the filling in of the pit, thus permitting the entrance of sand. No bones were noted in this vessel, but beyond question the remains of an infant had disappeared through decay.

Vessel C, 36 feet S. E., a layer of fragments of earthenware vessels, 22 inches by 3 feet 8 inches, 18 inches below the surface. It was made up of overlapping sherds of large size, at times single, and again double, and not of several vessels placed on their sides and crushed by the weight of sand, since cord-marked pottery lay with that having the complicated stamp, and when a fragment was imposed upon another, it often occurred that the convex portion of an upper sherd fitted into the concave portion of a lower, which could not be the case were two sides of a previously entire vessel brought into apposition through breakage. No remains or artifacts lay in the neighborhood of this layer.

Vessel D, 33 feet S. E., the lower portion of a vessel of the ordinary type, with perforated base, having the rim and upper part of the body crushed into small fragments. The vessel had been let down somewhat into the undisturbed yellow sand. From base of vessel to surface, 3 feet.

Burial No. 4, 33 feet S. W., portions of a skeleton with unattached epiphyses, partly in anatomical order, 3 feet 9 inches from the surface, below a local shell layer. A considerable portion of this skeleton was missing, presumably through a later burial (No. 11) placed below it, which was, however, aboriginal and contemporary with the mound, as shown by the undisturbed shell layer above. A diseased humerus from this burial was sent to the Army Medical Museum, Washington. With the bones was a mass of red pigment, which chemical tests showed to be an iron paint ore, probably hematite, and not cinnabar, which would have indicated European contact.

XXX.—A layer of oyster shells having its S. E. corner over Burial No. 4. In thickness it varied from 10 inches to 7 inches to 4 inches. Its outer margin was 8 feet 10 inches across. It extended into the mound a distance of 6 feet 8 inches, where it had a terminal breadth of 5 feet. The upper surface of this layer was 1 foot 10 inches from the surface of the mound.

Burial No. 5, a grave 33 feet W. of S. W. This grave, 3 feet from the surface to the base, 26 inches in diameter, ran 9 inches into the clear yellow sand on which the skeleton lay. The burial was that of an adult female, head E., on left side and so flexed that its major diameter was but 25 inches. Decay was noted in several of the molars, a condition not infrequent in this mound.

Burial No. 6, Vessel E, 31 feet S. S. E., a vessel of the usual type, inverted. The body and base so badly fractured that it was impossible to arrive at any conclusion as to a perforation in the base. Within the vessel were a few fragments of the bones of a child, including two phalanges of the toe, unaffected by fire. In addition, were some calcined shells and a fragment of a calcined shell with a central perforation. This vessel had been placed in a pit, the base of which, 3 feet 4 inches from the surface, was 8 inches below the line of the clear yellow sand, and was 3 feet 6 inches across at the point of entrance into the yellow sand.

XXXX.—29 feet S. E., a layer of decayed or fire-blackened wood, 1 foot in thickness, 3 feet 9 inches across, extending inward about 3 feet where it had a breadth of about 1 foot. It lay at the bottom of a pit filled with brownish sand. No human remains or artifacts were in association.

Burial No. 7, 29 feet W. by S., a circular pit, with a diameter of about 30 inches, whose base was 36 inches from the surface, the upper 22 inches being surrounded by disturbed brownish sand, the lower 14 inches extending into undisturbed yellow sand. About 6 inches from the base was a portion of a thorax, one scapula and the head of a humerus.

Vessel F, 25 feet S. E., a vessel of the ordinary type, lying on its side on undisturbed yellow sand, there 2 feet from the surface. No bones were discovered and the vessel was too much crushed to furnish exact data of any sort.

In the outer S. E. portion of the mound, unassociated with human remains, were six fresh-water mussel shells, one within the other, four badly crushed. The remaining two showed no perforation.

Burial No. 8, 21 feet E. by S., probably a grave, but the line of demarcation impossible to determine. On the base, 2 feet 4 inches down, was a skeleton, head E., and turned to the left, trunk on face, knees to left, legs flexed back on thighs. Arms parallel to sides of body, forearms flexed up. This skeleton, of an individual about 5 feet 5 inches in height, was of a slender male or of a strongly built woman.

Burial No. 9, 27 feet S. W., in a pit, 2 feet 6 inches from the surface, above No. 16, were a few scattered bones including phalanges, two bits of radius, one patella, two ossa innominata.

Burial No. 10, 28 feet S., a skeleton of a child lying on undisturbed yellow sand, there 3 feet 9 inches from the surface. The bones were inadvertently dug into and disarranged. No pit was apparent—by no means conclusive proof of its non-existence in the case of this mound.

Burial No. 11, 32 feet S. W., a grave beneath Burial No. 4 and under the shell layer XXX, having its base 5 feet 4 inches from the surface. The most careful endeavor failed to define the limits of this grave which contained a skeleton of a male on left side, head N. E. with one knee under the head and one against the forehead.

Burial No. 12, Vessel G, 26 feet S., a bell-jar shaped vessel, imperforate, with faint checked stamp, inverted on the yellow sand, there 3 feet 6 inches from the surface. A small section of the rim was missing. Several cracks were filled with a quick-setting cement which was allowed to dry while the vessel was in place. The vessel contained the calcined bones of a child lying on sand which extended up inside about two-fifths of the height of the vessel, which is 12.5 inches. Its diameter of mouth, which is also its maximum diameter, is 12.5 inches.

Burial No. 13a, b, c. 26 feet S., three skeletons of dogs buried singly within a few feet of each other.

Burial No. 14, 22 feet W., a pocket of calcined human remains and charcoal, 31 inches down, 9 inches across at the start, and about 3 inches thick. It tapered inward a distance of about 13 inches. Among the fragmentary bones were a number of shell beads, some calcined and others unaffected by fire.

Burial No. 15, 25 feet S. W., a grave, surface to bottom of pit, on which skeleton lay, 4 feet 6 inches. It extended 1 foot 6 inches into clear yellow sand. Its limits

in the disturbed sand above were not distinguishable. It contained a flexed skeleton of male on right side, head N. E.

Burial No. 16, 2 feet 9 inches directly below No. 9, or 4 feet 10 inches from the surface to the bottom of the pit on which the bones lay, a flexed burial of a female on left side, head S. E.

Burial No. 17, Vessel H, 14 feet S. E. by E., the lower portion of an imperforate vessel of the ordinary type, just below the surface. Portions had been broken off and scattered by the plow. It had been filled with a mass of calcined human remains, some of which from the upper part, lay scattered about.

Burial No. 17a, a skeleton of a dog some distance below Vessel H.

Burial No. 18, 21 feet S. of W., on the line of the clear yellow sand, there 4 feet 3 inches down, lay a skeleton of uncertain sex at full length, face down, head S. by E. The skeleton measured 6 feet and .5 of an inch as it lay, but the parts were not in immediate contact. No grave was noticeable.

Burial No. 19, 23 feet S. by W., a pocket of calcined fragmentary human bones

on the line of the clear yellow sand just 3 feet from the surface, about 6 inches across at the start and 4 inches thick, broadening to 10 inches and tapering to a point 10 inches from the start. With the calcined fragments were shell beads unaffected by fire.

Burial No. 20, 3 feet E. of No. 19, apparently a grave extending 12 inches into the clear yellow sand and having its



Fig. 68.—Section of grave 21. Mound D.

base 3 feet 6 inches from the surface. It contained the skeleton of a male, an ordinary flexed burial on the right side, head S.

Burial No. 21, 25 feet S., a pit extending 1 foot into the yellow sand, its base 3 feet from the surface (Fig. 68). At the bottom lay a skeleton of a young person about 10 years of age, flexed on the right side, head S. Above the skeleton was a layer of charcoal about 6 inches thick, mixed in places with burnt sand and shell, extending up the sides of the pit to a level about 1 foot 6 inches above. The diameter of the pit which was apparently circular, was, where the charcoal terminated, 3 feet 4 inches. The jaw and other parts of the skeleton lying in contact with the charcoal were charred or calcined, while other portions lying away from it showed no mark of fire.

Burial No. 22a, 14 feet S. E., a grave 7.5 feet long by 2 feet wide, running 17 inches into the undisturbed yellow sand, its base 4 feet 3 inches from the surface, containing skeleton of a woman at full length, face down, head N. by E., arms along side, measuring 5.5 feet as it lay.

Burial No. 22b, over the feet of Burial No. 22a, in disturbed sand, 3 feet 2 inches from the surface, a flexed burial of a young adult female, head N. E. Right knee up at right angle to the body, leg parallel to the thigh; left knee in contact with



the head. Right arm and forearm down along body; left arm along body, with forearm across body.

Burial No. 22c, 30 inches from the surface, above pelvic portion of Burial No. 22a. Male, face down, head S. E. Knees and legs to the left. Arms along body with forearms under it.

Burial No. 22d, above Burial No. 22b, but just beneath surface, skeleton of an adult male, disturbed by the plow, lying on back, head W., knees to the left.

Burial No. 22e, 10 feet E. by S., on the line of undisturbed sand, a flexed skeleton of a female, face down, head S. A pebble-hammer lay in association.

Above these burials, with the exception of No. 22d, the central shell layer first made its appearance, at first but an inch or two in thickness, increasing over the burials to 14 inches where its upper margin was 8 inches below the upper surface of the mound.

Burial No. 23, 21 feet W., 2 feet 8 inches down on clear yellow sand with a thin layer of oyster shells above it, was the skeleton of a female, face down and under the body, head W., a knee on either side of the head with arms between body and thighs.

Burial No. 24, 35 feet N. by E., skeleton of a dog, 2 feet 7 inches down.

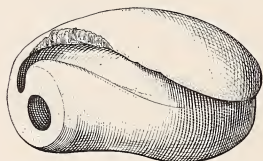


Fig. 69.—Massive head of shell. Mound D.  
(Full size.)

Burial No. 25, 17 feet E. of S., flexed skeleton of female, face down, head W., 2 feet 10 inches from the surface on the line of the undisturbed yellow sand. No grave was apparent.

Burial No. 26, 21 feet W. of S., a pocket of calcined fragments of human bones and charcoal, 3 inches thick at the start, lying on the line of undisturbed sand, 3 feet 8 inches down. This layer at the start was 1 foot 10

inches across, broadening 18 inches inward to 27 inches, with a maximum thickness of 8 inches and tapering from that point to its end, 2 feet 11 inches from the start.

Burial No. 27a, 16 feet S. by E., a pit with charcoal, much resembling No. 21, having its base 4 feet 2 inches from the surface. At its base was a skeleton of uncertain sex, flexed, trunk face down, head E. Though the skull lay in the charcoal, it bore no marks of fire.

Burial No. 27b, about 10 inches above No. 27a, was a flexed skeleton of a male, on right side, head W.

Burial No. 28, Vessel I, 19 feet S., just beneath the surface was a vessel crushed to fragments by the plow, with calcined pieces of human bones which the vessel had contained.

Burial No. 29, 18 feet S., flexed skeleton of male on back, on undisturbed sand, 3 feet 3 inches from surface, head S. W.

Burial No. 30, Vessel J, 14 feet S., undecorated vessel broken into fragments by the plow, containing calcined bones of a child and many small shell beads with 33

massive beads,<sup>1</sup> some at least wrought from the columella of *Fulgur carica* and still showing traces of the attractive natural carnelian color, the largest having a length of 2.25 inches and a diameter of 1.4 inches (Fig. 69). Two similar beads lay in the sand near by. With the shell beads were 16 pearls,<sup>2</sup> perforated, but otherwise in good condition, the largest having a diameter of 10.7 mm. by 9.6 mm.

Burial No. 31, 17 feet S. by W., skeleton of female on line of clear yellow sand, there 3 feet 6 inches from surface, head S. Trunk much twisted. Pelvic portion on back, upper trunk twisted to left. Left shoulder under and toward opposite side. Left arm and forearm along body. Right arm and forearm under body. Right thigh at right angle to body and projecting upward, leg flexed back against it. Left thigh along body with leg against thigh.

Burial No. 32, 20 feet S. W., skeleton of young person on yellow sand 3 feet 9 inches from surface, on right side, head E., body partially flexed, knees at right angles to body with legs flexed back on thighs.

Burial No. 33, 21 feet W. by N., skeleton of a child, flexed on left side, head W., lying on clear yellow sand in a grave the boundaries of which were not exactly distinguishable.

Burial No. 34, 22 feet W. by N., skeleton of an adolescent, lying on yellow sand 6 feet from surface, flexed on back, head N., next to Burial No. 1 and probably in same pit.

Burial No. 35, Vessel K, 19 feet S. W., an undecorated bowl of black ware, crushed by the plow, but partially held together by sand. Nearby were human bones and fragments of bone unaffected by fire, probably scattered by the plow. Their connection with the bowl, which apparently contained no human remains, could not be established.

Burial No. 36, 16 feet S. by W., skeleton of male, on undisturbed sand 4 feet from surface, flexed on right side, head N.

Burial No. 37, Vessel L, 18 feet S. W., a vessel of the ordinary type with top and upper body crushed by the plow, half filled with calcined human remains and imperforate, as are all vessels we have found holding calcined remains.

Burial No. 38, 13 feet S., skeleton of female, flexed on right side, head W., lying on the level, 2 feet below the surface.

Burial No. 39, 31 feet N. by W., a grave having its base 6 feet 2 inches from the surface, and extending about 4 feet into undisturbed sand. Its diameter at the line of the yellow sand was 8 feet 8 inches, lessening to 2 feet 9 inches, one foot above the base upon which lay a skeleton of a male, flexed on right side, head S. E. A bit of cord-marked pottery—possibly of accidental introduction—lay near the foot.

Burial No. 40, 14 feet S. by W., skeleton of a dog, 3 feet from surface.

Burial No. 41, 20 feet S. W., a pit extending 14 inches into yellow sand and having its base 4 feet 4 inches from the surface. On the base lay a skeleton of a female, flexed on left side, facing back, head S.

<sup>1</sup> See "Art in Shell," Plate XXXIV, Report Bureau of Ethnology, 1880-1881.

<sup>2</sup> As to pearls in Southern mounds see Antiquities of the Southern Indians, C. C. Jones, Chapter XXI.



Fig. 70.—Piercing implement of bone. Mound D. (Two-thirds size.)

Burial No. 42, skeleton of a dog, immediately above No. 41.

Burial No. 43, 18 feet S. W., 3 feet 6 inches from surface in same pit as No. 41, were a single skull and one tibia, about 3 feet distant. These bones had probably been disturbed by the introduction of the burial below.

Burial No. 44, 10 feet S. by W., skeleton of a female lying on a shell layer 2 feet 10 inches from the surface. The head, which would have been N. E., was bent over and crushed on the pelvis. The lower trunk lay on the back, the upper was bent over. The right arm lay along body with forearm flexed along thigh. The left arm was alongside of body with forearm across pelvis. The thighs extended laterally at right angles to opposite sides of the body. Legs were flexed back against them.

Burial No. 45, 6 feet S. E., several scattered human bones in the great central shell pocket. Other bones were scattered at various points throughout.

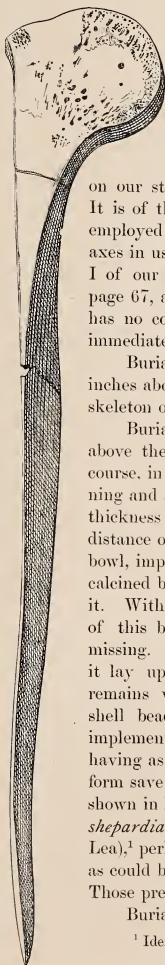
Burial No. 46, 16 feet W. by S., on the line of the yellow sand, there 3 feet 10 inches from the surface, was a skeleton of a female, at full length, measuring 5 feet 8 inches as it lay, on back, head S. face E., right arm along side, forearm crossing to pelvis; left arm along body, forearm flexed back with hand to shoulder.

Burial No. 47, 26 feet N. by E., on the yellow sand, there 2 feet from the surface, isolated cranium wanting face bones and lower jaw.

Burial No. 48, 13 feet S. W., 3 feet 6 inches down, skeleton of animal, probably dog, which fell into small bits upon removal.

Burial No. 49, 9 feet S. W., a fireplace composed of a layer of charcoal and blackened sand, 4 inches thick at start and 1 foot 8 inches across. One foot inward it was 25 inches across and 5 inches thick, lessening from that point to its termination 26 inches from its outer margin. It was 18 inches below the surface of the mound.

Burial No. 50, 2 feet S., in the great central shell pocket, 4 feet from the surface, was a deposit of calcined human bones, 3 inches thick at the beginning and 13 inches in breadth. Sixteen inches inward it was 25 inches across and about 4 inches thick. It extended inward 2 feet 9 inches. With the calcined bones was no charcoal, and fragments of bones of lower animals lying among them showed no trace of fire. The cremation, therefore, had not been carried into effect on the spot. With the remains was an interesting pointed implement 11.3 inches in length (Fig. 70), wrought from a split bone of a lower animal, with a carefully incised decoration on the handle, a part of which is missing. An interesting feature is a former fracture repaired by the use of bitumen. With the piercing implement was what may have been



a portion of a neatly carved handle of another bone implement; a small bone implement that crumbled to pieces, and half a rude chert arrowhead or knife.

Twenty-five feet N. by E., and 2 feet from the surface, which at this part had no layer of oyster shells and seemed encumbered to a considerable extent with sand plowed from higher portions of the mound, was an axe of steel. This axe, which was not greatly rusted and is now doing duty on our steamer, had a certain amount of wood remaining in the eye. It is of the form at present known as the "turpentine axe" and is employed for "boxing" pine trees. It bears no resemblance to those axes in use among later Indians, one of which is figured by us in Part I of our Report on the "Mounds of the St. Johns River, Florida," page 67, and, in our opinion, was a recent addition to the mound, and has no connection with the period of its construction. It was not immediately associated with human remains.

Burial No. 51, 7 feet S. W., 6 feet 8 inches from the surface, or 4 inches above the base of the great central pit, beneath the shell, was a skeleton of a male, flexed on left side, head N. E.

Burial No. 52, just E. of the head of Burial No. 51, about 10 inches above the bottom of the pit, was a layer of calcined human bones (of course, in small fragments) having a thickness of 4 inches at the beginning and a breadth of 1 foot 7 inches. One foot from the beginning its thickness was 5 inches, its breadth 2 feet. It extended inward a distance of 26 inches. At the eastern outer corner was an undecorated bowl, imperforate, of about one pint capacity, filled with fragmentary calcined bones which possibly had entered from the layer contiguous to it. With these was a molar of a bear. Partially covering the opening of this bowl was a somewhat larger one from which a portion was missing. On either side of the bowls was hematite and a thin layer of it lay upon the upper surface of the layer of bones. With the remains was a small cord-marked bowl in pieces, containing a few shell beads. In addition, unaffected by fire, were three piercing implements of bone, two of ordinary type, the other, 8.3 inches long, having as a head the articular portion of the bone—a common enough form save that a certain portion had been removed from either side as shown in Fig. 71. Near these was a mass of fresh-water mussels (*Unio shepardianus*, Lea; *Unio dolabriformis*, Lea; *Unio roanokensis*, Lea),<sup>1</sup> perhaps fifty, nearly all hopelessly decayed and crushed. So far as could be determined each one bore a double perforation for suspension. Those preserved show no variation from living forms.

Burial No. 53, 25 feet E. of N., a grave having its base 4 feet 9

<sup>1</sup> Identified by Professor Pilsbry.

Fig. 71.—Piercing implement of bone. Mound D. (Full size.)

inches from the surface and extending 2 feet 8 inches into the yellow undisturbed sand. The diameter of this grave, 2 feet 1 inch beneath the surface, where it first became apparent upon entering the clear sand, was 8 feet. It converged to a base upon which lay a skeleton of a male, flexed on right side, head N. E. The superficial layer of shell began at this point.

Burial No. 54, 30 feet N. of E., a layer of charcoal, blackened sand and calcined shells, 8 inches thick, 20 inches long, extending inward 18 inches. The upper margin of this layer was 3.5 feet from the surface.

Burial No. 55, 25 feet E. by S., a part of a skull and a sacrum, 2 feet 4 inches from the surface. One foot 2 inches lower and about 2 feet farther inward was a skeleton flexed on its right side, lacking the skull but having the sacrum in place.

Burial No. 56, 17 feet N. W., 3 feet 9 inches from the surface, skeleton of young person with epiphyses unattached, flexed on right side, head N. E.

Burial No. 57, 17 feet N. by W., 3 feet from the surface on undisturbed sand lay a skeleton of a male, on the right side, flexed, the knees out, head E. This skeleton showed a fairly well-united fracture of the lower end of the fibula.

Burial No. 58, 19 feet N. by E., in a pit having its base 5 feet from the surface, beneath a superficial layer of 2 feet 4 inches of shell, which began over No. 53, was a skeleton of uncertain sex, at full length, face down, measuring 5 feet 6 inches as it lay, head E., arms parallel to body. Above the skeleton, beginning at the surface, were :

|                       |                 |
|-----------------------|-----------------|
| Dark sand . . . . .   | 1 foot 3 inches |
| Shell layer . . . . . | 2 feet 4 inches |

The pit beginning immediately under the shell was filled with 1 foot 5 inches of disturbed yellow sand. As no oyster shells were mingled with the sand filling the grave, it is evident that the grave was completed before the beginning of the layer above it, and not dug through it.

Burial No. 59, 14 feet N. W., 3 feet 4 inches from surface, skeleton of male with bones disarranged through inadvertence of diggers.

Burial No. 60, 16 feet N. W., a grave filled with brown sand, having disturbed yellow sand on either side. From surface of mound to base of pit, 3 feet 3 inches. On undisturbed sand, flexed skeleton of female, head N. W., shoulders on back, lower trunk turned to the left, knees to the left.

Burial No. 61, 21 feet N. E., a pocket of calcined human bones and charcoal, 3 feet 4 inches from the surface to its lower margin, 10 inches thick, 20 inches across and extending inward 10 inches. Near this fireplace was the lower articular portion of the femur of a bear, neatly severed by a cutting tool. A similar specimen was taken from Mound B, Darien.

Burial No. 62, Vessel Ma, 17 feet E. by S., a vessel of the ordinary type, having its upper margin 9 inches below the surface, crushed to fragments by the plow, which, however, were subsequently recovered and pieced together. Height, 18 inches; diameter of mouth, 13.5 inches; diameter of body, 11.5 inches. Upright, within vessel Ma, was an undecorated bowl of black ware, slightly flaring (Mb). Approxi-



CERTAIN ABORIGINAL MOUNDS OF THE GEORGIA COAST. 125

mate measurements: maximum diameter, which was at the mouth, 8.5 inches; height, 5 inches. Within Mb, was a third vase (Mc) of black ware, having a globular body and flaring rim with decoration around the margin consisting of raised circles enclosing projections. Diameter at mouth, 5 inches; of body, 5.1 inches; height, 6 inches. Within Mc were a few calcined fragments of the bones of an infant. Both Mb and Mc, though badly broken, have been pieced together with practically no missing parts. Above and around Ma were pieces of earthenware belonging to at least two vessels, which may have served as a covering before the advent of the plow.

Burial No. 63, 13 feet W. by N., 2 feet 6 inches from the surface, in a grave which had its base on the undisturbed sand 4 feet 6 inches down, was a seated skeleton, facing N., with head crushed down on the pelvis. Both arms were parallel with the body, the forearms crossing on the pelvis. The thighs, with legs flexed back on them, projected up on either side. Sex uncertain.

Burial No. 64, immediately beneath No. 63, flexed skeleton of female, trunk to the left, head N. and facing in that direction.

Burial No. 65, isolated skull of a child in contact with the cranium of No. 64.

Burial No. 66, with the pelvis against No. 65 and the cranium of No. 64 was a skeleton of a young person, head S., upper trunk on back, head over on chest, legs flexed and turned to the right. Right arm along body with forearm beneath thighs. Left arm a little out and down, with forearm across pelvis.

Burial No. 67, along the bottom of the grave in which were Nos. 63, 64, 65 and 66, was the skeleton of a woman, face down, at full length, 5 feet 8 inches long as it lay; head N., arms and forearms parallel to trunk.

Burial No. 68, 10 feet N. by W., scattered human bones, 4 feet from surface.

Burial No. 69, 9 feet W. of N., skeleton of young person, flexed on right side, head S. E., 3 feet down. In association were a number of *Olivella* shells pierced for stringing.

Burial No. 70, on the same plane, and about 1 foot N. of No. 69, was the skeleton of a child about 5 years of age, flexed on the left side, head N. With it was a cord-marked bowl imposed upon a basket-marked cup, each of somewhat less than one pint capacity and imperforate as to its base. At the bottom of the cup were traces of red pigment.

Burial No. 71, just E. of the cranium of No. 70 were parts of the skull of an infant and a few fragmentary bones.

Burial No. 72, 11 feet N. W., 3 feet down, flexed skeleton of child from three to five years of age, badly crushed, head N.

Burial No. 73, Vessel N, 11 feet E. by N., just beneath the surface, an upright urn-shaped vessel with a faint diamond-stamped decoration, of poor material and completely rotten. It contained the calcined remains of a child. Though in such bad condition this vessel was cemented in place, pieced together and allowed to dry before removal and was thus recovered in fairly good condition. Approximate

measurements: height, 11 inches; diameter of mouth and maximum diameter of body, each about 8.75 inches (Plate XV).

Vessel O. Immediately behind Vessel N. on its side, facing it, was an imperforate bowl intact, with complicated, stamped decoration (Plate XIV, Fig. 2). Approximate measurements: diameter of mouth, and maximum diameter of body, each, 8.2 inches; height, 6 inches. No human remains were found in association, within or without.

Burial No. 74, 14 feet E. of N., skeleton of a dog.

Burial No. 75, 11 feet S. of E., 4 feet 9 inches down in a pit shown in the cross-section of the mound, a flexed skeleton of a child, head E.

Burial No. 76, 10 feet E., skeleton of a dog, 3 feet from the surface, at the bottom of a small pocket, beneath a local shell layer. This small pit had been dug through the shell layer, or through part of it, during its formation, as the pit had been filled with shells from the layer. However, a layer of calcined human bones (Burial No. 77) entirely intact, lay above the pit containing the dog, which was therefore not an intrusive burial.

Burial No. 77, 10 feet E., 6 inches from surface, a pocket of calcined human bones, 5 inches thick, circular, with a diameter of about 7 inches.

Burial No. 78, 11 feet E., 3 feet 8 inches from surface, in disturbed sand, skeleton of a child, flexed on right side, head S.

Burial No. 79, 18 feet N. E., 6 feet 9 inches from the surface, at the bottom of a pit and let into the clear yellow sand, was the skeleton of a male, at full length, face down, head N. W., with arms and forearms parallel to body. The cranium was saved (A. N. S., Cat. No. 2,166).

Burial No. 80, 11 feet E. by N., on the clear yellow sand on the slope of the pit ending with Burial No. 79 was a skeleton in a sitting position leaning forward, facing W., head forced down to pelvis, right arm along body, forearm crossing above pelvis, left arm along body, forearm forward at right angle. Thighs with legs against them, parallel to body.

Burial No. 81, 7 feet N. by W., 3 feet 8 inches down, just beneath the shell layer, in disturbed yellow sand, probably part of a large grave, the exact boundaries of which were not traceable, was a skeleton on right side, head N. W. A few scattered bones of another body, probably disturbed by the burial of No. 81, lay about.

Burial No. 82, Vessel P, in the central shell pocket, 3 feet W., 3 feet 6 inches down, crushed but held together by the shell, on its side, with a certain portion missing, was an imperforate cord-marked pot of poor material, approximately measuring 5.5 inches in height and 6 inches across its opening, where it had its maximum diameter. In it were the bones of an infant, unaffected by fire.

Burial No. 83, 8 feet E., nearly on the bottom of a pit, 3 feet from the surface, was the skeleton of a female on left side, head S. W., very much twisted as shown in Fig. 72. Beneath the cranium was the shell of a fresh-water mussel.

Burial No. 84, 5 feet N. E., 3 feet 4 inches down in a pit the limits of which were not determined, was the skeleton of a male, on the right side, head E.

Burial No. 85, 1 foot N., skeleton of a dog.

Mound D furnishes a good example of the curious forms of burial prevalent on the Georgia coast. We do not think all the skeletons were intentionally arranged as found, believing some, at least, were forced into pits comparatively small in size (for shovels in those early days were not so convenient as now, and digging was more onerous), and were twisted into positions more or less the result of chance. The burials at full length, usually at a great comparative depth from the surface, were unquestionably intentional as to their form, though the placing of the skeleton on its back or on its face may have been a matter of accident. In addition, we have layers of calcined human bones; uncremated infant skeletons buried in jars; incinerated remains of single infants in urns; and jars filled with incinerated remains, the result of a general cremation.

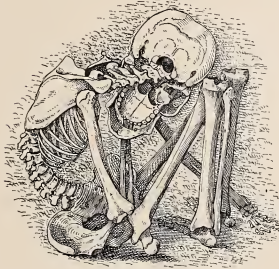


Fig. 72.—Burial No. 83. (Not on scale.)

One curious feature was the presence of numerous skeletons of dogs, which were not found in fragments, here and there a scattered bone, but interred in their entirety. These dogs, therefore, evidently had not served as food. Curiously enough, however, the dogs did not lie with or near human skeletons, as one would expect had they been slain and buried with their masters, but were accorded interment by themselves.

In no mound of the coast of Georgia have burials of dogs approached in number those in Mound D, though occasional ones—always represented by the entire skeleton—have been met with.

In Florida we found in a shell-heap on the Econlockhatchee creek, Orange County, a part of a canine jaw of considerable interest, which the late Professor Cope described and figured in the *American Naturalist*, July, 1893, in connection with certain references to prehistoric dogs in that number.<sup>1</sup>

Later, another fragmentary canine jaw was discovered by us in a Florida shell-heap.

On the base of the Tick Island mound, Volusia County, Florida, we found the skeleton of a dog, the skull of which is now in the collection of the late Professor Cope and was described by him in a note in our "Certain Sand Mounds of the St. Johns River, Florida," Part II.

On the base of the Light-house mound near Fernandina, Florida, were two skeletons of dogs, one in very poor condition. The skull of the better preserved one is in the possession of Professor Putnam and references to it by Professors Cope

<sup>1</sup> "Certain Shell Heaps of the St. Johns River, Florida, Hitherto Unexplored," by C. B. Moore. Third paper.

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and Putnam may be found in our "Certain Florida Coast Mounds north of the St. Johns River,"<sup>1</sup> page 25 *et seq.*

Professor Putnam, in whose possession all our Georgia canine skulls now are (1897), after an extended comparative study, is convinced that there can be no doubt that a prehistoric dog existed, in type resembling the collie but with slightly broader jaws.



Fig. 73.—Diagram of Mound E.

Mr. Mercer has lately described a portion of a canine jaw found by him in a Maine shell-heap, with a note by Professor Cope.<sup>2</sup>

OSSABAW ISLAND, BRYAN COUNTY. MIDDLE SETTLEMENT, MOUND E.

This mound, in the same field and about 300 yards W. of Mound D, had been plowed over for so long a period that little could be determined as to its original

<sup>1</sup> Privately printed, Philadelphia, 1896.

<sup>2</sup> "An Exploration of Aboriginal Shell Heaps." Publications of the University of Pennsylvania, Vol. VI, page 123 *et seq.*

height. Its altitude at the time of the demolition of the mound by us was 14 inches; its diameter we judged to be about 38 feet.

Like many other mounds of its class it was composed of dark sand over undisturbed yellow sand, separated by a dark band, probably the original surface of the field. The line of the base showed marked irregularities, with several curious pits similar to those already referred to in other mounds. Oyster shells covered the central portion of the mound to a depth of about 1 foot 6 inches.

We give a detailed description of the skeletal remains in conjunction with the diagram (Fig. 73).

1.—16 feet S. E., a grave with the base 34 inches from the surface and 22 inches below the base line of the mound. In it was part of a skeleton in anatomical order, trunk on back and upper extremities in order, arms down along body, cranium missing but a few teeth lying on ribs, lower extremities missing with the exception of left foot which lay on trunk immediately above pelvis.

2.—15 feet N. W., a female skeleton, head N. E., flexed on left side, 10 inches down.

X.—12 feet S. of W., a fire-place 1 foot beneath surface, 20 inches long, with a maximum thickness of 2 inches, and extending inward 1 foot 7 inches.

3.—11 feet W. by S., 8 inches down, a number of loose human bones having in association fragments of a vessel of about 2 quarts capacity, crushed flat. The cranium was missing. This disturbance probably owed its origin to the plow.

4.—8 feet W. by S., a skeleton of uncertain sex, head E., trunk on back, left thigh extended, leg flexed back upon it, right thigh flexed toward body, leg drawn down upon thigh, arms and forearms parallel to body. This skeleton, one humerus of which showed an imperfectly united fracture,<sup>1</sup> was 15 inches from the surface.

5.—12 feet N. by W., a grave with base 37 inches from the surface, containing a skeleton with trunk on back, head S. W., thighs flexed on body and turned to the right, legs flexed against thighs, right arm and forearm parallel with body, left arm along body with forearm flexed at a right angle across body. From the bottom of the grave to the top of the black base-line was 25 inches. The pit was 3 feet 3 inches across at the top.

Fig. 74.—Bone pin with incised decoration. Mound E. (Full size.)

XX.—7 feet W., a fire-place about 2 inches thick, 1 foot 4 inches below the surface. Its outer margin had a length of 30 inches, broadening to 3 feet 9 inches about 1 foot 11 inches inward. From the left corner a small spur projected 9 inches farther in.

6.—2 feet W., a curious grave, 5 feet 6 inches in diameter at its apparent

<sup>1</sup> Sent to the Army Medical Museum, Washington, D. C.



starting point beneath the black base layer of the mound and 3.5 feet across its base, extended toward the center a distance of 3.5 feet. The black basal layer of the mound continued unbroken above it, showing its completion previous to the inception of the mound. From the surface of the mound to the bottom of the grave was 5 feet 4 inches. From the bottom of the black band to the bottom of the grave was 3 feet 6 inches. In the grave, 4 feet 10 inches from the surface, were three skeletons of children all about five or six years of age. With them were many fragments of pots in layers and one small undecorated cup with a curious knob on the outside at the bottom. This cup, somewhat crushed, has been almost completely restored.

7.—Just beneath the surface were certain human bones, doubtless remains of a skeleton disturbed by a plow.

In the shell debris covering the mound was a bone pin 6 inches in length, encircled as to the upper part with incised decoration extending 2 inches down (Fig. 74).

#### OSSABAW ISLAND, BRYAN COUNTY. MIDDLE SETTLEMENT, MOUND F.

This low elevation, in the same field as Mound B and about 200 yards in a westerly direction from it, had long been under cultivation. Its highest portion, where superficial shell had a somewhat greater upward slope, was about 20 inches above the general level. The limits of the mound were not definitely fixed. A diameter of 76 feet was taken and the southernmost half of the circumference was carefully dug through.

The mound, which had absolutely no dark band running through it, was composed of black loam mixed with oyster shells. The usual grave-pits were present, the majority being filled with midden refuse, though several contained dark sand only.

Human remains, in an excellent state of preservation, were met with to the number of twenty. No urn-burials of any sort or pockets of calcined remains were found.

One skeleton of a dog was found, interred alone, as usual.

Cord-marked ware in the form of sherds, was present through the body of the mound but the complicated stamp was unrepresented save by two or three fragments from near the surface. One undecorated sherd had a thickness of 1.1 inches.

Four pebble-hammers lay separately in the sand. Three others, two of quartz and one of *Granulite*,<sup>1</sup> lay together, away from human remains. One had a length of about 6 inches.

Four rude piercing implements of bone came separately from the midden refuse in which also was found the tine of a stag-horn, severed by a cutting tool.

Burials were of the flexed variety; the majority of skeletons on the left side. The direction of the heads of eighteen was noted. Ten were to the E., two to the N. E., two to the S. E., two to the W., one to the N. and one to the S. W.

A little hematite lay with one burial. With another were two fresh-water mussel shells and a mass of rock, somewhat worked.

<sup>1</sup> All determinations of rock are by Dr. Goldsmith.

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OSSABAW ISLAND, BRYAN COUNTY. BLUFF FIELD, MOUND A.

The Bluff Field is a cultivated tract about 2.5 miles by land in a northeasterly direction from the Middle Settlement, and is under the same control.

Mound A, about midway between the extremities of the field, and perhaps 75 yards from the bluff, had a height of 2 feet 3 inches above the surrounding level. We gave to it a diameter of about 56 feet, which probably included more than the mound. The mound had been much plowed away but bore no trace of previous investigation, save several small holes dug by colored men.

The mound was completely dug through. It was composed of black loam with oyster shells scattered here and there and contained several local layers of shell. The central portion of the mound, with an average diameter of 24 feet, was a solid mass of oyster shells from the surface down to a thin stratum of black loam from 6 to 12 inches in thickness. Beneath was undisturbed grayish-white sand. At the center of the mound this mass of shell was 2 feet thick. Marginal pits filled with black midden refuse and containing no burials, were present.

Human remains in fairly good condition were met with at fourteen points—one deposit of calcined remains and thirteen skeletons. The skeletons, heading in all directions, were flexed on the right, on the left, or with trunk on back and lower extremities to the right or to the left. The calcined remains were a layer at the bottom of a pit extending 18 inches into undisturbed sand with fragments of charcoal above it. Completely covering the area where the pit entered the undisturbed sand, was a layer of four thicknesses of large cord-marked sherds.

Away from human remains was the skeleton of a dog, the principal parts of which were forwarded by us to Professor Putnam.

By the cranium of a child was a practically undecorated pot, imperforate, with inverted rim, in the shape of an inverted cone with rounded apex, or of an acorn with blunted point. Diameter of aperture, 4 inches; maximum diameter, 5 inches; height, 4.3 inches (Fig. 75).

Scattered sherds were practically unrepresented in the mound. A mass of stone, probably amphibolic gneiss, pitted, and used as a smoothing stone, lay loose in the sand.

On the surface, near Mound A, lay a rude implement, probably of amphibolic gneiss, about 4 inches in length, somewhat resembling in form a hoe-shaped implement, or spud. It is much chipped at the edge, having probably seen service as a hoe. It bears a longitudinal groove showing secondary use as a hone.

OSSABAW ISLAND, BRYAN COUNTY. BLUFF FIELD, MOUND B.

This mound, in the extreme S. W. part of the field, had a height of 19 inches. A certain amount had been ploughed away. No previous investigation was reported or noted.

A diameter of 40 feet was taken, and the circumference dug through, including we believe, considerably more than the mound. It was composed of black loamy

sand with oyster shells scattered throughout. Toward the center the shells became more numerous but were not in a compact mass. From what seemed to be the center of the surface of the mound to undisturbed sand was 26 inches.

Sherds were of very infrequent occurrence, none bearing the complicated stamp.

The mound, in swampy ground, contained human remains at six points, all badly decayed.

Burial No. 1, 3 feet W. of center, just beneath the surface, was a small pocket of scattered fragments of calcined human bones with charcoal at either extremity.

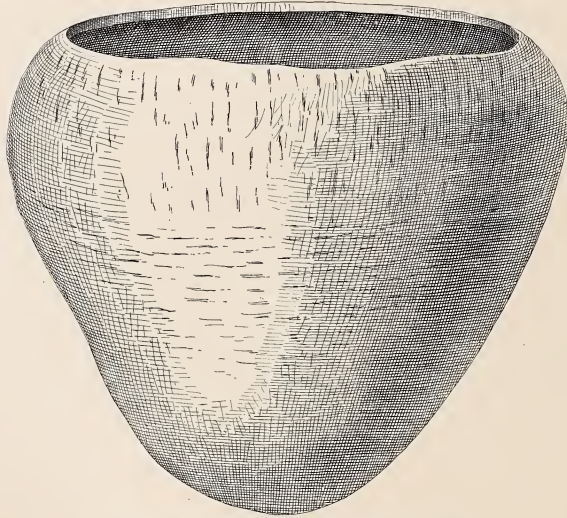


Fig. 75.—Vessel of earthenware. Mound A, Bluff Field. (Full size.)

Burial No. 2, in a central position in the mound, on the bottom of a pit 29 inches deep and extending 10 inches into undisturbed sand, was a deposit of calcined fragments of human bones, 14 by 18 inches, and 4 to 6 inches in thickness. At either side, and above this deposit, was charcoal. At its outer margin was a pebble-hammer of quartz and a small chisel of greenstone. A little farther in, resting on its imperforate base, was an undecorated bowl, with a slightly inverted rim, having a diameter at mouth of 5.3 inches, a maximum diameter of 6 inches and a height of 2.8 inches. Upright within this was a curious little imperforate, undecorated vessel. Diameter of mouth, 2.3 inches; maximum diameter, 3 inches; height, 2.4

inches (Fig. 76). Beneath the larger vessel was a tobacco pipe of earthenware, having the usual curious chipping on the stem, 3.4 inches in length; diameter of bowl, 1.3 inches (Fig. 77). On the upper surface of the deposit lay a neatly shaped arrowhead of chert.

Burial No. 3, 3 feet N. E., 3 feet from the surface, on the bottom of a pit extending 16 inches into undisturbed sand and having a diameter of 3 feet 4 inches at its line of junction with the body of the mound, consisted of the bones of a small child in fragments through decay. Surrounding sand was tinged with hematite.



Fig. 76.—Vessel of earthenware. Mound B. Bluff Field. (Full size.)

In contact with this skeleton was another, also of a young child, equally fragmentary, the legs extending up along the side of the pit. Above this skeleton was a layer of sherds three and four thick. Beneath both skeletons was charcoal.

Burial No. 4, 2 feet N., in a grave with its base 33 inches from the surface, and 2 feet in diameter where it entered the undisturbed sand, into which it ran 14 inches,

was the skeleton of a child about 5 years of age, flexed on the right side, heading W.

Directly N. on the same plane, were the skeletal remains of a child about 3 years of age, flexed on the back, heading W.

Burial No. 5, 6 feet N. W., 30 inches down, just let into undisturbed sand, was a skeleton of an adult female, flexed on the right side, head N. W.

Burial No. 6, 5 feet N. by W., 2 feet from the surface, was the skeleton of a young infant, unfortunately disturbed by one of our men in digging.

This mound calls to mind Mound A, of the Middle Settlement, in that the skeletons of adult males were excluded, and, as in Mound A, calcined remains were present. These remains included adult skeletons, but whether male or female we are unable to state. Another curious feature of this mound was the central position of burials.

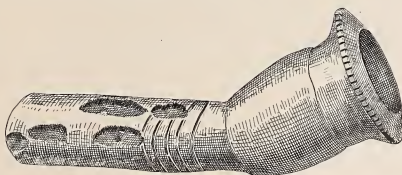


Fig. 77.—Tobacco pipe of earthenware. Mound B. Bluff Field. (Full size.)

## OSSABAW ISLAND, BRYAN COUNTY. BLUFF FIELD, MOUND C.

This mound, in a portion of the field used for the cultivation of rice, lay in low ground which was drained by us before proceeding to investigate, and even then the presence of water was a hindrance. The mound, which had been much dug into by negroes living on the island, was about 150 yards N. of Mound B and had a height of 30 inches, which in no wise represented its original altitude. A diameter of 50 feet, which more than included the mound, was taken, and the circumference dug through with the exception of where a former trench had been excavated.

The mound offered no structural feature of interest. Sherds were fairly abundant, the majority decorated with the complicated stamp.

A mass of coral, about thrice the size of a clenched hand, lay unassociated.

With no interment, but doubtless belonging to one previously removed, were a number of shell beads.

A grooved pebble-hammer and one-half of a sandstone hone lay separately, loose in the sand. A portion of a tobacco pipe, with projecting knobs upon the bowl, came from midden refuse.

In the entire mound human remains were met with at but three points.

Burial No. 1, Vessel A, the lower portion of a large imperforate vessel with complicated stamp, the upper part plowed away, filled with calcined human bones. With them were: a chert nodule; an oblong piece of chert, showing a certain amount of chipping; a fragment of chert; and part of a lance head of the same material.

Burial No. 2, 5 feet W., 1 foot down, on the bottom of a small pit was a deposit of fragments of calcined human bones, 1.5 inches thick at the start, 18 inches across and extending inward 17 inches where it attained a thickness of 3 inches. Above a portion of this deposit were a number of good sized fragments from several vessels. The decoration on two sherds was of interest. On one (Fig. 78), in relief, was an encircled point, sometimes an emblem of the sun-god, also a symbol of the Mayas and found in Europe on the painted pebbles of Mas d'Azil.<sup>1</sup> The other is shown in Fig. 79.

Professor Holmes, "considering the locality," is "inclined to regard them as merely ornaments or parts of patterns."

Thomas Wilson, Esq., writes of them as follows:

"The signs or marks which you have found on the pottery in \* \* \* \* \* Georgia, and about which you wrote me, have been noticed by me during my investigations of the Swastika sign. But I have never been able to find any connection between them and the Swastika, nor to find them in such association as to induce me to believe that they had either a symbolic or ideographic character, or were other than the mere decoration or ornamentation which we find in so many hundreds of other forms on the respective implements and objects of prehistoric times."

Professor Putnam takes a different view. He says:

<sup>1</sup> Of, and after, the period of the reindeer. "*Les Galets Coloriés du Mas d'Azil.*" *L'Anthropologie* (supplément). *Juillet-Août*, 1896. Pl. XI, Fig. 9.



“As to the circle with the dot, there can hardly be a doubt that it is a sun symbol. Of course in the minds of some persons this would simply be a circle with a dot in it, a mere decoration without any particular meaning; but I have long

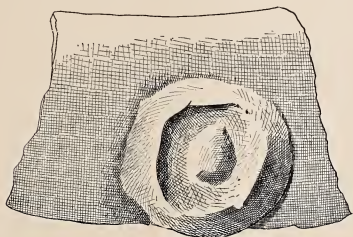


Fig. 78.—Sherd, Mound B, Bluff Field. (Full size.)

been convinced that in the development of American art, after passing through the realistic stage, conventionalized forms were used, and at this period of development, symbolism became a marked feature in certain regions. Finally the spaces around the essential figure or symbol were sometimes filled up at the fancy of the artist; the main point in all higher decoration *being the expression of a thought by a conventionalized form or sacred symbol.*

“The sun symbol, we may say, is cosmopolitan. It is widely expressed by a simple circle or a circle with a central dot. In this connection I call your attention to the paper by Mr. Willoughby and myself entitled ‘Symbolism in Ancient

American Art,’ and a more recent paper following out the same line of thought, written by Mr. Willoughby and entitled: ‘An Analysis of Decorations Upon Pottery from the Mississippi Valley.’ The perusal of this paper will, I think, convince you that the decorations consisting of circles, crosses and scrolls are really the more or less conventionalized rendering of certain symbols. You will notice this circle and dot combined with the swastika-like figure of the four winds in Fig. 11 of Mr. Willoughby’s paper, and you will find the sun symbol in various connections shown in many of the figures; also in some of the figures in our joint paper on ‘Symbolism.’



Fig. 79.—Sherd, Mound B, Bluff Field. (Full size.)

“The peculiar Z-shaped figure with the two dots probably has the same meaning as the swastika, or being a half swastika as Mr. Willoughby says, it probably indicates a gentle wind or breath, in other words, life. This is the actual meaning of the symbol as used among some

of the Pueblo tribes. You will find this same Z-shaped figure in the center of a design, representing a woman, drawn by the Mokis, in Mallory's paper, page 705 of the Report of the Bureau of Ethnology, 1888-89. In this, however, the two dots are not represented. I know of only one other example like yours, and that is shown on a small human figure carved in ivory from a mound in Ohio. This figure is represented with some sort of decoration over the chest and on that decoration is carved the Z-shaped design with the two dots as shown on your potsherd."

Burial No. 3, Vessel B, 4 feet W. N. W., approximately the lower third of a large imperforate vessel, the remainder of which had been ploughed away. Within were fragments of calcined human bones and 26 barrel-shaped beads of shell, remarkably well preserved, the largest about .75 of one inch in length.

The Cabbage-Garden and the Long-Field, neighboring tracts, were carefully searched for mounds without success, though shell heaps were abundant. A number of these were investigated without results of especial interest.

#### SKIDDAWAY ISLAND, CHATHAM COUNTY. THIRD SETTLEMENT, MOUND A.

This mound, in a field long under cultivation, leased by Fanny Johnston, colored, in the Third Settlement, scarcely rose above the general level. Its diameter was estimated at 74 feet; a section line extending E. S. E. and W. N. W. was run through what seemed to be the center of the mound and the half to the south was dug through. There was no sign of previous investigation. The usual pits and graves were present.

In the half of the mound investigated, human remains were met with at twenty-seven points as follows: four pockets of calcined remains; four late disturbances; one not determined; eighteen skeletons.

Of the 18 skeletons: two were at full length on back; nine at full length on face; four were flexed on the left side; one flexed, face down; while one, with the trunk on back, had the legs partly flexed; one was in a sitting position, with the head crushed down on the pelvis.

Excluding the burial in a sitting position the skeletons headed: E., 1; E. by N., 2; N. E. by E., 1; N. E., 3; N. N. W., 2; N. W., 1; W. S. W., 2; S. W., 1; S. E. by S., 1; S. E., 2; E. S. E., 1.

The five flexed burials, however, headed between S. E. and W. S. W.

Sherds were rarely met with in the mound. None of complicated stamp was present.

Near a burial was part of a gracefully shaped hammer of quartzite and a pebble-hammer.

With another burial were six pebble-hammers of quartz, one smoothing stone and hematite.

Several fragmentary implements of stone and one bone piercing implement were met with.

A fact carefully noted by us, all through our investigation of the Georgia Coast,

but not referred to until its close, namely, the utter absence of artifacts with burials at length, was again emphasized in this mound. Though as a rule, extended burials lay near the base, on it or below it, and often great pits had been made for their accommodation, yet associated artifacts were always wanting. As a rule, calcined deposits not enclosed in cinerary urns and masses of bones not in anatomical order were the most favored in respect to art-relics, though flexed burials were not entirely neglected.

SKIDDAWAY ISLAND, CHATHAM COUNTY. THIRD SETTLEMENT, MOUND B.

What the plow had spared of this mound lay in a cultivated field about 300 yards N. of Mound A. Its height was about 18 inches. Oyster shells were scattered on its surface and throughout the adjacent field. A diameter of 60 feet was taken and the eastern half completely dug through. Marginal pits filled with refuse were present. Local layers of oyster shells and the usual grave-pits were met with. One grave extended 4 feet below the surface.

Human remains, encountered at eleven points, included one aboriginal disturbance and three inadvertently dug into by men in our employ. The remaining seven are given in detail.

Burial No. 1, female in kneeling position, leaning forward, head N. E.

Burial No. 3, male in sitting position, facing N. Head crushed almost to pelvis.

Burial No. 5, 13 feet N. E., child from 3 to 5 years of age, in sitting position, facing E.

Burial No. 6, child about six years old, apparently flexed on right side, head S.

Burial No. 7, skeleton of uncertain sex in a sitting position, facing about S. S. W., tilted against one side of the pit.

Burial No. 8, skeleton of male, kneeling and crooked forward, head N. W.

Burial No. 11, skeleton of adolescent flexed on left side, head S. E.

Several pebble-hammers were met with.

Earthenware of the complicated stamp was wanting.

SKIDDAWAY ISLAND, CHATHAM COUNTY. NORTH-END SETTLEMENT.

This mound, in a field formerly under cultivation, about 1.25 miles in a S. S. W. direction from the northern end of the island, had sustained a certain amount of previous investigation. Its height was 2 feet; its diameter, apparently about 45 feet. The mound was completely dug down by us.

Several skeletons offering no points of especial interest and the lower part of a vessel of the ordinary type were met with. The upper part of this vessel had been ploughed away and lost. Near by lay one fragment of a calcined bone.

No artifacts of interest were found.

REMARKS.

The mounds of the Georgia coast, as judged by their contents, lead us to believe them to have been relics of a race ill supplied with stone, almost without copper,

but given to the manufacture of earthenware, which, however, lacked diversity of type.

The builders of these tumuli differed markedly from the aborigines of Florida in their method of constructing many of their mounds, in possessing a totally different type of tobacco pipe, in the absence of mortuary earthenware with ready-made perforation in the base.

They coincided, however, in the absence of the grooved axe and of the mortar made of stone. In both sections this utensil was probably of wood, as are some along the Georgia coast at the present time.

In mortuary methods we note a striking difference between the mound-makers of the Georgia coast and their neighbors to the south. In Florida, cremation, though practised, was by no means carried to so great an extent as on the coast of Georgia, while, to the best of our belief, placing of cremated remains in cinerary urns and uncremated skeletal remains in jars was unknown in Florida.<sup>1</sup>

A point of interest, as illustrating diversity of custom in neighboring localities, is that when jars were used for uncremated remains, infants exclusively were selected in some localities, as at Creighton Island, and at Ossabaw Island, and adults in others, as at Sapelo Island, and at St. Catherine's Island with one exception.

Another feature of interest was the occasional occurrence of mounds in which the skeletal burials were those of women and children exclusively. But the most striking feature of all and one for which we vainly seek a solution is the use in the same mound of forms of burial so varied, varieties of inhumation and of cremation lying side by side.

We are told by Cabeça de Vaca,<sup>2</sup> who, as the reader recalls, crossed from Florida to Mexico comparatively early in the sixteenth century, that certain aborigines of northwest Florida burned the remains of their doctors while burying those of all others. Here we see a distinction in form of burial, which, however, cannot apply to the Georgia coast, for even had physicians been proportionately as numerous in former times as they are at present, still the percentage of cremations in the coast mounds is too great to consider these cremations the remains of medicine-men alone. Besides, as we have seen, cremated remains of infants are met with on the Georgia coast.

In conclusion, we call the attention of the reader to mortuary customs across the sea in former times, so ably presented by the Marquis de Nadaillac in the succeeding paper, "Inhumation and Incineration in Europe."

<sup>1</sup> Colonel C. C. Jones (*op. cit.* page 456), refers to urn-burial in Florida. We think this accomplished writer, who did little work in that State, must have accepted erroneous information. Vessels buried beside skeletons often receive a certain number of bones from them, a fact which may have misled investigators as to urn-burial in Florida.

<sup>2</sup> "It is their custom to bury the dead, unless it be those among them who have been physicians, and those they burn." The Narrative of Alvar Nuñez Cabeça de Vaca, translated by Buckingham Smith. Washington, 1851, page 49.

## INHUMATION AND INCINERATION IN EUROPE.

BY THE MARQUIS DE NADAILLAC.<sup>1</sup>

All known facts show that in Europe inhumation and incineration, two such different methods of disposing of the human body, were in use at the same time among the same peoples during the age of iron, the age of bronze and, in some cases, even during the neolithic period.

The Iberians, the oldest inhabitants of Western Europe, buried their dead and punished notable criminals by the cremation of their bodies.

The Gauls burnt slaves, dependents and horses that they might follow their master into the life beyond.<sup>2</sup>

In the glorious days of Rome cremation was general. In the eyes of the aristocracy, however, the destruction of the human body by fire was a humiliation. By burial this aristocracy distinguished itself from the lower classes and from peoples subjected by conquest. We know that Sylla, of the illustrious Cornelia gens, was the first of his race to be cremated.

It is now generally admitted that the rapid extension of cremation was due to the Celts. We find it from Greece to England, from Etruria to Poland and Russia. Bodies were burnt and those who were not rich enough to have the entire body cremated, contented themselves with burning the head and the arms—hence partial cremation.<sup>3</sup>

But everywhere the two rites are side by side. Here, inhumation is the most employed; there, cremation. Why this difference among the same people, at the same epoch, in the same place of sepulture? Does it imply a diversity of origin, of caste, of social or religious condition?

The answer to this question is impossible in our present state of knowledge. Moreover, it should be different according to the country, the people, the epoch under consideration. Everywhere different influences have acted under different surroundings.

Brittany offers a striking example. The dolmen of Mt. St. Michel and the dolmen of Tumiac are but a short distance apart; both date from the neolithic period; they were built by the same race, probably during the same epoch. At St. Michel we find incineration;<sup>4</sup> at Tumiac, inhumation.<sup>5</sup>

<sup>1</sup> Translated by C. B. Moore.

<sup>2</sup> Caesar, *De Bello Gallico*, L. VI, C. XIX; L. I, C. XIV; L. VII, C. III.

<sup>3</sup> *Handbuch der Deutschen Mythologie*—d'Arbois de Jubainville, *Rev. Arch.* 1891, Mar.—April.

<sup>4</sup> R. Galles, *Rapport sur les fouilles du Mont St. Michel en Carnac*.

<sup>5</sup> L. Galles, *Fouilles du tumulus de Tumiac en Arzon*.



M. du Chatelier takes us to the other extremity of Brittany. Out of 145 megaliths, dating from the stone age, he reports 20 inhumations, 72 cremations, 31 containing charcoal alone. In 22 no conclusions were possible.

We see a similar state of affairs near the town of Reims, in the Puy du Dôme,<sup>1</sup> in the Marne and in a number of other of the French Departments. The rule is not universal, however. At Calvisson (Gard), for instance, we find neolithic burials embracing cremation only.<sup>2</sup>

In Scotland we are able to cite only the celebrated cairns of Caitliness. In them at the same time are met with, without a clue to explain such characteristic differences, the burial at length; the skeleton flexed upon itself; and cremation.

In Italy results are startling. "When you find," says Baron de Duhn,<sup>3</sup> "the two forms of sepulture together, it is because two populations were living side by side, and the predominance of one or of the other indicates that of the population practising the prevailing rite." In Italy, inhumation was practised at first; incineration appears with bronze; next inhumation returns with the oldest Etruscans. Incontestable proofs of this have been found at Alba, at Chiusi, at Pisa and at different points in upper Italy. At Felsina, the ancient metropolis of the Etruscans, the present Bologna, burials by incineration and burials by inhumation were contemporary. A like state of affairs existed at Certosa, at Marzabotto, at Villanova. In the necropolis of Villanova inhumations predominate;<sup>4</sup> at Marzabotto the two forms are of equal occurrence.<sup>5</sup>

Various Austrian provinces furnish indisputable evidence. At Santa Lucia; at Rosegg, in the Drave valley; at Rovische, in the Basse Carniole; at Vermo, in Styria; at Watsch; at San Margarethen; and especially at Hallstatt, which has given its name to a period whose beginning dates back 2000 years at least before our era; we constantly see the two rites in concurrent use.<sup>6</sup> The relationship between them varies only according to localities. At Watsch, for instance, with 200 tombs where incineration was employed, there were hardly a dozen where skeletons were found. But nothing would seem to indicate that these latter were destined for people of a lower class; while they were not protected by great slabs of stone like the others, their mortuary equipment was richer and the objects of bronze gave evidence of a higher art.<sup>7</sup> At Rovische researches yield at times quadrangular cases of stone each enclosing an urn filled with the ashes of the dead, or a skeleton stretched at full length, the head to the east, with an urn at its feet, clasps on the chest, rings on the fingers. At Santa Lucia, on the left bank of the Idria, at its point of union with the Isonzo, 1200 tombs, previously unopened,

<sup>1</sup> Cartailhac, *Mat. pour l'hist. de l'homme*, t. IV, 1<sup>re</sup> Série, p. 267; t. XII, 2<sup>e</sup> S., p. 145.

<sup>2</sup> *Ass. Scient. de France*, Marseille, 1891.

<sup>3</sup> *Remarques sur la question Etrusque*, Berlin, 1890.

<sup>4</sup> Count Conestabile, *Rec. Arch.*, t. XXVIII, pp. 253, 320.

<sup>5</sup> Count Gozzadini, *Atti e Memorie di Storia dell' Emilia, nuova serie*, t. VI, p. 1.

<sup>6</sup> Hochstetter, *Die neueste Gräberfunde von Watsch und S. Margarethen und der Culturkreise der Hallstätten Periode*.

<sup>7</sup> Notably there have been found many *sibule* and plates from sword belts, bearing in reponssé military, religious, or civil scenes, a regular album of the persons buried. A. Bertrand, *Les Celtes dans les Vallées du Pô et du Danube*.

were discovered. Incineration had been employed in them in by far the greatest number.<sup>1</sup>

Investigations were begun at Hallstatt in 1846. Nowhere, according to Baron de Sacken, who for a long time directed the work, has there been observed in the same region modes of burial so diverse and in part so remarkable—the incineration of bodies, the mingling in the same tomb of bodies burnt and bodies buried—nowhere in fine has there been observed on so great a scale a mixture of types belonging more particularly to the bronze and to the iron age. According to the latest information we learn that 993 tombs have been searched. Of these 527 show burials, 453 cremations. The funeral trappings were well preserved as a rule. There were discovered 640 objects in gold, 5574 in bronze, 593 in iron, 270 in amber, 73 in glass, 1243 in terra cotta.<sup>2</sup> In those tombs in which burial was practised the dead were laid out clothed in their garments.

If we look toward Germany we see similar cases. In tumuli near the lakes of Ammer and of Staffel, in upper Bavaria, which are of the later Hallstatt period, we find, out of 121 tombs, 44 given to incineration, 18 to inhumation, and 59 which show no trace of bones or of fire, though they contain the same mortuary deposits as the others. Later, in tombs attributed to the iron age, all the bodies are cremated.

In Hesse, Thuringia, Franconia, in the countries forming the extreme west of Germany, inhumation was the general rule during the entire stone age.<sup>3</sup> In Mecklenburg—an exception, no other example of which I know—men were buried, women incinerated.

In the tombs of Prussia and of the grand duchy of Posen the presence of skeletons and of urns filled with ashes proves the existence at the same time of the two methods of disposing of the dead.<sup>4</sup> The tumuli of eastern Prussia, notably those of Birkenhof, tell a different story. They enclose a varying number of stone cysts containing urns with incinerated bones. Each cyst was surrounded by a circle of stones, and often a larger circle of stones on end encircled several cysts. These urns, made without the use of the potter's wheel, frequently had two handles. Investigation yielded many objects in amber, but on the other hand articles of bronze, and of iron especially, were of the greatest rarity.<sup>5</sup>

Scandinavia shows a duplication of the points noted in the north of Germany. At divers places are remarked the simultaneous use of the burial rite and of destruction by fire.<sup>6</sup>

In Bosnia the *gromilas*, or tumuli, go back to the Hallstatt period. Cremation, however, is rare. Of 140 tumuli recently investigated, but 11 showed complete incineration, and 18, where the burning was partial. In all the others the body had been buried.<sup>7</sup>

<sup>1</sup> Hochstetter, VII *Bericht der Prähistorischen Commission*. Wien, 1884.

<sup>2</sup> *Mitth. der Anthrop. Gesellschaft in Wien* 1887-8. Dr. Hærnes, *Revue d'Anth.* May, 1889. A. Bertrand, *Rev. d'Ethn.* 1883.

<sup>3</sup> W. Schmidt, *Cong. Anth. de Paris*, 1878, pp. 285-7.

<sup>4</sup> Kohn u. Mehlis, *Materialien zur Vorgeschichte des Menschen im Ostlichen Europa*.

<sup>5</sup> O. Tischler, *Ostpreussische Gräbhügel*.

<sup>6</sup> W. Schmidt, *l. c.*

<sup>7</sup> *Fouilles des galyals préhist. de Grassinac, L'Anthropologie* 1896, p. 213.

Research in different portions of Russia leads to the same conclusions. Mr. Radimski has opened 530 graves in the necropolis of Jezerina. Three-fifths showed incineration; but everywhere the two rites were apparent in neighboring tombs and sometimes even in the same one. The majority of mortuary deposits belong to the epoch of la Tène, but some were of the date of Hallstatt and even of the Roman period.<sup>1</sup>

The results obtained by Mr. Zavinetvich in the province of Minsk, White Russia, show that inhumation predominated with increasing ratio in proportion as one approached the Dnieper.<sup>2</sup>

In the country formerly belonging to the Jadzvinques the presence of the two mortuary rites is noted.<sup>3</sup>

In all Europe we are confronted with two very different forms of sepulchral rites. We cannot tell their origin, we know only that cremation by degrees disappeared before the progress of christianity. Complete discontinuance, however, was slow, for we have an edict of Charlemagne, of the year 789, punishing with death those who continued to burn their dead according to the pagan custom.

<sup>1</sup> *L'Anthropologie*, 1894, pp. 472-3.

<sup>2</sup> Baron de Baye, *Congrès de Wilna*, 1893.

<sup>3</sup> *Congrès de Moscou*, 1892, p. 233.

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MOORE: SOUTH CAROLINA COAST MOUNDS.

ABORIGINAL STRUCTURE. MOUND ON LITTLE ISLAND.





MAP OF COAST OF BEAUFORT COUNTY  
SOUTH CAROLINA

X = Sand mound  
O = Shell enclosure  
Scale in miles

CERTAIN ABORIGINAL MOUNDS OF THE COAST OF  
SOUTH CAROLINA.

BY CLARENCE B. MOORE.

At the conclusion of our work on the Georgia coast, the results of which we have published in this Journal,<sup>1</sup> it seemed advisable, for the purpose of comparison, to continue our labors northward along the coast of South Carolina, or rather as much of it as affords an inland passage by water, sheltered by sea-islands, as is the case along the entire coast of Georgia. The portion of the South Carolina littoral permitting inland navigation lies between the Savannah river on the south and Georgetown on the north, about 125 miles in a straight line. A very extended amount of territory, however, much of it low lying marsh, is included between the sounds; the rivers, which are often only arms of the sea, the creeks and waterways of this portion of the coast.

That part of the coast lying between the Savannah river and St. Helena sound (see map) was many times gone over by us, and the inhabitants carefully questioned. In addition, we received material aid from a number of gentlemen of South Carolina and Mr. Clarence U. V. Benton, of near Beaufort, in particular, who made careful inquiries over an extended period of time, and afforded us much valuable information as to the locality of mounds. In this district, the coast of Beaufort county, in addition to the localities particularly referred to as having mounds, we searched Daufuskie island, Bull island, Hilton Head island, Jenkins island, Pinckney island, Spring island, Ladies island, and part of the mainland without finding mounds used for burial, though dwelling sites marked by the presence of oyster-shells were often met with, and on Bull island an interesting circular enclosure of oyster-shells of the same type as the great enclosure on Sapelo island, Georgia, though smaller.

The coast district lying between St. Helena sound and Charleston was less thoroughly searched. Inquiries were made along the inland route, and, in addition, parts of the North Edisto river, Bohicket creek, Steamboat creek, and the Stono river were gone over in a fruitless search, which yielded to our inquiries nothing but tar kilns and comparatively modern fortifications. Furthermore, there seemed to be, on the part of the inhabitants, a total ignorance of the existence of mounds on this part of the coast.

<sup>1</sup> "Certain Aboriginal Mounds of the Georgia Coast." Vol. XI.



From Charleston to Georgetown the inland route runs largely through marsh, and it is possible at but few places to effect a landing on solid ground. Pilots and persons familiar with the route were entirely ignorant of the presence of mounds in the neighborhood of the water. As this agreed so well with our own experience of the neighboring portion of the coast investigated by us, we determined to abandon the remainder of the inland route, and to devote our attention to a more promising field.

*Mounds Investigated.*

|                     |                                 |
|---------------------|---------------------------------|
| Near Bluffton.      | Little Island (2).              |
| Callawassie Island. | Near Button Hill (4).           |
| Hasell Point (2).   | Indian Hill, St. Helena Island. |
| Guerard Point.      | Polleewahnee Island.            |
| Indian Hill.        |                                 |

MOUND NEAR BLUFFTON, BEAUFORT COUNTY.

In a cultivated field belonging to the Cresson plantation, about 2.5 miles north of Bluffton, is a mound long under cultivation, having a height at the time of investigation of 3 feet 3 inches, a diameter of base of 58 feet. It was investigated by us by permission of Mrs. A. E. Coe, of Bluffton, under whose control it is. It had previously been dug into to a limited extent. The southern half was dug through by us and part of the central portion of the remainder. It was composed of dark yellow sand with no admixture of shell. No pits nor outlying graves were met with. A few chips of chert and scattered sherds, none with complicated decoration, were found. Almost at the center were fragments of a child's skull and two small deposits of calcined and unburnt bones together.

MOUND ON CALLAWASSIE ISLAND, BEAUFORT COUNTY.

This mound, in the pine woods near the northeastern end of Callawassie island, was investigated by us with the kind permission of Mr. William Pinckney, the lessee of the island. The mound, lying near a number of small deposits of oyster-shells, had a flattened appearance, presumably from previous cultivation; a part of the center had previously been dug out. The mound is 3 feet 4 inches in height and 48 feet across the base. The northern half was dug through by us, including considerable adjacent level territory, this last being done in a fruitless search for outlying pits or graves, which are so numerous near some mounds of the Georgia coast.

The mound consisted of dark sand containing a certain amount of clay. Scattered oyster-shells were present throughout. Along the base of the mound, at the level of the adjacent territory, was an irregular layer 8 to 12 inches thick, of crushed oyster-shells and fire-blackened sand. Beginning about 13 feet from the center, this layer increased somewhat in thickness, toward the center, and the oyster-shells lay loosely and unbroken. The superficial portion of the mound, to a depth

of about 1 foot, was composed of oyster-shells, with a certain admixture of sand. Well in toward the center, sand alone lay above this layer, but whether or not the layer of sand was due to later cultivation of the mound, we could not determine.

Burials began almost at the margin, nine of human remains and two of dogs.

Burial No. 1, 20 feet N. E. by N. from the center, 2 feet 10 inches down, in a pit 3.5 feet deep, was the skeleton of a female, the trunk on the back, partly flexed, with knees to the left. The skull with all cervical vertebrae but one was missing. There had been no late disturbance. The head, if present, would have pointed E. S. E. There was a well-united fracture of the left radius.

Burial No. 2, 19 feet N. N. E., female, flexed on the right side, head E. S. E., in a grave-pit 3 feet deep, the body slanting upward, 2 feet 4 inches down.

Burial No. 3, a dog, in a small grave of its own, under unbroken layers. The skull and principal bones were sent to Professor Putnam, Peabody Museum, Cambridge, Mass.

Burial No. 4, a young dog. The cranium was sent to Professor Putnam. The remaining bones were badly decayed. In this mound we notice the custom which prevailed in certain mounds of the Georgia coast, namely: according the honor of sepulture to their canine friends by the aborigines.

Burial No. 5, 17 feet W. N. W., 3 feet down on the margin of a pit 3 feet 8 inches deep, was a skull with two cervical vertebrae. At the same level, but farther into the pit, were several scattered long bones. The skull, sex not determined, has an apical bone and double parietal foramina. It was sent to the Army Medical Museum, Washington, D. C.

Burial No. 6, 16 feet N. N. E., in a pit 4 feet 3 inches down, was the skeleton of a young male, flexed on the right, head E.

Burial No. 7, in the same pit about 1 foot farther out from the center of the mound, on a level just below Burial No. 6, was the skeleton of a child, flexed on the right side, heading E. N. E. The pit containing these two burials was 6 feet 5 inches in depth.

Burial No. 8, 15 feet W. N. W., just below the black base layer, 3 feet down, was the skeleton of an adult of uncertain sex, flexed on the left side, head N. E. by N.

Burial No. 9, 13 feet N. E. by E., on the base, 2 feet 4 inches down, was the skeleton of a male with trunk on back and knees flexed to the right, head S. S. E.

Burial No. 10, 12 feet N. N. E., on the bottom of a pit extending through the base layer, 3.5 feet down, were a tibia, a fibula and the foot bones with scattered bones of the other foot, all under an unbroken layer of oyster-shells.

Burial No. 11, 8 feet N. W. by W., 2 feet down, under a mass of small marine univalves (*Littorina irrorata*) was the skeleton of a female, partly flexed on the right side, head N. E. by E.

No artifacts lay with the burials. Near the surface, unassociated, was a disc of earthenware, evidently fashioned from a fragment of a broken earthenware vessel whose cord-marked decoration was apparent on the disc. These discs, if

present at all in Florida, where the discoidal stone seems to be wanting, are extremely rare. They are numerous along the Georgia coast.<sup>1</sup> We found them in still greater numbers along the southernmost part of the coast of South Carolina. It is interesting to know that just such discs are found as far north as Canada, Mr. G. E. Laidlaw having met with great numbers in the ash-beds near Balsam lake, Ontario.<sup>2</sup> These discs were doubtless used in some sort of game. Mr. Laidlaw<sup>3</sup> thinks it probably resembled our "billy-button," which he has seen among the Crees and Salteaux of the Northwest British possessions. Mr. Stewart Culin<sup>3</sup> believes if they were used in a game it was one resembling our "checkers," and cites Mr. Cushing as to the existence of such a game among the Zuñis, and Mr. Fewkes as to a like game among the Mokis.

Sherds, which were fairly numerous, were undecorated or cord-marked, save one bearing a rude checked stamp.

In this mound was an unusual structural feature. The mound rested upon undisturbed grayish sand with a certain admixture of clay, and this stratum was above yellowish brown clay with a slight admixture of sand. At the center of the base of the mound a hole had been dug about 7 feet in diameter, extending down 5 feet 4 inches. In filling the pit, sand from the upper sand layer had been discarded, the material used being clay from the layer below, with a certain admixture of bits of charcoal and occasional oyster-shells. This mass of clay had somewhat the appearance of an altar, but careful search showed neither bones, artifacts nor evidence of the use of fire.

#### MOUNDS NEAR HASELL POINT, BEAUFORT COUNTY (2).

A mound about three-quarters of a mile in a northwesterly direction from Hasell point, on the Colleton river, stood in woods on the edge of a cultivated field. Its shape was that of the usual truncated cone; its height, 4 feet 7 inches; its diameter of base, 34 feet. Shell deposits were nearby. A small trench had previously been dug. Considerably over one-half was dug away by us with the permission of Mrs. Sarah Hasell, of Hasell point.

The mound was made of yellow sand with irregular layers of oyster-shells. Nothing was found by us save a few sherds, undecorated or cord-marked. In the sand thrown out by the previous digger were a few fragments of calcined bones, probably belonging to a central deposit.

In the field by the woods in which was the mound just described and a comparatively short distance from it was what the plow had spared of a mound, also the property of Mrs. Hasell, 1 foot 4 inches in height and 32 feet across, at the time

<sup>1</sup> "Certain Aboriginal Mounds of the Georgia Coast," C. B. Moore, *Jour. Acad. Nat. Sci.*, Vol. XI.

<sup>2</sup> "The Aboriginal Remains of Balsam lake, Ontario," "American Antiquarian," March, 1897, page 71.

<sup>3</sup> In private letters.

of our investigation. About one-half the mound and all the central part were dug through by us.

The mound was composed of dark brown sand with occasional pockets of oyster- and of mussel-shells. A central deposit of oyster-shells, with a diameter of about 15 feet, had a maximum thickness at the center of about 1 foot. Sherds were undecorated or cord-marked. Outlying burials were present as in some of the Georgia mounds.

Burial No. 1, 31 feet S. W. from the center of the mound, 15 inches down, was a pelvis and part of the thighs, apparently a late disturbance.

Burial No. 2, 29 feet W. S. W., a skeleton, full length on back, head N. N. W., 9 inches down, sex uncertain through decay.

Burial No. 3, 22 feet S. S. E., 10 inches down, a skeleton much decayed, flexed on the right side.

Burial No. 4, 16 feet E. S. E., on bottom of a pit, 3 feet down, was a skeleton of a male, partly flexed on the right side, head N. E.

Burial No. 5, 13 feet S. by W., 2 feet 5 inches down, in a pit with an undisturbed stratum of oyster-shells above, were leg and feet-bones in order, bones of the right arm also in order, sacrum, some vertebrae, the lower jaw and some ribs.

Burial No. 6, at the center, in a large pit, 3 feet 8 inches down, with charcoal and fragments of calcined human bones, were two femurs, two tibiae and a fibula, not in order, all unburnt. Three feet away, at about the same level, were burnt fragments of bones, also ribs, part of a radius and a lower jaw, showing no trace of fire.

#### ABORIGINAL ENCLOSURE, GUERARD POINT, BEAUFORT COUNTY.

In sight of the water, on Guerard point, on the Oketeet river, is a roughly circular, aboriginal enclosure composed of marine shells, mainly those of the oyster. It has been greatly lowered by the plow and considerably spread out. The present maximum height of the walls is 28 inches, their average breadth about 33 feet. The inside diameter is 65 feet, approximately. No oyster-shells except those of the enclosure were discovered in the neighborhood. This enclosure (whose use we cannot determine) is of the same class as that on Bull island, S. C., and the great one on Sapelo island, Ga., figured and described by us in our previous Report.

We are indebted to Mrs. C. B. Guerard, of Bluffton, S. C., for permission to investigate on her property at Guerard point.

#### MOUND AT INDIAN HILL, BEAUFORT COUNTY.

In a cultivated field, on the property of Mrs. E. C. Paget, who kindly gave permission to investigate, was a mound greatly lowered and spread out by cultivation. Its height was 17 inches; its diameter, 47 feet. There had been some previous examination. The mound was carefully gone through by us without result, save the discovery of a central deposit of burnt and unburnt bones considerably disturbed and a few rough sherds, mostly cord-marked.

## LARGER MOUND, LITTLE ISLAND, BEAUFORT COUNTY.

This mound, on the southeastern end of Little island, overlooking Whale branch, an arm of Broad river,<sup>1</sup> occupied the most prominent point of the eastern shore. The mound was investigated by us with the kind permission of James M. Crofut, Esq., of Beaufort, S. C., under whose control the island now is.

The mound measured from the north, where the ground sloped upward, had a height of 11 feet; from the south its altitude was a trifle over 14 feet. From the summit plateau to the base of the mound at the center was about 14 feet, showing there was no extension beneath the general level.

The base of the mound, elliptical in outline, had an east and west diameter of 100 feet, and a north and south diameter of 150 feet. The summit plateau had diameters east and west and north and south of 38 feet and 61 feet, respectively. Its outline also was elliptical. The plateau was markedly level, and the sides of the mound ascended at so steep an angle that evidently no cultivation had ever been attempted. No previous investigation had been undertaken so far as known.

On the mound were a number of pines, some large, and live-oaks of moderate size.

To determine the nature of this mound a large trench was dug along the base toward the center resulting in the discovery of walls on the bottom of the mound, the investigation of which required extensive digging.

The material above was removed, the space enclosed by the walls completely excavated, parts of the exterior were laid bare and the walls carefully shored by the aid of planks. The work of excavation, irrespective of the survey, the artist's work and the filling, took twelve days of seven hours each, much of the material requiring quadruple handling. During the work an increasing force of men was employed, the latter part requiring twenty-eight; exclusive of four engaged in superintendence. The walls, the area excavated and the extent of the mound are shown on ground plan (Fig. 1), and the structure as it appeared looking down from the southeast corner of the excavation is shown in the frontispiece,

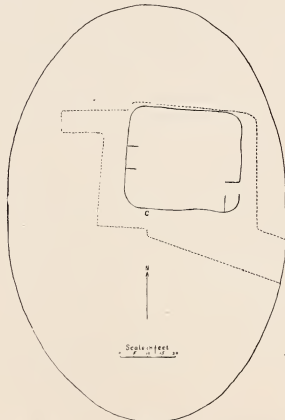


Fig. 1.—Ground plan of structure, excavation and mound. Little Island, S. C.

which is drawn from a sketch made on the spot, from photographs and from sections of the wall which were brought home.

<sup>1</sup> Broad river, the Grande of the Huguenots, A. D., 1562. For an interesting account of the aborigines of this vicinity see "History of Jean Ribault's First Voyage to Florida," by René Laudonnière. Historical Collections of Louisiana and Florida, New York, 1869.



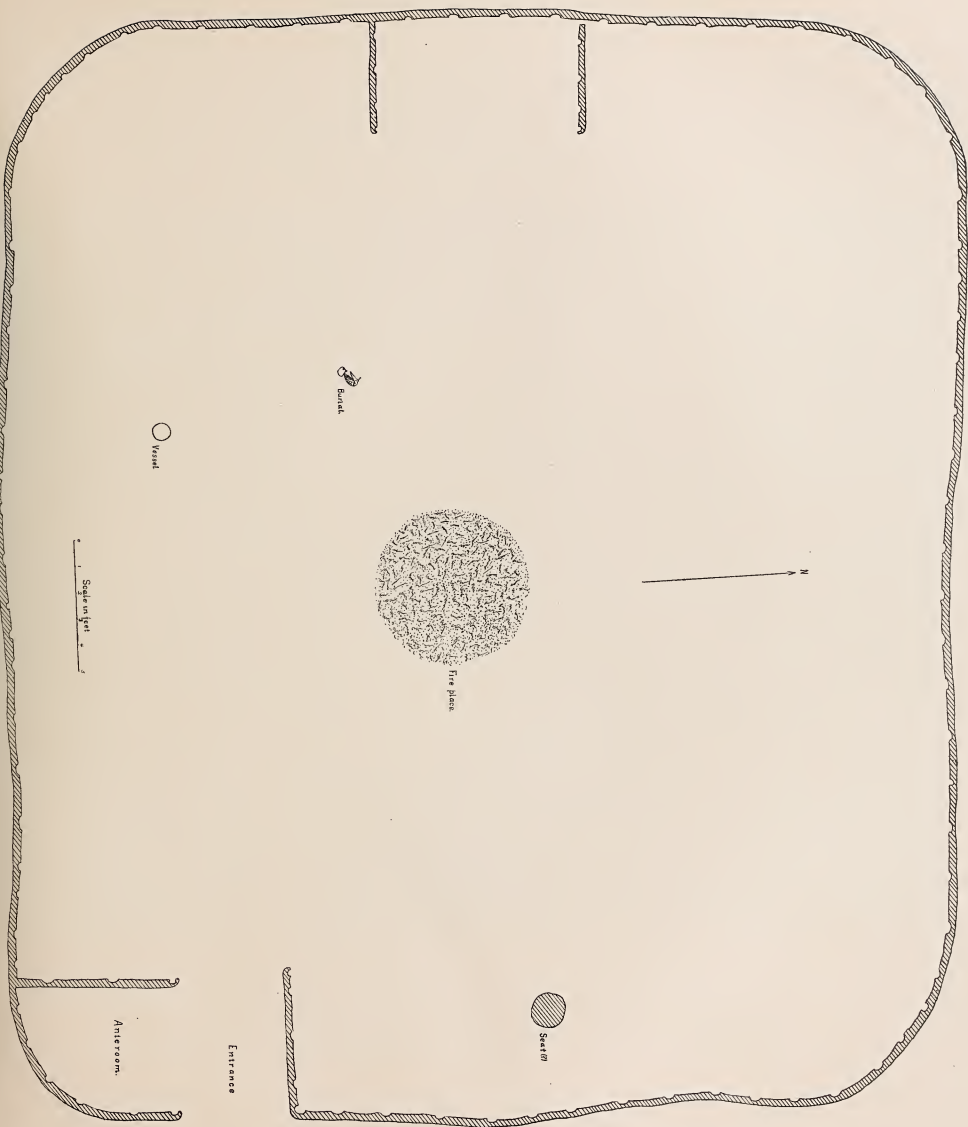


Fig. 2.—Ground plan of aboriginal structure. Mound on Little Island, S. C.

On the base of the mound and mainly to the north and east of the center (marked C on the ground plan) was a quadrilateral enclosure made by walls of clay, the northeast corner being 1 foot 7 inches, the northwest corner 7 feet 3 inches, the southeast corner 5 feet and the southwest corner 9 feet from the surface, respectively.

The enclosure was not exactly square, the sides varying slightly in length and the corners being rounded. Had it been quadrangular, the northern wall would have been 40 feet 2 inches in length; the southern, 41 feet 9 inches; the eastern wall, 35 feet 7 inches; the western wall, 36 feet 9 inches. The four walls in direction followed closely the cardinal points of the compass, the variation ranging between 2° and 4.5°. This orientation, however, was probably not intentional, as the eastern wall fronted, and was almost parallel to, the river, which at this point runs nearly north and south.

There were no windows. The entrance shown on the plan (Fig. 2) and marked X on the half-tone reproduction from a photograph (Fig. 3), was in the east wall near the southeastern corner. The width of the entrance was 4 feet 6 inches.

A partition of clay, the height of the wall and of similar structure, extended inward 5 feet 5 inches from the northern margin of the entrance. To the south of the entrance was a curious little three-sided compartment 5 feet wide at the entrance and 6 feet 3 inches in length, formed by the erection of a partition of clay and portions of the southern and eastern walls, including the southeastern corner. From the western wall were two parallel partitions of clay extending inward 4 feet 2 inches. These partitions practically enclosed the central 8 feet of the wall. Their use is problematic. They bore no marks of fire. During the excavation was found among the oyster-shells which covered the enclosure, a description of which will be given later, a cylindrical empty space, evidently the mold of a post, 8 inches in diameter and 6 feet in length, approximately. Starting from it on one side a layer of clay from 2 to 3 inches in thickness extended a number of feet. This layer contained, so far as we could determine, no holes showing former presence of supports, and it would hardly seem likely that such an area of clay could stand supported by a single post. For this reason and also from the fact that the clay did not lie upon the floor of the former structure but from 1 to 2 feet above in the shell, we cannot see how this layer could have been a partition, and are unable to suggest an explanation of its presence. Several other layers, unassociated with molds of posts, were met with in the shell within the enclosure.

The walls closely approximated 4 feet 3 inches in height. In thickness they varied from 2 to 3 inches, increasing to 4 or 5 inches at the top where a stringer had been enclosed. The wall had been supported by upright posts, which had been, in certain cases at least, covered with bark, as was plainly shown by the impression left in the clay. These uprights varied in diameter from 3.5 to 6 inches and projected 6 to 8 inches above the top of the wall. Some left molds in the clayey sand above the shell, indicating considerable enlargement around the top. We are unable to suggest a cause for this as no indication of anything extending from them was

discovered. These uprights, which were from 14 to 19 inches apart, were held together by twelve parallel circular cross-pieces, probably vines, each about .3 of an inch in diameter, surmounted by a circular stringer about 1 inch in diameter, over



Fig. 3.—Entrance and compartment. Aboriginal structure. Mound on Little island, S. C.

which, as we have said, the clay had been turned and rounded. At places, marks in the clay plainly showed where the cross-pieces and the stringer had been attached to the uprights, probably by vines. The half-tone reproduction of a photograph of a portion of the wall (Fig. 4) shows the impression of the uprights and cross-pieces.

The molds in the sand above the wall are also plainly distinguishable. The longitudinal lines are cracks which appeared in the clay on exposure to the sun, and have no connection with the process of manufacture of the wall.

Over this frame-work, with the exception of the inner portion of the uprights,



Fig. 4.—Portion of wall showing molds of uprights and cross-pieces. Aboriginal structure. Mound on Little island, S. C.

which were allowed to project from the wall, clay had been plastered, as shown in the cross-section of the upper part of the wall (Fig. 5); the space left by the stringer being marked A, those by the three upper cross-pieces B. The terminal posts of the partitions, however, had been enclosed in the clay. This clay, of a yellowish color



but turning red on exposure, was moist and soft when uncovered but hardened to the consistency of a sun-dried brick upon contact with the air and sunlight. It was homogeneous, containing no admixture of sand, gravel, stones or vegetable fibre. In its moist condition, inside and out, it had received the impression of the oyster-shells over its entire surface, thus rendering impossible the determination as to any incised decoration or the like.

At irregular distances, usually but not always between consecutive uprights, on the top of the wall, were semi-circular depressions from 2 to 4 inches in diameter, which had undoubtedly held ends of poles serving as rafters. A careful examination of the interior of some of these depressions indicated, by an increased height toward the inner surface of the wall, that the poles had slanted upward at a considerable angle. Other depressions were too much broken or indented by oyster-shells for any determination. It is probable that boughs rather than clay were used as a covering in the construction of the roof, as no fragments of clay lay upon the floor of the structure, and the sheets of clay lay upon the floor in the shells, to which we have referred, were by no means sufficient in area to represent a roof.

There were present in the floor of the structure numerous circular holes representing ends of former supports, some of which probably upheld the roof.

Considerable excavations were made under the corners and doorway of the structure without result.

The entire floor of sand, darkened by admixture of charcoal, was dug through at a depth considerably below any marks of occupation, which extended from 3 to 5 inches in depth, except in the case of post-holes, to which reference has been made. Some of the holes, of considerable diameter, were filled with oyster-shells, and were probably open when the filling-in began, but the great majority, smaller as a rule, contained dark sand and midden refuse, bits of deer bone, charcoal, potsherds, etc. One of these sherds bore the familiar complicated stamp. Another was unusually good ware with dark and hard interior. In one post-hole were a number of carbonized fragments of very slender corn-cobs. These holes containing midden refuse, but no oyster-shell, we considered to belong to a period antedating the disuse of the structure and to have been filled before the bringing in of the oyster-shells.

Toward the center of the floor, as shown on the ground-plan, was a fire-place about 6 feet in diameter, showing considerable use, as the sand was hardened and reddened to a depth of about 5 inches. On the floor near the eastern wall was a projection or large knob of clay, like a seat, circular with rounded top, 9 inches in height and 1 foot 4 inches in diameter.

Fourteen inches from the surface, beneath where a fire had been, was the skeleton of a very young infant.



Fig. 5.—Cross-section of upper part of wall. (One-quarter size.)



Just beneath the surface was a pot of about 8 inches diameter, the clay of which was so softened by moisture that it crumbled into pieces.

For some reason unknown to us it became the purpose of the aborigines to enclose their wall within a mound; and this they did apparently in the following manner: First they filled in the enclosure with a mass of shells (mainly of the oyster but containing those of the marine mussel, of the *Littorina irrorata* and doubtless of other shell fish), and midden debris (B) to about the height of the wall (A) allowing the deposit of shells (C) to continue a number of feet in a gradual slope beyond the wall, as may be seen by consulting the cross section (Fig. 6), taken about midway along the southern side of the enclosure. This shell deposit outside the

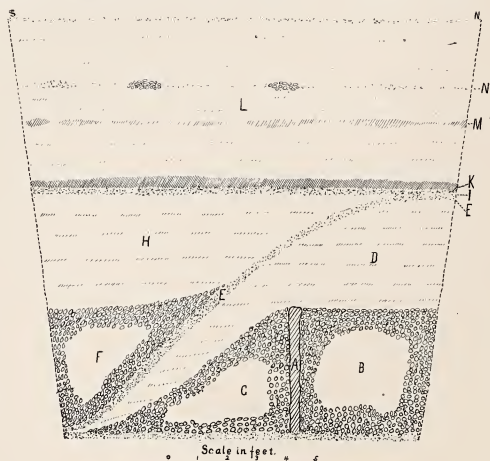


Fig. 6.—Cross-section of part of mound. Little island, S. C.

wall extended a distance of about 8 feet, measured horizontally. The oyster-shells were not a deposit made by occupation, since they lay loosely together and were neither crushed nor tightly packed, and single calcined oyster-shells from fire-places in shell heaps at a distance were scattered among them. Throughout the entire deposit we noticed but one fire-place, a small one, and this was unquestionably made during the filling in of the shells. From these facts we know that the oyster-shells had been carried to the enclosure from some dwelling site<sup>1</sup> to form the initial stage in the construction of the mound.

<sup>1</sup> For data as to shell heaps in this country the reader is referred to Professor Jeffries Wyman's Memoir "Fresh Water Shell Mounds of the St. Johns river, Florida" and "Certain Shell Heaps of the St. Johns River, Florida, Hitherto Unexplored," Clarence B. Moore, "American Naturalist," Nov., 1892; Jan., 1893; Feb., 1893; July, 1893; Aug., 1893; Jan., 1894; July, 1894.

Next, over the mass of oyster-shells, was piled the clayey sand of the surrounding territory, mainly in thin horizontal layers of various shades of white, brown, yellow (D). These layers were surmounted by what we took to be the layer of occupation (E) from 3 to 5 inches in thickness, consisting of clayey sand rendered black by action of fire and by admixture of charcoal. The mound, now about 8 feet 3 inches in height, presumably having been occupied for a period, was enlarged by piling oyster-shells (F) around its margin for a considerable distance out, though not to the margin of the final mound. Then the new mound was brought up to the level of the original one by the addition of layers of clayey sand (H). This added portion, with the plateau of the first mound, had served as a place of abode, as a layer of occupation (I), merging with the similar layer (E) on the plateau of the original mound, was plainly discernible. The plateau thus enlarged, so far as the investigation went, was covered with a layer of red clay devoid of sand (K) from 3 to 5 inches in thickness. Above this stratum of clay came the remainder of the mound as found by us (L) consisting of less distinct strata of clayey sand, another band of red clay (M), not so clearly marked, of about the same thickness as the other, and about 2 feet above it, and about 1 foot higher, signs of occupation in places (N) consisting of the usual particles of charcoal and occasional small pockets of oyster-shells, with nearly 3 feet of less distinctly stratified clayey sand superimposed.

Immediately under the lower stratum of red clay were a number of circular spaces from 6 to 11 inches in diameter and about 3 feet in depth, distinctly cutting the layers through which they passed and filled with sand of a single shade. In some cases the layer of red clay above them was intact; in others fragments of the layer had fallen into, and lay on the top of, the sand filling the space. It was, therefore, evident that the posts or stakes had disappeared, probably through decay before the imposition of the red clay layer. These post-holes were present not alone on the mound originally piled over the wall, but were found in the added portion (H).

In spite of an earnest endeavor on our part to show all these post-holes on a ground-plan we were unable to do so; their exact recognition being extremely difficult. That these posts had no connection with the clay wall beneath was distinctly shown by the fact that unbroken strata in every case lay between the bases of the holes and the level of the summit of the wall.

Beginning at the second layer of occupation, which, as we have stated, consisted of traces of fire and occasional small pockets of oyster-shells, a number of post-holes of somewhat greater diameter than those just described extended down about 3 feet terminating above, but never coming in contact with, the lower layer of red clay. They also were filled with sand, but were not nearly so numerous as the others and were not plotted by us. They evidently had no connection with any of the spaces beneath, and doubtless at one time held supports during another period of occupation.

We have then various distinct periods of occupation as follows: that of the clay wall on the original surface; that of the original mound; that of the original mound with its enlargement on which was a perishable structure of some sort sup-

ported by wooden posts; a still later occupation during which wooden posts were again in use; and finally that of the surface of the mound as found by us.

At two or three feet from the surface of the mound began two extensive pockets of oyster-shells about 3 feet in depth. Nothing was discovered in association.

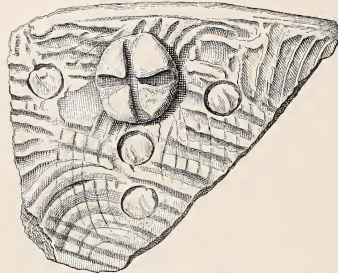


Fig. 7.—Sherd. Mound on Little island. (Full size.)

With the oyster-shells within and surrounding the enclosure were numerous sherds, undecorated, also stamped in squares and with complicated stamp. One with complicated stamp and knob impressed with a cross is shown in Fig. 7.

In addition were: pebble hammers of quartz and quartz pebbles; smoothing stones; many fragments of chert; two arrowheads of chert; bone awls; and a considerable number of discs made from fragments of earthenware vessels. Loose in the sand were a graceful arrowhead of chert, and,

near the surface, a polished chisel of volcanic rock, about 6 inches in length.

Just beneath the surface of the northern slope, in a small pit, was an intrusive burial, the remains of an adult male, heaped together, and in part calcined. With them were fragments of earthenware, a mass of sandy clay partly baked, and a quantity of carbonized maize.

Fortunately we know something of aboriginal structures which may throw some light upon this one. Gen. Gates P. Thruston, in his interesting "Antiquities of Tennessee" (Second edition, p. 68 *et al.*), has gathered much information on the subject. We quote at length:

"The ancient works of Tennessee were apparently of simple construction, but they indicate the existence of large family dwellings as a characteristic of aboriginal society. Early historical records are also in harmony with this view. From Garcilasso de la Vega we learn that some of the houses in the fortified native towns visited by De Soto were very large. He says, 'the whole number of houses' [in Mauvila, Alabama] 'did not exceed eighty, but they were of size capable of lodging from five to fifteen hundred persons each,' a statement probably extravagant, but generally sustained by the other chronicles.<sup>1</sup>

"Joutel, one of La Salle's companions in 1687, tells us that when they visited the village of the Cenis, west of the Mississippi, 'The Indian town, with its large thatched lodges, looked like a cluster of gigantic haystacks.' He declares that 'some of them were sixty feet in diameter.'<sup>2</sup> Joutel's description of one of these dwellings illustrates the house life of the southern Indians at that early period. 'These

<sup>1</sup> Garcilasso de la Vega, L. III, C. 20; Conquest of Florida (Irving), page 262.

<sup>2</sup> La Salle (Parkman), pages 415, 417.

lodges of the *Cenis*, he says, 'often contained eight or ten families. They were made by firmly planting in a circle, tall, straight, young trees, such as grew in the swamps. The tops were then bent inward, and lashed together, and the frame thus constructed was thickly covered with thatch, a hole being left at the top for the escape of the smoke. The inmates were ranged around the circumference of the structure, each family in a kind of stall, open in front, but separated from those adjoining by partitions of mats. Here they placed their beds of cane, their painted robes of buffalo and deer skin, their cooking utensils of pottery, and other household goods, and here, too, the head of the family hung his bow, quiver, lance, and shield. There was nothing in common but the fire, which burned in the middle of the lodge, and was never suffered to go out.'<sup>1</sup>

"In Iberville's Journal, it is stated that the cabins of the Bayougoula, a tribe of Louisiana, were circular in form, about thirty feet in diameter, and plastered with clay to the height of a man.<sup>2</sup> Adair says, the winter cabins, or hot houses of the Cherokees, and several other tribes, were circular, and covered six or seven inches thick with tough clay, mixed with grass. Father Gravier, speaking of the *Toungias* of Arkansas, says, 'Their cabins were round and vaulted. They were lathed with cane, and plastered with mud from bottom to top, within and without, with a good covering of straw.'<sup>3</sup> Tonti, who accompanied La Salle, in 1682, describes his visit to the town of *Taensas* on the Lower Mississippi. He says the natives had 'large square dwellings, built of sun-baked mud, mixed with straw, arched over with a dome-shaped roof of canes and placed in regular order around an open area. Two of them were larger and better than the rest. One was the lodge of the chief, the other was the temple or house of the sun. The house of the chief was about forty feet square, with no opening but the door. The temple 'where they kept the bones of their departed chiefs,' in construction, was much like the chief's house; a strong mud wall planted with stakes surrounded it. In the middle of the temple was a kind of an altar, before which a 'perpetual fire,' composed of large logs, was burning, and was watched by two old men devoted to their office.'<sup>4</sup>

"Colonel Morris, an agent of the Bureau of Ethnology, some time since explored a group of earth-works in Butler county, Missouri, consisting of 'an inclosing wall and ditch, two large outer excavations, and four inside mounds.' The largest mound had an average diameter of about one hundred and thirty-five feet, and was twenty feet high. Deeply imbedded within the central portions of the mound were found two large upright charred posts, near the charred and decaying remains of horizontal or cross timbers, and in connection with burned clay, ashes, charcoal, and charred bones, indicating almost certainly the remains of a large house structure, built upon or in connection with this mound, or upon the smaller mound, upon which the main mound appears to have been subsequently erected. Within the different strata or layers of the mound were the remains of nine large fire-beds, indicating

<sup>1</sup> La Salle (Parkman), page 417.

<sup>2</sup> Professor Cyrus Thomas, *Magazine of American History*, February, 1884.

<sup>3</sup> *Early French Voyages* (Shea), page 135.

<sup>4</sup> La Salle (Parkman), page 281.

altars, sacrifices, burial ceremonies, or possibly, merely the fire-hearthis used at different periods of occupation—Magazine of American History (Thomas), February, 1884. Gerard Fowke, an assistant of the Bureau of Ethnology, also reports that recently, in exploring a large mound on the Scioto river, in Ross county, Ohio, he discovered the remains of wooden 'posts set in pairs around the edge; other posts at intervals within assisted [or may have assisted] in holding up the roof. The interior space was nearly forty feet across. A streak an inch thick of mingled ashes, charcoal, and black earth, spread over the floor, indicated the usual untidy appearance of the aboriginal housekeeping.' The skeleton remains of an elaborate burial were inclosed in the mound, and appearances indicated that the house had been torn away or burned, and the mound subsequently increased in size over the remains.—Gerard Fowke's Report in the Cincinnati Commercial Gazette, July 23, 1888.

"In 1876, Professor Carr, of the Peabody Museum, in exploring a large mound in Lee county, Virginia, discovered a series of decaying cedar posts; imbedded in a circle around the top of the mound, which the intelligent explorer regarded as the remains of a large house structure similar to the council-house Adair saw on a mound in the old Cherokee town of Cowe, Georgia, in 1773.—Tenth Annual Report Peabody Museum, page 75.

"Professor Putnam also found an upright cedar post still standing deeply planted in the large ancient mound of the Lebanon group, in Tennessee."

#### SMALLER MOUND, LITTLE ISLAND, BEAUFORT COUNTY.

This mound, about 35 yards south-southeast from the large domiciliary mound, had been about one-half washed away by the waters of Whale branch in times of storm. The mound, when whole, must have had a base diameter of about 50 feet. Its height, measured on the north, was 3 feet 7 inches; measured on the south, somewhat more, as the bank on which it was, had a downward slope. What remained of the mound was practically dug through by us with the exception of that part on the north on which a large tree was growing. We are indebted to Mr. Crofut for permission to investigate.

The mound had been composed, as nearly as we could judge, of a mass of oyster-shells 3 to 4 feet in thickness at the center and sloping to the margin. This mass of shell rested on a layer of disturbed clayey sand about 1 foot in thickness. This mass of oyster-shells was covered with a mixture of clay and sand, the sand predominating, containing oyster-shells in varying proportion. From the surface, at what seemed to be the center of the summit plateau, to undisturbed sand was a vertical distance of 8 feet 8 inches. Therefore, the base of the mound was about 5 feet under ground.

Occupying the central part of the mound, apparently dug into the oyster-shells to within 1 foot of the basal layer of disturbed sand, was a pit having a diameter of 24 feet where it entered the shell (see diagram Fig. 8.) This pit had been filled with material resembling that of the layer above the shell. With the exception of a shaft of a human tibia, found loose in the sand, the central part of the mound



contained the only human remains met with by us. These consisted of four separate deposits of calcined fragments of human remains, each deposit representing the skeletons of several individuals. These deposits were closely associated; one lay at the center of the bottom of the pit, about 7 feet down; two, in the shell farther into the mound, 7.5 feet down; and one lay below these in the basal layer of sand, 8 feet 8 inches down. With one deposit were: shell beads, none over .5 of an inch in diameter; a perforated *Cardium*; a number of small marine univalves (*Margi-nella*); one chert knife; one entire tooth of a fossil shark; two parts of fossil sharks' teeth, probably used for piercing purposes; a piercing implement of bone; a tooth of a large carnivore; a lot of small pebbles, probably from a rattle; twelve cockle-shells (*Arca incongrua*) perforated for suspension; twelve marine shells (*Olivæ literata*) pierced longitudinally for stringing; a pebble about one inch in diameter. With another deposit were small shell beads. Loose in the sand was a fossil shark's tooth and throughout the mound were earthenware discs of the type which we have already mentioned. Certain sherds present in the mound bore the complicated stamp.

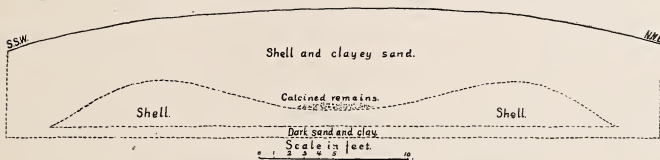


Fig. 8.—Cross-section through center of smaller mound. Little island, S. C.

#### MOUNDS NEAR BUTTON HILL, PORT ROYAL ISLAND, BEAUFORT COUNTY (4).

The settlement known as Button hill lies about three miles west of Beaufort. On the place of Mr. N. Christianson was a mound greatly lowered and spread out by cultivation. Its height was 1.5 feet; its diameter of base, 42 by 52 feet. Treasure seekers had dug considerably into marginal portions. The mound was trenched and the central part dug out by us without result.

A few yards distant was a somewhat smaller mound equally devoid of interest.

In a cultivated field about three-quarters of a mile south-by-west from the Christianson place, was a mound partly owned by Mr. Fred Carter and partly by Mr. James White, both colored. What the plough had spared of this mound was 2 feet 9 inches in height. The apparent diameter was 58 feet, but much material had been worked down from central portions. The southern half of the mound was worked through and the central portions were dug out. The mound was composed of yellow sand with the usual fire-places. A few loose sherds, plain and cord-marked, were met with. Four deposits of calcined and unburnt bones mixed, were found, the farthest from the center being at a distance of 13 feet. With one deposit was a small streak of hematite. Loose in the sand was a bird-arrow of chert.

About 300 yards southwest from the preceding mound, in a cultivated field,

over which oyster-shells were scattered, was the remnant of a mound belonging in part to the estate of Mr. George Waterhouse and in part to Mr. Fred Carter, colored. Our thanks are tendered to Mr. William P. Waterhouse, of Beaufort, for permission to investigate. The mound was somewhat irregular in outline, its base having a diameter of 52 by 57 feet. Its height was 2 feet 10 inches. It was about three-fifths dug through. A few scattered bones lay near the center under hematite. Four deposits of calcined and unburnt bones mingled were met with toward the center. With one were quantities of hematite; with another, a little mica. One deposit lay at the bottom of a large central pit 6 feet 3 inches from the surface. On the surface, near the mound, was picked up an unusually gracefully shaped "celt" of polished volcanic rock, with beveled cutting edge, the opposite end tapering to a blunt point.

#### INDIAN HILL, ST. HELENA ISLAND, BEAUFORT COUNTY.

This mound, rising high above the flat surface of St. Helena island, is a landmark known far and near as Indian hill. It stands in the midst of cultivated fields and is the property of a colored family named Chaplin.

The mound had seen but little previous investigation, practically none, if its size is taken into consideration, and the sides of the mound are too steep for cultivation. In shape the mound was the usual irregular truncated cone. The solid plateau was perfectly level. The height of the mound is 13 feet 2 inches; its diameter of base, east and west, 138 feet; north and south, 129 feet. The summit plateau, about circular, was 62 feet across.

From the northern side a trench 18 feet wide converging slightly toward the bottom and contracting somewhat, 15 feet farthest in, was run along the base to the center of the mound. The mound is composed, as far as our investigation enabled us to judge, of a tenacious mixture of sand and clay in small irregular streaks of different shades. Several small layers of clay were met with locally. No oyster-shells were found, though some were scattered around the surrounding fields.

A measurement from the center of the summit plateau, taken vertically to undisturbed soil, gave a depth of 15 feet or nearly 2 feet more than the height of the mound. As there were no signs of any basal pit to account for extra depth, it seems likely that the surrounding country, whose soil is a black loam filled with organic matter, was so long inhabited that a deposit two feet in thickness grew up around the mound.

Although no distinct evidence of long-continued periods of occupation was found in the mound, a number of post-holes from which the wood had rotted, still unfilled, were found at four distinct levels.

Sherds were infrequently found. Four pottery discs, one bearing a complicated stamp, came from midden-refuse, probably. On the base, doubtless left there by accident, was a handsomely wrought spearhead of chert, 5 inches in length.

No burials were met with and we must regard the mound at Indian hill as erected for domiciliary purposes.

Near the mound was a considerable rise in the ground having a height of about 2 feet. It was dug through to a certain extent and proved to be a dwelling site made up of rich clayey sand filled with organic matter and containing many bones of lower animals, also numerous sherds and a slight sprinkling of oyster-shells.

#### MOUND ON POLLEEWAHNEE ISLAND, BEAUFORT COUNTY.

Polleewahnee island, practically a part of St. Helena, is separated from that island by a small run. In a cultivated field containing shell deposits and having others in the vicinity, on the property of a colored family named Williams, about one mile north-northwest from Indian hill, is a mound 5 feet 10 inches in height, the sides of which, toward the base, have undergone extended cultivation. On the upper portion were good sized live-oaks and a palmetto. The mound was so spread out through continuous ploughing that it was impossible to determine its boundaries. A point judged to be the center of the summit was taken as the center of a circle having a diameter of 80 feet. The mound, thoroughly examined, proved to be without artifacts or burials.

A short distance away was a midden deposit similar to that near Indian hill.

The deposits of oyster-shells, evidence of dwelling sites throughout all the territory visited by us along the South Carolina coast were comparatively insignificant, being mainly confined to shells scattered over fields. It would seem then that the use of the oyster as an article of diet by the coast Indians decreased going northward, since the shell deposits of South Carolina are greatly exceeded by those of Georgia, which, in their turn, yield the palm to the mighty masses of shell along the Florida coast. Whether the restricted use of shell-fish for food on the South Carolina coast arose from a less bountiful supply of molluscs, a preference for other articles of diet on the part of the aborigines, or a sparse population, we are unable to decide.

A limited habitation would account for the scarcity of mounds domiciliary and sepulchral. The small number of mounds, however, could be explained under another hypothesis. The sea-islands of the Georgia coast in entirety or in large tracts are held by individual owners. Some islands are kept as game preserves and large parts of others lie fallow. Mounds on these islands have suffered less by cultivation than many on the sea-islands of South Carolina, where often the territory is divided into very small tracts, which are carefully and continuously tilled by their owners whose whole support they are. It is not unlikely, then, that what is left of some places of aboriginal sepulture along the South Carolina coast is no longer visible. Still, such mounds as have been investigated would doubtless be representative of those no longer evident.

These mounds, as may be seen from their description, may be divided into two classes: larger mounds used for domiciliary purposes and low mounds used for burial.

In the low burial mounds, as an almost invariable rule, burials were found well in toward the center, the only exceptions being a mound at Hasell point and

the mound on Callawassie island and in these mounds alone were burials found in anatomical order, the chief method of disposing of the dead elsewhere being partial cremation; that is, deposits where disconnected bones showing no mark of fire were mixed with charred and calcined fragments. In the Little island burial mound calcined bones alone were met with.

Although in certain mounds fragments of pottery were found bearing a complicated stamp of the type of the Georgia coast, no evidence of urn burial was seen during our investigation.

The custom to inter artifacts with the dead, so universal among the aborigines, seems to have been little practised along the South Carolina coast, for only at Little island, as the reader may recall, did we find it in evidence, and then little beyond the customary beads was present.

On the whole, it would seem probable the South Carolina coast has little to offer from an archaeological standpoint.

## CERTAIN ABORIGINAL MOUNDS OF THE SAVANNAH RIVER.

BY CLARENCE B. MOORE.

The Savannah river, a narrow, muddy stream with rapid current, is navigable as far as Augusta, about 223 miles following the course of the stream, though the distance in a straight line is considerably less. Our investigation was limited to this portion of the river, which has South Carolina on the northern side and Georgia on the southern side.

The river runs between swamps extending a considerable distance back, the inhabitants, as a rule, living in the back country, though at places bluffs have a few inhabitants. All these high places were carefully examined by us during part of the winter of 1897-1898, in a rapid steamer of light draught, our work, moreover, being greatly facilitated through data acquired by George W. Rossignol, captain of our steamer, who has been employed in mound work for years, who during the previous summer went to Augusta and back to prepare the way for the winter's work.

It soon became apparent to us that the Savannah river, though no digging into the mounds had been attempted for scientific purposes, did not offer a promising field, for many rises in the ground known as mounds by the inhabitants proved to be roughly circular banks thrown up by the current, and this was notably so in the case of Little Patten and Big Patten, which are given as Indian mounds, even on the government chart. In addition, the few mounds found back from the river in cultivated fields were very small and had been rifled by seekers after treasure, and the swamp mounds seemed made for domiciliary purposes. Therefore, we did not pursue our usual custom, totally to demolish each mound discovered, as we had done, as a rule, in Florida and on the Georgia coast. No mounds of which we heard, however, except one on which stood a house, were left uninvestigated.

The mounds of the Savannah river, in the main, as we found them, were of two classes, namely: low burial mounds of sand, back on the high ground, and large mounds of clay in the swamp, having a great summit plateau as though made for habitation and refuge in periods of high water. In one case we found a burial in one of these swamp mounds, which, however, may have been incidental during its erection.

It is not likely that the swamps of the Savannah had a large population in prehistoric times, for the aborigines were good judges of dwelling sites. No shell heaps are visible along the banks of the river—at least, below Augusta. There were then probably comparatively few mounds in early times and of these, doubtless some of the smaller have been ploughed away. In addition, the river is ever encroaching on the Carolina shore. In 1776, William Bartram saw a number of



mounds at Silver bluff,<sup>1</sup> about 27 miles by water below Augusta, of which no trace is now apparent. Colonel Jones<sup>2</sup> describes large mounds at Mason's plantation, below Augusta on the Carolina side, and examined a section of one which had been exposed by the river, finding no burials (page 155). He earnestly hopes that the mounds may be carefully watched during the process of destruction. All have totally disappeared. The archaeological examination of the Savannah river has been too long deferred.

*Mounds Investigated.*

- Near Pipemaker's creek, Chatham county, Georgia (2).
- Near Hudson's ferry, Screven county, Georgia (2).
- Near Mills' landing, Screven county, Georgia (2).
- Near Brooks' landing, Barnwell county, South Carolina (2).
- Near Demerie's ferry, Burke county, Georgia (2).
- Near Shell bluff, Burke county, Georgia (3).

MOUNDS NEAR PIPEMAKER'S CREEK, CHATHAM COUNTY, GEORGIA (2).

At the union of Pipemaker's creek and the Savannah river, about four miles above Savannah, in view from the river, on property belonging to Henry Taylor, Esq., of Savannah, who kindly gave us permission to investigate, are two aboriginal mounds.

The larger, a truncated cone in shape, has a base irregularly circular in outline with a diameter of about 130 feet. The diameter of the summit plateau, which also is circular, is about 60 feet. The mound, which has a height of 19 feet, presents a picturesque appearance. The sides are steep and on them grow cedars and live-oaks, the oaks covered with trailing moss. A large excavation had been made previous to our visit, by treasure seekers, we were told. The exposed portions were carefully examined by us and a certain amount of digging done without showing traces of burials. The mound seemed to be composed of clayey sand with oyster-shells in places.

Contiguous to the southwest margin of the large mound was a rise in the ground, circular in a general way, with a diameter of about 60 feet and a height of 3 feet at the center. The mound, which was more than half dug through by us, seemed to have been a refuse heap formed by long-continued occupation. It had also been used as a place of burial. Human remains were met with at eighteen points—the usual flexed burials, the head as a rule, though not always, pointing to the east. With the burials were small shell beads on two occasions and with one was a pebble-hammer roughly pecked to leave a central encircling ridge. In the midden debris were: many pebbles, some broken; bits of chert; two earthenware discs; one-half of a discoidal stone; numerous sherds bearing the check, the diamond-shaped and the complicated, stamp.

<sup>1</sup> C. C. Jones, "Antiquities of the Southern Indians," page 150.

<sup>2</sup> *Ibid.* page 153, *et seq.*

## MOUNDS NEAR HUDSON'S FERRY, SCREVEN COUNTY, GA. (2).

Hudson's ferry, about 68 miles by water above Savannah, is the steamboat landing for Enecks, a settlement and post-office about two miles inland. A man named Golden stated he had found two vessels of earthenware, one over the other, by the roadside at the landing, which contained cremated human bones. We visited Mr. T. J. Enecks, of Enecks, who showed us the vessels, which are of a type found on the Georgia coast.

In a field about 1 mile west of Hudson's ferry, on the property of Mr. William Prior, of Enecks, to whom we are indebted for permission to investigate, was a mound, much spread out by ploughing, in a cultivated field. Its diameter was 74 feet; its height, 2 feet 5 inches. The mound had been dug into previously to a certain extent. The holes remained unfilled. We were informed by the son of Mr. Prior that the digging was done by him and that he had found nothing except two skeletons. The mound was thoroughly investigated by us. It was of dark yellow sand without stratification or pits. A dark band ran through it at the level of the surrounding field.

Burial No. 1 was 4 feet S. E. by E. from the point taken by us as the center of the mound. The skeleton, of a male, heading S., was partly flexed, with trunk and face to the right. The legs were drawn up, the knees turned to the right, the upper arms lay along the body with the forearms bent across it. Near the skull was a chip of chert and a quantity of charcoal, though neither skull nor sand showed trace of fire. On either side of the right arm were two handsome discoidal stones each flat on one side and convex on the other, 2.3 inches and 2.7 inches in diameter, respectively. This skeleton had doubtless been buried, after exposure, with most of the parts held in place by the ligaments. The right foot, however, except the astragalus, was missing. The heel bone lay by the skull. The skeleton, which was 3 feet from the surface, had been let into the dark band at the base of the mound.

Burial No. 2 was 8 feet S. of the center and 2 feet 9 inches down, just through the black basal band. It was of a male, was flexed on the right and headed S. S. W. Back of the skull was a broken mussel shell and a tobacco pipe of earthenware covered as to the bowl with projecting knobs (Fig. 9).

Burial No. 3, 6 feet W. N. W., 2.5 feet down, head S., included the upper portion of a skeleton, the rest having been dug away during one of the excavations to which we have referred. In the sand, which had been thrown back and left, was an interesting tobacco pipe of light-colored clay consisting of an effigy of a bird, probably an owl. The wings, tail and "horns" are distinctly shown, as are the legs and eyes. Part of the bill is missing (Figs. 10, 11, 12). An interesting feature of this pipe is that the bird faces the smoker, the pipe evidently having been made more for the satisfaction of the owner than to attract the attention of others. We have before noticed this tendency in aboriginal pipes, notably in one found by us in the great Grant mound, Florida, where a small piece of copper had been fastened to the near side of the bowl.

Mr. J. D. McGuire, who has made an especial study of aboriginal tobacco pipes and whose memoir on the subject will shortly be brought out by the National Museum, says of this pipe that the specimen is the most interesting one of the pipes

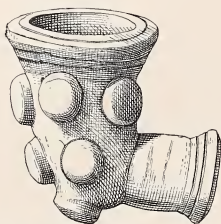


Fig. 9.—Tobacco-pipe of earthenware. Mound near Hudson's ferry. (Full size.)

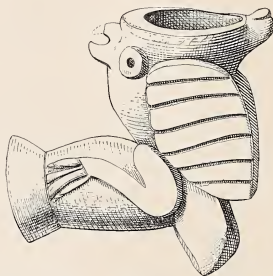


Fig. 10.—Tobacco-pipe of clay. Mound near Hudson's ferry. Side view. (Full size.)

of this type, which belongs to Georgia and South Carolina, that has come under his observation and by far the most elaborate one he knows of, though the pipe is related to other interesting pipes from the same locality and also from North Carolina and possibly from Tennessee.

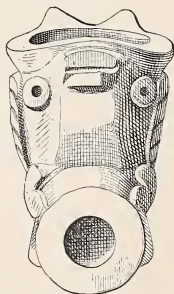


Fig. 11.—Tobacco-pipe of clay. Mound near Hudson's ferry. Showing front view. (Full size.)

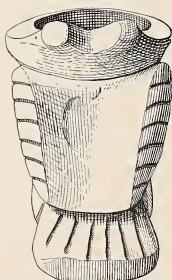


Fig. 12.—Tobacco-pipe of clay. Mound near Hudson's ferry. Showing rear view. (Full size.)

Mr. Andrew E. Douglass, whose superb collection of pipes may be seen at the Museum of Natural History, New York, writes of the bird-pipe as follows: "The pipe represented in the cuts is, so far as I know, entirely unique. It represents

what I take to be a conventional owl, and, as you observe, the face is turned to the smoker, which would be considered a legitimate Indian conception. It is not likely to have any duplicate, as it is hand-work and the artist is not likely to have adhered to the same design in modelling another. I regard it a fine specimen of original Cherokee work."

Burial No. 4, 8 feet W. S. W., 10 inches from the surface had been disturbed in part by the second pit of the previous digging. Charcoal lay near the skull.

Together, and unassociated with human remains, were three fossil shark's teeth, each somewhat over one inch in length, with bases and points considerably worn, showing use in handles as pointed tools. With them was a mussel-shell containing two bones with cores of spurs, doubtless belonging to a wild turkey. A pitted smoothing stone lay loose in the sand, as did two arrow-points of chert.

In a field formerly under cultivation, about half a mile southeast from the mound just described, was a mound of sand 4 feet 5 inches high and 61 feet across the base. It had been somewhat spread out by cultivation. Previous to our visit a small hole had been dug into the top. A trench 30 feet wide was dug, in from the margin through the center. About the middle of the mound were calcined fragments of bones probably belonging to one individual. Similar fragments were seen in the sand thrown out by the former digger.

#### MOUNDS NEAR MILLS' LANDING, SCREVEN COUNTY, GA. (2).

In the thick cypress swamp bordering the river and accessible only at low stages of the river, is a mound with circular base and marked summit plateau, also circular. This mound, about one-quarter of a mile in a northwesterly direction from the landing, which is about 112 miles by the river from Savannah, is on the property of Dr. G. L. Mills of Hirschman, Ga., and serves as a refuge for live-stock in times of freshet. Its height is 11 feet. Across the base is a distance of 92 feet. Trenching showed it to be of clay, apparently without stratification. No burials were encountered.

About half a mile in a northwesterly direction from the other is a mound apparently of the same type, though somewhat smaller. A small amount of trenching showed it to be of clay, but yielded no other result.

#### MOUNDS NEAR BROOKS' LANDING, BARNWELL COUNTY, S. C. (2).

Brooks' Landing, not given on the government chart, is about 121 miles from Savannah by the river. About half a mile in an easterly direction from the landing, in the cypress swamp, are two mounds on the property of Mr. S. G. Lawton, of Allendale, S. C., who courteously placed them at our disposition. The mounds, about the same size and almost contiguous, stand close to the edge of the terrace,

which borders the river in high water and is itself submerged in times of freshet. The northernmost mound was chosen for investigation. It was the usual shape, a greatly truncated cone with markedly level summit plateau. The diameter of base was 68 feet; of the summit plateau, 36 feet. Measured from the terrace on which it stands, its average height is 5 feet 4 inches, though, to an observer looking from the north and including the height of the terrace, its altitude would seem much greater. Trenches, aggregating 45 feet in length from 3 to 4 feet wide and from 5 to 6 feet deep, were dug into the summit plateau. About 5 feet down there seemed to be a black basal line indicating the original surface. The mound was of unstratified clay with occasional fire-places, perhaps in use during its construction. Three or four sherds were met with, and 5 feet from the surface was a deposit of small fragments of calcined bones, some of which were undoubtedly human. Probably this mound was domiciliary and the burial incidental.

#### STONY BLUFF, BURKE COUNTY, GA.

At Stony Bluff landing, about 131 miles by water above Savannah, the solid ground comes to the water's edge with masses of rock above the surface. This place has been the site of a great aboriginal workshop, the fields for acres around being covered with chips, spalls, cores, nodules and unfinished implements of chert. At places the deposit is such as to interfere with cultivation. The owner informed us that until recently, many interesting implements could be collected there and, as it was, we gathered a number of arrowheads and the like in the last stage of completion.

#### MOUNDS NEAR DEMERIE'S FERRY, BURKE COUNTY, GA. (2).

Demerie's ferry is about 161 miles by water, above Savannah. About three-quarters of a mile in a southerly direction from the ferry were two low mounds, kindly placed at our disposition by the owner, Mr. H. H. D'Antignac, of Augusta, Ga. These mounds had been dug into before. In the larger, human bones were at two points. Our investigation of the smaller was without result.

#### MOUNDS NEAR SHELL BLUFF, BURKE COUNTY, GA. (3).

Shell bluff, so called from a deposit of fossil oyster-shells, is 163 miles from Savannah, following the course of the river.

About half a mile in a west-southwesterly course from the river, in a cultivated field, were two low mounds greatly spread out by the plough and thoroughly dug through before our visit.

On the summit of a hill overlooking the field on one side and the river on the other, was a mound two feet in height and 52 feet across. The mound was made mainly of red clay which underlies the sand of the hill. We were not entirely satisfied as to the nature of the mound, which contained several modern burials with coffin-nails, etc. It may have been a domiciliary mound utilized in later times.





## CERTAIN ABORIGINAL MOUNDS OF THE ALTAMAHA RIVER.

By CLARENCE B. MOORE.

The Altamaha river, formed by the union of the Oconee and Ocmulgee, takes a southeasterly course through part of the State of Georgia entering the ocean through Altamaha sound. From the Forks, as the confluence of the two rivers is called, to the town of Darien is 131 miles by water,<sup>1</sup> and from there to the sea is a farther distance of 16 miles.

The Altamaha river, like the Savannah, is narrow, crooked, shallow and muddy. It runs between cypress swamps with here and there a bit of high ground. No aboriginal shell-heaps are to be seen along the banks and no mussel-shells were scattered over such fields as were examined by us. Such territory as borders the river appears far from fruitful and it seems hardly likely that a considerable population inhabited the banks of the river in former times.

There has been no previous systematic exploration of the mounds of the Altamaha. Colonel C. C. Jones<sup>2</sup> refers to "the lonely mounds along the Altamaha," but makes no reference to exploration. Dr. J. F. Snyder describes an urn-burial<sup>3</sup> found at a point near the river. Beyond this we know of no investigation previous to our own.

In the spring of 1896 we went up the river as far as Lake Bluff, 50 miles by water above Darien, and in addition spent several weeks around Darien where five mounds were thoroughly examined. The result of our work at Darien has already appeared in our memoir of the Georgia coast. In the spring of 1898 we spent twenty-one days on the river carefully covering the territory as far as the Forks, including in our work only mounds within three miles of the river on either side. However, none of importance at even a greater distance was reported to us.

As the reader will see, the mounds of the Altamaha are mainly insignificant as to size and unimportant as to contents. Pits were rare and trans-marginal burials, so frequent on the Georgia coast, were wanting. Interments, as a rule, occupied a central position in the mounds which were unnecessarily great for their contents. Cremation obtained as did the bunched burial and the burial of skeletons in anatomical order, or but slightly disarranged. Urn-burials were found in but two localities.

Larger mounds of clay in the swamp, used as places of abode or of refuge, such as are found along the Savannah river, are wanting along the Altamaha.

<sup>1</sup> Chart of the Altamaha river. House of Representatives Ex. Doc. No. 283. We are indebted to Frederick R. Howard, Esq., U. S. Engineer's Office, Savannah, Ga., for charts which have greatly facilitated our investigations.

<sup>2</sup> *Op. Cit.*, page 125.

<sup>3</sup> Smithsonian Report, 1890, page 609, *et seq.*

*Mounds Investigated.*

|                           |                              |
|---------------------------|------------------------------|
| Near Darien (5).          | Fort James.                  |
| Opposite Fort Barrington. | Reddish's Landing.           |
| Near wood landing.        | Near Matlock Water Road (2). |
| Joiner's Island (2).      | Near Ohoopce River (2).      |
| Lake Bluff (7).           | Below Tilman's Ferry.        |
| Old River (3).            | Near Iron Mine Landing (2).  |
| Oglethorpe Bluff.         | Hell's Shoal.                |
| Near Mitchell's Lake (5). | Buckhorn Bluff.              |
| Near Beard's Bluff (2).   | Gray's Landing.              |

## MOUND OPPOSITE FORT BARRINGTON, WAYNE COUNTY.

Fort Barrington, in Liberty county, about 23 miles by water above Darien, has opposite to it a landing, about 300 yards in a westerly direction from which was a small mound greatly ploughed down. It was two-thirds dug through by us yielding nothing beyond a few decayed human bones here and there.

## MOUNDS NEAR WOOD LANDING, LIBERTY COUNTY.

On the northern, or "White" side of the river, about 27 miles by water from Darien, is a nameless landing used by raftsmen. About 1 mile in a north-north-easterly direction from this landing, in thin woods, was a mound 2 feet 7 inches high and 40 feet across the base. The mound, which was of sand, like all those seen by us on the Altamaha, was trenched and dug centrally without result.

## MOUNDS ON JOINER'S ISLAND, LIBERTY COUNTY (2).

Old landing, on Joiner's island, is about 40 miles by water from Darien. In the "scrub," about 1 mile in a northerly direction from the landing was a mound 3 feet in height and 38 feet across. It had been much dug into by treasure seekers. What was left contained one pocket of calcined human bones.

About 100 yards in a northerly direction from the other was a mound 68 feet across the base and 6 feet 8 inches in height. It was thoroughly trenched, the entire summit plateau was dug out and parts of the sides. It was composed of dry sand unstratified and, to our great disappointment, yielded but two or three sherds.

## MOUNDS NEAR LAKE BLUFF, LIBERTY COUNTY (7).

In the "scrub," about three-quarters of a mile in a southwesterly direction from Lake Bluff, was a mound on the property of Messrs. J. R. McDuffie & Co., according to some, and of Messrs. Clarke Brothers, of Darien, according to others. Our thanks are tendered to both these firms, from whom we received a general permission to dig. The mound, which had been extensively dug into by others, had at the time of our visit a height of 5 feet 10 inches, a diameter of base of 52 feet.

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All that remained of the mound was dug through by us. It was composed of yellow sand unstratified and had a distinct dark band 2 inches in thickness running along the base at the level of the surrounding territory. There were no pits.

Exclusive of scattered human remains in disturbed sand, seven interments were met with. Three of these were pockets of small fragments of calcined human bones.

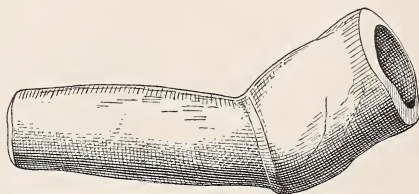
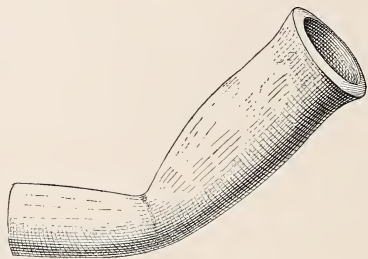


Fig. 13.—Tobacco-pipe of earthenware. Mound near Lake Bluff. (Full size.)

each presumably the remains of one skeleton. With two, no artifacts were present. With the third, lying immediately on top, was a hoe-shaped implement of calcareous rock, 8 inches in length. One side was much weathered. When new, this implement, polished and milk white, must have presented an attractive appearance. In all our mound work we have met with this type but once before, having found one



(Fig. 14.—Tobacco-pipe of earthenware. Mound near Lake Bluff. Full size.)

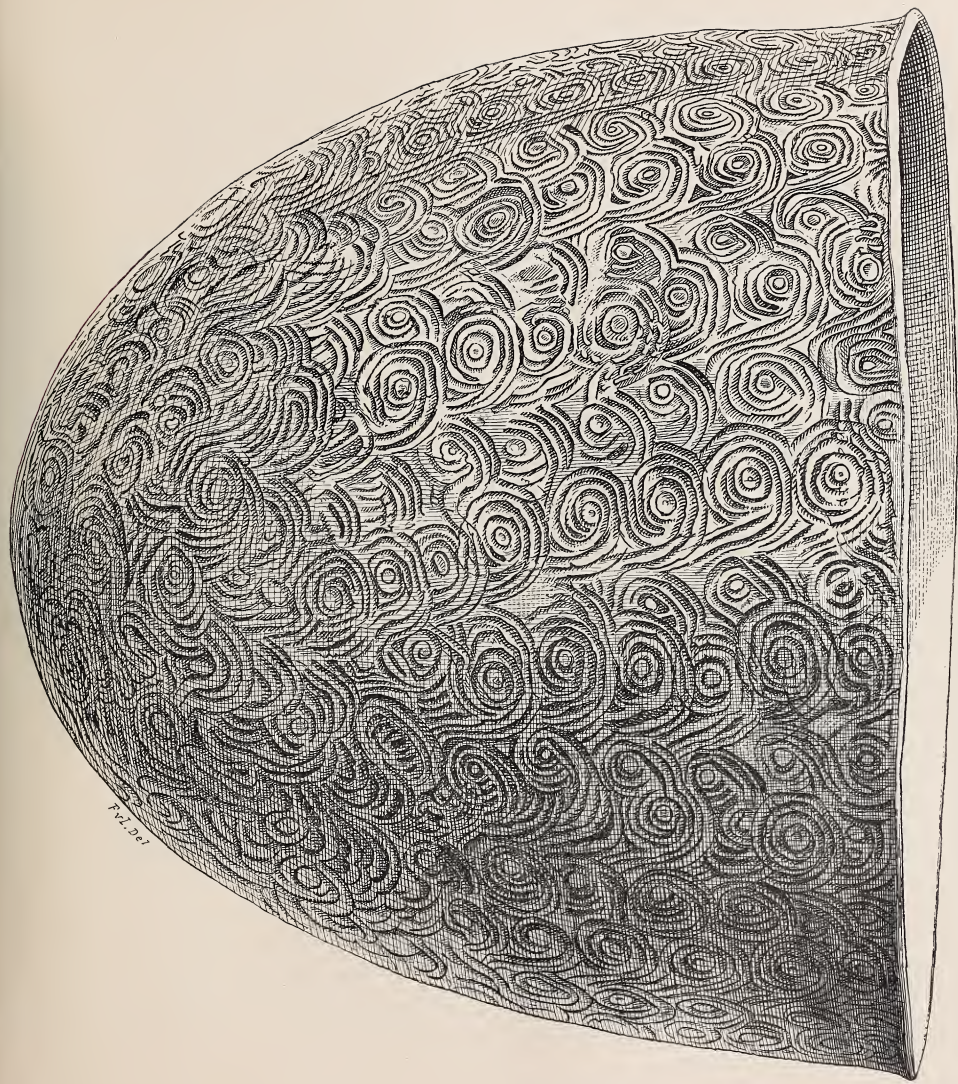
in the mound in the pine woods, back of Duval's landing, Blue creek, Lake county, Florida.<sup>1</sup>

The flexed skeleton of a child lay near the base. Close to the skull was a single vertebra of an adult. With the skeleton were a few shell beads.

<sup>1</sup> "Certain Sand Mounds of the St. Johns River, Florida," Part I, Journ. Acad. Nat. Sci., Vol. X.



Fig. 15.—Vessel E. Mouth near Lake Stett. (One-half size.)



1874



Thirty-eight inches from the surface was a pot (A) with rounded base and almost perpendicular sides faintly decorated with a complicated stamp. Its height is approximately 15 inches; its diameter, 13 inches. It was about two-thirds filled with good sized fragments of charred and calcined human bones, associated with small shell beads showing no mark of fire. This pot was capped and partly covered by an inverted undecorated pot (B), badly broken when discovered, but since suc-



Fig. 16.—Complicated stamped decoration on Vessel E. Mound near Lake Bluff. (Full size.)

cessfully put together. Its base was 19 inches from the surface. From a small flat base its sides extend out at a considerable angle. Its rim is almost horizontally inverted. Its maximum diameter is 17.25 inches; its diameter of aperture, 13.5 by 15.5 inches; its diameter of base, 3.5 inches; its height, 10.5 inches. Vessels A and B were presented to the Peabody Museum, Cambridge, Mass.

## CERTAIN ABORIGINAL MOUNDS OF THE ALTAMAHA RIVER. 179

An undecorated bowl, somewhat resembling B in shape, was found upright with its base 40 inches from the surface. It contained cremated remains of probably one individual, associated with small shell beads. Approximate measurements: height, 6 inches; diameter of aperture, 12.5 inches; maximum diameter, 13.25 inches. This bowl was covered by a pot (D) of the same type as A as to shape, but with a check-stamped decoration. It was somewhat crushed. Vessels C and D also were sent to the Peabody Museum, where the broken parts have been carefully reunited.

Inverted, and covering a large deposit of calcined bits of human bone, among which lay a small polished chisel of volcanic rock, two tobacco pipes (Figs. 13, 14), and twenty-six perforated pearls, some of them large, was a great pot (E) (Fig. 15), having a diameter of mouth of 19 inches, a height of 17 inches. It was decorated with an interesting complicated stamp shown in Fig. 16.

The pipes found with the remains were undecorated. One had a peculiar metallic lustre, perhaps conferred by the use of plumbago. Unfortunately, there is not sufficient material for chemical determination. Both pipes had small mutilations. We have before called attention to the fact that tobacco pipes are practically never found entire in the mounds of the Georgia coast and probably the custom to mutilate pipes to a certain extent, previous to their interment, extended up the Altamaha. None of the vessels, however, had any perforation of base as is so often the case in Florida and sometimes along the Georgia coast, where the aborigines probably desired to "kill" the pot that its soul might accompany that of the departed. It is a curious and significant fact that this same custom prevailed in Yucatan where Mr. Thompson describes the basal perforation of mortuary pottery.<sup>1</sup> Vessel E and its contents may be seen, with the rest of the collection, at the Academy of Natural Sciences, of Philadelphia.

Six low mounds in the neighborhood of the preceding, some of which had been rifled, were dug through by us with little result. In one the unburnt bones of an infant lay under an inverted, undecorated bowl, in fragments, which was sent to the Peabody Museum. One mound, previously undisturbed, had a pit at the center at the bottom of which, 4 feet 9 inches from the surface, with hematite, was a mass of unburnt bones in no particular order, including parts of skulls of eight individuals.

### MOUNDS NEAR OLD RIVER, LIBERTY COUNTY (3).

Old river, probably a former channel, joins the river proper about 60 miles above Darien. About one mile up Old river, on the east side, are the terminals of Hughes' lumber tramway and McDuffie's old tram. About 400 yards out from the lumber landing, a short distance to the left of McDuffie's tramway, going out, in the "scrub," were two mounds 15 feet apart. The mounds, the ordinary truncated cones, were unusually symmetrical. The smaller mound, 2.5 feet high, had a base diameter of 28 feet; the larger had a height of 3.5 feet, a base diameter of 32 feet. Both were thoroughly investigated, proving to be of sand. In the smaller mound

<sup>1</sup> "The Chultunes of Labna," Edward H. Thompson, page 11, Cambridge, 1897.

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no bones were met with by us, though fragments were found in the sand thrown out from a small central hole previously made. The larger mound contained a central deposit, 3 feet 9 inches down, consisting of a few calcined fragments and bits of unburnt bones.

A low neighboring mound yielded nothing of importance.



Fig. 17.—Shell gorget. Mound near Mitchell's lake. (Full size.)

MOUND NEAR OGLETHORPE BLUFF, WAYNE COUNTY.

A little mound thoroughly rifled was in the pine woods about 1 mile northwest of Oglethorpe bluff. Digging around the margin was without result.

MOUNDS NEAR MITCHELL'S LAKE, WAYNE COUNTY (5).

On the Altamaha, as on the Savannah, a dead river, which is an arm of the river coming to an abrupt ending, is called a lake. Mitchell's lake, about 69 miles from Darien, is such a one.

## CERTAIN ABORIGINAL MOUNDS OF THE ALTAMAHA RIVER. 181

In a swamp-field, the property of Mr. R. J. Madry, of Pye, Georgia, to whom we are indebted for permission to dig, about 2 miles in a southerly direction from the swamp-landing, was a mound of sand. Its height was 2.5 feet; its diameter of base, 36 feet. About one-half was dug through and the central portion dug out. A circular implement of rough sandstone, pitted on either side, was loose in the sand; also a few sherds. Human remains, all near the center, were at three points as follows: an unburnt bunched burial; a deposit, 4 feet down, of calcined and unburnt bones, the unburnt and the calcined bones at first separate, then mingled; a pocket of calcined fragments with a streak of sand, colored with hematite at one side.

About 150 yards north-northwest from the preceding was a mound 2 feet 4 inches high with a basal diameter of 31 feet. It was practically dug through by us. Almost in the center, about 3 feet down, was a bunched burial.

Nearly contiguous was a mound 1 foot 8 inches high and 26 feet across. It was dug into without result. About one-half mile in a northwesterly direction from the last mound was a mound 14 inches high and 30 feet across the base. It was practically dug through, yielding one bunched burial almost in the center.

In an old field about 1.5 miles west by north from the swamp landing near Mitchell's lake was a mound 2 feet in height and 32 feet in diameter of base. The mound, which had been cultivated, was opened with the kind permission of Mr. M. A. Coleman, of Pye, Georgia. The mound which was of unstratified sand, like all the Altamaha mounds, was practically demolished by us. Human remains, all bunched burials, were encountered at six points, some out toward the margin. With an adult skull was a shell disc .8 of an inch in diameter, doubly perforated. With fragments of a child's skull were a shell pin 2.8 inches in length and shell gorget, roughly circular, 4.4 inches in diameter (Fig. 17). This gorget originally had on the concave side an engraved decoration now indistinguishable as to character through weathering and also—curiously enough—because numbers of irregularly shaped holes had been cut through the gorget.

### MOUNDS NEAR BEARD'S BLUFF, LIBERTY COUNTY (2).

About one and one-half miles in a northwesterly direction from the landing, on the property of Mrs. Jack Jones, of Atlanta, Ga., who kindly permitted us to investigate, was a mound 3 feet high and 56 feet across the base. A considerable hole had been previously dug into the center. Our investigation showed the mound probably to be of a domiciliary character.

About one-half mile in a straight line from the preceding mound, in a northerly direction, across a small stream, the boundary of Tattnall county, in thick "scrub," also the property of Mrs. Jones, was a mound surrounded by hollows from which material for its construction had been taken. Its diameter of base was 36 feet. Its height, owing to neighboring depressions, was difficult to determine. Two and one-half feet would probably represent its average altitude. A small trench had been dug through the center previous to our visit. Considerably more than one-half the



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mound was dug away by us, resulting in the discovery of one small deposit of calcined human remains.

### MOUND NEAR FORT JAMES, WAYNE COUNTY.

Near this place was a low mound whose investigation was without result.

### MOUND NEAR REDDISH'S LANDING, WAYNE COUNTY.

Reddish's, a swamp-landing, under water when the river is high, is about 75 miles by water above Darien. About 2 miles in a northwesterly direction from the landing, in Spence's old field, formerly under cultivation, now the property of Mr. Hillhouse, was a mound, showing marks of cultivation. Its height was 4 feet and it is interesting to note, in connection with Altamaha mounds, that people living at considerable distances spoke of it as the largest mound that had come under their notice. Its original diameter of base was probably about 45 feet. A hole about 2 feet by 3.5 feet had been dug in the central portion almost to the base, and fragments of human remains lay in the marginal sand. About 5 feet from the center was a mass of unburnt bones, including parts of four skulls, also one calcined fragment of a skull. Charcoal was in association. One arrow-head was loose in the sand.

### MOUNDS NEAR MATLOCK WATER ROAD, TATTNALL COUNTY (2).

Matlock water road is a sort of canal joining Bluff lake with the river, used for floating out lumber. The length of the "road" is about 1 mile and its confluence with the river is about 77 miles by water above Darien. At the end of the lake, not far from its union with the canal, is a lumber tramway. In sight of this tramway, near its terminus, were two mounds said to be on the property of Mr. James Durntz of Beard's creek. The larger mound, with the usual circular outline of base, had been much lowered by cultivation. Its height was 1 foot 8 inches; its basal diameter, 38 feet. The mound was practically dug through by us. Near the center was a considerable deposit, first of calcined bones, then of unburnt bones and finally a mixture of the two. Parts of seven skulls were recovered. A considerable number of shell beads were in association.

A short distance away was a mound almost levelled by cultivation. At the center were a few unburnt bones disturbed by cultivation.

### MOUNDS NEAR THE OHOOPEE RIVER, TATTNALL COUNTY (2).

The Ohoopee river joins the Altamaha about 88 miles above Darien. In the "scrub," about one mile in, were two low mounds so dug into that no investigation was attempted by us.

### MOUND BELOW TILMAN'S FERRY, APPLING COUNTY.

About 93 miles by water above Darien and a little over one mile below Tilman's ferry, in a cedar "hammock," about 50 yards in from the river, was a mound of sand 2 feet 4 inches in height and 28 feet through the base. A former visitor had



left a hole 6 feet by 4 feet reaching almost to the base. In the sand thrown out were bits of calcined human remains. The remainder of the mound was demolished by us. A number of sherds, some having the complicated stamp, lay in the sand. About 8 feet from the center were a number of unburnt bones which apparently had been disturbed. Seven feet from the center were a skull and vertebrae with a number of shell beads, some two-thirds of an inch in diameter. Two feet down, about 7 feet from the center, was a skeleton of a female, flexed on the right side. Near the skull were a shell pin 3.25 inches in length, a part of another, and a considerable number of good-sized shell beads. Loose in the sand at various points, were two polished hatchets of volcanic rock and a small chisel.

#### MOUNDS NEAR IRON MINE LANDING, APPLING COUNTY (2).

These mounds, about 15 yards apart, were one-quarter of a mile in a westerly direction from the landing. Apparently they had been under cultivation. They were on the property of Mr. John J. Robinson, residing not far from the landing, which is about 94 miles from Darien. Each had a diameter of base of 24 feet, a height of about 15 inches. About one-half of each and the central portions were dug through by us. A few feet from the center of one was a bunched burial containing parts of two individuals. In the other, near the center, was a bunched burial and a few bits of calcined bone. Shell beads were in association.

#### MOUND NEAR HELL'S SHOAL, APPLING COUNTY.

Hell's shoal, a rocky and dangerous passage, is about 97 miles above Darien. Landing on the southern, or Indian side of the river, as it is still called, and going about one mile in a southwesterly direction, one comes to a mound on the border of a cultivated field. The mound also, in former times, had evidently been under cultivation. Its original diameter of base was probably about 35 feet; its height, at the time of our visit, a trifle over 2 feet. A hole 2 feet by 3 feet by 2 feet deep, with fragments of bone in the sand thrown out, had been made previous to our visit. A trench 21 feet by 26 feet was made from near the margin along the base through the center. The original central hole had cut through a skeleton. About 4 feet from the center, just below the surface, was an undecorated bowl of ordinary type with a diameter of 12 inches. Its original height had been about 8 inches. Part of the rim had been ploughed away. The vessel, to a depth of 3 inches was filled with small fragments of cremated bone. Beneath the bowl was charcoal and partly burnt wood, though the outside of the vessel showed no trace of fire.

#### MOUND NEAR BUCKHORN BLUFF, APPLING COUNTY.

Buckhorn bluff is about 100 miles by water above Darien. The mound, in an old field now overgrown, was about 500 yards west of the landing. Its height was 3 feet 9 inches; its basal diameter, 38 feet. Two insignificant holes had been dug in it previous to our visit. Trees growing on the marginal parts encircled the mound. The clear portion, including all the center, was investigated by us with

the kind permission of Mr. E. E. Mims, of Elliott, Ga. The mound, as usual, was of unstratified sand. A small pocket of calcined bones was about 6 feet from the center. Three feet and five feet from the center, respectively, were decaying fragments of a skull and of a skull and a humerus. Near one of these skulls was a handsome chisel of sedimentary rock about 7 inches long. Three feet from the center, on the base, was a flexed skeleton badly decayed. Near the cranium lay a well-made hatchet of polished rock about 8 inches long.

MOUND AT GRAY'S LANDING, TATTNALL COUNTY.

At Gray's landing, 120 miles by water from Darien, was a small mound 23 feet in diameter and 1 foot 4 inches in height. It was dug through by us with the permission of Mr. J. W. Matthews, the owner, resident nearby. It was composed of clayey sand. Sherds and fragments of chert were abundant, but no human bones were met with.

## RECENT ACQUISITIONS.<sup>1</sup>

By CLARENCE B. MOORE.

### A COPPER GORGET.

This gorget, shown in Fig. 18, is of hammered copper, undoubtedly native. It has a length of 8 inches, a maximum breadth of 3.1 inches. Its thickness, which is slightly irregular, has a maximum of .26 of an inch. Its weight is 17 ounces. It is covered with carbonate and has a perforation for suspension at one end. A small corner has been cut away since its discovery, doubtless to determine the nature of the metal.

This gorget has been examined by a number of experts in aboriginal copper, none of whom have seen a duplicate. It is certainly of extreme rarity.

Some time ago Professor J. W. Spencer, State Geologist of Georgia, heard of the discovery of the gorget and kindly put us in communication with the finder.

The gorget, we learned, was found with human remains and stone implements in an excavation made by the sons of Mr. James F. Dever, of Rockmart, Polk county, Ga., in a mound near that place. Polk county is on the Alabama line. The discovery of the gorget created considerable local excitement and at first an undue value was put upon it.

<sup>1</sup> Now on exhibition in the Moore Collection, Academy of Natural Sciences, Philadelphia.

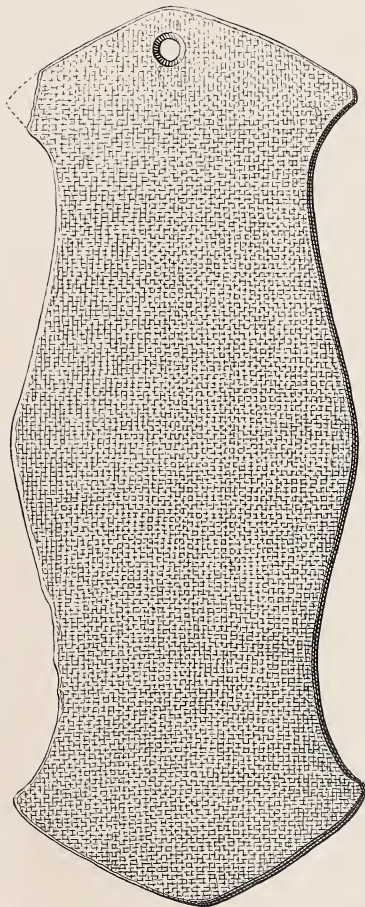


Fig. 18.—Copper gorget. Mound near Rockmart, Ga. (Full size.)



Fig. 19.—Effigy water-bottle. Missouri. (Full size.)



Fig. 20.—Effigy water-bottle. Missouri. Side view. (Full size.)

## A WATER BOTTLE FROM MISSOURI.

This vessel, well represented in Figs. 19, 20, has a height of 7 inches, a maximum diameter of 3.3 inches. It is made of clay of a light color and represents a figure with a peculiar style of head-dress. The ears are pierced, as is common in these effigy-bottles. The orifice is at the top. This vessel was obtained with a number of rare specimens from Mr. William J. Seever, of the Missouri Historical Society, who assures us that his collection was almost entirely obtained by himself during field-work. This particular vessel came from near the foot of a skeleton in a small mound which was the most easterly of a group known as the Richwood mounds, on the Whitehead farm, Stoddard county, Missouri.

The attention of the reader interested in prehistoric earthenware of Missouri is called to that excellent volume "Contributions to the Archaeology of Missouri by the Archaeological Section of the St. Louis Academy of Science, Part I. Pottery," Salem, Mass., 1880.

## A "BANNER-STONE" OF SHELL.

In the swamp bordering the St. Johns river, near Volusia, Volusia county, Florida, is a huge aboriginal shell-heap known as Mt. Taylor.<sup>1</sup> Shell from Mt. Taylor is now being moved to Jacksonville for use on roads, by Mr. C. H. Curtis, of Bluffton, Florida, who has at times materially aided us during our archaeological work on the river. Mr. Curtis has given strict instructions to those engaged in the demolition of Mt. Taylor carefully to save all objects found with the shells. We have been presented by Mr. Curtis with an interesting ornament, which, he informs us, was found by Albert Turner, a man in his employ, while clearing shell from roots of a tree. The specimen, therefore, occupied a position near the surface. The object, which is shown in Fig. 21, is a "banner-stone" of the bird-wing pattern,

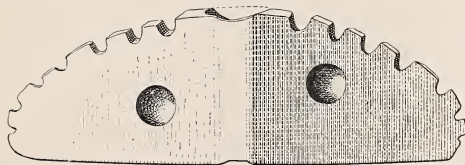


Fig. 21.—Shell "banner-stone," Florida. (Full size.)

carefully made. Its length is 4.1 inches; its height, 1.4 inches; its maximum thickness, .7 of an inch. The perforation, made by a circular drill, as is the case with "banner-stones," has a diameter of .6 by .7 of an inch at one aperture, where the drill has moved, and .6 of an inch at the other which is circular. One side of the ornament is practically flat over the perforation while the other presents two

<sup>1</sup> For details as to Mt. Taylor see our "Certain Shell-heaps of the St. Johns river, Florida, hitherto unexplored." *American Naturalist*, January, 1892, p. 12.



faces meeting in a transverse median ridge as shown in Fig. 22. This "banner-stone" has three peculiarities. Its upper margin is deeply notched; it has a semi-perforation, one lower than the other, on one side of either wing; and it is made of shell, probably the lip of the great marine univalve *Strombus gigas*.

In our mound work in Florida, Georgia and South Carolina we have seen nothing in shell resembling this ceremonial object.

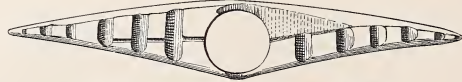


Fig. 22.—"Banner-stone" of shell. Top view. (Full size.)

We have consulted a number of gentlemen as to this "banner-stone," including David Boyle, Esq., author of "Primitive Man in Ontario;" Andrew E. Douglass, Esq., whose great collection of prehistoric ornaments, pipes and the like may be seen at the Museum of Natural History, New York; Dr. Saville of the same institution; and Professor Putnam; all of whom agree that the type in shell is entirely new to them.

In "Art in Shell" nothing like this "banner-stone" is described or figured.

## A CACHE OF PENDENT ORNAMENTS.

By CLARENCE B. MOORE.

During our second visit to the east coast of Florida (1896) we heard of a number of beautiful pendent ornaments found there in a mound on the property of Mr. Tillman of Quitman, Ga. As all reports as to the circumstances and nature of the find seemed to agree, we made it a point to visit the mound, which is at the union of Turkey creek with Indian river, four miles below Melbourne, Brevard county. The gentleman in charge showed us over the grove including the mound, and informed us that about 1883 a colored man found superficially in it an Indian ornament of stone. The colored man told the superintendent of the property, Mr. Thomas Creech, who, digging near the spot, found, together, twelve or thirteen polished stone objects of a similar type, several representing the carved heads of birds. The entire lot, we were told, was disposed of to Mr. Hector, a leading citizen of Melbourne and to Mr. H. McD. Spiers who subsequently moved to North Carolina. The mound, we learned, had been pretty well dug into subsequently without result. The ornaments, so far as we could learn, were not associated with human remains.

We then visited Fort Pierce where Mr. Spier's brother lived, who furnished us with the address of the North Carolina brother. We addressed a letter to this Mr. Spiers who courteously and promptly replied, informing us that his pendants, including one carved to represent the head of a turkey, had been given by him to another brother resident in California.

We called on Mr. Hector at Melbourne, who stated that he had from time to time parted with most of the pendants in his possession. He showed us, however, three, one of which, beautifully carved, represented the head of a duck.

Fig. 23.—Pendant of argillyte. Turkey creek mound. (Full size.)

A short time ago, upon examining part of the collection at the Academy of Natural Sciences, which had not been placed on exhibition, through the then unpreparedness of the archeological department, we found a beautiful pendant of highly polished argillyte<sup>1</sup> a little under 4.5 inches in length (Fig. 23), which we at once felt confident must have

<sup>1</sup> Probably an altered sedimentary. Determined by Mr. S. H. Hamilton of the Academy of Natural Sciences. For obvious reasons the specimen was not examined microscopically.

formed part of the famous cache from the Turkey creek mound. Upon investigation a memorandum was found stating that the object had been presented by James M. Wilcox, Esq., and that it came from a mound in Brevard county, Florida. Mr. Wilcox is now deceased. Doubtly to assure the connection of this pendant with the Turkey creek cache, we called on Mr. Arthur Wilcox, son of Mr. James M. Wilcox, who stated that he had accompanied his late father to Indian river and



Fig. 24.

Fig. 25.

Fig. 26.

Fig. 27.

Fig. 28.

Figs. 24, 25, 26.—Pendants of "trap" rock. Turkey creek mound. (Full size.)

Figs. 27, 28.—Pendant of slate, two views. Turkey creek mound. (Full size.)

was present when he bought certain Indian curiosities from Mr. Hector of Melbourne. This, in our opinion, establishes the connection.

The three pendants seen by us at Melbourne and another from the same cache are now in the famous collection of Andrew E. Douglass, Esq., at the Museum of Natural History, New York, and it is through the courtesy of that gentleman that

we are enabled to give half-tones of these pendants including two positions of the unique carving of the duck's head (Figs. 24, 25, 26, 27, 28).

The duck's head is of banded slate; the three others are believed to be of "trap" rock. Through a natural desire to avoid mutilating the specimens, however, microscopical sections have not been cut.

Unfortunately the owner of the Turkey creek mound would permit no investigation, but probably we can rely on the statement that the mound yielded nothing after an extended [though probably not methodical] search. We know, however, from our own rather extended experience along the coast<sup>1</sup> and from the reports of others, including Mr. Douglass, that the mounds of Indian river contain practically no burials or artifacts, except occasionally intrusive interments and associated objects. It is probable then that the Turkey creek mound also was of the domiciliary class and that the group of polished pendants of carved stone constituted a cache put in for safe keeping, like the cache of beautiful "banner-stones" found by Mr. Douglass in a mound near Tomoka creek, Volusia county, Florida.<sup>2</sup>

<sup>1</sup> "Mound Investigation on the East Coast of Florida" etc., by Clarence B. Moore. Privately printed, Philadelphia, 1896.

<sup>2</sup> "A Find of Ceremonial Weapons in a Florida Mound," etc. By A. E. Douglass. Proceedings Am. Assoc. Adv. of Sci., Vol. XXI.

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## VERTEBRATE REMAINS FROM PORT KENNEDY BONE DEPOSIT.

By EDWARD D. COPE.

### PREFACE.

The cave or fissure from which were obtained the organic remains described in the following paper was first made known to geologists by Mr. Charles M. Wheatley in 1871,<sup>1</sup> having been exposed the year previous by workmen engaged in quarrying the Cambrian limestone (Califerous epoch) at Port Kennedy, Upper Merion Township, Montgomery County, Pennsylvania. The fossils then collected were described by Prof. Cope,<sup>2</sup> the number of species determined at that time being thirty-four.

The paleontological interest of the locality seems to have been lost sight of until the attention of Dr. Samuel G. Dixon, the President of the Academy, was called, in 1894, to the finding of fossils in a dump heap adjoining the quarry. Dr. Dixon's examination of the fissure convinced him that farther exploration would be productive of good results, and, assisted by Messrs. S. N. Rhoads and D. N. McCadden, and with the permission and co-operation of Mr. Irwin, the proprietor of the quarry, an interesting collection was obtained, including the remains of a number of undescribed species.

Mr. Henry C. Mercer conducted the subsequent excavations and shared with Dr. Dixon and Mr. Clarence B. Moore the expenses of the undertaking; the latter, also, having made liberal contributions to the work. The Academy is, therefore, indebted to these gentlemen for the material from the so-called "bone-hole" which now forms a part of its paleontological collections and upon which the present communication is based.

Mr. Mercer published a preliminary account of his work,<sup>3</sup> describing the cave and the relation of the fossil remains to the stratified clay and stone contained therein, and to the debris. He also considers suggestively the nature of the deposit, and recounts the care taken to preserve reliable evidence as to the cause of the extraordinary accumulation of organic forms of Pleistocene age.<sup>4</sup>

Mr. Mercer's communication immediately precedes one by Prof. Cope,<sup>5</sup> in which he states that his studies were then based on not more than half the material submitted to him, and were to be regarded as only preliminary to the full report which he hoped to make at a future time. This was followed in 1896<sup>6</sup> by another paper on additional collections from the same locality, also preliminary to a complete and illustrated report to be made after a full investigation of all accessible material.

The full report alluded to is here presented. It is possessed of a melancholy interest from the fact that it is the last work of the distinguished paleontologist. Its preparation, which was continued during the intense agony of his last illness, furnishes a striking illustration of his indomitable self-will and devotion to the cause of science.

It has been thought best to publish the manuscript just as it was left by the author and

<sup>1</sup> Am. Jour. Sci. and Arts, 3rd Ser., I, April, 1871, pp. 235, 384.

<sup>2</sup> Proc. Am. Phil. Soc., XII, April 7, 1871, pp. 73, *et. seq.*

<sup>3</sup> Proc. A. N. S. Phil., 1895, p. 443.

<sup>4</sup> The paper by Mr. Mercer immediately following the present communication adds materially to our knowledge of the cave and its contents.

<sup>5</sup> Proc. A. N. S. Phil., 1895, p. 443.

<sup>6</sup> Proc. A. N. S. Phil., 1896, p. 378.

without such revision as the lapse of time may have made in some degree desirable. In this form it is believed to be more truly a memento of one whose work places him in the first rank of American naturalists, than if it were revised or added to even by those who would willingly perform the service as a labor of love. With the same desire that the contribution should bear the impress of no other mind or hand, the remains of new species have been illustrated, as far as possible, by photography, although this method foregoes the advantage of such emphasis of distinctive characters as can be given by an accomplished draughtsman working under proper supervision.

While this is the last of the brilliant series of contributions to science published by Prof. Cope under the auspices of the Academy, it is gratifying to know that his memory will be perpetuated in the department with which he was most closely associated by his provision for the foundation of a Curatorship of Paleontology, a provision which not only places on record his interest in the institution with which he was associated for upward of thirty-five years, but also secures the continuance of the work to which he devoted, with such distinguished success, the best years of his life.

EDWARD J. NOLAN.

REPTILIA.

TESTUDINATA.

CLEMMYS Wagl.

CLEMMYS INSCULPTA LeConte.

Fragments of three, and possibly other individuals, are referable to a species which I cannot distinguish from the existing one above named. There are parts of the anterior lobe of the plastron of three individuals; three fragments of the posterior lobe; the adjacent parts of the hyoplastral and inguinal marginal of the left side; with pieces of the plastron, and several marginal bones. As compared with the corresponding parts of *Clemmys insculpta* the median lip of the anterior lobe of the plastron is a little more produced. The inguinal space is also somewhat wider. The agreements are, however, so general that I make the identification as above, awaiting more perfect material before regarding it as final. The marginal bones show that the free border is not serrate.

CLEMMYS PERCRASSUS Cope (Pl. XVIII, figs. 1-1g). [Type No. 152, Mus. Acad. Nat. Sci.]

This species is represented by a part of the posterior lobe of the plastron, parts of the middle plastron, and some marginal bones of the bridge, from one locality; and from another, but near locality, three marginal bones (one from the axilla) and some pieces of the plastron. These may all belong to one individual. From the first-mentioned locality a few pieces of the plastron and a marginal bone of a much larger individual were obtained.

These specimens represent a species different from *C. insculpta* or any other known to me. The absence of characteristic parts, as the free extremities of the plastral lobes, etc., renders it difficult to define the species properly. The largest fragment of the first-mentioned specimen consists of the greater part of the right post-abdominal bone. This differs from the corresponding part of other species. Although the bone is not complete to the middle line, traces of the median suture are present. These show that the plastron is of no great width, or about equal to that of *C. insculpta*, while the post-abdominal is three times as thick. In another

respect it differs from all the species known to me. In the latter the free lateral margin is expanded and sharp-edged, anterior to the femoro-anal dermal suture, the suture marking an abrupt contraction of the border. In this species the contraction takes place anterior to the femoro-anal scutal suture, which extends from an obtusely rounded border. The thickened border is sharp-edged for only a short distance in advance of its terminus, the angle soon approaching right. This is due to the rapidly increased thickness of the border, by the elevation of its inner border into a ridge. The border, posterior to the femoro-anal scutal suture, though thickened, is flat. Posterior border not preserved. The marginal bones of the bridge are robust, and their superior face is slightly concave. The dermal suture present is about as in *C. insculpta*.

The second lot includes a piece of the inguinal marginal, which shows that this species has the fixed anterior lobe of the plastron of the Emydidae. The superior face is flat. On the inferior face the bridge is strongly convex in the transverse direction, and the convexity is cut off from the flat free inferior face of the marginal by a strong oblique groove from the axilla outward and backward. This groove is present, but faint, in *C. insculpta*. Posterior to the groove the inferior surface of the marginal is nearly flat in the latter. The free marginals associated with this piece are from posterior to the bridge. Although of large size their costal border is not sutural, but is smooth, showing that the animal had not attained its full growth. The gomphosis is well developed. The inferior surface is gently concave transversely, but the edge is not serrate nor recurved.

It is not proven that this species does not belong to the genus *Testudo*. The bones preserved, however, accord entirely with those of the semi-terrestrial forms of Emydidae distinguished under the name of *Clemmys* Wagl. (*Chelopus* Raf., *Rhino-clemmys* Gray).

## MEASUREMENTS, No 1.

|  | mm. |
|--|-----|
| Thickness of hyoplastral suture of post-abdominal bone near free border; | 18  |
| “ “ “ “ “ near median border;  | 9   |
| Width of thickened border of post-abdominal bone at femoro-anal suture;  | 10  |

## No. 2.

|   |    |
|---|----|
| Diameters of a posterior free marginal: |    |
| External border, length;                | 28 |
| Anterior border, length;                | 42 |
| Greatest thickness;                     | 11 |

## No. 3.

|   |    |
|---|----|
| Greatest thickness of a free marginal;      | 25 |
| Greatest thickness of a plastron at middle; | 18 |

The surface of the bones is nearly smooth, the only exception being some very faint grooves on the free marginals (No. 2) parallel to the long axis of the carapace.

TOXASPIS Cope.  
 American Naturalist, 1895, p. 757.

This genus was established for species of Terrapenidæ (Cistudinidæ) in which there are four claws on the posterior foot, and a zygomatic arch. The only known species is the existing *T. ornata* Agass.<sup>1</sup> A tortoise of this family left abundant remains in the Port Kennedy bone deposit, but thus far no feet nor crania have been preserved. It is therefore impossible to determine to which of the genera it belongs. I refer it provisionally to *Toxaspis*, which is the most primitive in structure; but the reference is of course provisional only. The family reference is clear, since the plastral articulation is preserved in several cases, showing the lysosternal character. The vertebral bones of the carapace are discontinued posteriorly, permitting the mutual junction of the costals.

TOXASPIS ANGUILLULATUS Cope (Pl. XIX, fig. 1). [Types No. 154, 155, Mus. Acad. Nat. Sci. Phil.]

Five fragmentary carapaces on beds of matrix, three parts of plastrons, and two moulds of carapaces in matrix, represent this box-tortoise. The carapaces display the characters of *Terrapene clausa* in the wide vertebral bones with obtuse median keel which crosses the intervertebral sutures and ceases at the dermal sutures, with an interruption before recommencing.

The typical specimen consists of a carapace which lacks the first and half the second vertebral scuta, and the marginals of the front and most of the left side. The vertebral scuta are wider than in *T. clausa*, and the costals shorter. The marginals bones are not recurved. The carapace is in all the specimens flattened, as is usual under pressure, but the component parts are not spread apart as would be the case with the existing species of the family if subjected to the same conditions. I am therefore of the opinion that this species is of a more depressed form than they. A peculiar feature of the species is the sculpture of the bones. This is a close and minute, but well-marked vermiculation, the ridges becoming parallel at the sutures between the bones, to which they are at right-angles. On the inferior side of the free marginals the sculpture becomes punctate-honeycombed. The extremital parts of the costals are furrowed longitudinally by a few sharply-defined grooves, which inosculate at one or two points, and then diverge, converge, or run parallel with each other to the suture with the marginals, when they cease.

The best preserved fragment of the plastron includes parts of both hypoplastral and post-abdominal bones. These display a character which I have not noticed in the existing species of the family; *i. e.*, the femoro-anal suture extends as far anteriorly as the hypoplastrum-post-abdominal suture. The minute sculpture is here obsolete, but there are faint grooves parallel to the anterior and median borders of the hypoplastrum as in the existing species. The free borders are unfortunately not preserved.

The typical carapace belongs to an individual of about the size of an adult *Clemmys insculpta*, and therefore of larger size than any of the existing North American Terrapenidæ. In two carapaces of smaller size, indistinct grooves extend transversely on the vertebral bones on each side of the median keel.

<sup>1</sup> This should evidently read *major*. See reference.

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MEASUREMENTS No. 1.

|   | mm.  |
|---|------|
| Length of carapace from posterior border to anterior suture of third vertebral scute; | 90   |
| Width of carapace at middle of third vertebral scute;                                 | 134  |
| Diameters, third vertebral scute { anteroposterior;                                   | 25   |
| { transverse;   | 48   |
| Diameters, penultimate costal scute { anteroposterior;                                | 26   |
| { transverse;   | 38   |
| Diameters, of penultimate marginal scute { anteroposterior border;                    | 10.5 |
| { transverse;   | 8.5  |
| Three ridges of costal bone;  | 1    |

No. 2.

|  |      |
|--|------|
| Length on median abdominal suture to ventro-femoral dermal suture; | 24.5 |
| “ “ “ “ to femoro-anal suture;                                     | 28   |

No. 3.

|   |     |
|---|-----|
| Thickness of hypoplastral at middle suture; | 4.5 |
|---|-----|

OPHIDIA.

ZAMENIS Wagler.

ZAMENIS ACUMINATUS Cope.

Represented by a fractured skull and twenty-five vertebrae from the anterior part of the column. The vertebrae display rather long, compressed, and obliquely truncate hypapophyses as far as they are preserved; and small protuberances project from the inferior side of the anterior zygapophyses. The upper portion of the costal articular face is the more convex; the inferior the more longitudinal.

Of the skull, the premaxillary, maxillary, proötic and mandibular bones are preserved so as to be available for study. The first named is subconic, being narrower and more protuberant than in *Z. constrictor* and *Z. testaceus*, with which I have compared it. It formed an obtusely conical body, the lateral borders enclosing less than a right angle. The maxillary has a distinct external margin on the posterior half, which is interrupted by a long open excavation above the posterior internal process. The anterior internal process is continuous with the superior border. The maxillary foramen is large and is situated just anterior to the latter process. The posterior internal process is truncate at the extremity. The two processes and the space between them measure the bases of eight teeth. The latter are subequal except on the anterior part of the bone, where they are a little smaller. In the same space there are nine teeth in a skull of *Zamenis constrictor* with which I compare it.

The mandible displays the characteristics of the genus. The pterygoid fossa is deep and wide, and the lateral laminae well developed; the inner lamina is not



so convex as in *Z. constrictor* and *Z. testaceus*. As in those species, the basis of the outer lamina continues for a short distance along the ramus as a low ridge, and on the outer side of this, a short distance in front of the fossa, the mandibular foramen issues. The cotylus for the os quadratum is large, and wider than in either of the species named. The prootic displays the large maxillary and smaller ophthalmic divisions of the foramen ovale, with a smaller foramen below the latter as in *Z. constrictor*; but the bridge separating the former two is narrower than in the specimens of the two species with which I have compared it.

In size this species is similar to the common black snake. The ramus of the mandible measures .035 m. in length; and is .0045 in depth at the inner side of the pterygoid fossa. The maxillary measures .0087 in length from the front of the anterior to the posterior border of the posterior, inner, transverse process. The length of a vertebral centrum is .006. The various details of structure already mentioned indicate the specific distinctness of this snake from the two species of the genus to which it is most nearly allied, and with which I have compared it. Its pertinence to the genus *Zamenis* is demonstrated by the cranial bones fortunately preserved.<sup>1</sup>

#### MAMMALIA.

##### GLIRES.

##### ERITHIZON Cuv.

But few remains of porcupines have been found in the Port Kennedy deposit, and it is not possible to determine the exact specific relations of the animal they represent.

##### ERITHIZON? DORSATUM Linn.

The Wheatley collection contains a superior molar, and the Academy collection a mandibular ramus with two molars in place and molars of five other individuals of this species. Three molars last found differ from the Wheatley tooth, and three of the four differ from the corresponding teeth of the existing *E. dorsatum*, but in different ways. An examination of ten crania of *E. dorsatum* gives the following results:—

In the Wheatley tooth, the posterior lake is transversely divided (in the long axis of the jaw) so as to leave an internal smaller and an external larger lake or fossa. In *E. dorsatum* the posterior lake is longitudinally divided (transverse to the axis of the jaw) into an anterior larger and a posterior narrower fossa. This division results from the development of a posterior transverse cingulum; or at least the occasional imperfection of the posterior wall gives that impression. This is also the character of one of the Port Kennedy molars. In a single skull of *E. epixanthum* at my disposal, the division appears to have resulted from the development of a transverse fold within the posterior fossa. In two of the Academy molars the posterior wall is duplicated near the middle, below the unworn apex, so that in an

<sup>1</sup> These specimens have not been found in the collection as transferred to the Academy.

unworn tooth no division of the posterior fossa is visible. Wear exposes the fossa, which is small and round and nearly median in position.

If these characters indicate specific difference, there are two species in the Port Kennedy collections. I am, however, not satisfied that such is the case, and must see better material before reaching a conclusion. The tooth of the Wheatley collection I thought at one time to indicate a species distinct from the common porcupine, to which I gave the name of *Erithizon cloacinum*.<sup>1</sup> One of the characters which I assigned to it was that the external enamel inflection in *E. cloacinum* is as deep as the internal in the vertical direction, while in *E. dorsatum* it is deeper. In the Academy specimens the external inflection is not so deep as the internal, as is sometimes the case in *E. dorsatum* also. The Port Kennedy molars are of the same dimensions as those of the existing species.

## MEASUREMENTS.

|                                       | mm. |
|---------------------------------------|-----|
| Diameters of superior molar           |     |
| { anteroposterior;                    | 76  |
| { transverse;                         | 77  |
| Incisor transverse diameter in front; | 55  |

Two of the Port Kennedy teeth were found in immediate normal juxtaposition, and probably belonged to the same jaw. They agree in their characters as above described. The mandibular ramus is more robust than the average of the species, while the molars are normal. One of the specimens includes four superior molars, which are not different from the typical form. An inferior deciduous molar resembles exactly that of *E. dorsatum*.

## SCIURUS Linn.

SCIURUS CALVICINUS Cope, Proc. Am. Phil. Soc., 1871, p. 86.

Established on two imperfect rami of the under jaw, with the incisor and first, second and third inferior molars *in situ*. The size approximates it to *S. hudsonius*, and exceeds that of *S. panolius*. The form of the ramus, so far as visible, is not unlike that seen in the same squirrel. The characters which distinguish it from *S. hudsonius*, are chiefly to be seen in the molar teeth, especially the anterior. The crowns of all are deeply cupped, and the triturating surfaces form anterior and posterior bounding bands, which widen outwardly. The margin of the tooth is elevated and entire, except externally, where the two usual low cusps are separated by a deep notch. In *S. hudsonius* the interior and exterior margins are both emarginate, each notch supporting a median cusp, thus forming three on each side. The anterior molar exhibits this character still more strongly. Its crown is a cup as wide as long, with high uninterrupted margin, except on the outer side, where it is decidedly notched. It has but two roots. In *S. hudsonius* this tooth has three roots, is longer than wide, and has three marginal cusps on the inner and outer sides of the crown.

<sup>1</sup> Proc. Am. Phil. Soc., 1871, p. 83, fig. 19.



## HESPEROMYS Waterhouse.

A ramus with first and second molars and incisor, agreeing in detail of structure with the group with which our recent *H. leucopus* is type, and of the size of that species, not certainly referable to the latter without further comparison.

ANAPTOGONIA Cope.  
Proc. Am. Phil. Soc., 1881, p. 91.

*Evotomys* Copes, Proc. Acad. Nat. Sci. Phil., 1884, p. 186; Report U. S. Geol. Survey Terrs., N. Amer. Rodentia, XI, p. 131, 1877; *Hypudicus* Keys and Blas. and Baird, not of Illiger.

I have described from the Wheatley collection several species allied to or belonging to the voles, and in this paper I add others. These forms are referable to three genera, which are defined as follows:

Pulp cavity and lateral grooves closed below; teeth rooted; *Anaptoгонia* Cope.  
Lateral grooves closed below, leaving pulp cavity open; no roots; *Sycium* Cope.  
Lateral grooves and pulp cavities open below; no roots; *Microtus* Selys.

The first term in this series of genera is the genus *Phenacomys* of Merriam, where the crowns of the molars are short, and there are rather elongate roots. This is naturally the primitive genus, and it is a curious circumstance that no fossil species referable to it has been yet discovered.<sup>1</sup>

But one species of *Evotomys* has been obtained from the cave formations of this country.

## ANAPTOGONIA HIATIDENS Cope.

*Arvicola (Anaptoгонia) hiatidens* Cope. Proc. Am. Phil. Soc., 1871, p. 91, fig. 18.

Represented by two series of the inferior molars of the right side from the second collection, and by a few others from the Wheatley series. The prism-formulae of these teeth are as follows: (1) 1 six lobed  $\frac{3}{2}$ 1; (2)  $\frac{3}{2}$ 1; (3) 1  $\frac{1}{4}$ 1. The first molar is larger than both the others together. Its triangles  $\frac{3}{2}$  are isolated, but anterior to these, one on each side, is well defined, but the dentine is continuous with that of the anterior lobe. This lobe consists of two prominent basal loops, and two less prominent terminal rounded lobes, all unsymmetrical. There are thus six keels on each side of the crown, and a rounded front border. The triangles of the  $m_2$  are acute, and the anteriors of the opposite sides are not fully separated from each other, a strip of dentine connecting them. In the  $m_3$  the triangle of one side is less developed than the other, and one extremity of the last column is smaller than the other, forming rather a curved process of a terminal triangle of the opposite side. The pulp cavity is well enclosed below, and the two roots are rather small and divergent.

As compared with the *A. rutila* of the northern parts of the earth, this species has doubled the linear dimensions of the teeth.

<sup>1</sup> See Merriam, North American Fauna, No. 2, 1889, p. 28: On a new genus and four new species of Arvicoline.

## MEASUREMENTS.

|                    |                          | mm. |
|--------------------|--------------------------|-----|
| Diameters of $m_1$ | longitudinal of crown ;  | 6   |
|                    | anteroposterior ;        | 4   |
|                    | transverse posteriorly ; | 1.6 |
| Diameters of $m_2$ | longitudinal of crown ;  | 5   |
|                    | anteroposterior ;        | 2   |
|                    | transverse posteriorly ; | 1.5 |
| Diameters of $m_3$ | longitudinal of crown ;  | 5   |
|                    | anteroposterior ;        | 2   |
|                    | transverse posteriorly ; | 1   |

The teeth of the second specimen are a little larger than those above measured. They are in a decayed jaw, with the incisor in place, and they agree with the types in all details, excepting only that the external column of the anterior lobe is not grooved.

The Wheatley collection contains a first inferior molar, and probably two superior molars. The former differs from those above described in having a character which is, I believe, only individual, since in every other respect the teeth are identical. None of the triangles are isolated, but are connected by a narrow strip of dentine, which is narrow posteriorly but widens anteriorly until it opens out into the terminal loop. On this account the sectional name of *Anaplogonia* was proposed for it. This name antedates that of *Evotomys* Coues by three years, and must be used for the forms to which the name *Hypudæus* was used by Baird, a name which had been already employed in another sense.

In the inferior m. 1, the triangles which do not open on one side to the anterior loop are  $1\frac{2}{3}$ , then one on each side, and the short wide terminal loop which is bilobed or emarginate in the middle of the end. The ridges, which are very prominent and acute, are, therefore,  $\frac{5}{8}$ ; at the extremity there are two short ones, between which a third and more prominent one rises a little below the grinding surface. A little more attrition would give the distal loop a trilobate outline, and a little more, an acuminate one, from the loss of the lateral angles; finally the median ridge disappears also. In its present state one of the terminal lobes is almost external, making the ridges  $\frac{5}{8}$ .

## MEASUREMENTS.

|                            | mm. |
|----------------------------|-----|
| Length, grinding surface ; | 5.0 |
| Width, grinding surface ;  | 2.4 |
| Length, fang and crown ;   | 7.8 |

Two opposite molars, held in natural relation by the matrix, resemble the above in structure and size so closely as to leave little doubt that they belong to the same species. Whether they should be referred to the superior or inferior series is uncertain, though analogy with the *Anaplogonia rutila* would suggest the latter. They represent the right and left second molars, and the triangular areas if isolated,



would be  $1\frac{3}{4}$ ; not one of them, however, is isolated, the dentine being continuous round the entering angles of enamel. The failure of these angles to reach the enamel margin of the side toward which they are directed, and an approach to parallelism of the entering and projecting enamel plates produce a tritulating surface, having the form of a succession of W's. This is the reverse of what occurs in *Anaptoгонia rutila* according to Prof. Baird, where the triangles become confluent at their bases, thus extending all across the crown; the same thing is seen in the posterior inferior molar in all the species. There is no trace of roots to these teeth or that previously described. Length of crown of second molar, m. .0056.

A third specimen is represented by the molars of both maxillary bones, much broken, the posterior of one of the series only being entire. This tooth is slightly curved, and exhibits three ridges on one side, and four on the other; triangles  $1\frac{1}{2}$  and a short loop with two basal angles, the inner more prominent than the other. None of these triangles are isolated, but are rather angular expansions of the continuous dentine. The two inner angles are much more prominent than the outer, but in old age they would probably be equal, judging from their appearance at the base of the tooth; viewed from below, they appear to be closed; showing that the character of the group *Anaptoгонia* in this respect is derived from a "retardation" of growth in a point which is early attained in true *Arvicola*.

## MEASUREMENTS.

|                  | mm. |
|------------------|-----|
| Length of tooth; | 5   |
| Length of crown; | 3   |
| Width of palate; | 4   |

## SYCIUM Cope.

Crowns prismatic, the common pulp cavity with lateral bony walls which close the lateral grooves, but do not close the pulp cavity below; no roots.

The position of this genus is exactly between *Anaptoгонia* and *Microtus*, and represents the steps by which the latter was developed from the former. One species is known to me, which does not differ much in size from the *Anaptoгонia hiatidens*.

Length of crowns of inferior molars, 9.4 mm.;

*S. cloacinum*.

SYCIUM CLOACINUM Cope. [Type No. 147, Mus. Acad. Nat. Sci.]

Two individuals of this species are indicated by the specimens preserved by Mr. Mercer. These include, the first, the  $m^2$  and  $m^3$ ; the second the  $m^1$  and  $m^2$ . As usual in this group the molars diminish in size posteriorly. The triangle formulae are:  $m^1$ ,  $1\frac{1}{2}$ ;  $m^2$ ,  $1\frac{1}{2}$ ;  $m^3$ ,  $1\frac{1}{2} + 3$  lobes.

In the  $m^1$  the triangles of one side are acute-angled; and of the other, obtuse-angled. The posterior triangle presents an angle posteriorly as well as laterally. In the  $m^2$  the same characteristics exist, with the addition that the anterior (terminal) triangle has its acute column pinched together, but not so as to exclude the dentine. In the  $m^3$  the entering angle (groove) of one side enters the triangle of the other side opposite to it, so as to destroy its triangular character. The

second triangle of the same side is also reduced by the deep inflection of the opposite groove. Opposite the apex of this second groove a rudimentary third triangle is present in the form of the section of a keel of the surface. This I reckon as one of the three divisions of the terminal lobe. The other two are not well distinguished; one opposite to the keel just mentioned is an acute angle, and the terminal one is strongly convex. Thus on this tooth there are three keels on one side and four on the other. The anterior (terminal) column is flattened.



Sycium cloacinum x 2.

Excepting on the  $m^3$ , all the triangles are well isolated.

## MEASUREMENTS.

|                           |   | mm.                  |
|---------------------------|---|----------------------|
| Diameters $m^1$ sp. no. 1 | { | longitudinal; 7.5    |
|                           |   | anteroposterior; 3.3 |
|                           |   | transverse; 2        |
| Diameters $m^2$ sp. no. 2 | { | longitudinal; 6      |
|                           |   | anteroposterior; 2.7 |
|                           |   | transverse; 2        |
| Diameters $m^3$ sp. no. 2 | { | longitudinal; 5.5    |
|                           |   | anteroposterior; 3   |
|                           |   | transverse; 1.7      |

The walls of the common pulp cavity are broken off in most of the teeth of this species above described, but portions remain in most of them, and in the  $m^3$  they are so far perfect as to show that the pulp cavity is not closed below as in *Anaptogonia*.

## MICROTUS Selys.

Études de Micromammalogie de l'Europe, 1859, p. 85. *Arvicola* Auctorum.

The numerous species of this genus are distinguished into groups by various characters, *e.g.*, those of the molar teeth, of the size of the ears, tail, etc. The extinct species can be most readily determined by dental characters, and as these are in all the species less matters of proportion, and more a question of the number of parts, they are to be preferred as possessing greater fixity. Thanks to the excellent work of Blasius on the mammalia of Europe (1857) it is possible to determine the relation of the American species to the types of the divisions proposed by European authors. I am also much indebted to my friend Mr. S. N. Rhoads for the opportunity of examining skulls of a number of rare N. American species, and especially of those described by himself from the Pacific Coast.

The species differ as to the number of triangles in the first inferior premolar. There is, however, some lack of constancy in the relations of the anterior triangles to the trefle, so that I have depended rather on the characters of the second molars in both jaws for convenience of definition of the larger groups. Thus in the species of *M. pinetorum* group, the last two triangles on one side fuse to a median position similar to that of the first column. In the other groups, where this tooth has two triangles on each side, the second superior molar differs in the number of its triangles.

There are always two on the external side; but the posterior outer may be prolonged to the inner side, or this prolongation may be cut off into a distinct triangle. These divisions include the following species:

A *Second inferior molar, triangles,  $\frac{2}{1}$  1.*

1. Second superior molar, triangles,  $1\frac{2}{3}$  *Agricola* Blasius. *M. agrestis*, Europe.
2. Second superior molar, triangles,  $1\frac{1}{4}$  1 *Myonomes* Raf. *M. riparius*, E. N. Amer.; *M. principalis* N. W. N. Amer.

3. Second superior molar, triangles,  $1\frac{2}{3}$  *Microtus* Selys (= *Hemiotomys* Selys, *Paludicola* Blas. *Tetramerodon* Rhoads). *M. amphibius*; *M. nivalis*; *M. ratticeps*; *M. campestris*; *M. arvalis*; *M. subterraneus*; *M. savii*, Europe; *M. xanthognathus*; *M. townsendii*; *M. arvicoloides*, N. Amer.; *M. diluvianus*; *M. speothen*; *M. sigmodus*; *M. involutus*, extinct, N. Amer.

AA *Second inferior molar, triangles,  $1\frac{1}{4}$  1.*

4. Second superior molar, triangles,  $1\frac{2}{3}$  *Pitymys* McM. *M. pinetorum*, N. Amer.; *M. dideltus*, extinct, N. Amer.

The species found in the Port Kennedy deposit are distinguished as follows:

- I.  $M_{17}$ , triangles  $1\frac{3}{2}$  + trefoil (*Microtus*).  $M_{27}$ , triangles  $1\frac{2}{3}$ ; large; *M. diluvianus* Cope.

- II.  $M_{17}$ , triangles  $1\frac{3}{2}$  + trefoil;  $m_{27}$ ,  $\frac{2}{1}$  1 (*Isodelta*).
  - a. First triangle on  $m_{27}$  equal the others.  $M_{17}$  with short trefoil; small; *M. speothen* Cope.

- III.  $M_{17}$ , triangles  $1\frac{2}{3}$  + trefoil;  $m_{27}$ ,  $1\frac{1}{4}$  1 (*Pitymys*).
  - a. First triangle on  $m_{27}$  marked by a constriction.  $M_{17}$  with long symmetrical trefoil, with a triangle nearly cut off at base on each side;  $m_{27}$ ,  $1\frac{1}{4}$  1; small; *M. dideltus* Cope.
  - aa. First triangle on  $m_{27}$  not indicated.  $M_{17}$  with laterally curved unsymmetrical trefoil, with a large angle on each side at base; small; *M. involutus* Cope.

*Microtus diluvianus* is a large species of the typical division of the genus as to its dental characters. The other species are nearer in dentition to the group *Pitymys*, *M. speothen* occupying an intermediate position. Individuals of the genus, and especially of the species *M. speothen* and *M. dideltus*, are abundant in the Port Kennedy fissure.

MICROTUS DILUVIANUS Cope, Proc. Acad. Nat. Sci. Phil., 1896, p. 381. [Type No. 144, Mus. Acad. Na. z.



This species of vole was first recognized from the  $m_{17-2}$  of both sides. Subsequently an  $m_{17}$  was obtained by Mr. Mercer, which agrees with the teeth first discovered and throws much light on its affinities. Among other things, this species is distinguished by its superior dimensions, which exceed those of any American *Microtus* and equal those of *Anaptogonia hiaticidens*.



*Microtus diluvianus* x 2.

The triangle formula of the superior molar teeth is  $m_{17}$   $1\frac{2}{3}$ ;  $m_{27}$   $1\frac{1}{4}$ .

In both molars the triangles are acute and are well closed, and the posterior one presents an angle posteriorly. The lateral keels are  $\frac{3}{2}$  and  $\frac{3}{2}$ . The valleys are wide open below.

## MEASUREMENTS.

|                             | mm.               |      |
|-----------------------------|-------------------|------|
| Diameters, m <sup>1</sup> { | longitudinal ;    | 9    |
|                             | anteroposterior ; | 3.75 |
|                             | transverse ;      | 2.50 |
| Diameters, m <sup>2</sup> { | longitudinal ;    | 7.5  |
|                             | anteroposterior ; | 3    |
|                             | transverse ;      | 2.2  |

The m<sub>T</sub> has lost the greater part of the trefoil, so that I cannot give its form. Its posterior portion is well expanded, giving at least two additional ridges to the crown, so that these read  $\frac{4}{3}+$ . The triangles are closed. At the external or free apex of each, the enamel layer is interrupted from the grinding face to the base, causing the presence of a fine groove. This groove is not apparent in the superior molars, and it may indicate a distinct species, and even genus. For the species the name *sulcata* may be retained, and the generic name *Schistodelta* be applied to it.

## MEASUREMENTS.

|                             | mm.                                    |   |
|-----------------------------|--|---|
| Diameters, m <sub>T</sub> { | longitudinal ;                         | 8 |
|                             | anteroposterior to trefoil exclusive ; | 4 |
|                             | transverse posteriorly ;               | 2 |

## MICROTUS SPEOTHEN Cope.

*Arvicola (Isodelta) speothen* Cope, Proc. Am. Phil. Soc., 1871, p. 87, fig. 13.

*Arvicola (Pitymys) tetradelta* Cope, l. c., 1871, pp. 87-88, fig. 14.

This species is represented by the entire dentition of the left ramus mandibuli, with a few fragments of the adjacent bone. As already pointed out, its characters entitle it to rank as a distinct section of the genus. Thus the triangles of the inner side of the anterior inferior molar are one less than in any species of the section *Microtus*. The anterior loop presents two well-marked angular basal areas, while its terminal portion is regularly rounded. That this is not one of the species of *Pitymys*, in which the basal lobe of the anterior trefoil has been cut off by unusual inflexion of the enamel angle, is demonstrated by the structure of the second molar, which is precisely that of typical *Microtus*, all the triangles from the posterior being isolated and alternating, producing the formula,  $1\frac{1}{2}$  0. The third molar has the usual formula 1-1-1, the posterior two lobes being crescentic, the anterior trapezoid.

## MEASUREMENTS.

|  | mm. |
|--|-----|
| Length, grinding surface inferior molars (no. 1) ;     | 6.8 |
| Length, grinding surface 1st inferior molars (no. 1) ; | 3.0 |
| Length, fang and crown 1st inferior molars (no. 1) ;   | 5.0 |

The structure of the molar triangles, *i. e.*, their acuteness and thinness of enamel induces me to describe here, without any certainty of reference, the superior molar teeth of two individuals found near the same time. The formulæ of the superior molars are (1)  $1\frac{1}{2}$ , (2)  $1\frac{1}{2}$ , (3)  $1\frac{1}{2}$  + trefoil with elongate acute basal lobes. This

formula is identical with that of *M. dideltus*, but the trefoil is smaller in that species. In another specimen, represented by incisor and sup. m. 1., the former has an oblique antero-external face, with narrow truncate outer face; enamel not striate, emarginate at the cutting edge. In *M. dideltus* (fossil, below), the antero-external face is more oblique, and without defined external plane; the end is not emarginate (in one specimen). This tooth appears to be relatively smaller and weaker in the ? *M. speothen*.

## MEASUREMENTS.

|  | mm. |
|--|-----|
| Length, fang and crown 1st superior molar (no. 3); | 4   |
| Width, enamelled face incisor superior (no. 3);    | 1   |

Two superior molars of another and rather smaller individual were referred to a distinct species in my original paper on the Wheatley collection under the name of *Arvicola tetradelta*. I now refer them to this species. In making the drawing they were represented as they lie in the matrix in reversed position, both the  $m^1$  and  $m^2$  being turned about. They do not differ from the corresponding teeth of *M. speothen*, the anterior triangle being as in it well formed and entirely distinct.

## MICROTUS DIDELTUS Cope.

*Arvicola didelta*, Proc. Am. Phil. Soc., 1871, p. 89, fig. 15.

*Arvicola sigmodus* Cope, *l. c.*, p. 90, fig. 17.

Represented by the mandibular rami of five, and superior dentition of probably two individuals. One imperfect cranium contains the dentition of both jaws, thus fixing the relations of fragmentary specimens, especially in the more important relation of the anterior, inferior and posterior superior molars. The characters of these show that it is allied to *M. pinetorum*.

The triangle formula derivable from the material is as follows: Superior: (1)  $1\frac{1}{2}$ ; (2)  $1\frac{1}{2}$  1; (3)  $1\frac{1}{2}$  + strongly sagittate trefoil; inferior: (1) trefoil with strong basal angles  $\frac{2}{3}$  1; (2)  $1\frac{1}{2}$  1; (3) 1-1-1. The trefoil of the  $m^1$  is large, elongate, subsymmetrical and rounded in front. At its base on each side is a prominent angle representing a pair of triangles, which are, however, not closed in front, although one of them is sometimes nearly so. Anterior to these is a low angle on each side, whose distinctness varies with the individual. In the last superior molar there is on each side a well-defined and isolated triangle, followed by a trefoil with a prominent reflexed angle on each side at the base, giving it an obtuse sagittiform outline. In the second inferior molar the anterior triangles of opposite sides are not isolated from each other, but they are well indicated by an indentation of the anterior border. In the  $m_3$  the triangles of opposite sides are fused together forming three transverse lenses.

Comparison with *M. pinetorum* is facilitated by Mr. G. S. Miller's figures and descriptions already referred to. The  $m_3$  is quite similar in the two species. The triangles of the  $m^2$  are not nearly so well defined in *M. pinetorum*, nor are the processes at the base of the loop so large and acute angled. In the  $m^2$  the anterior triangles of opposite sides are not as well outlined as in *M. dideltus*.



## MEASUREMENTS.

|   | mm. |
|---|-----|
| Length, grinding surface infer. molars (no. 1);     | 6.5 |
| Length, grinding surface 1st infer. molars (no. 1); | 3.0 |
| Length, fang and crown infer. molars (no. 1);       | 4.0 |
| Width, inferior incisor;                            | 1.5 |

The supposed superior maxillary dentition is represented by both series, that of the left side lacking the first molar, with the palatine surface and one upper incisor. The lobe formula is  $1\frac{3}{2}$ ,  $1\frac{1}{2}$ ,  $1\frac{1}{4}$  1 three lobed. The lobe of the posterior molar is quite elongate, and divaricates into two angles anteriorly, the external of which is almost isolated, almost giving the formula for the tooth  $1\frac{1}{2}$  1. The teeth of both sides are almost exactly alike. The near approach to isolation of this external angle is due to the deep inflection of the posterior inner groove and very near approach to a corresponding incurvature of the lobe.

## MEASUREMENTS.

|                                       | mm. |
|---------------------------------------|-----|
| Length of dental series;              | 7.0 |
| Width between middle of mm. 2;        | 5.0 |
| Width incisor tooth in front;         | 1.5 |
| Length from m. 2 to incisive foramen; | 4.9 |

## MICROTUS INVOLUTUS Cope.

*Arvicola involuta* Cope, Proc. Am. Phil. Soc., 1871, p. 89, fig. 16.

This species is represented by a mandibular ramus which supports all the teeth. The triangle formula is: (1)  $1 + \frac{2}{1}$  1; (2)  $1 \frac{1}{1}$  1; (3) 1-1-1. The trefoil is of peculiar shape, which distinguishes the molar from the corresponding one of *M. didellus*, to which this species is nearly allied. The two basal open triangles are present, and anterior to these are two angles which are not opposite, and one of which is much more prominent than the other. Anterior to these there is no lobe such as is characteristic of the species of *Microtus* generally, but the anterior border passes from one angle to the other. As one angle is much more prominent than the other, and is more anterior, the resulting figure is a hook, of which the more prominent angle is the point.

The  $m_{\frac{3}{2}}$  is characterized by the complete fusion of the two opposite anterior triangles, which is as complete as *M. pinetorum*, though the angles which represent their apices are not quite opposite. The sections of the columns of the  $m_{\frac{3}{2}}$  are acute angled triangles attached near their bases, and well isolated.

## MEASUREMENTS.

|   | mm. |
|---|-----|
| Length of inferior molar series;        | 6   |
| Length of $m_{\frac{1}{2}}$ ;           | 2.5 |
| Width of $m_{\frac{1}{2}}$ posteriorly; | 1   |
| Length of $m_{\frac{2}{2}}$ ;           | 1.5 |
| Width of $m_{\frac{2}{2}}$ posteriorly; | 1   |

## LEPUS Linn.

Remains of this genus are abundant in the deposit but I can only refer them to a single species.

## LEPUS SYLVATICUS Bachm.

Some fifty individuals are represented by the specimens in the Academy's collection. These differ a little among themselves in the form of the grooves on the anterior face of the pm.<sup>2</sup>, and in dimensions. I have found no characters by which to separate them from the species now living in the same region. The characteristic post-frontal region is, however, not present in any of the specimens, nor the ascending ramus of the lower jaw. The anterior premolar resembles that of *L. sylvaticus* rather than that of *L. americanus*.

Portions of crania of six individuals occur in the Wheatley collection. The palatal surface of one is exposed, and is longer in relation to its width than in a recent example. Thus in the former the length enters the width between the two anterior alveoli 1.2 times; in the latter 1.6 times. In Prof. Baird's figure it enters 1.4 times. Some of the specimens are smaller, some larger than the average of our recent ones. One of them had an oval mass of carbonaceous matter in its mouth, probably the remains of its unswallowed vegetable food.

## LAGOMYS Cuv.

Molars similar to those of *Lepus*, rootless, with crowns transverse to the axis of the series, all simple; masticatory surface not divided by median ridge, enamel boundary emarginate on the inner side. Number in maxillary bone? four.

## LAGOMYS PALATINUS Cope.

*Praotherium palatinum* Cope, Proc. Am. Phil. Soc., 1871, p. 94, fig. 20.

This rodent is represented by the palatal region of the cranium of one individual, with four superior molar teeth of each side in position. The latter diverge symmetrically, probably in consequence of pressure. But a small part of the palatine surface is preserved. The normal number of teeth is uncertain, but the anterior tooth is known from its relation to the fragments of maxillary bone and perhaps zygomatic arch. It resembles the three molars which follow it. Behind the fourth no trace of tooth or bone could be found on exploring the matrix, though the latter was unbroken, hence it is possible, though not certain, that there were none.

The genus differs from those of the Geomyinæ of Baird, in the simplicity of the first molar. The wide palate and narrower zygoma, as well as the forms of the teeth, are those of the rabbits, but it differs from the two genera, *Lepus* and *Lagomys*, in the identity of structure of the first molar with the others, and the absence of an enamel band dividing the triturating surface of each of them. In some of the teeth a trace of the dividing lamina is visible, but does not appear to have been elevated into a crest of the grinding surfaces.

In specific characters, this rodent differs from our rabbits in its small size and in having the molars deeply longitudinally grooved on the inner face, and not on

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the outer. In worn teeth this groove is continued into the grinding surface of the crown, without interruption from the enclosing enamel. The form of this surface is then an oval notched on the inner side, and rounded or slightly truncated on the outer. The palatine face is but partially preserved, and is considerably wider in proportion to the diameter of the teeth than in *Lepus sylvaticus*.

## MEASUREMENTS.

|   | mm.  |
|---|------|
| Length, crown of four consecutive molars; | 6.1  |
| Width, crown one molar;                   | 2.1  |
| Width, palate between bases of molars;    | 10.0 |

## EDENDATA.

MYLODON Owen.

MYLODON? HARLANI Owen.

A single ungual phalange of a *Mylodon*, perhaps of this species, was found by Mr. Wheatley. No trace of the genus has been found since that time.

## MEGALONYX Jefferson.

Remains of this genus of Megatheriidae are very abundant in the Port Kennedy fissure. Twenty-eight individuals are represented by fragmentary skulls and jaws. In one of these the skull is nearly entire, but is crushed; another consists of the greater part of the lower jaw with teeth; in others little but the jaws remains; in one the greater part of the cranium is present without jaws. Besides these there are one hundred and thirty separate canine-molar teeth, and perhaps twice as many separate molars. These jaws and teeth represent at least eighty-one individuals, and probably more. To these must be added fourteen individuals contained in the Wheatley collection, making a total of ninety-five animals. Bones of the skeleton are very abundant, but owing to the wetness of the cave deposit, only the harder ones have been preserved, with some exceptions. Thus the most numerous elements in the collection are carpals, tarsals, metapodials and phalanges.

The abundance of material enables me to determine the number and characters of the species more exactly than heretofore. I reaffirm the conclusion I reached in 1871, after studying the Wheatley collection, that *Megalonyx jeffersonii* Cuv., as described by Leidy, left no remains in the Port Kennedy fissure. By far the greater number of individuals belong to a rather smaller species, *M. wheatleyi* Cope, while a still smaller one, *M. tortulus* Cope, was not uncommon. A single tooth, so far, represents a third species of the size of *M. wheatleyi*, *M. loxodon* Cope.

The canine-molar teeth of these species all present characteristic and recognizable peculiarities, while the true molars differ rather in size than in form. The last superior molar, however, differs considerably in form. In some individuals it is triangular in section; in others the section is a transverse oval. All intermediate forms occur in *M. wheatleyi*. The inferior canine-molars are little or not curved, while the corresponding superior teeth are much curved anteroposteriorly. The internal bulge is not so conspicuous in the inferior canine-molars as in the superior.

The skulls preserved show that in this genus the malar bone is vertically expanded as in other Megatheriidae, and that the inferior process is not so large and palmate as in other genera. This portion has been lost from the skulls found elsewhere.

The astragalus is a variable bone in this genus. In the six best preserved of the collection I notice the following differences:—In two smaller, the limbs of the trochlear surface, which bound the trochlear fossa, are of equal width. In four larger ones the external limb is the wider. In five, the sustentacular facet is confluent with the recurved border of the navicular; in one large one the former is smaller and is widely separated from the navicular. In two large ones the ectal calcaneal facet is nearly flat; in one it is deeply decurved toward the sustentacular facet; in three others it is intermediate. These astragali belong in all probability to *M. wheatleyi*.

The four species of *Megalonyx* differ as follows:

#### SYNOPSIS OF SPECIES.

##### I Canine-molars with a convexity on the internal side.

Largest; superior canine-molars with groove anterior to internal bulge; long diameter about 40 mm.; inferior canine-molar compressed; *M. jeffersonii*.

Large; superior canine-molar without groove anterior to internal bulge; diameter about 32 mm.; inferior canine-molar compressed; *M. wheatleyi*.

Large; superior canine-molar uniformly convex on the inner side, and without grooves; diameter ;<sup>1</sup> *M. loxodon*.

Small; superior canine-molar with strong internal bulge anterior to middle, no groove in front; diameter about 25 mm.; inferior canine-molar robust, especially at borders; *M. tortulus*.

Young individuals of both *M. wheatleyi* and *M. tortulus* are represented in the collection. Their teeth may be recognized by their gradual increase of diameter to the base, their outlines being conic frusta. On such teeth of *Mylodon* was proposed the genus *Ophenodon* of Lund, and on those of the young *Megalonyx wheatleyi* I proposed to recognize a species which I called *M. sphenodon*, an error which I subsequently corrected. *M. dissimilis* of Leidy was proposed on an inferior canine-molar which is probably identical in form with that of *M. jeffersonii* (which is otherwise unknown), and a superior last molar which has an oval section, while in the known specimens of *M. jeffersonii* its section is triangular. As already remarked, this tooth presents in *M. wheatleyi* every form intermediate between these extremes, so that the supposed species *M. dissimilis* cannot be regarded as distinct from *M. jeffersonii*.

The more detailed specific characters are pointed out in the following pages.

MEGALONYX LOXODON Cope, Proc. Am. Phil. Soc., 1871, p. 74, fig. 2.

This species is represented by a single superior canine-molar contained in the Wheatley collection. I have found none corresponding with it in the collection made by Mr. Mercer. A second superior canine-molar which I formerly referred to

<sup>1</sup> Blank in MSS.

(*L. c.* fig. 1) belongs to *M. wheatleyi*, and represents very well the peculiarities which distinguish it from *M. jeffersonii*.

The tooth of *M. loxodon* is entirely convex on its internal face, being without the grooves which characterize the other species. The greatest transverse diameter is little nearer the posterior margin than the anterior, a character in which it differs from both *M. jeffersonii* and *M. wheatleyi*. The external face is slightly openly concave in transverse section, a character very exceptional in the other species, and then usually caused by the presence of a shallow groove. The size is that of *M. wheatleyi*, and less than that of *M. jeffersonii*.

## MEASUREMENTS.

Diameters of grinding face { anteroposterior; mm.<sup>1</sup>  
transverse;

MEGALONYX WHEATLEYI Cope, Proc. Am. Phil. Soc., 1871, p. 75, figs. 1, 3-5.

*Megalonyx dissimilis* Leidy; Cope *l. c.*, p. 83; not of Leidy.

The greater number of specimens of gaint sloths found at Port Kennedy belong to this species. Besides the set of upper and lower molars of one side of a decayed skull in the Wheatley collection, which served as the basis of the first determination of the species, the Academy collection contains the following, on which the further definition of the species is possible. No. 1, all the teeth of both sides except the left inferior canine-molar, in the crushed jaws. No. 2, molars and canine-molars of one side in decayed and crushed jaws. No. 3, all the molars of both sides without canine-molars. No. 4, a crushed skull nearly complete with all the teeth (canine-molars uncertain) in decayed jaws. No. 5, a maxillary with all the teeth (accompanied by the greater part of the lower jaw with all the teeth; besides other decayed, and crushed jaws which exhibit more or less of the dentition of one or both sides. These specimens render the identification of every tooth possible.

As the first mentioned Academy specimen possesses the normal dentition, although the skull is not the most perfect, I describe it first.

The superior canine-molars are strongly curved in the anteroposterior plane, first forward and the downward. They are slightly convex in transverse section of the external face, without interruption by a groove or open concavity. The longitudinal bulge of the internal face is nearer the anterior than the posterior edge of the tooth, and on the surface connecting it with the former there is only a slight trace of concavity. (In most other corresponding teeth of this species this trace is absent.) On the inner side of the bulge the transverse diameter contracts abruptly, and the surface turning toward the border forms an open concavity or groove with the bulge. The inferior canine-molars are flatter than the superior, and the greatest transverse diameter is a little nearer the posterior than the anterior border of the tooth. No concavity separates the low bulge from either border. In some other specimens a very shallow groove separates it from the borders. The transverse diameter at the posterior border is a little greater than that at the anterior.

<sup>1</sup> Blank in MSS.



Variations in the forms of the canine molars are frequent. In some superior teeth the posterior border is more pinched by the concavity than is normal; and in some the internal bulge is more prominent. In the latter case, there is a trace of the anterior groove. Such teeth resemble nearly those of *M. jeffersonii*, but they are always of considerably smaller size, and the bulge is usually more anterior. Inferior canine molars differ in the distinctness of the shallow concavities on each side of the bulge, but the latter are rarely as distinct as in *M. jeffersonii* ("dissimilis"), and the teeth are always smaller. The inferior canine molar is less curved than the superior; in fact it is scarcely curved at all.

The transverse section of the superior molars is triangular with obtuse apical angle directed outward, except in the case of the fourth, where the angle is directed inward. The external angle of the first molar is more truncated than those of the other molars. The posterior side of all the superior molars is slightly concave; the anterior slightly convex. The form of the last superior molar varies in different individuals. Thus, in the specimen above described, the section of the only one visible is triangular. In the second specimen mentioned, it is triangular on one side and sub-triangular ovate on the other. In the third, the single one visible is triangular, with a very obtuse apex. In the fourth, or nearly complete skull, it is not triangular but is ovate, flattened posteriorly. In the skull of *M. jeffersonii* from Natchez, described by Leidy, it is not as triangular as in the specimen of the *M. wheatleyi* here first described, but is very much rounded at the apex. These specimens show that Leidy's species, *M. dissimilis*, must be regarded as founded on an individual of *M. jeffersonii*, as already remarked. The only character by which the superior molars of *M. wheatleyi* may be distinguished from those of *M. jeffersonii* is their inferior size.

The crowns of the inferior molars of the *M. wheatleyi* specimens above described are not well displayed, so I refer to No. 2, where they can be seen. The grinding faces are triangular with the apices inward; the posterior tooth more truncated than the others. The crowns of the first two can not be distinguished from those of the superior molars. In the specimen No. 4, the first molar is less triangular than in No. 2, resembling rather the third tooth, while the second is triangular. The inferior molars of *M. jeffersonii* are incompletely known, the second being absent from the best-known jaw, the one figured by Leidy. The first and third only differ from those of the skull of *M. wheatleyi*, just mentioned, in their superior size.

For the cranial characters of *M. wheatleyi* I must depend on specimen No. 4, which is badly distorted, and the muzzle of both jaws broken off.

Considerable differences between this skull and that of *M. jeffersonii* are observable in the posterior regions. Thus, in the latter, the posterior side of the paroccipital region is strongly excavated; in *M. wheatleyi* it is flat. Within the paroccipital process the fossa, which is present in both species, is separated by a space from the sphenoid bone which differs materially in the two. The mastoid in *M. jeffersonii* presents downward a keel, which is convex posteriorly and externally. In *M. wheatleyi* this region is a transverse flat tuberosity bounding the insertion of

stylohyal ligament posteriorly. The occipital face is divided by a prominent median keel which is the continuation of a prominent process of the inion. This keel is much stronger than in *M. jeffersonii*, and in that species it descends upward and disappears in the inion. In this skull it grows more prominent upward, terminating in the process mentioned, which is wanting from *M. jeffersonii*. The band of ligamentous insertion bordering the inion is narrower than in *M. jeffersonii*. These characters confirm the specific diversity of *M. wheatleyi*, the more as those of the occiput are those of maturity, while the individual is considerably smaller. A part of an inion of a second skull in the Port Kennedy collection, which has no teeth accompanying it, resembles more nearly that of *M. jeffersonii*, though agreeing in size with the skull referred to *M. wheatleyi*.

Another portion of the latter skull which may be compared with a corresponding part of *M. jeffersonii* is the lower jaw, of which both rami are preserved, while the symphysis is wanting. Besides the inferior dimensions, the jaw differs from that of *M. jeffersonii* in the form of the angle. As in that species it is very large, and is produced as far posteriorly as the line which descends vertically from the condyle. Its inferior border is convex downward, and then turns upward to an acute upwardly directed apex. The superior border of the angle is concave, and it continues into the border of ascending ramus to the condyle. The coronoid process is large, *i. e.*, both wide and high, and it has an obtuse recurved apex. This ramus, as compared with that of *M. jeffersonii*, differs in the concavity of the superior border of the angle, which is straight or nearly so in the latter species, and in its less posterior production, since it extends posterior to the line of the condyle in *M. jeffersonii*. The inferior border of the ramus is more concave in *M. wheatleyi*. It is possible that these differences come within the range of specific variation, and it is not possible to determine their value finally, since there is available for comparison but one jaw of each. I suspect, however, that the difference in the forms of the angles is of some significance.

No malar bone of a species of *Megalonyx* has been hitherto observed. The specimen No. 4 exhibits that of one side nearly perfect, and that of the other side lacking only the descending process. In No. 1 the malar of the right side lacking the descending process is preserved. The vertical diameter of this element is much greater than the longitudinal. The portion immediately posterior to the orbit is subquadrate in form. Its posterior border is concave to receive the extremity of the deep and compressed zygomatic process of the squamosal bone, which joins it opposite the middle of the orbit. The anterior border of the malar is abruptly turned posteriorly and there rises above the zygomatic suture a narrow, elevated postorbital process, nearly to the superior plane of the skull. The anterior part of the malar sends downward and backward a long falciform process to below the line of the middle of the mandibular ramus. This process has a convex anterior border. The posterior border is at first straight, and then it becomes concave, forming with the anterior border an acute apex. An angular ridge rises from the anterior border and extends along the middle of the external side of the process to

the apex. From these specimens we learn that the malar bone in *Megalonyx* differs from that of *Mylodon* in the presence of the slender postorbital process and in the more slender and acute suborbital process. In most of the *Mylodons* it is fan-shaped, but in the genus or group *Lestodon* it is narrower, approaching the acuminate form seen in *Megalonyx whealleyi*.

A fragment of a right maxillary bone contains the four true molars and the canine molar. The proportions are much as in the *M. jeffersonii* figured by Leidy. The only perceptible difference, excepting the inferior size, is in the form of the first and last true molars. The crowns are less in fore and aft diameter than in the larger species. This is, however, probably only an individual peculiarity. The lower jaw of the same individual is represented by most of the right ramus and a part of the left. The posterior parts of the former are broken away and all the teeth are preserved. The only character which distinguishes this jaw from that one of *M. jeffersonii* described by Leidy, is that the symphyseal keel is more prominent, and the mental foramen relatively smaller. The former projects in front of the canine molar as far as the anteroposterior diameter of that tooth, while in *M. jeffersonii* it projects only three-fifths the diameter of the canine molar in front of it. The mental foramen is quite small. Whether these characters are constant or not must be determined hereafter.

## MEASUREMENTS.

| No. 1—Both jaws and part of skull.   |                             | mm. |
|--|-----------------------------|-----|
| Diameters of crown of superior canine molar                                  | { anteroposterior;          | 34  |
|  | { transverse;               | 16  |
| Diameters of crown of inferior canine molar                                  | { anteroposterior;          | 35  |
|  | { transverse;               | 15  |
| Diameters of m <sup>2</sup>  | { anteroposterior;          | 13  |
|  | { transverse, greatest;     | 20  |
| Diameters of m <sup>3</sup>  | { anteroposterior;          | 10  |
|  | { transverse;               | 17  |
| Depth of ramus mandibuli at posterior external foramen;                      |                             | 48  |
| No. 4—Crushed skull without muzzle.  |                             |     |
| Width at occiput;  |                             | 148 |
| Length from occiput to posterior border of orbit;                            |                             | 194 |
| Depth of zygoma at glenoid cavity;   |                             | 42  |
| “ “ at malar bone;   |                             | 31  |
| Diameters at malar bone  | { anteroposterior at orbit; | 42  |
|  | { vertical;                 | 208 |
| Length of postorbital process of malar;                                      |                             | 39  |
| “ of infraorbital “ “  |                             | 69  |
| Length of mandibular ramus from posterior external foramen to apex of angle; |                             | 132 |
| Depth of mandibular ramus at posterior external foramen;                     |                             | 69  |
| “ “ “ at condyle;  |                             | 111 |

|                  |   |                          |      |
|------------------|---|--------------------------|------|
| Diameters, $m^1$ | { | anteroposterior;         | 14   |
|                  |   | transverse;              | 19   |
| Diameters, $m^2$ | { | anteroposterior;         | 14   |
|                  |   | transverse (internally); | 22   |
| Diameters, $m^3$ | { | anteroposterior;         | 12   |
|                  |   | transverse (internally); | 21   |
| Diameters, $m^4$ | { | anteroposterior;         | 10   |
|                  |   | transverse;              | 17   |
| Diameters, $m_T$ | { | anteroposterior;         | 13   |
|                  |   | transverse;              | 18.5 |

## No. 5—Right maxilla and lower jaw.

|  |   |                  |      |
|--|---|------------------|------|
| Diameters, crown $m^1$                         | { | anteroposterior; | 30   |
|  |   | transverse;      | 19   |
| Length of diastema;                            |   |                  | 48   |
| Length of four true molars ( $m^2$ to $m^5$ ), |   |                  | 66   |
| Diameters, crown $m^4$                         | { | anteroposterior; | 13.5 |
|  |   | transverse;      | 21.5 |
| Length of symphyseal keel, axial;              |   |                  | 26   |
| Diameters, $m_T$                               | { | anteroposterior; | 29   |
|  |   | transverse;      | 16.5 |
| Length of diastema;                            |   |                  | 38   |
| " of $ms_{T-T}$ , inclusive;                   |   |                  | 57.5 |
| Diameters, $m_T$                               | { | anteroposterior; | 16.5 |
|  |   | transverse;      | 23   |

In No. 4 the pyramidal processes of the palatine continues as a vertical lamina from the last molar posteriorly, and presents downward a moderately thickened convexity, which has a submarginal ridge on the inner side. The greater cornua of the hyoid are preserved in place, but the body of the hyoid is gone. They consist of two subcompressed rods with expanded extremities, much as Leidy describes in *M. jeffersonii*.

An inferior canine-molar tooth which I regarded as indicating a peculiar species, which I called *M. sphenodon*, probably belongs to a young animal of *M. wheatleyi*. The apex of the tooth is contracted and the diameters continue to the base. Several such teeth occur in the present collection. Corresponding teeth of *M. tortulus* have been also taken from the Port Kennedy deposit.

This species was dedicated to the late Mr. Charles M. Wheatley, who took great pains to preserve the specimens first discovered at Port Kennedy, and to whom we owe nearly all the specimens of vertebrata from the trias of Pennsylvania which we possess.

Among the numerous separate molars are many last superior ones. These display every transition between the triangular and oval forms already referred to.





separated from the anterior border by a very shallow concavity, while a very distinct concavity separates it from the posterior border. The long axes of the two extremities of the tooth are not in the same plane. The inferior canine molars are but little curved, and they have a slight median convexity. What distinguishes them from *M. wheatleyi* is the greater width of the grinding face transversely, as compared with the long diameter, especially at the anterior and posterior edges of the crown. This thickness corresponds with the increased transverse diameter of the superior canine molars, and, together with the small size, induces me to refer them to that species, although found separately from them. These teeth display no mark of immaturity, but the borders are perfectly parallel.

The superior molars have the usual section, of triangular form with obtuse apex. The last molar has a truncate internal face, but the external angle is broadly rounded, so as to destroy the triangular form.

## MEASUREMENTS.

|  |                    |      |
|--|--------------------|------|
| Diameters of superior canine molar       | { anteroposterior; | 25   |
|  | { transverse;      | 14   |
| Diameters of inferior canine molar no. 1 | { anteroposterior; | 25   |
|  | { transverse;      | 14   |
| Diameters of inferior canine molar no. 2 | { anteroposterior; | 26   |
|  | { transverse;      | 14   |
| Diameters of m <sup>3</sup>              | { anteroposterior; | 12   |
|  | { transverse;      | 17   |
| Diameters of m <sup>4</sup>              | { anteroposterior; | 8    |
|  | { transverse;      | 11.5 |

The teeth of the young individual display the usual character of the contracted grinding face; but this is much more conspicuous in the canine molars than in the molars. The former display the prominent bulge characteristic of the species.

MEGALONYX SCALPER Cope (Pl. XVIII, figs. 2, 2a). [Type No. 184, Mus. A. N. S.]

A single canine molar is all that has been found of this species, so far. Judging from this tooth, the species differs more from those already described than they do from each other.

The tooth is characterized by its compression, so that its transverse diameter is relatively much less than in the other species. The anterior outline is very slightly convex, so that the crown has a very slight curvature. It was implanted a little obliquely, as indicated by the direction of the grinding surface. A marked peculiarity of the tooth consists in the fact that on the inner side, a little in front of the middle line, is a shallow longitudinal groove or valley, where the teeth of the other species of the genus present a convexity. Anterior and posterior to this valley, the inner side is gently convex. The external side is in general convex, viewed from the grinding face, but not regularly so, since a little in front of, opposite to the internal valley, there is a slight longitudinal convexity. This produces a flattening

of the surface between it and the anterior border of the crown. This border passes regularly into both the internal and external faces, while the posterior border is continuous with the external face, but joins the internal abruptly. The transverse diameter of the posterior part of the crown is greater than that of the anterior part, which is pinched. The hard dentine layer is much thinner on the internal than the external side of the grinding face. Hence, the former is worn at its middle much more than the latter, producing a chisel-like instrument.

## MEASUREMENTS.

|                               | mm. |
|-------------------------------|-----|
| Length of fragment of tooth ; | 50  |
| Diameter, anteroposterior ;   | 42  |
| "    transverse anterior ;    | 10  |
| "    "    middle ;            | 11  |
| "    "    posterior ;         | 12  |

This tooth bears a resemblance to the one described by Leidy as a type of a separate genus under the name of *Ereptodon priscus*.<sup>1</sup> If that tooth were a superior tooth and this one an inferior one, they might almost be referred to the same species, but for the fact that in Leidy's species the hard dentine is said to be as thick on the internal as on the external side of the crown. But I suspect that Leidy's tooth is from the lower jaw, as is probably the one here described. *Megalonyx scalper* is of the size of *M. jeffersonii* Cuv.

## INSECTIVORA.

## BLARINA Gray.

BLARINA SIMPLICIDENS Cope. [Type No. 150, Mus. A. N. S.]

Micromammalia are preserved in the carbonaceous layers of the Port Kennedy deposit along with their large and even gigantic relatives. The present species is nearly related to the existing short-tailed shrew, so characteristic of our fauna, but differs from it in certain small but important dental peculiarities.

A left mandibular ramus is all that represents *Blarina simplicidens*. By the aid of the excellent descriptions and figures given by Dr. Merriam<sup>2</sup> of the species of this genus, I am enabled to determine its relation to the known species. It is about the size of *B. brevicauda*, and no especial characters can be found to distinguish it from that species excepting the forms of the first premolar and last true molar. All the molar teeth are present, together with the large incisor, but the small external incisor is missing. The gap that it has left is small but evident. The crown of the first premolar is somewhat worn and has an antero-posteriorly oval section. It does not have the V form as in all the species figured



Blarina simplicidens.  
x 2.

<sup>1</sup> Extinct sloth tribe of North America; Smithsonian Contributions to Knowledge, 1855, p. 46.

<sup>2</sup> Revision of the shrews of the genera *Blarina* and *Notiosorex* by Dr. C. Hart Merriam, North American Fauna, No. 10, Washington, 1895.

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by Merriam, and which seems to be common to all the existing species. The last true molar is also more simple than in the existing species, consisting of a trigon only, and lacking the heel. The heel is present in all the species of this genus, of *Cryptotis*, *Notiosorex* and *Sorex*, according to Merriam. The  $m_1$  and  $m_2$  have the proportions and forms characteristic of the genus. The posterior extremity or base of the large incisor falls below the trigon of the  $m_1$ . The incisor has a strong superior groove, which is well defined within as well as without. It has a convexity of the external margin, beyond which it is broken off.

MEASUREMENTS.

|                          | mm. |
|--------------------------|-----|
| Length of molar series ; | 5   |
| "    of $m_2$ ;          | 2.5 |
| Depth, ramus at $m_2$ ;  | 2   |

CARNIVORA.

URSUS Linn.

URSUS HAPLODON Cope (PL XIX, fig. 2, 2a), Proc. Acad. Nat. Sci. Phil., 1896, p. 383. [Type No. 85, Mus. A. N. S.]  
*Arctodus pristinus* Leidy, Cope, Proc. Am. Phil. Soc., 1871, p. 96, not of Leidy.  
*Arctotherium pristinum* Leidy, Cope, Proc. Acad. Nat. Sci. Phil., 1896, p. 417.

This species is one of the characteristic forms of the Pliocene fauna, not only on account of its peculiarity but also on account of its abundance. The material which has come under my observation is as follows:—

WHEATLEY COLLECTION.

|                            | SPECIMENS. |
|----------------------------|------------|
| Jaw fragments with teeth ; | 3          |

ACADEMY COLLECTION.

|                                |   |
|--------------------------------|---|
| Cranium crushed ;              | 1   |
| Both jaws together ;           | 1   |
| Pre-maxillaries with canines ; | 1   |
| Maxillaries ,                  | 3   |
| Mandibular rami ;              | 8   |
| Superior incisors (separate) ; | 3   |
| "    canines    "              | 3   |
| "    molars    "               | 6   |
| Inferior incisors    "         | 3   |
| "    canines    "              | 2   |
| "    molars    "               | 10  |
|                                | <hr style="width: 10%; margin-left: auto; margin-right: 0;"/> |
|                                | 44  |

The above specimens may be supposed to belong to twenty-five individuals. Besides them there are numerous disconnected bones of the skeleton.

*Ursus haplodon* belongs to the American type of the Pliocene and present ages, which is distinguished from the typical ursi by the greater development of the

sectional part of the first inferior true molar. This is due to the more anteroposterior direction of the paraconid, the larger size of the protoconid, and the smaller size of the metaconid. The tooth makes a sensible approach to that of *Hyaenarctos*. To this group belong the following species, and they differ in the following ways:—

- I. Superior premolars crowded, overlapping. (South American.)  
 Large species; *U. ornatus* Cuv., *U. bonariensis* Gerv.  
 Smaller species; *U. brasiliensis* Linn.
- II. Superior premolars uninterrupted, not overlapping. (Californian.)  
 Muzzle very short; *U. simus* Cope.
- III. Superior premolars spaced. (E. N. America.)  
 Muzzle moderate; *U. haplodon* Cope.

Where *U. pristinus* should be placed in this series can only be ascertained by future discovery. The first named three species are separated from *Ursus* under the name of *Tremarctos* Gerv. (*Arctotherium* Brav.), as the humerus exhibits an entepicondylar foramen. It is not known whether the last two species possess this character or not.

A conspicuous character is common to *Tremarctos ornatus* and *Ursus* (? *Tremarctos*) *haplodon*, which is not present in *Tremarctos bonariensis* of the Pampean beds. There are two masseteric fossæ of the mandible, which are separated by a crest which extends obliquely downward and backward from below the coronoid process.

The size of the teeth of this species as well as that of the jaws preserved, exceeds the average dimensions of the grizzly bear (*Ursus horribilis*). *U. haplodon* was evidently one of the most formidable of its genus, and it probably found an abundant supply of food in the sloths of the genus *Megalonyx*, which were the most abundant of the contemporary mammalia.

I take as the typical specimen that in which both jaws are present, although several others exhibit the characters of special teeth more perfectly. The incisive part of the premaxillary bone is wanting. The inferior and part of the anterior orbital border is preserved, and also the coronoid process and condyle of the mandible. Of the superior dental series are preserved the c., pm. 1-3-4, m. 1-2. Of the inferior series there remain pm. 3-4, m. 1-2-3. The external face of the ramus from the base of the coronoid process to the angular region is broken away.

The proportions of the muzzle are shorter and deeper than in the living ursi, but they are not so short and deep as in *U. simus*<sup>1</sup> of the California caves. The length measured horizontally from the inferior border of the orbit in line with the anterior border to the premaxillary border is to the depth to the alveolar edge of the maxillary bone, from the same point, as 9 to 7. In *U. simus* these proportions are as 8 to 9. The characters of the infraorbital foramen can not be determined, owing to injury to the specimen. A conspicuous feature of the lower jaw is the large fossate form of the ramus anterior to the masseteric fossa, as far forward as

<sup>1</sup> American Naturalist, 1891, p. 998. Plate XXI.

the line of the anterior border of the last-inferior molar. The inferior border is flared out below it, descending to the external plane of the ramus below the middle of the second molar. This character is best seen in a separate ramus to be referred to later.

The superior incisors are perfectly preserved in a nearly complete left premaxillary bone, which is adherent to a part of the maxillary which contains the left canine; and they are less perfectly preserved in a left side of the face which contains nearly all of the teeth. The large external incisor has a triangular section at the base of the crown. The apex is turned a little externally but the base is continued as a ledge close to the second incisor from the posterior to the anterior face of the crown. The anterior face of the crown is not grooved, but there is a sharp longitudinal groove dividing that of both of the other incisors.

The superior canine is very robust, especially at and below the base of the crown. The latter is compressed oval in section, and has rounded anterior and posterior faces, with or without a fine median keel. There is a ridge-like ledge on the internal side of the crown, just posterior to the plane of the anterior border. The anterior three premolars are one-rooted. The first is the largest, and has a short, obtuse and compressed crown; it is situated close to the canine. The third is close to the fourth, while there is a short space anterior and posterior to the third. The fourth or sectorial has two subequal cusps, the anterior more conic, the posterior more compressed. The internal cusp is a well-developed cone which is less elevated than the external cusp, and is opposite the emargination between them. Both this tooth and the two superior true molars are biconvex externally, the groove of the external wall marking the posterior boundary of the metacone. The first true molar has a parallelogrammic outline, the long diameter anteroposterior. The metacone and ectocone are subequal and more elevated than the protocone and hypocone. A curved ledge extends from the protocone forward and outward to a small paracone, which is appendicular to the metacone in front. The protocone is opposite the posterior part of the metacone, and, like the hypocone, is strongly compressed. As in *U. simus* and the South American forms, there is a series of broad obtuse conules on the middle of the grinding surface of the crown. The anterior is opposite the metacone, the middle opposite the space between the latter and the ectocone, and the posterior near the posterior border of the crown. These conules do not occur in the species of the group No. 2 of the key given above. The last or second true superior molar is remarkable for the recurvature of the grinding face at its posterior extremity nearly to the base of the crown. This tendency is exhibited by several species of bear, but it is nowhere carried so far as in the present one. The protocone is represented by the internal angular border of the crown, which continues as an inconspicuous ledge around the anterior border to the anterior base of the metacone. The latter is an angulate ledge compressed to a crescent-shaped edge. It is separated by a transverse fissure from the similar but every-way smaller ectocone. The hypocone is a slight prominence of the border of the crown. The heel, measured



from the apex of the ectocone, equals half the length of the crown. The grinding surface of the heel is partly vermiculate, partly tuberculately rugose. The middle of the grinding face anterior to the heel is occupied by a series of low tuberosities, as in the first true molar.

Of the inferior incisors the crown of the external has a strong external space, which is lacking in the others. Its external face is longer, while the internal face is shorter than in the others. All have a shallow longitudinal groove of the external face. The inferior canine is without the keel of the posterior face of the crown. The premolars are all small, and the fourth only has two roots. All are isolated by short diastemata, excepting the fourth which is close to the first true molar. The crown of the first is oblique; of the second and third low conic. The fourth has a low median cusp with a short production of the base in front and a longer one behind, with a low median ridge. The sectorial displays a form like that of the South American forms and unlike those of Eurasia, in the simple character of the metaconid. The length of the blade, or protocono-paraconid, is two-fifths that of the crown. The metaconid is low and is opposite the posterior part of the protoconid. Immediately posterior to it, separated by a valley, is the small ectoconid. The external part of the heel is occupied by the large hypoconid, which is separated from the protoconid by a small supernumerary tubercle. I have found this tubercle present in the six sectorials of the different individuals of the collection.

Of the second inferior true molars there are ten in the collection, which pertain to nine individuals. Four of these are little or not worn. The grinding face is contracted transversely to a diameter less than that of the base of the crown. The external base is more swollen than the internal, while the internal side of the crown is most obliquely contracted at its superior portion. Only two cusps can be identified, the protoconid and the metaconid, which are connected by a transverse ridge, notched at the middle, and of which the metaconid is considerably the most elevated. There is a well-developed area which represents the trigon, but it develops no paraconid and no other cusps. The keel is about twice the length of the trigon and, though its margins are feebly notched at intervals, it develops no cusps or tubercles. There are traces of low obtuse tubercles along the middle of the grinding surface as in the superior molars. The grinding face in general is shallow concave. Its anterior and posterior borders are little contracted from the base. The last inferior molar is shorter in relation to the penultimate than in *U. arctos* and *U. martinus*, resembling in this respect *Tremarctos ornatus*. Its crown is a little longer than wide, and is broadly rounded posteriorly, though narrower than anteriorly. The grinding face is a little contracted and is slightly concave, and there is an emargination of the external border a little posterior to the middle. The surface is fully tubercular, coarsely anteriorly and finely posteriorly.

The enamel of all the molars is vertically rugose, except where worn by prolonged use. The rugosities are fine or rarely coarser ridges.

Two considerable parts of mandibular rami exhibit all the characters except the apex of the coronoid, which is lost from both. The ramus is moderately slender,

and the coronoid process rises steeply a short distance posterior to the last inferior molar. The masseteric fossa is well marked, following the inferior border of the ramus more closely than in *U. arctos*. It is bounded in front by a strong ridge which extends downward and backward from the base of the coronoid process, descending to near the inferior border of the ramus well in front of its anterior angle. This ridge is unlike anything in this region in any of the species of the genus known, but a similar character is present in *Tremarctos ornatus*, and is represented in DeBlainville's figure of a young animal.<sup>1</sup> Anterior to this ridge is the basin-shaped concavity already described, which is also peculiar to this species and to *T. ornatus*. The anterior angle of the inferior border is prominent and apparently obtuse. It is not present in DeBlainville's figure of *T. ornatus*. The mental foramen is below the third premolar. The condyle is more elevated in position than in the species of *U. arctos* group, since, when the jaw rests on a horizontal surface, its superior border is in the same plane as the apex of the inferior canine. In *U. arctos* and *U. maritimus* its upper surface is in the plane of the grinding surfaces of the molars. The articular surface presents more posteriorly than in those species and has no absolutely horizontal surface, such as is seen in the latter. The ramus, which displays its internal face, exhibits a shallow longitudinal concavity below the middle line.

## MEASUREMENTS OF SKULL AND TEETH.

|  | mm. |
|--|-----|
| No. 1 (type).  |     |
| Length from angle of junction of lines of anterior and inferior orbital borders;     | 95  |
| Depth from inferior orbital border to alveolar border at m <sup>2</sup> ;            | 70  |
| Length from mandibular condyle to anterior base of coronoid process;                 | 111 |
| Elevation of coronoid process above horizontal line anterior to condyle of mandible; | 77  |
| Length of superior molar series;   | 114 |
| Diameters of m <sup>2</sup> { anteroposterior;                                       | 36  |
| { transverse (greatest);   | 21  |
| Diameters of m <sup>1</sup> { anteroposterior;                                       | 23  |
| { transverse;  | 17  |
| Diameters of pm <sup>1</sup> { verticle in front;                                    | 10  |
| { anteroposterior;   | 15  |
| Anteroposterior diameter of canine at base of crown;                                 | 34  |
| Length of series of posterior five inferior molars;                                  | 99  |
| "    "    of inferior true molars;   | 77  |
| Diameters of m <sub>3</sub> { anteroposterior;                                       | 20  |
| { transverse;  | 16  |
| Diameters of m <sub>2</sub> { anteroposterior;                                       | 22  |
| { transverse;  | 18  |
| Diameters of m <sub>1</sub> { anteroposterior;                                       | 29  |
| { transverse of heel;  | 13  |

<sup>1</sup> Ostéographie, Carnassiers, Pl. VIII, fig. (no number).



The diameters of the astragalus of a medium-sized adult grizzly (cinnamon) bear are as follows: Greatest width, 46; greatest length, 39. The proximal diameters of an ungual phalange are, vertical, 27; transverse, 14 mm.

As already remarked, the nearest ally of this species among recent bears is *Tremarctos ornatus* Cuv. of the Andes. Besides the character of the humerus, this species differs from that one in the linear and not angulate arrangement of the premolar teeth, and perhaps in the presence of an anterior angle of the mandibular ramus, which is wanting from *T. ornatus* according to DeBlainville's figure. Among extinct species it must be compared with *Ursus pristinus* Leidy, and *U. sinus* Cope. In *U. sinus* the muzzle is shorter and the premolar teeth are larger and more closely placed, having no spaces between them. The grinding surface of the last superior molar is not so reflected upward. *U. pristinus* is only known from a second inferior molar which resembles that of the present species considerably, so that I formerly identified the two. In the present collection there are nine second inferior true molars, in place or detached, which agree closely and differ from the tooth described and figured by Leidy. The latter has the trigon of a different form, the internal side being more produced anteriorly than the external portion, or rarely, equally produced, while in *U. pristinus* the external portion is much more produced anteriorly, the inner being contracted, and presenting an angulate outline internally. It is cut off from the metaconid by a deep notch, which is represented by a faint trace in *U. haplodon*, which has a more anterior position. This tooth in *U. pristinus* thus resembles more closely that of the typical *Ursi*. Further, the tooth of *U. pristinus* is much more tubercular, the edge of the grinding surface being abundantly and deeply notched, a character indicated by traces only in *U. haplodon*. The same is true of the grinding face, which is more abundantly and acutely tubercular. The protoconid is much less elevated than the metaconid in unworn teeth. In *U. pristinus* these cusps are more nearly equal. The characters of the latter species are derived from the handsome figure given by Leidy (*l. c.*), as the typical specimen cannot now be found. Leidy's description, so far as it goes, corroborates the figure.

URSUS AMERICANUS Pallas.

Merriam, Proc. Biol. Soc., Washington, 1896, p. 79; Leidy, Jour. Acad. Nat. Sci. Phila., III, p. 169.

The black bear was apparently not nearly so abundant as the cave bear, remains of only eight individuals having been certainly discovered at Port Kennedy. These consist of a right ramus of the lower jaw containing the canine and last two molar teeth; a fragment of another ramus with the last two molars, accompanied by separate superior molars and canines of probably the same animal; a part of a maxillary bone with the last two molars; and several separate molars and canines. These specimens show a range of variation in size similar to that seen in the existing individuals, as may be seen from the measurements below. In the ramus first mentioned the premolars are all present and in the usual positions.

MEASUREMENTS.

|  | mm.  |
|--|------|
| Length of dental series, exclusive of incisors; no. 1. | 130  |
| "    from canine to $m_T$ , exclusive;    "            | 48   |
| Diameters, $m_{\bar{2}}$ { anteroposterior;    "       | 21   |
| { transverse;    "                                     | 12   |
| Diameters, $m_{\bar{3}}$ { anteroposterior;    "       | 15   |
| { transverse;    "                                     | 13   |
| Depth, ramus at $pm_{\bar{2}}$ ;    "                  | 41   |
| "    "    at $m_{\bar{2}}$ posterior root;    "        | 45   |
| Length of $m_{\bar{2}}$ ; no. .                        | 19   |
| "    of $m_{\bar{3}}$ ;    "                           | 15   |
| "    of $m^1$ ;    "                                   | 17.5 |
| "    of $m^2$ ;    "                                   | 26   |
| "    of canine (total chord);                          | 57   |
| "    "    (crown);                                     | 23   |
| Diameters, $m^2$ { anteroposterior; no. 4.             | 29   |
| { transverse;    "                                     | 17   |

There is no difference between these specimens and the corresponding parts of the black bear.

CANIS Linn.

CANIS PRISCOLATRANS Cope (Pl. XVIII, figs. 3-3g.) [Type No. 57, Mus. Acad. Nat. Sci. Phila.]

Remains of dogs are less abundant than those of other carnivores in the Port Kennedy ossuary. Excluding foxes, they consist of one right and two left superior sectorials of as many individuals; two superior true molars and a  $pm^1$  of the right side of a fourth individual; parts of canines of two others; and the distal end of a tibia, a right astragalus and a metatarsal, of probably different individuals.

The bones last mentioned are very large, exceeding those of the largest wolf known to me, and may have belonged to *Canis indianensis* of Leidy. Without other parts of the skeleton, however, this cannot be exactly determined. One of the superior sectorials is of large size, about equalling the large specimen of *C. lupus*, called *gigas* by Townsend. The three superior molars of a single individual belong to an animal of about the average size of the wolf, and somewhat smaller than the individual *gigas*. It is these that I regard as the type of a distinct species, having important points of resemblance to the coyote.

The tubercular molars are characterized by the general compression and acuteness of the cusps and crests. The external cusps are not as elevated as in *C. lupus*, but are rather low, and are separated to the base, as in *C. latrans*, and are compressed and acute. The conules in the  $m^1$  are not distinct but are, as in *C. lupus*, fused into the crest which has the protocone at its internal angle. The internal cingulum is large and of usual form. There is a sharp cingulum along the external base of the crown. The  $m^2$  is like the  $m_T$  with the usual differences, as in *C. latrans* and *C. lupus*; it also has a distinct external cingulum. The  $pm^1$  has the dimen-



sions seen in the wolf, but has the characters of the true molars in its greater compression and the more trenchant cusps. The posterior lobe in particular is more prominent and compressed. No cingula.

## MEASUREMENTS.

|                   |                                  |       |
|-------------------|----------------------------------|-------|
|                   |                                  | mm.   |
| Diameters, $pn^1$ | { anteroposterior ;              | 16    |
|                   | { vertical ;                     | 11.5. |
| Diameters, $m^1$  | { anteroposterior (externally) ; | 15    |
|                   | { vertical at paracone ;         | 10    |
|                   | { transverse ;                   | 20    |
| Diameters, $m^2$  | { anteroposterior (externally) ; | 8     |
|                   | { vertical at paracone ;         | 5     |
|                   | { transverse ;                   | 12    |

The forms of the cusps and cingula in this species are like those of the corresponding teeth of the coyote, except as to the conules. The size is that of the large, but not largest wolves.

## VULPES.

VULPES LATIDENTATUS SP. NOV. (Pl. XVIII, 4, 4a.) [Type No. 60, Mus. Acad. Nat. Sci. Phila.]

Represented by a first superior true molar of the left side of a dog, of dimensions not differing greatly from those of the red fox. The tooth differs materially in its proportions from the corresponding one of this well-known animal. While the transverse diameter of the crown is not different, the anteroposterior diameter exceeds it, especially at the internal extremity. This is due to the fact that the protocone is continued forward to opposite the internal extremity of the paracone, from which it is separated by a deep groove, which is wanting in *V. alopec.* Its base is continued as a cingulum outward to the middle of the width of the crown, a character wanting in the red fox; and the paracone sends a distinct crest forward to the anterior base of the paracone, a feature very faintly indicated in the red fox. External cingulum distinct.

MEASUREMENTS OF  $m^1$ .

|                                  |      |
|----------------------------------|------|
| Diameter, transverse at middle ; | mm.  |
| “ anteroposterior externally ;   | 11.5 |
| “ “ internally ;                 | 10   |
|                                  | 6    |

VULPES CINEREOARGENTATUS.

Two right inferior sectorials agree exactly with those of this species.

## MUSTELA Linn.

A single species of true weasel left its remains in the bone fissure. It is intermediate in dimensions between the fisher and the American pine-marten, and has become quite extinct with so many of its contemporaries.

VERTEBRATE REMAINS, PORT KENNEDY BONE DEPOSIT. 229

MUSTELA DILUVIANA Cope (Pl. XVIII, figs. 5, 5a). [Type No. 65, Mus. Acad. Nat. Sci. Phila.]

This species is represented by parts of three mandibular rami of the left side. One lacks the symphysis, the  $m_{\frac{2}{2}}$ , and part of the coronoid process; the second lacks the angle, condyle, and part of the coronoid, with the  $pm_{\frac{1}{1}}$ ; the third is a fragment supporting the  $m_{\frac{1}{1}}$  and containing alveoli of  $pm_{\frac{1}{1-2}}$  and  $m_{\frac{2}{2}}$ . These specimens agree closely in characters. A left inferior sectorial tooth represents a fourth individual.

The specific characters are seen, first, in the absence of posterior median lobe on the  $pm_{\frac{2}{2}}$ ; in the full development of the metaconid of the  $m_{\frac{1}{1}}$ ; in the slight spacing of the premolars and in the size. In the first and second characters it agrees with *M. pennantii* and *M. martes* and differs from *M. americana*. In size it is almost exactly intermediate between *M. americana* and *M. pennantii*. The heel of the sectorial is shorter than in *M. americana* and *M. martes*, in two of the jaws, but in the third the length is the same as in the latter species. The superior face of the heel is flat and oblique, with the external edge sharp. The ramus generally is as in the same species, the inferior outline greatly convex, and the condyle in the horizontal line of the heel of the sectorial. The angle is short, not extending as far posteriorly as the condyle. The masseteric fossa reaches as far as the anterior border of the tubercular molar. The latter has the form seen in the other species. The mental foramina have the same positions and proportions.

MEASUREMENTS.

|  |     |
|--|-----|
|  | mm. |
| Length of molar series of no. 1 (estimated for $pm_{\frac{1}{1}}$ ); | 35  |
| "    from $m_{\frac{2}{2}}$ to end of condyle;                       | 21  |
| Depth of ramus at $pm_{\frac{2}{2}}$ ;                               | 10  |
| "    "    at $m_{\frac{2}{2}}$ ;                                     | 12  |
| Length of base of coronoid;  | 18  |
| Length of sectorial;   | 12  |
| "    of heel of sectorial;   | 3.5 |
| Elevation of protoconid of sectorial;                                | 6.5 |
| Length, base $pm_{\frac{1}{1}}$ ;                                    | 7   |
| Elevation of crown of sectorial;                                     | 4   |
| Length of molar, series of no. 2;                                    | 36  |
| "    of sectorial;   | 11  |
| Diameters, canine alveolus   |     |
| { anteroposterior;   | 6   |
| { transverse (oblique);  | 6   |

As compared with *M. americana* this species differs other than in its superior size; the better developed metaconid of the sectorial; the absence of posterior lobe of the  $pm_{\frac{2}{2}}$  and the larger size of the  $pm_{\frac{1}{1}}$ . In the latter point it resembles more *M. pennantii*. The premolar teeth are slightly spaced, a character which does not appear in any of the recent species of the genus.

GULO LUSCUS Linn.

GULO Storr.

The wolverine is represented by parts of five mandibular rami with teeth, and a left superior sectorial. Four of these specimens were found close together, and it

is possible that they do not represent more than two individuals. The two other specimens are from different parts of the excavation, so that at least four individuals are represented. The fragments are in good preservation, and they are undistinguishable from corresponding parts of the wolverine. I give measurements of the most complete ramus, with those of the teeth of another fragment.

## MEASUREMENTS.

|  | mm. |
|--|-----|
| Length from $pm_3$ to condyle, inclusive; no. 1; | 76  |
| Length of $pm_1$ ;                               | 11  |
| Elevation of $pm_1$ ;                            | 5.5 |
| Length of sectorial;                             | 19  |
| Elevation of "                                   | 8   |
| Depth of ramus at $pm_2$ ;                       | 18  |
| " " at $m_2$ ;                                   | 21  |
| Width of base of coronoid;                       | 24  |
| Length of molar series less $m_2$ ; no. 2;       | 42  |
| " $pm_1$ ;                                       | 10  |
| Elevation, $pm_1$ ;                              | 6   |
| Length, sectorial;                               | 20  |
| Elevation, protoconid sectorial;                 | 10  |
| Length, heel of sectorial;                       | 4   |

This is one of the few species of the Megalonyx fauna that has survived to the present period. Its occurrence so far south as Pennsylvania has not been recorded, and Cones<sup>1</sup> states that its extreme southern distribution in N. America is between latitude 42° and 43°, that is in northern Massachusetts and New York. Its presence in the Port Kennedy fauna indicates a cool if not a cold climate.

OSMOTHERIUM Cope.  
Proc. Acad. Nat. Sci. Phil., 1896, p. 385.

Inferior dentition as in *Mephitis*, but the dental formula  $pm. 4, m. 2$ . Metaconid well developed; heel of sectorial large, cupped.

The inferior dental formula of this genus is that of the extinct form *Potamotherium*, which intervenes between *Mephitis* and *Lutra*. The typical species of *Osmotherium*, however, resembles *Mephitis* so greatly in its inferior dentition that I suspect that the superior molar formula will be found to be  $pm. 3, m. 2$ , as in *Mephitis*, instead of  $pm. 4, m. 2$ , as in *Potamotherium*. The latter genus is of Miocene age in Europe and North America, the genus *Brachypsalis* Cope, from the Loup Fork formation of Nebraska being probably founded on a species of *Potamotherium*. The presence of an additional premolar is important in the Mustelidae, but might in some case prove to be a mere individual variation. In the present instance this is clearly not the case, as it is accompanied in one species by the additional character of the mutual overlapping of the  $pms. 3$  and  $4$ , as in species of *Lutra*, a relation which does not exist in *Mephitis*. I do not, however, regard this as a generic

<sup>1</sup> Fur-bearing Animals of North America.

character, but simply as evidence that the character is not an individual variation, as compared with the *Mephitis mephitica*. In *M. fossidens*, described below, the pms. 2-3 overlap extensively.

OSMOTHERIUM SPELEUM Cope (Pl. XVIII, fig. 6). Proc. Acad. Nat. Sci. Phil., 1896, p. 385. [Type No. 67, Mus. Acad. Nat. Sci. Phila.]

Represented by a left mandibular ramus which contains alveoli or roots of the c. and pms. 4-2, with pm. 1 and ms. 1-2 perfectly preserved.

The ramus is robust, and its inferior border rises from below the heel of m. 1 upward and posteriorly. In *Mephitis mephitica* the ramus is less robust, and the inferior border begins to ascend below the posterior part of m. 2. The anterior border of the masseteric fossa is not sharply defined. There are three mental foramina, the first and second below pm. 2, and the third below pm. 1, the anterior being the largest. The molar teeth are much like those of *M. mephitica*, but are more robust. The metaconid is considerably smaller than the protoconid, as in *Mephitis putorius*, and smaller than in *M. mephitica*. The borders of the heel are strongly and equally elevated, enclosing the basin completely. The pm. 1 differs from that of *M. mephitica* in presenting a flat face inward and posteriorly, which is bounded externally by an angular ridge, as in *M. fossidens*. The crown of the pm. 2 is mostly lost, but a short, flat, transverse heel remains, which is similar to but smaller than that of the pm. 1. The anterior root of the pm. 2 is opposite the posterior root of the pm. 3, while the pm. 4 is entirely and directly in front of the anterior root of pm. 2, and exceeds it in size. The dental foramen enters at a point as far posterior to the m. 2 as the long diameter of the latter, about as in *M. mephitica*.

MEASUREMENTS.

|                                       | mm. |
|---------------------------------------|-----|
| Length of ramus from m. 2, inclusive; | 29  |
| “ of molar series;                    | 25  |
| “ of true molars;                     | 13  |
| “ of sectorial;                       | 10  |
| Width of “ at heel;                   | 5.5 |
| Length of heel of sectorial;          | 4.5 |
| “ of crown of m. 2;                   | 3   |
| Depth of ramus at pm. 4;              | 9   |
| “ “ at posterior border of m. 1;      | 9   |

The only question as to the validity of this form that can arise, is due to its similarity to *Mephitis fossidens*. See the description of the latter below.

MEPHITIS Linn.  
SPILOGALE Gray.

Two species of this genus occur in the bone deposit in considerable abundance. After a cursory examination I referred both of them to *M. mephitica*<sup>1</sup>, but a thorough study convinces me that this reference must be reconsidered. I give a

<sup>1</sup> Proc. Acad. Nat. Sci. Phil., 1895, p. 447.

table by which they may be distinguished from the two best known recent species *M. mephitica* and *M. putorius*. I add here that Dr. Merriam has endeavored to substantiate the reference of the latter species to a separate genus under the name of *Spilogale*<sup>1</sup>. He gives a list of characters which he regards as generic, but which are to me specific only, as they only consist of proportions of the skull and teeth.

- I.  $M^1$  with para- and metacone forming a straight longitudinal crest; no posterior ledge.  
Metaconid small, low; inferior premolars 2-3 overlapping; entoconid, low; *M. fossidens* Cope.
- II.  $M^1$  with distinct V-shaped para- and metaconules, separated by a fossa inwardly;  
Metaconid small, low; inferior premolars 2-3 not overlapping; ramus, lower border rising posteriorly; entoconid, low; *M. orthostichus* Cope.
- III.  $M^1$  without metaconule, but with a broad posterior ledge; paraconule, V-shaped.  
Metaconid small; premolars not overlapping; ramus not rising posteriorly; smaller; *M. putorius* L.  
Metaconid, large; premolars not overlapping; ramus rising posteriorly; entoconid elevated; larger; *M. mephitica* L.

As isolated mandibular rami are more frequently found than superior molar teeth, I give the following characters of the species based on this part.

- I. Inferior border of ramus rising posteriorly.
  - a. Entoconid elevated.  
Premolars 2-3 not overlapping; m. series 24 mm.; *M. mephitica* L.
  - aa. Entoconid low.  
Premolars 2-3 not overlapping; m. series 21; depth of ramus at  $m_T$  9 mm.; *M. orthostichus* Cope.  
Premolars 2-3 overlapping; m. series 21; depth of ramus at  $m_T$  7 mm.; slender; *M. leptops* Cope.  
Premolars 2-3 overlapping; m. series 27; depth of ramus at  $m_T$  10 mm.; robust; *M. fossidens* Cope.  
Premolars 2-3 overlapping; m. series 15 mm.; depth of ramus at  $m_T$  5 mm.; least; *M. obtusatus* Cope.
- II. Inferior border of ramus nearly horizontal posteriorly (entoconid low);  
Premolars 2-3 not overlapping; m. series 18 mm.; depth of ramus at  $m_T$  6 mm.; small; *M. putorius* L.

There are jaws and teeth of at least fifty-five individuals of the genus *Mephitis* in the collection obtained by Mr. Mercer. Of these I can determine, as to specific character, twenty-four. All belong to extinct species except perhaps two fragments of upper jaws, which contain the tubercular molars and other teeth, the former resembling the corresponding tooth of the existing skunk; no lower jaws of

<sup>1</sup> North American Fauna, No. 4, 1890, p. 5.





## No. 2 (with angle of mandible).

|                               | mm.  |
|-------------------------------|------|
| Length of $m_1$ ;             | 11   |
| Length from $m_1$ to condyle; | 26   |
| “ “ “ to angle;               | 23.5 |
| Depth of ramus at $m_1$ ;     | 7.5  |

## No. 3 (with canine).

|                             |      |
|-----------------------------|------|
| Length of dental series;    | 31   |
| “ of true molars and pm. 1; | 21   |
| “ of $m_1$ ;                | 11.5 |
| Depth of ramus at $m_1$ ;   | 8    |

This species represents a section of the genus distinct from *M. mephitica*, with which it is connected by *M. orthostichus*.

MEPHITIS ORTHOSTICHUS Cope (Pl. XVIII, figs. 8, 8a). Proc. Acad. Nat. Sci. Phil., 1896, p. 389. [Type No. 71, Mus. Acad. Nat. Sci. Phil.]

This species is represented by superior first molars of seven individuals and mandibular rami of three others. Unfortunately, in no case are inferior and superior dentition of the same individual preserved together. In one individual both rami are preserved.

This species is intermediate in size between *M. mephitica* and *M. putorius*, and resembles the latter species in the small metaconid. It resembles the *M. mephitica* in the rising inferior outline of the mandibular ramus, and differs widely from both species in the character of the superior  $m^1$ .

The superior  $m^1$  instead of presenting two parallel longitudinal crests, has a slightly curved crest representing the paraconule, which reaches a trihedral cusp, the metaconule. Thus is produced an internal longitudinal crest which presents a convexity anteriorly and an angle posteriorly, and an entrant angle between the two. The protocone is a mere cingulum which rises to the apex of the metaconule, and extends no further, so that there is no posterior ledge, as in the existing species. While the internal crest is quite different in its zigzag character from that of *M. fossidens*, the species further differs from the latter in the premolars, which do not overlap, and in the inferior size. The posterior border of the  $m^1$  is not so deeply notched as in *M. fossidens*.

The inferior dentition does not differ from that of *M. mephitica*, except in the small metaconid and entoconid, and the flatter posterior-internal face of the pm. 1, in which it resembles *M. fossidens*. The third premolar is in contact with the canine, and has two roots which do not overlap those of the second. The crown is longer than wide, and has a heel with a recurved rim. The third has the same, while the fourth is a narrow heel, with a recurved rim all round it. In no specimen is the angle of the mandible preserved.

## MEASUREMENTS.

 No. 1—Superior  $m^1$ .

|           |                         |     |
|-----------|-------------------------|-----|
|           |                         | mm. |
| Diameters | { anteroposterior;      | 8   |
|           | { transverse, greatest; | 8   |

## No. 2—Both mandibular rami.

|                            |                       |      |
|----------------------------|-----------------------|------|
| Length of premolar series; |                       | 11   |
| “ of molar series;         |                       | 13.5 |
| Diameters, $m_T$           | { anteroposterior;    | 10   |
|                            | { transverse of heel; | 3    |
| Diameters, $m_{\bar{2}}$   | { anteroposterior;    | 3.5  |
|                            | { transverse;         | 2.5  |
| Depth of ramus at pm. 1;   |                       | 9    |
| “ “ at m. 2;               |                       | 10   |

## No. 3—Smallest ramus.

|                              |  |     |
|------------------------------|--|-----|
| Length of last three molars; |  | 17  |
| “ of $m_T$ ;                 |  | 9.5 |
| Depth of ramus at pm. 1;     |  | 6   |
| “ “ at m. 2;                 |  | 8   |

In two last superior molars the short angle connecting the metaconule with the paraconular crest is rudimental or wanting, so that the arrangement only differs from that of *M. fossidens* in the greater separation of the metaconule from the crest. Such teeth are nearly transitional between the two species, but they maintain the inferior size of *M. orthostichus*. The two types of molars might be regarded as representing male and female, but for the difference in the relations of the inferior premolars, as pointed out in the analytical table of species.

MEPHITIS LEPTOPS Cope (Pl. XVIII, figs. 9, 9a). [Type No. 75, Mus. Acad. Nat. Sci. Phil.]

This skunk is represented by two mandibular rami in the collection of the Academy. One of these contains the alveoli of all the teeth excepting the incisors, but no teeth; the other supports the  $pm_T$  and  $m_T$ , and contains the alveoli of the  $m_{\bar{2}}$  and  $pm_{\bar{2}}$ . In the absence of the anterior part of the ramus it is not certain whether the second jaw belongs to the same species as the first, or type, but the peculiar proportions are the same in both.

While the dimensions are smaller than in any of the species excepting *M. obtusatus*, equalling those of *M. putorius*, the mandibular ramus is relatively more slender than in any of them. The inferior border rises from below the  $m_{\bar{2}}$  to the angle. The symphysis is more vertical than in *M. mephitica*, and the ramus is regularly convex from the canine posteriorly, and not concave, as in *M. mephitica*. The premolar series is short; the pms.  $\bar{2-3}$  are both two-rooted, and stand very obliquely in the jaw, overlapping each other considerably. The sectorial has the

supernumerary roots characteristic of the genus, and its length is equal to that of the premolar series together with the diameter of the canine. The sectorial and  $pm_{\overline{1}}$  of the second jaw have the characters seen in *M. orthostichus*.

## MEASUREMENTS.

|   | mm. |
|---|-----|
| Length of dental series, including canine; no. 1; | 25  |
| "    of premolar series;                          | 7   |
| "    of sectorial;                                | 10  |
| Depth, ramus at $pm_{\overline{2}}$ ;             | 7   |
| "    "    at $m_{\overline{1}}$ , posterior root; | 7   |
| "    "    "    "    "    no. 2;                   | 6   |

MEPHITIS OBTUSATUS Cope.<sup>1</sup>

This, the smallest species of the genus, is only known so far by a nearly entire right mandibular ramus, which has the condyle, angle, and symphysis complete, and all the molars excepting the  $pm_{\overline{2}}$  and the  $m_{\overline{2}}$ . Canine alveolus complete.

Besides its small size, this species may be recognized by the form of the ramus, which is like that of *M. leptops*; by its small sectorial tooth, and by the rudimentary character of the angle of the mandible. The alveolus of the canine indicates a tooth relatively as large as in the skunk. The third premolar has two roots, which, like those of the second, are planted transversely in the jaw. The  $pm_{\overline{1}}$  has no trace of posterior cutting lobe. The sectorial is a diminutive of that of *M. orthostichus*, having the same low metaconid and entoconid. The external median root is present.

The inferior border rises posteriorly but not so conspicuously as in *M. orthostichus* and *M. mephitica*. The symphysis is steep and the ramus convex externally posterior to the canine, as in *M. leptops*. The masseteric fossa is deeper and better defined, especially inferiorly and posteriorly, than in most of the species. The angle is represented by the thickening of the convex posterior border of the fossa, which is recurved as far as the condyle, in a way not seen in *M. mephitica*, *M. fossidens*, *M. orthostichus*, or *M. putorius*. The anterior border of the coronoid process, which has lost only the apex, slopes more obliquely posteriorly than in either of the four species just named.

It is only necessary to compare *Mephitis obtusatus* with *M. leptops*, which approaches nearest in dimensions and has the same form of the anterior part of the ramus, and nearly the same positions of the  $pm_{\overline{2-3}}$ . The length of the sectorial is much less in *M. obtusatus*, equalling the premolar series only; in *M. leptops* its length equals this plus the diameter of the canine. The dimensions of *M. obtusatus* are materially less, and the positions of the  $pm_{\overline{2-3}}$  more absolutely transverse than in *M. leptops*.

<sup>1</sup> None of the specimens labelled by Prof. Cope bear this name.

MEASUREMENTS.

|   | mm.  |
|---|------|
| Length of dental series, including canine ; | 17.5 |
| “ of premolar series ;                      | 6.5  |
| “ of sectorial ;                            | 6    |
| Length of ramus from symphysis to condyle ; | 28   |
| “ of basis of coronoid ;                    | 9    |
| Depth, ramus at $pm_{\frac{1}{2}}$ ;        | 6    |
| “ “ at $m_{\frac{1}{2}}$ posterior root ;   | 4.5  |

In this species we have a skunk of the small size of some of the weasels of the genus *Putorius*.

PELYCICTIS Cope.  
Proc. Acad. Nat. Sci. Phil., 1896, p. 390.

Dental formula  $pm_{\frac{1}{2}}$ ,  $m_{\frac{1}{2}}$ . Sectorial with basin-shaped heel and without metaconid. Premolars without posterior lobe.

This genus is only known from the mandible. The dentition agrees in number of teeth with both *Mephitis* and *Putorius*. From the former it differs in the absence of metaconid, and from the latter in the basin-shaped heel of the sectorial molar. From *Gulo* it differs in the presence of but three premolars. But one species is known.

PELYCICTIS LOBBULATUS Cope (Pl. XVIII, fig. 10), Proc. Acad. Nat. Sci. Phil., 1896, p. 390. [Type No. 66, Mus. Acad. Nat. Sci. Phil.]

Represented by an entire left mandibular ramus containing all the teeth excepting the third premolar and the incisors.



*Pelycictis lobulatus*.

This weasel is larger than any of the existing species of *Putorius* of North America, but equals *P. vittatus* of Brazil. In some respects the parts preserved resemble the corresponding ones of *Mephitis orthostichus*, but the differences are also conspicuous. The ramus is rather robust, and the symphysis is short. The inferior border is regularly convex, and rises to the angle. The latter projects as far posteriorly as the condyle. The condyle is rather elevated, its inferior border being in the horizontal line of the apices of the cusps of the sectorial. The coronoid process preserves its anteroposterior width to near the apex, which is broadly rounded, and not contracted as in *Lutra* species. There is a longitudinal keel on the inner side of the angle, distinct from the inferior margin.

The teeth form a continuous series, the anterior premolars not overlapping. The canine is rather small ; the crown is somewhat compressed, and is not grooved or faceted, but is smooth. The second premolar has the heel produced backward. In the first premolar the heel is a cingulum, and is not produced. The metaconid of the sectorial is represented by a convexity of the internal edge of the protocone. Heel concave, with an elevated border on the internal edge only. This consists of



a larger lobe or entoconid and a smaller between it and the lobe representing the metaconid. Entoconid not elevated, resembling that of the extinct species of *Mephitis* already described. No cingula. The tubercular molar has a semi-circular concave grinding surface, and no cingulum.

## MEASUREMENTS.

|  | mm.                |
|--|--------------------|
| Length of ramus from canine to condyle, inclusive; | 42                 |
| Depth of ramus at $pm_{\frac{1}{2}}$ ;             | 7                  |
| "    "    at $m_{\frac{1}{2}}$ ;                   | 8                  |
| Depth at condyle;                                  | 7.5                |
| "    at coronoid process;                          | 22                 |
| Length of dental series;                           | 25                 |
| "    of true molars;                               | 12                 |
| Diameter of base of crown of canine;               | 3.5                |
| Elevation of crown of canine;                      | 4                  |
| Diameters of crown of sectorial                    | { elevation;       |
|  | { anteroposterior; |
|  | { width of heel;   |
|  | 3.5                |
|  | 8.5                |
|  | 3.5                |

The jaw described is about the size of that of the common skunk.

## LUTRA Linn.

LUTRA RHOADSHI Cope (Pl. XVIII, figs. 11, 11a). Proc. Acad. Nat. Sci. Phil., 1896, p. 391. [Type No. 61, Mus. Acad. Nat. Sci. Phil.]

Portions of both mandibular rami with the right superior tubercular molar represent this otter. The right ramus supports part of one of the premolars, a large part of the sectorial and the tubercular. The left ramus supports the tubercular. In the right ramus the alveoli of the premolars and part of that of the canine are preserved. All belong to one individual, and were found in place in the matrix.

This species differs from *Lutra canadensis* in two conspicuous points: first, the inferior border of the mandible is a nearly straight line to the angle; second, the third premolar is nearly transverse to the long axis of the jaw in position in consequence of the much shorter mandibular symphysis.

The coronoid process is at right angles to the horizontal ramus, and its anterior and posterior borders are straight and of equal inclination to the obtuse apex; the posterior border is convex in *L. canadensis*. The condyle is opposite the base of the sectorial; in *L. canadensis* it is opposite the apices of the cusps of the sectorial. The anterior border of the masseteric fossa is below the middle of the tubercular molar. The inner side of the ramus is flat and not grooved, except immediately above the angle. The mental foramina are below the middle of the first and the anterior root of the second premolars.

Both the internal and external border of the inferior tubercular molar are elevated. The former as a low cusp. The crown is horizontal in position and is not tipped forward as in *L. canadensis*. An external basal cingulum on both this tooth

and the sectorial. In the latter the metaconid is well-developed: the protoconid and paraconid are broken away. The basin of the heel has much the form of that of *L. canadensis*, and the external cutting edge is notched in front. The first premolar is longitudinal in position, but the anterior root of the second premolar is interior to the middle line. The internal root of the third premolar is near the middle of the superior face of the ramus, but the interior root is anterior to the internal border of the anterior root of the second premolar. Both are close to the canine alveolus. The crown of a premolar was displaced and adherent in the alveolus of the root of the paraconid of the sectorial. This crown probably belongs to the second premolar. It has no lobe on its posterior edge, and is expanded posteriorly at the base. The superior tubercular has lost its paracone and metacone. The interior part of the crown is a broad table with the protocone as an obtuse cusp on the interno-anterior border, with a cingulum at its base. This part of the tooth is much like that of *L. canadensis*, but is not so convex posteriorly.

MEASUREMENTS.

|   | mm. |
|---|-----|
| Length of inferior molar series;              | 32  |
| "    "    premolar series;                    | 15  |
| "    "    sectorial;                          | 14  |
| Width of heel of sectorial at protoconid;     | 5.5 |
| Length of ramus posterior to $m_2$ ;          | 22  |
| "    of base of coronoid;                     | 15  |
| Elevation of coronoid posteriorly;            | 16  |
| "    of condyle above angle;                  | 12  |
| Depth of ramus at $pm_2$ ;                    | 13  |
| "    "    at $m_1$ , posterior root;          | 11  |
| Anteroposterior diameter of $m^1$ internally; | 7   |

This otter is dedicated to my friend Samuel N. Rhoads, whose papers on North American mammalia have materially advanced the knowledge of the subject.

TAXIDEA Waterh.

TAXIDEA AMERICANA Bodd.

Both premaxillary and maxillary bones with the teeth, and the attached left mandibular ramus are all that represent the badger. The dentition of both jaws is, however, so well preserved as to place the identification beyond question. The specimen shows that the badger already existed in the east at this geologic epoch; as I have already shown that it existed in the region now drained by the Columbia River, at the same time.

MACHÆRODUS Kaup.

This remarkable genus of cats existed in Asia and Europe during late Neocene times, and in Europe during Pliocene time, having been the contemporary of the hairy elephant, cave-bear, etc. It has not been certainly detected hitherto in North America, although several species have been referred to it. These

have been referred to other genera excepting *M. catocapis* Cope of the Loup Fork bed of Nebraska, which was only provisionally referred to it. Two saber-teeth of the North American Pliocene, described by Leidy, from Florida and Texas, belong, so far as their cranial structure indicates, to the genus *Smilodon*. The type of this genus is *S. neogæus* Lund, which is found in the Pampean bed of South America, probably of Pliocene age. In this genus the humerus lacks the entepicondylar foramen, which is common to all other members of the Felidæ, and the post-tympanic and post-glenoid processes are fused below the auricular meatus.

Two species of saber-teeth have been found in the Port Kennedy deposit, but in neither of them is the posterior part of the cranium known. The distal part of the humerus of one of them at least is probably known, and this presents the entepicondylar foramen. With this evidence in hand I have no other course but to refer the species to the genus *Machærodus*, provisionally.

In *Smilodon fatalis* Leidy of Texas, the superior sectorial has a large pre-anterior lobe as in *S. neogæus* of South America, which is rudimental in *Machærodus gracilis* of the Port Kennedy deposit, in which respect it agrees with the species of *Machærodus*. In *S. floridanus* the canine is much less compressed than in *S. gracilis*. The Port Kennedy species differ as follows:

Larger;  $pm_3$ , absolutely smaller, one-rooted;  $m_1$ , larger; *M. gracilis* Cope.  
Smaller;  $pm_2$ , larger, two-rooted;  $m_1$ , smaller; *M. merceii* Cope.

Neither of these species attained the dimensions of *Smilodon neogæus* of Brazil, but *M. gracilis* equalled the lion or *Machærodus cultridens* of Europe, while *M. merceii* had apparently the size of the jaguar.

MACHÆRODUS GRACILIS Cope (Pl. XX, fig. 1).

*Smilodon gracilis*, American Naturalist, 1880, p. 857; Proc. Acad. Nat. Sci. Phil., 1895, p. 448.

This saber-tooth is represented in the collection of the Academy by cranial fragments and dentition of four individuals, and by a great many bones and fragments of bones principally of the limbs and feet; and in the Wheatley collection by a superior canine which lacks most of the crown. The most important specimen consists of that part of the cranium and mandible which supports the dentition, which is entirely preserved as to the incisors, and on the left side as to the remaining part. The superior canine and the lower jaw are somewhat crushed. Nothing remains of the skull posterior to the maxillary bone. A separate superior canine tooth was found about eighteen inches from the skull fragment, which belongs to another individual. The third specimen is the one which was described at the second reference above given. It includes several teeth found near together but separated from the skull. They are a superior canine minus part of the crown, one and part of another superior sectorial of opposite side; a superior third premolar; and a first inferior premolar less certainly referable to it. A fragment of lower jaw with two molars found near the same time and place formerly referred here, belong to *Uncia inexpectata*. The fourth individual is represented by a part of the right mandibular ramus, which supports the sectorial tooth.

From the most perfect specimens I derive the following characters:—The superior incisors are peculiar in having well-marked cingular tubercles at the base internally. In I. 1 and 2 there are two such tubercles which are separated by a notch of the base of the crown; in I. 1 they are subequal, while in I. 2 the external is larger. In I. 3 the internal has disappeared and the external is at the external base of the crown. The principal cusp of I. 1 and 2 are compressed so as to be transverse in section; while in I. 3 the section is nearly round. The size increases rapidly from I. 1 to I. 3, and I. 2 is in all other respects intermediate between I. 1 and I. 3.

The superior canine has a long and rather slender crown which projects well below the flange of the lower jaw when the mouth is closed. It is strongly compressed throughout, and one side of the crown is little more convex than the other. The curvature is moderate, and the width of the crown is not greater below than at the alveolar margin. The edge is smooth and sharp and free from denticles. In the absence of denticles it resembles the canine of the species of *Smilodon* when known, and differs from those of most of the species of *Machærodus*, but not from all.

The molar dentition is pm.  $\frac{3}{2}$  m.  $\frac{2}{1}$ . The third superior premolar is small and one-rooted. The crown is oblique to the root, is without cusp, and is elongate oval in horizontal section. The second premolar is of moderate dimensions and the roots are well separated. The crown is compressed, and has besides the median cusp a median posterior cutting lobe, an anterior basal lobe which reclines posteriorly on the main cusp, and a vertical heel-lobe. The pm. 1 or superior sectorial is very large. In this specimen all of the crown anterior to the metaconid or blade is worn away, so that I refer to the description of specimen No. 2 for its characters.

The inferior incisors increase rapidly in size from the first to the third, and the canine follows immediately with an increase of dimensions in the same ratio. I. 1 is quite small; I. 1 and 2 have a basal tubercle at the external side of the crown, and the principal cusps are conic and slightly incurved. The crown of the canine is similar except that it lacks the basal lobe. The second premolar is one-rooted and has a low crown, which consists of a principal cusp and a low-conic heel. It is separated from the first premolar by a space equal to its long diameter. The first premolar is rather large and is more compressed throughout than the corresponding tooth in the large species of *Uncia*. Its principal cusp is directed more obliquely posteriorly than in *Uncia*. There is a well-developed and sharp-edged, but rather low posterior lobe, and a cingular heel-lobe. The anterior basal lobe is small and is posterior to the basal border of the crown. The inferior sectorial has the posterior cutting edge (protoconid) considerably longer than the anterior (paraconid), although its root is much more slender than that supporting the latter. The external base is quite convex outward.

The flange of the mandible projects moderately below the mandibular border, and is regularly convex in outline. The symphyseal region is concave anteriorly.

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## MEASUREMENTS.

|   |                            | mm.  |
|---|----------------------------|------|
| Diameters, crown of I <sup>1</sup>                                  | { longitudinal;            | 8.5  |
|   | { transverse;              | 5    |
| Diameters, crown of I <sup>2</sup>                                  | { longitudinal;            | 10   |
|   | { transverse;              | 6    |
| Diameters, crown of I <sup>3</sup>                                  | { longitudinal;            | 12   |
|   | { transverse;              | 10   |
| Diameters, crown of c   | { longitudinal;            | 113  |
|   | { transverse at base;      | 28   |
| Diameters, crown of pm <sup>3</sup>                                 | { longitudinal;            | 2.5  |
|   | { anteroposterior;         | 7    |
| Diameters, crown of pm <sup>2</sup>                                 | { longitudinal;            | 7    |
|   | { anteroposterior;         | 16   |
| Diameters, crown of pm <sup>1</sup>                                 | { longitudinal (metacone); | 10   |
|   | { anteroposterior;         | 34   |
| Diameters, crown of I <sub>T</sub>                                  | { longitudinal;            | 5    |
|   | { transverse;              | 4.5  |
| Diameters, crown of I <sub>2</sub>                                  | { longitudinal;            | 8    |
|   | { transverse;              | 6    |
| Diameters, crown of I <sub>3</sub>                                  | { longitudinal;            | 11   |
|   | { transverse;              | 8    |
| Diameters, crown of c   | { longitudinal;            | 15   |
|   | { transverse;              | 6    |
| Diameters, crown of pm <sub>2</sub>                                 | { vertical;                | 5    |
|   | { anteroposterior;         | 7.5  |
| Diameters, crown of pm <sub>1</sub>                                 | { vertical;                | 14   |
|   | { anteroposterior;         | 21   |
| Diameters, crown of m <sub>T</sub>                                  | { vertical;                | 14.5 |
|   | { anteroposterior;         | 24.5 |
| Length from I <sup>1</sup> to pm <sup>1</sup> , inclusive;          |                            | 128  |
| Length from I <sub>T</sub> to m <sub>T</sub> , inclusive (crushed); |                            | 126  |
| “ of inferior diastema (crushed);                                   |                            | 46.5 |
| Depth, mandible at pm <sub>2</sub> (crushed);                       |                            | 35   |

This specimen represents a species about the size of the lion. The teeth of the second individual have the following characters:—The edges of the crown of the canine, of which 20 mm. are preserved, are not denticulate. The anterior lobe of the superior sectorial is large, but the preanterior lobe is a rudiment. The protocone forms an angular process, but has no distinct apex; its base displays the origin of a separate root. Enamel smooth.

## MEASUREMENTS.

|  | mm. |
|--|-----|
| Inferior canine, length of root and 30 mm. of crown; | 111 |
| “ “ diameter anteroposterior at base;                | 27  |
| “ “ diameters at 30 mm. from base { anteroposterior; | 24  |
| “ “ { transverse;                                    | 11  |
| Inferior sectorial, anteroposterior diameter;        | 31  |
| “ “ transverse diameter at protocone;                | 14  |



The first (and last) inferior true molar which represents the fourth individual, is perfect, except in the loss of the anterior root. The blade of the metaconid is nearly twice as long as that of the paraconid. There is no posterior heel, but there is a thickening of the posterior border, which is separated at its apex from the posterior edge of the metaconid by a slight notch, which represents it. The anterior base is also swollen. Where not worn by use, the enamel has a weak and fine plication. Diameters of crown:—Total anteroposterior of metaconid, 16; vertical, paraconid 12, metaconid 15 mm.

The distal part of a right humerus, I suspect from its characters, to belong to this species. As compared with that of *Uncia inexpectata* it differs in its superior size, in the weaker ectepicondylar foramen, and in the fact that the internal border of the condyle is discontinuous at the distal convexity. In other words, the internal border of the olecranon fossa, which is parallel to the posterior part of the ulnar border of the condyle, disappears distally, and the radial border of the condyle commences far internal to it, and is parallel with the anterior part of the ulnar border. These two parts of the internal border of the condyle are connected by a continuous angle in *U. inexpectata*. The external epicondyle is not so large relatively in *S. gracilis* as in *U. inexpectata*. The internal epicondyle is low and very obtuse. The internal distal marginal crest is moderately prominent, without angle, and continues as a low ridge on the posterior median line of the shaft.

MEASUREMENTS.

|                         |                          | mm. |
|-------------------------|--------------------------|-----|
| Humerus.                |                          |     |
| Diameters of shaft      | anteroposterior;         | 34  |
|                         | transverse;              | 22  |
| Diameters of distal end | anteroposterior, middle; | 21  |
|                         | “ external;              | 43  |
|                         | transverse, total;       | 69  |
|                         | “ of condyle;            | 49  |

The astragalus is about the size of that of the lion, and displays the typical feline character of the enclosed astragalus notch, forming a foramen. The trochlea is moderately oblique, and is relatively wider and flatter than the modern Felidae. A difference between the bone and the astragalus of the leopard (*Uncia pardus*) is seen in the more internal position of the apex of the posterior inferior border. It is below the foramen in the latter; interior to this point in the former.

Calcanea of the right side of two individuals are preserved, and are about the size of those of the lion. The extremity of the tuber has a strong vertical concavity. The superior edge is rather narrow; the inferior face wider, about as in *Uncia* sp. The astragalus facets have the same shape as in *Uncia* sp.; and the pre-stentacular fossa and the groove above it are well-marked. The longitudinal groove of the superior part of the external face with the ridge bounding it below, is slightly developed. The external tuberosity adjacent to the head is well-marked, and the cuboid facet is more angulate externally than in *Felis* sp.

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Proximal parts of the third and fourth left metatarsals are present. They are remarkable for the wide and open anteroposterior grooving of the heads. The heads of both are notched in front of the middle of the external margin. The diaclast of the third is obtuse. The superior part of the shaft of the same is grooved longitudinally; the external face of the fourth is convex and fossate above and posteriorly, indicating that the fifth metatarsal was small. An ungual phalange lacks the apex. Its tendinous insertion is as prominent and pedicellate as fully as in a true cat, showing that the ungues possessed the retractile character as fully as any of the modern Felidae. In size this phalange equals that of the lion.

## MEASUREMENTS.

|  | mm. |
|--|-----|
| Astragalus.                                    |     |
| Greatest length;                               | 48  |
| "    width;                                    | 38  |
| Width of trochlea;                             | 27  |
| Diameters of head { vertical;                  | 17  |
| { transverse;                                  | 25  |
| External elevation of trochlea;                | 22  |
| Calcaneum.                                     |     |
| Total length;                                  | 78  |
| Width at extremity of tuber;                   | 21  |
| Depth at " " "                                 | 25  |
| Depth at ectal astragalar facet;               | 35  |
| Width at sustentaculum;                        | 31  |
| Diameters of head { vertical;                  | 19  |
| { transverse;                                  | 17  |
| Metapodials.                                   |     |
| Proximal diameters of mt. 3 { anteroposterior; | 19  |
| { transverse (exposed);                        | 14  |
| Proximal diameters of mt. 4 { anteroposterior; | 22  |
| { transverse;                                  | 17  |
| Width of mt. 3 at distal angle of diaclast;    | 16  |
| "    of mt. 4 at same point;                   | 14  |
| Ungual phalange.                               |     |
| Diameters of inferior tuberosity { vertical;   | 19  |
| { anteroposterior;                             | 18  |
| { transverse;                                  | 11  |

The remains above described, prove that during the Megalonyx epoch eastern North America was inhabited by a saber-tooth as large as the existing lion, which preyed on the other large mammals of the fauna. Its long, compressed, saber-shaped canine teeth were better adapted for the destruction of the sloths and bears

of that epoch, than the more conic teeth of the large cats of the present age. The latter were represented, as we shall see, by a contemporary species, *Uncia inexpectata*.

SMILODON MERCERII Cope (Pl. XX, figs. 2-2c). [Type No. 50, Mus. Acad. Nat. Sci.]  
*Uncia mercerii* Cope, Proc. Acad. Nat. Sci. Phil., 1895, p. 448.

This saber-tooth is represented in the Academy's collection by two premolar teeth from the upper and lower series, found near by at the same time and place; and by two mandibular rami of a second individual found together by Mr. W. H. Witte, Mr. Mercer's assistant. The premolar teeth are the specimens on which the existence of the species was inferred. They are quite similar to the  $pm_2$  and  $pm_1$  of *S. gracilis*, differing chiefly in their smaller size. The discovery of the mandible enables me to ascertain the characters which distinguish the species from *S. gracilis*. These are: The different proportions which hold between the inferior molar and the premolars; the two-rooted  $pm_3$ ; and the smaller size. The species is not so specialized in the sectorial direction as *S. gracilis*. Thus, the  $pm_1$  in the two species differ but little in size, and the  $pm_3$  is larger, though the jaw is smaller, and the  $m_1$ , or sectorial, is considerably smaller proportionately to the reduced size of the jaw in *S. mercerii*. These characters are brought out in the measurements. In further detail I observe that the posterior cutting lobe of the  $pm_2$  is more distinct from the heel, and is more compressed than in *S. gracilis*, and that the anterior base of the  $pm_1$  is less produced anteriorly.

But two incisors on each side are preserved, but the surface of the alveolar wall on one side preserves indication of the alveolus of the I. 1. The forms of the crowns of the other incisors and of the canine are as in *S. gracilis*. The symphysis is deep, and its anterior face transversely concave. The inferior projection of the flange is moderate, but greater than the anterior projection. Its edges are thin both anteriorly and inferiorly. The ramus is not deeper at the  $pm_2$  than behind the  $m_1$ . The coronoid process is low as in other Smilodons, with sloping anterior and slightly concave posterior border. The masseteric fossa is strongly marked, especially by the strong horizontally prominent inferior edge of the ramus. Anteriorly it fades out below the last true molar. The inferior border of the ramus is very greatly convex. The condyle and angle are broken off. There are two well-separated mental foramina; the posterior below the anterior root of the  $pm_2$ , and the anterior below the middle of the diastema. There are three subequal foramina on the anterior face of the symphysis; one immediately below the incisor teeth; one a little above the inferior line of the symphysis; and one a little nearer to it than to the superior foramen and in line with it. The dental foramen is very large and enters the ramus below the middle, and posterior to the vertical line of the posterior border of the sectorial.

## MEASUREMENTS.

|  | mm.  |
|--|------|
| Diameters of crown of $I_{\frac{1}{2}}$ { longitudinal ;           | 7    |
| { transverse ;   | 5    |
| Diameters of crown of $I_{\frac{3}{4}}$ { longitudinal ;           | 10   |
| { transverse ;   | 7    |
| Diameters of crown of $\bar{v}$ { longitudinal ;                   | 16   |
| { transverse ;   | 7    |
| Diameters of crown of $pm_{\frac{1}{2}}$ { vertical ;              | 6.5  |
| { anteroposterior ;  | 10   |
| Diameters of crown of $pm_{\frac{1}{4}}$ { vertical ;              | 14.5 |
| { longitudinal ;   | 19.5 |
| { transverse at lobe ;   | 9    |
| Diameters of crown of $m_{\frac{1}{4}}$ { vertical ;               | 11.5 |
| { longitudinal ;   | 22.5 |
| { transverse at middle ;   | 10   |
| Length from $I_{\frac{1}{2}}$ to posterior edge coronoid process ; | 142  |
| “ “ $I_{\frac{3}{4}}$ “ “ $m_{\frac{1}{4}}$ ;                      | 105  |
| “ of inferior diastema ;   | 36   |
| Depth, symphysis ;   | 49   |
| “ mandible at $pm_{\frac{1}{2}}$ ;                                 | 31   |
| “ “ at dental foramen ;  | 34   |
| Height of coronoid process posteriorly ;                           | 28   |

The premolar teeth on which the species was founded present the following characters. In the  $pm_{\frac{1}{4}}$  the crown is narrower in proportion to its length, and the base is convex anteroposteriorly on the external side, and concave on the interior side to a greater degree than in any of these species of *Uncia*. As a result the protocone is more convex on the outer than on the inner side, while the reverse is the case in the recent species of *Uncia* and in *U. inexpectata*. It has also a strong obliquity posteriorly to the apex, so that the anterior cutting edge is longer than the posterior, a character not seen in the species named, but characteristic of the genus *Smilodon*. The obliquity is much less evident in a superior second premolar, which has otherwise the same general character. In the inferior premolar the posterior cutting lobe is more developed than in any of the American species of *Uncia*, being separated from the adjacent parts by deeper fissures. The heel is quite prominent and has a superior cutting edge of a more pronounced character than in any of the species above named. The anterior basal cusp is larger than the heel and has also a superior longitudinal cutting edge.

The superior premolar is much like the larger one, but the protocone is less elevated and less oblique to the horizontal line of the base.

## MEASUREMENTS.

|  | mm. |
|--|-----|
| Diameters of $pm_{\frac{1}{4}}$ { vertical ; | 14  |
| { longitudinal ;                             | 21  |
| { transverse, posteriorly ;                  | 9   |
| Diameters of $pm_{\frac{3}{4}}$ { vertical ; | 8.5 |
| { longitudinal ;                             | 16  |
| { transverse, posteriorly ;                  | 7.5 |

VERTEBRATE REMAINS, PORT KENNEDY BONE DEPOSIT. 247

These specimens prove the existence with *Smilodon gracilis*. of a second species of saber-tooth of smaller size, which in its two-rooted second premolar resembles the species of *Machærodus*, a genus to which it may ultimately be found to belong when the remaining parts of the skull and teeth are obtained. *Smilodon mercerii* was a most formidable animal of the size of the jaguar, but with much more efficient mechanism for blood-letting than the latter. Why the cats of this type disappeared, while the *Uncia* remained, is as yet an unexplained problem.

This species is dedicated to Mr. Henry C. Mercer of the Archaeological Museum of the University of Pennsylvania, to whose personal exertions science is indebted for the greater part of the material described in this paper.

UNCIA Gray.

Proc. Zool. Soc. London, 1867, p. 263, Cope emend., Proc. Acad. Nat. Sci. Phil., 1879, p. 168.

This genus is related to *Felis* much as *Canis* is to *Vulpes*. As in the case of *Canis* and *Vulpes* it differs from *Felis* in the round and not fissured form of the pupil. It also differs from *Felis* in the considerably less complex turbinal bones, a distinction which does not appear to hold in the case of *Canis* as compared with *Vulpes*. The species of *Uncia* are of larger size than those of *Felis* in the existing fauna, and they are more diurnal in their habits. So the species of *Canis* are larger than those of *Vulpes* and are more diurnal. This genus includes the large cats of both hemispheres. A well-marked species left its remains in the Port Kennedy bone fissure.

UNCIA INEXPECTATA Cope (Pl. XXI, figs. 1-1f). [Type No. 52, Mus. Acad. Nat. Sci. Phil.]

*Crocota inexpectata* Cope, Proc. Acad. Nat. Sci. Phil., 1895, p. 148.

This species was founded on a superior sectorial tooth of the right side. I refer to the same species a large fragment of the right mandibular ramus containing the sectorial and most of the first premolar, with which were found the crown of the left inferior sectorial, left first premolar and three inferior incisor teeth. At another locality part of another superior sectorial was found, and at still another an entire superior canine. These specimens all belong to large species of *Uncia*, but to individuals of two slightly different dimensions. It remains to be determined whether these are referable to one species, but I suspect that such will prove to be the case. There are also parts of two humeri, fifteen metapodials and ten phalanges, which agree in size with this species, but which were found separately. The smaller specimens equal the average size of the jaguar.

The superior canine is less robust than that of the jaguar, and resembles in size and form that of the puma. As the apex is broken off, a trace only of the external groove remains. The crown is subcircular at the base, and the anterior internal and posterior median ridges are distinct.

The superior sectorial is remarkable for the small size of the protocone which has been broken off, leaving slight trace of its former existence. The slope of the adjacent surfaces is reconcilable with its presence, but small development. In this respect the tooth differs from the corresponding teeth of the *Uncias*, and resembles



that of the Smilodons. The internal root, however, I find is present, showing that the species cannot be referred to *Dinobastis*. It is the absence of the protocone which led me to suppose that this tooth is an inferior sectorial, and to refer it to a species of hyena under the name of *Crocota inexpectata*, with a reservation in favor of its possible pertinence to a feline animal. This suspicion is now fully confirmed. The parastyle is robust and has no preanterior lobe. The paracone is rather symmetrical, and has an angle on the internal side extending from the apex to the base of the internal root, which is weak in the recent *Uncias*, and is distinct in *Smilodon gracilis*. The metacone projects well posteriorly, and has an undulate cutting edge as in the *Uncias*. The size is about that of the sectorial of the jaguar. The fragment of a second superior sectorial tooth, already referred to, is identical in character with the complete one. Enamel smooth.

The inferior sectorial has the erect metaconid characteristic of the genus, the cutting edge being very steep, and the apex more elevated than that of the paraconid. The heel is represented by a slight swelling at the base of the metaconid. The tooth has quite the form of that of the jaguar. The first premolar has the erect cusp and large anterior basal lobe of that species. The principal cusp is much more convex on the internal than on the external side. The posterior lobe is well-developed, and the heel is a cingulum without median cutting edge. The crown is wider posteriorly than in *Smilodon*, having the robust character of the corresponding tooth in the recent *Uncias*.

The crowns of the incisors are short, decurved, and with acute apex. They are robust, and an external basal lobe is present in all three.

The distal half of the shaft of the humerus has lost the condyles. The entepicondylar foramen is a large vertical oval. The external border of the shaft as it expands to the epicondyle differs from the corresponding part in the existing species of *Uncia*, in being thicker and not alate. It terminates upward in a low ridge which is soon lost. Its size is about that of the jaguar.

The third and fifth left metacarpals and half of the fourth are perfect. The unciform facet of the third is distinct. The diaclast of the fourth is elongate, and is rounded in transverse section. The diaclast of the fifth differs from it in having an acute margin. When in place these metacarpals are divergent. The external side of the proximal extremity of the fifth metacarpal has two faces; one looking outward, upward and forward, the other looking directly outward. Its shaft is of moderate length.

The phalanges have the general character of those of the jaguar and leopard. This applies to those of all the series, including the ungual.

## MEASUREMENTS.

|                                 |                        |                    |                          |
|---------------------------------|------------------------|--------------------|--------------------------|
|                                 |                        | mm.                |                          |
| Diameters of superior sectorial | } vertical (paracone); | 10                 |                          |
|                                 |                        | } anteroposterior; | 24                       |
|                                 |                        |                    | } transverse (at roots); |



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FELIS Linn.

Gray emend. Proc. Zool. Soc. London, 1867, p. 270.

FELIS EYRA Desm., Cope, Proc. Acad. Nat. Sci. Phil., 1895, p. 449.

A left mandibular ramus which lacks all posterior to the last molar, and which retains two molars (pm. 1 and m. 1) and the canine, represents this cat. The pm. 2 was probably lost during the life of the animal, as the alveolar region is roughened anterior to the pm. 1.

The dentition is characterized by the very small size of the posterior lobe of the pm. 1, although the heel is well developed. The anterior basal lobe is small but distinct. There are two mental foramina, one below the position of the lost pm. 2 and a larger one in front of the same tooth. This agrees with the character of our specimen of *eyra* in the museum of the Academy, while in a more mature specimen than the last, but one mental foramen is present on both sides. The inferior canine has the usual groove in the fossil jaw, and the masseteric fossa extends to the line of the posterior border of the sectorial tooth.

## MEASUREMENTS.

|   | mm.  |
|---|------|
| Length of ramus from posterior border of m <sub>1</sub> ; | 36   |
| Depth of " " at " " " "                                   | 13   |
| " " " at position of pm. 2;                               | 11.5 |
| Length of base of pm. 1;                                  | 9    |
| Elevation of pm. 1;                                       | 5    |
| Length of base of m. 1;                                   | 6    |
| Elevation of protoconid of m. 1;                          | 10.5 |

An isolated calcaneum of a cat of the dimensions of the present species differs considerably from that of *eyra*. The principal difference is the rounded external border of the cuboid facet. In *eyra* this facet is obliquely truncate externally.

## MEASUREMENTS.

|                              | mm. |
|------------------------------|-----|
| Length;                      | 30  |
| Width at sustentaculum;      | 13  |
| " of cuboid facet;           | 9   |
| Depth of tuber at extremity; | 9   |

*Felis eyra* is at present distributed throughout the the neotropical zoological realm, exclusive of the West Indies.

LYNX Raf.

Gray, Proc. Zool. Soc. London, 1867, p. 276.

LYNX CALCARATUS Cope, (Pl. XXI, figs. 2, 2a). [Type No. 56, Mus. Acad. Nat. Sci.]

*Lynx rufus* Cope, Proc. Acad. Nat. Sci. Phil., 1895, p. 448, not of Guldenstadt.

This species is represented by left maxillary and premaxillary bones, which support the i. 3, c., pm. 1, 2. Besides this specimen there is another which includes

the right superior sectorial and left superior canine. Possibly belonging to the same animal is a left superior sectorial. Then there are a  $pm_2$  and two  $pm$ . A third specimen is represented by a part of the right mandibular ramus which supports the three molars. A fourth includes fragments of both mandibular rami with all the molars and a part of one canine.

From the last specimen I infer the existence of a species of *Lynx*, different from either of those now inhabiting North America. Its conspicuous character is the production of the base of the protoconid inward and backward into a rudimental heel. In the fourth specimen this supports a distinct metaconid, while in the third the heel is equally produced, but forms only a thickening without a free apex. I do not observe this form in seven skulls of the existing North American lynxes before me. As to other characters, the inferior canine displays grooves arranged as in the living species referred to. The two inferior dentitions differ from each other in the development of the posterior lobe of the second premolar. In No. 4 it is strong as in *L. canadensis*, while in No. 3 it is weak as in *L. rufus*, although both specimens have the same dimensions. In the latter also, the  $pm_2$  has a weaker anterior basal lobe than in No. 4, but the difference is slight.

It has occurred to me that the mandible no. 4 belongs to the ocelot (*Felis pardalis*), which sometimes has a rudimental heel and metaconid of the sectorial. The accompanying canine is, however, that of a lynx, and the mandible No. 3 cannot be separated from No. 4 specifically, while its sectorial differs from that of the lynxes. It is also not likely that, since the superior dental series are those of lynxes, the inferior series belong to another genus.

The superior dental series is that of a lynx of the size of *L. rufus*. In specimen No. 1 the only peculiarity noticeable is that the protocone of the sectorial is a little posterior to the usual position, its anterior border falling opposite the notch between the paracone and anterior basal lobe. In specimen No. 2 the protocone has the position seen in the existing lynxes. In No. 2, as in the separate superior sectorial, there is a small preanterior lobe, a character sometimes seen in existing lynxes.

## MEASUREMENTS.

|  | mm.  |
|--|------|
| Length of dental series from I. 3, inclusive; no. 1; | 42   |
| "    of diastema;                                    | 4    |
| "    of molars;                                      | 23   |
| "    superior sectorial;                             | 14   |
| Width of "    "    "    at protocone;                | 7    |
| Length of bases of $pm_{2-3}$ and $m_1$ ; no. 3;     | 29   |
| "    of base of $m_1$ ;                              | 12   |
| Length of bases of $pm_{2-3}$ and $m_1$ ; no. 4;     | 32.5 |
| Diameters, $pm_2$ { vertical;                        | 6    |
| { anteroposterior;                                   | 8.5  |
| Diameters, $pm_1$ { vertical;                        | 7    |
| { anteroposterior;                                   | 10   |
| Diameters, $m_1$ { vertical;                         | 7    |
| { anteroposterior;                                   | 12   |
| Length of diastema;                                  | 5.5  |
| Depth of ramus at $m_1$ , inside;                    | 15   |

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The determination of this species as distinct from the common wild-cat, with which I at first identified it, reduces the number of existing species by so much. In its character it approaches the primitive or ancestral cats, by a little.

## PROBOSCIDIA.

## MASTODON Cuv.

MASTODON AMERICANUS Leidy, *Ext. Mamm. Dakota, Nebraska, 1869*, p. 392.

Remains of about eighteen mastodons of this species were taken from the fissure. Only one of these exhibits characters of maturity; several others have one or two true molars unerupted, while others are still younger, one having three premolars in place.

Two lower jaws, which contain the last three molars, show considerable discrepancy in dimensions, as follows:—

## MEASUREMENTS, No. 3.

|                    |                  | mm. |
|--------------------|------------------|-----|
| Diameters of $m_2$ | anteroposterior; | 122 |
|                    | transverse;      | 80  |
| Diameters of $m_3$ | anteroposterior; | 200 |
|                    | transverse;      | 80  |

## No. 4.

|                    |                  |     |
|--------------------|------------------|-----|
| Diameters of $m_2$ | anteroposterior; | 103 |
|                    | transverse;      | 74  |
| Diameters of $m_3$ | anteroposterior; | 144 |
|                    | transverse;      | 71  |

The last inferior molar of No. 3 is then one-third the length of No. 4 longer than the latter. I have found a few last inferior molars of this species in the large collection of the Academy which approach No. 4 in their reduced size, but none so small in linear measurement.

The specimens obtained by Mr. Mercer give a full series of the permanent molar dentition. In specimen No. 1 we have pm. 3-2-1; No. 2 displays pm. 2-1, m. 1; No. 3, pm. 1, m. 1-2-3. This enables me to make a full description of the entire series, but as this has already been done by Falconer, Leidy and others, I will merely restate it briefly. The crests are: pm. 2-2-3; m. 3-3-4 and a talon. The premolars are more wrinkled than the true molars. The crest formula agrees with that which I found in the superior dental series of *Tetralodon productus* in 1875. The roots of the premolars are long and acuminate. Of the temporary dentition less complete material exists. A temporary molar has nearly the transverse diameter of the pm. 2, but has three cross-crests and a circular tubercle in front. The posterior cross-crest is narrower than the others. As the tooth has both anterior and posterior surface contacts I suppose it to be the  $d_2$ .

The occurrence of these huge animals in the fissure shows that it must have been open at the summit during the pliocene period.



## DIPLARTHRA.

TAPIRUS Bliss.

Remains of tapirs are abundant in the cave formations of North America, and in other deposits of corresponding age. They have not yet been found much north of latitude 40°, from localities in Indiana and Pennsylvania; *i. e.*, from near Richmond in the former State and Port Kennedy in the latter, while they are common in the south. All appear to be referable to a single species.

TAPIRUS HAYSII Leidy. Proc. Acad. Nat. Sci. Phil., VI, 106; VII, 201; Postpliocene Fossils of South Carolina, 1860, p. 106, Pl. XVII, figs. 1-12.  
*Tapirus americanus fossilis*, Leidy *l. c.*

Remains of thirty-five or more tapirs are contained in the Academy and in the Wheatley collections. These are principally represented by teeth and jaws with teeth in place. There are, however, some bones of the skeleton, including vertebrae, limb bones, and bones of the feet, including three astragali.

As observed by Leidy, there is a considerable range of variation in the dimensions of individuals, some of them not exceeding *T. terrestris* (*T. americanus*) in size, while others were considerably larger. So far as the dentition is concerned I cannot find any other difference between them, but I find nearly constant differences between animals of all dimensions and *T. terrestris*. I have four mandibular rami of *T. haysii* which contain the pm. 3, and four separate pm. 3. On comparing these with five mandibles of *T. terrestris*, I find that the pm. 3 in the former differs from that in the latter in the greater distinctness of the internal wall of the protoconid between the paraconid and the metaconid. In *T. haysii* it is a convex surface which descends to the inner base of the crown, separating the bases of the paraconid and the metaconid. In *T. terrestris* it is only visible at the apex of the protoconid, and the space between the paraconid and metaconid is concave instead of convex above, or, if slightly convex, the bases of the paraconid and metaconid come together and exclude the protoconid. This character is reinforced by a peculiarity in the symphysis of the lower jaw. It is not so much compressed as in *T. terrestris*, and its posterior face is not divided by a median tubercle as I find to be the case in six lower jaws of *T. terrestris*.

In *T. roulinii* the pm<sup>3</sup> is of more elongate form and the deuterocone is smaller, and the anterior cross-crest is of reduced proportions in the pm<sup>2</sup>, according to the figures of Hatcher.<sup>1</sup> In these points *T. haysii* resembles *T. terrestris*.

The relative proportions of the inferior incisors are much as in *T. terrestris*, but they are much larger in all the specimens in the Port Kennedy collection. The crown of the  $i_{\frac{2}{3}}$  is nearly as wide as that of the  $i_{\frac{1}{3}}$ , but it has less vertical extent, while the  $i_{\frac{2}{3}}$  has the usual reduced proportions; and the crown is obtuse. In some incisors there is a shallow longitudinal groove of the external face; in others it is very faint. I observe a trace of it in some specimens of *T. terrestris*. The superior incisors are like those of *T. terrestris*, but larger; none of them are in place. The inferior canine is robust and has two cutting edges as in *T. terrestris*. For comparison with *T. terrestris* I give the following measurements:

<sup>1</sup> Am. Journ. Sci. Arts, 1896, Pl. IV, fig. 2. DeBlainville figures a worn individual.

## MEASUREMENTS.

|  | mm.  |
|--|------|
| Diameters of superior molar crown  | 29   |
| { anteroposterior;   | 29   |
| { transverse;  | 32   |
| Anteroposterior diameter of complete series of superior molars of median size; |      |
| pm. 3;   | 24   |
| pm. 2;   | 23   |
| pm. 1;   | 24   |
| m. 1;  | 26   |
| m. 2;  | 30   |
| m. 3;  | 29   |
| Total;   | 181  |
| Length of six inferior molars (last not erupted);                              | 137  |
| Length of pm. 3 of same set;   | 25   |
| Depth of ramus of " " at m. 1;   | 55   |
| Length of symphysis mandibuli to base of crowns of incisors of another animal; | 98   |
| Width of same at narrowest point;  | 40   |
| Diameter of crown of I <sub>1</sub>  | 13   |
| { transverse on edge;  | 14   |
| { vertical within;   | 12   |
| Diameter of crown of I <sub>2</sub>  | 10   |
| { transverse on edge;  | 7    |
| { vertical within;   | 7    |
| Width of crown of I <sub>3</sub> ;   | 64   |
| Diameters of astragalus  | 49   |
| { anteroposterior (greatest);  | 50   |
| { transverse at trochlea;  | 22   |
| { " at head;   | 30   |
| Length of head from groove of trochlea;  | 30   |
| Anteroposterior diameter of head (total);                                      | 34   |
| Transverse diameter of distal condyle of 3d metapodial;                        | 26.5 |
| Anteroposterior diameter of distal condyle at heel;                            | 26.5 |

An imperfect mandible with deciduous molars and one permanent molar protruded and one in the jaw, found by Mr. Mercer in the bottom deposit of the Lookout Cave in East Tennessee, agrees with the species in the two characteristics mentioned, but is not larger than *T. terrestris*.

## EQUUS Linn.

Remains of a larger and smaller horse were obtained by Mr. Wheatley at Port Kennedy in 1871, and fine series of the dentition have been recently procured by Messrs. Rhoads and Mercer. The determination of the specific characters of the extinct species of *Equus* is not easy, and I have taken advantage of every opportunity to obtain light on their characters. I published a preliminary table in 1884,<sup>1</sup> and later, in 1893,<sup>2</sup> pointed out the characters of additional species. Finally, in 1895<sup>3</sup>, I added fuller descriptions of other species. I now give a brief

<sup>1</sup> Proc. Am. Phil. Soc., p. 10.

<sup>2</sup> Report Geo. Survey, Texas, Vertebrate Paleontology, pp. 66-83.

<sup>3</sup> Proc. Am. Phil. Soc., pp. 463-4.

synopsis of characters of such North American species as I am familiar with, as seen in the dentition.

- I. Small species with sharp-angled molars.
  - A prominent longitudinal keel at middle of external side of crown ; small ; *E. eurystylus* Cope.
  - No external longitudinal ridge ; least ; *E. minutus* Cope.
- II. Larger species with rounded angles of crowns of molar teeth.
  - A. Protocone 2.5 to 3 times in length of crown on true molars.
    - Size medium ; enamel less or more complex ; incisors  $\frac{2-3}{2-3}$  without inner cup-walls ; *E. fraternus* Leidy.
    - Size very large ; protocone grooved on internal face ; complexity moderate ; *E. crenidens* Cope.
    - Size small ; lake border simple ; *E. cummingsii* Cope.
  - AA. Protocone .5 to .66 long diameter of crown on true molars.
    - a. Smaller species ; molars  $25 \times 25 \pm$  mm.
      - Enamel borders simple ; protocone very flat ; *E. tau* Owen.
      - Enamel borders a little infolded ; last superior molar equal penultimate ; *E. semiplicatus* Cope.
    - aa. Larger species ; molars  $30 \times 35 \pm$  mm.
      - Protocone of premolars narrow ; enamel of molars little complex ; last superior molar larger than penultimate ; inferior incisors entire ; *E. occidentalis* Leidy.
      - Protocone of premolars equal that of molars ; enamel moderately plicate ; external inferior incisor without posterior cup-wall ; *E. intermedius* Cope.
      - Protocone of premolars equal that of true molars ; enamel folds very complex ; *E. complicatus* Leidy.

EQUUS FRATERNUS Leidy, Proc. Acad. Nat. Sci. Phil., 1858, p. 11 ; Postpliocene Fossils of South Carolina, Tuomey and Holmes, 1859, p. 100, Pl. XV, figs. 6, 8, 16, 17, 18 ; Pl. XVI, figs. 23, 27-9. Cope, Proc. Am. Phil. Soc., 1855, p. 465.

This horse is represented by the following specimens: A decayed skull of a young animal containing molars and incisors, a number of them in place and unworn; a series of twelve superior molars and three superior incisors, now separate, but found together, and probably belonging to one animal; a series of ten superior molars and three incisors, all found at the same time, and separated by the quarrymen, but apparently belonging to one skull, excepting one which is a duplicate; two upper molars and one upper incisor, found at the same time and distinguished from the others by their dark color; parts of both mandibular rami of one animal, containing twelve molars with the symphysis and all the inferior incisors in place, also of dark color; and part of another ramus containing four molars. These specimens indicate seven individuals. There are also bones of the skeleton, but these are not very numerous.

The superior molar teeth all agree in the fact that the anteroposterior diameter

of the protocone enters the same dimension of the entire crown from two a and third to nearly three times. These measurements are taken so as to include the enamel borders only. In the other pliocene horses of North America, the antero-posterior diameter of the protocone is from one-half to three-fifths that of the entire crown, excepting in the premolars of *Equus occidentalis* Leidy, and in the larger *E. crendens* Cope. I have used this character as diagnostic of species of this genus in my synopsis of the American species published in 1884, and it has unquestionable value,<sup>1</sup> as the development of the protocone is the one feature which distinguishes the molars of *Equus* from those of *Hippidium*. In the earlier species of *Equus* the diameter is always small, as in *E. cummingsii*.<sup>2</sup> In *Equus caballus* the character is very variable, but the diameter of the protocone generally increases from the front posteriorly. This is not the case in *Equus fraternus*, where the diameter is the same throughout the series. This species is also characterized by the imperfection of the posterior border of the cusps of the incisor teeth of the lower jaw. This character appears in the inferior series in the collection above referred to. The external incisor has no internal edge, and that of the second is fissured to the base of the cup. It is entire in the  $i_7$ . In the typical *E. fraternus* from Florida, the internal cup-border is wanting from the entire series. The superior incisors of the latter are unknown, but in the Port Kennedy specimens the interior border is present throughout, and the anterior face has a shallow, open, longitudinal groove.

One of the individuals differs from the others in the greater complexity of the enamel plates, especially on the opposed faces of the external lakes, agreeing in this respect with *Equus complicatus* of Leidy. In the other individual the enamel is less plicate, and is more as in *E. intermedius* Cope. In the upper molars of all the specimens there is a tendency to crenulation. The specimens from South Carolina which served as Leidy's types of *Equus complicatus*, and a superior molar so labelled by Leidy from Luzerne Co., Pennsylvania, are characterized by the considerable anteroposterior diameter of the protocone. All the specimens from Port Kennedy are on the other hand characterized by the very small anteroposterior diameter of this part of the tooth. The examination of a large amount of material leads me to believe that this character has greater significance in the extinct species than the degree of complexity of the enamel plication, within certain limits. A specimen in the museum of the Academy of Natural Sciences of Philadelphia has a protocone of exactly the same form and proportions as the Port Kennedy specimens. This is the only individual that has come under my observation which agrees with the series of smaller size now described from Port Kennedy.

The superior molars displaying moderate complexity, are of smaller size than the complex ones, conforming in this respect to the types of *E. fraternus*. The molars with complex enamel are of larger size, agreeing in this respect with the typical *E. complicatus*, and having also the dimensions of *E. intermedius* Cope. In

<sup>1</sup>Proc. Am. Phil. Soc., 1885, p. 463, Pl. XI, fig. 8.

<sup>2</sup>Report Geol. Survey, Texas, 1893, p. 67, Pl. XXII, fig. 7.

both series the grinding face of the  $m^3$  is considerably more elongate than those of the other true molars; and the  $pm^2$  is longer than any of the molars except  $pm^3$  and  $m^3$ .

Under the circumstances it is necessary to distinguish two races of *Equus fraternus*,<sup>1</sup> as already indicated: *E. f. fraternus*, and *E. f. pectinatus*, which may prove to be distinct species. The measurements of the superior molars of the Port Kennedy specimens of the former are as follows:

| MEASUREMENTS.     |   | mm.                              |    |
|-------------------|---|----------------------------------|----|
| Diameters, $pm^2$ | { | anteroposterior at middle;       | 29 |
|                   |   | greatest transverse;             | 28 |
| Diameters, $pm^1$ | { | anteroposterior;                 | 28 |
|                   |   | transverse;                      | 29 |
| Diameters, $m^1$  | { | anteroposterior;                 | 25 |
|                   |   | transverse;                      | 28 |
| Diameters, $m^2$  | { | anteroposterior;                 | 25 |
|                   |   | transverse;                      | 28 |
| Diameters, $m^3$  | { | anteroposterior (grinding face); | 32 |
|                   |   | transverse;                      | 25 |
| Diameters, $I^3$  | { | anteroposterior;                 | 10 |
|                   |   | transverse (oblique);            | 19 |

The measurements of the teeth of the var. *pectinatus* are as follows:

| MEASUREMENTS.     |   | mm.                        |    |
|-------------------|---|----------------------------|----|
| Diameters, $pm^2$ | { | anteroposterior at middle; | 32 |
|                   |   | transverse, greatest;      | 31 |
| Diameters, $pm^1$ | { | anteroposterior;           | 29 |
|                   |   | transverse;                | 32 |
| Diameters, $m^1$  | { | anteroposterior;           | 26 |
|                   |   | transverse;                | 31 |
| Diameters, $m^2$  | { | anteroposterior;           | 27 |
|                   |   | transverse;                | 30 |
| Diameters, $m^3$  | { | anteroposterior;           | 34 |
|                   |   | transverse;                | 27 |
| Diameters, $I^3$  | { | anteroposterior;           | 10 |
|                   |   | transverse;                | 20 |

The anterior face of the superior incisors displays a shallow groove interior to the middle vertical line of the crown.

The lower jaw above referred to, pertains to the typical form of *E. fraternus*. The metaconid metastyle is short anteroposteriorly and is deeply grooved on its internal face, the entering angle of the section of the groove being open on the anterior teeth, and becoming sharper posteriorly. The size of this lobe, the slight

<sup>1</sup>Cope, Proc. Am. Phil. Soc., 1895, p. 465.



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plication of the enamel and the dimensions, agree with the superior molars typical of *E. fraternus*. The symphyseal region is rounded and not keeled below, and the incisors, as above described, have the deficient interior plate, except the  $I_1$ , where it is present, differing in this respect from the Florida individuals. The mental foramen issues opposite the posterior border of the symphysis.

## MEASUREMENTS.

|  | mm. |
|--|-----|
| Length of inferior molar series ;          | 190 |
| Diameters, $pm_3$ { anteroposterior ;      | 33  |
| { transverse ;                             | 16  |
| Diameters, $pm_2$ { anteroposterior ;      | 30  |
| { transverse ;                             | 16  |
| Diameters, $m_1$ { anteroposterior ;       | 27  |
| { transverse ;                             | 16  |
| Diameters, $I_1$ { anteroposterior ;       | 10  |
| { transverse ;                             | 15  |
| Diameters, $I_3$ { anteroposterior ;       | 7   |
| { transverse ;                             | 16  |
| Depth of ramus at anterior border $pm_3$ ; | 80  |
| Distance from $I_3$ to canine ;            | 12  |

The fragment of a second lower jaw resembles closely the one just described. Some other bones of the skeleton have the following :

## MEASUREMENTS.

|   | mm.  |
|---|------|
| Least anteroposterior diameter of scapula ;                 | 63.5 |
| Anteroposterior diameter of scapula at coracoid ;           | 104  |
| Diameters of glenoid cavity of scapula { anteroposterior ;  | 64   |
| { transverse ;  | 53   |
| Length of bone at middle of side ;                          | 83   |
| Distal transverse diameter at middle ;                      | 44   |
| Length of coronary bone at middle of side ;                 | 39   |
| "    of coffin bone ;                                       | 58.5 |
| Greatest width of bone ;                                    | 89   |
| Diameters, proximal end of metacarpal 3 { anteroposterior ; | 35   |
| { transverse ;  | 55   |

The deficiency of the posterior wall of the incisors is the dental character which distinguishes this species best from *E. caballus*. The enamel plications of the superior molars are also a little more complex than is usual in the common horse. What other characters distinguish *Equus fraternus* can only be determined by the accession of new material from other parts of the skeleton.

The preceding observations show that two varieties of one species, or two distinct species of horse as large as the domestic animal, were a notable feature of the fauna whose remains were entombed at Port Kennedy.

Some of the specimens formerly determined by myself as *E. complicatus* probably belong to *E. fraternus pectinatus*; and individuals from Petite Anse, Louisiana, referred by Leidy to the same species (under the name of *E. major*), I have shown to belong to *E. intermedius* Cope. Leidy has regarded *E. complicatus* as the species for which Dekay proposed the name of *Equus major*, and I have followed him in previous papers without further inquiry. Having looked into Dekay's account, given in the first volume of the *Natural History of New York*, I find that no definite application of his name of *E. major* can be made. No description is given, and the localities referred to are those where *E. complicatus*, *E. intermedius*, and probably *E. fraternus* are found. I have accordingly returned to the appropriate name given by Leidy.

## MYLOHYUS Cope.

American Naturalist, 1889, p. 134.

Like *Dicotyles*, but only two inferior incisors on each side as in *Platygonus*.

Eighteen individual peccaries are represented by teeth in the present collection, and there are numerous bones. Although there are no incisive regions sufficiently well preserved to demonstrate the dental formula, the other characters are so like those of *M. nasutus* and *M. pennsylvanicus* as to render their reference to the same genus proper.

Certain dental characters are common to both species of the genus. Thus, the posterior pair of cusps of the premolars in both jaws is separated on the middle line by the juxtaposition of the talon of the tooth with the metaconulid. This is not the case with the true molars, excepting in the case of the third superior, where the second pair of cusps is separated in the same way. The last true molars of both jaws have besides a considerable talon.

The dentition appears to refer the individuals to two species, which are of about the same dimensions.

Pm<sup>3</sup> with six or seven cusps; inferior premolars without paraconulid; inferior canine with four planes, less compressed; superior canines compressed at base; *M. tetragonus* Cope.

Pm<sup>2</sup> with four cusps; inferior dentition unknown; superior canines robust and subtriangular at base; maxillary angulate; *M. nasutus* Leidy.

Pm<sup>1</sup> unknown; inferior premolars with paraconulid; inferior canine compressed, triangular in section; superior canines compressed, oval in section at base; maxillary flat; *M. pennsylvanicus* Leidy.

While the material shows that two species of *Mylohyus* left their remains in the Port Kennedy deposit, the proper reference of all the specimens is not practicable as yet, and the identification with known forms is provisional. Thus, of the supposed *M. pennsylvanicus* I have no certainly referable inferior canine, without which the identification is uncertain. The proper reference of superior molars is uncertain in both species. As *M. nasutus* was founded on an upper jaw only, either one of the Port Kennedy species may be referable to it.

MYLOHYPUS TETRAGONUS Cope (Pl. XXI, figs. 3, 3a, 3b). [Type No. 108, Mus. Acad. Nat. Sci. Phil.]

The specimen on which this species is described is an imperfect left mandibular ramus with the corresponding part of the symphyseal region. The fragment includes the canine, three temporary molars, and two true molars. It is so broken that I took from their places the crowns of the last two permanent premolars.

This jaw displays the long diastema which characterizes *M. pennsylvanicus*. Of the form of the jaw nothing can be said except that it is rather slender. All posterior to the  $m_{\overline{2}}$  is lost, and the part anterior to that tooth is crushed by compression. The canine tooth exhibits a peculiarity which I have not observed in any other peccary. Besides the two wide lateral planes and the narrower posterior plane, which give this tooth a triangular section in the known species, the internal posterior angle is truncated by a fourth plane. This plane extends from the apex to the base of the crown, and faces inward. It widens gradually downward, and is separated from the adjacent faces by distinct angles. Although the tooth is fully protruded its posterior face is not worn, and is slightly concave.

In the second premolar the four posterior cusps are of about equal size, and are separated by deep fissures. The anterior two are each larger than each of the posterior, and they are separated from each other and from the metaconulid by deep fissures. A minute trace only of paraconulid and none of any other cusps. The larger first premolar has the same number of cusps as the second, and they are disposed in the same way. The only material difference is the fact that the metaconulid is smaller than the other three cusps of the posterior four with which it is in contact. A minute trace of paraconulid, and none of any other accessory cusps. All the cusps separated by deep fissures. Enamel surfaces smooth.

The true molars differ from the premolars in that the metaconulid and talon are separated by the mutual contact of the hypoconid and entoconid, and both are smaller than the latter cusps. There is a rudiment of paraconulid as an enlargement of the external posterior basis of the metaconid, which is not cut off by a fissure from the latter. The enamel of all the cusps is plicate. The  $m_{\overline{2}}$  only differs from the  $m_{\overline{1}}$  in its slightly larger size. No external or internal basal cingula; anterior basal cingulum very slight.

## MEASUREMENTS.

|  |  |      |
|--|--|------|
| Length of diastema;                      |  | mm.  |
|  |  | 63   |
| Diameters of crown of $c_{\overline{1}}$ | { longitudinal (chord);<br>{ anteroposterior;<br>{ transverse on posterior face; | 36   |
|  |  | 10   |
|  |  | 6    |
| Length of molar series preserved;        |  | 77   |
| Diameters, $pm_{\overline{2}}$           | { anteroposterior;<br>{ transverse;  | 14   |
|  |  | 10   |
| Diameters, $pm_{\overline{1}}$           | { anteroposterior;<br>{ transverse;  | 15   |
|  |  | 13   |
| Diameters, $m_{\overline{1}}$            | { anteroposterior;<br>{ transverse;  | 16   |
|  |  | 13   |
| Diameters, $m_{\overline{2}}$            | { anteroposterior;<br>{ transverse;  | 18   |
|  |  | 14.5 |

There are no definite characters by which I can distinguish two species of peccaries in the superior molars in the Port Kennedy series; nor can I distinguish these from the superior molars of *M. pennsylvanicus* so far as they are known. The latter include only the pm<sup>1</sup> and m<sup>1</sup>. As the temporary dentition of the type specimens of *M. pennsylvanicus* is still in place, I had to extract the crown of the pm<sup>1</sup> from its place above the d<sup>3</sup>. All the superior premolars differ from the inferior premolars of the *M. pennsylvanicus* type in the absence of paraconule. They can be distinguished from these and from the inferior premolars of *M. tetragonus* in the greater size and thickness of the anterior cingulum.

There is one set of superior molars of both sides of one individual, lacking only the pm<sup>2</sup> of one side, accompanied by a superior canine. There are four superior true molars and canine, and two superior premolars of a second animal, and two inferior premolars with superior canine of a third individual. The third (anterior) premolar is more complex than in any peccary known to me, including *M. nasutus*. It has four principal cusps in pairs, but the anterior cingulum and talon are so large as to be easily reckoned as cusps. They send outward each a strong cingulum, but these are not continued on the external base of the crown. No central cusps. The crown as a whole is longer than wide. In *M. nasutus* this tooth is as wide as long, and has three cusps and a strong anterior cingulum. In the succeeding premolars the anterior and posterior cingula are well developed, and the anterior rises into a median tuberosity. The posterior sends a process anteriorly on the middle line to the metaconule. In the first and second true molars the anterior and posterior cingula are well developed, but the anterior does not develop a median tubercle while the posterior does develop a median tuberosity. The last true molar is built on the plan of a premolar. The anterior cingulum develops a tubercle and the metaconule is joined by a median posterior tubercle. Posterior to this is the true talon, a strong wrinkled transverse cingulum.

The canine is much more slender in both crown and root than that of *Dicotyles labiatus*, and it resembles in this respect *M. pennsylvanicus*.

## MEASUREMENTS.

|   | mm.  |
|---|------|
| Diameters, pm. 3 { anteroposterior;           | 11   |
| { transverse (greatest);                      | 9    |
| Diameters, pm. 2 { anteroposterior;           | 13   |
| { transverse;                                 | 11   |
| Diameters, pm. 1 { anteroposterior;           | 15.5 |
| { transverse;                                 | 13   |
| Diameters, m. 1 { anteroposterior;            | 16.5 |
| { transverse;                                 | 15   |
| Diameters, m. 2 { anteroposterior;            | 17.5 |
| { transverse;                                 | 15.5 |
| Diameters, m. 3 { anteroposterior;            | 21   |
| { transverse;                                 | 13   |
| Diameters, superior canine { length of crown; |      |
| { anteroposterior at base of crown;           |      |
| { transverse at base of crown;                |      |

This species is about the size of the existing white-lipped peccary (*Dicotyles labiatus*), but is much less formidably armed.

MYLOHYPUS PENNSYLVANICUS Leidy.

*Dicotyles pennsylvanicus* Leidy, Annual Report of the Geological Survey of Pennsylvania for 1887 (1889), p. 8; Pl. II, figs. 3-6.

This species was described by Leidy from parts of both jaws of an individual from the Hartman Cave in Central Eastern Pennsylvania near Stroudsburg. The jaws bear the temporary dentition with the first true molar of both sides. The permanent canines are half protruded; I have extracted the crown of one of these, with the crowns of the upper and lower first premolars. These specimens show clearly the differences between this species and *M. tetragonus*.

The inferior canine tooth has the crown much compressed, and with a narrow triangular section, and is without the interior face seen in *M. tetragonus*. In the first premolar the paraconulid is well developed, while it is wanting or extremely rudimental in *M. tetragonus*. On the other hand the paraconulid is absent from the first premolar of the upper jaw, as in the last-named species. The paraconulid is present in the first true molar of the inferior series, and presumably in the second.

The specimens which I refer to this species in the Port Kennedy collection belong to three individuals. The first consists of the anterior part of the left mandibular ramus, containing the first and second premolar teeth and the alveoli of the third premolar and of the canine. The second consists of three lower true molars, the first premolar, and the inferior canine; and the third is a part of a lower jaw containing the first and second premolars. In all of these teeth the paraconulid is well developed. The canine does not display the internal face seen in *M. tetragonus*, and the crown has a triangular section, but half of it is broken off. I have not identified superior molars of this species, and it is possible that those I have described under the head of *M. tetragonus* belong to it. As I do not possess the maxillary bone of this species, I do not know whether it really belongs to *M. pennsylvanicus* or to *M. nasutus*.

MEASUREMENTS, No. 1.

|   |      |
|---|------|
| Length of diastema;                             | mm.  |
| Diameters of pm <sub>2</sub> { anteroposterior; | 66   |
| { transverse;                                   | 11.5 |
| Diameters of pm <sub>7</sub> { anteroposterior; | 10   |
| { transverse;                                   | 13.5 |
|   | 12   |

No. 2.

|  |      |
|--|------|
| Diameters of pm <sub>1</sub> { anteroposterior;                | 14   |
| { transverse;  | 13   |
| Diameters of m <sub>7</sub> { anteroposterior;                 | 16   |
| { transverse;  | 13   |
| Diameters of m <sub>3</sub> { anteroposterior;                 | 23.5 |
| { transverse;  | 14   |
| Diameter of c <sub>1</sub> at base of crown { anteroposterior; | 12   |
| { transverse;  | 9    |



Two third inferior molars belonging to Nos. 2 and ? 3 have no heel posterior to the third pair of tubercles, one of which is larger than the other, and forms the posterior boundary. In a series of three inferior true molars whose specific reference is uncertain, the third tooth has a large talon posterior to the third pair of tubercles, which are subequal and symmetrical.

*Mylohyus pennsylvanicus* belongs to the Post-Champlain epoch of the pliocene, and it will be necessary to have conclusive evidence before admitting it as one of the Pre-Champlain fauna of Port Kennedy. Of course, as the latter includes the existing beaver, porcupine, black bear and badger, the presence of this peccary is not impossible.

MYLOHYUS NASUTUS Leidy. Cope, American Naturalist, 1889, p. 134.

*Dicotyles nasutus* Leidy, Extinct mammalia, Dakota and Nebraska, 1869, p. 385, Pl. XXVIII, figs. 1-2.

The only positive indication of the presence of this species in the Port Kennedy deposit is a superior canine tooth, of which a considerable part of the crown is worn away by use. Although this tooth was not present in the specimen which served as Leidy's type, both alveoli are perfect, and they display a form which shows that the teeth they contained were very different in form from the corresponding ones of *M. pennsylvanicus* and *M. tetragonus*. That is, they have robust crowns but little compressed at the base, with the section of a wide isosceles spherical triangle. In the species mentioned the section at this point is lenticular. The superior canine did not accompany the type specimen of *M. tetragonus*, but two other individuals display it, one of which is accompanied by the characteristic inferior premolar teeth. These teeth are much like those of *M. pennsylvanicus*.

The canine of *M. nasutus* is accompanied by four molar teeth, which have the same mineral stain, but which, from the labels, were not found at exactly the same spot. One of them is the last inferior molar. It is characterized by its elongate form, and the presence of three pairs of well-developed tubercles and a heel, with para- and metaconulid, and hypoconulid. If the smaller accompanying molars are inferior premolars, they agree with those of *M. pennsylvanicus* in the presence of the paraconulid.

MEASUREMENTS OF C<sup>1</sup>.

|                            |   |                  |           |
|----------------------------|---|------------------|-----------|
| Diameters at base of crown | } | anteroposterior; | mm.<br>11 |
|                            |   | transverse;      | 9         |

TELEOPTERNUS Cope.

True molars selenodont, brachyodont, without basal lobes or columns. Last inferior molars composed of two subequal columns, which are enamel lined on their adjacent faces, and are separated by a valley.

I find it impossible from the material at my disposal to determine whether this type is cameloid or cervid, as it presents a combination of characters not met with in either family. The entire absence of basal lobes or even a basal filling of the

grooves, together with the simplicity of the columnus and valleys refer the genus to the Camelidae, but the well-developed heel of the last inferior molar with its enclosed valley is not met with in that family, but is usual in the Cervidae. Under the circumstances I must leave the question of its position in doubt for the time being.

TELEOPTERNUS ORIENTALIS Cope (Pl. XXI, figs. 4, 4a). [Type No. 39, Mus. Acad. Nat. Sci. Phil.]

This ruminant is represented by teeth of three individuals. One of these includes two superior true molars (Nos. 1 and 2); the second, a last inferior molar, and the third, a last superior molar. All belong to adult, but not old animals, of about the size of the wapiti (*Cervus canadensis*).

The superior molars of No. 1 were found in juxtaposition. These are the first and second true molars; the first, is possibly the last of the deciduous series. These teeth are characterized by the incurvature toward the apex of the external wall of both the paracone and metacone. The median external rib is well marked on both, but that of the paracone is broader and less prominent. The ectostyle is very strong, and is followed posteriorly by a deep groove. The parastyle is also strong, while the metastyle is weak. Both molars are wider anteriorly than posteriorly, and the difference is most conspicuous on the  $m^1$ , where also the protocone is considerably lower than the hypocone. Enamel entirely smooth.

## MEASUREMENTS.

|                      | mm.                             |    |
|----------------------|---------------------------------|----|
| Diameters of $m^1$ { | anteroposterior;                | 20 |
|                      | transverse at paracone (base);  | 10 |
|                      | “ at metacone (base);           | 14 |
| Diameters of $m^2$ { | anteroposterior;                | 23 |
|                      | transverse at base of paracone; | 19 |
|                      | “ “ of metacone;                | 17 |

The last inferior molar (of the right side) is that of an older individual than the one last described, as it is more worn. It is moderately hypsodont, and the columns are deeply separated to their bases. Their internal walls have the same gentle curvature outward that the superior molars display in the opposite direction, and they are convex with a tendency to median angulation in the transverse section. The posterior column is smaller than the other two but both its crescentic plates are well developed, and they join posteriorly, closing the lake. The internal crescents are lower than the external, and their horns join the latter. There is a very weak parastylid, a small mesostylid, a trace of a metastylid, and a weak terminal heel-style.

## MEASUREMENTS.

|                                  | mm.                            |      |
|----------------------------------|--------------------------------|------|
| Diameters of $m_3$ {             | anteroposterior;               | 27.5 |
|                                  | transverse at base, paraconid; | 12   |
|                                  | “ “ metaconid;                 | 11   |
| Length of heel on grinding face; | 7.5                            |      |

The third superior molar of the left side, which represents this species, is intermediate in dimensions between the corresponding teeth of *Holomeniscus sulcatus* and *Holomeniscus vitakerianus*, and is about the size of that of the wapiti (*Cervus canadensis*). The anterior transverse diameter of the crown is conspicuously greater than that of the posterior portion, and the crown contracts in transverse diameter from the base to the grinding surface. The anterior horn of the paracone is well developed, and the external wall of the same has a prominent median ridge. The same is true of the metacone, but the median ridge is not so strong, and there is a moderate posterior marginal rim, which is in section the horn. The grinding surfaces of both are continuous with the fused adjacent horns of the protocone and hypocone. No processes of the protocone or hypocone project into the lakes. Enamel smooth.

MEASUREMENTS.

|                            |                                |
|----------------------------|--------------------------------|
|                            | mm.                            |
| Diameters of base of crown | { anteroposterior; 26          |
|                            | { transverse anterior lobe; 24 |
|                            | { " posterior " 19.5           |
| Elevation of paracone;     | 14                             |
| " of protocone;            | 10                             |

As this tooth strongly resembles that of some of the Cervidæ I may remark that it differs from those of the wapiti and *Cervalces americanus* in the absence of an intermediate internal basal column or metastyle. From the m<sup>3</sup> of a moose, which should abnormally lack the internal column, this tooth differs in the smoothness of the enamel and in the more elevated crown.

CARIACUS Gray.

CARIACUS LEVICORNIS Cope. Proc. Acad. Nat. Sci. Phil., 1896, p. 393 (Pl. XXI, fig. 5). [Type No. 41, Mus. Acad. Nat. Sci. Phil.]

A series of superior molars of the right side, lacking the last one, represents this species. There were obtained at about the same time the basal parts of the antlers of two deer of the same size, which I suspect to belong to this species. There are various bones of the skeleton of probably the same.

The true molars have internal basal columns, and the internal crescents send backward and outward processes into the lakes, as in the existing North American species of the genus. The molars are of the size of those of *C. virginianus*, but the premolars are smaller. The first and second are especially reduced in antero-posterior diameter, and while the third is larger than these, its form is different from that of the corresponding tooth in any species of this genus or of *Coassus*. The anteroposterior diameter of the crown does not exceed the transverse, and there is no ridge of the external face, such as is present in all the Cervi, but only a slight convexity. This ridge is present but indistinct in the other premolars. It is very strong on the paracone of the true molars, but weak on the metacone. The horns of all the crescents are well developed. The width of the base of the crown of the true molars is greater anteriorly than posteriorly. There are no processes entering the lakes of the premolars such as are usual in the species of *Cariacus*.

## MEASUREMENTS.

|                    |                    | mm.  |
|--------------------|--------------------|------|
| Diameters of pm. 1 | { anteroposterior; | 11   |
|                    | { transverse;      | 12   |
| Diameters of m. 1  | { anteroposterior; | 15   |
|                    | { transverse;      | 16   |
| Diameters of pm. 2 | { anteroposterior; | 16   |
|                    | { transverse;      | 16.5 |

The fragments of horns both include the burr. This is not very prominent, and the beam is quite smooth. There are indications of tines, but they are broken off at the base. In the shorter fragment a tine is given off on the internal side, but it is broken off near the base, and the beam beyond its base is also lost. In the second fragment the position corresponding to the internal tine is split away. Above it the beam is somewhat compressed anteroposteriorly, and sends off a smaller tine directly anteriorly. The beam in both is entirely smooth.

## MEASUREMENTS.

|  |                    | mm.  |
|--|--------------------|------|
| Diameters of beam of no. 1 at base               | { anteroposterior; | 18   |
|  | { transverse;      | 16   |
| Elevation to internal tine;                      |                    | 13.5 |
| Anteroposterior diameter of beam, no. 2 at base; |                    | 17.5 |
| “ “ “ “ at superior base of anterior tine;       |                    | 15.5 |
| Transverse diameter of “ “ “ “ “ “ “ “           |                    | 14   |
| Elevation of anterior tine above base;           |                    | 27   |

The smoothness of the beam of the horns distinguishes this species from the existing species of *Cariacus* of both North and South America, and resembles the condition seen in the species of *Coassus*, where the horns are unbranched. The inferior tine originates nearer the burr than in the known species of *Cariacus*, while the anterior tine is present only in species (*C. campestris*), where the interior tine is absent. The larger beam preserved shows no tendency to an anterior curvature such as is present in most of the species of the genus.

This species was probably of about the same size as the Virginian deer.

## CARIACUS sp.

Portions of four or five deer indicate a species different from the last, and so much like *C. virginianus*, that it is not possible with the material at hand to distinguish the two. The first individual is represented by the left pm<sup>1</sup> and m<sup>2</sup> and the right pm<sup>3</sup>; No. 2, by a right mandibular ramus containing six molars, the last about to be erupted, and the last deciduous remaining in place; No. 3 includes the m<sub>1-2</sub> of the right side; and the others fragments of molars.

The proportions of the superior molars and premolars are as in *C. virginianus*, and the valleys of the premolars are interrupted by the branches from the inner

column, which are absent from *C. levicornis*. In the lower jaw two characters are observable, which may be individual only. The anteroposterior diameter of the heel of the  $m_3$  is rather greater, and the internal basal columns are more elevated, indeed quite needle-like in the  $m_2$ .

MEASUREMENTS.

|   | mm. |
|---|-----|
| Length of six inferior molars of no. 2; | 87  |
| " of true molars;                       | 52  |
| " of last true molars;                  | 21  |
| Diameters, $m_2$ { anteroposterior;     | 14  |
| { transverse;                           | 9   |
| Depth of ramus at $m_1$ ;               | 21  |





## THE BONE CAVE AT PORT KENNEDY, PENNSYLVANIA, AND ITS PARTIAL EXCAVATION IN 1894, 1895, AND 1896.

By HENRY C. MERCER.

In 1871, and again twenty-two years later in 1893, the quarrymen at Archibald Erwin's quarry (in the ordovician limestone, overlaid by triassic shale, on the right bank of the Schuylkill two miles below Valley Forge), blasted into a chasm, about thirty feet below the surface, full of the remains of pleistocene mammals, reptiles, batrachians, insects and plants.

When invited by Dr. Samuel G. Dixon in 1894<sup>1</sup> to join him in the continuation of the excavation of the cave for the Academy of Natural Sciences of Philadelphia, I learned that the site in question was but one of a series of subterranean fissures, opened at the quarry by a process of blasting, which in forty years from its beginning (by John Kennedy in 1855) had transformed a gently sloping hillside into an amphitheatre several acres in extent, walled with perpendicular escarpments of rock sometimes a hundred feet high. After the demolition of an open chamber,<sup>2</sup> a series of galleries, often filled with sand and clay,<sup>3</sup> though never found to contain fossils, were

<sup>1</sup> In 1894, after an interim of twenty-three years, the attention of Dr. Dixon was called to the possible presence of fossil remains in the quarry by Mr. D. N. McCadden, who presented him with a tooth of a *Megalonyx* from an adjoining dump heap. Dr. Dixon, on visiting the cave, recovered from the undisturbed deposit teeth of a tapir and other mammals. He immediately began, assisted by Mr. Samuel N. Rhoads and Mr. McCadden, to excavate the fissure, arranging with me subsequently to superintend the work at the quarry. I take pleasure in acknowledging the help rendered by Professor Cope, the financial assistance given by Mr. Clarence B. Moore, and the painstaking labor of our assistant, Mr. William H. White.

<sup>2</sup> The opinion of eye witnesses is, that the large room referred to, from ten to twelve feet high, and for a time after its discovery used as a place for dancing and picnics, existed near the spot where the quarry pump-house now (1898) stands. Mr. E. B. Conard, carried into the cave in his grandfather's arms, remembers plenty of stalactites, a smooth floor and small passages leading to other chambers. Miss Isabella Loughin, who with Captain James Long and Mr. Andrews, danced there one evening in 1848, recollects well-swept clay floors and smaller rooms large enough to stand in, lighted with candles. According to her, Alexander Hill, clothed as King William, rode into the cave one Orange day on a white horse.

<sup>3</sup> The contours of eight, possibly nine subterranean galleries, were, in November, 1897, still traceable at the quarry, five of which were filled to the roof with clay and sand. Of these I examined (1) a fissure exposed on the east quarry wall only 35 feet north from the bone-bearing chasm and evidently a bifurcation of it, filled to its roof with sand and clay unmixed with stones, and deposited in waving films, but revealing no black stratum, and no trace of vegetable or animal remains, (2) a similar but larger fissure, much obscured by quarry refuse, about 35 feet farther to the north, (3) a rift full of stratified sand with very little clay, revealed on the quarry face under the cart track just opposite to and about twenty feet west of the fossiliferous fissure, (4) a bank of similarly stratified sand, representing the contents of a larger gallery close to the present (1898) pump hole, and against the quarry wall about twelve feet to the south of the "bone hole."

All of the above choked fissures showed remnants of water-worn faces of cave walls against the quarry escarpment; but, though doubtless connected with the neighboring bone chasm and filled with debris at or before the time of the filling of the latter, none of them revealed the ingredient of mixed stones, or showed a trace of vegetable or animal remains.

To the westward, nearly opposite the "bone hole," and doubtless closely related to it, (4) an open chasm half full of water of unascertained depth was discovered some years before our coming by the quarrymen, extending far below the quarry floor. After its long use as a receptacle for dump, its entrance, about six feet high, was closed with logs to prevent accidents to the cart horses.

The blasting in 1895 opened (5) a circular chamber about 15 feet in diameter, and 10 feet high at the north-western end of the quarry and about 300 feet from the bone deposit. It was floored with very fine grained red clay, which, judging from pendants of similar clay hanging from its ceiling, infiltrating through the pores of the

either obliterated or traversed, leaving their contours exposed on the escarpments, as bifurcations of an extensive cavern, undercutting the present Schuylkill water level, and hence draining at their formation into a lower water shed. A study of the topography, and the accounts of workmen present at previous blastings, showed furthermore that the bone fissure just exposed was identical with, or a bifurcation of that explored, as above noted, in 1871, when Mr. Charles Wheatley, Professor

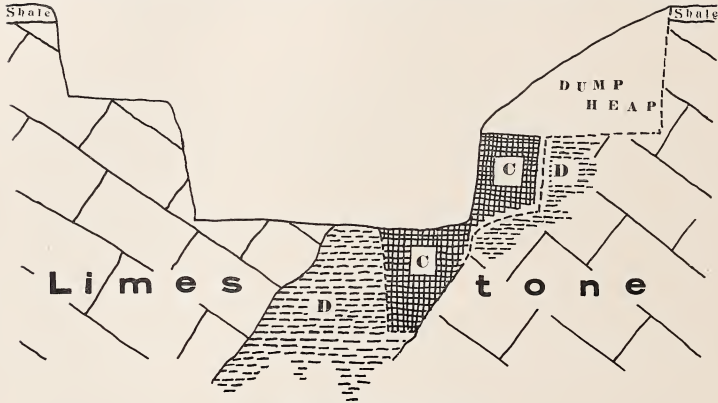


FIG. 1.—THE PORT KENNEDY BONE CAVE.  
(Not drawn to scale for the purpose of clearness.)

East and west cross-section of the south end of Erwin's quarry showing in the shaded parts C. C. D. D., the position of the bone-bearing fissure with its contents at the time of our first excavation in 1894. The cross-shaded portion C. C. represents roughly the amount of fossil-bearing debris removed by us in 1894, 1895 and 1896.

The dotted shading D. D. represents the fossil-bearing debris still (1898) remaining in the fissure.

E. D. Cope and Dr. George H. Horn had described the fossils obtained by the former at the place.<sup>4</sup>

The old fossil-bearing site, by no means fully excavated in 1871, and subsequently covered up in the quarrying process and forgotten, had been, it seemed, again encountered by a recent lowering of the quarry floor which had notched the

incumbent limestone stratum, then about 30 feet thick, had originated from the overlapped layer of decomposed triassic shale. (6) A long open passage, about five feet high and eight feet wide, had been exposed by blasting, along almost the entire north face of the quarry. Beginning on the west about 15 feet below the top of the limestone, it had, at its exposed termination on the east, enlarged into a chamber, the contour of which was still visible, about 6 or 7 feet high and 20 to 30 feet in diameter.

(7) Another open chamber or gallery was said to have been opened, and purposely closed again with large flat stones, near the middle of the present quarry area, when sinking the floor level during our absence in 1896.

<sup>4</sup>In the *Journal of Science*, 3rd series, vol. 1, p. 237, and *Proc. Am. Phil. Soc.*, April 7, 1871. According to Wheatley, as quoted, Dr. Quick of Phoenixville, first noticed the fossils in the quarry dump heaps in 1871, which fossils Wheatley continued to gather there and to excavate from the bank. Described later by the latter, they were restudied and fully described by Professor E. D. Cope and Dr. G. H. Horn in the *Journal of Science* above noted and in the *Proceedings of the American Philosophical Society*, as the remains of at least 91 individuals, representing 52 species (85 individuals and 42 species by Professor Cope, recent correction given later), 11 neotropical, 3 nearctic, 11 still common and 27 uncertain.

side of what might be compared to a bottle of unknown size, packed tightly with solid substances (see figs. 1 and 11). We stood, not under a rock arch, but in the open quarry, forty-five feet below the surface of the meadow above, and surrounded by escarpments of ordovician limestone dipping northwest, and where the latter were overlaid by a horizontal stratum of triassic shale. Immediately confronting us rose

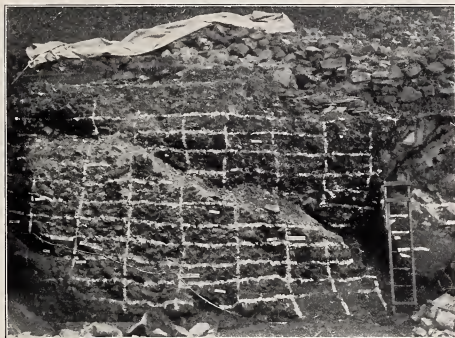


FIG. 2.—PORT KENNEDY BONE CAVE.

<sup>1</sup> The contours of the cave walls, extending downward below the foothold for an unknown depth, are seen to the right behind the ladder. The rectangles white-washed on the exposure preparatory to the removal and labelling of specimens, cover the fossil bearing area vertically laid bare. But the ladder standing at the general level of the lowest quarry floor, 45 feet below the top of the limestone escarpment, and on a level with the Schuylkill river (less than half a mile to the northward) rests on fossil-bearing earth filling all the deeper parts of the cave.

Above the upper whitewashed line and behind the stone wall, a heap of dumped earth (continually falling as the exposure was undermined) extends upward to the cliff's top at an angle of nearly 45 degrees. To the left an rushing rivulet crosses the foreground from left to right by a ditch close to the exposure.

a vertical exposure of clay, stones and bones, twenty-six feet wide and thirteen feet high, enclosed by water-worn cave walls, and pocketed in the rock front of the recently cut lowest bench in the quarry.

We were to dig into the receptacle (see fig. 1, C. C.) under a formidable mass of rubbish thrown upon it by the quarrymen, and by means of steam pumps work downward, spite of invading water, into the soft area of our foothold extending about thirty feet behind us.

From the vertical face of the digging, ends of limb bones, large and small, caught the eye, and at all points yellow angular fragments showing osseous fracture, together with the polished sides of tusks, and the enamelled faces of teeth set in jaws, astonished us.

To rescue these was our aim, while labelling them in India ink on removal, so as to fix their relative position, each as discovered, in a particular whitewashed rectangle, one of a series, one foot deep vertically, extending three feet inward horizontally<sup>1</sup> (save the last series C, which extended six feet inward horizontally), and three feet wide, covering the entire face of the exposure (see fig. 2). Trusting to reach some conclusion as to the age of the remains and their manner of deposition, while inspired with the hope of discovering traces of human presence in the deposit, and so settling there, the question of man's antiquity in Eastern North America

<sup>1</sup> Nine vertical, crossed by thirteen horizontal whitewashed stripes (see fig. 2), continually repainted, chequered the whole exposure with nine vertical rows of rectangles of the size named, numbered as rows in succession from left to right, each row containing thirteen subdivisions, numbered in succession from top to bottom. The inward advance upon the exposure was recorded by regarding any series of rectangles as

beyond all doubt, we labored at the place for three successive autumns. We dug away the exposed front of clay, stones and bones, working into it horizontally, until the interior water-worn walls of the cavern appeared. We pried off overhanging masses of rubbish and carted away the downfall to make safe the undermining of the bank. We cut down below the quarry floor and its water level into the soft earth under foot, laying bare depths of the fissure never seen before, until the inrushing of water drowned our pumps. But to the last we failed to exhaust the bones or fathom the depth or width of their tomb.

Our work continued during the autumns of 1894, 1895 and 1896, involving the removal of over 300 cubic yards of fossil bearing earth and quarry refuse, and resulted in a series of discoveries and observations of which an account is given in the following pages.

#### CONDITION OF THE REMAINS.

While it was easily noted that the bones divested of animal matter were fossilized, we soon saw that the depositing agency had so dislocated, crushed and scattered them that little hope was left of recovering an entire skeleton, a fact continually in evidence, as at B. 5-9,<sup>1</sup> where a long tusk ran into the bank just under the upper and lower jaws of a bear, or at B. 3, 11, where the jaw of a carnivore and the leg bone of a large animal lay in contact. At C. 4, 8, the mandible of a sloth pressed upon that of a bear, and at B. 6, 7; B. 8, 7, and B. 3, 7, isolated teeth and tusks of the mastodon had been scattered close around the well-worn molars of a tapir. A part of the jaw of a peccary was recovered at B. 7, 11, where again, as in the case of most jaws found, the lower mandible had been separated from the skull in reaching its position. At B. 4, 11, several incisor teeth lay near two large fragments of a jaw of the tapir, and close to several dislocated teeth of a sloth.

When jaws were found the skulls were generally missing, just as teeth were encountered alone, just as claws lay separated from metacarpals, or as fragments of a tree had been cut away from the parent stem, while generally the ingredients of the deposit had been scattered, broken, crushed and distorted by the well-betokened power of the transporting agency, aided by the grinding of stones and the down settling of clay and sand.

As skeletons deposited in the flesh must have lain together, this scattering of the remains warranted the inference that the flesh had decomposed from the bones, leaving the latter to soften and break in many instances before their final entombment.

Such prior dislocation and decomposition of fleshless skeletons was otherwise continually demonstrated, as at B. 3-3 and B. 3-6, where a yellow stripe, several inches thick, consisting of much rotted fragments still showing the grain of the bone,

exhausted at a horizontal depth of 3 feet (6 feet in the case of the last series C) from its start. Thus each specimen was further labelled with a letter of the alphabet to signify its relation to each successive three and six feet of horizontal progress. A specimen removed from the third row of rectangles at the depth of a seventh rectangle downward and within the first 3 feet of inward advance, would be labelled A, 3, 7; from the eighth rectangle at a depth of the fourth, would be labelled A, 8, 4, etc., while a specimen from the ninth rectangle, at a depth of eleven feet (or of the eleventh rectangle downward), in the second three, or third, six feet of inward advance, would be labelled B, 9, 11, or C, 9, 11, etc.

<sup>1</sup> These numbered letters, as designating (within 36 or 72 horizontal and 12 vertical inches) the position in the deposit of each labelled object found, are explained in the companion foot-note to page 3.



was pressed into a compact mass. When transported these fragments must have been already small, since if otherwise entombed more earth would have intervened in the interstices.

But continued excavation showed that the bones had suffered not only before but after their burial. We saw this in the twisting into fragments of jaws, which still lay piece against piece, in the distortion of carapaces of tortoises, and in the flattening of twigs and of boughs of trees (sometimes apparently squeezed from an original thickness of one to that of one-quarter of an inch), testifying to a down

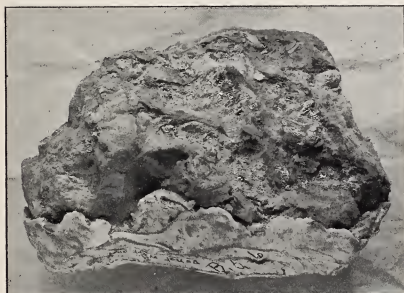


FIG. 3 (size one-third).—AN ILLUSTRATION OF THE METHOD OF RECOVERING FOSSILS AT PORT KENNEDY.

Mass of fossil-bearing earth, granulated bone, and bone fragments, enclosed in plaster-of-paris, as it appeared on removal from the Port Kennedy bone fissure at B, 5, 6. The plaster covers that part of the matrix first seen against the wet face of the exposure.

Now dry, the matrix has not yet been cut away from the bones resting inside, and whose lower portion, as originally seen, touch the plaster crust.

pressure after deposition, since their fragments had tilted out of level at the point of fracture.

In the work of rescue we undermined the bank with pick-axes. We cut out blocks with a chisel, prying loose with a crow-bar large masses and splitting these with trowels. Digging carefully with knives and trowels under and around preferred jaws and bones, we cased them, while still protruding like knobs from the bank, in matrices of plaster-of-paris fortified with sticks, to be opened after drying in the laboratory. Without this continual smearing of plaster upon masses of mud and bones, we had striven in vain, with fragments wet and soft as over-ripe pears, to save, for example, such specimens as the upper and lower tapir jaws, *Tapirus haysii*, with full complement of teeth; a skull and jaw fragment of the fossil bear, *Ursus haplodon* (see fig. 4.); the lower jaw of the peccary, *Mylohyus*; the lower jaw of the wolverine, *Gulo luscus*, or the crushed upper and lower jaw showing full dentition of the sabre-toothed tiger, *Smilodon gracilis*, illustrated in Professor Cope's paper.

But labor as we would the bones fell to pieces. In the interlaced tangle, the trowel destroyed more than it recovered. Not one-third of the skeletal remains found whole in the bank were saved or could be saved, while nine-tenths of the remaining number were crushed beyond recognition or reduced to masses of rotten splinters. Of the rescued specimens the majority were at best broken and distorted.



FIG. 4 (scale about four-thirteenths).—SPECIMEN ILLUSTRATING THE METHOD OF RECOVERING FOSSILS AT PORT KENNEDY.

Portion of the skull and upper jaw of the pleistocene bear, *Ursus haptodon*, about the size of the modern grizzly. Found in the Port Kennedy Cave at B, 5-9.

Deposited as a fragment by the transporting agent, the bones have been squeezed against each other, cracked and distorted by subsequent down settling of the debris. Saturated with water, and almost as soft as wet blotting paper when found, the mass, while in the bank, was cased on the opposite side with the plaster crusts still shown at its edges. On removal, and after partial drying, the mud covering the whole specimen was taken off with a knife.

Most rotten, soft and shattered were skulls, ribs, pelves, scapulae, femurs, tibiae and radii. In better condition were the jaws. Next came soft but generally unbroken carpals and astragali, while the enamel-protected teeth had held out best of all. But evidently the transporting agency which had deposited the bones had not been the event which had killed the creatures; on the contrary, as before suggested, the evidence showed that animals previously dead, had lain somewhere long enough after death for the flesh to rot away from the bones, and for the bones themselves to become soft enough to break into fragments, when the carrying agent, seizing them, had jostled them along with stones and mud into their present position.

#### EVIDENCE OF THE ACTION OF WATER.

First and last, evidence of the winnowing of material, characteristic of water-action attracted our attention. Cream-colored and yellowish-gray and black band-

ings, argillaceous or sandy, thickly peppered with angular stones, traversed the exposure, with a central down-swing from wall to wall. They were divisible on a large scale into four zones of stratification, counting from the top downward (see fig. 5), namely:

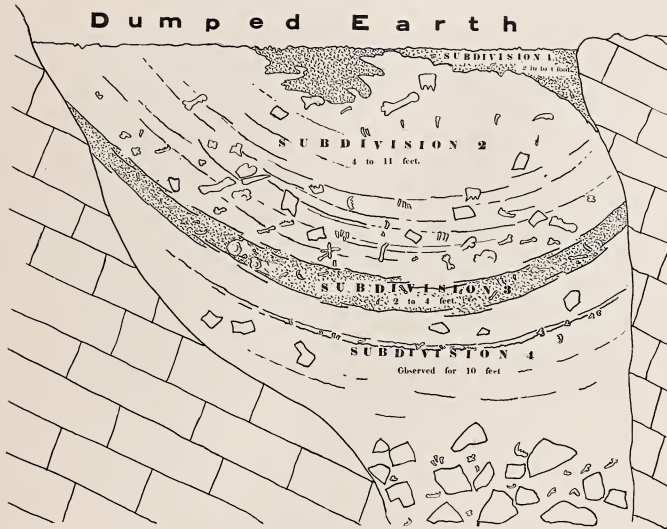


FIG. 5 (Scale 1 in. equals 4 feet).—THE PORT KENNEDY BONE CAVE.

Rough sketch showing the stratification by water. The black subdivisions 1 and 3 alone containing vegetal remains appear identical. Subdivision 1 probably marks the lowest point reached by Whatley in 1871. The remains of the smallest animals lie in subdivisions 3 or 1, otherwise there is no distinction in fossil contents of the zones of deposition.

#### *Subdivision 1.*

Two inches to one foot thick, faulting downward against the right cave wall.

A black zone of fine sandy clay and loam, containing few stones, faintly visible at the first inward digging, but becoming thicker and darker as we advanced horizontally, until its seeming disappearance at the fifth foot inward. Its deep black color and comparative freedom from stones clearly distinguished it from the layer below it. In its dense mass of fine, blackened and decomposed sticks, grasses and leaves, mixed sparingly with seeds, mosses, nuts and larger twigs, after the manner of muck deposits in swamps, lay not a few bones and jaws of small mammals, while the remains of larger species found in it crushed into fine pieces seemed less numerous than in the zones below.

*Subdivision 2.*

Four to eleven feet.

A zone of reddish-yellow sandy clay, showing finer waving lines of stratification, distinguished by slight differences in shade, containing fragments of limestone, occasionally water-rolled, of from one-half inch to two feet in diameter, fragments of sandstone sometimes water-rolled and small quartzite pebbles, together with numerous bones and teeth of large mammals. Apparently lacking vegetal and smaller animal remains, the zone was occasionally striped, as one of its most striking features, by horizontal bands from one to three inches thick of fine bone fragments resting close together, and sometimes reduced to the color and consistency of coarse corn meal.

*Subdivision 3.*

Two to four feet thick, dipping downward in the middle and highest against the left wall.

The most striking and interesting subdivision in the whole deposit, conspicuously black in color, apparently identical with layer 1, and contrasting strongly with the yellow subdivision 2 above it. It consisted of sandy clay darkly stained by the probable decomposition of vegetal matter, and contained, besides abundant vegetal remains, the bones and teeth of mammals both large and small, and the remains of birds, reptiles and batrachians not elsewhere found.

*Subdivision 4.*

Observed for about ten feet downward.

This consisted of a coarser zone of sand, clay and stones, contrasting clearly in its general yellow color and lack of vegetal remains with the black subdivision 3 above it. The remains of larger mammals, never of reptiles, batrachians or plants, found in it in place (either in a long and thin yellowish stripe about three to four feet below subdivision 3, or at greater depths, where, owing to the influx of water and continual caving of the banks, their position could not be recorded), were harder than any elsewhere recovered; those from the greatest depth requiring no treatment with plaster. Over most of the area of the subdivision, its coarse composition of sand and stones showed no sign of animal remains.

As supplementing the evidence of these lines and zones of deposit testifying to aqueous action, the work of water was further shown by the finding of water-rolled fragments of stone, referred to above, from half an inch to four inches and rarely two feet in diameter at various parts of the exposure, as rolled limestone at B, 4-8; B, 9-4; B, 3-6; B, 2-6, etc. and rolled sandstone at B, 5-7; B, 2-6; B, 4-10; B, 8-6. These testified to the churning of earth and stones in the final deposition of the mass, as did also several rolled bits of bones found at B, 3-11, and B, 9-11; while at B, 3-11, a remarkable, triangular segment of a tree (see central mass of wood in fig. 6) about three inches thick and fifteen inches in longest diameter, had been cut off its parent stem and rubbed smooth on its edges without destroying the comparatively soft bark.

But because Dr. S. G. Dixon had failed to find marine diatoms in the sandy



earth of the deposit, and because no evidence of marine life appeared anywhere among the remains, it seemed unnecessary to associate the filling in of the chasm with an invasion of the ocean. Enough had been seen to convince us that a fresh water flood, rising to a level of from fifteen to twenty feet above the present surface of the hill-top, hence a general inundation of the whole surrounding country,



FIG. 6 (size two-ninths).

Large blackened fragments of trees found at the west end of the darkly discolored area of layer 3 at about B and C, 3, 12. The now dry and cracked central fragment about 3 inches thick, has been rubbed smooth around its circumference by an erosive agent which has failed to remove the comparatively soft bark facing the specimen. The background consists of darkened earth characteristic of the layer.

bearing in its current the clay, stones and earth of neighboring levels, had tumbled into the fissure carrying with it the bones of creatures previously denuded of flesh and softened by decomposition.

#### NUMBER AND VARIETY OF THE REMAINS.

Summing up the mammals and reptiles described in an associated paper by Professor Cope, and the plants noted below, kindly identified by Messrs. Thomas Meehan and Stewardson Brown of the Academy of Natural Sciences of Philadelphia,<sup>1</sup> the work presents 377 individuals and 66 species, of which latter

<sup>1</sup> Mr. Meehan writes as follows: "There appears to be no great variety in the collection examined by me. The bulk of the seeds are young (July?) conditions of the hickory, *Carya porcina* Nuttall, and many of the thicker twigs belong to this hickory; beech nuts, immature (July) condition and beech twigs; *Pinus rigida*; *Quercus palustris*, the pin oak; seeds with a tendrill of *Ampelopsis*, apparently the Virginia creeper, *A. quinquefolia* (one of the seeds had been gnawed by a small rodent). The mosses all appear to be the common *Sphagnum* of our swamps. A thorn, slender and slightly curved, belongs to *Crataegus*, and there is an impression of a *Crataegus* fruit—probably the cockspur thorn, *C. crus-galli*.

"Of the leaf impressions, one appeared to belong to a buttonwood, *Platanus*, the others to a willow, *Salix*,—but they are too fragmentary to identify positively.

"The wood and bark could not be well identified by their own characters, which are obscure, but tracing



40 are extinct, as against 12 plants (the whole list) and 12 animals which still exist.

Most abundant and testifying to the omnipresence of edible leafage, were the remains of sloths, following which, in order of remarkable frequency, came the bones of skunks, rabbits, tapirs, bears, mastodons, peccaries and turtles. There is nothing in the common tree or plant specimens found to preclude the existence at the spot of such a forest as would have been familiar to modern eyes. But the



FIG. 7 (size three-fifths).

Specimens of darkly discolored boughs and twigs from layer 3 at the Port Kennedy bone fissure, flattened by the down settling of debris in the cave after their deposition by water. With them lie six cones and cone fragments of *Pinus rigida*, likewise flattened when discovered, but which on drying expanded into their present form within a few days.

seemingly unnatural association of such neotropical animals as the tapir and peccary with the boreal wolverine, suggest several problems of climate and zoological distribution unfortunately left undiscussed by the naturalist who died suddenly before his final estimate of the number of individuals and species had been made.

Wheatley, in 1871, found at the same spot 85 individuals and 42 species, of which 11 were neotropical, 3 nearctic, 11 common to northern Europe and America and 9 uncertain. We found 33 species not encountered by him, unearthing no remains of *Myiodon*, ox, mole or bat, with but one insect to duplicate his discov-

the recognized twigs from the slender to the stouter specimens, it is safe to say most belong to the pig nut hickory, *Carya porcina* Nuttall (*Juglans glabra* of Miller).

"Mr. Brown's identifications, so far as they go, accord with mine, but he found in the specimens he examined the hazelnut, *Corylus americana*, and what he believed to be bur oak, *Quercus macrocarpa* Michx., but which I should refer to white oak, *Q. alba*, but the cup is quite large if entombed at the same season with the others (July 7)."

eries, though, notwithstanding the fact that he failed to find any trace of the to us abundant skunk, when all is considered, these apparently accidental variations in the contrasted lists of results seem of minor importance. As shown below, the same geological age and character marks both collections.



FIG. 8 (size two-thirds).

Specimens of nuts, seeds, leaves, moss etc., found at various parts of the darkly discolored area of layer 3. (1) Fragments of charcoal, probably naturally carbonized from C, 2 and 4, 10. (2) Acorn cup, *Quercus palustris*, C, 3, 10. (3) Plum seeds, *Prunus*, C, 2 and 4, 13 and 14. (4) Hickory nuts, *Carya*, layer 3. (5) Hickory nuts, *Carya glabra*, from talus. (6) Hickory nut in the husk, *Carya ovata*, C, 3 or 4, 13 or 14. (7) Acorn cups *Quercus macrocarpa*, C, 3 or 4, 13 or 14. (8) Hazel nuts, *Corylus americana*, C, 3, 10. (9) Bladder nuts, *Staphylex*, C, 4, 13 or 14. (10) Fragment of pine cone, *Pinus rigida*, not labelled. (11) Coprolites? or masses of rotted vegetable matter in layers, C, 3, 13. (12) Hickory nuts, *Carya glabra*, C, 6, 13. (13) Masses of moss, *Sphagnum*, C, or 4, 13 or 14, and C, 6, 10. (14) Willow leaf against a mass of mud, not labelled. (15) Beech seeds, *Fagus ferruginea*, C, 3 or 4, 13 or 14. (16) Hickory nuts, *Carya glabra*, not labelled.

#### FOSSIL REMAINS FOUND IN THE PORT KENNEDY CAVE.

The species excavated in 1894-96 are in italics; Roman type indicates those peculiar to the Wheatley collection.

| Excavated by Wheatley<br>in 1871. |          |                                   | Excavated for the Academy Natural<br>Sciences 1894-95-96. |              |
|-----------------------------------|----------|-----------------------------------|---|--------------|
| Individuals.                      | Species. |                                   | Species.  | Individuals. |
|                                   |          | Mammals:                          |   |              |
| 1                                 | 1        | <i>Erethizon dorsatum</i> Linn    | 1   | 6            |
| 2                                 | 1        | <i>Sciurus calcinus</i> Cope      | 1   | 1            |
|                                   |          | <i>Castor fiber</i> Linn          | 1   | 1            |
| 1                                 | 1        | <i>Zapus hudsonius</i> Zimm.      | 1   | 1            |
| 1                                 | 1        | <i>Hesperomys</i>                 | 1   | 1            |
| 3                                 | 1        | <i>Anaptogonia hiatidens</i> Cope | 1   | 3            |
|                                   |          | <i>Sycium cloacium</i> Cope       | 1   | 2            |
|                                   |          | <i>Microtus diluvianus</i> Cope   | 1   | 1            |
| 1                                 | 1        | <i>Microtus speotheni</i> Cope    | 1   | 3            |
| 1                                 | 1        | <i>Microtus dideltus</i> Cope     | 1   | 7            |
| 1                                 | 1        | <i>Microtus involutus</i> Cope    | 1   | 1            |

## BONE CAVE AT PORT KENNEDY.

| Individuals. | Species. | Species.                                     | Individuals. |
|--------------|----------|--|--------------|
| 6            | 1        | <i>Lepus sylvaticus</i> Bachm.               | 1            |
| 1            | 1        | <i>Lagonyx palatinus</i> Cope                | 1            |
| 12           | 1        | <i>Megalonyx wheatleyi</i> Cope              | 1            |
| 1            | 1        | <i>Megalonyx tortulus</i> Cope               | 1            |
| 1            | 1        | <i>Megalonyx loxodon</i> Cope                | 1            |
| 1            | 1        | <i>Megalonyx scalper</i> Cope                | 1            |
| 1            | 1        | <i>Mylodon harlani</i> Owen                  | 1            |
| 1            | 1        | <i>Blarina simplicidens</i> Cope             | 1            |
| 1            | 1        | Scalops ?                                    |              |
| 6            | 1        | Vespertilio                                  |              |
| 2            | 1        | <i>Ursus haplodon</i> Cope                   | 1            |
|              |          | <i>Ursus americanus</i> Pallas               | 1            |
|              |          | <i>Canis priscolatrans</i> Cope              | 1            |
| 1            | 1        | Undetermined                                 |              |
|              |          | <i>Vulpes latidentatus</i> Cope              | 1            |
|              |          | <i>Vulpes cinereoargentatus</i>              | 1            |
|              |          | <i>Mustela diluviana</i> Cope                | 1            |
|              |          | <i>Gulo luscus</i> Linn.                     | 1            |
|              |          | <i>Osmotherium spelzeum</i> Cope             | 1            |
|              |          | <i>Mephitis fossidens</i> Cope               | 1            |
|              |          | <i>Mephitis orthostichus</i> Cope            | 1            |
|              |          | <i>Mephitis leptaps</i> Cope                 | 1            |
|              |          | <i>Mephitis obtusatus</i> Cope               | 1            |
|              |          | <i>Mephitis</i> , undetermined               | 1            |
|              |          | <i>Pelycictis lobulatus</i> Cope             | 1            |
|              |          | <i>Lutra rhoadsii</i> Cope                   | 1            |
|              |          | <i>Taxidea americana</i> Bodd.               | 1            |
| 1            | 1        | <i>Machærodus gracilis</i> Cope              | 1            |
|              |          | <i>Smilodon mercerii</i> Cope                | 1            |
|              |          | <i>Uncia inexpectata</i> Cope                | 1            |
| 1            | 1        | <i>Felis eyra</i> Desm.                      | 1            |
|              |          | <i>Lynx calcaratus</i> Cope                  | 1            |
| 2            | 1        | <i>Mastodon americanus</i> Leidy             | 1            |
| 6            | 1        | <i>Tapirus haysii</i> Leidy                  | 1            |
| 2            | 1        | <i>Equus fraternus</i> Leidy                 | 1            |
|              |          | <i>Equus fraternus pectinatus</i> Cope       | 1            |
| 3            | 1        | Bos  |              |
|              |          | <i>Mylohyus tetragonus</i> Cope              | 1            |
|              |          | <i>Mylohyus pennsylvanicus</i> Leidy         | 1            |
|              |          | <i>Mylohyus nasutus</i> Leidy                | 1            |
|              |          | <i>Mylohyus</i> , undetermined               | 1            |
|              |          | <i>Teleopternus orientalis</i> Cope          | 1            |
|              |          | <i>Cariacus</i> , undetermined               | 1            |
|              |          | <i>Cariacus levicornis</i> Cope              | 1            |
| 2            | 1        | Mammal, undetermined                         |              |
|              |          | Birds :                                      |              |
| 1            | 1        | <i>Melagravis altus</i> , leg bone with spur |              |
| 1            | 1        | <i>Gallinago</i>                             |              |
|              |          | Batrachia and Reptiles :                     |              |
| 2            | 1        | <i>Rana</i> , undetermined.                  |              |
|              |          | <i>Clemmys insculpta</i> LeConte             | 1            |
|              |          | <i>C. percerassus</i> Cope                   | 1            |
| 2            | 1        | Tortoise, undetermined                       |              |
|              |          | <i>Toxaspis anguillulatus</i> Cope           | 1            |
|              |          | <i>Zamenis acuminatus</i> Cope               | 1            |
| 3            | 1        | Undetermined                                 |              |
| 12           | 12       | Insects :                                    |              |
|              |          | <i>Cychnus wheatleyi</i>                     |              |
|              |          | <i>Cychnus minor</i>                         |              |
|              |          | <i>Cymindys aurora</i>                       |              |
|              |          | <i>Chlænius punctatissimus</i>               |              |
|              |          | <i>Pterostichus levigatus</i>                |              |
|              |          | <i>Pterostichus longipennis</i>              |              |

| Individuals. | Species.                                  | Species. | Individuals. |
|--------------|---|----------|--------------|
|              | <i>Dicaeus alutaceus</i>                  |          |              |
|              | <i>Aphodius scutellaris</i>               |          |              |
|              | <i>Aphodius micans</i>                    |          |              |
|              | <i>Phanæus antiquus</i>                   |          |              |
|              | <i>Copris punctulatus</i>                 |          |              |
|              | <i>Saprinus? ebeninus</i>                 |          |              |
|              | Plants:                                   |          |              |
|              | <i>Quercus palustris</i>                  | 1        | 1            |
|              | <i>Quercus alba</i>                       | 1        | 1            |
|              | <i>Quercus macrocarpa</i> (2 acorns)      |          |              |
|              | <i>Fagus ferruginea</i>                   |          |              |
|              | 180 seeds and 20 fragments of seeds       |          |              |
|              | <i>Corylus americana</i>                  |          |              |
|              | 21 nuts and nut fragments                 | 1        | 1            |
|              | <i>Pinus rigida</i>                       |          |              |
|              | 9 cones and 2 cone fragments <sup>1</sup> | 1        | 1            |
|              | <i>Prunus</i> 3 seeds                     | 1        | 1            |
|              | <i>Carya porcina</i> 9 nuts               | 1        | 1            |
|              | <i>Carya alba</i> 2 nuts                  | 1        | 1            |
|              | <i>Ampelopsis quinquefolia</i>            | 1        | 1            |
|              | <i>Sphagnum</i>                           | 1        | 1            |
|              | <i>Cratægus</i>                           | 1        | 1            |
|              | <i>Cratægus crusgalli?</i>                | 1        | 1            |
| <hr/>        | <hr/>                                     | <hr/>    | <hr/>        |
| 85           | 42  | 66       | 377          |

Though the fissure had revealed the remains of a multitude of mutually antagonistic creatures the relics showed no trace of their racial hostilities and daily appetites. Rodents, of whom individuals of 13 identified species were found, had not gnawed the bones, and no sign appeared that the numerous carnivores had preyed upon their natural victims. The large and the small, the fierce and the gentle, lay together, overpowered, in most instances it seemed, by a common fate.

On the other hand, insects may have swarmed in the wet hole at any time after the destruction of the animals, and, while of these Wheatley found, as identified by Dr. Horn, 12 individuals of *Carabidæ*, *Scarabæidæ* and *Histeridæ* (see list), our excavation revealed but the single wing of one unidentified individual. As a rule such creatures as might have escaped a water catastrophe were not discovered at the spot. If we except bones of the wild turkey and snipe found by Wheatley, few, if any, of the remains, could have been identified as those of birds; and though turtles were abundant, and frogs found by Wheatley, we found no fish and no mollusks.

#### AGE OF THE REMAINS.

Whatever else was to be inferred from the debris we knew its geological date. We had gone back one geological step into different conditions of species and a different climate. Extinct animals in dominant numbers, or still existing species since migrated far from the region, clearly stamped the deposit as typical of the

<sup>1</sup> Black, water soaked and flattened almost beyond recognition when found, several of these cones on drying in the warm room at Port Kennedy, to our astonishment, expanded into their natural form.

epoch called pleistocene, and of that alone.<sup>1</sup> There was no mixing of geological time intervals, no down-washing of new into old deposits in the deep chasm. The minor variations noted between the water bandings were fully weighed, such as that the vegetable and minute animal remains common in subdivisions 1 and 3 were not observed in subdivision 2; that turtle remains were only found in subdivision 3; that the bones from subdivision 4 were much harder than those elsewhere found; that the remains from subdivision 2 were yellow in color, while those from subdivision 1 and 3 were black. On the other hand, the small animal remains noted in subdivision 1 were common in subdivision 3, while the large remains of subdivision 2 occurred also in subdivisions 3 and 4.<sup>2</sup>

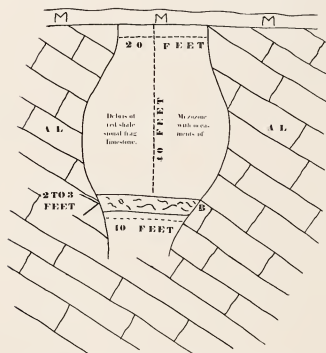


FIG. 10.—THE PORT KENNEDY BONE CAVE.

Rough sketch drawn by Wheatley in 1871. His description is as follows:

"M mesozoic shale; A. L. auroral limestone. Width at top 20 feet. Below expands to 30 feet. At depth of about 45 feet (B) it is ten feet wide. Black clay B with leaves, stems, etc., 18 in. thick. In red tough clay underneath, for six to eight in. in depth, fossils.

would have been presented in cross-section against the quarry walls. But no such channels have been revealed, and there seems no reason to question the general features of Mr. Wheatley's description of the fissure given in the accom-

When all is considered, the distinctions observed, as illustrated in the appended chart, fig. 9, seem of secondary importance. As in the case of the stones of varying size and frequency, as in the differing thickness and quality of the bandings themselves, the winnowing of material characteristic of water action best and easiest explains the differences. One or a series of closely successive inundations occurring in pleistocene time had probably deposited the remains in their present position.

#### THE FATE OF THE ANIMALS.

Obliterated as the original situation was by blasting, the topography of the quarry clearly precluded the supposition that the bones marked the site of an eddy in an ancient water course. Had a narrow canyon, once the bed of a stream, traversed the hill top its trough-like ends

<sup>1</sup> Since the age of the limestone rock is ordovician, the cave galleries might have been formed (by the erosion of rain water charged with carbonic acid or otherwise) in any geological time since then. But the vertical chasm in question could not have been open if existing in triassic time, else the horizontal bed of triassic shale immediately overlying it would have filled it.

<sup>2</sup> If older than the pleistocene, however, we might have expected to find the remains of prepleistocene animals in its deeper debris. But in signaling the fact that no sign of such a discovery was made here, we remember that no such evidence has been reported, strange to say, from any cave.

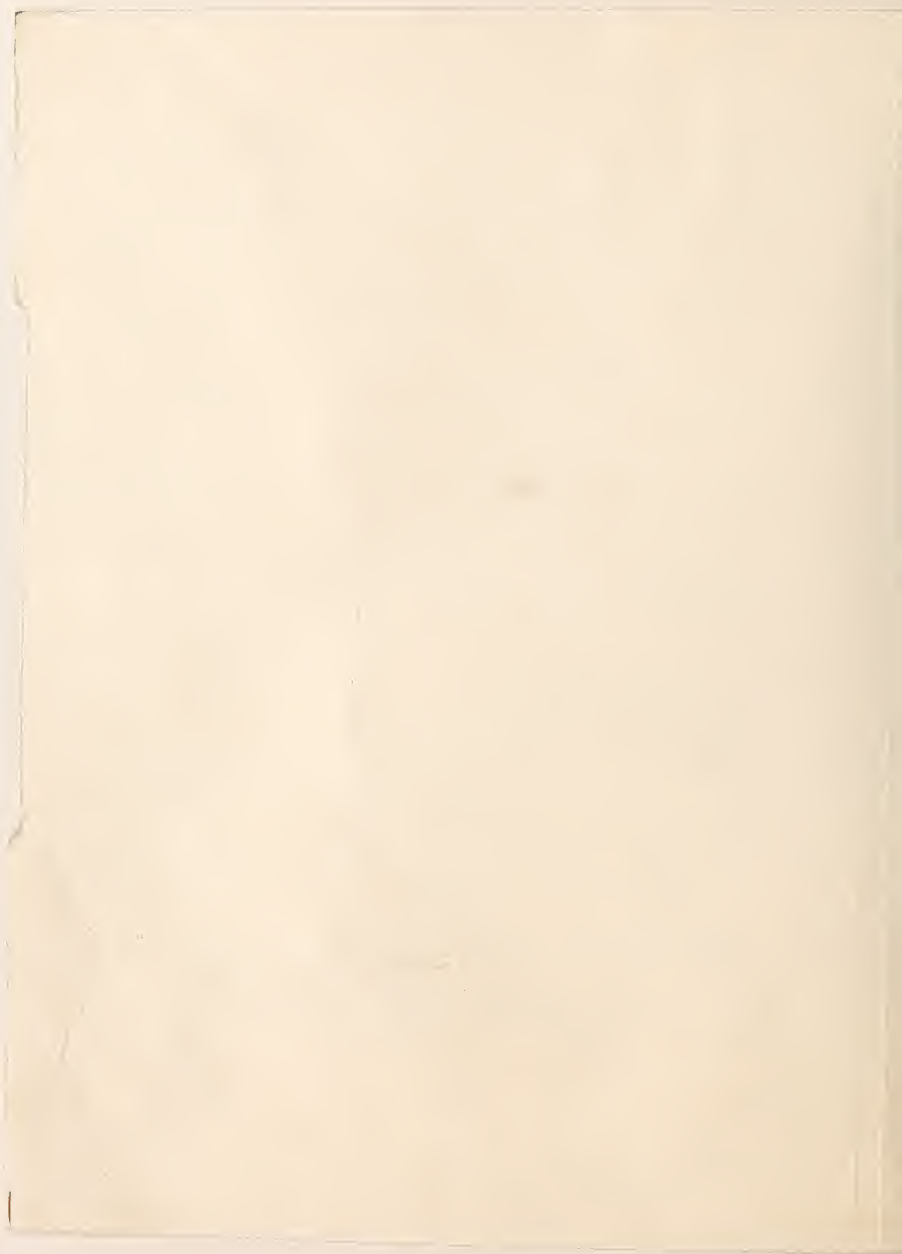
<sup>3</sup> Regarded horizontally it seemed worth noting that though the turtle carapaces continued common through subdivision 3, at all points, the fine hollow bones (of birds or small mammals) seemed to grow much scarcer on the left.



PLATE  
1



PLATE 1











panying cut (fig. 10), copied from his figure published in the *Journal of Science and Arts*, 3rd Series, Vol. I, p. 237.<sup>1</sup>

The chasm which primitive man would have avoided as a habitation was, we may suppose from the drawing, an abyss, edged with shale crusts, twenty to thirty feet in diameter at the mouth, and at least fifty, probably sixty or seventy feet deep, with descending walls sloping inward: a well-like hole, down

which the flood of an inundation, overwhelming the hill-top, would have tumbled like a waterfall (fig. 11).



FIG. 11.—THE PORT KENNEDY BONE CAVE.

East and west cross-section of the south end of Erwin's quarry (not drawn to scale for the sake of clearness, showing in the shaded parts A, B, C, D the probable original shape, size and relative position of the chasm). The continuous dotted line shows the area of rock and debris, and a portion of the original cave at present removed by the blasting and excavation of limestone at the quarry.

The lined shading at A shows the probable portion of the contents of the chasm removed by Wheatley in 1871.

The lined shading at B shows the part of the contents of the chasm removed by Dr. Dixon and Mr. Rhoads in 1874.

The cross shading at C shows that part of the contents of the chasm removed by ourselves in 1894, '95, '96.

The dotted shading at D, D, D shows the position of the contents of the chasm still remaining at the site.

The lowest continuous dotted line marking the quarry floor is at the level of the neighboring river. The excessive and increasing influx of water at the point marked by the lower letter C, threatening danger to the quarry, prevented further digging in 1896.

To the largest mammals the place would have been inaccessible. Unable to reach its bottom alive they could not have ventured thither as animals sometimes enter caves, to die. On the other hand, granting the ability of the mice and many of the smaller rodents to ascend and descend the walls, the evidence all indicates that even they were forced into the death trap with the rest and perished with them. Had they crawled down the perpendicular sides, had they entered through lateral fissures so as to have been present alive at the time of, or soon after the death of the others, traces of their gnawings should have been found on the bones, but the

absence on all the specimens of these unmistakable tooth marks, so often recognized upon cave remains, was one of the striking characteristics of the fossils.

That the general fate of so many creatures had been a sudden and common

<sup>1</sup> The drawing below the point B shows that he considers that the bottom of the fissure had not been reached, though he does not say so. But granting the intrusion of the remains from the surface, his presentation of a crust of triassic shale, resting like a flat roof directly over the chasm and its contents, is probably imaginary. The shale crust doubtless existing at the spot, and still seen capping the limestone escarpments near by, must have been worn away or broken in immediately over the chasm when Wheatley saw it. His depth of forty feet is likewise improbable, notwithstanding irregularities in the surface, since the quarry floor of 1871 (a portion of which still remains), then represented the bottom of his exposure (and the present top of ours is not more than 30 to 33 feet below the original level of the hill-top). There are evidences of constriction, however, in the fissure walls at the top of our exposure, where I found protruding crusts of rock much shattered by blasting, arching inward, and where the general configuration seemed to account for the narrowed outline of Mr. Wheatley's drawing at the depth of his horizontal dotted line marked "10 feet." On the whole, his contents as illustrated in the figure, probably the result of guessed measurements, do not affect the more important question of the general configuration of the chasm, which he has fortunately preserved for us, and there seems no reason to doubt that we are at present at work in a portion of it below his stratum B and his 10-foot line. At our point of exposure the chasm had again widened to 25 feet, a state of affairs which I attempt to illustrate in the chart (fig. 11).



catastrophe seemed further inferable from the thickness of the remains. Had the animals fallen in inadvertently, one by one, as has been suggested, had a long interval elapsed between the fate of the first and last victim, more stones and earth, more vegetable matter would doubtless have fallen into the chasm to become intermingled with the bones.

Admitting the previous death and fleshy decomposition of the animals, as before supposed, we cannot reasonably infer that any natural transporting agent could have gathered together in this fashion the heterogeneous skeletons of creatures dead at various spots; that through various causes it could have sifted them comparatively free from mixed debris, and finally washing them in one of the currents of a wide-spread flood to the top of a submerged hill, there tumbled them into a chasm.

Not unreasonably, therefore, we may suppose not only that the creatures had perished together, but also that they had perished on the spot or at the chasm—not meeting their fate during a long interval of time, and through a long series of chance tumbles, but suddenly and by force of a single event.

The cause to be imagined is one that would not only destroy the animals, but one that would bring them to the chasm together and there destroy them, so depositing the remains as to prevent their subsequent scattering, and while it may be supposed that a large forest fire could have so stampeded the creatures as to drive them pell mell into the fissure, the evidence more reasonably indicates that the destructive event was a wide spread inundation, and for the following reasons:—

Because no sure proof of the action of fire was found either upon the bones or the vegetable remains; because a large inundation was already proved at the spot which, having covered the top of the hill and tumbled into the cave, had, as before shown, accounted for the deposition of the bones; and because evidence of a great flood is further apparent in the existence of several other adjacent subterranean passages filled with stratified sand and clay. For these reasons it seems superfluous to suggest any other kind of natural phenomenon as a probable explanation of the death of the animals.

Let us suppose the advance of an overwhelming flood whose quick waves, submerging the surrounding region, drive in terror the inhabitants of the forest to higher ground. Led by chance direction of flight, the quarter of visible approach of the water, or the slope of land, the horde hurries up the hill-side in question where by chance the chasm, interrupting their path, receives many living animals pressed pell mell into the hole by the force of onrushing bodies. Killed by the fall, crushed by the weight of superincumbent carcasses or drowned by the quick following water (which, though it then doubtless entered the fissure, could not have done so in sufficient volume to cover the bodies with debris, since the skeletons did not lie intact), we may reasonably imagine the death of the animals followed by the gradual decomposition of their flesh and denudation of their bones. Such exposure to the action of the air and possibly water, regarded as a preface to one or more subsequent inundations, probably greater than the first, fairly accounts for the facts. The latter freshet or freshets again overwhelming the chasm, falling

heavily upon the softening mass of bones and whirling them as in a boiling cauldron, reduce many to small fragments and finally deposit them in their present position with stones, mud, plants and trees.<sup>1</sup>

On the other hand, the presence of bones of birds and of tortoises (if of water species) and frogs, which, following the currents of the flood, might have avoided partnership in a stampede of land animals caused by a water catastrophe, are facts of weight in opposition to the hypothesis advanced.

#### RELATION OF THE DEPOSIT TO ANTHROPOLOGY.

Six months work, leaving the chasm incompletely excavated, had failed to reveal traces of humanity in the deposit. If man had existed at the period, we might have expected, not unreasonably, that the waters which gathered together and poured into this tomb so many living creatures had seized him also, and that at some unexpected moment our discovery of a fragment of his skeleton, a hand-made implement of bone, a potshred or a chip of jasper, would have settled the much vexed question of his presence in pleistocene America. But no such sign appeared, and this fact is negative evidence of weight.

Yet it is not to be overestimated, first, because we had not demonstrated that no human trace existed in the unprobed depths of remaining debris; and second, because the cave was, as before noted, in no sense a place fitted for human habitation, and hence a site where human remains would have accumulated.

Nevertheless, though our labor had thus no direct bearing upon anthropology, Port Kennedy must retain a strong indirect interest for the student of primitive humanity in the New World. As if preserved in a bottle the remains of so many bears, cats, herbivores, rodents and reptiles of extinct race help to illustrate the conditions of the geological time immediately preceding the present and known as the pleistocene, the period when early man is known to have existed in Europe, and in which he has been alleged to have existed in America. Judged by the presence of such animals as the sub-tropical tapir and peccary, a winter climate milder than the present probably then prevailed. Then, as at the discovery of America, Pennsylvania must have been a land of trees, where abundant sloths of gigantic size, ranging under the yet familiar shade of the pine, the beech, the oak and the hazel, tore their green fodder to the ground, and where the elephantine mastodon fed upon bushes still familiar to modern eyes. If bears of formidable size were abundant, feline carnivores, like the sabre-tooth tiger and the jaguar were comparatively rare, and this fact, together with the abundance of the large grass-eating milder animals, indicates a region less dominated by brutes hostile to primitive humanity than pleistocene Europe.

<sup>1</sup> Under the present drainage system, granted subterranean connection with the river only one-quarter of a mile away, the galleries if free of debris, would have been full of water at depths greater than the present dammed Schuylkill level, or at about fifty-five feet below the brink of the fissure. Without such communication the level of inflowing water in the fissure might have been expected to rise as high as water will now rise in the quarry, or to within, perhaps, twenty-five or thirty feet of its rim.

## SUMMARY.

The results of the work thus far may be summed up as follows: We have proven by protracted observation the existence of a fossil deposit of great variety and unknown extent continuing in undiminished quantity downward and inward beyond the reach of our last digging. Learning that the remains were deposited in strata, ground, crushed, broken, and mixed with pebbles, proving their deposition by water, we have determined phenomena indicating the existence of at least one great inundation of the Schuylkill Valley and possibly two in pleistocene time. We have found evidence to show with reasonable certainty that the original configuration of the fissure was that of a deep well-like chasm opening vertically downward from the sloping surface of a hill, and have discovered ground for supposing that the animals stampeded by a flood had rushed simultaneously to their destruction into the abyss, when, after the decomposition of their flesh, a second freshet, or series of freshets, had redeposited their dislocated and softened bones. Recording the position of numbers of bones, and preserving them for study, we have gathered data as to families of animals which, like the wolverine, badger and porcupine, have survived, and as to others, like the skunk, which have changed with the lapse of time. We have recovered the remains of genera which, by lack of change, prove their present antiquity. We have traced northward the distribution of the tapir and peccary, thrown light upon the skeletal characteristics of the family of sloths, and gathered a hint as to the fate of the American horse. Failing to discover the American reindeer, we have found the beaver without trace of the larger *castoroides*, the mastodon without the mammoth, thus offering paleontology a standard for comparison with which other discoveries might be tested while illustrating the faunal conditions of a geological epoch immediately preceding the present, alleged to have witnessed the presence of man on the American continent.







## CERTAIN ABORIGINAL REMAINS OF THE ALABAMA RIVER.

BY CLARENCE B. MOORE.

The union of the Coosa and Tallapoosa rivers, in the central part of the State of Alabama, forms the Alabama river, which, running in a westerly, and then in a southerly, course through the State, about 375 miles by water, is joined by the Tombigbee river and thence on, under the name of the Mobile river, continues a distance of 50 miles, by water, to Mobile bay, a part of the Gulf of Mexico.

The Mobile and Alabama rivers are navigable by flat-bottomed steamers of light draft between Mobile, at the head of Mobile bay, and Montgomery, about 400 miles farther up, and in high water even beyond the "Forks," though for years Montgomery has been the terminus for the regular line of steamers.

This Report treats of certain aboriginal remains bordering the Mobile and Alabama rivers.<sup>1</sup>

The time devoted by us in person to the location and investigation of the aboriginal remains of these rivers was about three months of the early part of 1899, during which time a great number of landings were visited, and at important ones conversation was had with persons familiar with the territory for miles around.

In addition, Mr. L. D. Cutting, engineer of our boat for years and thoroughly familiar with mounds, twice went from Mobile to Selma on the regular steamers in the busy season, making inquiries at landings and of passengers, and also visited Montgomery in prosecution of the search.

Furthermore, a resident of Montgomery, familiar with the river, accompanied by a companion, was employed by us to go down the river in an open boat from Montgomery to Matthews' Landing, about 200 miles by water, making inquiries along the way.

Although the attention given by us to the Mobile and Alabama rivers does not compare with that accorded by us to the St. Johns river, Florida, and to the Georgia coast, yet it was fully ample to indicate that mounds along these rivers were of rare occurrence and, as a rule, insignificant in size. It must not be supposed, however, that the meagre list of aboriginal remains investigated includes all located by us and by those working in our interests. While the majority of owners of property along the river hastened to give cordial permission to investigate, a number ignored our communications, though several times addressed. However, the aboriginal remains investigated were presumably representative.

<sup>1</sup> The map is mainly taken from the Government report, as are the distances, which are by water, "Annual Report of the Chief of Engineers," 1884, Ex. Doc. I, Pt. 2, Vol. 2.

The Mobile river, running mainly through swamps, could have offered few sites for aboriginal abode; but the banks of the Alabama, though swampy in places, often rise into lofty bluffs, and on them might be expected mounds far exceeding in number those which seem to be present. In many places pebbles, chips of stone, sherds, arrowpoints, mussel-shells, indicating dwelling sites, strew the surface, and we think it likely that, as mounds are so often wanting near such sites, the people who lived there buried rather in cemeteries, which, unmarked above the surface, have escaped notice.

But even allowing for many places of sepulture not located by us, it is not likely the borders of the Mobile and Alabama rivers were as thickly settled as were those of Florida's greatest river. The shad which visit the St. Johns, the bass so abundant in its clear waters, are wanting in the Mobile and Alabama rivers. In the great Florida stream, shell-fish were so abundant that shell-heaps covering acres remain along the banks, some a score of feet in thickness. Along the Mobile are shell-heaps of insignificant size, while on the Alabama scattered shells only mark former places of abode. But even apart from these considerations, it must be borne in mind that the Mobile and lower Alabama run largely through swampy ground, malarial in summer, a fact which aborigines choosing a place of abode would doubtless take into consideration. Yet we are told<sup>1</sup> that De Soto found the Mobilian Indians living along the banks of the Alabama, between the present sites of Montgomery and Mobile, and later, remnants of the Mobilians dwelt near the coast; bands of Alabamas were settled from the union of the Coosa and Tallapoosa to below where Montgomery now stands; Creeks and Choctaws occupied other portions of the river. Still these Indians had villages on elevated points, doubtless avoiding the swamps, and did not line the banks as did the Indians of the St. Johns.

No systematic investigation of the Mobile and Alabama rivers has been made previous to our own. In the Annual Report of the Bureau of Ethnology<sup>2</sup> we find brief notices of investigation conducted at two points on the Alabama river, one of which is not definitely located; but beyond this we believe excavations have been limited to ignorant search for treasure or to the spasmodic digging of the seeker after relics.

*Aboriginal Remains Investigated.*

- Mound near Twenty-One-Mile Bluff, Mobile county (Mobile river).
- Mound near Twenty-Four-Mile Bend, Mobile county (Mobile river).
- Mound near Little river, Monroe county.
- Mound near Potts' Landing, Monroe county.
- Morrisette Mound, Clarke county.
- Cemetery at Nancy Harris Landing, Monroe county.
- Mound near Webb's Landing, Wilcox county.
- Mound near Burford's Landing, Wilcox county.

<sup>1</sup> "The History of Alabama," Pickett. Reprinted 1896.

<sup>2</sup> 1890-91, page 289-290.

- Mound on Burford Place, Wilcox county.
- Mounds near Matthews' Landing, Wilcox county (4).
- Mound on Joel Matthews' Place, Dallas county.
- Mound on Hunter Place, Dallas county.
- Cemetery at Durand's Bend, Dallas county.
- Mounds on Charlotte Thompson Place, Montgomery county (4).
- Mound on Rogers Place, Montgomery county.
- Mound near Horseshoe Bend, Elmore county.
- Mounds in Thirty Acre Field, Montgomery county (2).
- Mound in Big Eddy Field, Montgomery county.
- Mound at Jackson's Bend, Elmore county.

MOUND AT TWENTY-ONE-MILE BLUFF, MOBILE COUNTY (MOBILE RIVER).

Twenty-one miles above Mobile is one of the few spots of high ground on the low-lying banks of the Mobile river. About three hundred yards west of the landing, close to the road, was an unstratified mound of clay, 6.5 feet high and having a basal diameter of 58 feet. A large trench had previously been dug into the center through the southern part of the mound. The remainder of the mound was investigated by us with the kind consent of Mr. George R. Dupree of Mobile, resulting in the discovery of parts of two disturbed skeletons. No pits or graves were found. Loose in the clay were numerous sherds, mainly undecorated; the bottom of a small vessel with four feet; three stone hones; one chert arrowhead; one smoothing stone; three large glass beads.

MOUND NEAR TWENTY-FOUR-MILE BEND, MOBILE COUNTY (MOBILE RIVER).

About three-quarters of a mile in a westerly direction from the landing at Twenty-Four-Mile Bend, in a cultivated field, is a low, irregular mound much ploughed down, the property of Mrs. Smith, reported to be a Choctaw Indian of almost pure blood.

The mound, which is of sand with a large admixture of clay, has been dug through by a former owner in a vain search for treasure.

A small amount of digging done by us was without result.

MOUND NEAR LITTLE RIVER, MONROE COUNTY.

Little river enters the Alabama about one hundred miles above Mobile.

In a cultivated field, about one-half mile from the mouth of Little river, on the left-hand side, going up, was a mound long ploughed over and consequently much extended. When investigated by us its height was about 2 feet. Its original diameter of base probably did not exceed 50 feet. The mound was dug through by us with the cordial permission of Mr. T. S. Moore, of Tensaw, Ala., the owner.

There was no evidence of previous investigation, though sherds of excellent ware and interesting decoration, evidently from burial urns, scattered over the surface, told of wreckage wrought by the plough.

The mound was a mixture of clay and sand without stratification. Bits of charcoal and other evidence of fire were present throughout.

The burials remaining were largely central or near the center. A number had been disturbed by the plough and doubtless many more had been taken from the mound in former time by the same agency. Such as remained were of the bunched variety<sup>1</sup> with three exceptions. One of the bunches had six femurs of adults with two skulls and other bones of adults, and at one side the skull and certain bones of an infant.

A skeleton was extended in anatomical order from the pelvis down. Below it was a skull with a few ribs. Nearby was another skull.

Just below the surface, crushed to small pieces, were parts of the remains of one or more vessels. Among them lay the bones of an infant.



FIG. 1.—Earthenware vessel. Mound near Little river. (About four-ninths size.)

Almost in the center of the mound were many fragments of two vessels crushed by the plough and wanting certain parts, doubtless ploughed away. The remaining portions have been reunited and are, with nearly all the collections made by us, at the Academy of Natural Sciences of Philadelphia.

The under vessel, B, contained the bones of an infant. The ware was of fairly good quality, without admixture of pounded shell. Height, 6.5 inches; maximum diameter, 13.7 inches; diameter of aperture, 10.7 inches. The vessel is semi-globular in shape, with a small upright rim decorated with notches around the exterior edge. The body bears a complicated incised decoration partly shown in Fig. 1.

<sup>1</sup> For forms of burial see our "Certain Aboriginal Mounds of the Georgia Coast," pg. 6 *et seq.* Journ. Acad. Nat. Sci., Vol. XI.

Vessel B had been capped by Vessel A, a handsome circular dish of excellent ware without admixture of shell, black in color, thick and highly smoothed. The edge of the rim is decorated with notches and its interior surface with incised, parallel lines at intervals. Below the rim, on the inside, is incised cross-hatched decoration. Diameter, 16 inches; depth, 4.5 inches (Fig. 2).



FIG. 2.—Vessel A. Mound near Little river. (Three-eighths size.)

With a burial, near the head, were: a neat lance-head of quartz; a small vessel of inferior ware, irreparably broken into fragments, and a pair of ear-plugs somewhat decayed and broken. Each ear-plug has been made of two discs of shell, each somewhat over one inch in diameter. Each pair of discs has been joined together by a sort of mortar composed of calcined shell, pulverized and clay.<sup>1</sup>

<sup>1</sup> Determined by Mr. S. H. Hamilton of the Academy of Natural Sciences of Philadelphia.



We shall have occasion later in the Report to refer at greater length to earplugs of this type.

In caved earth was a rude vessel with pointed projections around the outside of the rim. Height, 2.7 inches; maximum diameter, 4 inches (Fig. 3).



FIG. 3.—Vessel of earthenware. Mound near Little river. (Full size.)

A head of a predatory bird, modelled in red earthenware, blackened exteriorly, which doubtless had seen service as the handle of a vessel, lay loose in the earth. Part of the bill is missing (Fig. 4).

Also in loose earth was a disc of earthenware, cut from a sherd. In former Reports we have had occasion to mention these discs which doubtless were used in games. They occurred in great numbers in some of the mounds of the Alabama river, and their presence has been noted from South Georgia to Canada. Curiously enough they are almost, if not entirely, absent from the Florida mounds investigated by us, which is likewise the case as to the discoidal stone. They are referred to in Mr. Stewart Culin's exhaustive "Chess and Playing Cards."<sup>1</sup>



FIG. 4.—Earthenware head of bird. Mound near Little river. (Full size.)

Three discoidal stones were in caved earth or were thrown back by the diggers in the mound. A handsome one, probably of clay-stone colored with iron, is 2

<sup>1</sup> "Report of the U. S. National Museum," for 1896.

inches in diameter and 1 inch in thickness. Another is of the same size, while the third has a diameter of 3.5 inches, a thickness of 1.5 inches. These two are of a close-grained volcanic rock, the larger being probably porphyry.<sup>1</sup>

With the large bunched burial, to which we have already referred, were: two undecorated, circular gorgets of shell, both badly broken; six massive shell beads, finely preserved; numerous glass beads; one small sheet copper bead; one perforated pearl, the only one met with by us in Alabama, though the chroniclers of De Soto speak of their great abundance there; one pair of ear-plugs and a single one, the mate to which was doubtless overlooked by us, all of the type referred to before; two shell pins in fragments, of the ordinary type, made of the columella of a marine univalve cut down for the shank with the original diameter left for the head. With all these were three handsome shell pins differing from the usual type, aptly described by Professor Holmes<sup>2</sup> as follows: "They differ from the pins heretofore described, being in all cases unsymmetrical. The shaft is flat and somewhat curved and joins the mushroom-shaped head near one edge. This results from the peculiar shape of the portion of the shell from which the pin is derived . . . ."

Such pins have the shaft cut from the parietal wall of the shell and the head from parts extending to either side of the suture, as shown in Fig. 5.

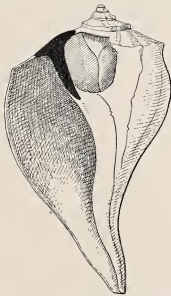


FIG. 5.—Fulgur showing part from which the pin is made. (Not to scale.)

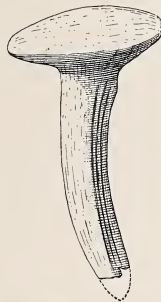


FIG. 6.—Shell pin. Mound near Little river. (Full size.)

The three pins are about equal in size, each being about 2.5 inches long with diameter of head of 1.5 inches. One is shown in Fig. 6.

All shell pins found by us have been near the skull; therefore, we believe them to have been used as ornaments in the hair.

<sup>1</sup> All identifications of rock in this Report have been made by Dr. E. Goldsmith, of the Academy of Natural Sciences of Philadelphia. As we have not furnished microscopical slides from the specimens, exact determination has been impossible.

<sup>2</sup> "Art in Shell of the Ancient Americans." Second Annual Report of the Bureau of Ethnology, page 216, Fig. 8, Pl. XXX.

Near the surface, together, were: the iron or steel blade of a knife, two gun flints, vermilion paint and a brass object presumably belonging to a musket or rifle.

In this mound was an intrusive burial which had been made in a large pine box fastened with hand-made nails. With the skeleton were two brass buttons.

#### MOUND NEAR POTTS' LANDING, MONROE COUNTY.

This mound, the property of Dr. G. G. Scott, of Mt. Pleasant, Ala., who kindly consented to its investigation, is about one mile in a southerly direction from Potts' Landing.

The mound, in a cultivated field, ploughed over for a long period, is much spread out and very irregular in shape. Its height at present is 5 feet 7 inches; its basal maximum and minimum diameters are 118 feet and 100 feet, respectively.

The central part of the mound, dug out by us, showed the material to be a mixture of clay and sand. There were no indications of use as a burial ground.

#### MORRISSETTE MOUND, CLARKE COUNTY.

This mound, not far from Marshall's Bluff Landing, in a cultivated field, is about 6 feet high and 40 feet across the base, approximately. Untouched by the plough, owing to the steepness of its sides, it is the most symmetrical mound met with by us on the Alabama river, almost a perfect truncated cone in shape.

The owner, Mr. Robert Morrisette of Perdue Hill, did not reply to our request for permission to investigate. We refer to the mound here only in the idea that it richly deserves a systematic investigation, permission for which might be obtained should there at any time be a change of ownership.

#### CEMETERY AT NANCY HARRIS LANDING, MONROE COUNTY.

The neighborhood of this landing suffered greatly by the freshet of 1886 which wrought such havoc along the banks of the Alabama.

In conversation with persons living along the river and with colored people resident at the landing, we heard of pots, broken and whole, of tobacco pipes and of human bones, washed up by the flood and left scattered over the surface on the subsidence of the water.

A careful examination was made by us and sounding rods were used in all likely-looking territory, unfortunately without material success, though scattered human bones, fragments of pottery and, in one case, the earthenware head of a bird, which had served as the handle for a vessel, were met with.

The territory around the landing is of clay covered with sand. This sand, in nearly every instance, had been swept away with the burials it contained, leaving, we fear, little chance for future archaeological work in this vicinity.

#### MOUND NEAR WEBB'S LANDING, WILCOX COUNTY.

The mound, showing no mark of cultivation, was in a ploughed field on the flat summit of a small hill, about three quarters of a mile in a northwesterly direction from the landing.

The mound, which was dug down with the kind permission of Mr. M. L. Stabler, of Peach Tree, Ala., had a height of 4 feet; a basal diameter of 38 feet. A small hole had previously been dug into the center of the mound which was of sand with slight admixture of clay.

Human remains, very badly decayed, were met with at seven points and were represented by a skull here, a skull with a single long bone there, and the like. Once the crowns of teeth alone remained.

With one burial was a beautifully wrought celt, probably of greenstone, 9.7 inches in length, measuring across its evenly ground blade 2.5 inches, gracefully tapering at the other end to a rounded point .4 of an inch in diameter.

Near another burial, one on the other, were two small, rude, undecorated gorgets of shell, roughly circular.

Several arrowheads were loose in the earth.

#### MOUND NEAR BURFORD'S LANDING, WILCOX COUNTY.

Our thanks are due to Mr. W. P. Murphy, of Rockwest, P. O., for permission to investigate this mound, which is situated in woods which apparently have grown on ground previously cleared, about 1.5 miles in a southerly direction from Burford's Landing. The height of the mound was 6 feet 8 inches; across the base it was 58 feet. The only previous examination apparent was a small, shallow hole near the summit.

A large trench made by us showed the mound to be of sand. With the exception of fragments of decaying bones, several arrowheads and two rough knives of stone, nothing was met with.

#### MOUND ON BURFORD'S PLANTATION, WILCOX COUNTY.

This plantation is on the left-hand side of the river going up, about one-half mile below Holly Ferry. The mound is about one mile W. S. W. from the landing, in the heart of a swamp. It had been much trampled by cattle and consequently spread out and reduced in height, which, at the time of the investigation, was 3 feet. The diameter of base was about 45 feet. It was thoroughly investigated with the cordial permission of Mr. W. P. Burford, of Rockwest P. O., Ala., and proved to be of rich clayey sand.

At several points were decayed remains of parts of skeletons. Two arrow-points lay loose in the sand.

#### MOUNDS NEAR MATTHEWS' LANDING, WILCOX COUNTY (4).

About 1.5 miles in a southwesterly direction from the landing, in a ploughed field, about 100 yards from the river, was a mound much ploughed down and irregular in shape. Two great depressions nearby showed whence the material was derived.

The present height of the mound is 5 feet 4 inches; the major and minor axes of its base are 120 feet and 70 feet, respectively.

It was investigated by kind permission of Messrs. Miller and Bonner, of Camden, Ala., through whose courtesy all our work near Matthews' Landing was done.

Extensive trenching of the mound, which was of clay covered with sand, showed it to have been of a domiciliary character with no yield beyond sherds, one perforated mussel shell and one earthenware "checker."

About 50 yards in a southwesterly direction from the mound just described, near the river bank, with the plantation road passing over it, was an irregular undulation from 1 to 2 feet in height. Its exact area was impossible to determine though it was considerably less than that of the neighboring mound. A large portion was dug through by us. The upper stratum was of clay 4 or 5 inches thick. Next came a layer of yellow sand 18 inches to 2 feet in thickness, having a slight admixture of clay, while the bottom layer, from 1 to 2 feet thick, was of clay blackened with charcoal and organic matter and containing many sherds. In it were a large number of pottery "checkers" and one small one of shell, also the earthenware head of a duck, formerly the handle of a vessel. The ware was of good quality, containing an admixture of pounded shell, while some was black and highly polished.

Burials were met with at two points: one being the bunched remains of an adult and of a child; the other, also of an adult and of a child, had the bones in anatomical order.

The crania, badly broken, showed artificial flattening. The Choctaws, we are told,<sup>1</sup> compressed the skulls during infancy, and hence were called "flatheads" by the traders. Probably other Indians along the Alabama practised this same custom of cranial compression.

This mound had every appearance of having been a dwelling site like its neighbor, with burials, perhaps of a later period than the mound itself.

About 400 yards in a W. S. W. direction from the landing is a mound on undulating country, with probably an average height of 7 feet. The sides, washed by the river in times of unusual flood, probably originally ran steeply up to a perfectly level plateau, most likely intended for domiciliary purposes. Pine trees, some 2 feet in diameter, are on the mound which bears no appearance of previous cultivation. The mound at present has somewhat the shape of a blunt wedge, probably conferred by wash of water and, doubtless, formerly was rectangular in shape like other mounds of its class. The summit plateau, in an easterly and westerly direction, has a diameter of about 138 feet, with a base diameter about 35 feet greater. Across the western portion of the plateau, the thick end of the wedge, the diameter is about 100 feet, the base-diameter about 45 feet in excess.

Various trenches and pits indicated the mound to have been made of sandy clay, with a superficial layer of sand, of varying depth, say from 1 to 3 feet. About 3 feet down, extending through the mound on the same level, was a thin layer of earth blackened probably by fire and admixture of organic matter, seemingly indicating a long-continued period of occupation. No interments were found

<sup>1</sup> Pickett, quoting Adair, "History of Alabama," page 125 *et seq.*



below this layer, though some lay on it, from which we concluded that the original mound had been increased 3 feet in height and subsequently used for burials.

About three-fourths of the plateau was dug through by us to a depth of 3 feet, resulting in the discovery of burials as follows:

Burial No. 1.—With its top 9 inches below the surface, was a vessel (A) of coarse ware, consisting of clay with admixture of pounded shell. The body, which is semi-globular, is undecorated; the neck is upright and surrounded with perpendicular ridges; the rim is flaring. A good example of this type, Vessel BB, is shown in our account of the aboriginal cemetery at Durand's Bend.



FIG. 7.—Vessel containing skeletons of infants. Mound at Matthews' Landing. (About one-third size.)

The vessel has a height of 8.5 inches; a maximum diameter of 14.5 inches; a diameter at the mouth of 12 inches.

Ranged around the sides were disconnected parts of skulls of several infants, having beneath them and partly around them many other bones, probably the remainder of the skeletons which had been disarticulated and carefully packed away.

With these, occupying a central position, was the skeleton of a very young infant which had been buried in anatomical order. All these bones have been kept exactly as found, and now, soaked with glue and coated with shellac to impart solidity, occupy their original position, a certain amount of earth which had entered through a crack having been removed. The arrangement of the bones is well shown in Fig. 7.

Over Vessel A, inverted, was a circular, undecorated dish of very coarse ware—clay and pounded shell—having a maximum depth of 3 inches and a diameter of 13.5 inches. In this dish is a large crack, dating from early times, as is shown by a perforation in either side through which had been passed a cord or sinew to lash the parts together, after the aboriginal fashion.

On top of the upturned base of the dish (B) were a number of fragments of earthenware which had formed part of another vessel, doubtless put on for additional protection.

We have here a form of burial new to our work, namely plural burial of skeletons in a single urn. Along the Georgia coast we found urn-burials of single skeletons and urns filled with cremated remains of various individuals. Later in this report we shall see a repetition of this plural form occurring in the aboriginal cemetery at Durand's Bend.

Burial No. 2.—2 feet below the surface was the skull of an adult in fragments, as were all crania found unenclosed in this mound. No other bones were in association. With the skull was an undecorated vessel with globular body and upright neck. Height, 3.75 inches; diameter of body, 3.5 inches. With this vessel was a diminutive bowl, 1.9 inches in diameter, 1 inch in height. This little toy had incised decoration over the entire exterior surface (Fig. 8).



FIG. 8.—Earthenware vessel. Mound at Matthews' Landing. (Full size.)

Such vessels are usually supposed to have been placed with children. In the skull, which this little bowl accompanied, the wisdom teeth were present. With the other objects was a little bowl 1.7 inches long, 1.5 inches broad, .75 inch deep wrought from a pebble, which, possibly, to a certain extent, had been hollowed out by nature.

Burial No. 3.—A bunched burial consisting of certain bones of a child, without the skull, lay 18 inches below the surface. This burial was surmounted by part of a bowl, crushed, from which the rim was missing.

Burial No. 4.—13 inches down were parts of skeletons of an adult and of a child, mingled. Alongside was part of an undecorated vessel of about one quart capacity. It will be noted that the canny aborigines who built this mound, as in other sections of the country, were sometimes inclined to be quit of tributes to the dead by interment of objects otherwise useless. Still, their gifts to the departed compare favorably with those of the present time.

Burial No. 5.—Fragments of a skull in caved earth.

Burial No. 6.—Certain bones of an adult, without cranium, 3 feet down.

Burial No. 7.—1.5 feet down, upright, was a vessel of about two quarts capacity, with semi-globular body and flaring rim decorated with knobs around the outer margin of the mouth. This vessel, badly broken by blows from a spade, contained certain bones of a young child, namely: one-half of a lower jaw, one clavicle, certain ribs, pelvic bones, and one piece of a vertebra. With these bones was an undecorated, imperforate ornament of shell, a trapezoid in shape, 2 inches long with an average breadth of 1.5 inches. Beneath the vessel were certain bones of an adult.

Burial No. 8.—A bunched burial consisting of a cranium with a few bones, all apparently belonging to one person, 2 feet below the surface.

Burial No. 9.—A bunch consisting of twelve tibiae, thirteen femurs and other long bones, 34 inches down. Scattered among these bones were fragments of earthenware representing part of a vessel.

Burial No. 10.—A few scattered fragments of bone just beneath the surface.

Burial No. 11.—A large, inverted vessel with rude line and punctate decoration lay over the skull of a child, which surmounted a number of its bones heaped together. This vessel, broken in small pieces by roots and pressure, was sent to the Peabody Museum, Cambridge, Mass., as were the bones which, soaked in glue and allowed to dry in place, are preserved, as to position, exactly as found.

Burial No. 12.—This burial consisted of one-half of the lower jaw, some ribs and a clavicle with the cranium to one side, all belonging to an adult. In association were two shell beads each about .5 of an inch in diameter.

Burial No. 13.—2 feet down was a bunched burial consisting of one humerus, bones of both forearms, two femurs, two tibiae, one fibula.

Burial No. 14.—Isolated skull of an adult, 20 inches down. With it was a discoidal stone of ferruginous claystone, 1.8 inches in diameter. On the major, or lower, surface, are cut two concentric circles (Fig. 9). Somewhat farther in the mound, on the same plane, were pairs of femurs, humeri, tibiae, radii, ulnae, all parallel to each other with a cranium to one side and above.

Burial No. 15.—On the same plane as Burial No. 14 and 1 foot north of it, was a bunch of adult long bones, all parallel. Just beyond was the skull of an infant with a few bits of decayed bone.

Burial No. 16.—Certain crushed and decayed bones of an infant, including the cranium, lay 15 inches below the surface. With the skull was an undecorated, imperforate disc of shell, 3 inches in diameter.

Burial No. 17.—Two femurs, one tibia, one fibula, one humerus, the cranium, all belonging to an adult, 29 inches down. All these were surmounted by two fragments of a large vessel.



FIG. 9.—Discoidal stone. Mound at Matthews' Landing. (Full size.)

Burial No. 18.—Just under the surface was a bunch of certain bones of an adult and of an infant, mingled. No crania were present.

Burial No. 19.—Two crania of adults with one of a child. With these, 30 inches down, were a few bones belonging to at least two adults.

Burial No. 20.—26 inches down, a few fragments of crushed and decayed bones.

Burial No. 21.—15 inches down, a bunched burial of a skull and a few long bones of a child.

Burial No. 22.—Isolated skull of adult, 2 feet down.

Burial No. 23.—A few bits of decayed bone belonging to a child, 1 foot below the surface.

The high percentage of interments of children in this mound is worthy of remark.

#### MOUND ON THE JOEL MATTHEWS' PLACE, DALLAS COUNTY.

This estate, about one mile below Cahaba, on the right side of the river going down, had a mound in a large cultivated field, about 40 yards from the woods. Investigation was made with the courteous permission of Mr. B. F. Ellis, of Orrville, Ala., the lessee of the property.

As near as we could judge, the mound, before the cultivation it had undergone, had been about 32 feet across the base. Its height above the general level was 4 feet 3 inches, though, at the center, a burial lay 5 feet 6 inches from the surface.

The mound was about three-quarters dug through by us, including the entire central portion. It was of dark brown, loamy sand without stratification.

Human remains, encountered at twenty-one points, consisted of small bunches of human bones and sometimes a single skull. In no case was a skeleton present or had there been any attempt to bury in anatomical order. In one instance there was a small deposit of fragments of charred and calcined bones, the only instance of cremation met with by us on the Mobile or Alabama rivers.

No artifacts were present with the burials, and the sole yield from the mound was a few rude arrowpoints.

#### MOUND ON THE HUNTER PLACE, DALLAS COUNTY.

The Hunter Place, on the right-hand side of the river going down, is about four miles from Selma by land.

About 300 yards from the landing, on the edge of a cultivated field, was a mound about 50 feet across the base and 7 feet in height. Its sides were too steep to permit cultivation. Unfortunately, a narrow trench running N. and S. had been dug completely through the mound. We are indebted to Mrs. Fanny Pollard, one of the Hunter heirs, residing on the estate, for permission to dig.

Owing to the previous disturbance a complete investigation was not attempted. The eastern part of the mound was mostly dug through by us and a small portion of the western part.

The mound was composed of a mass of clay covered to a depth of several feet with sand.

Human remains, a bunched burial, were met with but once.

In the debris thrown out by previous diggers was a spool-shaped ornament of copper the pattern often found in Ohio mounds, and a sheet copper disc 2.5 inches in diameter with a central repoussé boss having in the middle a perforation for attachment.

ABORIGINAL CEMETERY, DURAND'S BEND, DALLAS COUNTY.

Durand's Bend, formed by a long curve of the Alabama river, is about thirteen miles above Selma by water. At one point the land is only about 150 yards across, and there, during the great flood of 1886, when the territory was under water, the river cut through in several places, washing away superficial portions. On the subsidence of the flood it was found that parts of an aboriginal burial place had been laid bare and that human bones, earthenware vessels, whole and in fragments,



FIG. 10.

and various other objects of aboriginal make, were scattered over the surface. Many persons from Selma visited the ground, reaping a rich harvest. we were told, and since then others visiting the spot, have located, by the aid of iron rods, numerous vessels under the surface, which they dug up and carried away.

Dr. W. J. Stoddard, of Selma, the owner of the property, a gentleman greatly interested in scientific matters, determined to end reckless digging by unauthorized persons and, for a considerable period, has withheld permission to dig. We are indebted to Doctor Stoddard for cordially placing his entire plantation at our disposal with fullest permission to investigate to any extent we saw fit.



Over six days were spent by us at Durand's Bend, having a considerable number of colored men living on the place in addition to the trained workers from our steamer, some of whom have been with us for years.



FIG. 11.

The territory in which urn-burials were found by us was a cultivated field of about three acres, almost on the river bank and its immediate vicinity. The



FIG. 12.



FIG. 13.



FIG. 14.

FIGS. 10, 11, 12, 13, 14.—Fragments of earthenware vessels. Cemetery, Durand's Bend. (Full size.)

discovery of vessels elsewhere on the place was reported by colored people living there, but none was found by us though a really exhaustive search was made and much territory, in addition to the field we have referred to, gone over by lines of men prodding at short intervals with iron rods.

The surface of the field and some of the other territory was covered with broken pebbles, chips of stone and numerous sherds. Some of these, evidently from burial urns broken by the flood or by previous visitors, are shown in Figs. 10, 11, 12, 13, 14.

Other sherds were undecorated, or had the check stamp and probably belonged to cooking utensils. Among all these were a few bearing the complicated stamp so familiar in Georgia and Carolina.



FIG. 15.—Head of earthenware.  
Cemetery at Durand's Bend.  
(Full size.)



FIG. 16.—Perforated pebbles. Cemetery at Durand's Bend.  
(Full size.)

In addition, scattered over the field, were: arrowpoints of quartz; smaller ones usually of black chert; hammer-stones, discoidal stones made from flat pebbles pecked into shape; many discs made from fragments of pottery; a human head in earthenware, about 2 inches high, somewhat injured on one side (Fig. 15); fragments of various implements and a number of pebbles, some clayey and soft, others of a silicious character and hard, each having a perforation, seemingly artificial, though in no case was the perforation of that even character such as was made by the tubular drill used with sand by the aborigines to cut resistant rocks. The holes, on the contrary, were irregular in shape, some showing a certain polish as to the interior surface. These pebbles were not found associated with the dead, but singly and loose in the earth.

Professor Putnam declares them to be natural formations. It is not even likely they were utilized by the aborigines since, as we have said, they lay apart from burials. Certain of these formations are shown in Fig. 16.



FIG. 17.—Notched pebble.  
Cemetery, Durand's Bend. (Full size.)

During trenching of part of the field and the excavation of vessels many objects, similar to some of those enumerated, were met with and it is probable that those on the surface were left there by the subsiding water.

During our excavation we met with a discoidal stone of *Felsite*, highly polished; a flat pebble notched for suspension (Fig. 17); two canine teeth of large carnivores, one grooved at the base for suspension; an interesting little chisel made from a flat pebble of silicious rock colored with iron, with the beginning of a perforation (Fig. 18), about 2.2 inches long and 1.75 inches across the blade.

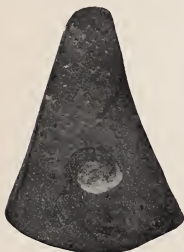


FIG. 18.—Chisel of silicious rock. Cemetery at Durand's Bend. (Full size.)



FIG. 19.—Pendant of earthenware. Cemetery at Durand's Bend. (Full size.)



FIG. 20.—"Bannerstone" of hematite. Cemetery at Durand's Bend. (Full size.)

From colored inhabitants we got a small pendant of earthenware with a single perforation (Fig. 19), and a "bannerstone" of polished hematite with an uncompleted perforation (Figs. 20, 21).

As iron rods, as a rule, located only urns, numbers of trenches were dug, always over 2 feet in depth, through the sand into undisturbed material beneath. This resulted in the discovery of twenty-seven unenclosed burials from 2 to 3 feet below the surface. Two of these were bunched burials; one, a burial of part of a skeleton, mainly in order; one, part of a skeleton, disturbed by a burial beneath; one, a child on its back with its thighs drawn up; one, also a child, on its left side. Twenty-one skeletons lay extended at full length on the back, all but three with arms parallel to the trunk. In one instance the right arm crossed the lumbar vertebrae; in another, the right hand lay upon the pelvis. A child had both hands raised to the shoulders.



FIG. 21.—Cross-section of Fig. 20.

The skeletons had no uniformity of direction, but headed to all points of the compass.

Sixteen were of adults, seven were of adolescents or of children. The skeletons probably had been interred when denuded of flesh, though still fairly well connected by ligaments. This was evidenced in a number of cases where bones were wanting, or were placed in improper order or turned in the wrong direction.

Crania were so badly decayed, crushed or penetrated by roots that but two were preserved. These two, found near together, close to the bluff, belonged to singularly well-preserved skeletons. One, of a male (Collection Academy of Natural Sciences, No. 2,168) seems to partake strongly of the negro type. Its companion, however (Collection Academy of Natural Sciences, No. 2,169), shows marked artificial flattening. Adair tells us that the Choctaws practised flattening of the skull. These skulls may belong to comparatively recent interments.



Inhumation of artifacts with unenclosed dead was met with but once at Durand's Bend. Two feet from the surface, extended on its back, was the skeleton of a delicately formed man or of a woman. The bones of the feet were missing, except one heel bone which lay against the pelvis. Near the hand and forearm were eight tines cut from stag horn. They were neither grooved nor perforated, but, nevertheless, doubtless formed part of a wristlet and were attached together by a partial insertion through some material.

Near the chest of the skeleton were a number of small imperforate shell discs, and across the chest, near the chin, was a so-called "hoe-shaped implement" of volcanic rock, 5.5 inches in length, and 4.5 inches in maximum breadth across the blade. As usual with these "implements" it had a countersunk perforation in the shank.

Objects of this type are by no means common. In all our mound work we had met with them but twice before, one in a mound near Blue Creek, Lake county, Florida; another in a mound near Lake Bluff, on the Altamaha river, Georgia. Later, the reader may see that this type was fairly abundant in mounds near Montgomery, where several imperforate specimens were found, as well as certain ones having perforations and one with a perforation begun, but not completed. It may be as well to say here, since we are on the subject of the "hoe-shaped implement," that we do not believe it to have been used as a hoe. All specimens found by us and those found by others, which we have examined, have the edge finely ground and without notch or chipping, which would not be the case had they seen service as hoes. Besides, farther up the Alabama river we found part of a so-called "hoe-shaped implement" made from the soft blue clay found along the banks of the Alabama. Such an object could never have been intended for active use. Furthermore, the shanks of several of the implements found by us show by a discoloration where there has been a handle, allowing a portion of the shank to project behind. The perforation comes along the margin and was doubtless used, where it was present, to lash the handle more firmly. We are convinced that the "hoe-shaped implement" was a ceremonial axe.

No fractures, and in one case only, an osteitis, was a pathological condition present in the bones. The skeletons showed less muscular markings than we have met with in other sections.

A considerable number of urn-burials were met with by us at Durand's Bend, consisting usually of a vessel holding the remains, capped by another, inverted, to keep out the earth. As a rule, the up-turned base of the upper vessel was about 6 inches from the surface, though doubtless before the freshet swept across the bend, the depth was considerably greater.

But the mortuary vessels, so far as noted, are made of a mixture of clay and pounded shells. In shape and decoration they present no marked variety, but for that matter, at the present day, we can hardly boast of a great diversity of type in mortuary receptacles. The under vessel was usually of the type found by us at Matthews' Landing, with the same undecorated body and often with similar perpen-



dicular ridges around the neck beneath the flaring rim, or with loop-like handles in place of ridges. This under vessel was usually surmounted by a bowl with little flare to the rim and with incised and punctate decoration. Sometimes the decoration was exclusively on the inside of the neck and rim. At times, however, there had been utilized as a surmounting vessel the body of a vessel of the type ordinarily used as a receptacle and placed beneath. In such cases the rim and neck were missing and presumably a broken vessel had been utilized.

When not otherwise specified in the description, the vessels are imperforate as to the base. The reader may recall that in Florida many, and along the Georgia coast some, vessels were found by us from the bottoms of which pieces had been broken, possibly to "kill" the vessel to permit its soul to accompany the spirit of its master to the happy hunting-grounds; or perhaps, in the case of mortuary urns, to allow the soul to escape. It is interesting to note on the Alabama river the occasional occurrence of this curious custom.

It will be noted that no cremated remains, so abundant among the urn-burials of Georgia or parts of Georgia, were met with by us in the cemetery at Durand's Bend.



FIG. 22.—Vessel A. Cemetery, Durand's Bend. (Three-sevenths size.)

Nearly all the vessels, when discovered by us, were more or less cracked and the cracks, as the vessel dried and contracted, tended to widen. Moreover, many vessels, through long exposure to moisture, were soft and friable. In every case we dug carefully around the vessels and, brushing the earth from them, permitted them to harden in the sun, at the same time applying a quick-setting cement between the margins of the cracks. Before lifting, when the state of the vessels

required it, stout cotton bandages tightened by improvised tourniquets were adjusted with advantage, and these bandages were allowed to remain in place until the vessels had made their journey North. In certain cases where vessels, crushed into small fragments, had had principal parts irrecoverably carried away by the plough, and the remaining parts bore no decoration of interest, they were abandoned.

We shall now give in detail a description of the vessels and their contents. All measurements are approximate. The vessels, when not otherwise specified, may be seen at the Academy of Natural Sciences, Philadelphia.

Vessels A and B.—Vessel B, of the type already referred to as coming from Matthews' Landing, which we shall hereafter, for convenience, call the receptacle type, has beneath the rim on the outside, instead of the upright ridges, four small loop-shaped handles, such as are shown on the figure of vessel E E. Its maximum diameter of body is 14 inches; its height, 10 inches. The rim is badly shattered and parts are missing. In B were splinters of decaying bones, one humerus of a very young infant and a mussel shell (*Unio crassidens*).

Vessel B was capped by an inverted bowl (A) with incised and punctate decoration as shown in Fig. 22. Maximum diameter of body, 14 inches; height, 7 inches. In the base was a perforation which could not have come from the metal rods in use for sounding, as the splintering showed a blow from the inside and, moreover, the piece was missing. This is the first case in any section of the country where we have found a surmounting vessel with basal perforation.

Vessel C.—A short distance below the base of Vessel B, to one side, was a bowl (C) intact, with incised and punctate decoration, practically the same as that on Vessel A, having a maximum diameter of 7 inches, a height of 8.5 inches.

It lay inverted about 4 inches above a skull belonging to the skeleton of an infant, in anatomical order.

Vessel D.—This vessel, similar in shape and decoration to Vessel B, was badly broken. It contained a few fragments of bones of an infant and a mussel shell of the kind found in Vessel B. Vessel D was surmounted by fragments of what had probably been a part of a vessel. These fragments, with Vessel D, were sent to Peabody Museum, Cambridge, Mass.

Vessels E and F.—Vessel F, of the usual receptacle type, 11.7 inches high, 17.2 inches in maximum diameter, contained the bones of an infant, with a shell bead, a perforated cockle-shell (*Cardium*) and a small oval, undecorated shell gorget with double perforation. Vessel F was capped by Vessel E, inverted, from which the rim had been broken prior to its burial. The body has a maximum diameter of 18 inches; the height of the fragment is 8 inches. These vessels were sent to the University of Pennsylvania, Philadelphia.

Vessels G and H.—Vessel H, 23 inches across the body and 16 inches in height, of the receptacle type as to shape, with the ridges and, in addition, six small loops beneath the margin, contained parts of the skeleton of an adult, namely: two shoulder blades, two collar bones, breast bone, twenty-four ribs, the pelvic bones and nineteen vertebrae. The shoulder blades and corresponding

vertebræ were in anatomical order. The skull and all bones of the extremities, except those of the feet, were wanting. These bones were in fairly good condition, and it is impossible to ascribe the absence of the other bones of the skeleton to decay. The bones filled but a small portion of the vessel, so the interment of but part of a skeleton was not necessitated.

Surmounting and partly covering Vessel H was an inverted vessel (G), without rim, of the type of Vessel E.

Vessels I and J.—Vessel J, of the receptacle type, 15 inches through the body at its maximum and 11.8 inches high, contained the bones of an infant, apparently



FIG. 23.—Beads and ornaments of shell. Cemetery at Durand's Bend. (Full size.)

in anatomical order, though exact determination was difficult owing to disarrangement caused by removal of infiltrated sand. Near the neck was a stopper-shaped ornament of shell, 1.25 inches long and presumably a necklace made up of forty-four rectangular pieces of shell, incised and doubly perforated, all closely resembling one another. Certain of these beads, with the ornament, are shown in Fig. 23.

Turned over the mouth of Vessel J was a bowl (I), 12.2 inches maximum diameter and 5.5 inches in height.

Its decoration is incised and punctate (Fig. 24). It has two small perforations made by the sounding rod.

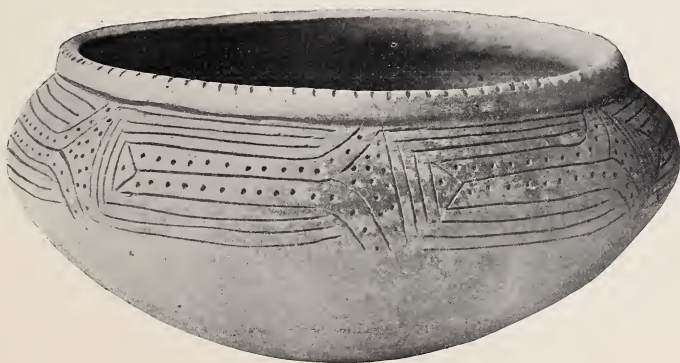


FIG. 24.—Vessel I. Cemetery, Durand's Bend. (One-half size.)

These two vessels lay among mingled fragments of two other vessels with scattered bones of an infant. Presumably the fragments represented an earlier burial broken by the introduction of the later one.

Vessels K and L.—Vessel K, of the regular receptacle type, has a maximum diameter of 20 inches; its height is 14 inches. It contained certain bones belonging to the skeleton of an adult: the vertebrae and ribs, beginning with the fifth dorsal vertebra, down; the shoulder blades; the collar bones; the pelvic bones; the breast bone and the bones of both feet. Here again we have a fragmentary burial not necessitated by a limited size of vessel. In the mound in Dumoussay's Field, Sapelo Island, Ga., we found the upper part of the skeleton of a woman, buried in a vessel of earthenware with the lower part buried beneath. In this case, however, the vessel was packed to its full capacity, which was far from being the case with Vessel K.

Over the bones, on the base of Vessel K and wholly contained in it, was part of an inverted bowl, the rim from which was entirely missing.

Vessel M.—This vessel, of the usual receptacle type, was badly broken and deficient in certain parts which doubtless had been ploughed away. It contained a few decaying bones of the skeleton of an infant. On the fragments of this vessel lay a mass of small pieces of a dish, once, no doubt, a surmounting vessel. This urn-burial was discarded.

Vessel N.—This vessel, just under the surface, had lost its upper portion and the surmounting vessel by exposure to the plough. The vessel differed from others at Durand's Bend. It had been of fine, light-yellow ware with incised scroll work painted a brilliant red. On the base were a few bits of decaying bones of an infant.

Vessels O and P.—Vessel P, of the receptacle type, with loop handles in place of ridges, fell into small pieces upon removal. It contained a few bones of an infant.

An inverted bowl (O) had been let into Vessel P for a short distance. This bowl, with slightly flaring rim with incised decoration on the inside, has a maximum diameter of 12.75 inches, a height of 5.2 inches.

Vessels Q and R.—Vessel R, of the receptacle type, contained the bones of an infant, seemingly in anatomical order. It has a height of 13 inches; a maximum diameter of 19 inches. There is an aboriginal perforation in the base.

Over Vessel R was an inverted vessel (Q) without a rim, which fell into small pieces upon removal.

Vessels S and T.—Vessel S, of the usual type, having loops beneath the margin, has a maximum diameter of 20 inches; a height of 14 inches. On the base were certain bones of a skeleton belonging to a period toward the close of infancy. These bones were not in regular order, and the skull, except the lower jaw, was wanting. Above the bones, which were lying on the base of the vessel, had been placed a sort of circular dish (T), inverted, having a maximum diameter of 13.5 inches and 2.8 inches deep. This dish bore no decoration with the exception of certain notches around the margin. While most of the bones were covered by the dish, a part of the margin lay against a scapula which was upright and





FIG. 25.—Vessel V, containing burial. Cemetery, Durand's Bend. (One-half size.)



parallel to the side of the larger vessel, and certain bones lay beyond that part of the base of Vessel S included beneath the inverted dish.

Vessels U and V.—Vessel V, the usual type as to shape, with loops instead of ridges around the neck, one of which was missing, is 22 inches in maximum diameter and 15 inches high. It contained one of the most striking burials which it has been our fortune to meet with. As a general rule, cracks in the receptacle vessel or the crushing in of the surmounting one permits the entrance of earth; thus covering the contents of the burial-urn and making difficult their uncovering without disarrangement. In this case, however, Vessel U, of the receptacle type but without rim, had kept out all foreign matter, except a slight deposit of earth on



FIG. 26.—Vessel W. Cemetery, Durand's Bend. (Six-thirteenths size.)

the burial beneath, so the greater vessel, when uncovered, was seen to be filled to the level of the rim with bones presumably belonging to two skeletons; the smaller ones at the bottom, then layer upon layer of the major long bones, capped by two skulls side by side, looking toward the South. One cranium was of an adult male. The other, of an adolescent, seemed to indicate artificial antero-posterior compression. Near it were a few shell beads. We did not discover whether other artifacts accompanied the remains since, to keep the bones exactly as found, the entire mass was deluged with glue without removal, to hold the bones in place and impart consistency. Subsequently, certain bones in contact with the sides of the vessel were cemented to it and then the mass received two coats of shellac. Even in this condition, the vessel being somewhat broken and the bones certain to fall apart when jarred, it was deemed impossible to secure safe transportation North, either by freight or by express. Therefore, the vessel with its contents was securely packed

in a light box with handles and, by courteous consent of J. C. Morrison, Esq., District Superintendent of the Pullman Palace Car Company, New Orleans, the box was brought North by us in the sleeping car on our return. A good half-tone representation of the bones as they appear in the vessel, looking down, is given in Fig. 25.

Vessels W and X.—Vessel X, of the usual receptacle type, having loop handles, is 9.7 inches high and 14.2 inches across at its widest part. It contains a pile of bones probably belonging to two infants whose skulls lie on top. One shell bead was visible among the bones which were not removed but were glued in place.

On Vessel X, the aperture down, was Vessel W, a bowl 13 inches in maximum diameter and 6.5 inches high, having incised and punctate decoration as shown in Fig. 26.

Vessels Y, Z, AA, BB, CC.—These vessels, found as shown in Fig. 27, constitute one of the most interesting urn-burials ever met with by us.

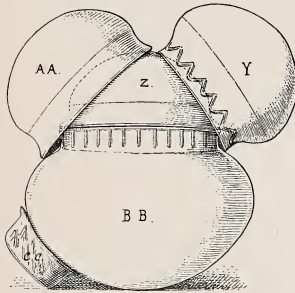


FIG. 27.—Urn-burial, drawn from sketch made on the spot. Cemetery, Durand's Bend. (One-ninth size.)

Vessel BB (Fig. 28), of the receptacle type, 17.7 inches in maximum diameter and 12.2 inches in height, contained parts of an infant's skeleton in anatomical order, though the skull and certain other bones were missing. Shell beads were in association.

BB was capped by a vessel (Z), inverted. AA and Y also inverted, the lower part of their rims resting against BB, were placed obliquely, so as nearly to cover Vessel Z.

A small vessel (CC), height, 2.5 inches, diameter of body, 4.3 inches, lay on its end in the earth with part of its rim pressing against the lower portion of Vessel BB.

Vessel CC, of very poor material, is in the shape of a bowl with rude incised decoration and handles roughly representing the head and tail of a bird. Portions of the vessel have crumbled away. From the end of bill to tip of tail the diameter is 7 inches.

Vessel AA is a bowl of red ware. Its maximum diameter is 12.8 inches; its height, 6.6 inches. Its somewhat flaring rim has a series of << incised on its inner surface, making spaces left bare and filled with red coloring matter alternately.

Vessel Z is the counterpart of Vessel AA, with the exception of being 1 inch less in height (Fig. 29).

Vessel Y, with basal perforation, is of the receptacle type, though used as a surmounting vessel. It is 12.5 inches in maximum diameter and 8.6 inches in height. The ornamentation differs from the usual upright or loop handles, as is shown in Fig. 30.



FIG. 28.—Vessel BB. Cemetery, Durand's Bend. (About one-third size.)



FIG. 29.—Vessel Z. Cemetery, Durand's Bend. (About one-half size.)



FIG. 30.--Vessel Y. Cemetery, Durand's Bend. (About one-half size.)

Vessels DD and EE.—Vessel EE, the usual receptacle type, badly broken, had on the base decaying bones of an infant, with an undecorated, circular shell gorget, 1.7 inches in diameter, having a double perforation.



FIG. 31.--Vessel DD. Cemetery, Durand's Bend. (About two-sevenths size.)

Covering the aperture of Vessel EE, was an inverted bowl (DD), with incised and punctate decoration, 14.3 inches across at its broadest part and 6.8 inches in height (Fig. 31).

A hole had been knocked in the base of Vessel DD, and over this hole had been placed, inverted, the base of another vessel, presumably to keep out the earth.

This urn-burial complete was sent to the Peabody Museum, Cambridge, Mass., where broken portions have been pieced together. This burial, as it appeared when found, is shown in Fig. 32.

Vessels FF and GG.—These vessels had been crushed and shattered into small pieces, among which were shell beads and fragments of bones of an infant.



FIG. 32.—Vessel EE surmounted by Vessel DD in position as found. Cemetery, Durand's Bend. (About three-fourteenths size.)

Vessels HH and II.—These were crushed to small pieces and parts had been carried away by the plough. The remaining fragments, among which were a few decaying bones of an infant, were abandoned.

Vessels JJ and KK.—In all respects similar to the preceding ones.

Vessels LL and MM.—These were the smallest mortuary vessels met with by us at Durand's Bend. The under one (MM) has a maximum diameter of 9.5 inches. It is 6 inches high. It is of the usual type and contains the skull of an infant and some, perhaps all, of the skeleton which was not in anatomical order. These bones, in better condition than infant remains usually are, were hardened by us by means of glue and are preserved intact in the urn.



Inverted over the mouth of Vessel MM was a bowl (LL) in fragments, with flaring rim decorated on the inner surface with rudely incised lines. Parts of Vessel LL, recovered and glued together, showed the bowl to have had a maximum diameter of 10 inches; a height of 3.7 inches.

Several additional vessels, found in small fragments, will not be particularly described.

Just beneath the surface, with no human remains in association, was a vessel, heart shaped in section and decorated as shown in Fig. 33.

Its maximum diameter is 3.5 inches; its height, 1.8 inches. It unfortunately received a blow from a spade.

Two small undecorated pots lay near the surface apart from human remains, while another, with rude incised decoration, came from the vicinity of a broken urn. This vessel is of the coil method of manufacture where coils of clay are superimposed in manner much as we make a straw hat, and of all the vessels found, so far as noted, contained no admixture of pounded shell.



FIG. 33.—Earthenware vessel. Cemetery, Durand's Bend.  
(Full size.)

#### MOUNDS ON THE CHARLOTTE THOMPSON PLACE, MONTGOMERY COUNTY (4).

About six miles below Montgomery, on the left side of the river, going down, in a cultivated field, about one-quarter mile from the water, was a mound 67 feet through the base, approximately, with a summit plateau having a diameter of about 32 feet. The height of the mound was about 9 feet though its position across a natural ridge made its altitude appear somewhat greater on two sides.

Though the mound was uninjured by cultivation, unfortunately a trench 10 feet to 12 feet broad had been dug from the margin into the summit plateau some distance though stopping short of the center of the mound.

The mound was investigated by us, with the kind permission of Mr. W. G. Henderson, of Montgomery, the owner.

Beginning at the margin, a trench 20 feet across was run below the base of the mound to the margin of the summit plateau. No burials were met with outside of 4.5 feet of the margin of the plateau. On the discovery of human remains at that point the trench was widened to include the entire plateau and 4.5 feet beyond on

either side. This trench was continued through the mound until it was apparent no farther burials lay beyond. In this way a mere shell was left standing, in which, presumably, there are few, if any, interments.

Four or five feet in from the margin of the mound, whose outer portion was sand, there began a nucleus of clay around and over which the mound was built. The clay rose sharply and speedily attained the height of about 3 feet, which it maintained with slight variation throughout. This flat table of clay was, as we have said, surrounded and surmounted by sand.

Human remains were found in the sand, in the clay, and, in a few cases, in pits extending below the level of the mound. An earnest attempt was made to keep score of the burials, but skeletons in anatomical order (flexed and partly flexed) were comparatively few, while bunched burials, interments of parts of skeletons and bones scattered in all directions, were so numerous and so intermingled that the task was given up as hopeless.

There were no cases of cremation, though in several instances thin layers of what seemed to be charcoal lay above the bones.

This mound was, to us, in one respect of peculiar interest, for, from top to bottom, were objects of iron, of glass, and of other material, derived from the whites, which proved the mound to be of post-Columbian origin and emphasized what has always been our contention, that in a mound built after contact with Europeans, artifacts obtained from them will be amply in evidence.

#### SHELL.

*Pins.*—Shell pins were present in great numbers. Indeed it seemed as though every third burial was provided with them. In one case four lay with a single skull. Excluding numbers of decayed pins and others broken in excavation, no less than ninety pins, from 1.5 inches to 7 inches in length, were recovered from the mound. Among these were four of the interesting variety described by us as coming from the mound near Little river.

*Gorgetts.*—Twenty-seven shell gorgets, irregularly circular, from 1.8 inches to 4.9 inches in diameter, lay with burials, usually those of children—one child having two. Unfortunately, none bore engraved decoration, though nine had a circle of semi-perforations on one side near the margin and four were marginally decorated with notches (Figs. 34, 35).

Certain gorgets had a single perforation for suspension, while some were doubly and even trebly perforated. In several cases where holes had worn through, others had been drilled.

*Beads.*—Shell beads were with the burials in bewildering profusion and variety, some no larger than a good-sized pin's head, others, great sections of axes of marine univalves, 1.6 inches in length.

A few flat beads with incised decoration and doubly perforated, somewhat resembling those from Durand's Bend, were present (Fig. 36).

With two burials were numbers of small marine univalves (*Marginella*) perforated for stringing.



FIG. 34.—Shell gorget. Mound on Charlotte Thompson Place. (Full size.)

*Ear-plugs.*—As is well known, it was the custom of many of our aborigines to pierce the lobe of the ear and to enlarge the opening so that various objects, some of considerable size, could be worn by thrusting them through the lobe. This curious



FIG. 35.—Shell gorget. Mound on Charlotte Thompson Place. (Full size.)

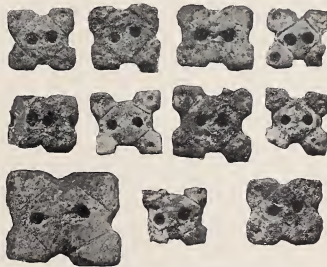


FIG. 36.—Shell beads. Mound on Charlotte Thompson Place. (Full size.)

custom, still to a certain extent kept up by women, which attained its maximum as to size of perforation in Peru, permitted the buttoning in of various objects, some of copper, such as are found in Ohio and elsewhere, or of stone, copper-coated, like

those taken by us from Mt. Royal, Florida, or of shell, of the type referred to by us as coming from the mound near Little river. In the mound on the Charlotte Thompson Place were three pairs of shell ear-plugs, each pair taken from near a cranium, and several fragmentary ones decayed and broken. One pair was of the type found in the Little river mound, that is, discs of shell, one smaller than the other, fastened together with a mortar made of clay and pounded calcined shell. In one respect this pair of ear-plugs differs from those at Little river in that one disc of one ear-plug is centrally perforated. The other two pairs have each ear-plug carved from a solid piece of shell, with one flange, doubtless the one worn on the inside, somewhat smaller than the other. Both pairs are perforated centrally through the minor axis. But one ear-plug is sufficiently well preserved to furnish measurements as to original size. This shows one side to have a diameter of 1.6 inches; the other, 1.4 inches.

*Fish-hook.*—On the base of the mound, associated with human remains, with



FIG. 37.—Shell fish-hook. Mound on Charlotte Thompson Place. (Full size.)

bone piercing implements and a bone fish-hook 2.5 inches long, was a neatly made fish-hook of shell, 2.8 inches in length, grooved for attachment of the line. In this instance, though they are of different materials, we shall speak of the fish-hooks together. The shell fish-hook is shown in Fig. 37; the bone one, in Fig. 38.

In relation to fish-hooks in North America, Rau, "Prehistoric Fishing," page 122, says, "In the first place I have to allude to their great scarcity in the eastern portion of North America and to state that those



FIG. 38.—Bone fish-hook. Mound on Charlotte Thompson Place. (Full size.)

which have been found within that area are almost exclusively of bone. They occur more frequently on the Pacific Coast, especially in California latitudes and there they consist of bone or shell."<sup>1</sup>

Professor Rau cites a number of early authors on North America who refer to fish-hooks of bone.

Professor Holmes, "Art in Shell,"<sup>2</sup> page 207 *et seq.*, tells us, "The use of shell in the manufacture of fishing implements seems to have been almost unknown among the tribes of the Atlantic Coast and with the exception of a few pendant-like objects, resembling plummets or sinkers of stone, nothing has been obtained from the ancient burial mounds of the Mississippi Valley. Hooks of shell, however, are very plentiful in the ancient burial places of the Pacific Coast. . . ."

<sup>1</sup> "Smithsonian Contributions to Knowledge," 1884.

<sup>2</sup> Second An. Report of Bureau of Ethnology.

Abbott, "Primitive Industry," page 208, figures a bone fish-hook and comments on the rarity of such objects in eastern North America.

C. C. Jones in his "Antiquities of the Southern Indians" points out the absence of fish-hooks from the districts described by him, and in all our mound work in Georgia, in South Carolina, in Alabama and in Florida, where, in addition, shell heaps were exhaustively searched, we have met with fish-hooks in this instance alone, so the reader can appreciate the interest of this discovery, which furnished, so far as we can learn, the only shell fish-hook found east of the Pacific Slope.

*Scraper*.—A fine mussel-shell (*Unio heros*) was found, perforated for attachment to a handle and showing marks of wear at one end.

*Drinking Cup*.—A marine univalve (*Cassia cameo*), with interior portions cut out to form a drinking cup, lay near a skull. This is the first instance where a drinking cup has been found by us wrought from a shell other than the conch (*Fulgur*).

*Shells*.—Seven mussel-shells (*Unio heros*) were found near a burial, while another, filled with tines of a stag-horn and decaying piercing implements of bone, lay near human remains.

A cockle-shell (*Cardium magnum*) lay almost in contact with a skull.

#### EARTHENWARE.



FIG. 39.—Earthenware disc. Mound on Charlotte Thompson Place. (Full size.)

*Discs*.—A number of discs made from potsherds, for use in games, lay in midden refuse throughout the mound and a disc of earthenware, slightly broken, having on one side a central depression surrounded by six rays, also was present (Fig. 39).

*Vessels*.—The yield of earthenware vessels from this mound was disappointing in view of the fact that fragments of good ware were present in the mound. In one instance only were vessels found with the dead. Two bowls lay on

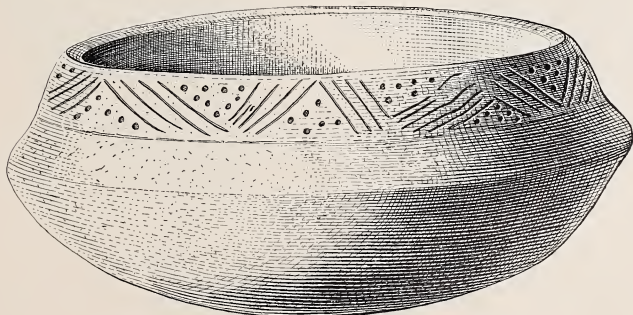


FIG. 40.—Earthenware vessel. Mound on Charlotte Thompson Place. (Full size.)



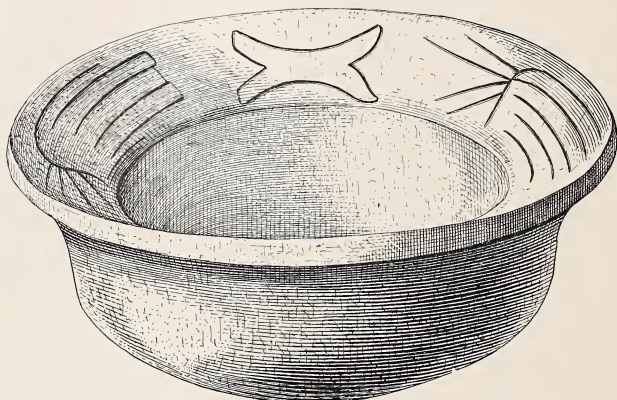


FIG. 41.—Earthenware vessel. Mound on Charlotte Thompson Place. (Full size.)

the ribs of a skeleton. One, with incised and punctate decoration exteriorly on the rim, has a maximum diameter of 4.8 inches and is 2 inches in depth (Fig. 40). The other, with incised decoration on the interior of the rim, is 4.8 inches in maximum diameter and 1.7 inches deep (Fig. 41).

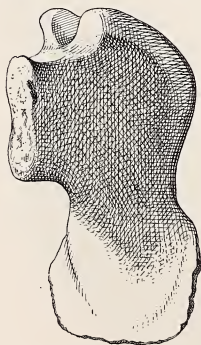


FIG. 42.—Handle of earthenware. Mound on Charlotte Thompson Place. (Full size.)



FIG. 43.—Tobacco-pipe of earthenware. Mound on Charlotte Thompson Place. (Full size.)

A handle of a vessel, modelled after an animal-head, was loose in the earth (Fig. 42).

*Tobacco-pipes.*—The tobacco-pipes, three in number, from this post-Columbian mound, were poor in quality and uninteresting as to design.

One lay with midden refuse in the margin of the mound (Fig. 43).

Another, somewhat broken, has a handle and a decoration of notches around the margin of the bowl (Fig. 44).



FIG. 44.—Tobacco-pipe of earthenware. Mound on Charlotte Thompson Place. (Full size.)



FIG. 45.—Tobacco-pipe of earthenware. Mound on Charlotte Thompson Place. (Full size.)

The third is undecorated (Fig. 45).  
The two latter lay with human remains.

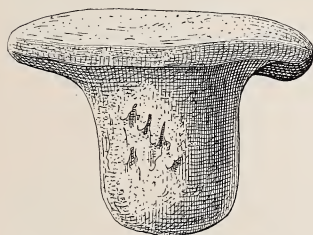


FIG. 46.—Stopper-shaped object of earthenware. Mound on Charlotte Thompson Place. (Full size.)

*Stopper-shaped Object.*—In caved sand was an object of earthenware resembling a mushroom in shape, having a height of 1.5 inches; a maximum diameter of 2.5 inches. This may have served as a stopper for a water-bottle (Fig. 46).

BONE.

*Piercing Implements.*—A number of piercing implements of bone of the usual type, often badly decayed and broken, came from the mound; also a bone implement showing oblique wear at one end, the use of which we cannot determine.

*Anklet.*—At the feet of one skeleton were a number of tines in close association, cut from stag-horn, which had doubtless been attached to an ankle. Similar ones came from near the wrist of a skeleton in the cemetery at Durand's Bend.

*Fish-hook.*—Reference has been made to this.

STONE.

*"Celts."*—Excluding broken implements, there came from the mound, nearly always with burials, thirteen hatchets and chisels of the usual rocks, from 3 to 7 inches in length.

"*Hoe-shaped Implements.*"—Always with burials, were three "hoe-shaped implements" or ceremonial axes, as we believe them to be, each perforated through the shank somewhat above the blade and none showing breakage or chipping. Plainly visible on two, were marks where a handle had encircled the shank, leaving part of it projecting behind. The length of each is about 5.5 inches; in breadth of blade they vary between 4.5 and 5.3 inches.

The material in one case is *Granulyte*; in the other two, *Felsite*.

A part of a "hoe-shaped implement" made from the soft blue clay of the bluffs of the Alabama river, lay loose in the earth.

*Gorget.*—A beautiful gorget of *Felsite*, 2.6 inches long and 2 inches across the blade, is modelled exactly after the "hoe-shaped implement" in shape, though the perforation comes higher on the shank. Its length is but 2.5 inches; its breadth across the blade, 2 inches. Should we consider this a "hoe-shaped implement," it is the smallest on record (Fig. 47). It was found with the bones of an adult.

*Discoidal Stones.*—Three discoidal stones, handsomely polished, were met with and a number of flat pebbles rounded by chipping.

*Miscellaneous.*—During the excavation were found several rude arrowheads; a neat little one of



FIG. 48.—Unidentified object of stone. Mound on Charlotte Thompson Place. (Full size.)

black flint; a rude cutting implement of quartz; hammerstones; and a curious little object of silicious rock, 1.4 inches in length, resembling a fiddle bow, seemingly of artificial design (Fig. 48).



FIG. 47.—Gorget. Mound on Charlotte Thompson Place. (Full size.)

#### COPPER.

At all depths in the mound were ornaments of sheet copper, always with interments and often associated with shell, stone, glass or iron. On one side of some was a coarse woven fabric preserved by copper salts.

*Pendants.*—Eleven pendants of sheet copper in fairly good condition, and a number of fragments of pendants were met with. Nine of these pendants resemble in shape a spearhead with rounded point. One pair of these found together has rude incised decoration uniform in type though differing slightly in detail. In each a part of the conventional aboriginal eye is represented as shown in Fig. 49. The two pendants, which differ slightly in size, are about 4 inches in length and 2 inches in maximum diameter. Like all pendants of this type, each has a single perforation for suspension.

Three of the pendants, somewhat smaller than those described, have a decoration conferred by pressure, including a section of the human eye toward the upper end.

One pendant, with a length of 3.7 inches and a maximum width of 1.5 inches, has no decoration except marginal indentations.

Two other pendants are too much corroded for exact description.



FIG. 49.—Pendants of sheet copper. Mound on Charlotte Thompson Place. (Full size.)

One pendant, about 4 inches long and with a maximum width of 2 inches, is of much more solid material than the others. It is badly corroded. Still clinging to it is a remnant of cord upon which a number of shell beads are strung.



FIG. 50.—Pendants of sheet copper. Mound on Charlotte Thompson Place. (Full size.)

All decoration on the pendants is of purely aboriginal design. We shall describe and illustrate this type more fully in our account of the mounds in the "Thirty-Acre Field."

A pair of sheet copper pendants found end to end extending across the vertex of a cranium, have a wavy outline common to both but not exactly coinciding. The material of one is thicker than that of the other (Fig. 50).

*Breast-pieces.*—We call by this name oblong plates of sheet copper with two or three holes in the middle, presumably for attachment to garments.

Five such pieces were present in this mound, one somewhat broken by pressure against a bone.

Two, 4 inches by 8 inches, and 3.5 inches by 8.5 inches, respectively, seem to

be undecorated. One of these shows distinct lamination, that overlapping of the metal in places through rude hammering processes, which we look for in aboriginal copper.

One breast-piece, 2.8 inches by 8 inches, has a row of marginal indentations and on one side punched decoration which a heavy deposit of carbonate rendered almost indistinguishable when found. This deposit, however, yielded to dilute acid. The plate was submitted to Professor Putnam, who writes as follows:

"The copper band was just received and studied by Willoughby and myself. The following are our conclusions:

"The band is very likely from an officer's belt or perhaps helmet. The small holes about the edge indicate that it was fastened thoroughly to some object for which it was made. The design is that of a spread eagle with a lion on each side facing the eagle. The design was made by a series of punchings with a metal tool (thus - - -). It is not in drawn lines like our native work.

"The design is European and of the heraldic character. I believe you will find some such design on 16th and 17th century objects.

"Is it not likely that some Indians got this and other European things in the mound, from some of the early soldiers or settlers, that this piece was punched in the center and worn by an Indian?"

Of the remaining two pieces, one, 2.2 inches by 6 inches, has for decoration indentations around the margin and transverse rows of indentations. The other, 1.1 inches by 3.2 inches, greatly carbonated, is seemingly without ornamentation. A small fragment of cord still remains in the two perforations.

Upon most of these ornaments fragments of coarse vegetable fibre adhere.

In addition to these was a piece of sheet copper with the two longer sides straight and parallel, and the other two curving outward. Its length is 5.5 inches; its breadth, 3.5 inches. About .75 of an inch apart, longitudinally, are two raised bosses and apparently other decoration near the margin. The piece is badly carbonated and broken. On the side which lay nearest the skeleton still remain remnants of a comparatively fine fabric, doubtless belonging to a garment. On the outside a coarse, woven vegetable fabric still remains, which probably enveloped the entire skeleton.

*Disc.*—On the skull of a child, 8 feet 7 inches from the surface, with diminutive shell beads, was a sheet copper disc, .8 inch in diameter, decorated on one side with three concentric circles.

In the second part of our "Certain Sand Mounds of the St. Johns River, Florida"<sup>1</sup> we included a monograph on aboriginal copper as viewed from a chemical standpoint. Our conclusions, we believe, have been universally accepted. As certain of our readers, unfamiliar with the question, may not have access to the work referred to, we venture upon a brief resumé of our conclusions and the way they were arrived at.

Native copper, that is metallic copper found in nature, is of great purity, as pure as, or purer than, can be produced by any smelting processes of the present time. In addition, there is no reliable record of the discovery of lead in native copper.

<sup>1</sup> Journ. Acad. Nat. Sci., Vol. X.



This native copper is present in great quantities near Lake Superior, where aboriginal mines have been discovered; nuggets are found in the "drift" and native copper, to a certain extent, has been found in various States and in Cuba.

In Europe the supply of copper is not obtained from native copper but from ores, almost invariably sulphide ores, which are rich in impurities and contain quantities of arsenic, etc., which even now are hard to eliminate and which, in earlier times, were more than the rude smelting processes of those days could successfully cope with. It is stated that earlier German coins have, in late years, been resmelted with profit to obtain the silver contained in them.

In Europe, furthermore, it was the custom to introduce lead during treatment of the copper ores.

Now, analyses of copper found in aboriginal mounds in which no objects of European provenance are present, show the copper to be of the highest purity and always free from lead.

Therefore, we know that the aborigines of this country made use of native copper. They could not have obtained the metal from the whites, as it is purer than could be smelted to-day from the sulphide ores of Europe and is far purer than was produced by the comparatively rude processes of the 16th, 17th and 18th centuries.

The reader may see from the foregoing that there should be little difficulty in determining chemically the provenance of copper, provided a careful analysis is made.<sup>1</sup>

In the Charlotte Thompson Mound, which, from top to bottom, contained artifacts of European origin in close association with objects of aboriginal make, a study of the copper is of particular interest.

One of the breast-pieces from the mound had an irregular appearance, showing uneven thickness and marked lamination, the overlapping of parts of the copper upon other parts, which we often see in aboriginal work, being markedly noticeable and particularly so when a section of the piece, cut out for analysis, was examined along the edge. This piece was marked "A" and submitted to H. F. Keller, Ph.D., Professor of Chemistry of the Boys' High School, Philadelphia, and long an expert in copper in the "Lake" regions of Michigan. The analysis of the plate marked "A" is subjoined.

"This metal is of extraordinary purity. Minute quantities of iron and silver are the only impurities distributed throughout its entire mass.

"Quantitative determinations yielded:

|                  |                  |
|------------------|------------------|
| Silver . . . . . | 0.0022 per cent. |
| Iron . . . . .   | 0.0272 " "       |

"In one part of the plate a very small proportion (0.0016 per cent.) of lead was also found, but this must be regarded as due to local contamination from an external source, for other parts of the same plate are absolutely free from lead. Other metals, such as bismuth, antimony, arsenic, nickel, etc., are also entirely absent.

<sup>1</sup> The analysis should be made with the utmost care, bearing in mind that most of the sulphuric acid to be had in this country contains lead. Analyses made for us are duplicated in blank to guarantee absence of foreign matter from the chemicals employed.

"The plate is coated with oxide and carbonate of copper and in some places also with clay, and with oxide and phosphate of iron.

"The percentage of copper in the metallic portion of the plate was estimated to be 99.969 per cent."

Here we clearly have an ornament of native copper, of aboriginal make, used by the Indians along with objects obtained from the whites, just as in this mound we met with beads of shell and beads of glass together.

Just where this native copper came from, of course we cannot say. It may have come down the Coosa river from where some of De Soto's men saw highly-colored copper, undoubtedly native, a locality believed by Pickett<sup>1</sup> to be in the present De Kalb County, Alabama.

More likely it came from the "Lake" region of Michigan and worked its way southward in course of trade.

Another breast-piece from this mound, showing no lamination, was marked "B" and submitted to Doctor Keller who reports as follows:

"The quantitative analysis of the copper plate marked "B" resulted as follows:

|                              |        |           |
|------------------------------|--------|-----------|
| Copper . . . . .             | 97.425 | per cent. |
| Silver . . . . .             | 0.037  | " "       |
| Lead . . . . .               | 1.082  | " "       |
| Bismuth . . . . .            | 0.035  | " "       |
| Antimony . . . . .           | 0.378  | " "       |
| Arsenic . . . . .            | 0.071  | " "       |
| Iron . . . . .               | 0.024  | " "       |
| Nickel . . . . .             | 0.013  | " "       |
| Residue, O, Cl, etc. . . . . | 0.935  | " "       |

In this case we have a copper loaded with impurities, among which is lead, evidently the product of an early smelting process—in a word, copper supplied to the aborigines by Europeans.

It is seldom we are able to give from one mound, native copper showing aboriginal methods of work and copper undoubtedly obtained by the aborigines from European sources.

#### BRASS.

*Bells.*—Two sheet-brass bells resembling sleigh-bells, were found with one burial and one with another. We read that hawk-bells, small bells attached to the legs of falcons, brought over by Europeans, were popular among the aborigines, but the bells found in this mound, each about 1 inch in diameter, were, perhaps, too large for use in falconry. The upper part of a small but heavy brass bell was present with a burial.

*Miscellaneous.*—An object of brass, perhaps the base of a candlestick, also was met with.

<sup>1</sup> "The History of Alabama," p. 27.

## IRON.

Five objects of iron, one the link of a chain, some others possibly spikes, were found with burials at all depths—even at the base of the mound.

## SILVER.

An undecorated gorget of silver, roughly circular, 1.9 inches in diameter, lay near a burial.

## GLASS.

Glass beads were present in five or six instances, some near the base.

## DOG.

Close to the base was the skeleton of a dog, the skull of which, though the skeleton was of post-Columbian origin and possibly of mixed breed, was sent to Professor Putnam who is now engaged in a careful study of aboriginal dogs,<sup>1</sup> in the hope that it might prove useful for comparison.

The existence of a pre-Columbian dog is denied by no one.

Cabeça de Vaca on his long journey among the tribes before unseen by white men, repeatedly encountered dogs, as did the expedition under De Soto. Upon one occasion many dogs served as food for De Soto's men on the upper Coosa, a part of the Alabama river.

We have found skeletal remains of dogs in Florida shell-heaps<sup>2</sup> which are undoubtedly pre-Columbian and skeletons of dogs were present, singly, in certain mounds opened by us in Florida<sup>3</sup> and in South Carolina,<sup>4</sup> while in some of the Georgia sea-islands<sup>5</sup> man's truest friend was accorded a regular sepulture in the general burial mounds.

## ASSOCIATION OF OBJECTS.

In a post-Columbian mound the association of objects with burials is of peculiar interest, showing the use of articles obtained from the whites along with objects of purely aboriginal origin. Not to weary the reader with too long a list we give a few examples.

With the skeleton of a child were two shell gorgets and two pins of shell.

With bones of an adult were: an undecorated gorget of shell; two fine shell pins; massive beads of shell; a flat, oblong shell bead with double perforation; and two glass beads.

A stone hatchet, shell beads and two copper pendants lay together, 8 feet down.

<sup>1</sup> "Thirty-second Annual Report Peabody Museum," page 4.

<sup>2</sup> "American Naturalist," July, 1893.

<sup>3</sup> "Certain Sand Mounds of the St. John's River, Florida," Part II. Journ. Acad. Nat. Sci. Phila., Vol. X, pg. 157. "Florida Coast Mounds North of the St. Johns River," pg. 25. Privately printed, Philadelphia, 1896.

<sup>4</sup> "Certain Aboriginal Mounds, Coast of South Carolina." Journ. Acad. Nat. Sci. Phila., Vol. XI, pg. 149.

<sup>5</sup> "Certain Aboriginal Mounds of the Georgia Coast." Journ. Acad. Nat. Sci. Phila., Vol. XI, pg. 127 *et al.*

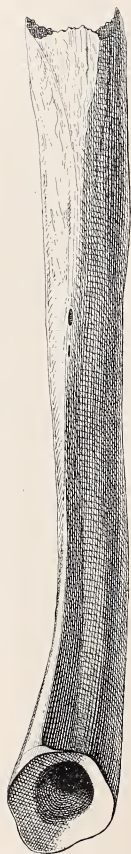


FIG. 51.—Human thigh-bone showing workmanship. Small mound on Charlotte Thompson Place. (Full size.)

Five feet from the surface, with human remain, lay a brass bell, the brass base of a candlestick and shell beads.

Glass beads with a gorget and beads of shell had been placed with remains of a child. Near the base, together, lay a stone "celt," two discoidal stones, a bit of iron and a copper pendant.

A shell drinking cup, a stone "celt," sheet copper and iron lay together with human remains on the base.

Not far from the mound just described, was an undulation composed of midden refuse. No burials were met with in it.

In the same field was another rise in the ground, composed of dark sandy loam with many sherds and mussel-shells.

Lying on the surface, where the plough had thrown it out, was the central portion of the shaft of a human femur, 4.8 inches in length. At one extremity of the fragment was an interesting exhibition of workmanship, the end being reamed out almost to a cutting edge, probably to serve as the handle to a tool.

Careful search was made in the refuse heap, resulting in the finding, about 6 inches below the surface, of another fragment which fitted to the one already found, making a total length of 8 inches. This portion of the shaft of the femur, presumably a woman's, is the proximal part with the articular portion roughly broken off. The bone is highly polished, presumably through wear, and a part of the *linea aspera* is worked or worn away.

This interesting specimen is shown in Fig. 51, where it is represented as raised somewhat at one end and is consequently foreshortened.

During all our mound work we have but twice before found human bones bearing trace of workmanship.

In the Tick island mound was a piercing implement wrought from a human femur,<sup>1</sup> while from the mound at Bluffton came a part of a parietal bone decorated with incised lines, probably a portion of a gorget.

Professor Jeffries Wyman,<sup>2</sup> the pioneer of shell-heap investigation in Florida, says: "We have not found tools made of human bones, but it is not improbable that these were used for such purposes, as the sawed human thigh-bone found at Osceola mound naturally suggests." Professor Wyman, in a foot-note refers to a humerus from a human skeleton, ground and scraped as though for a tool, found in a shell-heap at Ipswich, Mass. Professor Putnam also has described this bone.

<sup>1</sup> "Certain Sand Mounds of the St. Johns River, Florida," Part I.

<sup>2</sup> "Fresh-Water Shell Mounds of the St. Johns River, Florida," p. 51.

Three human bones covered with elaborate incised carving from Ohio mounds have been described by Professor Putnam and Mr. Willoughby, jointly, in the *Proceedings* of the American Association for the Advancement of Science, 1896, and we are indebted to Mr. Willoughby for the information that there are in the Peabody Museum fragments of two elaborately carved parietal bones from an altar in the famous Turner group of mounds, Ohio.

Less than half a mile in a westerly direction from the large mound is a mound about 4 feet high, of red clay, which had been so dug into previously that farther investigation was not considered advisable.

#### MOUND ON THE ROGERS PLACE, MONTGOMERY COUNTY.

About 1 mile in an easterly direction from the mound on the Charlotte Thompson Place is a considerably smaller mound, on the property of Mr. Loraine Rogers, of Montgomery, who kindly placed it at our disposition.

The mound was partially investigated by us, but as it seemed to be of a domiciliary character it was not extensively dug through.

#### MOUND NEAR HORSE-SHOE BEND, ELMORE COUNTY.

About 5 miles below Montgomery, on the right side of the river, going down, at the upper end of a bend known as the Horse-shoe, in a cultivated field, about 100 yards from the river was a mound bearing no sign of previous examination. Its height was 4 feet 9 inches; its diameter of base, 40 feet. It was trenched in from the margin considerably beyond the center, with kind permission of Mr. Henry Irvin, of Montgomery, the owner.

It was of unstratified clay with no sign of sherds, fire-places or bone, and was doubtless erected for domiciliary purposes.

#### MOUNDS IN THIRTY-ACRE FIELD, MONTGOMERY COUNTY.

At Big Eddy Landing, about one mile below the union of the Coosa and the Tallapoosa rivers, is the plantation of Mr. A. M. Baldwin, of Montgomery, through whose kindness and that of Mr. T. R. Stacey, of Chisholm, Ala., under whose care the plantation is, we were permitted to make full investigation.

The Thirty-Acre Field mound, in the midst of a cultivated field bordering the swamp, about one-half mile in an E. by S. direction from the Alabama river, had been at times washed by freshets, but still preserved the shape of an inverted bowl. Its height was 13 feet; its base diameter, 88 feet; the diameter of the summit plateau, 42 feet.

In order to determine the nature of the mound, about one-half the circumference, the eastern and the northern portions, were surrounded and excavation along the line of the base was carried in for about 10 feet without discovering interments.

Next a portion of the trench, about 26 feet across, was carried in 8 feet farther, or almost to the margin of the summit plateau, still with no trace of human remains.



Then the mound was surrounded at a height of 7 feet from the base, where the section was 62 feet in diameter, and excavation along that level was begun. The first burial was met with 4.5 feet from the start, or about 5 feet outside the margin of the summit plateau, but not until we had gone considerably nearer to the plateau were burials in any number encountered.

It became evident from this and from the digging which preceded it, that the mound, which was made of small layers and considerable masses of sand with strata of clay blackened by fire and admixture of midden refuse, had been dwelt upon and then increased in height and diameter a number of times, and that, during the various periods of occupation of the mound, burials had been made by digging down from the surface of what happened to be the summit plateau at the time of the burial. For instance, burials were present, dug down from the level of the summit plateau as it was at the time of our investigation, while other burials lay considerably deeper in pits, which could be traced only as far as unbroken strata three or four feet above. Well in, toward the center was a grave 10 feet from the surface, but only 4 feet 2 inches beneath unbroken strata.

Our excavation, therefore, was concave in shape, the deepest portion being at the center of the mound. It is possible some burials were missed by us, but we believe them to have been few indeed.

#### SKELETONS.

Owing to a considerable number of burials in a comparatively restricted area there were, as may well be imagined, many aboriginal disturbances by digging of other graves.

Without considering such scattered bones, 111 skeletons were met with, all in anatomical order, some flexed to the right, some to the left. Others were partly flexed, that is to say, the trunks lay upon the back with the legs drawn up against the thighs and turned to the right or to the left.

Skeleton No. 102, adult, lay with the trunk on the back, the head pressed forward on the chest, upper arms along the body and forearms across the trunk. The legs were drawn up to the thighs, the knees to the thorax. The feet were turned inward toward each other, the toes meeting below the pelvis.

As this skeleton presented certain features of interest as to form of interment and was in much better condition than most others in the mound, it was decided to make an effort to save it intact. The clay, except that immediately under the bones, was dug away until the skeleton lay a couple of feet above the general level of that part of the excavation.

Next, the skeleton and the bed of supporting clay were saturated with glue and a slow fire was built around to aid in drying. This fire was kept up about six hours.

Then the skeleton and the mass beneath were allowed twenty-four hours for additional solidification, a platform having been built above to keep off dew and rain.

The next step was to sever the skeleton with about one foot of partially dried



FIG. 82.—Burial No. 102. Found in Thirty-Acre Field. (Not on scale.)

clay from the rest of the mass, with the aid of a large saw, and clay and bones, supported by the saw, were gently pushed over on to a sort of stretcher constructed for the purpose in advance.

The mass, by no means light, was carried by men long used to mound work, across the field and down a slippery clay bank to a bateau in which the journey was safely made to our steamer lying in the river.

After this, the mass was treated to another bath of glue and allowed to remain two weeks on the boiler of the steamer. The next stage was reached in our laboratory on the upper deck where all the clay, but a thin layer, was worked off and two iron rods were placed longitudinally beneath. The base of the clay then received a coat of cement which included the rods.

The mass was carefully packed in a crate and the crate, in its turn, encased in a box, surrounded by elastic packing, and the whole was sent North by express under special arrangement as to care in transportation.

This burial is shown in Fig. 52.

A few skeletons of infants lay apparently at full length.

The skeletons in this mound headed in all directions.

The bones, which were badly decayed, no cranium with the exception of that of Burial No. 102 being preserved, showed no fractures during life and in but one case, osteitis, was a pathological condition present.

#### SHELL.

*Beads.*—With a considerable number of skeletons were beads of shell, usually at the neck, but at times extending down the chest and occasionally at the wrist. Some were small marine shells (*Marginella*) pierced for stringing; others were of the ordinary type, of various sizes, including sections of columellæ, 2.3 inches in major diameter.

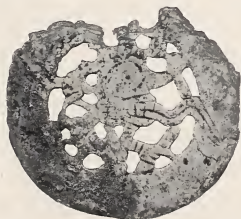


FIG. 53.—Gorget of shell. Mound in Thirty-Acre Field. (Full size.)

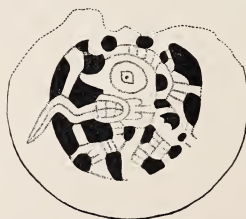


FIG. 53a.—Drawing of gorget shown in Fig. 53. (Full size.)

With one skeleton were forty-eight flat beads, almost square, as a rule, with double perforation, somewhat larger, but less ornate than those from Durand's Bend and from the Charlotte Thompson Place.

*Pins.*—Quantities of shell pins, some 6.5 inches in length, were with the skeletons, always near the skull. No less than six were found with a single burial.

*Gorget.*—Near the bones of an adult and of an infant, buried together, was a circular gorget of shell, 2 inches in diameter, slightly broken at one part of the rim. The decoration is carved and engraved on one side, as shown in Fig. 53, where the figure is reversed, and shows a grotesque head probably represented as wearing a mask, with a great nose and a huge, protruding tongue. The design on this gorget has been carefully drawn to scale, much enlarged by the aid of a magnifying glass, and reduced to natural size in reproduction. The excised portions are shown in black. Prof. Frank Hamilton Cushing believes the figure to be kneeling, one hand grasping a baton, the other resting on the exceedingly flexed knee. The teeth are closed. The figure is probably represented as blowing or hissing. According to Professor Cushing the figure has the double beaded forelock, common to certain warrior figures on shell gorgets and copper plates.

In General Thruston's "Antiquities of Tennessee," Second Edition, Chapter IX, and supplement to Chapter IX, is a comprehensive account, fully illustrated, of these rare and interesting human figures sometimes found on gorgets of shell and plates of copper, and they are also described in Professor Holmes' "Art in Shell."<sup>1</sup>

With skeleton No. 66, a child's, was an oblong gorget of shell with rounded corners, having double perforation for suspension at one corner, 1.8 inches by 1.6 inches. In the center is an incised circle with semi-perforations and a quarter circle with a semi-perforation in each corner, as shown in Fig. 54.



FIG. 54.—Gorget of shell. Mound in Thirty-Acre Field. (Full size.)



FIG. 55.—Gorget of shell. Mound in Thirty-Acre Field. (Full size.)

Skeleton No. 90, of an infant, had two hairpins of shell and two circular gorgets of shell. Curiously enough, no beads were met with.

One gorget, 2 inches in diameter, has on one side an interesting incised decoration representing two birds, standing, facing each other, their bills almost in contact (Fig. 55).

<sup>1</sup> Second Annual Report, Bureau of Ethnology, 1880-1881.





FIG. 56.—Gorget of shell. Mound in Thirty-Acre Field. (Full size.)

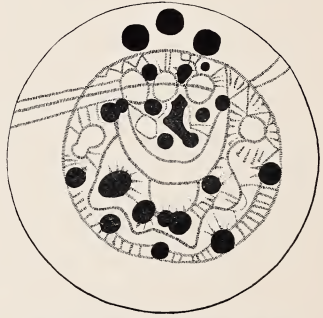


FIG. 56a.—Drawing of gorget shown in Fig. 56. (Full size.)



FIG. 57.—Earthenware vessel. Mound in Thirty-Acre Field. (About five-sixths size.)



The other gorget, trebly perforated for suspension, shown in half-tone, Fig. 56, where the figures have unfortunately been reversed, and drawn in Fig. 56*a*, has a design we have been unable to decipher.

Professor Cushing, who has kindly given the matter of these gorgets considerable attention, considers the design to be figures of blowing gods or warriors surrounded by one of the typical gorget serpents.

Several other gorgets, all undecorated, broken beyond redemption, were met with.

*Miscellaneous.*—With a number of massive beads was an ovoid object of shell, imperforate, 1.9 inches long by about 1.4 inches in thickness.

#### EARTHENWARE.

*Vessels.*—With burial No. 54 was a vessel of the type in use at Durand's Bend though much smaller and having, in addition to the upright ridges, the small loop-shaped handles. This vessel has a maximum diameter of 4.3 inches and is 2.8 inches in height. It was unfortunately broken by a blow from a spade, but has been partly pieced together. With another burial was a water-bottle with maximum diameter of 4.9 inches and a height of 4.2 inches having five protuberances around the body, enclosed in double incised lines. Between are incised lines running diagonally. The vessel had fallen to pieces, but had been put together with the exception of a portion of the base (Fig. 57).



FIG. 58.—Tobacco-pipe. Mound in Thirty-Acre Field. (Full size.)

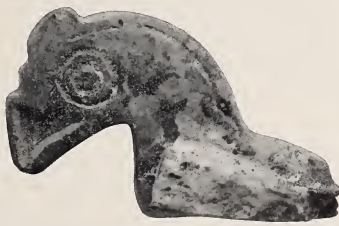


FIG. 59.—Handle of earthenware vessel. Mound in Thirty-Acre Field. (Full size.)

*Tobacco-pipe.*—An undecorated tobacco-pipe was found in loose dirt thrown out by the diggers (Fig. 58).

*Miscellaneous.*—Loose in the mound, in midden refuse, were numbers of earthenware discs, wrought from sherds, for use in games as before described.

The earthenware head of a bird, which had seen service as the handle of a vessel, was found loose in the earth (Fig. 59).

#### STONE.

*Tobacco-pipe.*—In earth thrown out by the diggers was a rude soapstone pipe with oblong bowl, similar in type to those described by us in other reports as coming from the lower St. Johns river, Florida, though smaller.



FIG. 60.—“Hoe-shaped implement.” Mound in Thirty-Acre Field. (Full size.)

"*Hoe-shaped Implements.*"—Burial No. 79, adult, a delicate male or a female, had shell beads at the neck and a "hoe-shaped implement" of volcanic rock, 5.3 inches long and 4.5 inches in maximum diameter of blade. There is no perforation. No mark of use is apparent.

Burial No. 88, adult, had shell beads and hairpins and an imperforate "hoe-shaped implement" of volcanic rock, 6.3 inches long and 4.8 inches across the body. It also bears no mark of use.

With burial No. 105, an adult, was an interesting association of objects. By the neck were massive beads of shell and an ovoid object of shell. On the chest lay a "hoe-shaped implement" of felsitic rock, with a shank unusually long, the total length being 9.4 inches, while the maximum diameter of blade is but 4.3 inches. On one side of the shank are marks where a perforation has been attempted with a tubular drill. A handle has encircled part of the shank beginning at the abandoned perforation and extending back to about 1.5 inches from the end, as may be seen in Fig. 60.

*Discoidal Stones.*—Throughout the mound, in midden refuse, were a number of flat pebbles rudely rounded for use as discoidal stones.

At the elbow of Burial No. 45 was a beautifully wrought discoidal stone of quartz, 3 inches in diameter, while near the hand of Burial No. 100 was a slightly larger discoidal stone of *Granulyte*. Several smaller discoidals of volcanic rock came from this mound. A discoidal of clayey rock bore an incised cross (Fig. 61).

"*Cells.*"—Several hatchets and chisels of the usual rocks were present in the mound.

*Miscellaneous.*—Scattered throughout the mound, but never with burials, were numbers of perforated pebbles, natural formations, to which we have already alluded.

Several unassociated arrowheads were met with and one of quartz near the head of a skeleton.

Fragments of mica were encountered in places.

Near skeletons were a small bowl seemingly made from part of a geode and a beautiful little ornament of red jasper, perforated for suspension (Fig. 62).



FIG. 62.—Ornament of red jasper. Mound in Thirty-Acre Field. (Full size.)



FIG. 61.—Disc of clayey rock. Mound in Thirty-Acre Field. (Full size.)

#### COPPER.

Two discs of sheet copper were in disturbed earth near a skeleton, while two other skeletons had discs of a similar type on either side of the skull. These ornaments, one pair of which was 2 inches in diameter each, the other 1.5 inches each, were of the familiar type, namely, an incised boss in the middle with a small central perforation for attachment and marginal decoration of concavo-convex beading. All apparently had been mounted on a thin layer of wood.

With a skeleton were the remains of a sheet copper pendant in the shape of an arrowhead with blunt point.

## MISCELLANEOUS.

A rattle consisting of a tortoise shell, much decayed, containing many small pebbles, lay near a skeleton, and near another was a piercing implement of bone pointed at either end.

## REMARKS.

Nothing indicating a knowledge of the whites was met with in this interesting mound with a single exception. A colored man at work at a place across which much superficial material had been thrown, found a leaden bullet. We do not consider this discovery as of necessity indicating a post-Columbian origin for the mound, and are inclined to believe that aborigines having a leaden bullet would have had many other articles of European make which would have found their way into the body of the mound.

## SMALLER MOUND IN THE THIRTY-ACRE FIELD, MONTGOMERY COUNTY.

About twenty-five yards in a westerly direction from the mound in the Thirty-Acre Field, was a much smaller one almost ploughed away. In fact, had it not been of a lighter color than the surrounding soil, it might have escaped our notice. Its height was about 1 foot; its diameter, about 50 feet.

It was completely dug through at a depth of about 1 to 1.5 feet from the surface where undisturbed clay was met with. The upper part of the mound was of yellowish clay; the lower, of dark material consisting of clay and of midden refuse.



FIG. 63.—Disc of earthenware, smaller mound in Thirty-Acre Field. (Full size.)

Thirty-one internments, similar to those found in the other mound, were uncovered.

In the debris were the usual pebbles, chipped into discoidal form, polished chisels, broken "celts," hammer-stones, etc. Also a perforated disc of earthenware and another with the perforation surrounded by lines, as shown in Fig. 63.

With the burials were many shell pins and beads including a considerable number of flat beads larger than those found before. We give a selection in Fig. 64.

In addition, were a handsome discoidal stone; a stopper-shaped object of earthenware, somewhat broken; four cubes of galena; a sheet copper pendant, badly broken, similar in style to the one from the other mound and to those from the Charlotte Thompson Place.

With burials were two lots of sheet copper pendants of the prevalent blunt-pointed arrowhead type. The first lot of seven varied in length from 2.8 inches to 3.9 inches and in maximum breadth from 1 inch to 1.8 inches. Two lay separately near the head, while five, near by, piled one upon the other, were apparently upon decayed bark enclosed in matting which the copper salt had preserved. This matting was made of split cane which, in one direction, goes once under and four

times over and, on the same side, in the other direction, runs over one and under four, as shown in Fig. 65. On the opposite side of the matting the pattern is, of course, reversed.



FIG. 64.—Shell beads. Smaller mound in Thirty-Acre Field. (Full size.)

The other lot of pendants, eight in number, were piled one upon the other. In size they resembled the others.

The decoration on all the pendants had been conferred by pressure. On the



FIG. 65.—Matting. Smaller mound in Thirty-Acre Field. (Full size.)

upper part was a portion of the aboriginal eye, and as this eye was not complete, it seemed to us at first as though the pendants had been cut from a sheet of copper previously decorated. Upon closer examination, however, it was noted that the section





FIG. 66.—Pendants of sheet copper. Smaller mound in Thirty-Acre Field. (Full size.)



FIG. 67.—Pendants of sheet copper. Smaller mound in Thirty-Acre Field. (Full size.)

inches in maximum diameter, with incised decoration (Fig. 68).

MOUND IN BIG EDDY FIELD, MONTGOMERY COUNTY.

This mound, in a field known as Big Field or the Big Eddy Field, is about one-half mile in a southwesterly direction from the larger mound in the Thirty-Acre Field and is under the same ownership. In the midst of a level field, long under

of the eye always occupied the same place on the pendant, and that the eyes, though having a general resemblance, were in no case exactly alike. Moreover, the decoration beneath, though similar in a general way, was never identical as would have been the case, had the design resulted from a stamp rather than from the pressure of a moving object such as horn pushed down on copper placed over buckskin. We have not been able to learn the meaning of this design which, however, is distinctly aboriginal. A selection of these interesting pendants is shown in Figs. 66, 67.

There came also from this mound a small, coarse, undecorated pot and a water-bottle of smooth black ware, badly broken, 5 inches high and 4.3

cultivation, it is a great landmark looming up from all directions. Though washed by rain and by freshets it has fairly well retained its shape of a truncated cone, and has been a place of refuge for stock when territory for miles around had been submerged. Its height was 16 feet 7 inches; the diameter of its base, 108 feet, and that of the summit plateau, about 50 feet.



FIG. 68.—Water-bottle of earthenware. Smaller mound in Thirty-Acre Field. (Full size.)

Owing to its advantage in flood time a great reduction in the height of the mound was not deemed advisable. We were, however, permitted to dig through the upper 6 feet.

The mound, so far as investigated, was of much softer material than the mound in the Thirty-Acre Field, being homogeneous, composed of sandy clay, without layers of occupation, though midden refuse and marks of fire were present in places.

It transpired during the digging that the upper part of the mound had been in use as a sort of cemetery in comparatively recent times. Curiously enough, as though

a survival of the aboriginal custom of placing objects with the dead, on the breast of a child in a pine coffin was a Spanish piece of eight reals of the year 1815—one of those “pieces of eight” which the buccaneers so highly prized.

In all, nineteen aboriginal burials, some greatly disturbed, were met with, the form coinciding with that in vogue in the mounds in the Thirty-Acre Field. All bones were past preservation, through decay.

With burials were a handsome “celt” of fine-grained *Syenite*, 11.5 inches in length; a chisel; quantities of shell beads and pins; a mushroom-shaped object of earthenware, somewhat broken; a deposit of copper pendants, in small pieces, of the type already described; two discs of copper of the type found in the Thirty-Acre Field mound and another deposit of pendants, one on the other, similar in type to the other lot. These pendants lay on a coarse fabric of twisted vegetable fibre, which, in its turn, lay upon cane matting. This material, like other wrapping material found on copper in other sections, was, in our opinion, not to envelop the copper alone, but was simply a part of a general envelopment of the entire skeleton of which the portion found, preserved by the copper salt, alone remains. We see how the Peruvians wrapped their dead and doubtless, in many sections, a similar custom obtained in this country.

Mr. Harlan I. Smith, of the Jesup North Pacific Expedition, has recently published the results of his work in the southern interior of British Columbia.<sup>1</sup> Of the burials there he tells us, “the bodies were buried upon the side, with the knees drawn up to the chest. They were wrapped in a fabric made of sage-brush bark, and were covered with mats of woven rushes.”

#### MOUND AT JACKSON'S BEND, ELMORE COUNTY.

Jackson's Bend, having the Alabama on one side, the Coosa on another, has, on the Coosa side, a farm belonging to Mr. Brown Jackson, colored, overlooking the water. In periods succeeding floods it has been the custom of those residing near to examine the section of the bluff laid bare and to dig where dark-colored earth, running down, indicated the presence of a grave. We were shown many objects of interest taken from these graves, some of which, kindly presented to us, showed contact with the whites. Among the objects of aboriginal make was a portion of a bowl of a tobacco-pipe in the shape of a human head (Fig. 69).

In the S. E. corner of the Bluff Field, over which were scattered numerous arrowheads of quartz and of chert, was a mound long under cultivation, about 3.5 feet high and of indeterminable basal diameter. This mound, which, we are told, had been previously dug into, was trenched to a certain extent by us, resulting in the discovery of the head and shoulders of a skeleton with a number of marine shells (*Oliva literata*) perforated longitudinally for stringing. The remainder of



FIG. 69.—Part of tobacco-pipe.  
Jackson's Bend. (Full size.)

<sup>1</sup> “Science,” N. S., Vol. IX, No. 224, pp. 535 to 539, April 14, 1899.

the skeleton, presumably, had been dug away. Not far distant, near the surface, lay a skeleton on its back with machine-made nails in association—doubtless a recent burial.

#### GENERAL REMARKS.

As we have seen, the mounds of the Alabama are small in size, increasing somewhat in the northern portion where the country is more elevated, and present no striking features structurally.

Of sites of former cemeteries reported to us in considerable number, revealed by the action of floods, but one still yielded interments to a careful search, so, as to these, we are unable to draw definite conclusions.

The artifacts of the early inhabitants of the banks of the Alabama resemble in a general way aboriginal objects used elsewhere. Quartz largely superseded, as a material for projectile points, the chert in use in Florida and on the Georgia coast. Earthenware was often of fairly good quality and, as a rule, had admixture of pounded shell with the clay. The type and decoration of vessels found entire by us were not striking, though heads of birds and other fragments occasionally found indicate the use of such articles as handles on interesting forms of ware, and with the admixture of pounded shell and with loop-shaped handles suggest Tennessean influence, while occasional polished black ware recalls the vessels of Mississippi. The gritty ware of lower Georgia and its complicated stamp decoration were almost absent from the Alabama river, though occasional sherds with decoration of the kind prevailing in Georgia, Carolina, and sometimes found in upper Florida were met with. No pottery was found of the highest standard of that beautiful ware in use along the Gulf in aboriginal times.

Perforation below the rim on opposite sides of the vessel, which served for purposes of suspension, was practically absent from vessels found by us along the Alabama river.

The most striking feature of the Alabama, and one new to our work, was plural burials of uncremated bones in single urns. On the Georgia coast, while vessels often filled to the top with calcined remains are met with, we have never found, or heard of the finding of, over one unburnt skeleton in a single vessel.

Another feature of interest was the almost total absence of cremation. While in Florida this rite was often practised, and while the mounds of many of the rivers of Georgia and of its coast teem with calcined human remains contained in urns or unenclosed, but one case of cremation was met with by us along the entire Alabama river.

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## CERTAIN ANTIQUITIES OF THE FLORIDA WEST-COAST.

BY CLARENCE B. MOORE.

During the past eight years we have made certain investigations of aboriginal remains in the southern United States with the aid of a large flat-bottomed steamer containing a corps of assistants and numbers of trained men to dig. The results of these investigations have been embodied in reports appearing in the Journal<sup>1</sup> of the Academy of Natural Sciences of Philadelphia, where the collections made by us during our work are deposited.

Several years ago we explored the mounds bordering the Florida east-coast, following the footsteps of Mr. Andrew E. Douglass, of the Museum of Natural History, New York, finding, as he did, but little of comparative interest in the mounds of that section.<sup>2</sup>

A certain amount of investigation of the aboriginal remains of the west coast of Florida has been made by Mr. S. T. Walker, the results appearing in the reports of the Smithsonian Institution, Washington, D. C., for the years 1879 and 1883.

The data obtained by Mr. Walker, while of interest, were not of a nature to encourage farther archaeological work on the west coast, and had it not been for the remarkable discoveries made in the muck on the upper end of the island of Marco, almost the northernmost key<sup>3</sup> of the Ten Thousand Islands, which border the Florida west-coast along the counties of Lee and Monroe, it is not likely a visit would have been made by us to the Florida west-coast. But when the magnificent collection, mainly of objects of wood, was shown us by Mr. Frank Hamilton Cushing, and we had studied his brilliant preliminary report,<sup>4</sup> we resolved to visit the west coast of Florida, and did so during about three and one-half months of the winter of 1900, to make a reconnoissance, as it were, to determine whether or not a series of seasons could profitably be spent by us in making a thorough examination of what might prove to be so rich a field.

<sup>1</sup> "Certain Sand Mounds of the St. Johns River, Florida." Parts I and II, Journ. A. N. S. P., Vol. X, 1894.

<sup>2</sup> "Certain Sand Mounds of Duval County, Florida. Two Mounds on Murphy Island, Florida. Certain Sand Mounds of the Ocklawaha River, Florida." Journ. A. N. S. P., Vol. X, 1895.

<sup>3</sup> "Certain Aboriginal Mounds of the Georgia Coast." Journ. A. N. S. P., Vol. XI, 1897.

<sup>4</sup> "Certain Aboriginal Mounds of the Coast of South Carolina. Certain Aboriginal Mounds of the Savannah River. Certain Aboriginal Mounds of the Altamaha River." Journ. A. N. S. P., Vol. XI, 1898.

<sup>5</sup> "Certain Aboriginal Remains of the Alabama River." Journ. A. N. S. P., Vol. XI, 1899.

<sup>6</sup> "Additional Mounds of Duval and Clay Counties, Florida. Mound Investigation on the East coast of Florida. Certain Florida Coast Mounds North of the St. Johns River." [Privately printed.]

<sup>7</sup> An island, from the Spanish *cayo*.

<sup>8</sup> "Exploration of Ancient Key-dweller Remains on the Gulf Coast of Florida." Proceedings of the American Philosophical Society, Vol. XXV, No. 153.

During the summer of 1899, G. W. Rossignol, formerly captain of our steamer, and thoroughly familiar with aboriginal remains, accompanied by a companion knowing the territory, made a journey along the coast from Anclote Key on the north to the Caloosahatchee river on the south, including the shores of Tampa Bay. Great numbers of mounds and shell heaps were located by him and the addresses of the owners<sup>1</sup> secured, from nearly all of whom we obtained in advance permission to investigate, so that our labors were greatly expedited. Never before had we set out so thoroughly prepared for work and never did our efforts meet with so little success.

Our journey extended from near Clearwater Harbor on the north to Tampa Bay, and to such mounds on the Bay as seemed of most interest, including parts of the Alafia, the Little Manatee and the Manatee, rivers; through Sarasota Bay; down Pine Island Sound, including some of the keys described by Mr. Cushing; part of the Caloosahatchee river; Estero Bay with Mound Island; Key Marco; and the Ten Thousand Islands to the Chatham river, not far from the North-west Cape.

#### FOUR MILE BAYOU, HILLSBORO COUNTY.

Four Mile Bayou was the northernmost point on the coast visited by us.

On the east side of Four Mile Bayou, beginning at a small bayou that connects with the greater one, is a ridge of shell, 640 paces in length, running parallel with the water and only a few yards back from high water mark. The ridge, which runs N. by W. and S. by E., has been cut into to a certain extent by the removal of shell for use on streets of the town of Clearwater Harbor. The section exposed showed no artifacts other than a few bits of pottery with the check stamp. One hundred yards from the northern end the ridge is 64 feet across and 5 feet high. Two hundred yards farther along its altitude is 3 feet 7 inches; its breadth, 76 feet. Five hundred yards from the northern extremity it is 79 feet across and 4 feet 10 inches high. The southern end, for the last 150 feet, has a breadth of 50 feet and is 8 feet 6 inches high.

On the east side of Four Mile Bayou, on the property of Mr. J. F. Girard, living near by, is a mound 4 feet high and 58 feet across the base. This mound had a top layer of shell and black loam 1.5 feet thick. Next came about 1 foot of yellow sand and finally a layer of shell and loam about 1 foot 4 inches in thickness. A central excavation and lateral trenching indicated this mound to be of a domical character.

About 300 yards in a northerly direction from Mr. Girard's place, in woods, on property belonging to Mr. George T. Chamberlain, of Tampa, is a mound thickly covered with scrub growth, having an irregular basal outline. Excavations, whence came material for the mound, are near its base, and a person standing at the bottom of one of these would form an incorrect idea as to the height of the mound, which, measured from the western side, apparently from the

<sup>1</sup> To owners of mounds who so readily and so cordially granted us permission to dig, we wish to tender our warm thanks.

general level, is 18 feet. The diameter of the mound north and south is 150 feet; east and west, 116 feet. The summit plateau is 60 feet by 28 feet.

Considerable digging led us to believe the mound to be of irregular local layers of shell and sand, covered with sand which, at the summit plateau, is about 3 feet in thickness. A few burials closely flexed were met with, none at a greater depth than 3 feet. While there was not sufficient digging to enable us to determine positively, it is our belief that this mound is of a domiciliary character with superficial burials.

About 150 yards N. N. W. from the mound just described, also on the property of Mr. Chamberlain, is another mound, the N. E. slope of which has been eaten away by a small stream.

Excavations made previous to our visit, and the great section laid bare by the stream, showed no presence of shell or indication of interments.

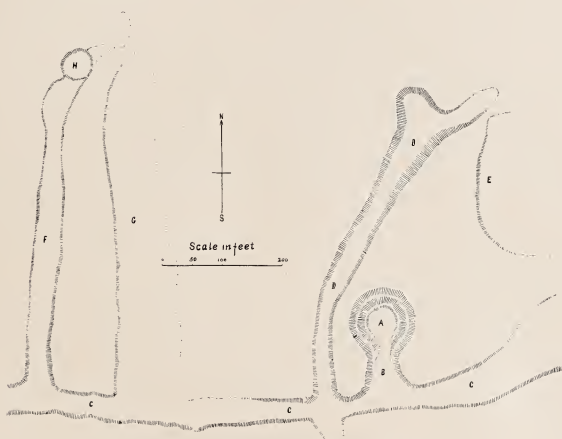


FIG. 1.—Plan of mounds and causeways, Point Maximo.

Disston City and New Cadiz are on the mainland a few miles south of Big Bayou. Small sand mounds on properties belonging to Mr. Martin Campos and Mrs. R. Barnett, yielded neither human remains nor artifacts.

#### POINT MAXIMO, HILLSBORO COUNTY.

Following the coast line down we come to Point Maximo. About half a mile in an easterly direction inland are several very interesting aboriginal works on the



property of Mr. R. Strada, of St. Petersburg, Fla., who refused permission to dig. Thickly covered by palmettoes, is a mound marked A on the plan (Fig. 1), apparently of sand and shell, now having a small frame cabin on the summit. This mound, which is referred to by Mr. S. T. Walker,<sup>1</sup> nearly circular as to outline of base, has a diameter at base of a little over 100 feet. The height is 10 feet above the general level.

From the southern side of the mound a broad ridge of shell (B) connects the mound with another ridge (C) running parallel to the water. The remainder of the base is surrounded by an excavation from 1 to 2 feet in depth below the general level, though seemingly much deeper when looked down upon from ridges adjacent to the mound. In a westerly direction from the mound is a curious ridge (D), 700 feet long, running in a northeast by easterly and southwest by westerly direction, with a maximum height of 6 feet 9 inches and a maximum breadth of 70 feet. This causeway does not seem to be a deposit of shell, formed during aboriginal occupation, but rather built for a purpose, as parts of it are of shell and sand mingled; parts, shell and sand side by side; parts, all sand. Beginning near the northeastern terminus of the ridge another causeway (E), mainly of sand, extends about 250 feet in a southerly direction where it turns to the east, having approached at this point within 50 feet of the ridge (C), which leaves the southern side of the mound. The area enclosed between these ridges is about 1 foot 3 inches below the general level, and doubtless furnished material for the causeways.

Beginning with, and nearly at right angles to, the shell ridges (C) fronting the water, about 500 feet in a westerly direction from the principal mound, two embankments (F, G) extend in a northerly direction about 500 feet, terminating at a mound of sand (H) about 3 feet 6 inches above the general level and 55 feet across the base, approximately. The embankments converge from 131 feet between them where they leave the shell ridge to 17 feet where they join the mound.

The westernmost causeway is well defined; is of sand, where excavations were made; is from 35 feet to 53 feet in breadth and 1 foot 6 inches in height. The eastern embankment is less well marked and merges, on the other side, with the surrounding country. Two excavations of moderate size were made in the sand mound; one without result; the other yielding human remains, badly decayed, just below the surface.

The space included between the ridges varies from 2 feet 8 inches to 1 foot in depth, and has somewhat the appearance of a canal. Presumably the removal of material for the ridges is responsible for the depression.

In the territory back of Point Maximo are other embankments of considerable size which were not investigated by us through refusal of permission by the owner. Numerous small shell ridges not included in the plan lie to the east of mound A back of shell ridge C.

<sup>1</sup> Smithsonian Report, 1879, p. 404.

## MOUND ON PINE KEY, HILLSBORO COUNTY.

Pine Key is one of the islands at the entrance to Tampa Bay. The mound described by Mr. Walker, is on the southernmost portion of Pine Key, which is divided into two parts by a small bayou. The mound, which is most difficult to find, being surrounded by trees and scrub growth, is about 300 yards in an E. S. E. direction from the southern end of a sheet of water called the Duck Pond, or about 50 yards in an easterly direction from a tongue, or continuation extending beyond the end of the lake. The tongue, itself apparently of artificial origin, is connected with the mound by a canal of irregular breadth, nowhere exceeding 58 feet, which, leaving the tongue at right angles, goes directly to the mound. The canal, at the present time, is not over 2 feet 3 inches in depth, though banks on either side make it appear considerably more.

The mound, which is very irregular, varies from 60 feet to 85 feet in diameter of base and is about 6 feet in height, taken from the general level. Deep depressions near parts of the base show whence the material for the mound was derived.

A number of small and shallow excavations were apparent.

Seven of our men dug 3.5 hours on parts of the mound previously undisturbed. The mound is made of unstratified white sand. Burials were met with at six points from 1 foot below the surface to 6 feet in depth. These burials were closely flexed in a manner to be described more particularly in our account of a mound on the Little Manatee river. With one burial were a number of massive beads of shell. With others were bits of earthenware vessels having incised and punctate decoration.

## MOUNDS NEAR POINT PINELOS, HILLSBORO COUNTY.

Point Pinelos is the southernmost extremity of the peninsula which bounds Tampa Bay on the west. On the property of Mr. Wm. B. Henderson, of Tampa, about three-quarters of a mile in from Point Pinelos, following a course N. W. by W., is an oblong mound with rounded corners, extending longitudinally almost due east and west. Its major diameter of base is 155 feet; its minor diameter, 47 feet. The summit plateau is 105 feet in length and 30 feet across at the center. Each extremity of the plateau is 19 feet across. Mr. S. T. Walker (Smithsonian Report, 1879, p. 407) gives this mound as No. 10 on his list, and gives the height as 25 feet. The exact altitude above the surrounding level is 16 feet 6 inches, and above the mass of sand which surrounds the base, 12 feet 6 inches. From the summit plateau to undisturbed sand at the base of the mound is a depth of 17 feet. The sides of the mound are precipitous, ascending at an angle of 30 degrees.

A graded way extends from the exact center of the southern side of the summit plateau almost due south, a distance of 112 feet. This causeway, made of sand with a sprinkling of shell, is 34 feet broad at its union with the mound and 23 feet across, 12 feet from its terminus.

The labor of seven men working five hours on a trench beginning 46 feet from the western end of the north side of the mound indicated the mound to be of

irregular layers of sand and of shell, the exterior being of sand. Several bits of rude, undecorated ware, one fragmentary bone piercing implement, a bit of chert lance-head were the only relics met with.

One hundred and thirty feet N. from the eastern end of the mound is an excavation of circular outline, 91 feet in diameter and 6 feet 7 inches deep, from which sand for the mound was taken. Another excavation 94 feet by 78 feet, similar in character and of the same depth, lies 125 feet E. S. E. from the eastern end of the mound.

A number of low sand mounds in the neighborhood of the one described gave no feature of interest.

There are several low mounds near St. Petersburg, which have been dug into. In addition, in the town, on the property of Mr. J. A. Armistead, of St. Petersburg, who granted permission to investigate, are two mounds in a field. One is conical, of shell and very steep; the other, of sand, has a rather unpromising appearance.

At the northern extremity of old Tampa Bay, near Safety Harbor, permission to dig was refused.

Near Tampa are two mounds which have been dug through by treasure seekers, it is said.

#### MOUNDS ON ALAFIA RIVER, HILLSBORO COUNTY.

The Alafia river runs into Hillsboro Bay, a part of Tampa Bay.

Riverview is a small settlement about 5 miles up the Alafia river. About 1 mile farther up on the opposite side of the river, somewhat back from the landing, is an unstratified sand mound where considerable digging was without result.

About one-half mile above the mouth of the river is Shell Bluff, the property of Mr. R. E. Gibson, in whose orange grove is a low, irregularly shaped sand mound about 2 feet in height, with a diameter of 55 feet at present time. Owing to presence of orange trees, trenching only was attempted. A considerable number of burials were met with, flexed and lying on the left side as a rule. No artifacts were with the remains.

Mill Point is less than one-half mile above the mouth of the Alafia river, on the right-hand side going down. At this point are a number of aboriginal works which are shown on the accompanying plan (Fig. 2). Investigation was made by us with the consent of Mr. W. B. Henderson, of Tampa, to whom we are indebted, in addition, for kindness shown us in other ways.

Along the banks of the river are shell ridges (A) with a maximum height of 8 feet. In rear of these ridges are shell fields and other ridges running back, not shown on the plan. Parallel with the water of a sort of bay to the east of the point, is a steep ridge of sand (B) terminating abruptly at either end, containing local layers of shell. A certain amount of investigation in this ridge, which is 148 feet long, about 62 feet wide at the base and somewhat over 11 feet high, gave no indication of interments. A roadway about 30 feet wide at its central part slopes

upwards and joins the ridge about at right angles, near the center of the western side. The length of this roadway from its beginning to the mid-line of the ridge is 82 feet. Off the northern end of the ridge is a depression (C) with sloping sides, having a maximum depth of 4.5 feet, a maximum breadth of 56 feet and 96 feet in length. From this depression doubtless came material for the ridge. A short distance west of the ridge is a mound (D) very much spread out, which, apparently, has been under cultivation in earlier times. Its basal dimensions are 80 feet by 68 feet; its height, 4.5 feet. Various excavations showed it to be of white sand with a certain intermixture of loam, and local layers of shell. A few fragments of human bones lay near the surface.

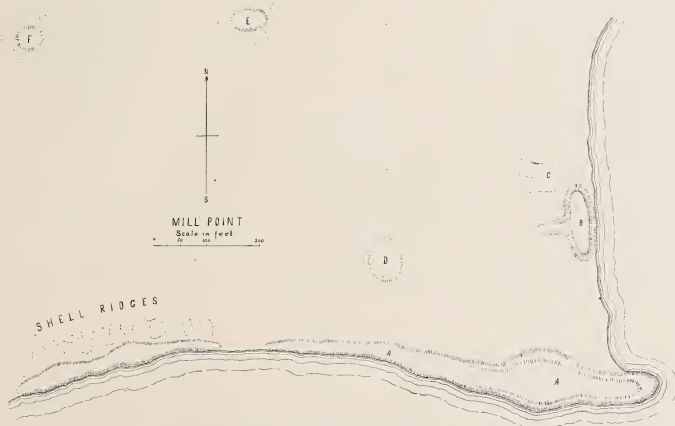


FIG. 2.—Plan of mounds and causeways near Mill Point.

Several hundred yards from this mound, in a northerly direction, in pine woods, on property of Mr. L. G. Newman, of Tampa, is a sand mound (E) about 3 feet in height. Considerable digging showed it to be domiciliary. A similar mound (F) but a short distance from the other yielded no result. Depressions around these mounds are shown in broken lines.

Bullfrog creek is a tributary of the Alafia river. On this creek was formerly a shell heap of considerable size. It is referred to by Mr. Walker in his list of shell heaps of Tampa Bay and its location given on a plan. This mound has since been largely demolished to furnish shells for the streets of Tampa, and its destruction was watched with interest by many. We are informed on all sides that no

object of interest was met with during the work, and as this so closely agrees with our experience of the shell heaps of the west coast, we are inclined to accept it.

#### MOUND NEAR LITTLE MANATEE RIVER, HILLSBORO COUNTY.

On the north side of the Little Manatee river, about 1.5 miles up, is the residence of Mrs. Cordelia Hoey, on the summit of a great aboriginal shell heap, possibly one of those seen by DeSoto and his men. A short distance in a northerly direction from the house is a mound thickly covered with scrub, into which a small trench had been dug prior to our visit. The mound, irregularly circular and rather rugged as to its surface, has a base diameter of about 58 feet, a height of 6 feet. From the southwest side of the mound an aboriginal canal, almost straight, runs a distance of 238 feet to the water. Leaving the mound the canal is 64 feet across, converging to a width of 36 feet at its union with the water. The canal, in common with the field through which it runs, has been under cultivation, and consequently is irregular as to sides and bottom. The maximum depth is now 3 feet 3 inches, though, according to Mr. Hoey, twenty years ago, when first he came to the place, the sides were steeper and the canal about 2 feet deeper, so that high tides entered the field until a dam was placed across the mouth of the canal.

Beginning in the marginal part of the northeast side of the mound, a trench 35 feet across at the beginning was run 29 feet in to the center of the mound, where the trench had converged to a width of 9 feet. The mound was of pure white sand, unstratified. At the very outset burials were encountered. In all, 112 burials were met with, classing as such human remains with which the cranium was present and omitting a limited number of bones found loose in the mound. These burials were in a much greater state of flexion than we have usually seen in our mound work. The prevailing form of interment was a squatting position, the feet on a level with the pelvis, the legs against the thighs and these drawn up against the body. The upper arms were against the sides with the forearms sometimes raised parallel to the upper arms and sometimes on the chest, reaching to the neck. The head was bent over and forced down between the thighs, sometimes to the pelvis. Certain skeletons lay on the side with the same general arrangement of the extremities and the skull pressed over against the knees. So compact were these bundles of bones, which were not the bunched burial so often met with, where separate bones, not in order, are loosely piled in a heap, that we believe the skeletons in this mound, perhaps denuded of flesh, but held together by ligaments, were enveloped in wrapping of some sort and tightly bound with cord or sinew. One of these bundles of the average size was 23 inches long and about 26 inches in circumference.

The crania were so decayed and so injured by roots of palmetto scrub which covered the mound, that none was preserved.

In connection with human bones lying loose in the mound, and with probable denudation of flesh from the skeletons prior to interment, the reader will recall that it was near Tampa that DeSoto rescued Juan Ortiz, a member of a former Spanish expedition, who was found guarding from wild beasts, dead bodies of aborigines, exposed for a period prior to interment.



Under two crania was sand made pink by admixture of hematite. With, or in the immediate vicinity of, burials were: a shell drinking cup; a well-made head of shell; a number of blue glass beads and two bits of looking-glass; a spear-head of chert; a large flake of the same material, doubtless used as a knife; a pebble hammer; a smoothing stone, apparently of lime rock; a fossil shark's tooth over 4 inches in length, considerably worked at the base, probably for hafting;<sup>1</sup> a polished pendant of stone, minus a portion of the base; a stone pendant, badly broken; a pendant, probably of fine-grained sandstone,<sup>2</sup> representing the head of a bird, of which, unfortunately, most of the bill is wanting (Fig. 3). Pendants in the form of birds have<sup>3</sup> frequently rewarded our search in southern mounds. In a mound near Tavares, Lake County, Florida, we found a bird amulet of igneous rock, the head of which was wanting.<sup>3</sup> We have seen, described and figured,<sup>4</sup> a beautiful pendant representing the head of a duck, which came from the Turkey creek mound, among a cache of other pendants, and is now in possession of Andrew E. Douglass, Esq., of the American Museum of Natural History, New York.



FIG. 3.—Pendant. Mound near Little Manatee river. (Full size.)

Throughout the mound were sherds mostly plain, though some bore incised, and some punctate, markings. One had stamped decoration.

About 400 yards E. by N. from the mound just described, in pine woods, is a mound 3 feet high and 72 feet in diameter, the property of Mr. J. A. Darcey, living nearby. A central excavation yielded neither burials nor artifacts.

#### INDIAN HILL, HILLSBORO COUNTY.

About 3 miles down Tampa Bay from the mouth of the Little Manatee river is an island known as Indian Hill, probably eight acres in extent, almost covered by an aboriginal deposit of shells, including oyster, clam, conch (*Fulgur*), cockle (*Cardium*), *Pecten*, *Strombus gigas*, *Strombus pugilis*, *Fasciolaria gigantea*, *Fasciolaria tulipa*. Part of the shell deposit is made of irregular mounds and ridges. At one extremity, however, the deposit rises steeply, forming a great heap seemingly composed of three mounds with depressions between. The circumference of base is 423 paces. The largest of these heaps has a height of 30 feet above the surrounding shell deposit and 36 feet 7 inches above water level. We believe, after personal inspection of the majority of Florida shell heaps and careful inquiry as to the rest,

<sup>1</sup> A shark's tooth similarly treated, was found by us in a mound on Ossabaw Island, Georgia, and is described in our "Certain Aboriginal Mounds of the Georgia Coast."

<sup>2</sup> Theodore D. Rand, Esq., of the Academy of Natural Sciences, has kindly identified all rocks referred to in this Report. As we have not furnished Mr. Rand with sections of the specimens, the determinations are not considered final by him.

<sup>3</sup> "Certain Sand Mounds of the Oeklawaha River, Fla.," Journ. Acad. Nat. Sci. Phila., Vol. X.

<sup>4</sup> "A Cache of Pendent Ornaments," p. 190, Journ. Acad. Nat. Sci. Phila., Vol. XI.

that the shell deposit at Indian Hill exceeds in height any in the State, though considerably greater altitudes for other sites have been given by writers who base their assertions upon estimate. In Fig. 4 we give a photograph showing the great deposit at Indian Hill, extending completely across the background of the picture, with the house of the owner of the island, Mr. F. B. Walker, occupying the westernmost extremity of the heap. Unfortunately, it is beyond the power of the camera to show the slope or comparative height of mounds owing to undue prominence given to the foreground.

Close to the great shell heap is another, also of shell, very symmetrical, with upward slope of 28 degrees, in places. This mound, shown in the photograph in front of the greater heap, oblong with rounded corners, extends 76 feet in a N. E. and S. W. direction. Its minor diameter is 55 feet; its height above the general level of the surrounding shell is 12 feet 4 inches. At the S. W. end of the mound a trench was run in from the margin 21 feet, converging from 41 feet at the beginning to 20 feet at the end. The mound was built of layers of small oyster shells and strata of crushed shell and blackened debris. During the excavation, human remains were met with at seventeen points and in other places while caving the sides of the excavation at the end. No remains lay at a depth greater than 4 feet, while the majority were just beneath the surface. With three exceptions the burials consisted of parts of disarranged skeletons. Two skeletons lay much flexed, on the side; the other, face down and partly flexed. No artifacts were with the remains.

At one end of this mound lay numbers of small shells (*Strombus pugilis*) with two perforations for a handle, in the body whorl below the periphery and much chipped and worn at the beak. These and similar shells, lying here and there over the entire deposit, had doubtless served as hammers, probably to open shell-fish for food.

In a southerly direction, along the east shore of Tampa Bay, is Terraccia Island, Manatee Co. On this island (see map), on the property of Mr. L. W. Johnson, is a low irregular mound, in which were found a few flexed burials without artifacts.

About 150 yards N. N. W from this mound is a shell deposit, with the usual ridge leading to it.

On property of Dr. L. R. Warren, of Braidentown, Florida, not far from the other remains on Terraccia Island, is a large oblong mound running north and south, with the usual graded way leading to it.

Up the Manatee river, Manatee Co., near Erie P. O., are three small mounds, on properties belonging to Messrs. L. P. Foy and Louis Brubacher, in which were found only a few scattered bones.

On the southern extremity of Cow Point Island, Sarasota Bay, Manatee Co., on property of Mr. C. W. Thigpen, are an aboriginal shell deposit and two low burial mounds, in which were present closely flexed burials without artifacts.



FIG. 4.—Principal shell heaps, Indian Hill, Tampa Bay.

Near the shore of Sarasota Bay, on property of Mr. J. H. Gillespie, of Sarasota, are three low sand mounds, much dug into previous to our visit, in which we found practically nothing.

Near Snell's Bayou, Manatee Co., in sight of the water, is a mound on property of Mrs. F. E. Brooks, of Birmingham, Michigan, whose winter home is near the mound. The mound, of brown sand, is 109 feet across the base and 10 feet in height. A central trench was without result.

About one-half mile in a southerly direction from Sarasota, Manatee Co., a few yards from the water, in oak and palmetto scrub, is a mound on the property of Mr. Adolph Zakezewski, of Philadelphia, Pa. The mound is 20 feet high with somewhat irregular basal outline, and about 130 feet across. Considerable digging done previous to our visit showed no trace of human remains along the sections, nor were our excavations more successful. The mound, which is probably of a domiciliary character, seems to be of gray sand without shell.

#### MOUND ON PINE ISLAND, LEE COUNTY.

Southward from Charlotte Harbor is Pine Island Sound in which is Pine Island. About three miles down, on the eastern side of the island, is a small key supposed to be about three acres in extent. This island rises in places to a considerable height owing to an aboriginal deposit of shells, whence its name.—Indian Old Field.

About three-quarters of a mile in a W. N. W. direction from Indian Old Field, on Pine Island, is a mound a trifle over 5 feet in height and 60 feet across the base. It is situate away from the mainland proper, on what is known as a sandspit,—territory not usually covered by tides but subject to overflow during unusually high ones. It seems curious for aborigines to have chosen such a spot for a place of interment when solid ground in abundance was so near at hand.

The mound, on property of the late J. H. Kreamer, Esq., of Philadelphia, Pa., was but partly investigated by us. A trench, 28 feet across at the beginning, was started at the northeast side of the mound where wash of tides had carried away a portion, leaving an abrupt section. The trench, converging to 24 feet at the end, was carried in a distance of 20 feet. The mound, unstratified, was of gray sand. At the base and below, where were a number of burials, the sand was black from admixture of loam. At the beginning of the excavation were numbers of fragments of pottery, belonging to different vessels, placed thickly together. Nearby were several shell drinking cups and a number of conch-shells.

Interments met with at thirty-eight points, consisted of burials loosely flexed and others closely drawn together like those we have described from the mound on Little Manatee river. There were also several masses of disconnected bones and skeletons disturbed by burials made afterward, though probably by the same tribe.

With the burials were three "celts" of iron or steel; glass beads, on three occasions; two tubular sheet silver beads with overlapping edges; one kite-shaped pendant of thin sheet silver, decorated with a repoussé cross (Fig. 5); a handsome



lance-head of hornstone, 4 inches long; a lance-head of chert; two arrowheads of chalcedony; a tooth of a fossil shark, perforated for use as a pendant. With the basal burials and with the sub-basal ones, some of which were 6.5 feet beneath the surface, were no artifacts. The burials on and below the base, in every case but three, were closely flexed, while the flexion in the body of the mound was loose in character. The burials with European objects, however, were not intrusive, but belonged to the period when the part of the mound in which they were made.

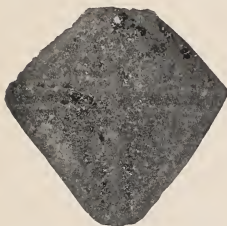


FIG. 5.—Pendant of silver. Mound on Pine Island. (Full size.)

At the northern end of Pine Island Sound are several islands, among which Mondongo and Joseffa were visited by us. These islands, though thickly covered with aboriginal deposits of shell, are not of the pile-dweller type, since the islands are of sand, a number of feet in height, on which the debris of aboriginal meals has been thrown. Though Mr. F. P. Roach, owner of Joseffa Island, placed it at our disposition, we had by this time done so much fruitless digging into the shell of the west coast that we did not feel justified in taking time from what we believed to be a richer district farther south.

#### JOSSELYN KEY, LEE COUNTY.

Josselyn Key, in Pine Island Sound, off the northwestern end of Pine Island, has been described by Mr. Cushing. There is a large shell deposit on the island with courts, canals, mounds and platforms. We made a number of excavations in the muck of various courts and canals, finding absolutely nothing.

#### DEMOREY KEY, LEE COUNTY.

This island lies about two and one-third miles S. S. E. from Josselyn Key. Here our men made numerous excavations in the muck, finding it from 1 to 3 feet in depth. Nothing was obtained beyond several bits of coarse earthenware.

Mr. Cushing has described Demorey Key with considerable detail, and it was there he found the "truncated pyramid" with the wall of conch-shells described by him,<sup>1</sup> and shown in Plate XXIX and, in elevation with the rest of the key, in Plate XXVIII. Mr. Cushing says: "The most remarkable feature of this key was a flat, elongated bench, or truncated pyramid, that crowned the middle elevation. I discovered this merely by accident. In order to gain a general idea of the key, which was almost as much overgrown with luxuriant and forbidding vegetation as had been the wilder key first explored, I climbed high up among the skinny and crooked limbs of a gigantic gumbo limbo that grew directly from the inner edge of

<sup>1</sup> *Op. cit.*, pp. 10 and 11.



this elevation. Luckily, great festoons of tough vines clung to the lower limbs of this tree, for in shifting my position, I slipped and fell, and was caught by these vines, to the salvation of my bones, probably, since by the force of the fall some of the vines were torn away, revealing the inner side of this platform and the fact that it was almost vertically faced up with conch-shells; their larger, truncated and spiral ends, laid outward and in courses so regular, that the effect was of a mural mosaic of volutes. I hastily tore away more of the vines, and found that this faced-up edge of the platform extended many feet in either direction from the old gumbo limbo. I may say here, that on occasion of two later visits I cleared the façade of this primitive example of shell architecture still more; was enabled, indeed, when I last visited the place—since I was then accompanied by a considerable force of workmen—to entirely expose its inner side and its southern end. Thus was revealed—even more completely than is shown in Plate XXIX—a parallelogramic and level platform, some three and a half feet high and twelve yards in width, by nearly thrice as many in length. It was approached from the inner side by a graded way that led obliquely along the curved ascent up from the mangrove swamp, to a little step-like, subsidiary platform half as high and some twelve feet square, which joined it at right-angles, just beyond the point shown at the extreme right of the picture here given. The top of this lesser step, and the approaches to either side of it, were paved with very large, uniform-sized clamshells, laid convex sides upward, and as closely and regularly as tiles. The lower or southern end of the main platform was rounded at the corners, and rounded also on either side of the sunken ascent midway, in which the longer of the graded ways I have described terminated. Contemplating the regularity of this work, its central position and its evident importance, as indicated by the several graded ways leading to it from distant points, I could not doubt that it had formed the foundation of an imposing temple-structure, and this idea was further carried out by the presence at its northern end of two small, but quite prominent altar-like mounds."

Although Mr. Cushing seems carefully to have looked into this matter, we believe him to be mistaken in attributing an aboriginal origin to this wall of conchshells.

We four times visited Demorey Key with a force of men to dig.

The elongated bench described by Mr. Cushing is a portion of an ordinary aboriginal shell ridge, which seemed to us to have been somewhat flattened to serve as a site for a modern house and garden. In fact, we are informed by "Johnny" Smith, Mr. Cushing's guide, that at the time of his visit to Demorey Key, a house, partly in ruins, occupied a portion of this level space just by the little platform. When we first visited the key (March, 1900), we saw a frame house which must have occupied the site of the older one. This house also had been removed when last we stopped at the key.

The wall of conch-shells, shown in our plan (Fig. 6) by the solid line A to B, does not surround a parallelogram, but extends about 100 feet only on the inner, or

eastern side, where it distinctly leaves the straight line to go around a gumbo limbo tree, as shown at C. This alone we think sufficient to prove the comparatively modern origin of the wall. At the southeastern corner it circles about a lemon tree at D and comes to an end. There is no sign of a wall in the southwestern corner, there being there only a loose heap of large shells, mostly conchs. Such

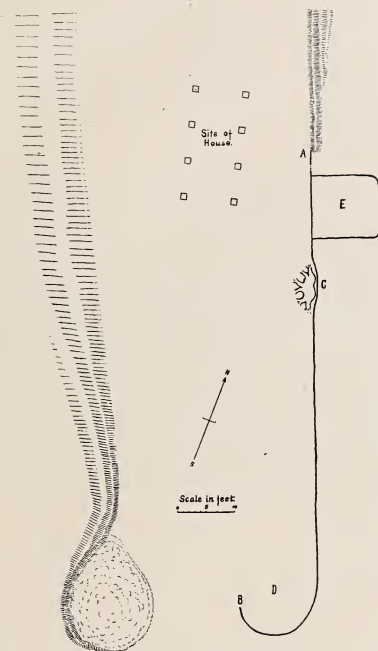


FIG. 6.—Plan of shell ridge and wall of conch-shells, Demorey Key.

heaps are very frequently met with on the shell islands which have been cultivated, since the large shells interfere with the hoe and the plow. At Chokoloskee, in the Ten Thousand Islands, great piles and ridges of these shells, collected within the last few years, are to be seen. At Josselyn Key are similar heaps of shells thrown loosely together, which Robert Allen, the captain of our steamer, informed us he

had seen in process of collection by Josselyn, the former owner of the key. Several such piles are in close proximity to the leveled space at Demorey Key.

There is no defined outline of a parallelogram save along the wall, the other portions being the simple, gradual slope of an ordinary shell ridge.

The wall itself seemed to us to have been built by some settler in the present century, primarily to serve as a sort of retaining wall to keep in place great numbers of conchs which lie loosely behind the wall, and thus when loam was superimposed, to broaden his vegetable garden. The slope of the shell heap on the inner side is much steeper than on the outer side where it was not necessary to build a wall.

We removed portions of the shell wall at various places and dug into the mass of material beyond at the level of the base, finding glass, iron and earthenware, one bit with a glaze.

We examined also the subsidiary platform referred to by Mr. Cushing and shown on our plan at E. The pavement of large clam shells, the convex side upward, described by him, no longer remained, though here and there were clam shells mostly with the convex side upturned. Young Smith, a brother of Mr. Cushing's guide, informed us that he had lived upon Demorey Key after Mr. Cushing's visit, and had displaced many of these shells. Digging into the platform we discovered it to be made of loose conchs with a certain amount of undisturbed, black loam on top, in all a little over one foot in thickness. Just below this loam, and over the conch-shells, was a large fireplace leading us to suppose that the platform had been built for use as a kitchen. Beneath was the black surface loam of the shell heap. One foot down, among the conch-shells of the platform, and just above the black loam of the original surface, under the fireplace, we found a number of large pieces of glass showing marks of fire.

#### MOUND ISLAND, LEE COUNTY.

Mound Island, or Johnson's Key, as it is also called, is in Estero Bay, about seven miles in a straight line in a southeasterly direction from Punta Rasa, and may be reached by a sheltered way behind islands, or from the Gulf through Carlos Pass.<sup>1</sup> Mound Island, where we were courteously received by Mrs. F. M. Johnson in the absence of her husband, the owner, is, in our opinion, the most typical of all the Key-dwellers islands. We were informed by Mrs. Johnson that its area is about 140 acres. A survey we have seen makes it about 128 acres in extent. In addition to a general shell deposit over most of the island, and numerous graded ways, courts, small canals and at least one hooked-shaped breakwater at the mouth of a canal, a great canal, still admitting water in the highest tides, running nearly N. E. and S. W., bisects the island. Beginning in the northeastern portion of the island, this highway for canoes, a little farther on, passes the burial mound of the island, and at about two-thirds of its length goes between embankments of shell,

<sup>1</sup> Government Chart, No. 174, shows Little and Big Carlos Pass. They are now united. Mound Island lies nearly two miles in an easterly direction from the Pass.

at places over 20 feet in height, having on its left the great precipitous shell-heap which gives the island its name. In Fig. 7 we show a representation of this mound with part of the main, or dividing, canal, sketched from an elevation to the north.

Mr. Cushing, in his brilliant preliminary report (page 19 *et seq.*), speaks of Mound Island at some length. At the foot of page 19 he says, "It consisted of a long series of enormous elevations crowned by imposing mounds that reached an average altitude of over 60 feet." Mr. Cushing here has given an estimate as the actual height, and we feel impelled to call attention to this since we have repeatedly gone on record that no shell deposit of Florida reaches a height of 40 feet. In point of fact the principal mound of Mound Island is 31 feet above sea level at half tide, and 30 feet, 2.5 inches in height if measured from the general level at the base. These measurements were made and repeated with a theodolite, and we believe them to be accurate. Different stages of tide might modify the first measurement by a foot or two either way.



FIG. 7.—Principal mound with portion of main canal. Mound Island.

Persistent excavations were made by us in the muck of the canals and courts at Mound Island, which was sometimes 3 or 4 feet in depth, resulting in the discovery of a few bits of earthenware only and a handsome implement wrought from a conch-shell, unfortunately without a handle. The result of our work was a bitter disappointment to us, as we had gone to Mound Island fully prepared with a band of diggers and with a portable pump to keep down the water while engaged in the muck.

The burial mound in the northeastern part of the island, to which we have referred, lies in a mangrove swamp. It is 65 feet across the base and about 11 feet in height. It is composed of sand and loamy material with a certain admixture of shell. We dug into this mound to a certain extent, finding nothing of particular interest. Many relics, however, mostly of European origin, have come from it.



**FLORIDA COAST**  
 FROM LITTLE MARCO Is TO CHATHAM RIVER  
 1950



Some of these, we believe, have been presented to the Museum of Science and Art of the University of Pennsylvania by Mr. Joseph Willcox.

#### LITTLE MARCO ISLAND, LEE COUNTY.

The Ten Thousand Islands, whose name is not conferred in a poetical way, but probably falls short in describing the number, beginning with Little Marco Island in the north, thickly fringe the coast line of part of the counties of Lee and Monroe to the Northwest Cape, a distance of about seventy miles, in a straight line.

These keys, formed by oyster bars, sand and the roots of the mangrove tree, are from a few feet to a number of miles in area, and are, as a rule, just above the level of the sea. But an insignificant proportion of these islands have been utilized by the Key-dwellers.

All published maps of this part of Florida are grossly inaccurate in respect to the Ten Thousand Islands, locating key settlements on the mainland, reversing their positions and the like, while Government charts skip most of the islands, the task being too difficult to cope with.

The map given by us, mainly taken from the Government chart, shows, as it does, below Key Marco, only the outlines of the outer tier of islands, and, in addition, indicates the location of the shell islands visited by us. These islands do not lie in open water, but are enclosed in a labyrinth of other keys.

On the eastern side of Little Marco Island is a shell settlement with the usual ridges and mounds of moderate size.

#### MARCO, LEE COUNTY.

Marco, on the northernmost end of Key Marco, by far the most important of the Ten Thousand Islands (see map), is where Mr. Cushing made his marvelous collection of objects of wood and of shell in the muck at the bottom of a small triangular court, enclosed between ridges of shell.

All the territory in and around Marco, including its canals, its courts and its mounds of shell, was cordially placed at our disposition by W. D. Collier, Esq., of Marco, the owner, and investigation was made by us in the muck of courts in the immediate vicinity of the one so advantageously explored by Mr. Cushing. Absolutely nothing rewarded our efforts.

From Mr. G. E. Cuthbert, of Marco, we obtained a collection of objects ploughed up during cultivation, among which were many rather rude "sinkers" of shell and others somewhat resembling them, but too carefully made to have served for other than ornamental purposes. In Fig. 8 are shown selected specimens of this kind from the Ten Thousand Islands, including Marco; Goodland Point, Key Marco; and Chokoloskee Key.

In the Marco collection are four shell discs. One, with two perforations, is evidently a gorget; one is imperforate; one has a small central perforation, while the remaining one has a much larger hole in the middle. All these are shown in Fig. 9.



FIG. 8.—Ornaments of shell. Ten Thousand Islands. (Full size.)

There were also a number of rude sinkers of coralline limestone and one, globular in shape, of coral.

A curious type found among the Florida keys, consisting of oblong strips of shell, is represented by four specimens in the Marco collection. These objects



FIG. 9.—Discs of shell, Key Marco. (Full size.)

might seem to be unfinished were it not that the margins are carefully worked, and some show a high polish as from use.

A neatly-made chisel, probably of argillyte, 3.4 inches in length, is polished and has a circular section. On one end is a bevelled cutting edge; on the other, a blunt point.

#### GOODLAND POINT, MARCO ISLAND, LEE COUNTY.

Goodland Point, about six miles farther down the east side of Marco Island, on its southeastern extremity, has a great expanse of shell deposit which was put at

our service by Mr. Samuel Pettit, the owner. In the mangroves, about one-half mile from the landing, are a number of low, irregular undulations, which seem to have served as places of burial for the aboriginal settlement. Considerable previous digging had been attempted. An imperfect examination indicated that parts of disjointed skeletons had been buried just below a shell deposit, and subsequently about one foot of loam had been piled above.



FIG. 10.—Disc and "sinkers" of limestone. Goodland Point. (Full size.)

With a femur, a tibia, fragments of a fibula, parts of a radius, were four arrow-heads, or knives, of chert.

One small mound had twelve shell drinking cups just beneath the surface. Though the mound was less than half demolished by us, over twenty of these cups were met with.

From the sons of Mr. Pettit we got a considerable collection of objects found during cultivation of the place, including several beautiful shell pendants; many



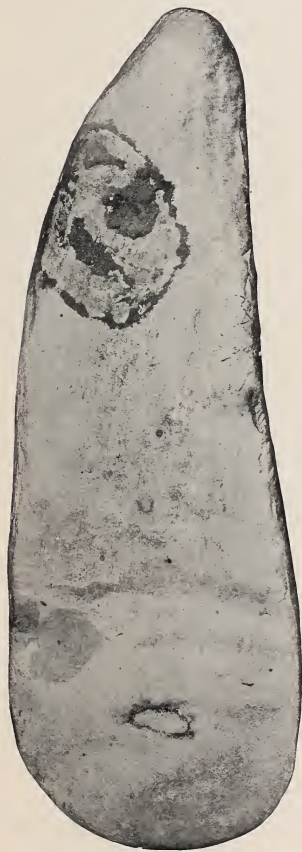


FIG. 11.—“Celt” of shell. Goodland Point. (Full size.)



FIGS. 12, 13.—Objects of shell. Goodland Point. (Full size.)

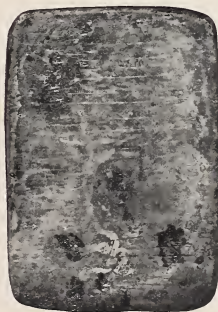
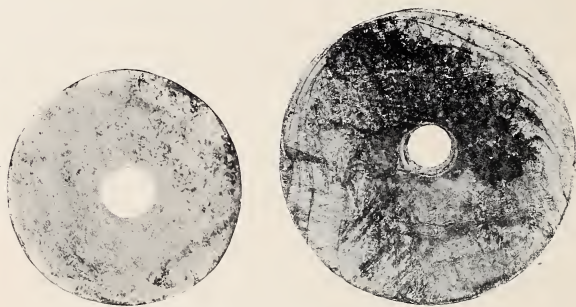


FIG. 14.—Object of shell. Goodland Point. (Full size.)



rude "sinkers" of shell and of coralline limestone; a perforated disc of soft limestone which, with some typical stone "sinkers," is shown in Fig. 10; a beautiful and perfect "celt" of shell, wrought from the lip of *Strombus gigas*, about 7.5 inches long, of a type not found out of Florida in the United States, but present in certain West India islands (Fig. 11); two smaller "celts" of shell; three narrow, oblong strips carefully cut from the body whorl of a large marine univalve, of the type we have referred to as found at Marco, two of which are shown in Figs. 12, 13; a shorter and wider oblong section of shell, much polished (Fig. 14); two centrally perforated discs of shell shown in Figs. 15, 16; a scoop-shaped object of shell with rough incised decoration (Fig. 17); another, spoon-shaped, also of shell (Fig. 18); a chisel of igneous rock, with bevelled cutting edge, similar in type to the one from Marco, though somewhat larger.



FIGS. 15, 16.—Discs of shell. Goodland Point. (Full size.)

One of the most interesting features of this collection is a beautifully wrought implement, probably of claystone, of a type not found in the National Museum, we are informed by Professor Holmes. At one end is a carefully made bevelled cutting edge; the other end originally tapered to a fine point. This specimen, Mr. Pettit's son informed us, was found intact by him, but having been allowed to fall, it broke into a number of pieces. These pieces, with the exception of a small fragment from the pointed end, which he had lost, have been put together by us. The present length is 13.12 inches, though the reproduction makes it a little greater; the maximum diameter is .56 of an inch (Fig. 19).

With the objects of shell and of stone obtained by us at Goodland Point were two earthenware heads of birds, one probably representing a turkey head (Fig. 20); the other, the head of a predatory bird, perhaps an eagle (Fig. 21).

These heads, which doubtless served as handles of vessels, are interesting, owing to the section whence they came, since no such heads were met with by us else-



FIG. 17.—Object of shell. Goodland Point.  
(Full size.)

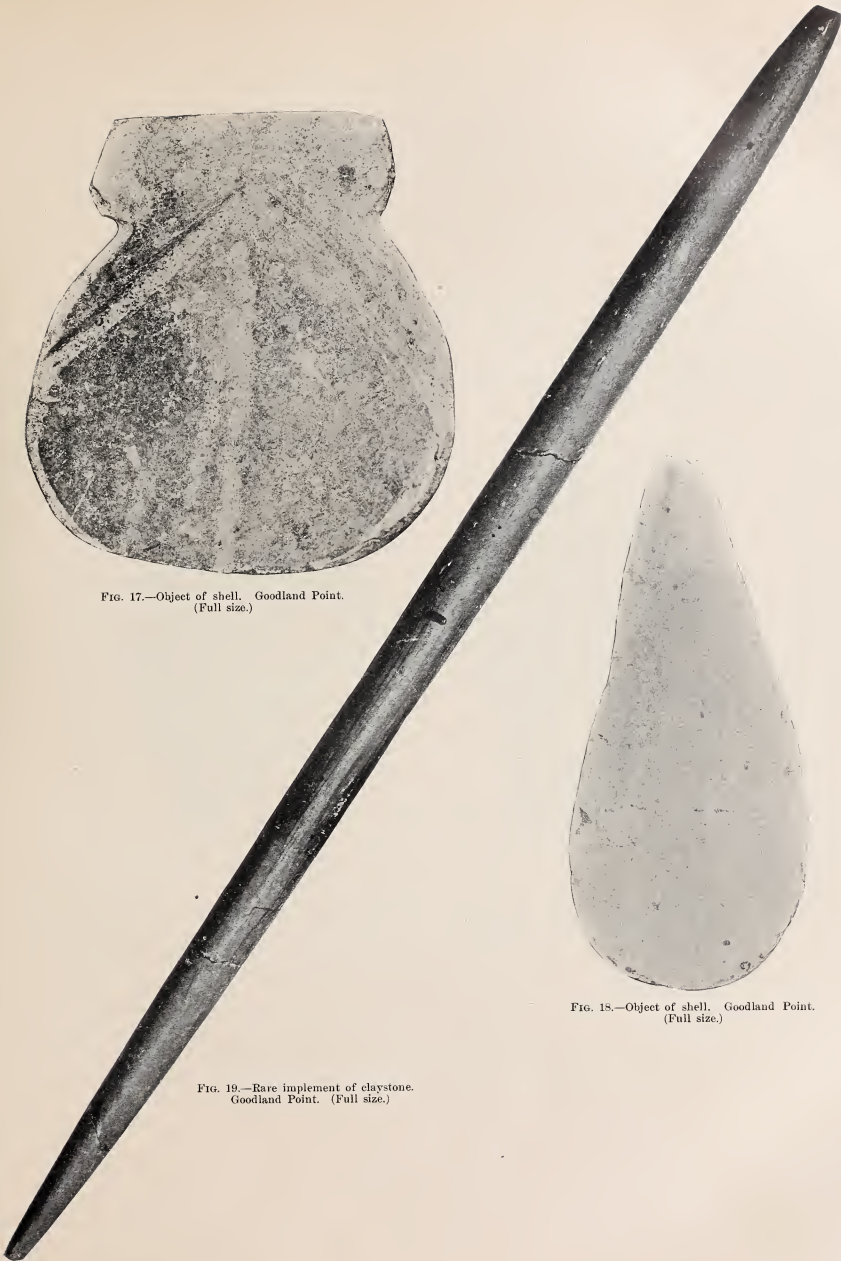


FIG. 19.—Rare implement of claystone.  
Goodland Point. (Full size.)

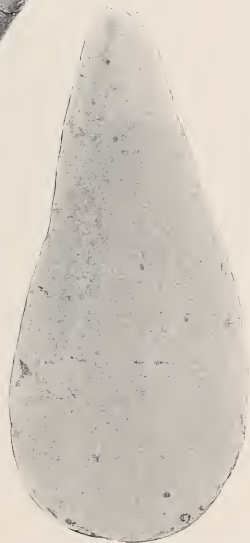


FIG. 18.—Object of shell. Goodland Point.  
(Full size.)

where on the southwestern coast of Florida, or, we think, have been described by others as coming from there.

The heads show considerable excellence of design and workmanship, and far exceed, in these respects, any bird-head handles met with by us in other parts of Florida, with one exception.

Mr. S. T. Walker, in the Smithsonian Report for the year 1883, describes and figures certain earthenware bird-heads from Florida, but these came from the extreme northwestern coast of that State, not far from the Alabama line, and, moreover, are of little artistic excellence.

In the mound at Ginn's Grove, St. Johns river, Orange County, we found a beautifully painted and incised head of a predatory bird,<sup>1</sup> which Professor Holmes describes in his "Earthenware of Florida."<sup>2</sup>

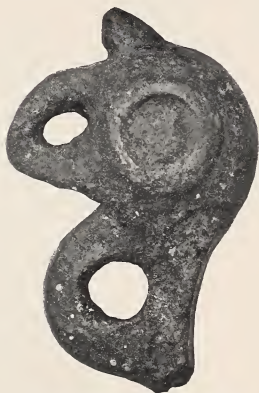


FIG. 20.—Earthenware head of turkey.  
Goodland Point. (Full size.)



FIG. 21.—Earthenware head of predatory bird.  
Goodland Point. (Full size.)

Elsewhere on the St. Johns we have found bird-head handles of vessels, but these others were rude in character.

It is interesting to note a groove cut around the base of the neck of the predatory bird, showing that, after the separation from the vessel, the head was used as a pendant.

Blue Hill, on Horr's Island, about one mile S. W. from Goodland Point, has a

<sup>1</sup> "Certain Sand Mounds of the St. Johns river, Florida." Part I, p. 87. Plate XV, Fig. 4.

<sup>2</sup> Page 124, Journ. Acad. Nat. Sci. Phila., Vol. X.

considerable aboriginal shell deposit and a sand mound about 6 feet in height, which has been thoroughly dug through.

Caximbas Hill is a wind formation on the southwestern part of Marco Island. Nearby is a considerable shell deposit.

Proceeding in a southerly direction among the Ten Thousand Islands, we visited Gomez' Old Place on a small nameless key reached from the Gulf through a pass about two miles east of Coon Key, and continuing in about one mile in a northerly direction. The key, at present writing (1900), is uninhabited. It covers probably about 30 acres of interesting shell deposit, partly surrounding a basin that fills with the rising tide.

Dismal Key, Lee County, lies about 2 miles north of Horse Key, an outside island about 5 miles E. S. E. from Coon Key Pass, which is the southern entrance to Marco. This unsurveyed key has a great shell deposit with the usual mounds and the like.

Fikahatchee Key, Lee County, unsurveyed, perhaps 150 acres in extent, can be reached by an inland passage at high tide, or from the Gulf through a nameless pass and continuing in among the islands for from three to four miles. In any event, a pilot is requisite. On this island is an extensive shell deposit. A family living on the key occupies a house partly built upon piles.

Russell's Key may be reached from the Gulf by entering the islands about three miles above Sandfly Pass and continuing in among the keys another three miles. This key, which has large aboriginal shell deposits, perhaps 60 acres in extent, is occupied by Mr. J. W. Russell and Mr. M. M. Gaston with their families.

Wiggins' Key on Sandfly Pass,<sup>1</sup> about one mile from the Gulf, on the right-hand side going out, has extensive shell deposits and two small burial mounds of sand and shell which have been much dug into. Our excavations, made with permission of Mr. J. Wiggins, the owner, were unrewarded.

This place is shown on maps as in the northern limits of the county of Monroe, but at the present time this territory, extending south below Chokoloskee Key, is claimed by Lee County, and, it is said, probably will be obtained by it.

#### CHOKOLOSKEE KEY, MONROE COUNTY.

This island lies in the lower part of Chokoloskee Bay, a sheet of water back of the maze of islands bordering the Gulf.

The island is unsurveyed. It is roughly circular and is said to be somewhat

<sup>1</sup> See Government Chart, No. 173.





FIG. 22.—Unidentified object of limestone. Chokoloskee Key. (Full size.)



FIGS. 23, 24.—“Sinkers” of coral. Chokoloskee Key. (Full size.)

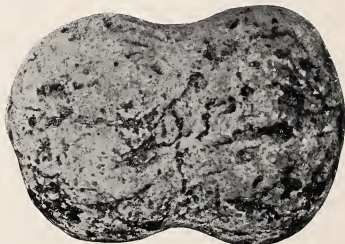


FIG. 27.—“Sinker” of limestone. Chokoloskee Key. (Full size.)



FIG. 25.—Canine of bear, used as pendant. Chokoloskee Key. (Full size.)



FIG. 26.—Implement of argillyte. Chokoloskee Key. (Full size.)

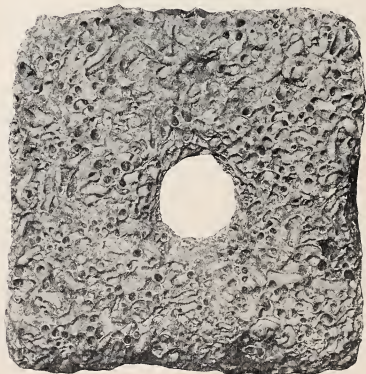


FIG. 28.—Net “sinker” of shell. Chokoloskee Key. (Full size.)



over one-half mile in diameter. It is almost entirely covered with great shell deposits, including lofty peaks, graded ways, canals and the like. Rising from the mangrove swamp at the edge of the northern part of the island, is a mound of shell of abrupt ascent, a fraction over 27 feet in height, if measured from the level of low water. Running in from the southern section of the island are two graded ways enclosing a canal. These ways terminate in mounds facing each other. The easternmost mound, slightly the higher, on its western side, where it rises from the canal, has a slope of thirty-three degrees. Its height above the level of the bottom of the canal is 18 feet 4 inches, and 22 feet 4 inches above low water level. From Mr. McKinney, postmaster at Chokoloskee, and from others, we obtained an interesting collection of artifacts, including shell pendants; shell "sinkers;" two shell "celts;" a shell disc; a small "celt" of decomposed rock; a handsomely made heart-shaped object of limestone, with perforation, which seems too carefully wrought for use as a "sinker" and too large for a pendant (Fig. 22); two "sinkers" of coral (Figs. 23, 24); a pendant made from a canine tooth of a large bear, probably

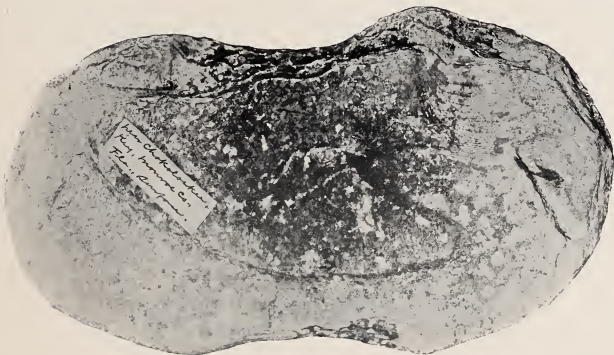


FIG. 29.—Net "sinker" of clam shell. Turner's river. (Full size.)

*Ursus floridanus*, grooved for suspension (Fig. 25); a very rare type of implement, probably of argillyte, perhaps used as a piercer (Fig. 26); a net "sinker" of coralline limestone (Fig. 27); a net "sinker" of the shells of the reef-building mollusc, *Vermicularia nigricans*, Dall<sup>1</sup> (Fig. 28).

We have found on the keys a number of perforated "sinkers" of this material, but all others were of irregular outline, unworked as to the margin.

Near the mouth of Turner's river, which enters Chokoloskee Bay in an easterly direction from the key and not far from it, is a considerable shell deposit

<sup>1</sup> Identified by Professor Pilsbry of the Academy of Natural Sciences.

where we found, among other objects, a sinker made from a clam-shell (Fig. 29). It is interesting to recall that Mr. Cushing found in the muck at Marco "chipped and notched fragments of heavy clam shells" in place on fishing nets.

#### WATSON'S, MONROE COUNTY.

About four miles up Chatham river is a series of shell fields owned by Mr. Watson who resides on the place.

#### CONCLUSIONS.

It is our belief, judging from the results of our work along the Florida west-coast, that archaeological opportunities offered there are more for the surveyor than for the excavator. And the surveyor must have a care, while introducing into his plans all visible remains of the aborigines, not to idealize, and thus on his plans show more than is present on the various sites.

We believe Mr. Cushing's discoveries at Marco were an isolated case, and in fact, Mr. Cushing has so expressed himself to us. Perhaps a hurricane crushed in, at that particular spot, a group of dwellings, including a temple or sacerdotal house. Continuous digging in the muck of keys might reveal scattered objects, accidental losses, whose specific gravity caused them to sink when falling into the water. This would not be the case with objects wholly of wood as were the majority of those found by Mr. Cushing at Marco.

We are not prepared to believe that aboriginal objects of wood, some artistically carved, were confined, as to their use in Florida, to the keys of the southwest coast. The kitchen-middens of Europe show the preservative quality of mud for wood, and we, therefore, think that wooden objects were found at Marco, because they lay in a better medium for preservation, and not because they were in use only along the southwest coast. We know the Florida Indians of other parts of the State used wood. Ribault's French Huguenots (1564) saw in use "a little vessel of wood"<sup>1</sup> near the mouth of the St. Johns, where we opened two great Indian mounds. In the famous mound at Mt. Royal, farther up the river, which we believe to be the place near the lake visited by some of the Frenchmen, where lived a great king, we found a long pin, or skewer, of wood, parts of which, preserved by a coating of sheet copper, were beautifully carved.<sup>2</sup>

We think, therefore, it not unlikely that the sand mounds of Florida contained a store of objects carved in wood, which have long since disappeared through decay.

#### CERTAIN SHELL IMPLEMENTS OF THE SOUTHWEST COAST OF FLORIDA.

Florida may be called the home of the shell implement in this country, for no other State has such an extent of sub-tropical sea coast where shells abound, and in no other State is such a need created through absence of stone.

<sup>1</sup> "Historical Collections of Louisiana and Florida," p. 229.

<sup>2</sup> "Certain Sand Mounds of the St. Johns river." Part II, Fig. 15, p. 142, Journ. Acad. Nat. Sci. Phila., Vol. X.

While implements of shell are fairly numerous throughout the State, they are in most profuse abundance along the southwest coast, especially the keys of the Ten Thousand Islands. The great majority of these implements are marine univalves perforated to receive a handle. Many have beaks ground down almost to a cutting edge, while other shells, in use as hammers, have blunter beaks. It is of this form of implement, that is to say, a shell used with a handle, as a hammer, a chisel, a hoe, a gouge, an adze or the like, that we propose to speak. On Key Marco, Chokoloskee Key and other places the great abundance of conchs (*Fulgur*) and "horse conchs" (*Fasciolaria*) is a positive detriment to cultivation and great heaps of these shells, as we have previously stated, are often collected by the inhabitants before agricultural work is attempted. Among these shells a fair percentage had been used as implements, broken and thrown aside in aboriginal times, while a few, presumably lost, are still fairly perfect.

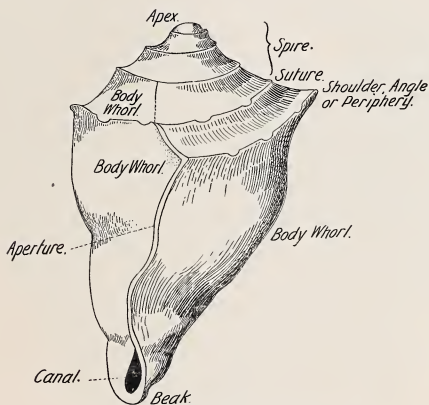


FIG. 30.—Nomenclature of parts of marine univalve.

Before going into the matter of these shell implements, it may be well to show a representation of a marine univalve with the names applied to its various parts (Fig. 30), which we have borrowed from a book by Professor Pilsbry, of the Academy of Natural Sciences of Philadelphia, to whom, with Mr. Joseph Wilcox, also of the Academy, we are indebted for much information as to Florida shells.

We shall now describe a representative selection from the shell implements collected by us from the surface of the keys of the southwest coast of Florida. All are shown full size in the illustrations.



FIG. 31.—Shell implement. Goodland Point. (Full size.)

Fig. 31 is a massive conch (*Fulgur perversum*), with two round, carefully made holes to allow the handle to run diagonally to the right of the columella.<sup>1</sup> The beak is carefully ground almost to a straight edge which would be at an acute angle with a handle. The body whorl has been cut off several inches back. Δ



FIG. 32.—Shell implement. Chokoloskee Key. (Full size.)

small rudely made hole above the periphery, not shown in the reproduction, probably has no connection with the tool as such, as great numbers of conch shells not used as implements have similar holes presumably made to sever the muscle of the fish and facilitate its removal from the shell. This specimen came from Goodland Point.

<sup>1</sup> The columella or axis of the shell.



Fig. 32 shows a stout *Fulgur perversum* from Chokoloskee Key. It is beautifully wrought, the two holes being round<sup>1</sup> and carefully cut to allow a handle to pass to the right of the columella in a way that would bring the sharp cutting edge



FIG. 33.—Shell implement. Chokoloskee Key. (Full size.)

at the beak at right angles to a handle. The body whorl has been cut several inches back. There is a small rude hole above the periphery of the kind we have referred to. This implement would serve admirably as a gouge.

<sup>1</sup> A part of the axis showing to the left of the farther hole takes away from the circular appearance in the reproduction.

Fig. 33 is of a lighter *Fulgur perversum*, also from Chokoloskee Key. Two round holes would allow a handle to pass through the shell to the right of the axis,

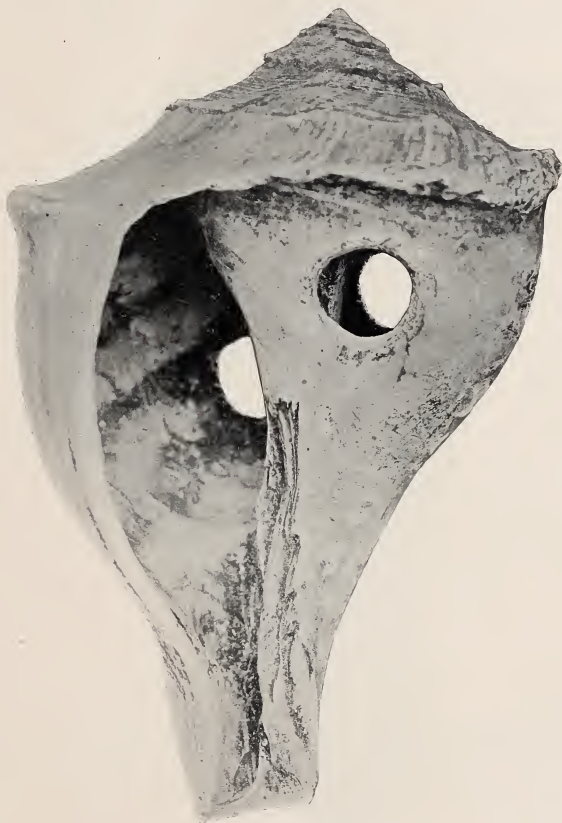


FIG. 34.—Shell implement. Goodland Point. (Full size.)

at an angle to the ground beak. A large round additional opening is present, perhaps made to allow a firmer lashing of the handle to the axis. A considerable portion of the body whorl has been removed.

Fig. 34 is a representation of a heavy *Fulgur perversum* from Goodland Point. Part of the body whorl has been removed, as in other specimens, perhaps to facilitate balance, certainly to obviate the necessity of making a second hole through the overlapping whorl. A small rude hole is above the periphery. Two round



FIG. 35.—Shell implement. Goodland Point. (Full size.)

perforations have permitted a handle to pass through to the right of the axis, bringing the cutting edge, which is carefully ground from the inside, at an angle to the handle. A third hole to the left of the axis was probably for additional attachment of the handle. This implement was presumably a gouge.

In Fig. 35 we have a *Fulgur perversum* from Goodland Point, showing a modification of the two preceding types. Round and carefully made holes would bring a handle to the right of the column, at an angle to the gouge-shaped cutting edge, but, in place of an additional hole for thongs to pass through to lash the handle to the axis, the upper part of the shell, including the spire, has been removed. This is a common type along the west coast.

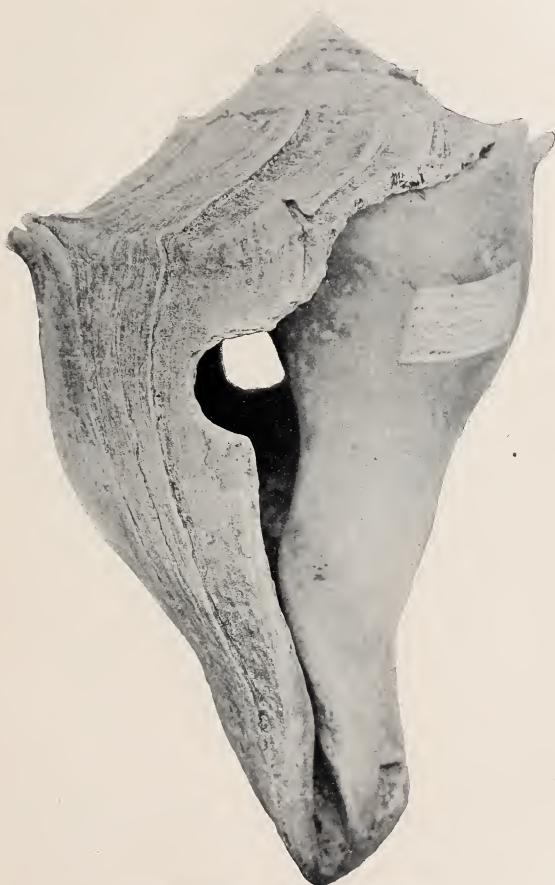


FIG. 36.—Shell implement. Mound Island. (Full Size.)

A massive *Fulgur perversum* is shown in Fig. 36, which, unlike the other shells described, did not come from the surface but lay, one foot down, in the muck in the main canal at Mound Island, Estero Bay. In this specimen are present the small hole above the shoulder and the partial removal of the body whorl from the edge back. A deep notch allowed a handle to pass to the left of the axis through a round hole in the back of the shell. The massive beak is ground to a straight cutting edge, which would be at a slight angle to a handle.



FIG. 37.—Shell implement. Mound Island. (Full size.)

Fig. 37 shows a *Fulgur perversum*, also from Mound Island, with considerable portions removed and in all respects similar to a specimen previously described save that, in place of the double perforation allowing a handle to pass to the right of the axis, the handle, resting in a notch, would pass to the left of the axis through a circular hole on the farther side.





FIG. 38.—Shell implement. Chokoloskee Key. (Full size.)

The implement shown in Fig. 38, a *Fulgur perversum* from Chokoloskee Key, is a variant in that, though deeply notched at the edge of the whorl, the hole at the other side of the shell is not in line to permit the passage of a handle. It is possible the handle abutted against the interior of the shell and was lashed to the axis through the perforation.



FIG. 39.—Shell implement. Chokoloskee Key.  
(Full size.)



FIG. 40.—Shell implement. Goodland Point.  
(Full size.)

Fig. 39 shows a *Fulgur perversum* with notch and single perforation. So much of the shell has been removed that the columnella is exposed. The beak is rounded. This implement, which is from Chokoloskee Key, was probably used as a hammer.

Fig. 40 gives a type frequently met with on the west coast, namely, the upper portion of a *Fasciolaria gigantea* containing two holes for a handle, with the long axis extending from it, rounded at the beak by use as a hammer. This specimen comes from Goodland Point.



FIG. 41.—Shell implement. Chokoloskee Key.  
(Full size.)

Fig. 41, from Chokoloskee Key, shows a *Fasciolaria gigantea* with somewhat more of the shell, containing two perforations for a handle and a third to allow a firmer attachment to the axis. Much of the beak has disappeared, probably through use as a hammer. This type also is frequently met with on the west coast.

Fig. 42 represents a small and light *Fulgur perversum* from Fikahatchee Key, with notch opposite the perforation. The beak is ground for use. A series of small round holes encircles the shell above the shoulder. This specimen, which is slightly foreshortened in the reproduction, is unique in our experience.



FIG. 42.—Shell implement.  
Fikahatchee Key. (Full size.)



FIG. 43.—Shell implement. Fikahatchee Key. (Full size.)



FIG. 44.—Shell implement. Goodland Point. (Full size.)



FIG. 45.—Shell implement. Russell's Key. (Full size.)

Fig. 43, a *Fulgur perversum* from Fikahatchee Key, with much of the shell removed, is greatly worn and rounded at the beak. Presumably in its use a handle was dispensed with.

Fig. 44, a *Strombus gigas*, is the same type of implement as the preceding. It came from Goodland Point.

Fig. 45 is a *Strombus pugilis* from Russell's Key, with two holes to permit a handle to pass through to the left of the axis. The beak is much chipped. In all probability, this little shell was used as a hammer to open shell-fish, and is of the kind we found in such quantities at Indian Hill.

It will be noted that the type of implement of which we write, on the west coast of Florida was almost universally made from *Fulgur perversum*<sup>1</sup> or *Fasciolaria gigantea*.

*Fulgur carica*, on the average, is a much stouter shell than *Fulgur perversum*, and was very generally in use on the east coast and on the St. Johns river for the helved implements under consideration. On the west coast *Fulgur carica* is not found, so that the aborigines of these parts were compelled to look to *Fasciolaria* and heaviest forms of *Fulgur perversum*, which, however, as our illustrations show, were often amply sufficient. *Fasciolaria gigantea* is of rare occurrence on the east coast, and we have never seen these implements made from it there.

Irrespective of the shell in use, there are other points of divergence between these implements from the west coast on one hand and from the east coast and from the St. Johns river on the other.

On the east coast and on the St. Johns the shells, practically without exception, have holes for the handles rudely made,—knocked out, apparently. On the other hand, openings for the helves in the shells of the west coast are frequently round and carefully made, as may be seen by reference to the illustrations, though at times, perforations on the west coast are rude also.

A type found only on the west coast, we believe, shows the removal of a large portion of the shell on one side, as is shown in certain of the illustrations. Implements of this type were found by Mr. Cushing in the muck at Marco with wooden handles in place.<sup>2</sup>

Another feature peculiar to the west coast is the cutting of a notch into the margin of the aperture opposite a perforation in the body whorl, as shown in certain of our illustrations, the notch taking the place of a second perforation. We have seen this notch on the St. Johns river but once or twice, where it was present on a *Fulgur perversum* with a carefully wrought hole. The shell was associated with columellæ of *Fasciolaria*, all probably an importation from the west coast.

It is but comparatively recently that the uses of these implements wrought from entire shells have been looked into with attention.

Professor Rau figured and described<sup>3</sup> them as war clubs.

In the *American Naturalist* (August, 1893, p. 720, *et seq.*) we combatted this view on the grounds that many of the shells were too small to be formidable; that the size of the holes often gave evidence of handles too slender to sustain a heavy shock; that the beaks of the shells frequently showed much chipping and wear, which would not be the case if kept for use in battle. We pointed out, also, that the acute angle at which the heavy shells themselves were sometimes placed on the handles on the east coast would indicate employment as hoes rather than use as war clubs.

<sup>1</sup> *Fulgur perversum*, if held facing the observer, has its opening to the left, while *Fulgur carica*, held in the same position, has its opening to the right.

<sup>2</sup> *Op. cit.*, p. 40.

<sup>3</sup> Smithsonian Report, 1879, p. 222.



As we have stated, Mr. Cushing found at Marco these shell tools with handles in place. On some were remains of thongs that bound them. Mr. Cushing mentions various uses for which these tools have served.

While a few of the heaviest varieties of these implements may have seen service as war clubs, it is evident that their use was widely diverse.

Dr. Thomas Wilson of the United States National Museum, Washington, D. C., is now engaged upon an investigation of righthandedness and lefthandedness among the aborigines, and to aid him in his research is examining aboriginal implements which may furnish indications bearing upon the question. In furtherance of this we have furnished Doctor Wilson with over seventy implements of the type we have just described, about thirty of which have been retained permanently by the National Museum. The remainder have been sent to the Museum of Natural History, New York, and to the Peabody Museum, Cambridge, Mass. The shells figured in this Report with others and with the collections made by us on the west coast of Florida, are at the Academy of Natural Sciences of Philadelphia, where may be seen the result of our labors in various southern States.

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## THE OSTEOLOGY OF VULPES MACROTIS.

BY DR. R. W. SHUFELDT.

As long ago as October, 1887, there was collected for me at Fort Mojave, Arizona, U. S. A., the skeleton of one of the smaller foxes of the southwestern part of the United States. It was from an adult male individual, and was taken by Private Charles Ruby, of Company A, of the 9th U. S. Infantry, who, through Professor S. F. Baird's assistance, had long collected material in the West for the Smithsonian Institution at Washington, D. C. The specimen was sent to me when I was serving at Fort Wingate, New Mexico, as post surgeon. Upon examination the skeleton was found to lack but one patella, a tooth, the clavicles, part of the hyoidean arch, and the os penis. It was labelled *Vulpes velox*.

In April, 1900, this material was still in my private collection, and upon looking into the subject, it seemed to me that the skeleton in none of the smaller western foxes had ever been fully described. On Plate XXXIV, in Baird's *Mammals of North America*, there are three views given of a skull of *Vulpes velox* with two of the mandible. These are quite accurate, as they were carefully compared by me with a good average skull of that species. Mivart gives the dental formula of *V. velox* in his well-known work on the Canidae, and Professor Huxley had a skull of this fox at hand at the time he wrote his valuable paper *On the Cranial and Dental Characters of the Canidae*.<sup>1</sup> As this species was known to Say, and to Audubon and Bachman, it is very likely that reference has been made to it many times since their day, but there seems to be no complete account of its skeleton extant or of that of any of its near congeners or allies in the southwest.

Very recently this skeleton was kindly examined for me by Mr. Gerrit S. Miller, Jr., of the Department of Mammals of the United States National Museum, and carefully compared with such material as was necessary representing the osteology of the genus *Vulpes* in the collections of that institution. Mr. Miller quickly made it clear that the skeleton in my possession had belonged to an individual of the species known as *Vulpes macrotis*, a form closely allied to *V. velox*, and not to the latter form, from which it was easily distinguished by a number of very good characters, both osteological and otherwise. This well-known mammalogist was also good enough to loan me an example of the skull and mandible of *V. velox*, belonging to the United States National Museum, for use in the way of comparison in the present account. This skull was from a specimen collected by the late Doctor Elliott Coues on the Souris River, Dakota, and was a male

<sup>1</sup> P. Z. S., April 6, 1880.

animal.<sup>2</sup> At this time the National Museum does not possess a skeleton of either *V. velox* or *V. macrotis*, although there are skeletons of other foxes in the collections.

It is not the object of the present memoir to enter in detail into the subject of the position of the Canidæ in the system, much less to make an exhaustive comparison of the skeletons of the genus *Vulpes*, although that would be an excellent task to accomplish. Unfortunately the material is not at hand at the present writing to carry out either of these projects, so the best that can be done at this writing is to offer as complete an account of the skeleton of *Vulpes macrotis* as possible; then naturalists in the future, better supplied with material, will be able to utilize this contribution in their researches.

Flower, in his *Osteology of the Mammalia*, has truly said that a "perfect arrangement of any group of animals can only be attained simultaneously with a perfect knowledge of their structure and life-history. We are still so far from this that any classification now advanced must be regarded as provisional, and merely representing our present state of knowledge. Moreover, as naturalists will estimate differently the importance to be attached to different structural modifications as indicative of affinity, it must be long before there will be any general agreement upon this subject." It is now about twenty years ago since Professor Flower penned those words, and they are quite as true to-day as the day he wrote them. Several years afterwards, in his masterly contribution to the ninth edition of the *Encyclopædia Britannica*, on the *Mammalia*, he recognizes a Section Cynoidea of the Carnivora, in which the single family Canidæ is placed, to contain all of the "dog-like animals," they holding, as this eminent authority seemed to think, "an intermediate position between the other two sections (Æluroidea and Arctoidea), retaining also many of the more generalized characters of the ancient members of the order. The structure of the auditory bulla and adjacent parts of the bones of the skull is quite intermediate between that of the Æluroid and Arctoid forms. In the number and arrangement of the teeth they more nearly approach the primitive heterodont type than any other existing Carnivora."

Flower divided the family Canidæ into two series, with several genera in each,—thus :

| <i>Family.</i> | <i>Series.</i>                  | <i>Genera.</i>   |
|----------------|---------------------------------|--|
| CANIDÆ.        | A.—Thoid or Lupine Series.      | {<br>1. CANIS.<br>2. CYON.<br>3. LYCALOPEX.<br>4. NYCTEREUTES.<br>5. ICTICYON. |
|                | B.—Alopecoid or Vulpine Series. | {<br>6. VULPES.<br>7. FENNECUS.<br>8. LYCAON.<br>9. OTOCYON.                   |

It was Professor Huxley, in his memoir *On the Dental Characters of the*

<sup>2</sup> No. 15,355, Coll. U. S. Nat. Mus.

*Canidae*,<sup>3</sup> who first established or distinguished these two series of the *Canidae*, and in doing so he admitted that "within each of these series there are considerable modifications, which give rise to corresponding terms in the two series." It appears that the first of these modifications is in the proportion of the sectorial and next following teeth relatively to the basicranial axis, which axis is taken at the value of 100, and is a line, measured mesiad on the base of the skull (bisected) extending from the posterior border of the basioccipital bone to the articulation between the presphenoid and the ethmoid. It is evident, as Professor Huxley adds, that the "measurements of the other parts of the skull can then be expressed in terms of 100, and their development, irrespectively of the absolute size of the animal, becomes apparent."

The second modification noticed refers to the extent of the areas for the insertion of the temporal muscle upon either side of the skull. Huxley observed that "in all young canine animals, the upper edges of the attachment of the temporal muscles are separated by a wide interspace of a lyrate form, with its apex directed posteriorly, which may be called the *sagittal area*. The boundaries of this area are but little raised; and, as age advances, it becomes gradually diminished by the approximation of the temporal muscles. This approximation takes place more rapidly behind than in front, and results in the narrowing, and in most cases coalescence, of the temporal ridges throughout the greater part of the length of the sagittal suture, while in front they diverge to the supra-orbital processes and inclose the glabellar area." This very distinctive feature is well seen in the skulls I have at hand, for in *Vulpes velox* and *V. macrotis*, the sagittal area, though unlike in form in both, is large and distinctly defined, while in all the skulls of a series of *Canis latrans*, collected by me in New Mexico and Arizona, this area is reduced to a median ridge of narrow width, and extending as far forward as the coronal or fronto-parietal suture. This ridge is longitudinally marked in the median line by the sagittal suture for the anterior two-thirds of its length.

In speaking of a third modification, Huxley remarked that "In most of the Alopecoids, the contour of the inferior margin of the angular process continues the direction of that of the inferior margin of the ramus in front of it; and this slopes gradually upward and backward. In *C. littoralis* and *C. cinereo-argentatus*, however, the inferior contour of the ramus in the region of the attachment of the digastric muscle, in front of the angular process, is inclined almost at right angles to the latter, and forms a sort of rounded 'subangular lobe' beneath the angular process. De Blainville long since figured and called attention to this feature of the mandible in *C. cinereo-argentatus*." The angular processes, as well as the subangular lobes, are characteristically the same in *Vulpes velox*, *V. macrotis* and in *C. latrans*. They quite closely agree with what Professor Huxley found in *C. fulvipes*. Further on in the present paper reference will again be made to some of the data set forth in this excellent memoir.

<sup>3</sup> P. Z. S., 1880, p. 248.

## THE SKULL.

Both the skull (Plate XXII, figs. 1-7) of *Vulpes macrotis* as well as that of *V. velox* before me, belonged to individuals that had not fully reached maturity. This is clearly proven by the fact that both the cranial and the facial sutures are still very evident and easily traced. This is also the case with one of my skulls of *Canis latrans*, while in another skull of the same species the sutures are all nearly obliterated, while other evidences of advanced age are present. These changes are well known to students of mammalian osteology, and are sometimes very remarkably exemplified: the skulls in extremely old individuals varying widely in their external appearances from those of subadult specimens of the same species, and to an extent to sometimes almost lead to the belief that the animals to which they severally belonged were not of the same species. This is a fact that paleontologists bear well in mind, and there are instances upon record where mistakes, due to the non-appreciation of these changes, have occurred.<sup>4</sup> The manner in which they effect the appearance or morphology of the temporal fossæ and sagittal crest in the Canidæ has already been noticed above, and it remains but to say that during their progress there is no appreciable change either in form or appearance of the brain-case within. These changes occur in many mammals, and are particularly noticeable in the elephant.

Viewed upon its *superior surface* it will be seen that the cranium of *Vulpes velox* has a subglobular form with the temporal areas slightly roughened, and the extensive shield-shaped sagittal area quite smooth. The apex of the latter is towards the interparietal bone, and the sagittal crest is barely perceptible, even posteriorly, where in *Canis latrans* it is very conspicuous. In both *Vulpes macrotis* and *V. velox* the coronal suture and the posterior two thirds of the sagittal exhibit interlocking serrations of the apposed margins, a condition that likewise obtains in the frontal suture of the skull of *V. velox*.

All the other sutures upon this aspect of the skull in these two foxes, as well as in the coyote, have smooth margins, especially the nasal and inter-nasal ones. Either post-orbital process is well developed, being a triangular ledge of bone, with its apex directed backward and outward, and its superior surface showing a decided depression, better marked in *macrotis* than in *velox*, while in *Canis latrans* it is not present at all, that surface being rounded, and the process, bluntly pyramidal in form, extending directly outward. Proportionately, the skull in *V. macrotis* is longer and narrower than it is in *V. velox*, and this is well seen in its facial portion on the surface we are now considering, where in the first-named fox this feature is markedly the case.

<sup>4</sup> In this connection Flower has said that these changes or modifications "depend mainly on the fact that the brain, and consequently the cavity which contains it, and also the sense capsules, increase in size in a much smaller ratio than the external parts of the head, especially the jaws and prominences for the attachment of muscles. The disproportionate growth and alteration of form of these parts, concomitant with little or no change in the brain-case, is effected partly by increase in thickness of the bones, but mainly by the expansion of their walls and the development of cells within, which greatly extend the outer surface without adding to the weight of the bone."—*Osteology of the Mammalia*, 3d Ed., p. 148.



The *zygomatic arches* are prominently developed in these animals, and possess the same general characteristics in both species. Their extremities, composed of the usual bones, face directly upward, or, in other words, they have a superior and an inferior surface, the zygomatic or squamosal end being triangular and small, while the malar-maxillary extremity is also triangular, but broad and extensive. The middle third of the arch possesses an internal and external surface, the superior and inferior margins being somewhat sharp and curved,—the upper one convex and the lower concave, Plate XXII, fig. 1.

In *Vulpes macrotis* the fangs or roots of the last molar tooth ( $m^2$ ) upon either side perforate anteriorly the zygomatic arch. These perforations occur just within the postero-mesial borders of the expanded portion, there formed by the maxillary bone, Plate XXII, fig. 7. Similarly perforations also occur in *Vulpes velox* and in *C. latrans*. Viewing the skull directly from above, the post-orbital processes shut these *molar foramina* out of sight in the majority of skulls, but they are sometimes seen upon this aspect in *macrotis*, because it has such a narrow skull and flaring zygomatic arches.

As in the Canidæ generally, either *nasal* is a long, narrow bone, which, with the fellow of the opposite side, extends from a point opposite the anterior margin of the orbit to the supero-mesial boundary of the anterior nares. Here the border of either bone is notched and free, the two together completing about a fourth of the narial aperture. In *Canis latrans* their anterior extremities are truncated from their antero-external angles backward obliquely to their postero-mesial angles. Their hinder ends in *Vulpes macrotis* articulate with the frontals and are likewise truncated, the two bones together forming a wedge, entering between the frontals, its apex being situated posteriorly. The external border of a nasal articulates with the corresponding borders of the frontal, maxillary and premaxillary of the same side. In this situation the *nasal process of the frontal* tends to extend forward to have its anterior apex meet the apex of the *nasal process of the premaxillary*.

Between these two species, however, a greater or less interval occurs, greater in *velox* than in *macrotis*, while in some of the Canidæ (as figured by Huxley) they seem actually to meet. It is certainly the case in *Canis littoralis*, and may occur in *Canis vulpes*. Foxes and other forms in the family with shorter faces may have the apices of these processes well apart. There is a very considerable interval, for example, in *Octocyonalandii*. Upon the posterior aspect of the skull of *Vulpes macrotis* it is to be observed that in the median line above is the well-developed *inter-parietal bone*, with its contracted anterior angulation extending forward between the parietals, with its similar and lateral projections lying, on either hand, between the corresponding parietal and supraoccipital. Its mid-longitudinal line is co-extensive with the comparatively feebly developed sagittal crest; the low but well-defined *occipital crest* traverses from side to side its lateral projections. The parietal sutures of the interparietal long remain visible or even ununited, while the bone seems to early ankylose with the supraoccipital. This is also the case in other Canidæ and in many domesticated dogs. As in all true foxes the *supraoccipital*

is comparatively large and broad, with its internal and external surfaces quite smooth. For the most part it lies in the vertical plane, being perpendicular to the basi-cranial plane.

*Vulpes macrotis* possesses a very large *foramen magnum*, a trifle larger in proportion than it is in *V. velox*, and very distinctly so in comparison with that foramen in *C. latrans*. For example, the transverse or major axis of the subelliptical foramen magnum in *V. macrotis* measures 1.3 centimeters, its minor vertical axis 1.1 cm. and the mid-longitudinal axis of the skull, from the border of the foramen magnum to the most anterior point between the premaxillaries, measures 10.2 cms. In *C. latrans* the corresponding measurements are 1.8 x 1.4 cms., and 18.5 cms. The *occipital condyles* have their narrow and mesial moieties in the horizontal plane where they are but barely separated in the middle line. Their broader and more rounded halves curl upward, one upon either hand, and their anterior borders are markedly concaved, being correspondingly convex behind.

As in the Canidæ generally the *paroccipital processes* are conspicuously developed. Either one, as a strong projection, descends and completely molds itself upon the superior and posterior aspect of the corresponding *auditory bulla*, lending to it considerable support. Between either par-occipital process and the occipital condyle of the same side, there is a narrow though deep valley, while to the outer side of the process, upon this aspect of the skull, may distinctly be seen the mastoid portion of the petriotic bone. It is bounded in front by the low, thin, sharp line of the *lambdoid* or *occipital crest*.

Turning to the lateral aspect of the skull in *V. macrotis*, Plate XXII, fig. 1, the long, narrow face that this fox possesses at once becomes apparent. The lengthy and acute backward projecting naso-maxillary process of the premaxillary is distinctly seen, as is the sutural line between the maxillary and frontal and malar bones. It is tangent to the periphery of the orbit in front, and passes beneath it, below. Forward of this, and above the diastema existing between the third pre-molar and sectorial teeth, is the large and vertical slit-like *infraorbital foramen*, for the passage of the second division of the fifth nerve. Within the orbit may be seen the usual foramina and the usual bones forming its smooth, shallow, antero-mesial concavity. The upper half of this is formed by the orbital portion of the *frontal*; anteriorly by the small *lacrymal*; below by the *pterygoid* and *maxillary*; externally by the malar; and postero-mesially by the *palatine*, *orbito-sphenoid* and the *atisphenoid*. The various foramina require no special description, as they make no particular departure from those openings as they occur in the skull of the common dog. A description of the *zygomatic arch* has already been given in a previous paragraph.

In *Vulpes macrotis* the *meatus auditorius externus*, is somewhat larger, in comparison, than in *V. velox*; very much more so than in *C. latrans*. Indeed, the opening is so large in the specimen at hand that the interior of the *tympanic cavity* can easily be studied from without. The *ossicula auditus* (*malleus*, *incus* and *stapes*) all appear to be lost, and so cannot at this writing be described.

Firm osseous union has solidly sealed together the various bones bounding the auditory chamber, as the *periotic*, the *squamosal* (above), the *tympanic*, and the *auditory bulla* (beneath), while to the inner side we see the *basal* and *exoccipital*. The sutures among the *squamosal*, *parietal*, *alisphenoid*, and *frontal bones* upon the lateral aspect of the skull, remain clearly defined for the greater part of the animal's life, and it is only in Canidæ of extreme old age that they become to some degree faintly defined or almost obliterated.

Passing to the consideration of the base of the skull in *Vulpes macrotis* it is interesting in the first place to note the extent of difference existing between it and a skull of *V. velox* seen upon the same view, Pl. XXII, figs. 5 and 6. Upon examination of material in the United States National Museum it would appear that these differences are constant and diagnostic. Principally, there are three of them that are evident upon casual observation:—In *V. macrotis* the osseous palate is transversely much narrower than in *V. velox*. This is especially noticeable in the distance between the carnassial and first molar teeth of the opposite sides. The *malar portion* of the zygomatic arch is deeper in the antero-posterior direction in *macrotis* than in *velox*. The *auditory bullæ* are comparatively larger in the first-named fox than in the last-named. This character is very evident when we come to compare series of skulls of these two well-marked species. In general the entire skull of *V. macrotis* is thinner and more delicately fashioned than in *velox*, and its being narrower throughout is easily appreciated upon comparison, either from a dorsal or ventral aspect, Pl. XXII, figs. 2, 5, 6 and 7.

In the bony roof of the mouth in the specimen of *V. macrotis* at hand, the sutures defining the limits of the *premaxillary*, *maxillary* and *palatine bones* have become almost entirely obliterated. This is not usual in other Canidæ, unless age has very far advanced. We know, however, that in this family the suture between the maxillaries and premaxillaries in this situation is a transverse one, extending from a mid-point upon one canine tooth to pass directly across to the one upon the other side,—the two, long, slit-like *anterior palatine foramina* lying partly upon the maxillary side of the boundary, Pl. XXII, fig. 5. Otherwise, upon either side, the maxillary supports the dental armature of the upper jaw in this, as in other true foxes, namely, the four premolars, and the two true molars, each premaxillary supporting three inciser teeth. Posteriorly, the free margins of the *palatines* are rounded, forming, as they do, the anterior border of the posterior narial aperture. Upon either side, the palatine bones are continued backward by the thin and compressed *pterygoid bones*, which here, as vertical plates, descend directly downward from the alisphenoids, terminating below in free laminae of bone, each known as the *hamular process* of the pterygoid. Each is represented by a thin triangular plate of bone in a vertical longitudinal plane, separated by an interval of nearly a centimeter in width. The valley thus created is deep and of some length (2 cms.), it being the backward extension of the narial passage, and forms in the Canidæ a conspicuous feature of the mid-basal area of the skull. Above, either *pterygoid* articulates with the under surface of the *presphenoid* and the *basal-sphenoid bones*.

In the middle line of the base of this skull of *V. macrotis*, proceeding from before backwards, we are enabled to see the *vomer*, the *presphenoid* and the *basisphenoid*, and the sutures among them are fairly well defined. Still more posteriorly the *basi-occipital* creates the roof of the narrow, but deep passage between the *auditory bullæ*, and its lateral margins are raised that they may better articulate with those remarkable osseous capsules upon either side. Upon examining the aperture of the *Eustachian canal*, the *foramen lacerum medium*, the *foramen ovale*, *foramen rotundum*, the *alisphenoid canal*, the *postglenoid foramen*, the *foramen lacerum posterius*, the *condylar foramen*, the *stylomastoid foramen*, and some few other features in this region of the base of the skull, they are seen to agree with what is already known as to the cranial osteology of this family of mammals.

The glenoid fossæ are narrow and elongated; their long axes being perpendicular to the longitudinal axis of the skull. Behind either one is a conspicuous *post-glenoid process*, curving downward and forward, and serving to retain the condyles of the mandible in their sockets during life. Either *auditory bulla* is hemi-ellipsoidal in form,—thin and hollow. The exposed convex surface is extremely smooth, though in some species of the Canidæ it may be slightly roughened by delicate venations, but these are absent in the genus *Vulpes*. Within the cranial casket a well-defined *sella turcica* is seen, and upon either hand, the internal surfaces of the *orbito-sphenoid bones*. Anteriorly, the posterior margin of the *mesethmoid* is inserted, forming, as usual, the *crista galli*. The *cribriform plate* is extensive, and presents two suboval moieties with the posterior surfaces facing backward and very slightly, upward. Internally, this plate is perfectly smooth, and the foraminal perforations exceedingly numerous.

As is the case in *Canis latrans*, and other Canidæ, the dense inner surface of the vault of the cranium is marked by convolutions, to receive the corresponding convolutions of the brain-mass, while the *tentorium cerebelli* very extensively ossifies. All the fossæ of the brain-case—*cerebellar*, *cerebral*, and *olfactory*—are well marked off, and comparatively capacious. Other features of the interior of the brain-case are present, but being well known require no special description here.

The spongy bones of *V. macrotis* were not studied in section, but they are probably as complicated as in *C. latrans*, of which such a sectional preparation was examined.

That they are so in many of the domesticated dogs has been clearly shown by the late Sir William Henry Flower.<sup>5</sup>

These *turbinal masses* of bone in the olfactory chamber of the skull in mammals are worthy throughout the class of our very closest study. Morphologically they are full of interest, and should never be set aside as was the habit of the late Dr. Elliott Coues, who thought them too complicated to be worthy of description. Such an unscientific opinion was fully controverted by the late keen anatomist, Dr. Harrison Allen, who devoted an entire memoir to the comparative morphology

<sup>5</sup> Osteology of the Mammalia, pp. 129, 130.



of these ossifications in many of the mammalia. They appear to be of certain taxonomic value among the bats.

The *hyoidean apparatus*, in so far as its osseous parts are concerned, is not complete in this skeleton, some of the delicate bones having been lost. There is every indication, however, that it in no way markedly departs from the corresponding structures in other small foxes, and in the main with the Canidae generally. Professor Flower gives an excellent account of the hyoidean apparatus of the dog in his *Osteology*, and I have studied these visceral arches in both adult and embryonic types among the mammalia. They are more or less uniform for the family, and among the Canidae, if my information be correct, present hardly any generic differences. The *mandible* has the general form of that bone in the family Canidae (Pl. XXII, figs. 1, 3 and 4), it being V-shaped in form, and ankylosed quite firmly anteriorly by an extensive symphysis. By active maceration, however, the two elongated rami will separate at this point, as has been the case in jaws of the coyote and kit fox at hand. According to some authorities, in very old animals the union may become complete and firm through coössification. In *V. velox* a ramus of the mandible is shorter, deeper, and thicker through and through than it is in *V. macrotis*, in which latter fox it is evidently more delicately fashioned. Either ramus has an extreme length of about 7.9 cms., its lower margin being thickened and rounded, convex in the antero-posterior direction, and very slightly curved from side to side. Its upper border exhibits the sockets for the implantation of the mandibular teeth, six much smaller ones occurring anteriorly on the united rami for the incisors. The *symphysis* has a length of about 2.3 cms., it being more extensive in front and tapering off behind. Between a canine socket and the coronoidal vertical portion of the jaw, the *alveolar border* is quite straight, while nearly a level surface exists anteriorly and above the symphysis bounded by the sockets of the first premolars, the canines and the incisors. The *condyles* stand out quite prominently, being transversely elongated, narrow and attached by their mid-anterior points at right angles to the plane of either coronoidal portion of the jaw, at points about half way between the apices of the *coronoid processes* and the *angles*, or about in the same plane in which the alveolar borders lie. The *coronoid process* upon either side is flat and smooth on its mesial surface, and concave throughout upon its external aspect. It is, on the whole, moderately recurved backward, the true apex being pointed in that direction. Its anterior border, externally, is thickened and there forms a narrow though conspicuous rim. At either *angle* there is a prominent *angular process* developed, which is present in the jaws of all of the Canidae examined by me. Anything approaching a subangular lobe, however, is quite absent,—in which character, strange to say, it agrees with *Icticyon venaticus*, but not with *Otocyon lalandii* (where this lobe is much produced), nor with *Canis azaræ* and *C. littoralis*. On the mesial aspect of either ramus below and between the condyle and the posterior commencement of the alveolar border, we meet with the *inferior dental foramen*, it being of some considerable size, and opens directly backward.



On the external surface of either ramus in front there are to be seen two more foramina,—the anterior one is the *mental foramen*, and is at a point below the diastema between the first and second premolars; the other, behind it, smaller in size, is slightly in front of the corresponding interval between the second and third premolars. In *C. latrans* they are nearly of a size, and the posterior one is immediately below the centre of the third premolar. In all instances these foramina are in the same horizontal plane and midway between the alveolar and lower border of the ramus. Viewing the ascending portion of either ramus from behind, it will be seen that it curves gently outward, which is the case in all of the Canidæ.

Professor Huxley made some interesting comparisons of this aspect of the mandible among groups more or less remotely or nearly allied to the canine group.<sup>6</sup>

#### THE AXIAL SKELETON.

*Vulpes macrotis* may be said to have a somewhat delicate frame constituting the skeleton of its trunk. The cervical, dorsal and lumbar vertebrae all possess thin, sharpened and produced processes, thus doing away with all appearance of heaviness in structure or bulkiness in form, as we notice in some small mammals. The caudal vertebrae again are slender and elongated, making the skeleton of the tail appear lash-like and frail. Much lateral compression characterizes the skeleton of the thorax, the ribs being long and not at all stout, while the sternum has a corresponding structure, the segments composing it being small, elongated, and more or less slender. For the size of the animal, the pelvis is rather a stout bone, but at the same time by no means strikingly so. In the *number of vertebrae* possessed by *Vulpes macrotis*, or in the specimen now being examined by me, it agrees exactly with a specimen examined by Sir Wm. Henry Flower of *Canis vulpes*; in other words, it has seven cervicals, thirteen dorsals, seven lumbar, three sacrals, and twenty-one caudal vertebrae. Professor Flower met with a specimen of *Canis lagopus* that had the same number in the various divisions of the vertebral chain, while in another case of *Canis vulpes* the animal had but nineteen caudal vertebrae. All of the ferine forms of the Canidæ, so far as we know, possess seven cervicals and three sacrals. Variation sometimes takes place in the domesticated breeds of dogs in the lumbar and sacral regions, as Flower found a German boarhound with fourteen thoracic or dorsal vertebrae; Newfoundland and mastiffs with eight lumbar vertebrae; and a greyhound with four sacrals. *Canis procynoides* has fourteen thoracic and but six lumbar vertebrae, and *C. vulpes* has been known to have the same number. *Otocyon megalotis* has the usual number in the series, but has twenty-two vertebrae in the skeleton of its tail. It is this caudal part of the vertebral column that varies most in this particular. Omitting the domesticated breeds of dogs, however, it probably can be said with truth for the Canidæ that the number of caudal vertebrae are never less than fourteen (*Iticyon venaticus*) nor more than twenty-two, which is the case, as has just been noted, in *Otocyon megalotis*.

<sup>6</sup> P. Z. S., 1880, p. 263, fig. 14.

The *atlas* is the broadest bone of the entire column, though the spreading transverse processes of the last lumbar gives it nearly an equal breadth. No vertebra in the entire chain at all resembles the atlas in form. It is about twice as wide as it is long, and its big neural canal is bounded on either side by the narrow cap-like articulations for the condyles of the occiput. Either quadrate, horizontal transverse process is pierced, near its middle, by the vertebrarterial canal, the foramen for the first spinal nerve being anterior to this just within the supero-anterior border close to the condyloid cup. A rudimentary hypapophysis exists, but the neural spine is entirely absent. There is a smooth articular facet present for the articulation of the long, peg-like odontoid apophysis of the axis. It is situated in the middle line inferiorly within the neural canal. The thin, sharp, lofty neural spine of the *axis* extends the entire length of that bone, and projects conspicuously beyond the centrum in front. The hæmal spine is likewise laterally compressed, but it is feebly developed and principally confined to the hinder part of the centrum of the vertebra. This is likewise the case with the third, fourth and fifth cervicals, this inferior spine being absent upon the sixth and seventh cervicals, as it is completely so from the balance of the vertebral column. Neural spines, however, are found upon the last five cervicals, where they increase in height and sharpness as we pass backward in the direction of the thorax. Large, strong zygapophyses characterize the cervicals, and the transverse processes are thin, sharp and conspicuous. In the second to the sixth inclusive they are bent downward and project beyond the centra both in front and behind. These processes become suddenly contracted in the seventh cervical, where they more closely resemble those in the pre-dorsal series. Upon either side the vertebrarterial canal passes through all of the cervicals, save the seventh or last one.

Metapophysial processes are first seen feebly pronounced on the third cervical, they grow stronger and stronger from before backward to include the sixth. On the seventh they are more or less aborted, as they are upon the first five dorsals, when they again make their appearance upon the sixth dorsal, as a feeble pair of minute spines pointing backward. After this they gradually increase in size to diminish again on the fourth lumbar, being entirely absent in the fifth, sixth and seventh lumbar, and the remaining part of the column.

The *ten* first dorsal vertebræ are more or less like each other, while the last three dorsals, although they support true ribs, resemble the first lumbar. In the ten first dorsals the neural spines are very prominent, being well separated from each other in the articulated skeleton, lofty, laterally compressed, narrow, with nearly parallel anterior and posterior borders. This spine in the leading dorsal or thoracic vertebra has a height of two centimeters, and it is nearly perpendicular to the longitudinal axis of the centrum. In the tenth dorsal the neural spine is but one centimeter high, and the process leans backward. Between these two extremes a gradual change in form and height takes place from the first to the tenth inclusive. Thoracic vertebræ have their zygapophyses much reduced, but the interlocking among them is very firm. Transverse apophyses are also inconspicuous in

this part of the column. Laterally the heads of the ribs upon either side articulate *between* the facets of the centra, except in the last two pair, where they articulate entirely upon the body of the vertebra to which they belong. From the eighth thoracic to the ultimate lumbar inclusive the vertebrae increase in size and conspicuoussness. The neural spines, situated upon the fore part of the centra, lean forward, and are thin, narrow and laterally compressed. We find the tallest in the middle of this series, while the zygapophyses are strongly tilted upward in the last three dorsals and leading lumbar, to become slightly less and less so as the pelvis is approached.

The transverse processes, bent downward, forward and outward, are narrow, thin, sharp plates, compressed from above downward, and in the last of the series have somewhat dilated ends. They are hardly to be noticed in the last three thoracics, but after that they gradually commence to lengthen, until those on the last two lumbar vertebrae attain a length of two centimeters each. The neural canal appears to have the least calibre in the post-thoracic region, and the greatest in the pre-cervical and post-lumbar. Throughout the chain at their ordinary sites in the carnivora, the usual foramina exist between the vertebral centra for the exit of the pairs of the spinal nerves.

The three *sacral vertebrae* are all firmly ankylosed together, and present, both dorsally and ventrally, two pairs of neural foramina. Small neural spines are also present, but no haemal ones. With respect to size, the first sacral is the biggest. It and the second offer strong lateral abutments for the ilia of the pelvis. It is only the fore part of the last sacral that does this,—the postero-lateral processes of this vertebra being free and directed backward and outward. Somewhat similar ones are developed upon the four leading caudal vertebrae, but the rest of the series of those in the tail become more and more rudimentary and elongated as we pass toward its tip, the last few again shortening, to become mere rodlets of bone, with barely any semblance whatever to a true vertebra.

*The Sternum.*—Agreeing with other small vulpine forms among the Canidae, this part of the skeleton in *Vulpes macrotis* consists of *eight* pieces,—one being the *presternum*, one *xiphisternum*, and six pieces in the *mesosternum*. These latter decrease in size from before backward, being in any case but small subcylindrical rods of bone with enlarged extremities. They meet each other in subcircular disc-like articulary facettes, the mesial extremities of the cartilaginous costal ribs articulating between them, one upon either side. The *xiphisternum* is represented merely by a long very slender piece of cartilage, while the *presternum* is longer than any of these sternal segments.

Rather more anteriorly than midway on its shaft dorsad, there is a small pair of facettes, one upon either side, with which articulate the first pair of costal ribs. The apex of this piece of the sternum is bluntly rounded off. The second pair of costal ribs articulate at the junction of the presternum and first piece of the mesosternum, while at the junction of the last piece and the xiphisternum two pairs of costal ribs articulate, and the extremities of a "floating pair" approach this point.

All of this arrangement agrees with what Professor Flower found in a domesticated dog, *Canis familiaris*. The sternal or costal ribs appear to have a feeble ossification of a somewhat granular nature.

They are thirteen pairs of true *vertebral ribs*, the first pair being the shortest and the ninth pair the longest. From the 8th to the 13th pair inclusive they are very slender, but slightly curved, and decidedly rod-like. The first pair of ribs are short, rather stout, and subcylindrical in form. They are likewise curved. In the first five pair, and especially in the first three pair, the sternal moities are dilated and flattened from side to side. All the leading pairs of these ribs have their vertebral ends completely developed, possessing all the characters known to be present in the ribs of the ordinary mammalia. As we pass posteriorly the features of the vertebral heads become gradually more rudimentary, especially in the matter of the disappearance of the neck, the tubercle and the angle, the capitulum alone remaining for articulation with the vertebra above. The last two or three pairs of the costal ribs do not meet the sternum, but come in contact with the same structures in advance of them. *Vulpes velox* in all probability agrees with *V. macrotis* in all this part of its skeleton; that is, in its vertebral column, sternum and ribs.

#### THE SHOULDER GIRDLE.

Many anatomists have touched upon this part of the skeleton of the Canidæ in osteological works. For example, Sir Richard Owen, in his second volume of the *Comparative Anatomy and Physiology of Vertebrates*, on page 510, said in effect that in the Canidæ the scapula, and especially the limb-bones, are longer and more slender relatively than in the Viverridæ, Mustelidæ and in the plantigrade carnivora. The clavicles are reduced to mere styles. Years afterward, Sir Wm. Henry Flower, in his *Osteology of the Mammalia*, stated that in "the carnivora the anterior and posterior fossæ of the scapula are nearly equal in area. [Refers to the scapula of the domestic dog as an example.] The spine and acromion are fairly developed, the latter often with a broad metacromial process. The coracoid is much reduced." According to Parker "a portion of the scapula, near the coracoid border, ossifies from an independent centre. The clavicle is sometimes absent, and when present varies much in its development, but is always rudimentary and suspended in the muscles, never reaching either the acromion or sternum. In the Felidæ it is slender and curved, being longer than in any other members of the order. In the Canidæ it is very short, and rather broad and flat. In most of the Ursidæ it is absent."

The *clavicles* in the skeleton of *V. macrotis* before me are missing, but there is every reason to suppose that they agreed in their general characters with the vulpine carnivora generally; that is, in some respects they were rudimentary and did not reach either the acromion or the sternum; they have been lost in this particular specimen.

The *scapulae*, however, are thoroughly developed and strong, well-ossified bones.

The one from the left side is here shown in fig. 8 of Plate XXIII, seen upon its dorsal surface. A small double foramen, or twin foramina, are seen in the post-scapula part near the hinder margin, that may or not be present in the scapulae of other individuals. Sharp and thin, the decidedly convex margin of the *præscapula* has its bounding rim slightly thickened, but not nearly so much so as the straight margin of the glenoid or posterior border, where, too, the edge for its entire length is raised and tilted outward and backward. On the other hand, the supra-scapular border, which is very slightly convex upward, has its edge about as thick as the antero-superior part of the coracoid or anterior border, and is the continuation of it. It meets the thickened glenoid border almost at a right angle, which angle is especially thickened. As to the amount of surface, the *præscapula* and the *post-scapula* areas are about equal, while that of the *mesoscapula* presents an anterior surface about equal to half the præscapular area, and a posterior surface about equal to half the area of the postscapular. The inner or thoracic surface of the scapula is generally smooth, being but slightly ridged and roughened in certain places for the origin and insertion of muscles. There is a sub-vertical shallow groove present, extending from the glenoid cavity to the junction of the anterior and posterior borders that indicates the location of the base of the "spine of the scapula," or meso-scapula of the other side of the bone. An *acromion process* is well developed. If we hold the bone in its normal position as the animal stands up, it is gently curled backward. The coracoid is thick and strong, and it adds considerable strength to the anterior part of the glenoid cavity. This last has a subelliptical outline, is moderately concave, the major axis of the concavity being in the longitudinal direction, or in a plane roughly parallel to one in which the spinal column is situated. A slight constriction or neck joins the glenoidal portion of the scapula with its "blade." This scapula has an extreme height of about six centimeters and a width of about 3.5 cms.

*The Arm, Forearm and Manus* (Pl. XXIII).—In describing this part of the skeleton, as well as the bones of the posterior extremity, the terms of the relative position employed are those which the bones assume when the animal stands or walks in the ordinary way.

Upon examining the *humerus*, it is found to present all the usual characters found in that bone among the Canidæ generally. This statement also applies to the remaining bones of the pectoral limb, as well as to those of the skeleton of the hinder extremity. As shown in figure 9, the humerus is very slightly shorter than it actually is in life, judging from the specimen at hand. It has an extreme length of 9.2 cms., the ulna having a length of 10.2 cms., and the radius shorter than either measures but 8.7 cms.

At the proximal extremity of the *humerus* we find the smooth, convex head of the bone, with its axis directed upward and backward. There is scarcely any neck between it and the rest of the bone, though the articular portion below curls over the part commonly so considered. To its inner side is the *lesser tuberosity*, it being well developed. To the outer side of this, and distinctly marked off by the rather



shallow bicapital groove, is the *greater tuberosity*, it being broad, flattened from without inward, and having its thick, roughened, convex margin raised well above the general summit of the bone. Distally, at the other end of the humerus, the articular trochleæ are conspicuously developed, being distinctly separated from each other by an intertrochlear groove, which is especially deep posteriorly. The radial condyle is small and pitted upon the outer aspect, while the ulnar or internal condyle is more prominent, has a very sharp and raised inner boundary, and develops a tuberosity instead of a pit upon its outer side. The deep anconeal fossa is perforated by a large intercondylar foramen, and the supinator ridge, extending up the shaft from the external condyle is strongly marked. Another strong muscular ridge passes entirely down the shaft from the greater tuberosity to the internal condyle, it, at the lower end of the bone, being spirally parallel to the aforesaid supinator ridge. Between the two extremities, or the middle third of the shaft of the humerus, is otherwise smooth and subcylindrical in form; the shaft as a whole exhibiting a gentle sigmoid curve from one end to the other. Its deltoid ridge, occurring in the upper third of the shaft in the muscular line described above as passing down from the greater tuberosity, is but feebly pronounced, being not nearly as well marked as it is in some of the other carnivora, as for example in the Ursidae.

In common with all other mammals the forearm or *anti-brachium* has in its skeleton the two bones *radius* and *ulna*, both articulating with the humerus at their proximal extremities and with the upper row of the carpus, distally. Between the bones themselves the articulation is very close, both at their extremities and by elongated roughened facettes, one on either bone, at the junction of upper and middle thirds. Here a dense ligament helps to hold the bones together. As we have seen, the *radius*, although shorter than its companion, is much the stouter bone of the two, its antero-posteriorly flattened shaft is but very slightly bowed, and nearly of uniform calibre from one end to the other. Its extremities are enlarged for the articulatory purposes, as has already been stated. The facet for the humerus is of an oblong shape, and is co-extensive with the greater sigmoid cavity of the ulna. Distally, the carpal facet of the radius is much larger, also oblong in outline and concave. Here, anteriorly, on either hand occurs a deep, short groove, which in life transmits tendons. Flower says that the radius in the carnivora "differs from that of man, inasmuch as its upper end is broad, flattened and extends further across the front of the humeral articular surface, forming part of the hinge; and although it is never ankylosed with the ulna, scarcely any appreciable amount of movement is allowed between them."<sup>7</sup>

At the distal extremity of the antibrachium, the *ulna* is about equal in length to the radius, its end being considerably enlarged, projecting and mesially concaved in conformity with the radius in such a way as to complete the concavity in which the proximal row of carpal bones articulate. This distal ulnar enlargement is less than one-third of that of the radius at the same extremity. Proximally, the ulna projects over a centimeter and a half beyond the radius, the projection being the

<sup>7</sup> *Loc. cit.*, p. 274.

*olecranon* or *anconal* process,—the most conspicuous part of this bone of the forearm. It is strong, quadrilateral in outline, compressed from side to side. A deep, longitudinal notch is found on the supero-anterior angle of the olecranon. While its postero-internal aspect is somewhat concealed, caused by a prominent raised rim of the edges of the process, proximally and below. The sigmoid cavity is deeply sculpt, and its supero-anterior angle in some positions of the humerus will pass into the intercondylar foramen of that bone.

For rather more than its superior third the shaft of the ulna is obliquely flattened, so that its anterior surface looks forward and outward. It gradually contracts as it approaches the above-described articulation with the radius in the narrow "interosseous space." Below this point the shaft of the ulna is very slender and straight, and exhibits upon its inner aspect a fine, deep, longitudinal groove, which runs nearly to its distal end. Among all the carnivora we meet with this large compressed olecranon on the ulna, and observe that its shaft tapers gradually from above downward in the direction of the wrist.

In the *manus* we have the *carpus*, *metacarpus* and *phalanges*. According to Flower, "In the carnivora, the scaphoid and lunar bones always coalesce into a single *scapho-lunar* [as in *Ursus americanus*], with which the *centrale* is united, the latter never appearing<sup>8</sup> as a distinct bone, except sometimes in very young animals. The radial accessory ossicle or sesamoid is generally present. All have five digits, with the complete complement of phalanges, except the *Hyæna*, in which genus the pollex is represented only by a rudimentary metacarpal. This digit is usually much reduced in size, and often, as in the dog, does not reach the ground in walking. It is best developed in the bears and allied forms. The first metacarpal is never more freely movable than any of the others. As a general rule the middle digit is somewhat the longest, the second and fourth nearly equal to it, the fifth shorter, and the first the shortest.

"As the toes are nearly always armed with long, strong, curved, and sharp claws, the ungual phalanges are large, strongly compressed, and pointed, and they develop from their base a broad, thin lamina of bone, which is reflected over the root of the horny claw, and holds it more firmly in place."<sup>9</sup>

In *Vulpes macrotis* the *radial accessory ossicle* of the carpus is very small and rudimentary, while the pisiform on the ulnar side of the wrist is powerfully developed, and articulates with a distinct facet upon the outer side of the *cuneiform*. This latter bonelet, together with *scapho-lunar*, forms the convex proximal facet for articulation with the radius and ulna of the antibrachium, the last named affording about four-fifths of the surface, and articulating entirely with the radius. For the distal row we have four carpal bones, the largest of which is the unciform, which articulates with the proximal ends of the fourth and fifth metacarpals—the first, second and third metacarpals each having a small bone to itself. Of these

<sup>8</sup> B. G. Wilder, "On the Composition of the Carpus in Dogs." *Bull. Cornell University, Vol. I*, p. 301, 1874.

<sup>9</sup> *Osteology of the Mammalia*, pp. 287-289.

the outer one on the radial side is the *trapezium*, the next, the *trapezoid*, and the one next to the unciform, the *os magnum*.

Agreeing in the main with the vulpine Canidae generally, the joints of the *metacarpus* present nothing of special note. As in the majority, if not in all true canines, the *pollex* metacarpal is much reduced in size, short and straight. Proximally, its end is somewhat enlarged, but in its extreme length this bone is not over 1.3 cms. in length. Its single phalanx and unguis are likewise greatly reduced, and it is more than probable that it plays but a feeble part in the locomotory functions of the fore-foot or paw, as it is doubtful that it reaches the ground in running, walking, or standing. The remaining four metacarpals are straight, stout and strong. At their distal ends each and all present the usual trochlear joints for the proximal articular extremities of the first row of phalanges. Their upper ends are much compressed from side to side, and they fit so firmly against each other, that they are capable of scarcely any motion at all. *Second* and *fifth metacarpals* are about a length, each being about 2.8 centimetres long, and the last named is the stouter bone of the two. *Third metacarpal* has a length of about 3.2 cms, and the fourth is very slightly shorter. These bones appear almost alike and both are slenderer than the fifth metacarpal.

Free *sesamoids* do not appear to exist in any of tendons in the sole of the fore-foot of this little fox. Digits II-V each possesses two *phalanges* and a terminal unguis joint. The upper row of the former is composed of stout, short, straight bones, each presenting the usual articular ends as seen among the Canidae generally. The phalanges to the second and fifth digits are shorter and stouter than those to the third and fourth—the first averaging 1.3 cms in length, and the latter 1.7 cms. (II-V being nearly of a length, as are III and IV.) The distal row of phalanges is proportionately shorter and slenderer than the proximal row, but their general comparisons are about the same. Finally, the terminal row or *unguis joints* are each armed with a strong compressed osseous claw, which latter is curved and pointed. They have the thin basal lamina spoken of by Flower, but not as strongly developed as we find them in the Felidae. A minute tubular canal longitudinally pierces the core of each one of the bony claws of the fore-foot, apparently for the passage of the vessels to its apex, where it opens, for the horny sheath covering it during life. As in other small Canidae, the middle digit is rather longer than any of the others, the second and fourth being somewhat shorter than it, fifth still shorter, and pollex, as already stated, shorter than any of them by far. Indeed, the entire length of this digit is not sufficient to carry the apex of its unguis joint past the distal end of the second metacarpal bone alongside of it.

#### THE PELVIC GIRDLE AND THE SKELETON OF THE HINDER LIMB.

Sir Richard Owen, in his *Comparative Anatomy and Physiology of the Vertebrata* does not give us a dozen lines upon the *pelvis* in the carnivora; and Flower in the last edition of the *Osteology of the Mammalia* hardly does more, and neither of these distinguished authorities refer to the pelvis of the genus *Vulpes*. On speak-

ing of the carnivora as a group, Flower says in the work just cited, that "the pelvis is generally elongated and narrow, the ilium and ischium being in a straight line, and of nearly equal length. In most species the ilia are straight, flattened, and not everted above [makes reference to his figure of the pelvis of a dog, Fig. 115, p. 317], the iliac surface is very narrow and confined to the lower part of the bone, as the acetabular and pubic borders meet in front above; the gluteal surface looks directly outwards and is concave; the sacral surface forms a broad flat plane above the attachment to the sacrum, the crest being formed by the united edges of the sacral and gluteal surfaces, instead of the iliac and gluteal surfaces, as in man. The symphysis is long; it includes part of both pubis and ischium, and commonly becomes completely osseous in adult animals. The thyroid foramen is oval, with its long axis parallel to that of the whole bone. The ischia are wide and divergent posteriorly.

"In the Hyæna the pelvis is shorter and wider than in most other carnivora, both the upper ends of the ilia and lower ends of the ischia being considerably everted."

Now in *Vulpes macrotis* the *pelvis* is by no means unlike that part of the skeleton as we find it in some of the more fox-like species of the domesticated dogs. Flower figures the "ventral surface of right innominate bone of dog ( $\frac{1}{3}$ )" in his *Osteology of the Mammalia* and in its general features it very closely resembles the same surface of the pelvis of the fox now being considered, and the description above quoted likewise answers very well in describing the same. There are plenty of half-breed Indian dogs in the Indian camps of the northwestern parts of the United States that doubtless possess pelvises with characters almost identical with those of *Vulpes*.

The ilia of this pelvis have the sacrum of the vertebral column wedged in between them quite as firmly as we find it in man and many other animals, and the articular surface for the articulation with the sacrum is of the same roughened character. Above this surface the blade of an *ilium* rises for more than a centimetre, its superior crest being convex, while its external surface is markedly concaved. The posterior borders of the ilia are very nearly in the same plane with the ischia, and in fact the pelvis as a whole is much compressed in the antero-posterior direction. Scarcely any indication of a "greater sacro-sciatic notch" or a "lesser sacro-sciatic notch" is present, though on the anterior rim of the basin of this pelvis, a rudimentary anterior superior spine is seen, the anterior inferior spine being well-marked and conspicuously developed. Either acetabulum is a hemispherical concavity with an average width of nine millimetres. Its base is not perforated by a foramen, while the *cotyloid notch* at its lower part is distinctly marked. The *symphysis pubis* is very firmly co-ossified for its entire length, the suture being almost obliterated upon its dorsal aspect. It has a length of 2.3 cms. and the *pubic arch* is wide and much concaved. Each *obturator foramen* is very large and of a subcircular outline, with an average diameter of eleven millimetres. In the middle line at the narrowest place their peripheries are but 3.5 millimetres

apart. Below, and to the outer side of one of these foramina, the surface of the *ischium* is broad, flat and quite extensive, with its outer angle thickened and prominent. This last is the "tuberosity of the ischium," and it is far more conspicuous than it is in *Homo* and the apes. Laterally, an ischium is concealed on its border, while inferiorly it is convex and rimmed. The *inlet* of this pelvis has a median longitudinal diameter of 2.5 centimetres, and a transverse diameter of 2.3 cms. at its widest part—in other words the inlet is nearly circular in outline.

Passing to the skeleton of the thigh, leg and pes, we find the *femur* of the first-named division of this limb to be a very interesting bone, with well-pronounced characters. Viewing it upon its anterior aspect its more or less slender subcylindrical shaft appears to be nearly straight from one extremity to the other, but seen on lateral view, there is a gentle curvature backward to be recognized, especially at the distal half, and this is here enhanced by the remarkable manner in which the large condylar end is produced posteriorly. This part is massive and profoundly channeled by the intercondyloid notch behind, to a lesser degree below, and rather faintly in front. The condyles are nearly equal in size, the external one being rather the larger, while both are situated on the same level distally. Their external surfaces are more or less smooth, the tuberosities above the external condyle alone being in evidence to break the general smoothness of the surface of this distal end of the femur.

Proximally, the bone presents for examination the head, neck and the greater and lesser trochanters. Head and neck are almost exact miniatures of those we find on the femur in a man, the former being quite hemispherical in form, and the latter constricted and proportionately a little shorter. A distinct depression for the *ligamentum teres* is present, and the axis of the neck makes an obtuse angle of some 135° with the longitudinal axis of the shaft. Rising no higher above the summit of the bone than the head, the *trochanter major* is strongly developed, and has a deep excavation on its postero-internal aspect. Standing between this and the neck, and two or three millimetres below both, we meet with the *trochanter minor*, here very distinctly developed as a small but conspicuous tuberosity. Passing just to the inner side of this, and running down the shaft obliquely to the junction of upper and middle thirds, and from thence straight down to the smooth and flat "popliteal space," is a "muscular line" or ridge, best marked in the upper third of its course. A similar line (*linea aspera*) passes from the base of the trochanter major, its outer aspect, to run down in nearly a straight line to the tuberosity above the external condyle, where it stops. These two muscular lines are parallel and quite close together for the whole middle third of the femoral shaft. Nutrient foramina occur on the anterior aspect of the trochanter major, in the intercondyloid notch, and on the side of the internal condyle, a fact that inclines me to think that there is no regular site for these openings.

*Fabellæ* are also present at the back of the knee-joint of this fox, a small ossicle or fabella being found in the ligament posterior to either condyle; but the sesamoid spoken of by Flower as "a wedge-shaped bone within the joint, lying on



the articular surface of the tibia, an ossification of the internal inter-articular semi-lunar cartilage," does not appear to be present. A *patella* of some size, however (8 mm. long), and of an oval form, exists in its usual place in the common extensor tendon at the front of the knee-joint. Its anterior surface is convex and roughened, while posteriorly it presents an articular facet for each femoral condyle.

Morphologically, the *tibia* and *fibula* of the leg are interesting bones. Viewing the former upon its anterior aspect it will be noticed that the upper moiety of the shaft is gently curved in such a manner that it is concave on its outer side and correspondingly convex upon its inner side. Below the middle of the bone it is nearly straight, with a slight inclination, however, to exhibit a curvature the reverse of what has just been described as being found in the upper half. Again the upper half of the tibia is massive and strong, the crest upon its anterior aspect being prominently developed. This feature is most conspicuous above, gradually disappearing as the middle of the shaft is approached, after which this part of the bone is compressed in the antero-posterior direction. A horizontal section made first below the summit would be distinctly triangular, and a similar one made in the lower third would be elliptical. Seen from above the summit of the tibia has a cordate outline, the apex being to the front, and the figure completed by a median notch behind. In this latter locality the margins are curled downward, and particularly so where the fibular articulation is found, so that this facet is *beneath* this projecting part of the summit of the tibia, and consequently the fibula is shorter than the former bone proximally.

The tibial shaft is wonderfully smooth, and exhibits longitudinal muscular ridges only at its upper third at the posterior aspect. Distally, its extremity is but moderately enlarged, and compressed from before backward. Its basal aspect is peculiarly concaved in order to articulate with the astragalus of the tarsus. This concavity would not be suspected simply by viewing the bone directly from in front, from behind, or from the side, so completely is it on the basal end of the shaft. It is marked by a distinct and deep little notch anteriorly, close to the *internal malleolus*.

The *fibula* is an exceedingly slender bone of uniform calibre, being markedly compressed from side to side, including its extremities, which are rounded and dilated. The upper one of these articulates with the tibia in the manner described above, while the lower one projects beyond the end of the former, where it becomes the *external malleolus* of the ankle-joint. Owing to the aforesaid curvature of the upper half of the tibial shaft, the fibula stands far apart from its companion in that part of the skeleton of the leg, but below the middle of the shaft, these two bones come in contact, and from this point to the distal fibular enlargement (external malleolus) they are in extremely close contact, probably actually co-ossified in very old individuals. Flower says the "fibula is slender, and in dogs curved towards the tibia, the lower half being closely applied to that bone." This is true only in part, as proximally it is the tibia that is curved *away* from the fibula, the latter, as has been said, being almost perfectly straight from one end to the other.

*Vulpes macrotis*, in common with other terrestrial carnivores, has the skeleton of *pes* divided into three parts, namely, the *tarsus*, the *metatarsus*, and the digits or *phalanges*. The *tarsus* is composed of seven distinct bones articulating with each other in a manner similar to what is known to occur in the tarsi of other representatives of this group. These bones are the *astragalus*, the *os calcis* or *calcaneum*, the *scaphoid* or *navicular bone*, the three *cuneiform bones* (internal, middle and external), and the *cuboid*.

Morphologically, the astragalus is composed of the *tibiale* and the *intermedium*, the internal cuneiform is the first tarsal (tarsale I), the middle the second, the external the third, and the cuboid the united fourth and fifth tarsals (tarsale IV and V).

The *metatarsus* of *V. macrotis* consists of four much elongated metatarsal bones, of a very rudimentary, hook-like *hallux*, only 4.5 mm. long, and freely articulating with the anterior facet upon the internal cuneiform. On the under side of each distal trochlear extremity of the fully developed metatarsal bones we find a pair of large *sesamoids*. Each pair of these sesamoids is so disposed as to give the appearance of being but a single one, deeply grooved in the longitudinal direction, both on the dorsal as well as the ventral aspects. They are in the plantar tendons of pes. The podal phalanges closely resemble those of the manus, and have bones of the same number, and nearly of the same form and size. Great beauty of adaptation and movement characterizes the ankle-joint of this fox, especially in its articulation with the bones of the leg.

The *astragalus* is a very irregularly formed bone, consisting of a trochlear portion and head. The latter is a cuboidal projection that extends forward from the antero-internal aspect of the former, and has its distal, vertical face entirely occupied by a slightly convex, smooth facet for articulation with the navicular bone or scaphoid. Seen from above, the trochlear part of the astragalus has a most perfect articulation of that character, reminding one at once of the distal end of a phalanx in the manus of *Homo*, or in the pes of any large true raptorial bird. Its median groove is longitudinal, and extends from the head of the bone backward clear around and under for some distance, making in all a beautiful curved surface. The lateral margins are somewhat sharp, especially the inner one, which in the articulated ankle fits into the little narrow and deep notch which was described above as being found on the anterior distal margin of the basal part of the tibia. This admirable arrangement prevents to a great degree the danger of the lateral dislocation of the bones of the leg and the tarsus from any violence or sudden sprain in running.

On the under side of the astragalus there is a somewhat irregular trochlea for articulation with the *os calcis*. Its convexity is transverse or just the reverse of the one on the upper side of the bone. Furthermore we find here a minute longitudinal groove passing toward the head of the bone, but with its posterior extremity terminating in a deep pitlet. Internally, the surface of the astragalus is extensive and undulating; externally, it is narrow and markedly curved, the curve corre-

sponding to the curve of the internal trochlea of the superior aspect. When normally luxated, the astragalus rests upon the supero-internal aspect of the os calcis and articulates with it by two facets. Above, it articulates with the tibia and fibula; the former monopolizing all of the trochlear surface, while the infero-internal aspect of the distal end of the latter articulates with the greatly curved and narrow facet, described above as composing the outer surface of the tarsal bone under consideration.

The *os calcis* or calcaneum has an extreme length longitudinally of 2.4 cms., and a width of one centimetre, measured at its widest part across the articulation for the astragalus. This latter occupies the anterior half of the bone superiorly, while its anterior face is occupied by a vertical facet devoted to the articulation with the cuboid. The posterior half of the calcaneum is rather deep, compressed from side to side, with the free upper extremity enlarged, and bears a smooth, vertically convexed, laterally concaved surface for the insertion of the distal end of the tendo Achillis. The "lesser process" of the os calcis is well developed, and beneath it is plainly to be seen the groove for the passage of the tendon of the flexor longus pollicis muscle. Flower says<sup>10</sup> that the recent researches of Baur, *On the Morphology of the Tarsus in the Mammals*, "American Naturalist," January, 1885, make it probable that a certain bone on the tibial side of the tarsus of *Hyrax*, many Edentates, *Ornithorhynchus* and rodents,—and hitherto looked upon as a sesamoid bone,—is the rudimentary tarsale tibiale, whilst the astragalus is the intermedium representing the lunare of the hand. This tibiale is frequently fused with the centrale, the navicular bone in such cases containing the elements of the centrale and tibiale." Again, in the same work, on page 342, he says, "In addition to these constant tarsal bones, there may be supplemental or sesamoid bones; one situated near the middle of the tibial side of the tarsus, largely developed in many carnivora and rodents; another, less frequent, on the fibular side; and a third often developed in the tendons of the plantar surface of the tarsus, especially large in the armadillos. There is also usually a pair of sesamoid bones opposite each metatarso-phalangeal articulation on its plantar aspect." In carefully examining these parts in *Vulpes macrotis* it becomes clear that the first-mentioned bone (or sesamoid?), considered in the above footnote to be the *tibiale*, is fused with the *centrale* or *navicular bone* on its plantar side. The smaller one, on the fibular side, if present at all, must be either extremely rudimentary or else co-ossified with some other tarsal element. It was not found in this fox. In a former paragraph, the paired sesamoids on the plantar aspect of each metatarso-phalangeal articulation, have already been described.

Passing to the *cuboid* we meet with a large strong bone having a length equal to that of the scaphoid and external cuneiform combined. It articulates with both of these bones as well as with the proximal extremities of the fourth and fifth metatarsals anteriorly and the os calcis behind. Dorsally, the bone is comparatively smooth, while on its ventral side in front it presents a deep groove, which crossing

<sup>10</sup> *Osteology of the Mammalia*, Third edition, p. 340.

this surface obliquely, is intended to lodge the tendon of the peroneus longus muscle. On the external aspect the commencement of this groove is indicated by a deep notch, which in life is converted into a foramen by the ligament stretching across it from the fifth metatarsal to the cuboid itself.

The *scaphoid* is a short, subcylindrical segment of some size, with a round concave facette for the astragalus, and, anteriorly, facettes for the three cuneiform bones, and it articulates with all of these elements. Below, it fuses with a large plantar sesamoid.

Having a very regular appearance, the three *cuneiform bones* are wedged in between the scaphoid behind, and the rudimentary hallux, and the second and third metatarsals in front. In point of size, the external cuneiform is the largest, the internal the next biggest, and the middle one the smallest of the three. The internal one develops a conspicuous plantar process for the attachment of ligaments. Anteriorly, it articulates with hallux and second metatarsal. The middle or shortest cuneiform, articulates anteriorly, only with the second metatarsal, while the longer *external cuneiform* articulates with the proximal end of the third metatarsal.

Apart from the rudimentary *hallux*, all of the four remaining *metatarsals* are long, rather stout, and subcylindrical bones. Proximally, they are crowded close together, practically firmly moulded upon each other for at least one-third of this part of their lengths, and this in such a manner that from side to side they offer dorsally a marked *convex* surface as compared with the far shallower concave surface on their plantar aspects when similarly considered. As they extend forward toward the toes, the two middle ones very slightly part company, and so their shafts keep nearly straight, but the second and fifth each somewhat curve away from the longitudinal median plane, and thus their shafts exhibit this curvature.

The *second metatarsal* is the stoutest of the four, and the third the slenderest. Third and fourth each have a length of 4.6 centimeters, while second and fifth measure but 4.2 cms. Distally, they present the usual trochlear heads for the articulations of the posterior extremities of the corresponding *pedal digits*. These last each possess two phalangeal joints, and terminate with a freely articulated osseous unguis, all morphologically similar to what we find in the digits of manus.

The character of the articulation between the metatarsal joint and the phalanx in the case of any toe is different from what is found between the two joints of the toe itself. In the first instance the head of the metatarsal bone has a convex, subellipsoidal articulation dorsad, and a sharp, median longitudinal keel on the plantar aspect. The rounded surface articulates with a corresponding facet on the proximal end of the phalanx, but below this, the articulation is deeply notched in the median line in order to admit the aforesaid keel on the end of the metatarsal, and this is kept in place in life by the paired sesamoids and the plantar tendons. The interarticulation between the phalangeal joints themselves is of the simpler trochlear type, such as we find in the case of the joints in the manus or pes of *Homo*, and between the last phalanx in any toe and its unguis joint the plan is

even still simpler, the trochlear head being less evidently defined. *Vulpes macrotis* has the skeleton of its second toe equal in length to that of the fifth, and that of the third equal to that of the fourth,—the bones all being strong, stoutish and well-proportioned. The second toe has a length of about 3.4 centimeters, and the third 4.0 centimeters. These measurements include the ungual joints, and all the bones normally articulated. In the case of any digit, its proximal joint is about one-fourth longer than the next one beyond. For example, the length of the proximal joint of the fourth digit is 1.8 cms., the next joint in the same toe being 1.4 cms., and their calibres vary in proportion. The sharp-pointed angular joints exhibit but little curvature, and at their articulations their basal portions extend plantar-wards as a process, in each case, for the insertion of the plantar tendon of the flexor longus digitorum.

## EXPLANATION OF PLATES.

All the figures are of natural size, except fig. 12 of Plate XXIII, and from photographs made direct from the specimens by the author.

## PLATE XXII.

Fig. 1. Left lateral view of the skull and lower jaw of *Vulpes macrotis*.

Fig. 2. Dorsal aspect of the skull of *Vulpes velox*, the mandibles having been removed.

Fig. 3. Lower jaw or mandible of *Vulpes macrotis*, viewed from above.

Fig. 4. Right ramus of mandible of *Vulpes velox*, seen from above, and rotated inward. Tip of canine tooth, and the incisors broken off; molars and other teeth complete and in position.

Fig. 5. Ventral aspect of the skull of *Vulpes velox* (same specimen as is shown in fig. 2). The lower jaw has been removed.

Fig. 6. Ventral aspect of the skull of *Vulpes macrotis*.

Fig. 7. Dorsal aspect of the skull of *Vulpes macrotis*. Same specimen as is shown in fig. 6.

## PLATE XXIII.

Fig. 8. Left scapula of *Vulpes macrotis*, external surface.

Fig. 9. Dorsal surface of the left humerus of *Vulpes macrotis*, showing the preaxial border, greater tuberosity, and the external condyle.

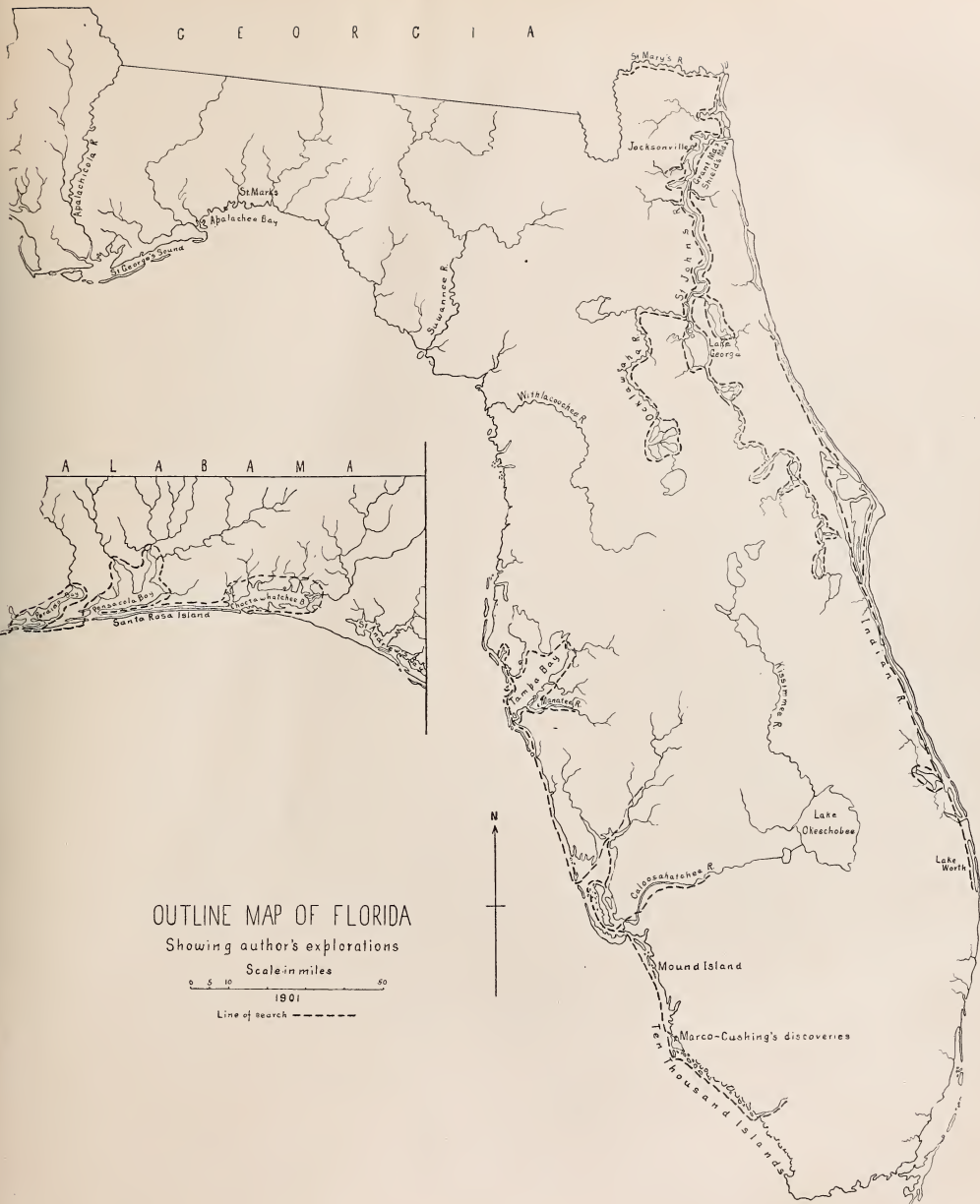
Fig. 10. Anterior view of the left femur of *Vulpes macrotis*.

Fig. 11. Left tibia and fibula of *Vulpes macrotis*, normally articulated, and viewed upon external aspect. (All the bones, except those shown in figs. 2, 4, and 5, of Pl. XXII, belong to the one and same individual in author's collection, the ramus of the jaw in fig. 4, Pl. XXII, belonging to the specimen of *V. velox* of the U. S. Nat. Museum, No. 15,355.)

Fig. 12. Right lateral aspect of the skeleton of the trunk of *Vulpes macrotis*. (Reduced rather less than one-half.) Naturally articulated, and the dried ligaments and cartilaginous costal ribs not removed. Exhibits the normal relations of the bones of the trunk.



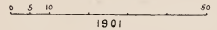
G E O R G I A



OUTLINE MAP OF FLORIDA

Showing author's explorations

Scale in miles



Line of search - - - - -





MAP OF PART OF NORTHWEST COAST OF FLORIDA  
 From U.S. Government Charts Nos. 185, 186, 187

Scale in miles  
 0 1 2 3 4 5 6 7  
 1851 1871  
 X indicates mound.

CERTAIN ABORIGINAL REMAINS OF THE NORTHWEST  
FLORIDA COAST.

PART I.

BY CLARENCE B. MOORE.

During the past ten seasons we have investigated aboriginal remains in the southern United States and have devoted most of that period to Florida and to the States that border it, Alabama and Georgia. By the outline map of Florida which we give, showing the territory covered by our work in that State, it will be seen that nearly all the waterways had been investigated by us, except the northwest coast. Now, this portion of Florida should be of great interest archaeologically, bordering, as it does, a section stretching across much of southern Georgia and most of southern Alabama, and an investigation by us looking to the tracing of possible influence from States where we have done so much work, on peninsular Florida, which we know so well, through the coast-territory, seemed to be worth our while.

Beginning, then, in the winter of 1901, at Perdido bay, the coast-boundary between Alabama and Florida (see map), we explored carefully eastward, including Pensacola bay, Santa Rosa sound and Choctawhatchee bay. Our results, which are largely based on the discovery of earthenware, are given in this part of our Report.

It is our hope, next year, if all goes well, carefully to cover St. Andrew's, and St. Joseph's, bay, Apalachicola bay, St. George's sound, Apalachee bay and all the lower northwest coast to Tampa, including, perhaps, parts of some of the rivers that enter the Gulf along our route.

The mounds of the section we have explored, we know from experience, and of the territory we hope to visit, from reliable accounts, have been exposed to relentless attack by seekers for buried treasure. In no part of Florida is the pursuit of this *ignis fatuus* so intense, and persons, otherwise sane, seemingly, spend considerable portions of their time with spade and divining rod in fruitless search. Fortunately, the mounds, though injured, have not been destroyed.

In the way of legitimate research, Mr. S. T. Walker in the Smithsonian Report for 1883,<sup>1</sup> gives an account of his explorations along Pensacola bay, Santa Rosa sound and Choctawhatchee bay, with maps and with figures of human and animal

<sup>1</sup> Pg. 854, *et seq.*

heads which have served as handles for earthenware. Mr. Walker failed to find the deposit of earthenware in the great mound at Walton's Camp.

Professor Holmes informs us that an interesting collection of earthenware was taken from the mound at Bear Point, Perdido bay, by Mr. Parsons, then of the Coast Survey, and we are indebted to Professor Holmes for a series of illustrations of these vessels which resemble those found by us, and which will form a plate in Professor Holmes' forthcoming report on aboriginal earthenware of the United States, to be published by the Bureau of Ethnology.<sup>1</sup>

In the Proceedings of the American Association for the Advancement of Science, 1875, page 282, *et seq.*, G. M. Sternberg, Surgeon, U. S. A., publishes an account of "Indian Burial Mounds and Shellheaps near Pensacola, Florida, Bay." The author describes his explorations in the Bear Point Mound and in the mound at Walton's Camp, Santa Rosa sound, where he, also, we note, missed the great deposit of earthenware.

The student of the archaeology of this part of the Florida coast is doubtless familiar with "The Narrative of Alvar Nuñez Cabeça de Vaca,"<sup>2</sup> who landed at Tampa in 1527 with part of an ill-fated expedition, and who spent six years (1528-1533) as a prisoner among the aborigines of the northwest Florida coast, living at places where explorations treated of in this volume were carried on, on Santa Rosa Island (Malhado Island) and near Pensacola bay. The inhabitants of this section are described as poor. We are told (p. 50) "for three months in the year they eat nothing else than these [oysters] and drink very bad water. There is great want of wood, and mosquitoes are in very great numbers. The houses are of mats, set up on masses of oyster shells, which they sleep upon, and in skins, should they accidentally possess them." Nevertheless, these coast aborigines were possessed of earthenware. "Before their houses were many clay pitchers of water," we are told (page 35).

Dr. M. G. Miller, who has accompanied us in all our mound work, determined, as to human remains, this season, as before, and aided in our work generally and in putting this Report through the press.

<sup>1</sup> We would call the attention of any reader wishing a more thorough acquaintance with the aboriginal ware of this country to:

"Pottery of the Ancient Pueblos."

"Ancient Pottery of the Mississippi Valley."

"Origin and Development of Form and Ornament in Ceramic Art."

All by Professor Holmes and all in the Fourth Annual Report of the Bureau of Ethnology, 1882-1883; and in the same volume "A Study of Pueblo Pottery as Illustrative of Zuni Culture Growth," by Frank Hamilton Cushing.

"Archæological Expedition to Arizona in 1895," by Jesse Walter Fewkes. Seventeenth Annual Report of the Bureau of American Ethnology, 1895-1896.

"Illustrated Catalogue," etc., by William H. Holmes. Third Annual Report of the Bureau of Ethnology, 1881-1882.

"Contributions to the Archæology of Missouri, Part I, Pottery," by the Archæological Section of the St. Louis Academy of Sciences.

"Antiquities of Tennessee," by Gates P. Thruston.

Various Reports on Antiquities of Florida, Georgia, South Carolina and Alabama, by Clarence B. Moore. Journal of the Academy of Natural Sciences of Philadelphia, Volumes X and XI.

<sup>2</sup> English translation by Buckingham Smith. Privately printed, Washington, 1851.

*List of Mounds Investigated.*

(See Map)

Bear Point, Perdido bay.  
 Near Bear Point, Perdido bay.  
 Josephine P. O., Perdido bay.  
 Maester Creek, Blackwater bay.  
 Graveyard Point, East bay.  
 Santa Rosa sound (2).  
 Walton's Camp, Santa Rosa sound.  
 Don's Bayou, Choctawhatchee bay.  
 Black Point, Choctawhatchee bay.  
 Rocky Bayou, Choctawhatchee bay (2).  
 Basin Bayou, Choctawhatchee bay.  
 Jolly Bay, Choctawhatchee bay.  
 Black Creek, Choctawhatchee bay (3).  
 Near Point Washington, Choctawhatchee bay.  
 Cemetery near Point Washington, Choctawhatchee bay.  
 Hogtown Bayou, Choctawhatchee bay.

MOUND AT BEAR POINT, PERDIDO BAY, BALDWIN COUNTY, ALA.<sup>1</sup>

This mound was in woods about 150 yards in a N. W. direction from Bear Point, on land belonging to Mr. Arthur B. Jones, of Chicago, Ill.

The mound, which had been fairly riddled by previous digging, was roughly circular in outline, with a diameter at base of 80 feet. The summit plateau, also circular, was 63 feet across. As the mound was partly surrounded by depressions, whence sand for its making had come, its southern portion, built up against a natural slope, was somewhat difficult to determine as to height. On the northwest side the mound was 7 feet 2 inches above the general level and 8 feet on the northeast side. Measured from the south, it was but 1 foot 8 inches above the adjoining territory. Forest trees were on the plateau, including a fallen live oak 10 feet in circumference, 4 feet from the base.

The mound was dug through by us beginning at the extreme margin of the northern portion with a line of men extending about 50 feet. As no interments were met with until the summit plateau was reached, portions of the remaining marginal parts were omitted.

The mound was of yellowish sand, unstratified. A dark band marked the base, which was the original surface of the surrounding country. From the surface of the summit plateau in the northerly portions of the mound, to the base, was 5 feet 4 inches, and this depth was maintained until the slope of the ridge to the south was reached, where the mound and the slope merged.

<sup>1</sup> As Perdido bay is the coast boundary between Alabama and Florida, we have included this mound.



Some distance in from the margin, a second dark band began from 2 to 2.5 feet above the base. This band, which contained bits of charcoal and debris, marked a period of occupation, making it evident that the aborigines, after living for a while on a low mound, had heightened it and used it for burial purposes. Few burials were found below the upper band, and when they were met with, the band had been cut through. Two good examples of the domiciliary mound heightened and then used for burials have been described by us in preceding Reports; namely, the great Shields' Mound, near the mouth of the St. John's river, Florida, and the mound at Matthew's Landing, Alabama river.

In all, human remains were met with in forty-four places, counting only such burials as were seemingly undisturbed by previous digging.

Unless otherwise stated, burials were above the upper dark line in the mound.

Burial No. 1.—Two femurs and part of a radius.

Burial No. 2.—Two skulls with a conch-shell in association. These skulls, like all others in this mound, were badly decayed and are spoken of as skulls because enough of them remained to show that two crania, or the better part of two crania, had been interred.

Burials Nos. 3, 4, 5, 7, 8, 9, 12, 16, 17, consisted each of a single skull, unassociated with other bones. With Burial No. 12 were two shell beads.

Burial No. 6.—A lone skull covered by a circular dish inverted, unfortunately badly crushed. This dish, without basal perforation, of rather coarse, black ware, has incised decoration on the inner surface and a row of notches around the rim. Its diameter is 15.75 inches; its depth, 4 inches. A former cracked portion had been held together by cords or sinews running through perforations on either side of the crack. Incidentally, it is of interest to note that this method of repair was in use in Egypt probably 5000 years ago.<sup>1</sup> This dish has been sent to the Museum at Memorial Hall, Fairmount Park, Philadelphia.

Burial No. 10.—Part of a femur, possibly a late disturbance.

Burial No. 11.—A few decayed fragments of one or two long-bones with a chert lancehead over 4 inches in length.

Burial No. 13.—A grave or a late disturbance. A pit running from, or from near, the surface, cutting through the upper dark band and extending almost to the base of the mound. On the bottom was a bit of a skull and a humerus.

Burial No. 14.—Fragments of decaying long-bones lying in sand unquestionably undisturbed.

Burial No. 15.—A bunch of badly decayed bones, principally long-bones, without a skull.

Burials Nos. 18, 26, 27, 33, 44.—Each a skull with a few other bones.

Burial No. 19.—A few bones without a skull.

Burial No. 20.—Bones falling in caved sand. With them was a quadrilateral

<sup>1</sup> "Naquada and Ballas," by W. M. Flinders Petrie, D. C. L., L. L. D., and J. E. Quibell, B. A., London, 1896.

vessel with four rudimentary feet. The decoration is an incised representation of animal paws. Diameter at opening 3.6 inches; height, 2 inches (Fig. 1).



FIG. 1.—Vessel with Burial No. 20. Mound at Bear Point. (Two-thirds size.)

Burial No. 21.—Over the skull of a child, with which were four large shell beads, was an inverted bowl broken into many pieces. This bowl, since put together, is 11.25 inches in maximum diameter and 4.25 inches in depth. It has no basal perforation. The decoration, incised, Professor Holmes tells us, consists of a conventionalized animal head showing the eye and teeth. On either side are other parts of the animal's body highly conventionalized (Fig. 2). This symbolism on earthenware, which reached its greatest extent along the Gulf coast, will be treated exhaustively by Professor Holmes in his forthcoming work, to which we have already referred.



FIG. 2.—Vessel with Burial No. 21. Mound at Bear Point. (Half size.)

Burial No. 22.—A skull with a few long-bones. With the bones was a beautiful bottle of smooth black ware, with a globular body incised in an interesting way over every portion. A white substance, placed in the lines, greatly emphasizes them. The neck of this bottle is missing through an early fracture. Maximum diameter, 3.25 inches. Near the vessel lay an iron nail.

Burial No. 23.—Part of a dish of smooth black ware with the remainder probably cut away by recent digging. Beneath were disturbed bones.

Burial No. 24.—Certain long-bones without a skull. An arrowpoint lay with them.

Burial No. 25.—Part of a dish of black ware well smoothed, with an incised line encircling the interior below the margin. Recent digging had removed a con-

siderable part of this plate and possibly some bones, as a single molar only was present.

Burial No. 28.—At the base of a pit beginning at or near the surface, which extended through the upper dark band and a short distance below the base, were remains of what had been a wooden box about 2 feet square. Little more than dust remained. Badly rusted nails and small clamps of iron were present. Within the remains of the box, packed together, were: two skulls; four femurs; four tibiae; two scapulae; one clavicle; certain ribs and vertebrae; also glass beads.

Burial No. 29.—Skull and certain bones of an adult with some bones of a child, without the skull. With these were thirty large shell beads and three shell hairpins, the shanks partly decayed.

Burial No. 30.—Under an inverted bowl in fragments were: a small bit of shell and certain milk teeth; bitumen; twelve silver buttons; glass beads; an undated silver coin of Spanish-Mexico, which, we were informed at the United States Mint, was struck by Charles and Joanna between 1521 and 1550 A.D.; an iron spike; a small piece of sheet brass or copper with stamped decoration, evidently European. The bowl, which has been pieced together, is of black ware; has a maximum diameter of 15.4 inches, a depth of 6.75 inches. This bowl, whose decoration is much like that of Vessel No. 53 (Fig. 109) from the Cemetery near Point Washington, has been sent to the Museum of Natural History, New York City. We could not determine as to perforation through the absence of a part of the base.

Bitumen, as the reader is doubtless aware, was used by the aborigines as a sort of cement to hold in place in their sockets knives and the like. We shall have occasion again to speak of bitumen in describing the mound near Maester creek, East bay, which is not far from the ancient settlement of Charruco, where Cabeça de Vaca went to live after leaving the aborigines on Santa Rosa Island.

Burial No. 31.—Over the skull of an adult lay a circular dish of black ware in fragments. The rim is notched and a single incised line runs around the inside about 3 inches below the margin. This dish, imperforate as to its base, was sent to the Peabody Museum, Cambridge, Mass., where it has been carefully pieced together. We are indebted to Professor Putnam for photographs of this dish and of all vessels which, sent to the Museum from time to time in a fragmentary condition have there been put together.

Below the dish, lying on its side, was an imperforate vase, having a semi-globular body and slightly expanding neck with a diameter at aperture of 5.6 inches, a height of 4.25 inches (Fig. 3). This



FIG. 3.—Vessel with Burial No. 31. Mound at Bear Point. (Half size.)

vessel contained a number of marine bivalves which Mr. H. A. Pilsbry, of the Academy of Natural Sciences, has identified as *Callista gigantea*.

Burial No. 32.—Certain bones of an infant and twenty-two large shell beads.

Burial No. 34.—Inverted and covering an adult skull with a few vertebrae, was a badly crushed bowl of black ware having incised decoration much similar to that on Vessel No. 31 (Fig. 28) from the mound at Walton's Camp. This bowl, which has been sent to the Museum of Natural History, New York City, is 17 inches in maximum diameter and 7 inches deep. A perforation had been made through the base.

In preceding Reports we have described the custom obtaining, mainly in peninsular Florida, to perforate the base of vessels put with the dead in order to "kill" the pot, it is believed, to free its soul to accompany that of the departed. We have described also, how, to a limited extent, this custom was noticed by us in the case of burial urns up the Alabama river and along the Georgia coast. We shall see in this Report how largely this basal perforation was practised along the northwest coast of Florida.

Burial No. 35.—The skull of an adult with part of a bowl lying to one side. A former digging had seemingly carried away the other part.

Burial No. 36.—Inverted and lying over a child's skull crushed flat, was a small, circular dish of black ware very badly broken. There is a certain amount of incised decoration on the inner surface. The base has a perforation. This bowl was sent to the Peabody Museum.

Burial No. 37.—The skull of a young adult was covered by an inverted bowl badly crushed, having an incised decoration much like the design shown on Vessel No. 41 (Fig. 35) from the mound at Walton's Camp. This bowl has been sent to the Peabody Museum, Cambridge, Mass.

With the skull were: two shell ear-plugs; two iron nails; a section of shell somewhat worked; a quartz pebble; three bits of chert; an imperforate vase of black ware with incised decoration, lying on its side, 5.5 inches in maximum diameter of body and 4.25 inches in height (Fig. 4).

Burial No. 38.—Over the skull of an adolescent lay a bowl of brown ware having the body encircled by two incised lines below the margin. One handle which had stood upright above the rim, and was probably the head of a bird or of a quadruped, is missing. The other handle, semi-oval in shape, extends at right angles from the opposite side of the bowl. There is a basal perforation. This bowl has been sent to the Museum of Natural History, New York City.

Burial No. 39.—Two skulls, one of an adult, the other of a child, and a bit of femur were covered by a bowl with base-perforation, 13.25 inches in maximum diameter, 6.5 inches in height (Fig. 5). The decoration, incised, consists of a series of the figures shown in the half-tone reproduction. Professor Holmes believes the central one to be a conventional animal head with conventionalized parts of the body on either side.

Burial No. 40.—A pit running from the surface to the base of the mound,





FIG. 4.—Vessel with Burial No. 37. Mound at Bear Point. (Full size.)



FIG. 5.—Vessel with Burial No. 39. Mound at Bear Point. (Half size.)



which at this point was about 4 feet down. Toward the bottom of this pit had been thrown two skulls and some other bones not in contact, but separated by a certain amount of sand. Above all these more sand had been placed, and then a small pile of bones consisting of certain long-bones, a clavicle and a skull which was badly crushed. Immediately above these, forming an apex to the pile was the skull of an adult capped by an inverted bowl broken but since pieced together.



FIG. 6.—Vessel with Burial No. 40. Mound at Bear Point. (Half size.)

This bowl, 11.75 inches in maximum diameter and 5.5 inches high, has a small basal perforation. The decoration consists of two animal paws between a design made up of parallel curved lines surmounted by a punctate line. The small addition to this design shown in the half-tone occurs but once, and was probably inserted to fill space (Fig. 6). Beneath one of the skulls was a piece of iron.

Burial No. 41.—An inverted bowl of black ware, parts of which were not found, lay over what had perhaps been a burial of which practically nothing remained.

Burial No. 42.—A skull with some long-bones, having in association a discoidal stone of volcanic rock, 3.5 inches in diameter, and an object of iron, probably the handle of a cutlass.

Burial No. 43.—In a broad pit reaching almost to the base of the mound were scattered five skulls and a great mixture of other bones, mostly long-bones.

Several small vessels were found unassociated. A vase of black ware (Fig. 7),

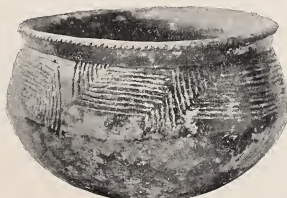


FIG. 7.—Vessel of earthenware. Mound at Bear Point. (Half size.)

imperforate, has incised decoration. Its maximum diameter is 5.1 inches; its height, 3 inches. This vase lay inverted, but unassociated with human remains. Probably recent digging had removed them.

In form and style of decoration the vessels surmounting burials in the Bear Point mound resemble somewhat those found by us capping urns on the Alabama river, but while the earthenware on the Alabama usually contains a large admixture of pounded shell, that of Bear Point, as a rule, has no shell, and where it is present, it is finely powdered and appears here and there in the vessel sparsely.

Sherds came from the mound in great numbers and in considerable variety. Some had been dropped singly during the making of the mound, while others lay together in undisturbed sand. On the surface, where diggers had thrown it, was much broken ware, and quantities lay in their refilled excavations. Among the sherds, loose in the



FIG. 8.—Decoration on sherd. Mound at Bear Point. (One-third size.)



FIG. 9.—Decoration on sherd. Mound at Bear Point. (One-third size.)

sand, were several with complicated stamp decoration.

Others had the loop-shaped handle so common in the middle Mississippi district and which we found along the Alabama river. Fig. 8 shows a "wall of Troy" decoration from a sherd in the Bear Point mound. Another sherd has a complicated and very neatly incised decoration as shown in Fig. 9. Various animal heads, handles of vessels, were met with, several together beneath the roots of a large tree.

In Fig. 10 we show a number of these handles of vessels: *a*, probably the head of a deer; *b*, a human head with the ears pierced, a duplicate to one found near by, doubtless from the same vessel; *c*, a quail's head; *d*, undetermined; *e*, head of a duck; *f*, a rabbit's head.

Throughout the mound, with human remains at times and again loose in the sand, where perhaps they had been thrown by recent digging, were many pieces of red oxide of iron of a bright crimson color, some showing where parts had been chipped off, probably for grinding, and others having a concave surface where material had been rubbed out for use as paint. With the red oxide, at places, was limonite for yellow paint. When Cabeça de Vaca was living with the aborigines of Charruco he made little trading trips to the westward going to the same Perdido bay where we found this paint in such abundance. He tells us (page 54), "such were what I carried into the interior \* \* \* [conches that are used for cutting, etc.], and in barter for them I brought back skins, ochre with which they rub and color their faces, and flint for arrowpoints, cement and hard canes of which to make arrows, and tassels that are made of the hair of deer, ornamented and dyed red."

Five hammer-stones lay together.

Loose in the sand, but probably in many cases disassociated from human remains by the constant digging to which the mound had been subjected, were: many hammer-stones; pebble-hammers; hones deeply grooved by sharpening of



FIG. 10.—Handles of vessels. Mound at Bear Point. (Full size.)

tools; over one dozen arrowheads or knives; two "celts" apparently of sedimentary rock, each over five inches in length; two small chisels, seven discoidal stones of various rocks, including porphyry<sup>1</sup> and shaly ferruginous sandstone, 1.1 to 2.75 inches in diameter.

In this mound, for the first time in our experience, we met with a form of burial where a solitary skull, or a skull with a few bones, is covered by an inverted bowl. In peninsular Florida we have not found vessels used to cover interments. In Georgia, urns containing single skeletons and capped by inverted bowls are found, also cremated remains similarly treated or placed upon the ground with a bowl turned over them. On the Alabama river, where we met with cremation but once, we found large vessels, capped by others inverted, sometimes containing remains of several individuals. The reader will see that the form of burial noticed at the Bear Point mound continues along the upper part of the Florida coast.

In the Bear Point mound were many objects of European provenance, showing some of the burials at least to be of post-Columbian date. This mound clearly adds to the force of what we have always maintained, that when articles were valued by the aborigines, they were interred with the dead, and that it is unlikely that a mound of any size containing no objects showing white contact, was made after intercourse with whites was begun.

#### MOUND NEAR BEAR POINT, PERDIDO BAY, BALDWIN COUNTY, ALA.

About one mile W. S. W. from Bear Point, in a garden belonging to Mr. Bill, resident on the place, is a mound with shell-fields adjoining. The mound, much spread by continual ploughing, has a present height of 30 inches, a base diameter of 48 feet. It is impossible to estimate the original dimensions and inadvisable to give them from hearsay. The entire southern half of the mound, from the margin and central parts of the northern portion, were dug through by us showing the mound to be of unstratified sand. There had been some comparatively recent disturbance.

Burials were first encountered 19 feet from the center. Seven in all were met with, consisting of bunches of bones badly decayed, rather loosely deposited, sometimes with, and sometimes without, the skull.

Two arrowheads, one of quartz, were with the burials, also numerous sherds, the small check-stamp predominating. Others were undecorated or had incised lines or punctate markings, or a larger check-stamp. Several bits of fine, smooth ware bore bright crimson paint. None of the sherds, so far as noticed, had intermixture of pounded shell, though ware of this kind lay on the surface of adjacent shell-heaps.

In the mound, also, were hammer-stones, hones and bitumen which, as we have said, was used as cement.

<sup>1</sup> Theodore D. Rand, Esq., of the Academy of Natural Sciences, has kindly determined for us the rocks mentioned in this Report, as accurately as possible without mutilation of specimens.

## MOUND NEAR JOSEPHINE POSTOFFICE, PERDIDO BAY, BALDWIN COUNTY, ALA.

A small sand mound about three-quarters of a mile in a northerly direction from the landing at Josephine Postoffice, in pine-woods, was dug through by us without result. The mound was doubtless the former site of a tepee.

At Inerarity Point, on the Florida side of the bay (see map), are numerous shell-fields and small shell-heaps. In addition to extended inquiries, careful search failed to locate a burial mound at this place.

## MOUND NEAR MAESTER CREEK, BLACKWATER BAY, SANTA ROSA COUNTY, FLA.

Blackwater bay is an extension of East bay, which is a part of Pensacola bay. The mound, in sight of where Maester creek enters Blackwater bay, was dug through by us by permission of Mr. Frank Berrian, agent, who resides nearby. The mound, of sand, circular in outline, 3 feet high, 30 feet across the base, unstratified, had been dug into in two places by treasure hunters.

In addition to bones disturbed by former digging, and to burials of which almost no trace was left, human remains were met with by us at sixteen points. The form of burial included the bunch, the lone skull, and, in one place, a bunch of long-bones without a skull.

Beneath a cranium, together, were six cannon bones of the deer. Five were broken or partly decayed. One showed an end cut off squarely and seemingly had served as a handle of some sort. A lancepoint of chalcedony, 5.5 inches long, lay loose in the sand, also an arrowpoint of the same material and one of quartzite. In addition were a grooved hone and a small slab of red oxide of iron, showing a concavity through use. A number of masses of bitumen, one about the size of a cocconut lay together. We have before referred to how Cabeça de Vaca made trading excursions from Charruco, an aboriginal settlement which cannot have been far from this mound, over to the head of Perdido bay, and brought back, among other things, ochre to be used as paint and cement which we know to have been bitumen, in all probability.

The earthenware in the mound consisted of five vessels, all deposited singly in the extreme marginal western part of the mound between south and northwest. They were unassociated.

Vessel No. 1.—A perforate vase with semi-globular body, constricted neck and rim slightly flaring. The decoration consists of roughly incised perpendicular lines around the neck starting from a punctate circle about one-half inch below the rim. Maximum diameter, 6.25 inches; height, 5 inches; diameter of opening, 4.5 inches.

Vessel No. 2.—A bowl of excellent ware, semi-globular body, incurving toward the aperture, and perforate base. The decoration consists of incised and punctate markings (Fig. 11). Maximum diameter, 9 inches; depth, 5 inches; diameter of opening, 6.2 inches.





FIG. 11.—Vessel No. 2. Mound near Maester creek. (About seven-ninths size.)

Vessel No. 3.—A bowl found inverted, oblate spheroid in shape, imperforate. The ware is fairly good. The decoration consists of incised lines and punctate markings around the rim as shown in Fig. 12.

Vessel No. 4.—A bowl badly broken, with faint check stamp markings.

Vessel No. 5.—An undecorated bowl of about three quarts capacity. The base has a perforation.



FIG. 12.—Vessel No. 3. Mound near Maester creek. (Half size.)

## MOUND NEAR GRAVEYARD POINT, EAST BAY, SANTA ROSA COUNTY, FLA.

The locality takes its name from a modern graveyard adjoining a small church. The church, which faces the water, is in full sight of the mound, which has been under cultivation and seems greatly extended by it. The mound is roughly circular in outline. Its present diameter is about 75 feet; its height, 2.5 feet. Careful trenching convinced us that the mound was domiciliary in character.

Two and one-half miles in a westerly direction from the mound at Graveyard Point we dug through, without result, a small mound in woods, where treasure seekers had left a considerable excavation.

Other small mounds located during a careful search of bays around Pensacola had been too badly cut to pieces by seekers after treasure to invite investigation.

## MOUNDS NEAR SANTA ROSA SOUND, SANTA ROSA COUNTY, FLA. (2).

About twelve miles from the western extremity of Santa Rosa sound, northern side, on ground formerly cultivated, and in full view of the water, were undergrowth removed, are two mounds but a few yards apart, surrounded by a considerable shell deposit. Each has been much spread by the plough.

The larger mound, circular in outline, has a base diameter of 81 feet. The summit plateau is 52 feet across. The height of the mound is 3.5 feet. To the northwest is an excavation 80 feet across and 5 feet 9 inches deep in the center, whence sand was taken for the building of the mound. Careful trenching indicated the mound to be domiciliary in character.

The smaller mound, 26 feet across the base and 2 feet 9 inches high, had been built after the thin shell deposit which covered the field was made, since this deposit extended beneath the mound. Above this shell was from 1 to 1.5 feet of sand in which were numbers of burials. Such as were met with by us in digging part of the mound lay flexed on the right side or showed disturbance, probably aboriginal. There were no artifacts with the remains, and such sherds as were met with had evidently been gathered with the material for the mound. These sherds showed variously the check-stamp, the complicated stamp, incised decoration and crimson paint.

## MOUNDS AT WALTON'S CAMP, SANTA ROSA SOUND, SANTA ROSA COUNTY, FLA.

Walton's Camp, which got its name during the Civil War, is near the eastern extremity of Santa Rosa sound, northern side, on property belonging to Mr. J. T. Brooks, resident on the place.

At the water's edge is a shell-heap of considerable size. About 150 yards in a N. E. by N. direction, across a cultivated field, on the edge of woods, is a mound roughly oblong with rounded corners, having a major diameter of base of 223 feet east and west, parallel to the sound. The minor base-diameter is 178 feet. The summit plateau is 179 feet by 135 feet.

A graded way, 78 feet from its beginning to the edge of the summit plateau, joins the mound on the southern side, somewhat east of the center.

The mound is so surrounded by depressions, whence material for its construction was taken, that its exact height above the general level is difficult to get from the exterior. From a point on the southern side the altitude is 10 feet, 7 inches; from the northern side, 12 feet. In the digging it was found that the depth of the mound from the surface of the summit plateau to the base was probably about 12 feet on an average.

There had been much previous digging, the entire central portion of the mound being fairly riddled with excavations.

During our investigation eleven men on an average dug for seven days. This digging consisted of trenching at various points to determine the construction of the

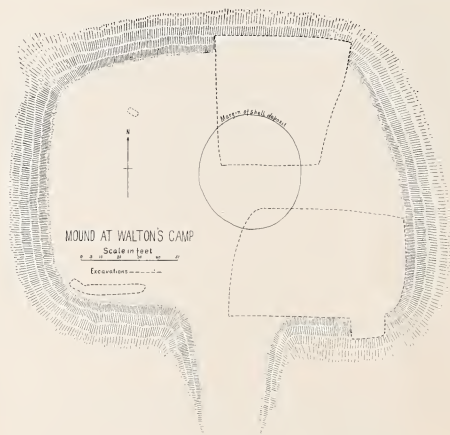


FIG. 13.—Plan of mound at Walton's Camp, showing excavations.

mound; the removal of a large part of the summit plateau to a depth of from 3 to 5 feet; the investigation of much of the marginal portion on the northern side of the mound (see diagram, Fig. 13, on which our principal work is shown).

Not far from the base, on the northern side, a trench 67 feet across at the start was continued in about 75 feet, converging to 45 feet at the end. This trench did not follow the base after sufficient work had been done to show we were dealing with a mound originally used for domiciliary purposes and later heightened and

broadened much in the manner of the mound at Bear Point, and of others of this class found elsewhere by us. Since writing our conclusions on this subject we have, on our return, read Mr. Walker's account of his visit to this mound, and find he, also, realized the fact of its enlargement at various periods.

Not far from the margin on the northern side, a black band about 7 inches thick was met with 4 feet from the surface of the mound, approximately. This band, like the one in the mound at Bear Point, colored by charcoal and organic matter, was the ordinary layer of occupation. The band did not continue through the mound, and was not found at the extremities or in the southern portion.

The central part of the summit plateau, say about 55 feet in diameter, had been heightened about 2 feet by a layer of shell covered with sand. Where this layer began, on the northern side, it was from 6 to 8 inches in thickness. This deposit of shell and sand was not taken into account in our measurement of the height of the mound.

No burials were met with in the northern part of the mound until 35 feet in from the margin of the summit plateau, and then only disturbed fragments left by former digging, no intact burials being found prior to the abandonment of the trench almost at the center of the mound. The western end and the northeastern portion of the mound showed no trace of use as places of interment.

Beginning almost exactly at the southeastern corner of the plateau and extending a little down the slope were burials, many of which were capped by inverted vessels of earthenware. The area where burials with earthenware were most numerous extended 39 feet to the westward and 32 feet to the northward of this southeastern corner. But one large vessel was found farther in and a few small ones which accompanied, but did not lie over, burials. Interments uncovered by bowls extended considerably farther into the mound and to the westward from where the covered burials lay. Burials, then, in the mound were about as follows: in the area to the southeast, as described by us, were various forms of burial, including some of the variety met with by us at the Bear Point mound, where lone skulls, or skulls with a few bones, were capped by inverted bowls. In the extreme southern portion of the central part of the mound were burials without the down-turned bowl, and in the northern part of the center, presumably the same form of burial had existed, as parts of large bowls were not found with the disturbed remains, but all this area, except the comparatively small portion to the south, which was excavated by us, had been so thoroughly dug into by others that exact determination as to form of burial was impossible. Still, judging from the absence of fragments of large vessels, to which we have referred, and that there is no history of the finding of vessels there, we believe all the burials in this central area were similar in form to those met with by us in its southern margin. Roughly speaking, that part of the mound where all burials were without earthenware corresponded with the central shell deposit of which we have spoken, and which is shown on the plan, and we believe this shell deposit was placed in the mound in connection with these burials.

It has seldom been our fortune to investigate a mound where exact determina-



tion of burials was so difficult, for, in addition to the great amount of later disturbance, aboriginal burials were so spread that it was difficult to say where one burial ended and another began. According to our account, kept with the strictest attention, 66 burials were met with, none, we believe, over 3 feet in depth. Such of these as were accompanied by vessels of earthenware will be described, particularly, later. Other burials were some at full length, some bunched. In addition, there were solitary skulls and fragmentary parts of the skeleton. Cremation was absent.

Few artifacts, save earthenware, were met with, either loose in the sand or with the dead. There were: pebble-hammers; three large, flat hones of fine-grained ferruginous sandstone; shell beads with a number of burials; two shell hair-pins; three discoidal stones, one of granitoid rock; two rude cutting implements of quartzite; two hatchets, one, 9 inches long, of indurated slate; a flat

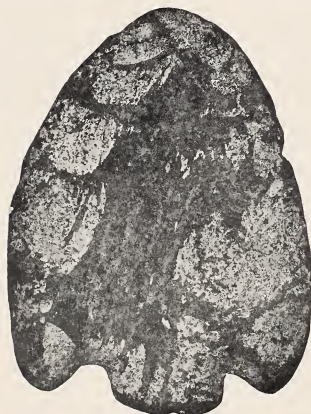


FIG. 14.—Lancepoint, Mound at Walton's Camp.  
(Full size)

chisel of the same material, 7 inches long; a bead of bone, 2 inches in length; several masses of red oxide of iron, hollowed out by use as paint; a bead of red jasper, 1 inch in length; many arrow and spear points, some loose in the sand, others with interments. In addition, was a lancehead 3.6 inches in length and 2.6 inches broad, of most unusual form, being heart-shaped as to outline. Mr. Rand is unable to identify the rock of which this lancepoint was made, without mutilating the specimen. Upon the material is a deposit which at first was supposed to be calcareous, but which failed to react with acid (Fig. 14). This interesting specimen lay with two arrow-points near an adult skull.

The earthenware in the mound at Walton's Camp was its especial feature. Forty-nine vessels, more or less complete, were taken out by us in addition

to some small ones badly broken, which, showing no feature of particular interest, and not in association with burials, will not be described by us.

Many vessels among those taken out, we regret to say, were broken by our men since, lying superficially beneath masses of roots, they were, of necessity, exposed to blows from spades or axes. Many more were found crushed to pieces by roots or by weight of sand, aided, no doubt, by the effect of frost.

In the mound, with whole vessels, were great numbers of fragments in undisturbed sand. Sometimes parts of vessels had been interred, and often parts, broken to pieces, lay in a little pile. Again, numbers of fragments were heaped together.



These often came from many vessels, being a few parts of each so that it seemed as though fragments, usually decorated, had been saved for burial in the mound. These heaps were not found immediately with human remains and were probably buried in a general way. We shall have occasion again to speak of this custom in describing the cemetery near Point Washington.

All through the mound were single fragments of vessels which had got in during the period of occupation or with sand from neighboring fields during construction. These sherds bore, as a rule, the check-stamp as decoration and also various combinations of the complicated stamp. We found no stamped earthenware in conjunction with burials, though there was abundance of it in fragments on the surface of surrounding fields where the aborigines had lived. It would seem, then, that the stamped decoration was in use on vessels intended for domestic purposes and not on mortuary ware.

There is a wide range in the quality of the ware from the mound at Walton's Camp. Some is excellent, much is inferior. As in the ware in the Bear Point mound, small quantities of finely pounded shell are present in places, that is to say locally and not in even mixture throughout the vessel. There is one exception, however, a small vessel where shell coarsely pounded shows on the surface even, as is often the case on vessels of the middle Mississippi district and from the Alabama river. The loop-shaped handle, so often found in the districts we have just named, was present in the mound at Walton's Camp.

A number of heads of earthenware, which had served as handles on vessels, were loose in the sand.

The predominating forms of ware in this mound were the bowl and the dish, and it is interesting to note that a form of dish entirely new, we believe, was discovered by us, namely, a six-pointed, or star-shaped style.

Perforation of the base of vessels was almost universal in this mound, not only in the case of those buried directly with dead, but fragments which included the base had also the perforation, though the remainder of the vessels was not present. We are unable to decide whether parts of vessels were "killed" before interment in the heaps of ware we have described, or whether vessels, having undergone perforation, were broken and then scattered here and there in the mound.

In peninsular Florida we noted, and were first to describe, a curious custom, an account of which we take from one of our preceding publications. "This was the only occurrence in the mound of ready-made mortuary ware. For the benefit of those not familiar with our previous Reports on the Florida mounds, we may say that it was the custom in that State often to knock out the bottom, or to make a hole through the bottom, of earthenware vessels, previous to inhumation with the dead, and that this custom is believed to have been practised with the idea that the mutilation 'killed' the vessel, freeing its soul to accompany that of its owner into the next world. Apparently, however, it entered the minds of the more thrifty among the aborigines that vessels of value might serve a better purpose, and hence there arose a class of ceremonial ware, usually small in size, often of fantastic

design and always of flimsy material, with bases perforated during the process of manufacture. This cheap ware was probably kept on hand and did duty for vessels more valuable and less readily spared."

In the mound at Walton's Camp we met with this ready-made mortuary ware in one case only, the most westwardly occurrence in our experience. It is interesting to note this fact since perforation of the base made after completion of the vessel occurs to the westward and up the Alabama river, though sparingly.

We shall now give a description of the various vessels taken from the mound by us and of their finding.

Vessel No. 1.—A vase, perforate as to base, found lying on its side near human remains. The body, oblate spheroid, is decorated with the current scroll. The neck, slightly flaring, has incised and punctate decoration as shown in Fig. 15. Height, 6 inches; maximum diameter, 5.5 inches. This vessel, when found, had parts missing, and, in addition, was struck by a spade.



FIG. 15.—Vessel No. 1. Mound at Walton's Camp. (Half size.)



FIG. 16.—Vessel No. 2. Mound at Walton's Camp. (One-third size.)

Vessel No. 2.—An imperforate bowl found inverted over the skull and some bones of a child, with which were two shell hair-pins and an arrowpoint or knife. This bowl is 15.4 inches in maximum diameter and 7 inches in depth. It has an interesting incised symbolical decoration. The design, which is repeated around the vessel, is shown in Fig. 16.

Vessel No. 3.—This bowl was found in four pieces with fragments of other vessels. Cemented together, it measures 6.5 inches in maximum diameter and 2.8 inches in depth. There is a basal perforation. The decoration, incised and punctate, is shown in Fig. 17.



FIG. 17.—Vessel No. 3. Mound at Walton's Camp. (Half size.)

Vessel No. 4.—This vessel, of inferior ware and without decoration save a scalloped margin, lay crushed to fragments near a single skull with which were four arrowpoints or knives and the curious lancepoint we have figured.

Vessel No. 5.—A circular dish of inferior black ware inverted over a few phalanges. The decoration, rather rudely done, is incised. The basal perforation is to one side of the center. Diameter, 13 inches; depth, 2.5 inches (Fig. 18).



FIG. 18.—Vessel No. 5. Mound at Walton's Camp. (One-third size.)

Vessel No. 6.—A bowl found crushed to pieces, inverted over a solitary skull. The base has a perforation. The decoration, a species of scroll, is incised. The fragments were sent to Peabody Museum, Cambridge, Mass., whence the photo-

graph used in the half-tone was furnished us with the measurements: maximum diameter, 17.25 inches; depth, 5.75 inches (Fig. 19).

Vessel No. 7.—The larger part of a six-pointed dish of black ware, found in fragments and sent to the Davenport Academy of Natural Science, Davenport, Iowa. We shall have occasion, later, to refer to this type.

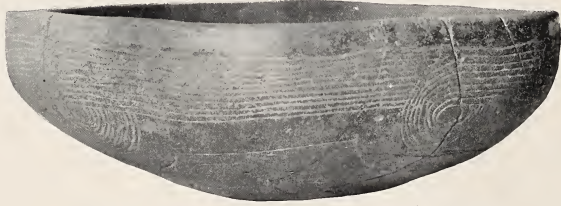


FIG. 19.—Vessel No. 6. Mound at Walton's Camp. (Two-sevenths size.)

Vessel No. 8.—A bowl, broken, with base perforation, found lying about 2 feet from a bunched burial, at an angle of about forty-five degrees, aperture up. It has been pieced together and sent to the Museum at Memorial Hall, Fairmount Park, Philadelphia. The decoration, incised, is much like that on Vessel No. 40 (Fig. 102) from the cemetery near Point Washington. Maximum diameter, 10.2 inches; depth, 4.1 inches.

Vessel No. 9.—This vessel, much resembling a cap in shape with visor before and behind, is said to belong to a class modelled after trays of wood. It is unbroken

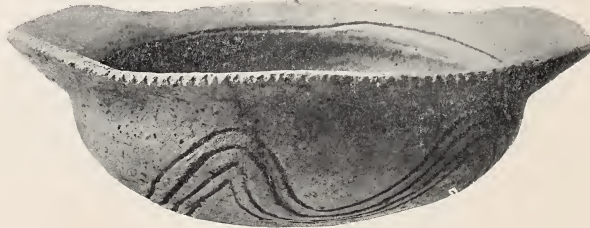


FIG. 20.—Vessel No. 9. Mound at Walton's Camp. (Half size.)

save for a basal perforation. It is of yellow ware, and is notched around the margin except at the handles. There is an incised meander decoration. Major diameter, 10.5 inches; minor diameter, 8.25 inches; depth, 3.6 inches (Fig. 20). It lay, inverted, over a single fragment of bone, though others had probably disappeared through decay.



Vessel No. 10.—A small bowl found with many fragments of earthenware just below the surface.

Vessel No. 11.—This interesting bowl of excellent red ware is intact with the exception of a mortuary perforation. It lay, inverted, over the skull of an adult, the skull of an adolescent, a few vertebrae and the clavicle of a child. The decoration, incised, uniform all around, consists of a series of conventionalized heads in which the eye and teeth are prominent. Maximum diameter, 15.25 inches; depth, 6 inches (Fig. 21).



FIG. 21.—Vessel No. 11. Mound at Walton's Camp. (About half size.)

Vessels Nos. 12 and 13.—Small bowls from the same deposit as Vessel No. 10. One has three small handles. A fourth handle is missing. The other, with incised and punctate decoration much resembling that on Vessel No. 24, this mound, has been sent to Memorial Hall, Fairmount Park, Philadelphia. Both vessels are perforate as to the base.

Vessels Nos. 14, 15, 16.—Vessel No. 14, a counterpart of Vessel No. 9, this mound, lay inverted, in fragments, on a dish of black ware also inverted. This dish, with incised and punctate decoration, is six pointed, or star-shaped. There is a base-perforation. Maximum diameter, 14.75 inches; depth, 3 inches (Fig. 22). This interesting type, as we have stated, we believe to be new. Professor Putnam and Professor Holmes had not seen it previously. Partly between Vessels Nos. 14 and 15 lay a portion of a vessel in fragments. All this ware lay above an infant's skull. Vessel No. 14, pieced together, has been sent to Memorial Hall, Fairmount Park, Philadelphia.

Vessels Nos. 17 and 18.—Small bowls found together just below the surface apart from human remains.

Vessels Nos. 19 and 20.—Vessel No. 19, a circular dish of crude black ware,



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8.5 inches in diameter and 1.5 inches in depth, having incised decoration on the inner surface, lay face down on Vessel No. 20, which, inverted, was over a few fragments of the bones of a child. These bones lay upon a large portion of another dish. Vessel No. 20, a bowl of brown ware, intact with the exception of a basal



FIG. 22.—Vessel No. 15. Mound at Walton's Camp. (About half size.)

perforation, has an admirably executed incised and punctate decoration as shown in Fig. 23. Maximum diameter, 13.8 inches; depth, 6.5 inches. Vessel No. 19, also, is perforate.

Vessel No. 21.—A small, rude, imperforate bowl, undecorated with the exception of four knobs on the margin, lay about 1 foot from human remains.



FIG. 23.—Vessel No. 20. Mound at Walton's Camp. (Half size.)

Vessel No. 22.—A large fragment with much of the rim missing lay, inverted, over a skull with a few other bones.

Vessel No. 23.—A star-shaped dish of black ware, found crushed, with a small portion missing, has been sent to the Peabody Museum. No human bones were found in association.

Vessel No. 24.—An imperforate bowl found inverted over the skull of an infant. The decoration is a series of partially interlocked scrolls with punctate and lined work in addition. Maximum diameter, 12.5 inches; depth, 5.3 inches (Fig. 24).



FIG. 24.—Vessel No. 24. Mound at Walton's Camp. (Half size.)

Vessel No. 25.—A bowl 6.8 inches in diameter and 2.9 inches in depth, with perforate base and incised and punctate decoration. This bowl came from just below the surface (Fig. 25).

Vessel No. 26.—A bowl of black ware, perforate, having a notched rim, incised and punctate decoration, lay near Vessel No. 24. Maximum diameter, 6 inches; depth, 3.2 inches. This bowl, with small protuberances, is, doubtless, a life-form somewhat resembling Vessel No. 49, this mound, which, however, is more clearly defined, distinctly representing a fish.



FIG. 25.—Vessel No. 25. Mound at Walton's Camp. (Half size.)

Vessel No. 27.—A perforate bowl found lying on its side near human remains. The decoration is similar to that of Vessel No. 40 (Fig. 102) from the Cemetery near Point Washington. Maximum diameter, 5.1 inches; depth, 2.8 inches.

Vessel No. 28.—Found, badly crushed, inverted over a few fragments of bone.

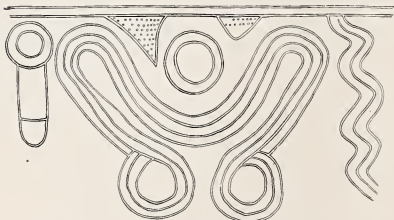


FIG. 26.—Decoration. Vessel No. 28. Mound at Walton's Camp. (One-third size.)

The decoration, which Professor Holmes believes to be a highly conventionalized head with the eye above and parts of the body on either side, is shown in Fig. 26.

Vessel No. 29.—A perforate bowl in fragments found inverted over a skull and some bones of an infant and certain bones of a child with which were a considerable number of shells of *Marginella*, pierced

to use as beads. The decoration consists of a repetition of three upright wavy lines. This bowl is now at the Peabody Museum.

Vessel No. 30.—A perforate vessel 5.5 inches by 4.6 inches and 2.8 inches in depth, representing a frog much after the manner of the ware of the middle Mississippi district. The legs, fashioned separately and pressed upon the body, have fallen off in part (Fig. 27).

Vessel No. 31.—A bowl found, badly crushed, inverted over the skull of an adult. This bowl, which has been pieced together, and sent to the Museum of Natural History, New York, is imperforate. The decoration, incised and punctate, consists of a series of designs as shown in Fig. 28, which doubtless represents jaws with teeth and possibly an eye in the center. Maximum diameter, 16 inches; depth, 5 inches.

Vessels Nos. 32 and 33.—A bowl with a single handle almost upright and the current scroll decoration. The base is perforate. The dimensions are 5.5 inches long by 5 inches across; the height, 2.5 inches (Fig. 29). This bowl lay inverted just below the surface with no bones in association. Beside it lay Vessel No. 33, also inverted, in fragments.

Vessel No. 34.—A small, perforate bowl with incised and punctate decoration (Fig. 30).



FIG. 27.—Vessel No. 30. Mound at Walton's Camp. (Full size.)

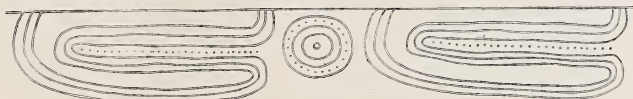


FIG. 28.—Decoration; Vessel No. 31. Mound at Walton's Camp. (One-fourth size.)



FIG. 29.—Vessel No. 32. Mound at Walton's Camp. (Two-thirds size.)



FIG. 30.—Vessel No. 34. Mound at Walton's Camp. (Half size.)



Vessel No. 35.—Small bowl badly broken.

Vessels Nos. 36 and 37.—Both perforate as to the base. Vessel No. 36 (Fig. 31), 7.8 inches maximum diameter, 2.5 inches in depth, with the favorite partially interlocked scroll decoration, was found inverted over Vessel No. 37 standing upright.



FIG. 31.—Vessel No. 36. Mound at Walton's Camp. (Three-quarters size.)

The base of Vessel No. 37 rested upon a number of fragments of pottery piled one upon another in such relation to each other that it was evident the breakage occurred before the fragments were placed together. These pieces, when put together, formed part of a dish, only. Vessel No. 37, a pot, has four loop-shaped handles and incised and punctate decoration. Its maximum diameter is 5 inches; its height,



FIG. 32.—Vessel No. 37. Mound at Walton's Camp. (Half size.)



FIG. 33.—Section of Vessel No. 38. (Half size.)

3.2 inches (Fig. 32). There is a deposit of soot showing domestic use, a rare occurrence among mortuary vessels in this part of Florida.

Vessel No. 38.—This vessel with incurved rim and incised decoration on the upper portion, rather rudely executed, has a basal perforation. The vessel lay near the four preceding ones, apart from human remains. Diameter, 9 inches; diameter of aperture, 5 inches; height, 2.75 inches (Figs. 33, 34).

Vessel No. 39.—Certain fragments of a dish piled one on the other over a few decaying fragments of the bones of an infant, with which were shell beads.





FIG. 34.—Vessel No. 38. Top view. Mound at Walton's Camp. (About seven-ninths size.)

Vessel No. 40.—This bowl of about 3 pints' capacity, with perforate base, though inverted, was not associated with human remains. The decoration consists of notches at the rim and a single incised line with five small knobs.

Vessel No. 41.—Parts of a bowl lying over a few remnants of long-bones of a young person. The decoration consists of a series of designs similar to the one shown in Fig. 35.

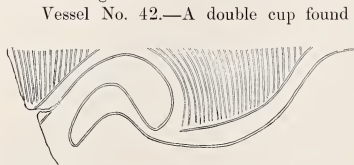


FIG. 35.—Decoration; Vessel No. 41. Mound at Walton's Camp. (One-third size.)

this custom, so often met with in peninsular Florida, at the beginning of the description of this mound.

Vessel No. 42.—A double cup found by the side of the skull of a child. Diameters, 4 inches by 2.5 inches; height, 2.6 inches. There is a scroll decoration incised on the rather inferior ware (Fig. 36). Each base is perforate but not through the knocking out of fragments as in the other cases noted by us, but by means of careful cutting while the clay was soft. We have referred to



FIG. 36.—Vessel No. 42. Mound at Walton's Camp. (Full size.)

Vessel No. 43.—A bowl of poor material with incised decoration, having on



FIG. 37.—Vessel No. 43. Mound at Walton's Camp. (One-third size.)

one side, as handles, two upright effigies of the human head. At the other side, a flat handle such as usually represents the tail in bird-effigy vessels of the middle Mississippi district, projects horizontally. A considerable part of the base is missing. Maximum diameter, 9 inches; depth, 4 inches (Fig. 37).

Vessel No. 44.—A small vessel shattered by a blow from a spade. Infant bones were in association.

Vessel No. 45.—A bowl, crushed to pieces, inverted over fragments of the skull of an infant or of a young child. With the exception of a few missing parts, this bowl has been pieced together, showing a perforation of the base. Maximum diameter, 16 inches; height, 5.5 inches.



FIG. 38.—Decoration, Vessel No. 45. Mound at Walton's Camp. (One-third size.)

The decoration, shown in Fig. 38, may be divided into three parts, the two to the right of the reader are repeated around the bowl. The part to the left appears but once. This bowl has been sent to the American Museum of Natural History, New York City.

Vessel No. 46.—An imperforate bowl of about one pint capacity, of excellent ware highly smoothed, having five encircling, incised lines below the rim (Fig. 39). It lay near the skull of a child.

Vessel No. 47.—A small, imperforate pot with two loop-shaped handles, found inverted, by the side of an infant's skull with which were three mussel shells.



FIG. 39.—Vessel No. 46. Mound at Walton's Camp. (Half size.)

Vessel No. 48.—A flat-bottomed perforate cup of inferior ware, with rude, symbolical decoration, found near the surface. This cup, struck by a spade, has been pieced together. Diameter of aperture, 4.5 inches; of base, 2.8 inches; depth, 3 inches (Fig. 40).



FIG. 40.—Vessel No. 48. Mound at Walton's Camp. (Two-thirds size.)

Vessel No. 49.—Part of a bowl of about two quarts' capacity, in fragments, found with other ware, apart from human remains. This interesting bowl, showing the influence of the middle Mississippi district, is a life-form representing a fish. On one side a clearly defined head projects. Half way around, on either side, projections doubtless represent fins. That part of the bowl which included the



FIG. 42.—Handles of earthenware vessels. Mound at Walton's Camp. (Full size.)



tail is missing. The decoration, found on various vessels representing fish, perhaps symbolizes fins (Fig. 41).



FIG. 41.—Vessel No. 49. Mound at Walton's Camp. (Half size.)

Fig. 42 shows five handles of bowls, representing heads of birds, from the mound at Walton's Camp.

Four interesting sherds have been selected from those found at the Walton's

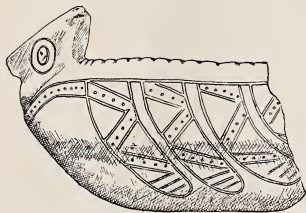


FIG. 43.—Sherd. Mound at Walton's Camp. (Half size.)

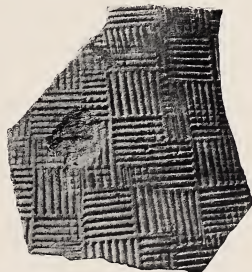


FIG. 44.—Sherd. Mound at Walton's Camp. (Half size.)

Camp mound. Fig. 43 shows the head of an owl with conventionalized wing. Fig. 44 gives the complicated stamp decoration already described as coming from the



midden refuse in the mound. Fig. 45 represents a head, a series of which evidently ran around the vessel. The drawing is made from two fragments, one of which shows one portion of the head; the other, the remainder. Fig. 46, when turned on end, shows a head with eye, mouth and teeth.



FIG. 45.—Sherd. Mound at Walton's Camp. (Half size.)

the Sound, is a sand mound at present 7.5 feet in height. It had been much dug into before our visit. Careful investigation on our part met with no success and confirmed our belief that the mound had been erected for domiciliary purposes.

Various small mounds are in the neighborhood of the great one investigated by us. Careful digging convinced us that all were of a domiciliary character. In one containing midden refuse with much shell was a piercing implement of bone and a buck-horn handle with a socket to receive an implement.

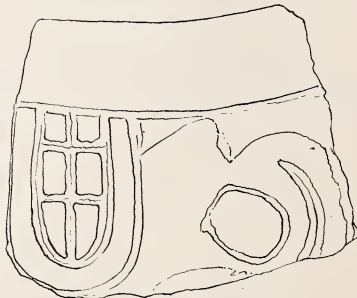


FIG. 46.—Sherd. (Full size.)

#### MOUND NEAR DON'S BAYOU, CHOCTAWHATCHEE BAY, SANTA ROSA COUNTY, FLA.

Garnier's Bayou is near the western extremity of Choctawhatchee Bay. Don's Bayou enters Garnier's Bayou on its western side.

In scrub, about 200 yards in a westerly direction from the landing, at the head of Don's Bayou, in a field on Government property showing signs of early cultivation, is a mound of irregular outline, greatly spread by the plough, apparently. The major and minor basal diameters are 80 feet and 50 feet respectively. The present height is 3 feet. Thorough trenching showed the mound to be of sand and probably erected as a dwelling site.

#### MOUND NEAR BLACK POINT, CHOCTAWHATCHEE BAY, WALTON COUNTY, FLA.

About one-quarter mile in a northwesterly direction from Black Point, in scrub, formerly a cultivated field, on Government property, is a rather symmetrical mound of circular outline with basal diameter of 83 feet.

The diameter of the summit plateau is 46 feet. Thorough trenching showed the mound to have been a place of residence only. Isolated sherds lay here and there in the sand of which the mound was composed, some of excellent quality, undecorated, with the check-stamp, with the complicated stamp and with incised decoration.

#### MOUNDS NEAR ROCKY BAYOU, CHOCTAWHATCHEE BAY, WALTON COUNTY, FLA.

On the west side of Rocky Bayou, about 1.5 miles up, in scrub, not far from the water's edge, was a mound, circular in outline, 28 feet across the base and 2 feet 3 inches in height. A small trench had been dug through the central part.

This mound, which was demolished by us, was of unstratified sand. Three badly decayed skulls, each with some fragments of other bones, were met with and a few small pieces of bone lying alone.

About 8 inches below the surface, apparently unassociated, was a tobacco pipe of soapstone, similar to those we have found in mounds near the mouth of the St. John's river, Florida, where the orifice for the stem almost equals in size the bowl of the pipe. In shape the pipe forms almost a right-angle with one side 4 inches in length, the other side, 3 inches.

With human remains, near together, were five small vessels of yellow ware, all perforate as to the base. Three are undecorated bowls, each of about one-half pint capacity. Another, semi-globular, 3.6 inches in maximum diameter, has the rim turning inward to leave an aperture of about 1.7 inches. The height is about 2.4 inches. The fifth vessel has the form of a gourd. Its length is 4.6 inches; its height, 2.8 inches. The diameter of aperture is 1.4 inches (Fig. 47). The end of the stem has



FIG. 47.—Gourd-shaped vessel. Mound at Rocky Bayou.  
(Two-thirds size.)

a small irregular hole which seems to have come through decay.

A graceful "celt," probably of igneous rock, with well-ground edge and rounded end, 8.5 inches in length, lay near the surface.

In various parts of the mound were several vessels, parts of vessels and sherds, of no particular interest.

About 100 yards east of the eastern side of the mouth of Rocky Bayou, in a field formerly cultivated but now overgrown with scrub, is a mound of irregular outline, with basal diameters of 72 feet and 112 feet. The height is 4 feet. Careful trenching gave every indication that the mound had been domiciliary in character.

## MOUND NEAR BASIN BAYOU, CHOCTAWHATCHEE BAY, WALTON COUNTY, FLA.

This mound was in thick scrub, about one-quarter mile in a westerly direction from the first habitation on the western side of the bayou, on property of Mr. George Berry, of Portland, Fla. The mound proper had a diameter of base of 40 feet, a height of 6 feet 6 inches. A graded way 28 feet long and 20 feet across, where it joined the mound on its S. W. side, was about 3.5 feet lower than the mound where it united with it.

A hole involving half of the central part of the mound had been dug previous to our visit.

The mound, with the exception of certain marginal parts, was dug through by us. Careful search failed to discover that dark line which we usually recognize as marking the base. The outer part of the mound at the N. E. side was composed entirely of black, loamy sand, rich in organic matter, having a maximum depth of 6 feet. This did not seem to be midden material, but muck from swampy ground near by. The remainder of the mound was of yellow sand, with black sand above it in varying depths, but nowhere approaching the depth of the black sand at the side of the mound.

While the former digger doubtless disturbed certain burials, yet, as the excavations made by him converged considerably, it is not likely a large percentage was affected. It is probable that certain burials had disappeared through decay, as, in addition to some scattered bones, but four burials were met with by us. Three of these consisted of decaying fragments of skull with friable pieces of long-bones, all between 6 and 7 feet in depth. A number of long-bones in fragments lay together.

Five and one-half feet from the surface was a bowl 3 inches in diameter, with perforate base. No remains were found near it, though it is likely a burial had lain with it.

No artifacts were with burials, practically all objects met with by us being near the bottom of the deposit of black loam on the northeastern side of the mound, in which were no burials.

Near together were four undecorated bowls all with base-perforation and all slightly broken in addition. Near them lay many pieces of mica.

Several fragments of excellent yellow paste lay somewhat scattered. Pieced together, they showed a fragment 7.5 inches in height, of a cylindrical vessel with flat base. The design, carefully made with a blunt point, is symbolical. The head of a duck stands out in relief for a handle (Fig. 48). Most careful search was made for the remainder of this vessel throughout the entire deposit of dark sand, and we are forced to believe that the fragments obtained by us represent all that was in the mound, and that this portion of the vessel, as Mr. Fewkes says of another class of objects, "should come under the group of sacrifices called substitutional, or symbolical, a part for the whole."<sup>1</sup>

A number of scattered fragments formed part of a pot decorated with crimson paint.

<sup>1</sup> "Property-right in Eagles among the Hopi," *American Anthropologist*, October-December, 1900, p. 690.

Also in fragments, rather closely associated, immediately on the base of the black loam deposit was a large part of an effigy-vase of yellow ware. The figure is that of a male in a squatting position. Its height is 9.5 inches. It is 6.5 inches across the shoulders and has a maximum thickness of 5.3 inches. The diameter of the aperture, which is at the top of the head, is 3.4 by 3 inches. The arms, which



FIG. 48.—Fragment of vessel. Mound near Basin Bayou. (About two-thirds size.)

had been fashioned separately and fastened to the body by pressure, are missing. Around the head is a band, part of which has fallen from the forehead and part from the back. Much of the base is wanting. This interesting effigy, taken from the front and from the side, is shown in Figs. 49, 50.

Isolated sherds showed fine ware with incised decoration. The complicated stamp was represented by four varieties.

No use of powdered shell with the paste was noted.





FIG. 50.—Same. Side view. (Two-thirds size.)



FIG. 49.—Eggy-vase. Mound near Basin Bayou. (Two-thirds size.)



## MOUND NEAR JOLLY BAY, CHOCTAWHATCHEE BAY, WALTON COUNTY, FLA.

Jolly bay is at the eastern end of Choctawhatchee bay. Landing at the head of Jolly bay, on the north side, and keeping about one mile inland in an N. N. W. direction, a mound is reached in pine woods on the verge of hammock land near a fine stream of water. The mound, on property of Mr. R. L. Burnham, resident on the place, was investigated by kind permission of the owner. The mound had been dug into more extensively than any of its size it has been our fortune to see and, as usual, vain search for treasure was the motive of the wreck. Little beyond the sloping portion of the mound and part of the eastern end remained intact. Fortunately for us, deposits of earthenware in mounds in this section of the country are often marginal, so that we believe little, if any, pottery was destroyed by previous digging. We were informed by Mr. Burnham that he had been present when others were seeking for gold, and had witnessed the finding of but one pot since the digging began, twenty years ago.

The height of the mound as we found it, was 3 feet 9 inches; its diameter east and west was 70 feet and 55 feet north and south. Its summit plateau was 51 feet by 38 feet.

All undisturbed parts of the mound which was composed of unstratified sand, were dug through by us.

Twenty-seven undisturbed burials were met with. These were lone skulls; skulls with a few fragments of long-bones, and, occasionally, long-bones without the skull, all badly decayed.

With one skull was a lancepoint 5 inches in length. Another skull had eight arrowpoints or knives, five of quartzite, three of jasper.

With a burial was a piercing implement made from the column of a *Fulgur*.

A small chisel of undetermined rock, a broken "celt" and several arrowpoints, one of blue quartz, lay loose in the sand.

On the southern side of the mound, beginning at the general level, dark sand extended below the surface, continuing into the slope for a considerable distance. In this sand were several vessels, and burials also were present in it.

In all, fourteen vessels were met with, all but one or two in the sloping portion of the mound, and none much farther in than the margin of the summit plateau.

We give in detail a description of the vessels.

Vessel No. 1.—A little below the surface, almost at the beginning of the upward slope, with no bones in association, lay an interesting dish of yellow ware, five pointed, with basal perforation. The decoration, which is incised and punctate, is evidently symbolical. Maximum diameter, 7.5 inches; depth, 2.3 inches (Fig. 51).

Vessel No. 2.—2 feet 10 inches down, inverted over the skull of an infant, with other bones near by in a condition resembling sawdust, was a bowl with incised decoration much the same as that on Vessel No. 20 (Fig. 23) from the Walton's Camp mound. Maximum diameter, 8.8 inches; depth, 4 inches. The base is imperforate. On the sides of the bowl is much soot indicating use for domestic purposes.

460 CERTAIN ABORIGINAL REMAINS OF THE N. W. FLORIDA COAST.

Vessel No. 3.—3 feet 3 inches down, upright, unassociated, was an undecorated, perforate bowl of excellent ware. The rim, thickened, projects horizontally about .5 inch. Maximum diameter, 6.5 inches; depth, 2.7 inches.



FIG. 51.—Vessel No. 1. Mound near Jolly Bay. (About full size.)

Vessel No. 4.—This vase, with perforate base, undecorated, of about one quart capacity, has a globular body and an upright neck, slightly expanding, 1.25 inches high.

Vessel No. 5.—A rude, undecorated bowl of about one quart capacity.

Vessel No. 6.—A bowl, 3 feet down, inverted over a fragment of human bone. The ware is inferior. The decoration is incised. From one side a head, probably representing that of a frog, projects. Opposite, a tail, apparently, has been lost through breakage (Fig. 52). Maximum diameter, including head, 3.6 inches; depth, 1.8 inches.



FIG. 52.—Vessel No. 6. Mound near Jolly Bay. (Full size.)

Vessel No. 7.—3 feet down, lying on its side, un-associated, was a perforate vessel with undecorated, globular body and upright neck, slightly flaring, 2 inches in height. The neck has a poorly defined check-stamp decoration.

Vessel No. 8.—This bottle, imperforate, of dark ware, is probably the most



FIG. 53.—Vessel No. 8. Mound near Jolly Bay. (Full size.)

interesting vessel taken by us from the Florida coast. It fell with caving sand, so that data as to its association with human remains were not obtainable. The body, which tapers to a flat base 1.8 inches across, has a maximum diameter of 5 inches.

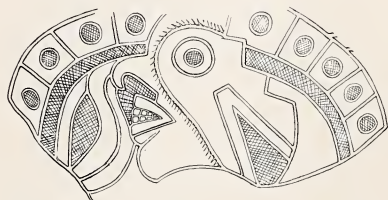


FIG. 54.—Engraved decoration on Vessel No. 8. (Half size.)

on the half-tone representation of the bottle (Fig. 53) and diagrammatically in Fig. 54.

On the opposite side of the bottle is an engraved design representing an eagle



FIG. 55.—Vessel No. 8. Opposite side. (Full size.)



with extended wings and head turned to the reader's left (Figs. 55, 56). Two vertebræ of a child were in the sand within this bottle.

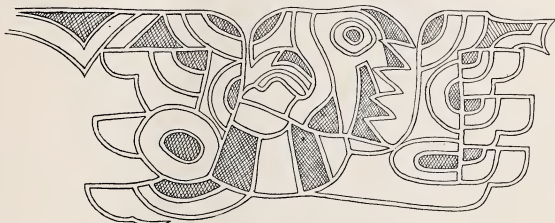


FIG. 56.—Engraved decoration on Vessel No. 8. Opposite side. (Half size.)

Vessel No. 9.—Fragments of part of a bowl.

Vessel No. 10.—Bowl, perforate base, inferior ware with four incised, encircling, parallel lines. Maximum diameter, 8.25 inches; depth, 5.2 inches. From the rim, projecting obliquely upward, are six rude animal heads, much resembling in style those shown on Vessel No. 13, this mound.

Vessel No. 11.—A bowl with rough, incised decoration and in-turned rim a little less than 1 inch in width.



FIG. 57.—Vessel No. 11. Mound near Jolly Bay. (About half size.)

From the body are four projections. This vessel, which rudely represents a life-form, lay tilted on its side 2 feet below the surface. No bones were in association. The base is perforate (Fig. 57).

Vessel No. 12.—A rather rude, imperforate bowl with bird-head handle and conventional tail on the opposite side. The decoration on the

upper part of the bowl, which is slightly thicker than the lower part, is incised. Diameter of body, 7 inches; depth, 4.75 inches.

Vessel No. 13.—A bowl of inferior ware, perforate, with undecorated body and four projections, rude representations of animal head (Fig. 58). Maximum diameter, 7.6 inches; depth, 4.4 inches. This bowl has been used for culinary purposes.

Vessel No. 14.—Soon after our work on this mound began, parts of a vessel of dark ware, the body surrounded by several incised lines, were thrown out by a digger. Somewhat later other parts were met with. About two hours after this the same digger found several other fragments of this vessel, much farther in. At the end, almost the entire vessel was present and such small parts as were missing no doubt escaped our attention and that of the digger. From all this it would





FIG. 58.—Vessel No. 13. Mound near Jolly Bay. (Half size.)



FIG. 59.—Handle of vessel. Mound near Jolly Bay.  
(Full size.)



FIG. 60.—Handle of vessel. Mound near  
Jolly Bay. (Full size.)

seem that an entire vessel had been broken and its parts scattered on the sand during the construction of the mound.

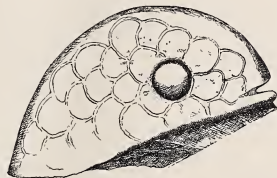


FIG. 61.—Handle of vessel. Mound near Jolly Bay. (Half size.)

Loose in the sand were three handles of vessels; two representing human heads (Figs. 59, 60), and one the head of a fish, neatly executed (Fig. 61.)

#### MOUNDS NEAR BLACK CREEK, CHOCTAWHATCHEE BAY, WALTON COUNTY, FLA. (3).

These mounds lay in sight of each other in an old field about 2.5 miles up Black Creek and one mile inland in a southwesterly direction from Mr. David Evans' lower landing.

The mounds had all been under cultivation, and evidently all had been greatly spread by the plough. The smallest was less than one foot in height. The others were 70 feet and 96 feet in diameter and 1.5 feet and 4 feet in height, respectively. All these mounds were carefully trenched with no result, save to indicate their former use as places of domicile.

#### MOUND NEAR POINT WASHINGTON, CHOCTAWHATCHEE BAY, WASHINGTON COUNTY, FLA.

This mound was about two miles in a westerly direction from Point Washington, near a spring of excellent water. The spring feeds a pond from which a narrow creek, navigable for small boats, runs to the bay, somewhat over a mile distant. The mound, on the property of Mr. Simeon Strickland, Sr., of Point Washington, who kindly permitted us to dig, was of circular outline, 36 feet across the base and 6 feet high. Previous diggers, treasure seekers, we were told, had made a large hole in the center, probably 8 feet in diameter, and had driven a trench in from the margin.

The mound, of yellow sand without stratification, was demolished by us.

Burials were central to a certain extent, the first being met with 8 feet in from the margin. In all eleven were met with by us at depths varying from 2 feet to the base of the mound, and doubtless a considerable number was destroyed by the hunters for gold. The form of burial was the solitary skull, sometimes accompanied by a few fragments of other bones or, occasionally, long-bones without the skull

were met with. On the center of the base of the mound, 6 feet down, was the only skeleton found, being the bones of an adolescent lying at length to the knees, with the lower legs flexed under.

With the exception of a thick sheet of mica below this skeleton, no artifacts were met with in the mound in direct association with the dead. Two arrowheads were loose in the sand, as was a ball of galena, about 2 inches in diameter. There was present, also, a part of a small disc of copper, or of brass, too minute and too corroded for determination.

While no tributes were placed immediately with burials, yet, as we have seen to be the case elsewhere, there was in this mound a large deposit of earthenware, marginal in the main, placed generally.

In the N. E. part of the mound, not far from the margin, where the mound was a trifle over two feet in height, was sand much darker than the rest, though not so markedly in contrast as was the black loam in the marginal part of the mound near Basin Bayou. In this sand in the Point Washington mound, in close association, in contact even or, at times, one placed partly within another, were ten vessels of from one pint to two quarts capacity, approximately, the under ones lying on the base of the mound. A short distance away were five additional vessels while, a little further in, lay a number of others. In all, thirty-eight vessels of earthenware came from the mound, all, save two, from or from the vicinity of, the place we have noted. Of the two exceptions, one was from the margin, but several yards distant from the rest, while the other fell with caving sand from near the surface. This vessel was imperforate as to the base and was the only one met with by us in the mound clearly without mortuary mutilation, though several were too fragmentary for determination.

One of the groups of vessels lay with their bases resting upon great fragments of much larger vessels, as on a floor.

In two cases vessels whose bodies tapered to the base, had the base entirely knocked away instead of perforated simply. In one case, the base was found later, some distance from the vessel to which it belonged.

Of the thirty-eight vessels found by us none exceeded two quarts in capacity, and in none was admixture of powdered shell apparent. The paste, yellow, as a rule, ranged from inferior to most excellent quality, resembling the ware of peninsular Florida. Many were undecorated; others offered no novelty in shape or ornamentation, while others, again, were crushed to fragments. We shall, therefore, confine ourselves in description to vessels worthy of especial notice.

Vessel No. 1.—This vessel, of excellent ware, was found in a number of pieces and without a base. The design is incised (Fig. 62).



FIG. 62.—Vessel No. 1. Mound near Point Washington.  
(Half size.)

Vessel No. 2.—This vase has the lower half of the body hemispherical; the upper part somewhat constricted. The neck is slightly flaring. There have been four small projections from the rim, of which two remain. Encircling the rim on the upper surface is an incised line. The ornamentation, incised, is a cross-hatch beneath two arching parallel lines. Maximum diameter, 5.5 inches; height, 4.5 inches (Fig. 63).



FIG. 63.—Vessel No. 2. Mound near Point Washington. (Half size.)

Vessel No. 5.—A vase of thick ware with flat base, and quadrilateral as to the lower part of the body. The upper part turns inward. The neck is upright. The ornamentation, incised and punctate, shown on the two sides in Fig. 64, is repeated on the other two sides. Capacity about one pint.

Vessel No. 6.—An acorn-shaped vessel of less than one pint capacity, with pinched decoration, perhaps intended to imitate the acorn (Fig. 65).



FIG. 64.—Vessel No. 5. Mound near Point Washington. (Full size.)

Vessel No. 14.—This vase, of inferior ware, resembles Vessel No. 5, this mound, as to shape of body which, in this case, is undecorated. The vessel, which





FIG. 65.—Vessel No. 6. Mound near Point Washington. (Two-thirds size.)



FIG. 66.—Vessel No. 14. Mound near Point Washington. (Half size.)

flares slightly at first and then becomes upright, has six parallel circles of punctate markings. Capacity about one quart (Fig. 66).

Vessel No. 18.—This interesting vessel of thick and excellent ware, a light yellow with many traces of crimson paint, somewhat resembles in shape of body Vessel No. 5. The head of an owl projects horizontally from one side. On either



FIG. 67.—Vessel No. 18. Mound near Point Washington. (Full size.)



side, behind the head, are deeply incised representations of wings. An incised tail is opposite the head. Just above the tail is a neatly made perforation as for suspension. Presumably a corresponding one on the opposite side has been omitted. The capacity is less than one pint (Fig. 67).



FIG. 68.—Vessel No. 19. Mound near Point Washington. (Full size.)

Vessel No. 19.—This vessel, of good yellow ware, bearing traces of crimson paint, has a double compartment with a human head between for a handle. The decoration, incised and punctate, is confined to one compartment. The closing of the scroll is a treatment similar to that found on vessels from Yucatan (Fig. 68).

Vessel No. 21.—The body is semi-globular, with high and slightly expanding neck. The base is flat. The body is undecorated. Around the neck is an interesting complicated decoration conferred by the use of a stamp. Maximum diameter, 5.75 inches; height, 6 inches (Fig. 69).

Vessel No. 22.—A bowl with semi-globular body and thickened rim, of about three pints capacity. The interior has a coat of crimson paint, as has part of the outside.

Vessel No. 25.—A vase of flattened outline, of most excellent yellow ware



FIG. 69.—Vessel No. 21. Mound near Point Washington. (Three-quarters size.)

and with gracefully rounded rim. The complicated decoration, beautifully carved, confined to the upper portion, is practically all shown in Fig. 70. Fig. 71 gives the outline of the side. Maximum diameter, 6 inches; height, 3 inches; diameter of aperture, 3.5 inches.

Vessel No. 27.—A pot with two encircling lines of punctate markings (Fig. 72).

Vessel No. 29.—A pot with ovoid body, of about two quarts' capacity. A thick rim flares slightly. A border .5 inch in diameter, consisting of complicated stamp decoration, is just below the rim. Diameter, 5.6 inches; height, 6.8 inches (Fig. 73).

Vessel No. 35.—In shape an inverted truncated cone. The ware, bright yellow, has been colored crimson about one inch below the rim. Next follows a band about 1.75 inches broad, without paint, with incised decoration. The remainder of the vessel is crimson. Parts are missing. Height, 6 inches; maximum diameter, 4.5 inches (Fig. 74).



FIG. 70.—Vessel No. 25. Mound near Point Washington. (About one-sixth oversize.)



FIG. 71.—Section of Vessel No. 25. (Half size.)



FIG. 72.—Vessel No. 27. Mound near Point Washington. (Half size.)



FIG. 73.—Vessel No. 29. Mound near Point Washington. (One-third size.)



FIG. 74.—Vessel No. 35. Mound near Point Washington. (One-third size.)



FIG. 75.—Vessel No. 38. Mound near Point Washington. (Half size.)

Vessel No. 38.—A fragment of a vessel of eccentric form, of very superior ware, beautifully decorated. Traces of crimson paint remain (Fig. 75).

CEMETERY NEAR POINT WASHINGTON, CHOCTAWHATCHEE BAY,  
WASHINGTON COUNTY, FLA.

Over a score of years ago, we were told, persons living at Point Washington noticed earthenware vessels, or parts of vessels, projecting above the ground in a hammock about 3.5 miles west of their settlement. Incidentally, it may be said that the word hammock is used in certain parts of the Southern United States to describe a tract of land on which grow the palmetto, the oak and certain other trees, in contradistinction to the pine barrens, the swamp, the marsh, or the prairie. This hammock, which is about three acres in extent, lies in from the bay and is surrounded by pine woods. It is said that former visitors from the town obtained a number of vessels at this place, though we saw but little evidence of former digging, either on or below the surface.



Four and one-half days were passed by us at the cemetery with ten men to dig and three men to supervise.

About one-quarter of an acre was dug through by us and it is our belief that that part of the hammock containing burials was thoroughly dug by us, the limit being determined not only by the spade but by sounding rods of iron which we found so useful in our work at the aboriginal cemetery at Durand's Bend, Alabama river.

The cemetery near Point Washington was not exactly level, there being a number of irregular rises in the ground with flat spaces between. These rises, which probably did not exceed a foot in height, in three cases contained large deposits of human bones, solid masses with outlying bones here and there, these bones not being enough apart to call them separate burials, nor yet so closely associated that they might be considered one interment. One of these deposits had seventeen skulls, all of adults but one, as to which we had not sufficient data to judge. Numbers of long-bones accompanied the skulls. In other parts of the cemetery were single skulls, others with long-bones and, in a few cases, long-bones without the crania, in addition to the burials found under earthenware vessels, which will be taken up later.

Certain skulls from the cemetery showed marked flattening as by compression. Captain Bernard Romans, in his "A Concise Natural History of East and West Florida," page 82, tells us, speaking of the Choctaws, "their women disfigure the heads of their male children by means of bags of sand, flattening them into different shapes, thinking it adds to their beauty."

Artifacts other than vessels of earthenware were not numerous. A piece of iron lay near a skull and glass beads were with a number of burials. There were also: shell beads in many places; several undecorated gorgets of shell; a hoe-shaped implement of calcareous lime-stone, much disintegrated, with one of the masses of skulls; a large hone with a burial; eleven bits of chert and two arrowpoints together, with human remains; two glass finger-rings loose in the sand; two pendants of shell resembling barbless arrowpoints in shape, with a burial; a piercing implement of shell, wrought from a columella, with two circular grooves.

While the burials without earthenware covering were largely in the low mounds, burials under vessels were chiefly in the slopes of the mounds or in the levels and depressions between them.

At certain places in the cemetery, from a few inches to one foot below the surface, as in other cases reported by us, but still more noticeably so, lay quantities of earthenware over considerable areas. No burials were with or beneath these deposits which, at places, were so near together as almost to resemble a floor. These deposits were made up of fragments of vessels, some very large; occasionally a small, well-made vessel, usually with some imperfection; or bowls rarely over one quart in capacity, of poor material, often undecorated and sometimes broken in addition.

During our entire investigation, though particular care was exercised and

<sup>1</sup> New York, 1775.



the matter was constantly kept in view, no vessel of any size was reconstructed from pieces present in these deposits. Parts of smaller vessels, probably intended for domestic use, lay among the sherds. It has suggested itself to us that possibly vessels broken in domestic use were put aside and carried in numbers to the cemetery, where these fragments were spread upon the surface with small, unbroken vessels, not with, but near, the burials. In lapse of time leaf mould and shifting sand could readily account for the superficial depth at which these deposits were found. Fragments, during conveyance and deposit, would become greatly mixed, which would account for our inability to find full complement of parts of vessels and, moreover, as it seemed to us that decorated portions predominated, it may be that such parts were more carefully preserved. A definite method to settle this question, to which we have already referred in our account of the mounds at Bear Point and at Walton's Camp, would be to preserve each fragment of ware found during an investigation and, at the end, to endeavor to restore vessels from parts found at various points. This herculean task, however, could be attempted reasonably only in the case of a cemetery which had never undergone previous disturbance.

The earthenware at the cemetery contained practically no admixture of pounded shell, though here and there a small amount was present locally in vessels as was the case with those in the mound at Walton's Camp.

When bowls lay inverted over burials, such burials were from 1 to 3.5 feet in depth.

Vessel No. 1.—A life-form of coarse yellow ware, imperforate. The decoration is punctate. There are small holes at either end for suspension. Length, 4.1



FIG. 76.—Vessel No. 1. Cemetery near Point Washington. (Full size.)

inches; maximum diameter, 2 inches; depth, 1.6 inches (Fig. 76). A small part of the tail was broken by a trowel. This interesting little vessel lay apart from burials with many pieces of broken ware.

Vessel No. 2.—A bowl found in fragments but since pieced together. The base is perforate; the decoration, incised. Maximum diameter, 10 inches; depth, 5

inches (Fig. 77). No human remains were found with this bowl though probably they had disappeared through decay.

Vessel No. 3.—Found lying on its side, crushed to fragments.

Vessel No. 4.—Inverted, crushed to fragments, parts missing.

Vessel No. 5.—Inverted, imperforate base. The decoration is a partially inter-locked scroll rudely done. There are notches around the rim. Maximum diameter, 12.75 inches; depth, 7 inches.



FIG. 77.—Vessel No. 2. Cemetery near Point Washington. (One-third size.)



FIG. 78.—Vessel No. 7. Cemetery near Point Washington. (One-third size.)

Vessel No. 6.—One half of a large star-shaped dish lying inverted over a fragment of a skull, three large shell beads and two pebbles.

Vessel No. 7.—A pot three pints in capacity, perforate, with rough decoration on the neck (Fig. 78). This pot lay inverted just beneath the surface.

Vessel No. 8.—About the same size as Vessel No. 7 and lying in fragments near it.

Vessel No. 9.—A vessel of eccentric shape with incised and punctate decoration, perforate and with two small holes for suspension. Length, 6 inches; maximum diameter, 2.7 inches; height, 1.7 inches; diameter of aperture, 1.3 inches (Fig. 79).



FIG. 79.—Vessel No. 9. Cemetery near Point Washington. (Half size.)



FIG. 80.—Vessel No. 10. Cemetery near Point Washington. (Half size.)

Vessel No. 10.—A water-bottle of black ware, interestingly incised on body and on base. A white material has been rubbed into the lines. The base is perforate. There are two small holes for suspension, at the rim. Maximum diameter, 4 inches; height, 4 inches; aperture, 1.2 inches (Fig. 80). This bottle lay with the seventeen skulls and the mass of bones to which we have referred.



FIG. 81.—Vessel No. 11. Cemetery near Point Washington. (Full size.)



FIG. 82.—Vessel No. 12. Cemetery near Point Washington. (Full size.)



FIG. 83.—Vessel No. 13. Cemetery near Point Washington. (One-third size.)

Vessel No. 11.—A bottle similar to Vessel No. 10, with base perforation, holes for suspension and white material in the incised lines. Maximum diameter, 4.6 inches; height, 4.4 inches; aperture, 1.4 inches (Fig. 81). This bottle lay almost in contact with one of the skulls to which we have referred.

Vessel No. 12.—A bottle of inferior ware, rudely incised. The base is imperforate. Maximum diameter, 2.5 inches; height, 3.1 inches; aperture, 1 inch (Fig. 82). This bottle lay about 2 feet 8 inches down and about 9 inches below the mass of bones to which reference has been made. With it were small fragments of human remains.

Vessel No. 13.—An undecorated, wide-mouthed bottle with body heart-shaped in outline. The base is perforate. This bottle lay almost inverted. No bones remained near it. Diameter of body, 6.6 inches; height, 7.5 inches; diameter of aperture, 3.8 inches (Fig. 83).

Vessel No. 14.—An imperforate bowl partly crushed by a large root, since pieced together. The decoration, incised, represents highly conventionalized bird-wings though, in this case, the head and the tail of the bird do not appear



FIG. 84.—Vessel No. 14. Cemetery near Point Washington. (One-third size.)

on the bowl. In one instance, to the reader's left, on the bowl (Fig. 84) the circle has not been filled in as have the others. Maximum diameter, 13 inches; depth, 6.3 inches. This bowl lay inverted over the skull of an adult. Beneath the skull were a number of long-bones while one foot lower down was another skull. These bones were apparently the advance guard of a mass of remains behind and to one side of them which formed the deposit with the eleven crania to which we have referred.

Vessel No. 15.—Possibly part of a small bottle, though the aperture seems too smooth to mark the presence of a fracture. The decoration, incised and punctate, confined to the top of the body, is given, with section, in Fig. 85.

Vessel No. 16.—A large fragment lying by the side of Vessel No. 17. The decoration, a common one, consists of a series of concentric diamonds with central circles.



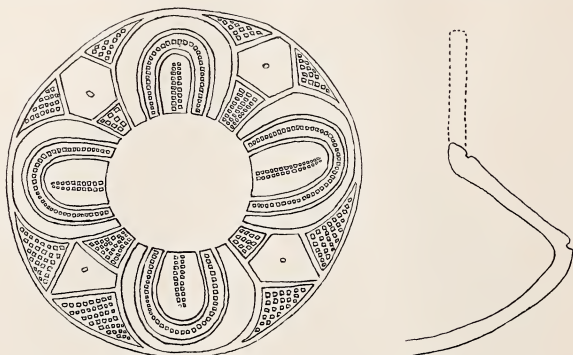


FIG. 85.—Vessel No. 15. Top view and section. Cemetery near Point Washington. (Full size.)

Vessel No. 17.—An imperforate bowl of black ware found, badly crushed, inverted over a human skull with a fragment of clavicle and some vertebrae. With these was a chisel of iron or of steel. This bowl, put together with the exception of a small part of the rim, which is wanting, has an incised decoration shown in Fig. 86. Maximum diameter, 15.5 inches; depth, 6.4 inches.

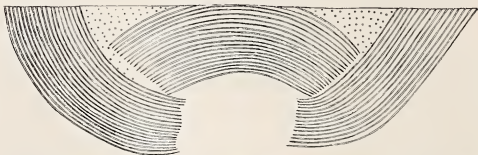


FIG. 86.—Decoration, Vessel No. 17. Cemetery near Point Washington. (One-third size.)

Vessel No. 18.—A bowl, badly crushed, found turned over the skull of an adult, about 2 feet from Vessels Nos. 16 and 17. This bowl, 3 feet 6 inches down, lay at a considerably greater depth than the vessels ordinarily. The decoration, incised, is a form of the partially interlocked scroll. The fragments of this bowl were sent to the Davenport Academy of Natural Science, Davenport, Iowa.

Vessel No. 19.—A bowl found upright in one of the deposits of sherds. The base is perforate. The decoration is incised scroll and punctate, much like that of Vessel No. 24 (Fig. 24) from the mound at Walton's Camp. Maximum diameter, 9.5 inches; depth, 4.5 inches.

Vessel No. 20.—A bowl with perforate base, lying just beneath the surface



with no associated remains. The decoration, incised, is in the main similar to that of Vessel No. 40 from this cemetery. Maximum diameter, 6.8 inches; depth, 3 inches.

Vessel No. 21.—A large fragment of a vessel, lying over a skull.

Vessel No. 22.—Found just below the surface, lying on its side in the deposit of sherds, containing, and surmounted by, parts of other vessels, was a vessel of two compartments, which, we believe, represents the open bivalve rather more conventionalized than is sometimes seen in the ware of the Mississippi district, a good example of which may be found on Plate VI in Thruston's excellent



FIG. 87.—Vessel No. 22. Cemetery near Point Washington. (About seven-eleventh size.)

“Antiquities of Tennessee.” The decoration on the body consists of a form of incised scroll. On the base of one compartment are concentric circles. On the other base, these circles begun, have not been completed. There are no basal perforations (Fig. 87).

Vessel No. 23.—An imperforate bowl inverted over fragments of the skull of a child or of an infant, 11.5 inches maximum diameter, 6.5 inches in depth. The decoration, incised, is shown in Fig. 88. By a small crack near the rim three holes, intended to allow a sinew or a cord to strengthen the parts, have been begun but not completed.



FIG. 88.—Decoration, Vessel No. 23. Cemetery near Point Washington. (About one-third size.)

Vessel No. 24.—A large fragment from the pottery layer, having on one side an animal head for a handle.

Vessel No. 25.—A perforate bowl inverted over the skull of an old person,

which showed marked artificial flattening. Maximum diameter, 13.2 inches; depth, 6 inches. The decoration is shown in Fig. 89. This bowl, mounted over



FIG. 89.—Decoration, Vessel No. 25. Cemetery near Point Washington. (One-third size.)

the skull which was found beneath it, placed upon sand and roots from the cemetery, has been sent to the Museum at Memorial Hall, Fairmount Park, Philadelphia.

Vessel No. 26.—A little above Vessel No. 25 and to one side of it was an unbroken, imperforate bowl, lying over the skull of an adult with which were one piece of tibia, one ulna, one clavicle, part of a humerus, a piece of a pelvis and one half of a lower jaw. On the upper part of the bowl is incised decoration, evidently symbolical, while designs representing animal legs and paws encircle the body of the bowl. Maximum diameter, 15 inches; depth, 6.8 inches. This bowl, mounted over the burial found beneath it (Fig. 90) is at the Academy of Natural Sciences of Philadelphia, where may be seen the principal part of all our collections.

Vessel No. 27.—Immediately under the burial with Vessel No. 26 lay an imperforate bowl over the skull of a woman. The incised decoration is a combination



FIG. 91.—Vessel No. 28. Outline. Cemetery near Point Washington. (Half size.)



FIG. 92.—Same vessel, top decoration. (Half size.)

of the favorite scroll. Maximum diameter, 11 inches; depth, 5 inches. This bowl with its skull and with sand from the cemetery, has been sent to the Free Museum of Science and Art, University of Pennsylvania, Philadelphia.



FIG. 93.—Same vessel, decoration of body. (Half size.)

Vessel No. 28.—

This little vase was found, upright, slightly mutilated, in a layer of fragments. Incised decoration is on top and interesting incised symbolical decoration surrounds the body. Maxi-

imum diameter, 3.2 inches; height, 3 inches; aperture, 1 inch (Figs. 91, 92, 93).

Vessel No. 29.—This little vase was found inverted but apart from human remains. A part of the base was knocked in by the blow of a spade. There is rude, incised decoration of curved lines on the body and on the neck. Maximum diameter, 2.7 inches; height, 3.5 inches (Fig. 94).

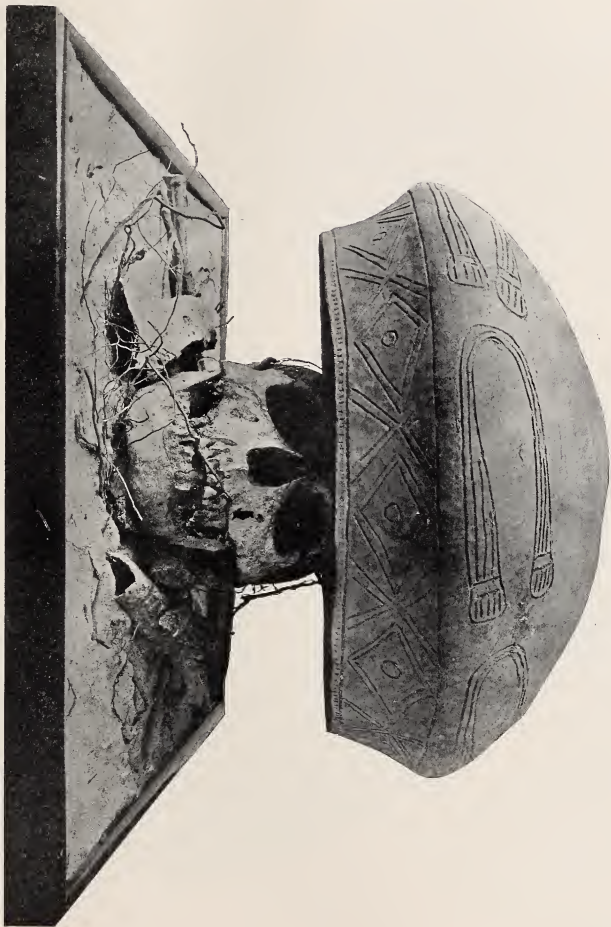


FIG. 96.—Vessel No. 36 in place over burial. Cemetery near Fort Washington. (About one-third size.)



FIG. 94.—Vessel No. 29. Cemetery near Point Washington. (Full size.)

Vessel No. 30.—This interesting, imperforate, dipper-shaped vessel lay inverted over fragments of the skull of an adult. Incised decoration of diamonds, circles and straight lines surrounds the upper part of the body. A solid handle, 3 inches in length, projects horizontally from one side. Diameter of bowl, 8 inches; depth, 3.4 inches (Fig. 95).

Vessel No. 31.—This graceful, imperforate vessel, evidently modelled after a section of a gourd, lay inverted over the skull of an adolescent, about one-half foot distant from Vessel No. 30. At the end of the handle is a small hole for suspension. The incised decoration is shown on Fig. 96. Diameter of body, including handle, 10.3 inches; breadth of body, 7.1 inches; depth, 3 inches.

Vessel No. 32.—This vessel, representing an owl with the head and conventional tail and incised decoration of conventionalized wings, lay somewhat crushed by roots over a skull in fragments (Fig. 97). Maximum diameter, 11.5 inches; depth, 4.8 inches.

Vessel No. 33.—This bowl lay over the skull of an adult, in contact with Vessel No. 32. The upper part of the body is surrounded with incised decorations,



FIG. 95.—Vessel No. 30. Cemetery near Point Washington. (About seven-elevenths size.)





FIG. 96.—Vessel No. 31. Cemetery near Point Washington. (About seven-tenths size.)



FIG. 97.—Vessel No. 32. Cemetery near Point Washington. (Half size.)

among which may be recognized the usual aboriginal bird's eye and symbolical designs often found on vessels representing fish. The base of the bowl is imperforate (Fig. 98). Maximum diameter, 18.8 inches; depth, 9 inches.

Vessel No. 34.—This bowl lay inverted on one side of the base of Vessel No. 35. The base was imperforate, but a piece has been knocked out by a blow from a spade.

Vessel No. 35.—A perforate bowl of light-colored ware, found inverted over a few fragments of a skull. The incised design is much like that on Vessel No.





FIG. 98.—Vessel No. 33. Cemetery near Point Washington. (One-third size.)

50, from this cemetery, which, however, has projecting heads. Maximum diameter, 14.3 inches; depth, 5.5 inches.

Vessel No. 36.—This interesting bowl, of excellent ware, perforate as to its base, has on one, side projecting slightly, what seems to be a representation of the



FIG. 99.—Vessel No. 36. Cemetery near Point Washington. (About seven-fifteenths size.)

head of a frog much in the manner of heads we see on bowls from Nicaragua. Below are incised designs intended for legs and feet. Symbols encircle the upper part of the bowl. Maximum diameter, 15.7 inches; depth, 7.2 inches (Fig. 99).

Vessel No. 37.—This bowl, badly crushed by roots, lay inverted over the skull of an adult. Restored, the base shows a perforation. The decoration, the well-known scroll, has a pink material inset in the lines (Fig. 100). Maximum diameter, 15.5 inches; depth, 7 inches.



FIG. 100.—Vessel No. 37. Cemetery near Point Washington. (One-third size.)

Vessel No. 38.—Inverted, but with the rim slightly tilted upward, were two halves of a bowl over a skull in fragments with a few long-bones. These two halves did not lie as though placed in the mound as a whole, and subsequently



FIG. 101.—Decoration, Vessel No. 39. Cemetery near Point Washington. (One-third size.)

fractured, since a broken margin of one side was turned away from the corresponding margin of the other side.

Vessel No. 39.—This beautiful little bowl of black ware, imperforate, lay on its base, unassociated. The decoration, incised, is shown in Fig. 101. The upper part, the partially interlocked scroll, is uniform throughout. Below, the designs would seem to connect the vessel with that class bearing projecting heads and tails of fish, on which some of these symbols often appear. Maximum diameter, 5.5 inches; depth, 2 inches.

Vessel No. 40.—Resting on its base was a perforate bowl (Fig. 102), 15.8 inches in maximum diameter and 8.2 inches in depth. The incised decoration represents a conventional animal head with other parts of the body. Within this



FIG. 102.—Vessel No. 40. Cemetery near Point Washington. (Half size.)



FIG. 103.—Vessel No. 45. Cemetery near Point Washington. (About five-sixths size.)

bowl were decaying fragments of a skull and other bones. Capping the bowl was a large fragment of a vessel, inverted. Here for the first time on the Florida coast we find the regular enclosed burial so often described by us as present along the Alabama river and in mounds of the Georgia coast.

Vessel No. 41.—This imperforate bowl was found inverted over fragments of a skull of an adult. Part of the ware had been crushed in by a large root and the bowl received a blow from a spade, in addition. The incised decoration is a variety of scroll similar to that on Vessel No. 20 (Fig. 23) from the mound near Walton's Camp. Maximum diameter, 16.3 inches; depth, 8.3 inches.

Vessel No. 42.—A bowl crushed to fragments by a large root, inverted over the fragments of a skull of an adult. To one side lay a single shell bead. This bowl was sent to the Peabody Museum, Cambridge, Mass.

Vessel No. 43.—A perforate, six-pointed, or star-shaped, dish of black ware with the decoration usual on these dishes, somewhat rudely executed, lay turned over some fragments of bone resembling sawdust more than anything else. Maximum diameter, 17.2 inches; depth, 4.2 inches. Holes have been drilled on either side of a crack to permit the lashing together of the parts. This vessel, which, as we have said before, is of an entirely new type, has been sent to the National Museum, Washington, D. C.

Vessel No. 44.—A bowl of yellow ware, badly crushed by roots. The decoration is a form of the favorite scroll.

Vessel No. 45.—A bowl found in contact with Vessel No. 44, having for handles on one side, three rude models of birds' heads, one looking in, two looking out, and on the other, the conventional bird's tail. The incised decoration, as might be expected, represents conventional bird-wings (Fig. 103). Diameter of body, 7.75 inches; height, 2.7 inches. This vessel, part of which was badly crushed by roots, lay over minute fragments of bone.

Vessel No. 46.—An imperforate dish of yellow ware, of the six-pointed type, found over certain bones of a child, with shell beads. This dish, badly crushed when found, has been pieced together, showing the usual decoration on vessels of this type. Maximum diameter, 18 inches; depth, 4.7 inches.

Vessel No. 47.—A bowl with basal perforation, found lying over a skull, occiput down. Pressure against the chin had caused the side of the bowl to give way. One foot distant and a little above the level of the inverted rim of the bowl were certain long-bones. The skull, which was much better preserved than were most from this cemetery, was sent with the bowl and sand for mounting, to the Peabody Museum, Cambridge, Mass. The decoration on the bowl is similar to that on Vessel 41 (Fig. 35) from the mound at Walton's Camp.

Vessel No. 48.—A bowl found crushed to fragments, lying over the skull of an adult. The pieces, carefully collected, were sent to the American Museum of Natural History, New York City.

Vessel No. 49.—A pot, imperforate, with notches around the rim and a



six-pointed margin. This pot was found inverted (Fig. 104). Maximum diameter, 5.5 inches; depth, 3.7 inches.

Vessel No. 50.—An imperforate bowl of light-colored clay, found, badly crushed, turned over the skull of an adult. The incised decoration consists of diamonds, small circles, etc., similar to other vessels already figured. From either side a head, presumably that of a frog, projects (Fig. 105). Again we would call attention to bowls of Nicaragua in connection with these small heads, projecting from the side. Maximum diameter, 14.5 inches; depth, 6.8 inches.



FIG. 104.—Vessel No. 49. Cemetery near Point Washington. (Half size.)

scattered bones. Incised decoration shown in Fig. 106, covers the body and imperforate base. Diameter of body, 3.9 inches; length of neck, 1.2 inches; height, 4.8 inches.

Vessel No. 52.—This handsome bowl of black ware, imperforate (Fig. 107) has



FIG. 105.—Vessel No. 50. Cemetery near Point Washington. (One-third size.)

incised decoration, with light colored material inset in the lines (Fig. 108). It lay in a mass of human bones loosely scattered. Maximum diameter, 4.9 inches; depth, 3.5 inches.

Vessel No. 53.—An imperforate bowl with lined decoration and conventional legs and paws below, lay inverted in the same mass of bones as Vessel No. 52 and about one yard from it (Fig. 109).

Vessel No. 54.—This vase, of inferior yellow ware, lay on its side in the same mass of bones from which came Vessel No. 51. The decoration is punctate with





FIG. 106.—Vessel No. 51. Cemetery near Point Washington. (Full size.)



FIG. 107.—Vessel No. 52. Cemetery near Point Washington. (Two-thirds size.)

the favorite scroll (Fig. 110). There is a basal perforation made previous to baking. Maximum diameter, 3.6 inches; height, 3 inches.



FIG. 108.—Decoration, Vessel No. 52. Cemetery near Point Washington.  
(One-third size.)



FIG. 109.—Vessel No. 53. Cemetery near Point Washington. (About seven-twelfths size.)



FIG. 110.—Vessel No. 54. Cemetery near Point Washington.  
(Full size.)

Vessel No. 55.—A bowl, imperforate, with symbolical decoration rudely executed (Fig. 111). Maximum diameter, 6.5 inches; depth, 3.5 inches. This bowl, one side of which was crushed by a blow from a spade, lay over the skull of a child.

Vessel No. 56.—This vessel lay on its side, in the pottery deposit just beneath the surface. The ware is poor and rather rudely decorated. The rim has two perforations for suspension, a feature seldom met with in this section. A basal perforation lies to one side of the center. Parts of the vessel are missing. Maximum diameter, 5.3 inches; height, 4 inches; aperture, 4.5 inches (Fig. 112).

Vessel No. 57.—This small, six-pointed dish of bright yellow ware, perforate as to the base, lay in a deposit of pottery and, like nearly all vessels from such deposits, it is imperfect, having one corner missing.



FIG. 111.—Vessel No. 55. Cemetery near Point Washington. (Half size.)



FIG. 112.—Vessel No. 56. Cemetery near Point Washington. (Half size.)

Fig. 113 shows a number of handles of vessels from the cemetery near Point Washington. The heads of various birds are shown in *a*, *b*, *c*, *f*, *h*, and *i*. An unusual form, two birds' heads, each looking in an opposite direction, is shown in *g*. The head of a turtle is poorly represented by *j*. In reality the head is very life-like, being of black ware decorated with red paint. The animals represented in *d* and *e* are doubtless dogs. Cabeça de Vaca, during his travels, met with many aboriginal dogs.

In Fig. 114 we have additional handles of vessels from the cemetery.

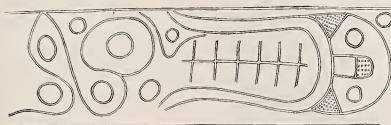


FIG. 115.—Decoration from part of vessel. Cemetery near Point Washington. (One-third size.)

Heads of owls, presumably, are shown in *a* and *c*. We have in *b* an entire bird with a head disproportionately large. A bird's head is shown in *d*. Another dog is figured in *e*.

Fig. 115 shows symbolical decoration on a large sherd.



FIG. 113.—Handles of Vessels. Cemetery near Point Washington. (Full size.)





FIG. 114.—Handles of Vessels. Cemetery near Point Washington. (Full size.)



The head of an owl, a handle on a vessel, is shown in Fig. 116. The ware is most excellent and there is decoration with red paint.



FIG. 116.—Sherd. Cemetery near Point Washington. (One-third size.)

Fig. 117 gives a large frog's head.

In Figs. 118, 119, we have two views of a part of a vessel which has had the head of a bird projecting upward and wings extending horizontally as handles.

A human head belonging to a bowl is shown in Fig. 120. This head is hollow and small objects within rattle when shaken. Fig. 121 represents a fragment of a vessel having for a handle the head of a serpent. To the reader's left may be seen a place on the vessel from which another head, presumably that of a serpent also, has disappeared. To one familiar with the markings on a Florida rattlesnake, the diamond-shaped design on the vessel must be highly

a Florida rattlesnake, the diamond-shaped design on the vessel must be highly



FIG. 117.—Sherd. Cemetery near Point Washington. (About two-thirds size.)

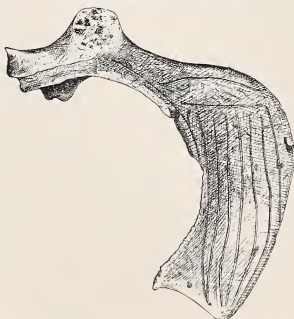


FIG. 118.—Sherd. Cemetery near Point Washington. (Half size.)



FIG. 119.—Same. Another view. (Half size.)

suggestive. The aborigines of Florida, in common with those of many other places, held the serpent in high esteem. "Nor have I seen a savage who would willingly kill a snake," says Captain Bernard Romans in his "Concise Natural History of East and West Florida."<sup>1</sup>



FIG. 120.—Handle of Vessel. Cemetery near Point Washington. (Full size.)

William Bartram, who travelled in Florida before our Revolutionary War, tells most amusingly of how a rattlesnake, having full possession of an Indian village, was killed by him, and how, afterward, certain braves feigned a fierce attack upon him, with much noise, that the manes of the snake, believing them to be his avengers, might be appeased.<sup>2</sup>



FIG. 121.—Sherd. Cemetery near Point Washington. (One-third size.)

We have found a small effigy of a snake in copper in the mound at Mt. Royal, St. John's river, Florida, which place we believe to be the site of the town of the great King, near the lake

<sup>1</sup> Page 101.

<sup>2</sup> Travels. Dublin, 1793, p. 258 et seq.

(Lake George) visited by part of the colony of Huguenot French on their journey up the river, the rest remaining at Fort Caroline near the river's mouth.

MOUND NEAR HOGTOWN BAYOU, CHOCTAWHATCHEE BAY, WASHINGTON  
COUNTY, FLA.

At Hogtown Bayou are the principal shell deposits of Choctawhatchee bay, which are extensive, but in no wise comparable with those of the St. John's river, or with many on the Florida east coast, or on parts of the west coast, farther south.

It is our belief that a cemetery lies undiscovered at this place, as previous search by others has failed to locate a mound there, and careful investigation on our part availed only to find a small mound near the water's edge, about one mile up the bayou on the south side. This mound contained no burials.

The results of our exploration of the northwest Florida coast, so far as we have gone, that is from the Alabama boundary to the easternmost extremity of Choctawhatchee bay, are of considerable interest.

A new form of burial has been met with in our work, namely, that where a lone skull or a skull with a few bones lies beneath a down-turned vessel of earthenware. In but one case was the enclosed form of burial found, i. e., where human remains placed in a vessel are covered by an inverted dish, bowl or large fragment of earthenware. Incidentally, we may say the inverted vessel over human remains lying on sand prevails in Georgia, but these remains have been cremated, while cremation has not been met with on that part of the northwest Florida coast investigated by us.

Little of interest but earthenware has come from the mounds and cemeteries lately explored by us, but of earthenware a most striking collection has been obtained. This ware is purely aboriginal in style, no trace of European influence appearing in its make or decoration, which latter is largely symbolical. A mixture of cultures is plainly apparent in this ware. We have many of the life-forms of the ware of the middle Mississippi district, but the admixture of coarsely powdered shell in use in that section is wanting in the clay of vessels here. We find the complicated stamp decoration of Georgia and of Carolina, but the tempering of the clay with small pebbles forming "gritty ware" is not met with. We encounter in this northwest Florida district, ware from the soft paste of the kind so well known in peninsular Florida to the eastward, while, on the other hand, we find the black, polished ware of Mississippi and districts to the westward of our field of research.

The small check-stamp found everywhere else by us is also abundantly present in the district we have lately explored.

Perforation of the base of earthenware interred with the dead, so widely practised in peninsular Florida and occasionally met with in lower Georgia and Alabama, though unknown, we believe, in the middle Mississippi district which seems so

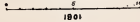
greatly to have influenced the ware of the northwest Florida coast, is very prevalent in this coast district. This mutilation of base consisted in the knocking out of a small portion before interment with the dead in fulfilment of some ceremonial rite. In peninsular Florida, as we have already pointed out in this Report, the aborigines went a step farther and prepared in advance, presumably, flimsy mortuary ware with a base-perforation made during process of manufacture. This ready made mortuary perforation, which we have never encountered in Alabama, Georgia or Carolina, was met with by us, in our researches this season in very few instances and to the eastward of Pensacola bay only. It might seem that the custom to perforate the base of earthenware by fracture, originating in Florida, or brought there from we know not where, spread upward and sideward to a limited extent and that ready made mortuary perforation, probably a refinement and an afterthought, was less widely disseminated. All this, however, before final conclusion, had best await results of work we hope to be able to do the coming season.



MAP OF THE TOMBIGBEE RIVER FROM COLUMBUS

Reduced from Government Surveys

Scale in miles





## CERTAIN ABORIGINAL REMAINS OF THE TOMBIGBEE RIVER.

By CLARENCE B. MOORE.

Two years ago, in 1899, we investigated the antiquities of the Alabama and Mobile rivers<sup>1</sup> with rather interesting results, showing the existence on the Alabama river of the custom of plural burials of uncremated remains in urns, these urns being capped by other vessels inverted.

It seemed to us that an investigation of the Tombigbee river, which, with the Alabama, forms the Mobile river, would be desirable.

To facilitate and greatly to expedite our work, J. S. Raybon, Captain of the flat-bottomed steamer from which our mound work is done, started with a companion from Columbus, Miss., on the Little Tombigbee river, and pursued a downward course to the junction of that river with the Black Warrior and on down the Tombigbee river (see map) to its union with the Alabama, in all a distance of about 334 miles.

In this work, which was most conscientiously done, Captain Raybon spent nearly four months, and located, we believe, nearly every camp-site and mound of the entire territory covered by him. The owners of these antiquities, addressed in advance, almost unanimously granted permission to investigate, so, from the outset of our work in the winter of 1901, our entire time could be devoted to direct research.

Elaborate charts, in sections, kindly furnished us by Major William T. Rossell, U. S. Engineer, Mobile, Ala., and R. C. McCalla, Esq., Assistant Engineer, Tuscaloosa, Ala., greatly facilitated our work.

We had hoped, on the Tombigbee river, to locate cemeteries at or near localities showing former aboriginal occupation, but after much search with sounding rods and with trenches without favorable result of any sort, work on camp-sites was abandoned and mounds alone were looked into.

After six weeks' work vigorously pushed by our large party, including our trained diggers aided by ample local assistance, where necessary, so little in a positive way had been gained by us that our search was given up at Bickley's Landing, 29 miles below Demopolis, Ala., and 178 miles from Columbus, Miss, our starting point. From Bickley's Landing to the union of the Tombigbee with the Alabama is a distance of 156 miles, left uncovered by us. Reports from this territory were less encouraging than had been those from that investigated by us.

<sup>1</sup> "Certain Aboriginal Remains of the Alabama River," *Journal of the Academy of Natural Sciences of Philadelphia*, Vol. XI.

We give, for the use of any future explorer, a list of camp-sites and mounds on the Little Tombigbee and Tombigbee rivers, as located by Captain Raybon. We are, of course, unable to vouch for the nature of those below the end of our investigation and show on the map only such as were visited by us.

We wish to extend sincere thanks to all owners of property who kindly granted us permission to investigate, and where such permission was accorded it is so stated in our list.

- Butler's Gin, mound, James Cox, Esq.  
 Chowder Spring, mounds, William S. Mustin, Esq., permission.  
 Chowder Spring, mound, Messrs. Halbert & Vaughn, permission.  
 Halbert Lake, mound, P. M. Halbert, Esq.  
 Moore's Bluff, camp-sites, J. T. W. Hairston, Esq., permission.  
 Moore's Bluff, camp-site, W. Snowton, Esq.  
 Blue Rock Landing, camp-sites, A. B. Mybrick, Esq., permission.  
 Wild Cat Bend, mound and camp-site, J. T. W. Hairston, Esq., permission.  
 Union Bluff, camp-site, Hon. T. B. Franklin, permission.  
 Opposite Union Bluff, mound, J. T. W. Hairston, Esq., permission.  
 Jim Creek, camp-site, William Baldwin, Esq.  
 Pumpkin Landing, camp-site, Mrs. S. C. Monk.  
 Davis Gin Landing, mound and camp-site, J. E. Stewart, Esq.  
 McLaren's Landing, mound and camp-site, Winston Jones, Esq.  
 Pickensville Landing, camp-site, Mrs. W. A. Peterson, permission.  
 Pickensville Landing, camp-site, W. H. Horton, Esq., permission.  
 Jackson Landing, camp-site, Mrs. Elizabeth Jones.  
 Ringgold's Bluff, camp-site, Milton B. Curry, Esq., permission.  
 Ringgold's Bluff, mound and camp-sites, Mrs. Susan West, permission.  
 McFattion Landing, mound and camp-site, B. B. Cohen, Esq., permission.  
 Carraway Landing, camp-site, Mrs. Caroline Carraway.  
 Memphis Landing, mound, Mr. Mouchett, permission.  
 Blubber Creek, mounds, Lee Stone, Esq., permission.  
 Coleman Landing, mounds and camp-sites, A. H. Cooper, Esq., permission.  
 Clanton Landing, camp-sites, Mrs. Henrietta Bradford, permission.  
 Stone's Ferry, camp-site, Richard Lang, Esq.  
 Summerville, mound, James B. Summerville, Esq., permission.  
 Kearney's Bluff, camp-site, William Hagaman, Esq., permission.  
 Ballard Lake, camp-site, William Hagaman, Esq., permission.  
 Cat-fish Landing, camp-sites, James Luke, Esq., permission.  
 Windham Landing, mound and camp-sites, W. B. Peebles, Esq., permission.  
 Sipsev Landing, camp-site, D. Poynor, Esq., permission.  
 Hill's Landing, camp-site, John W. Cook, Esq., permission.  
 Opposite Barnes' Gin, camp-site, John W. Cook, Esq., permission.  
 Barnes' Gin, camp-site, Messrs. W. M. and J. A. Halsell, permission.  
 Hibbler's Landing, camp-site, Messrs. W. M. and J. A. Halsell, permission.

- China Bluff Landing, camp-site, John W. Cook, Esq., permission.  
 Craig's Landing, mounds, John W. Cook, Esq., permission.  
 Taylor's Landing, mounds, Mrs. Jane Pettit, permission.  
 Smith's Ferry, camp-site, Hugh Lang, Esq., permission.  
 Goodson's Landing, mound and camp-site, Logan Waller, Esq., permission.  
 Noxubee river, camp-sites, R. Hibler, Esq., permission.  
 Gainesville, camp-site, B. May, Esq.  
 Gainesville, camp-site, Dr. Williams, permission.  
 Jolley's Woodyard, mound, J. H. Rogers, Esq., permission.  
 Swilley Landing, camp-site, Freemon Cook, Esq., permission.  
 Croft Landing, camp-sites, J. J. Drew, Esq., permission.  
 Cook Landing, mound and camp-site, B. A. J. Outland, Esq., permission.  
 Cook Landing, mound, J. C. Childs, Esq.  
 Bates' Gin, camp-site, Samuel Jones, Esq., permission.  
 Hayes' Ferry, camp-site, E. F. Bouchelle, Esq., permission.  
 Epes, mound, Doctor Epes.  
 Hilman's Landing, mound, J. J. Hilman, Esq., permission.  
 Martin's Ferry, camp-sites, J. J. Hilman, Esq., permission.  
 East Bluffport, camp-sites, James Hewbanks, Esq., permission.  
 Durden's Ferry, camp-site, Louis Salem, Esq.  
 Durden's Ferry, camp-site, W. B. Baltzell, Esq., permission.  
 Lipscomb Gin, mounds and camp-sites, E. P. Lipscomb, Esq.  
 Brasfield Landing, mound, J. S. Brasfield, Esq., permission.  
 Cole's Landing, mounds and sites, Mrs. Hugh Cole, permission.  
 Cather's Landing, mound and site, Messrs. Mayer Brothers, permission.  
 Tutt's Landing, camp-site, Messrs. Mayer Brothers, permission.  
 Demopolis, mound, Hon. T. F. Howze, permission.  
 Spragins' Mill, mound, T. S. Spragins, Esq., permission.  
 Simmons' Landing, mounds, Robert B. Flowers, Esq., permission.  
 West Pace's Landing, mounds, J. B. Meriwether, Esq., permission.  
 Moscow, mounds, R. W. Larkins, Esq., permission.  
 Hart's Lower Landing, camp-site, J. T. Hart, Esq., permission.  
 Black Bluff, camp-site, Abram Abrams, Esq.  
 Bryan's Burn, mound, John Erwin, Esq.  
 Beck's Sawmill, mounds, Thomas J. Beck, Esq., permission.  
 Bickley's Landing, mounds, Mrs. M. E. Crane, permission.  
 Rembert Landing, mounds, D. J. Meador, Esq., permission.  
 Oakchia Landing, mounds, W. B. Gilmer, Esq.  
 Stiner Landing, mounds, K. Stiner, Esq.  
 Breckenridge Landing, mounds, Messrs. J. D. Carter and Brother, permission.  
 Breckenridge Landing, mounds and camp-sites, W. H. Evington, Esq.  
 Mann's Ferry, mounds, Hon. W. H. Taylor, permission.  
 Mann's Ferry, mounds, Misses M. E. and E. V. Luther, permission.

Mann's Ferry, mounds, Messrs. H. A. and D. D. Woolf, permission.  
 Brown Landing, mounds, J. A. Watters, Esq., permission.  
 Tuskahoma, mound, B. B. Nobles, Esq., permission.  
 Campbell's Landing, mound, S. P. Noble, Esq., permission.  
 Opposite Bashi Creek, camp-site, J. S. Henson, Esq., permission.  
 Bashi Creek, mound, S. P. Noble, Esq., permission.  
 Opposite Wildeat Landing, mound and camp-site, S. P. Noble, Esq., permission.  
 Turner's Shoals, camp-site, Mrs. Monetta.  
 Opposite Oktippa Creek, camp-site, Mrs. E. Monetta.  
 Opposite Powe's Landing, mounds, H. A. Powe, Esq., permission.  
 Thornton's Upper Landing, mound, T. J. Cowan, Esq., permission.  
 Thornton's Upper Landing, camp-sites, J. P. Armistead, Esq., permission.  
 Cox's Landing, mound, J. W. Nichols, Esq., permission.  
 Bass' Landing, mound, D. B. Bass, Esq., permission.  
 Malone's Landing, mound and site, Mrs. Henrietta Malone, permission.  
 Buck Landing, mound, Mrs. Henrietta Malone, permission.  
 Santa Bogue Creek, mound, F. Boykin, Esq.  
 Peavy's Landing, mound, F. Boykin, Esq.  
 Jackson, mounds, Charles Saint, Esq., permission.  
 Jackson, mound, C. W. Zimmerman, Esq., permission.  
 Jackson, mound, T. I. Kimbell, Esq., permission.  
 Bolan's Woodyard, mound, James Richardson, Esq.  
 Gaines' Upper Landing, mound, H. L. Gaines, Esq., permission.  
 Carney's Bluff, mound, P. A. Bryant, Esq., permission.  
 Payne's Woodyard, mound, T. H. Bush, Esq.  
 McIntosh Landing, mound, A. F. Hook, Esq., permission.  
 Upham's Mill, mound, William Mehars, Esq.  
 Cut-off, mound, C. G. Foot, Esq., permission.  
 Cut-off, mound, G. D. Tuatt, Esq.

#### MOUND AT BUTLER'S GIN, LOWNDES COUNTY, MISS.

The mound, oblong in shape, is in a cultivated field about 200 paces S. S. E. from the landing, on property of Mr. James Cox, of Columbus, Miss. It is 8 feet high, with basal diameters of 128 feet and 180 feet. The diameters of the summit plateau are 80 feet and 137 feet. This mound is a refuge in flood time, and has houses upon it. No investigation was allowed.

#### MOUNDS NEAR CHOWDER SPRING LANDING, LOWNDES COUNTY, MISS.

In a cultivated field, about 250 yards N. N. E. from the landing, on property of William S. Mustin, Esq., of Columbus, Miss., is a mound of circular outline, 5 feet 8 inches high, 80 feet across the base. Part has been under cultivation. On the other portion is a small log cabin. Considerable excavation in various parts showed the mound to be of sandy clay. This mound was probably domiciliary.

About 100 yards N. N. W. from the preceding, in woods bordering the field, is a mound on property of Messrs. Halbert and Vaughn, Columbus, Miss. The mound is of sandy clay. Wash of freshets has made its outline irregular. It is 5 feet 3 inches in height and 90 feet by 104 feet across the base. The mound was largely dug into by us to the base, including central parts, resulting in the finding of several bunched burials and a number of isolated bones. We may say here, for the benefit of those not familiar with mound work, that the bunched burial consists of a lot of loose bones piled together in a heap. It was often the aboriginal custom to expose the dead until the flesh disappeared and to bury the bones at certain intervals of time. One small, rude, clay pot with a loop-shaped handle at either side of the rim was found unassociated.

In the Burrell field, about one-half mile in a straight course N. E. from Wild Cat Bend, is a mound on the property of J. T. W. Hairston, Esq., of Martinsville, Va. It is of clayey sand, 3 feet 2 inches high, and 60 feet by 70 feet across the base. This mound was largely excavated without result.

In the same field, which was a dwelling site, apparently, considerable sound-ing was done with iron rods. About one foot below the surface one skeleton was met with, buried on the left side with the thighs at right angles to the body and the legs parallel to the thighs.

#### COLEMAN MOUND, LOWNDES COUNTY, MISS.

This mound, well known through all the district, probably originally was a parallelogram in shape, but the washing of high water has made the outline irregular. It is about one mile in a northerly direction from Union Bluff, on property of J. T. W. Hairston, Esq., of Martinsville, Va. Though the owner courteously gave us permission to dig, we refrained from doing so, as the mound was of the regular domiciliary type and, farthermore, its great value as a place of refuge, and the presence of a number of houses upon it, made investigation inexpedient.

#### MOUNDS NEAR GOOSE POND, PICKENS COUNTY, ALA.

Goose Pond is in the swamp about one mile in a westerly direction from Mc-Fatton Landing. Near the pond are three mounds, within a few feet of one another, on property of B. B. Cohen, Esq., Sheffield, Ala.

The most northwesterly, about 30 feet in diameter and 2 feet 3 inches in height, had a previous excavation in the center, about 5 feet in diameter. Considerable digging on our part in the loamy sand yielded one bunched burial—a pile of bones surmounted by a skull.

The middle mound had been cut to pieces by previous digging.

The most southeasterly of the mounds, of loamy sand, 24 feet diameter of base, 1 foot 9 inches in height, though previously untouched, yielded nothing to a careful examination.



## MOUNDS NEAR BLUBBER CREEK, PICKENS COUNTY, ALA.

About 130 feet from the river's bank and 300 yards south of Blubber creek, approximately, were five mounds on property of Lee Stone, Esq., Birmingham, Ala., nearly in a straight line N. W. and S. E., and two in a more southerly direction, as shown in the plan (Fig. 1).



FIG. 1.—Mounds at Blubber Creek.

Mound A, the most northwesterly, like all the others, consisted of sand, with perhaps a slight admixture of clay. A great tree grew upon it, filling it almost solidly with roots. Slight investigation yielded nothing.

Mound B was practically dug away. At the center of the base were a few fragments of bones, badly decayed, and teeth of an infant. With these were a few small shells, perforated for use as beads, and a small number of shell beads. With these bones was a water-worn boulder, 11 inches in diameter and three inches thick, considerably pitted on either side—doubtless used for pounding

maize. Beneath this stone was a great number of pebbles, some broken.

Mound C was entirely dug away. At two points were a few fragments of human bone and, 30 inches down at the center of the base, were some bones of a child with milk teeth, having shell beads at the neck.

Mound D was dug out as to its central parts. One human tooth alone was met with.

The central parts of Mound E were dug through. The bones, or part of the bones, of an adult were met with 20 inches down; also fragments of bones near the margin.

Mound F seemed to have been a dwelling site and to have grown by slow deposit. The sand was dark with organic matter, and fire-places were here and there. There were much broken pottery and two discs cut from fragments of pots. Discs of this kind, of which we have frequently written before, were doubtless used in a game. They are found in various parts of the United States and Canada, and have been met with by us in numbers along the Alabama river, in South Carolina and in Georgia, but not in peninsular Florida.

Mound G was centrally dug out. A few decayed bones of an adult were met with and a rude arrowhead of chert loose in the sand.

## MOUND AT SUMMERVILLE, PICKENS COUNTY, ALA.

In a great cultivated field, about one-half mile in an easterly direction from the landing, on property of James B. Summerville, Esq., of Stone, Ala., is a mound roughly circular in outline, rising about 11 feet above the general level, though,

from excavations near the base, whence material for the mound came, it seems much higher. It is circular in outline, 172 feet across the base, with a diameter of 100 feet on the summit plateau. This mound, of great value to the owner, to pen stock in time of freshet, was entrusted to us with a courtesy that marked so many mound proprietors of Mississippi and of Alabama. As excavations on the sides, though refilled, would leave the mound subject to wash when exposed to water, trenches were dug on the summit plateau only. A number of these showed the mound to be of clayey sand with here and there fire-places and refuse material. This mound, like others of its class, was erected, doubtless, as a living site and a place of refuge.

#### MOUND AT WINDHAM LANDING, PICKENS COUNTY, ALA.

This mound, on the edge of a cultivated field, about 150 yards N.W. from the landing, on property of W. B. Peebles, Esq., of Vienna, Ala., was 19 feet in diameter and 1 foot 8 inches high. The removal of two-thirds of the mound, including the center, showed neither burial nor artifacts.

#### MOUND AT COOK'S LANDING, GREENE COUNTY, ALA.

In a cultivated field, about 300 yards in a N. N. E. direction from the landing, on property of J. C. Childs, Esq., of Warsaw, Ala., is a mound covered with trees, very symmetrical, 5 feet high, 35 feet across the base. Previous to our coming, a trench had been dug in from the margin and the immediate center of the mound removed. The southern half of the mound was dug through by us, showing it to be of clayey sand in places and of clay in others. No bones or artifacts were found.

#### MOUND NEAR HILMAN'S LANDING, SUMTER COUNTY, ALA.

In a cultivated field about one-half mile S. E. from Hilman's Landing is a mound 6.5 feet in height, on property of J. J. Hilman, Esq., of Epes, Ala. Wash of water in time of freshet had given it a rather irregular outline. Its diameter of base is about 108 feet, and that of the summit plateau is 62 feet. As houses were upon it, and as it was clearly of a domiciliary type, no digging was done by us.

#### CAMP-SITE, EAST BLUFFPORT LANDING, GREENE COUNTY, ALA.

At East Bluffport, on property of Mr. James Hewbanks, colored, are extensive fields, over which the river has swept at times, giving them the appearance of the cemetery at Durand's Bend on the Alabama river, which we have described in another Report. Arrowheads of chert, small bits of human bone and fragments of pottery are abundant in places, but, unlike the case at Durand's Bend, the potsherds were, as a rule, small and undecorated, coming, seemingly, from cooking utensils of moderate size rather than from great burial urns or from the decorated vessels that usually surmounted them. A careful examination of the territory yielded nothing

underground, and, besides arrowheads, only a small semilunar knife, chipped from a jasper pebble, from the surface (Fig. 2). From the owner of the property we obtained a rude undecorated earthenware pipe of considerable size, somewhat broken.



FIG. 2.—Knife, East Bluffport Landing. (Full size.)

#### BRASFIELD MOUND, BRASFIELD LANDING, GREENE COUNTY, ALA.

This noble mound towers above cultivated fields about one-half mile in a N. E. direction from Brasfield Landing, on property of J. Stanhope Brasfield, Esq., of Demopolis, Ala. This mound and the Grant mound near the mouth of the St. John's river, Florida, are the most impressive in appearance it has been our fortune to meet with. The mound, on land high above the wash of freshets, has to-day as sharp an outline, practically, as when it was completed. Oblong in shape, its upward slope is at an angle of 30 degrees. Its base has a length of 200 feet running N. W. by N. and S. E. by S. and a minor diameter of 168 feet. The summit plateau is 135 feet by 105 feet. The mound, measured at the ends, is about 19 feet in height. At the sides it is somewhat less, owing to an upward slope of the surrounding territory. There is no graded way or means of access to the summit save by clambering up the sides. Certain terraces in the neighborhood, we were told, had no connection with the mound, being circle-ditches made in recent times to prevent the wash of rain. As domiciliary mounds of this character sometimes have burials near the surface, trenches were dug in the summit plateau with no other result than to show the mound to be made of various materials—of sand, of clay and of sand and clay.

It was such mounds as this, doubtless, that De Soto's men saw on their march, and an extract from Pickett's "History of Alabama,"<sup>1</sup> taken from Garcilasso de la Vega, may not be out of place:

"The houses of the Chiefs, with but few exceptions, stood upon large and elevated artificial mounds. When the Indians of 1540 resolved to build a town, the site of which was usually selected upon low, rich land, by the side of a beautiful stream, they were accustomed, first, to turn their attention to the erection of a mound from twenty to fifty feet high, round on the sides, but flat on top. The top was capable of sustaining the houses of the Chief and those of his family and attendants; making a little village by itself of from ten to twenty cabins, elevated high in the air. The earth to make this mound was brought to the spot. At the foot of this eminence a square was marked out, around which the principal men placed their houses. The inferior classes joined these with their wigwams. Some of these mounds had several stairways to ascend them, made by cutting out incline-planes, fifteen or twenty feet wide, flanking the sides with posts, and laying poles horizontally across the earthen steps, thus forming a kind of wooden stairway.

<sup>1</sup> P. 64 *et seq.*

But, generally, the lofty residence of the Chief was approached by only one flight of steps. These mounds were perpendicular, and inaccessible, except by the avenues already mentioned, which rendered the houses upon them secure from the attack of an Indian enemy. Besides the motive of security, a disposition to place the Chief and his family in a commanding position, and to raise him above his subjects, caused the formation of these singular elevations."

#### MOUND AT COLE'S LANDING, GREENE COUNTY, ALA.

This mound, circular in outline, 3 feet in height, 36 feet across the base, is but a few yards from the river bank, about 200 yards in a N. W. direction from the landing. It is on property controlled by A. Y. Sharpe, Esq., of Demopolis, Ala. All the central part of the mound, which was of hard clay, was carefully dug through by us. No interments were met with but, loose in the clay, was a polished hatchet of volcanic rock.

#### MOUNDS AT SPRAGINS' MILL, MARENGO COUNTY, ALA.

Spragins' Mill is about eight miles below Demopolis, on the east side of the river. The mounds, which were beautifully rounded and but a few yards apart, were 150 yards from the water and one-quarter mile in a northerly direction from the mill, on property of T. J. Spragins, Esq., of Demopolis, Ala.

The southernmost mound, circular in outline, 3 feet 4 inches high, had a basal diameter of 40 feet. The mound, which was intact, was dug through by us, save a marginal part on one side. It was unstratified, of brownish sand. In addition to a few scattered bones, human remains were found at five points.

Burial No. 1.—Decaying skull and a few fragments of long-bones.

Burial No. 2.—Skull, long-bones of legs, one humerus, all crumbling through decay.

Burial No. 3.—Skull with scattered bones. With these were two rudely-shaped bits of shell, perforated, and a triangular shell pendant, pierced for suspension (Fig. 3).

Burial No. 4.—Nearly 3 feet down and just below the center, four crania and a pile of various bones. With one skull was a small, neat arrowhead and nearby lay a lancehead of quartzite, 5 inches in length.

Burial No. 5.—Skull of an adult, alone.

The northernmost mound, 4 feet 9 inches high, had a diameter of 40 feet across the base and resembled the other in shape and in material. A hole about



FIG. 3.—Shell pendant. Mound at Spragins' Mill. (Full size.)

2 feet in diameter had previously been dug near the center. This mound was practically dug through by us. Human remains were present in nine places.

Burial No. 1.—A single femur.

Burial No. 2.—A skeleton of an adult, flexed on the right side, heading S.

Burial No. 3.—Skeleton of an adult, flexed on left side, heading N. N. W.

Burial No. 4.—Skeleton of a powerful adult, male, flexed on the left side, heading E. In contact with the skull were seven fish-hooks of bone, each about 1 inch in length. Four were more or less decayed. The reader of our Report of the Alabama river<sup>1</sup> may recall that in a mound near Montgomery we found a large fish-hook of shell, said to be the only one of that material ever met with east of the Pacific slope, and one of bone. Bone fish-hooks are less uncommonly met with, though far from numerous. These two cases are the only ones where fish-hooks have been found by us.

The hooks from the mound at Spragins' Mill and from the Alabama, like most others we have seen figured as coming from the United States, are unbarbed. Rau,<sup>2</sup> however, shows a barbed fish-hook from New York. A barbed hook is figured in the Archaeological Report, Minister of Education, Ontario, 1900. The barbed hook may possibly be a more northern type. Eskimo influence has been suggested.

Burial No. 5.—Skeleton of adolescent, full length on back, heading N. E.

Burial No. 6.—Lower part of a skeleton, lying in the same direction and by the side of Burial No. 5. The upper part had been removed by the previous excavation of which we have spoken.

Burial No. 7.—Bones disturbed by the plow or by cattle.

Burial No. 8.—Near the center, 4 feet down, on the black basal line, a skeleton of an adult, flexed on the left side, heading N.

Burial No. 9.—Skeleton of an adult, flexed on right side, heading S. W.

Loose in the sand, separately, were: a pitted hammer-stone of considerable weight; a pitted smoothing-stone; a small and handsome chert arrowhead; a rude arrowhead. Together, were deposited five hammer-stones, the largest 6 inches in diameter. Four were more or less pitted. With these was a large pebble, rudely notched on opposite sides for attachment. Near these were: a stone with three pits; pitted hammer-stone; a triangular pebble chipped on one side to a rude cutting edge. A pebble similarly treated was found elsewhere in the sand.

#### MOUNDS NEAR SIMMONS' LANDING, SUMTER COUNTY, ALA.

In the swamp, about 1.5 miles, from the landing, in a W. by S. direction, on a ridge, were three mounds in sight of each other. The most westerly, of unstratified sand, had basal diameters of 34 feet and 40 feet. The height was 3.5 feet. No trace of previous examination was apparent. The mound was dug through by us with the exception of a small portion surrounding a tree. The results were as follows:

<sup>1</sup> Journ. Acad. Nat. Sci., Vol. XI, p. 322.

<sup>2</sup> "Prehistoric Fishing," p. 128.



Burial No. 1.—2 feet to 3 feet from the center, 4 feet down, on the base, was a lone skull with a few rough shell beads.

Burial No. 2.—3 feet down, a skeleton flexed on the right side, the skull 8 feet from the center, the rest of the skeleton extending toward it.

Burial No. 3.—2 feet down, about 6 feet from the center, a bunch of bones with two skulls.

The second mound, 50 paces in an easterly direction from the former, was 26 feet across the base and 2 feet high. Traces of a small trench were apparent. The mound was dug through by us.

Near the center, 2 feet down, was a skull, and then, at a distance, thighs, legs and feet. Apparently the earlier trench was responsible for the missing bones. With the skull were a few rough shell beads.

The third mound was 17 paces in an easterly direction from the second. The base-diameter was 21 feet; the height 3 feet. There seemed to have been no previous examination. The mound was demolished by us except a small marginal part around a tree. Twenty-six inches down, near the center, was a bunched burial with a cranium on top.

#### MOUNDS NEAR WEST PACE'S LANDING, SUMTER COUNTY, ALA.

These mounds, of which we located over one dozen, are on Cedar Ridge, which runs through the swamp about 3.5 miles in a S. W. direction from Simmon's Landing, on property of J. B. Meriwether, Esq., of Demopolis, Ala. The mounds, of sand and of circular outline are irregularly placed along the ridge which runs in a north and south direction. The most northerly mound has a height of 2 feet, a diameter of 30 feet. The next, with a diameter of 20 feet and 17 inches high, is 94 feet from the former in a S. W. by S. direction. The third mound, 428 feet from the second, is 3 feet high and 33 feet across the base. The other mounds are less widely separated. None is over 3 feet in height. Unfortunately, the principal ones had been dug into previously in central parts. Supplementary investigation accorded these resulted in the discovery of a few disturbed human bones. Three mounds, apparently intact, were centrally dug out by us. In one nothing was met with. In another were loose bones in three places. The third, near the center, had a skeleton of a young adult, lying at full length on the back.

#### MOUNDS NEAR MOSCOW, SUMTER COUNTY, ALA.

In a cultivated field, about 1 mile in a westerly direction from the landing, on property of Robert W. Larkins, Esq., Coatopa, Sumter County, Ala., was a mound apparently intact in respect to investigation, but much spread through cultivation. The diameter of base is 30 feet; the height, 3 feet. A central excavation was made by us 19 feet by 20 feet, through clayey sand, unstratified, to the base.

Burial No. 1.—3 feet down, 8 feet from the center, were several fragments of long-bones under the skull of an adult.

Burial No. 2.—5 feet from the center, 2 feet down, lay a large bunch of long-bones, including three humeri, with the skull of an adult on top. To one side was another skull.

Burial No. 3.—4 feet down, about 5 feet from the center, was a skull from which the lower jaw was wanting, over a femur and part of an ulna.

In woods on high ground, about 1 mile in a southerly direction from Moscow Landing, about 400 yards from the river, were eight mounds, also on property belonging to Mr. Larkins. Three of these were investigated by us.

Considerably the largest was 26 feet across the base and 3.5 feet in height. There was no trace of previous digging. The mound, practically dug through by us, was of a mixture of sand and clay, unstratified.

Burial No. 1.—2 feet 8 inches down, 6 feet from the center, were portions of two humeri.

Burial No. 2.—1 foot down, 5 feet from the center, lay an isolated skull.

Burial No. 3.—3 feet 4 inches down, 3.5 feet from the center, was a skull and part of one humerus.

Burial No. 4.—At the same level and about half a foot from Burial No. 3, lay the skull of a child with two fragments of long-bones. Six inches away were five cannon bones of deer piled parallel to one another.

Burial No. 5.—2 feet from the center, 1 foot down, was a lone skull, crushed and rotten, as were all in this mound.

An arrowhead and a scraper lay loose in the sand.

A slight elevation near by yielded no results. It was probably the site of a tepee.

The next largest mound in the group was 2 feet high and 22 feet across the base. We noticed no trace of previous examination.

An excavation 11 feet by 12 feet in the center showed human remains, disturbed by one of our diggers before inspection by us. Nearby were: a bit of stone; a bone with a groove worn into it; a rough arrowhead; several chips of chert; and a rude, undecorated tobacco-pipe of earthenware with a former fracture, which was considerably increased by a blow from a spade.

#### MOUND NEAR SUCARNOCHEE CREEK, SUMTER COUNTY, ALA.

Likewise on the property of Mr. Larkins, on a tongue of land between the river and Sucarnochee creek, about 35 yards from the edge of the bluff and 1.25 miles below Moscow, approximately, was a symmetrical mound in the woods. Its height was 4 feet; its basal diameter 25 feet. This mound, which showed no previous investigation, had so inviting an appearance that it was entirely dug through by us except a small portion around the roots of a large tree. The mound was composed of clay with but a slight admixture of sand. In different parts of the mound were:

Burial No. 1.—A lone skull, badly decayed.

Burial No. 2.—A solitary skull, crushed flat.

Burial No. 3.—Centrally, a single skull in fragments. With it was part of what must have been a fine weapon of quartzite, a spearhead or a dagger. The fragment, from which a part is missing at either end, is 7 inches in length.

Burial No. 4.—Two femurs.

#### MOUND AT BRYAN'S BURN, SUMTER COUNTY, ALA.

In a great cultivated field, about one-half mile W. N. W. from the landing, on property of John Erwin, Esq., Greensboro, Ala, is a mound which has been badly washed, 150 feet long by 106 feet across. Its height is 5.5 feet. It is known far and wide as "The Indian Mound." A number of excavations indicated the mound to belong to the domiciliary class.

#### MOUNDS NEAR BICKLEY'S LANDING, MARENGO COUNTY, ALA.

About one-half mile in a southerly direction from the landing, on property of Mrs. M. E. Crane, of Myrtlewood, Ala., forty mounds, in sight one of another, many marginally in contact, were located by us, and possibly some escaped our notice. These mounds were nearly all of circular outline and none exceeded 5 feet in height. All were seemingly intact. All were above high-water mark and most were symmetrical, though a few had been a little spread by cultivation.

Ten of these mounds were entirely dug through by us, except marginal parts surrounding large trees. All were composed of a mixture of sand and clay and unstratified.

Mound I.—4 feet high, 26 feet basal diameter.

Burial No. 1.—2 feet 7 inches down, a crushed skull with some teeth and 1 foot away, three cervical vertebrae and more teeth. With the skull were a drill and a knife (Fig. 4), chipped from jasper pebbles, and a lot of pebbles and chippings.



FIG. 4.—Knife chipped from pebble. Mound at Bickley's Landing. (Full size.)

Burial No. 2.—4 feet from center, 3 feet 4 inches down, were fragments of femurs; two tibiae, one with foot bones and an extra os calcis, the other with os calcis and astragalus only. Nearby was a large layer of charcoal.

Burial No. 3.—3 feet down and 4 feet from center lay a lone skull and several cervical vertebrae. With these were: one knife chipped from a pebble; a hammer-stone the size of a clenched hand; sixty-one pebbles, doubtless material for drills, etc.; eight pebbles partly chipped.

Burial No. 4.—5.5 feet from center, 3 feet down, was a skeleton at full length, with the exception of one thigh, which lay at an angle. With the bones were: decayed shells; pebbles; small arrow-points; a hammer-stone; decaying animal bones, possibly implements; and a drill beautifully chipped from a jasper pebble, the surface of which showed on the base of the drill (See Fig. 5).

Mound II.—Diameter, 18 feet; height, 3 feet.



FIG. 5.—Drills chipped from pebbles. Mounds at Bickley's Landing. (Full size.)

Burial No. 1.—2 feet down, about 6 feet from center, a solitary skull.

Burial No. 2.—Near center, 1 foot down, seven skulls with a large collection of various bones.

Burial No. 3.—16 inches below the preceding, a lot of long-bones.

Mound III.—3 feet high, 22 feet diameter.

No burials were met with in this mound and it is likely all traces of bones had disappeared through decay since human remains in the other mounds were in a very bad condition. A large hammer-stone was the only artifact met with.

Mound IV.—4.5 feet high, 25 feet in diameter.

Burial No. 1.—4 feet from center, at short distances apart and at somewhat different depths, but all probably thrown together on the slope of the mound as it was forming, were a skull and femur, one femur and two tibiae and a single skull.

Burial No. 2.—3 feet from center, 2 feet down, were two femurs, one tibia, one humerus.

Burial No. 3.—5 feet from the center, 4.5 feet down, was a skeleton which had been interred while partly held together by ligaments. The skull and some vertebrae lay a short distance away and one humerus was reversed as to position.

Burial No. 4.—4 feet from the center, 2 feet down, was a single skull. Associated with it were some pebbles, some flakes and an arrowpoint. Another skull lay a short distance farther in.

Burial No. 5.—A lone skull 5 feet from the center, 1.5 feet down.

Burial No. 6.—5.5 from the center and 4.5 feet down, were fragments of pelvis, a femur and a tibia.

Burial No. 7.—2.5 feet from the center, 5.5 feet down, lay a solitary skull.

Burial No. 8.—4 feet from the center, 1 foot 8 inches down, a skull of a child.

Mound V.—This mound, unlike the others given here, was oblong in shape, tapering at the ends and slightly crescentic. Its basal diameters were 40 feet and 20 feet; its height, 2 feet 7 inches.

Burial No. 1.—10 feet from center and 2 feet down, were one humerus, two femurs and two tibia.

Burial No. 2.—At the center, 3.5 feet down, on the basal line, lay a skull with other bones, in fragments. With these was a rude tobacco pipe of earthenware broken to pieces by the digger, also pebbles and animal bones.

Burial No. 3.—10 feet from center, 3 feet down, lay one skull and fragments of various bones.

Mound VI.—1 foot 3 inches high, 21 feet diameter.

Burial No. 1.—At the center, 2 feet 3 inches down, were a few badly decayed fragments of long-bones showing serious inflammatory disease.

Burial No. 2.—2 feet down, 3 feet from center, was a single skull. Part immediately with this skull and part between it and Burial No. 1, were thirteen small arrowpoints, some delicately made; a lancehead; a small hone; flakes; a large arrow or spearpoint; a decayed bone implement and certain bones of a deer and of a rodent.

Mound VII.—3 feet high, 24 feet diameter.

Burial No. 1.—4 feet down, 3.5 feet from the center, were fragments of human bones including parts of two skulls, burnt and calcined. At first glance it seemed as though cremation had been practised but the presence close to the bones of a hole extending down from the surface, where a stump had burnt out and baked the surrounding clay, showed the fire to have been accidental. Fragments of charcoal from the part of the tree above ground still lay upon the surface.

Mound VIII.—3 feet high, 26 feet diameter.

Burial No. 1.—5 feet from center, 2 feet down, were a skull, a tibia and a femur.

Burial No. 2.—1 foot 10 inches down, were fragments of a skull in caved soil.

Burial No. 3.—4 feet from center, 3 feet 8 inches down, was a skull with some cervical vertebrae and part of one shell bead.

Burial No. 4.—2 feet from center, 4 feet down, lay a pelvis, a bit of femur and other loose bones nearby. With these were a hammer-stone and an awl chipped from a pebble.

Burial No. 5.—3 feet 8 inches down, 4.5 feet from the center, were two femurs and heel bones.

Mound IX.—3 feet high, 22 feet diameter.

Burial No. 1.—5 feet from center, 2 feet down, a lone skull and a lancepoint.

Burial No. 2.—3 feet 6 inches from center, 2 feet down, were scattered fragments of bones.

Burial No. 3.—3 feet 4 inches down, were a skull and a few cervical vertebrae. Another skull lay above.

Burial No. 4.—At center, 8 inches down, were some long-bones.

Mound X.—3 feet high, 20 feet diameter. This mound was the only one investigated by us which had been ploughed over.

Burial No. 1.—2.5 feet from the center were one tibia and part of a pelvis.

Burial No. 2.—2 feet from the center lay a solitary skull near the surface.

Burial No. 3.—At the center, 2.5 feet down, were a skull, a humerus and some vertebrae. With them were: pebbles; a pebble-hammer; a bone piercing implement; an arrowpoint; a cannon bone of a deer; decayed shell beads.

At Bickley's Landing, as we have stated, our investigation of the Tombigbee river was abandoned. Though the results cannot be considered of great interest, there are points to which it may be well to call the attention of the reader.

Presumably cemeteries, unmarked above ground, are on the Tombigbee as



they are on the Alabama, but there is no history of their discovery and nowhere along the river, on the surface, did we find fragments of vessels that seemed to have been for other than household use, judging from the fact that they formed parts of comparatively small vessels.

Readers of our Report on the Alabama river may recall that in connection with one burial only on all that river was cremation met with by us. On the Tombigbee, it was not found at all. Now, in peninsular Florida, cremation is met with to a certain extent. Cremated bones are found sometimes lying mixed with unburnt bones and calcined fragments of human bones lie in or near fire-places, though we do not recall having met with there on any occasion, masses of calcined fragments away from unburnt bones and with no fire-place in the vicinity, such as we found so often in Georgia. Still, the use of fire in connection with burials obtained at times in the mounds of the peninsula, though it was far from general. Cremation then, in the peninsula, such as it was, can hardly have reached there from southern Alabama where its use was so extremely limited, especially as the use of fire in connection with human remains was not met with by us in that portion of northwestern Florida through which it would have to pass to reach the peninsula from Alabama. We must look, therefore, we think, to Georgia as the territory through which cremation passed to reach Florida for, in Georgia, isolated pockets of fragments of cremated bones; masses of cremated fragments, placed on the ground and covered with inverted vessels; and vessels filled with cremated remains and capped by inverted bowls were plentifully met with by us.

## CERTAIN ABORIGINAL REMAINS OF THE N. W. FLORIDA COAST.

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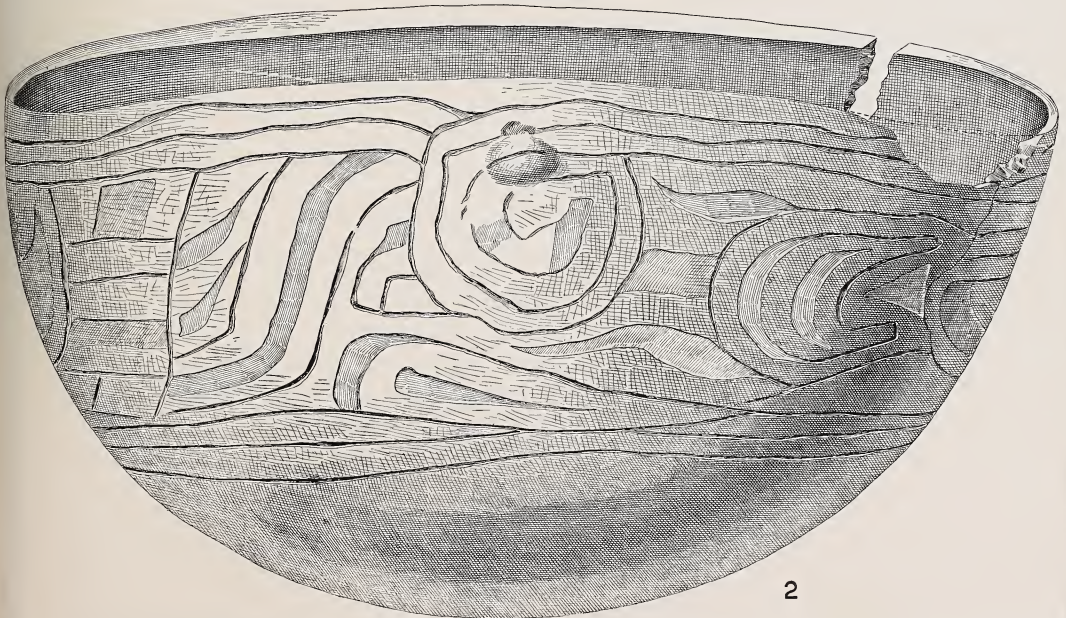








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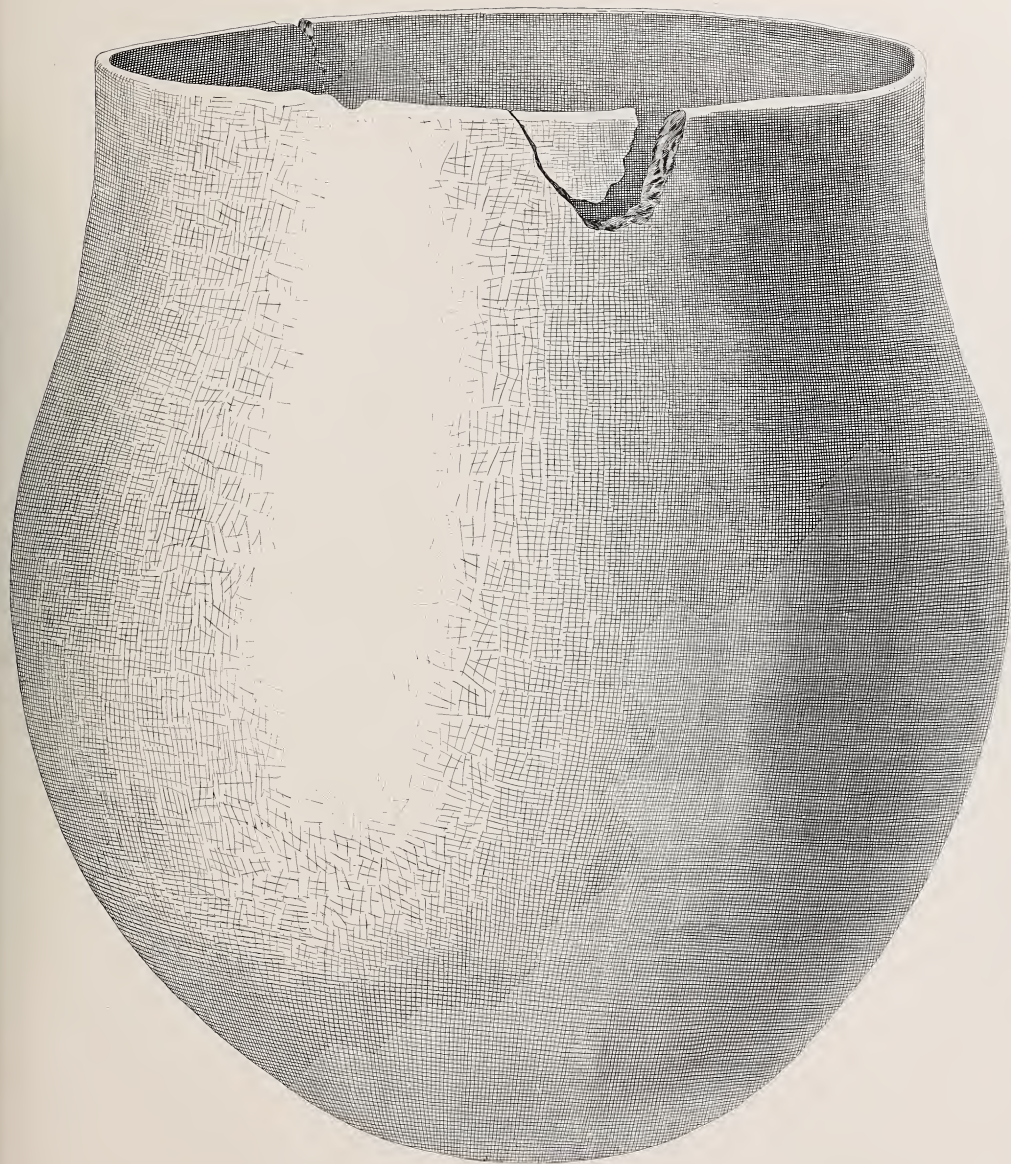
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MOORE: GEORGIA COAST MOUNDS.

1. VESSEL OF EARTHENWARE, MOUND B, DARIEN. 2. VESSEL OF EARTHENWARE, WALKER MOUND. (BOTH FULL SIZE.)





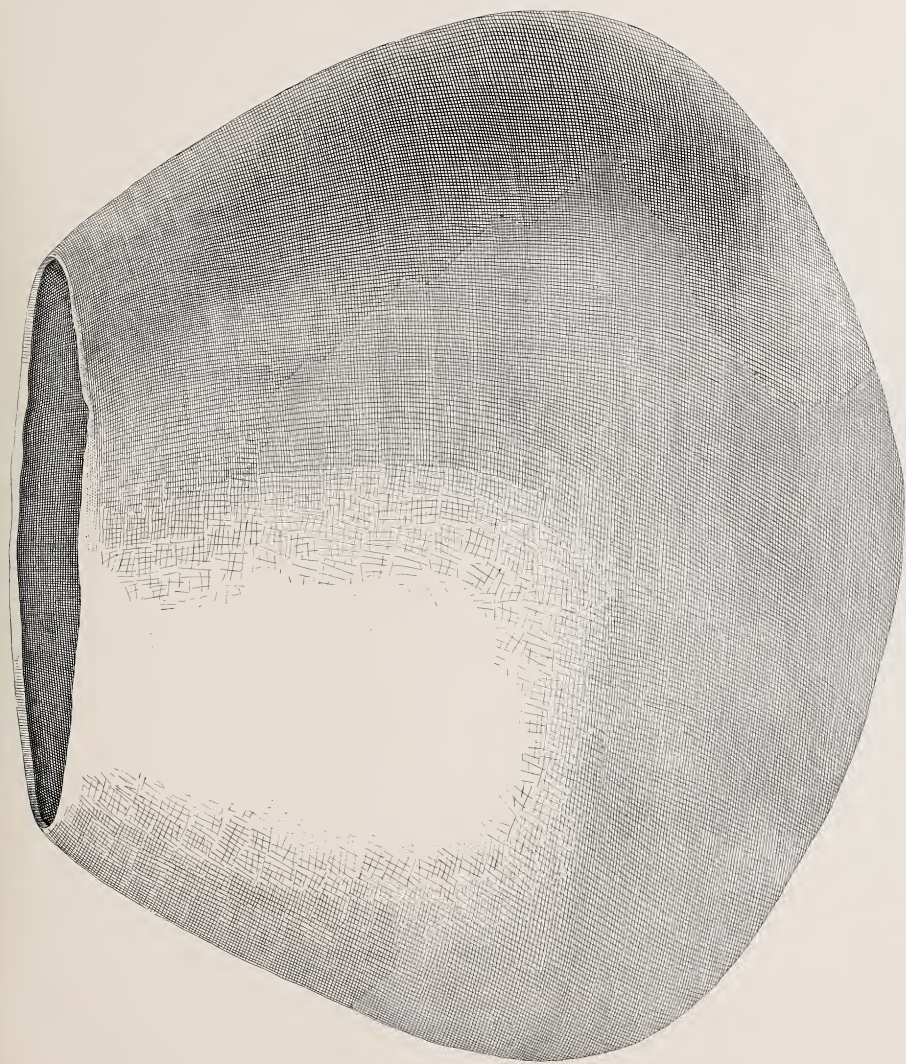


MOORE: GEORGIA COAST MOUNDS.

VESSEL C (BURIAL 207, MOUND AT SHELL BLUFF (SEVEN-EIGHTHS SIZE.))





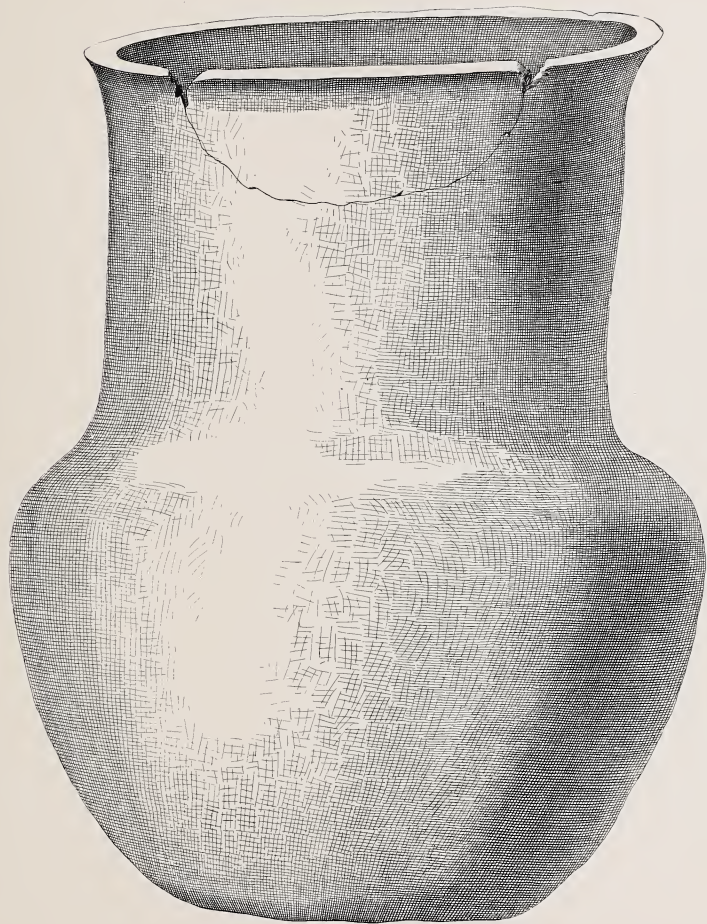


MOORE: GEORGIA COAST MOUNDS.

VESSEL D (BURIAL 20A). MOUND AT SHELL BLUFF. (FULL SIZE.)



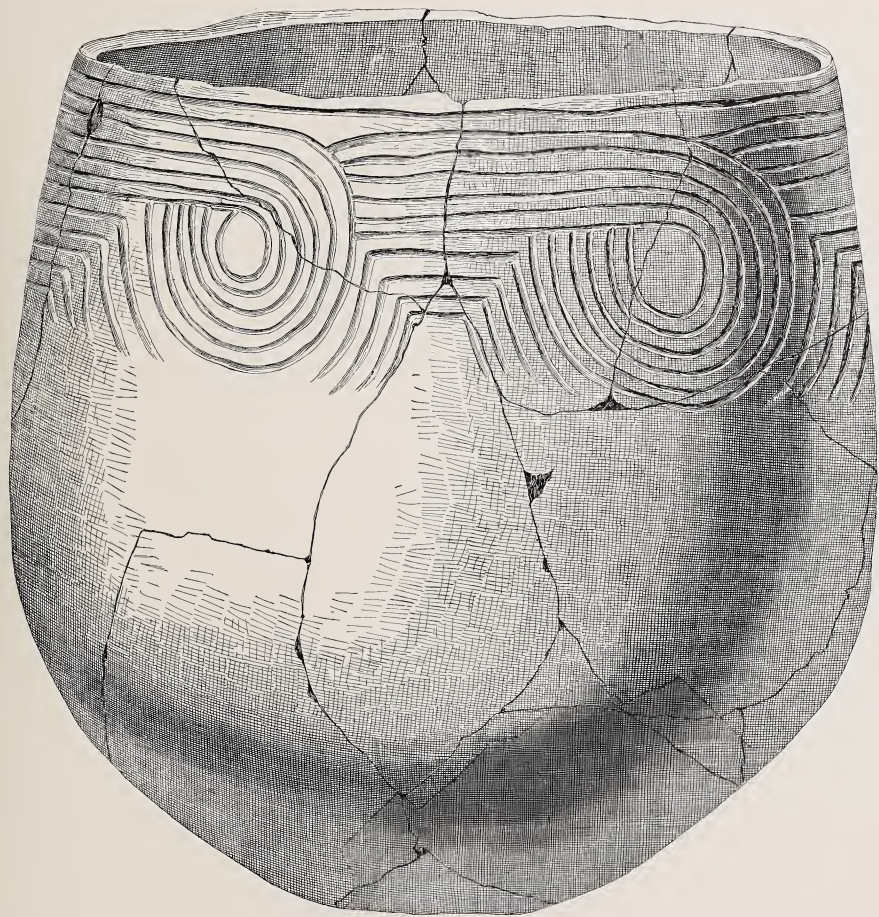




MOORE: GEORGIA COAST MOUNDS.

VESSEL OF EARTHENWARE. MOUND NORTH END OF CREIGHTON ISLAND. (FULL SIZE.)



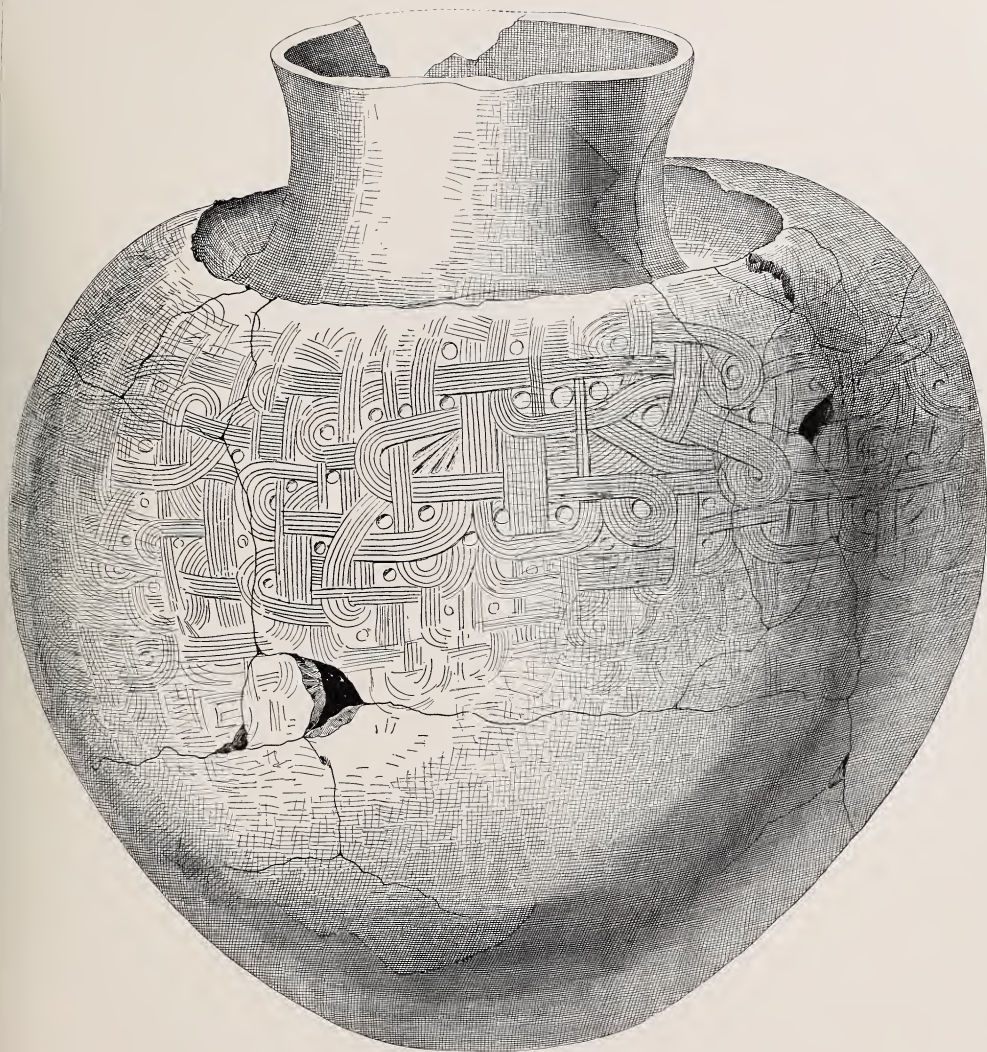


MOORE: GEORGIA COAST MOUNDS.

CERAMIC URN, WALKER MOUND. (HALF SIZE.)



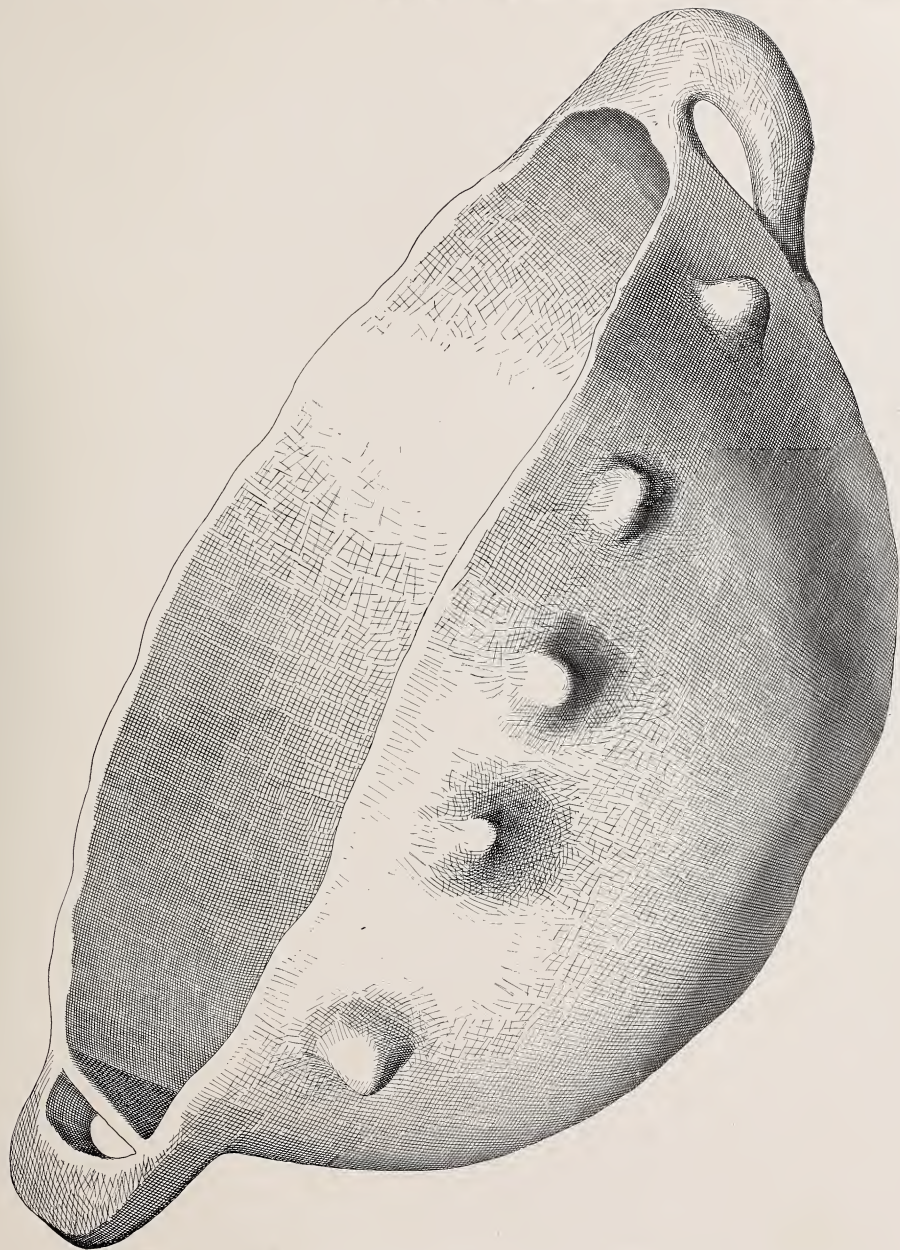




MOORE: GEORGIA COAST MOUNDS.

CINERARY URN, WALKER MOUND. (THREE-FIFTHS SIZE.)



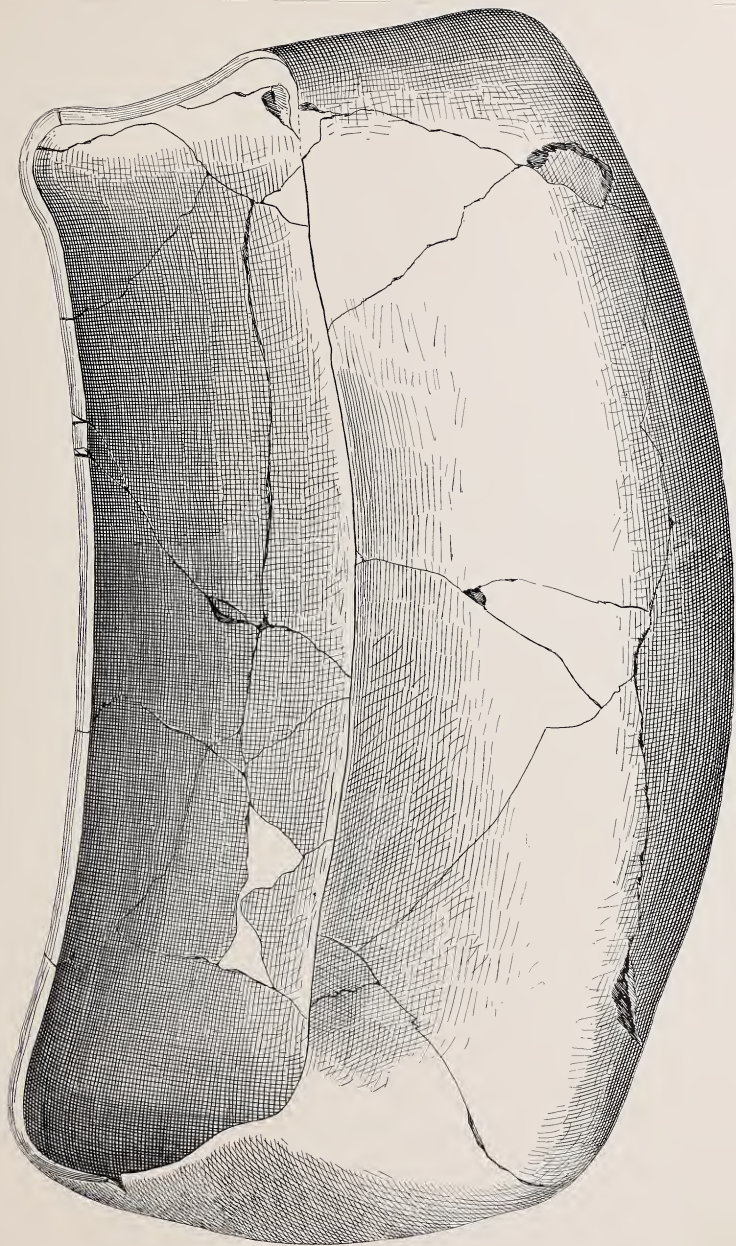


MOORE: GEORGIA COAST MOUNDS.

DISH OF EARTHENWARE. MOUND AT BOURBON, SAPELO ISLAND. (FULL SIZE.)







MOORE: GEORGIA COAST MOUNDS.

VESSEL C (BURIAL 36). MOUND IN DUMOUBSAY'S FIELD, SAPELD ISLAND. (THREE-FIFTHS SIZE.)



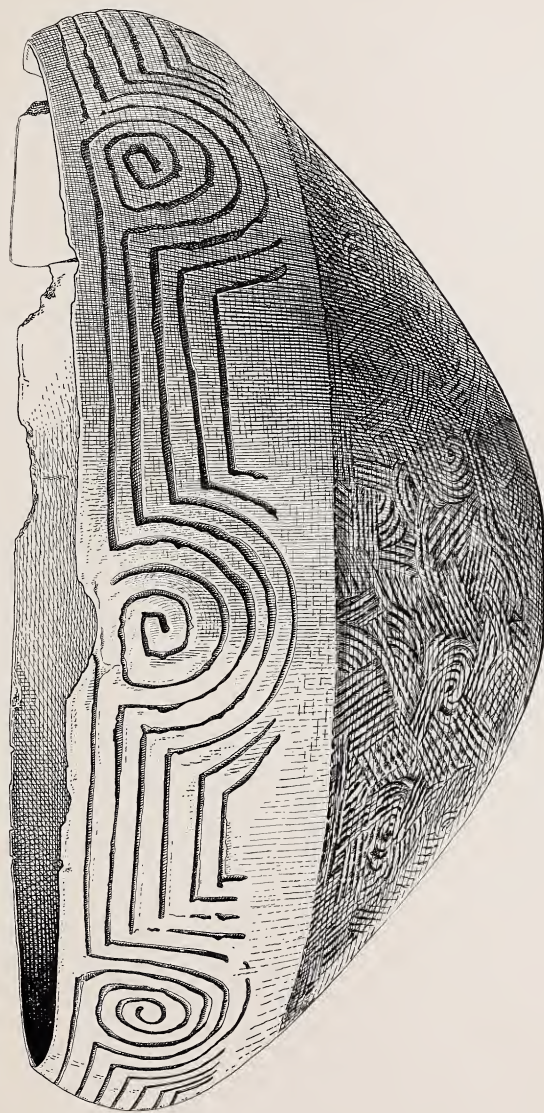




MOORE: GEORGIA COAST MOUNDS.

VESSEL D. MOUND A, MIDDLE SETTLEMENT, OSABAW ISLAND. (ABOUT FIVE-EIGHTS SIZE.)



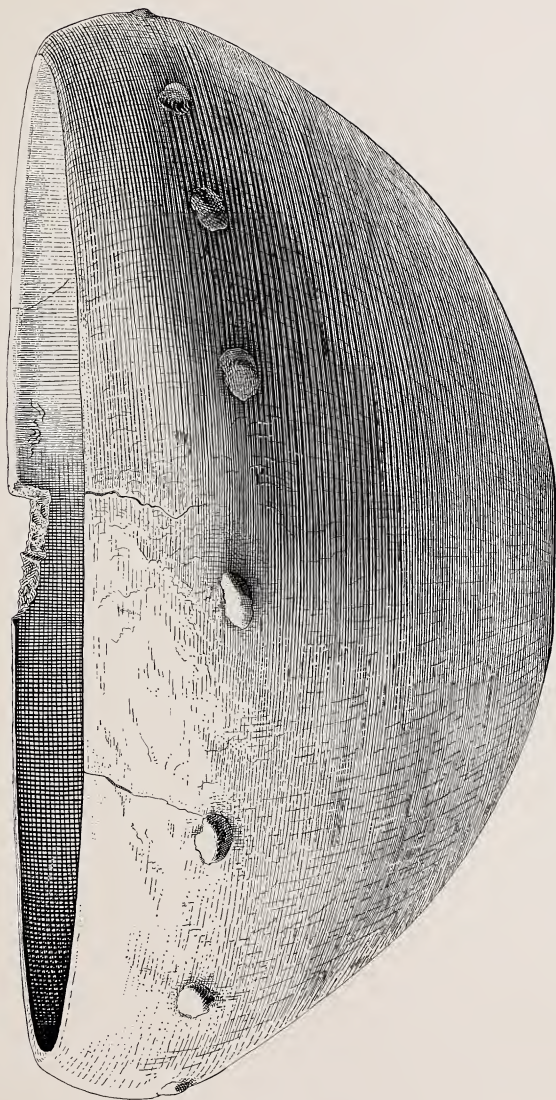


MOORE: GEORGIA COAST MOUNDS.

VESSEL RR. MOUND A, MIDDLE SETTLEMENT, OSEBAW ISLAND. (ABOUT FOUR-FIFTHS SIZE.)



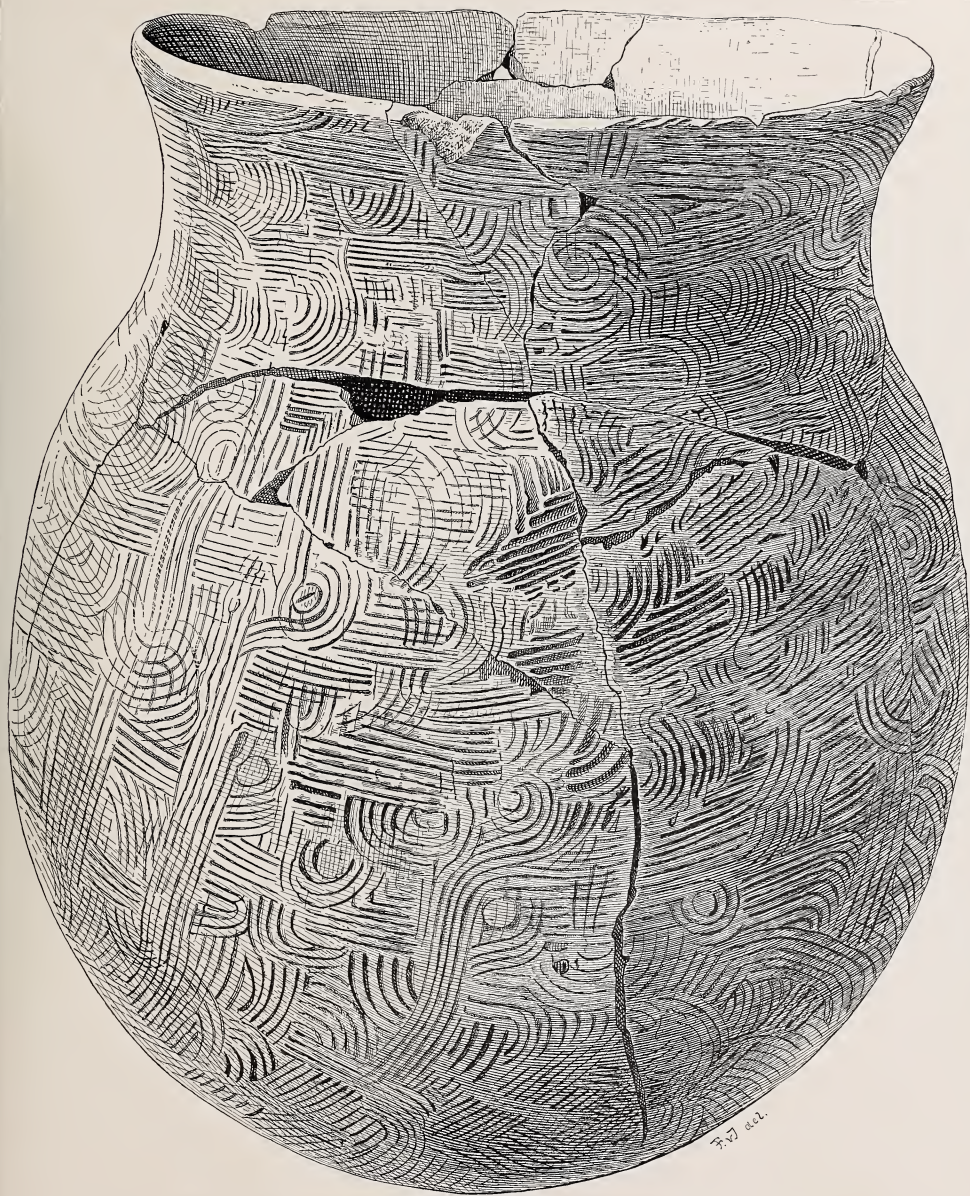




MOORE: GEORGIA COAST MOUNDS.

VESSEL 58. MOUND A, MIDDLE SETTLEMENT, OBSARAW ISLAND. (ABOUT FIVE-SEVENTHS SIZE.)



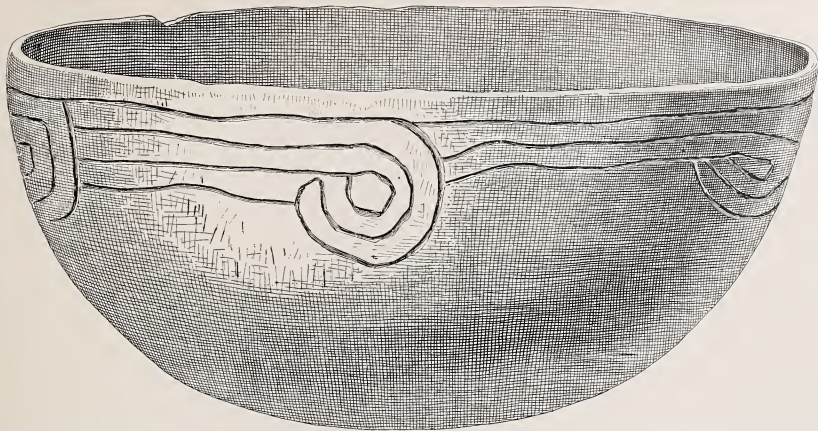


MOORE: GEORGIA COAST MOUNDS.

VESSEL AA. MOUND A, MIDDLE SETTLEMENT, OSSABAW ISLAND. (ABOUT TWO-THIRDS SIZE.)







1



2

MOORE: GEORGIA COAST MOUNDS.

1. VESSEL II. 2. VESSEL I. BOTH MOUND A, MIDDLE SETTLEMENT, OSABAW ISLAND. (FULL SIZE.)





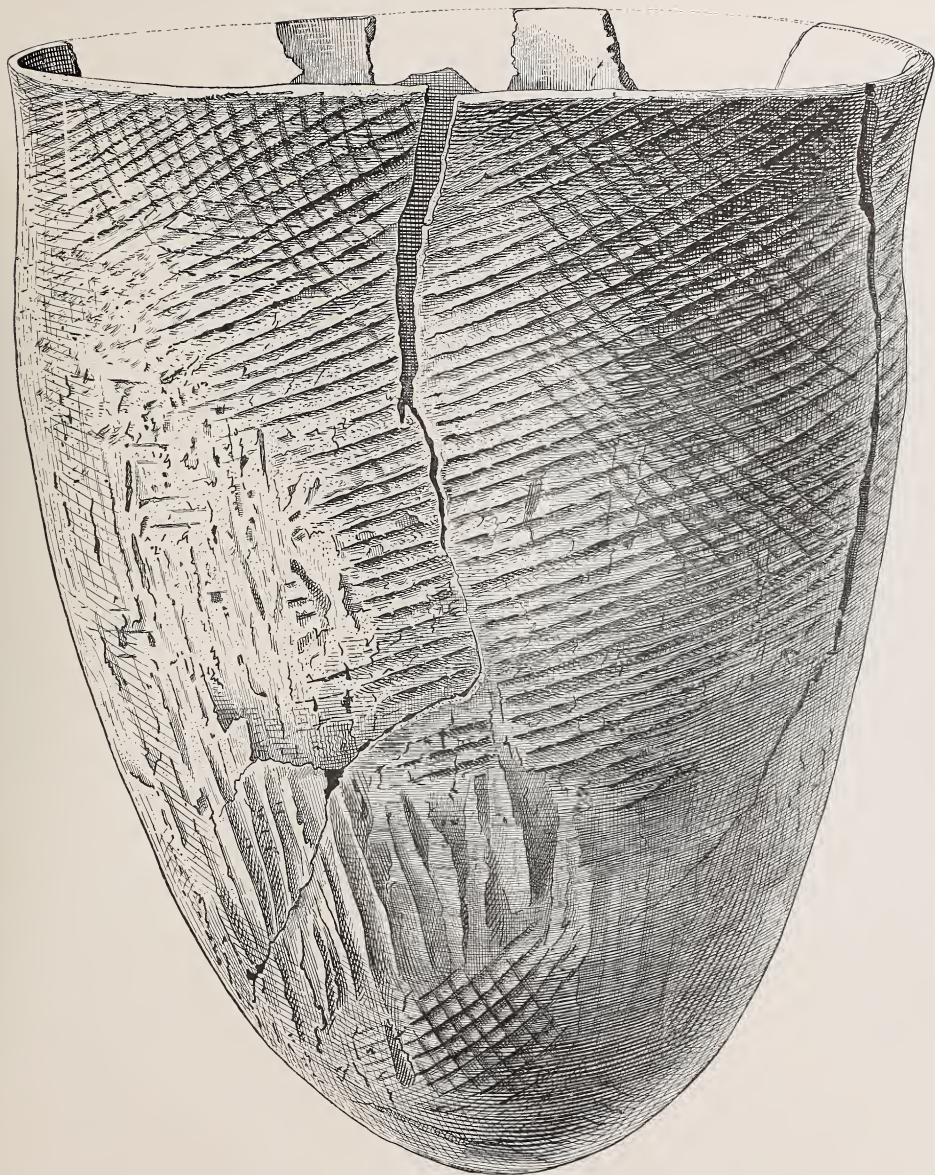


MOORE: GEORGIA COAST MOUNDS.

1. VESSEL LL. MOUND A, MIDDLE SETTLEMENT, OSSABAW ISLAND. (FULL SIZE.)  
2. VESSEL O. MOUND D, MIDDLE SETTLEMENT, OSSABAW ISLAND. (FULL SIZE.)





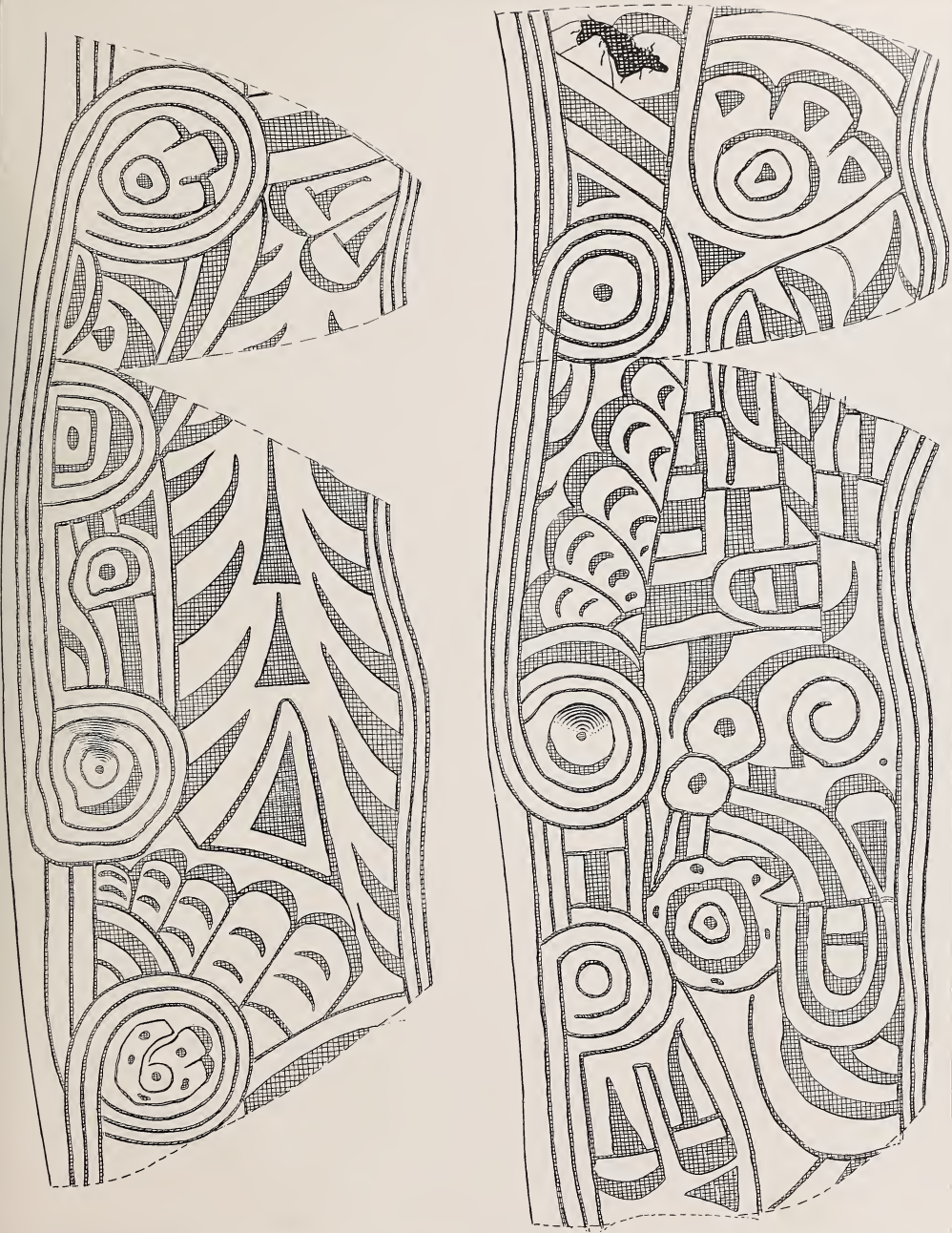


MOORE: GEORGIA COAST MOUNDS.

VESSEL N. MOUND 9, MIDDLE SETTLEMENT, OSABAW ISLAND. (TEN-ELEVENTHS SIZE.)







MOORE: GEORGIA COAST MOUNDS.

DIAGRAM OF INCISED DECORATION ON VESSEL OF EARTHENWARE. WALKER MOUND. (NINE-TENTHS SIZE.)





1-1b. *CLEMYS PERCRASSUS*. 2-2a. *MEGALONYX SCALPER*. 3-3b. *CANIS PRISCOLATRANS*. 4-4a. *VULPES LATIDENTATUS*. 5-5a. *MURTELA DILUVIANA*. 6. *OSNOTHERIUM SPELEUM*.  
7. *MEPHITIS FOSSIDENS*. 8-8a. *M. ORTHOSTICHUS*. 9-9a. *M. LEPTOPS*. 10. *PELYCICTIS LOBULATUS*. 11-11a. *LUTRA RHODASII*.



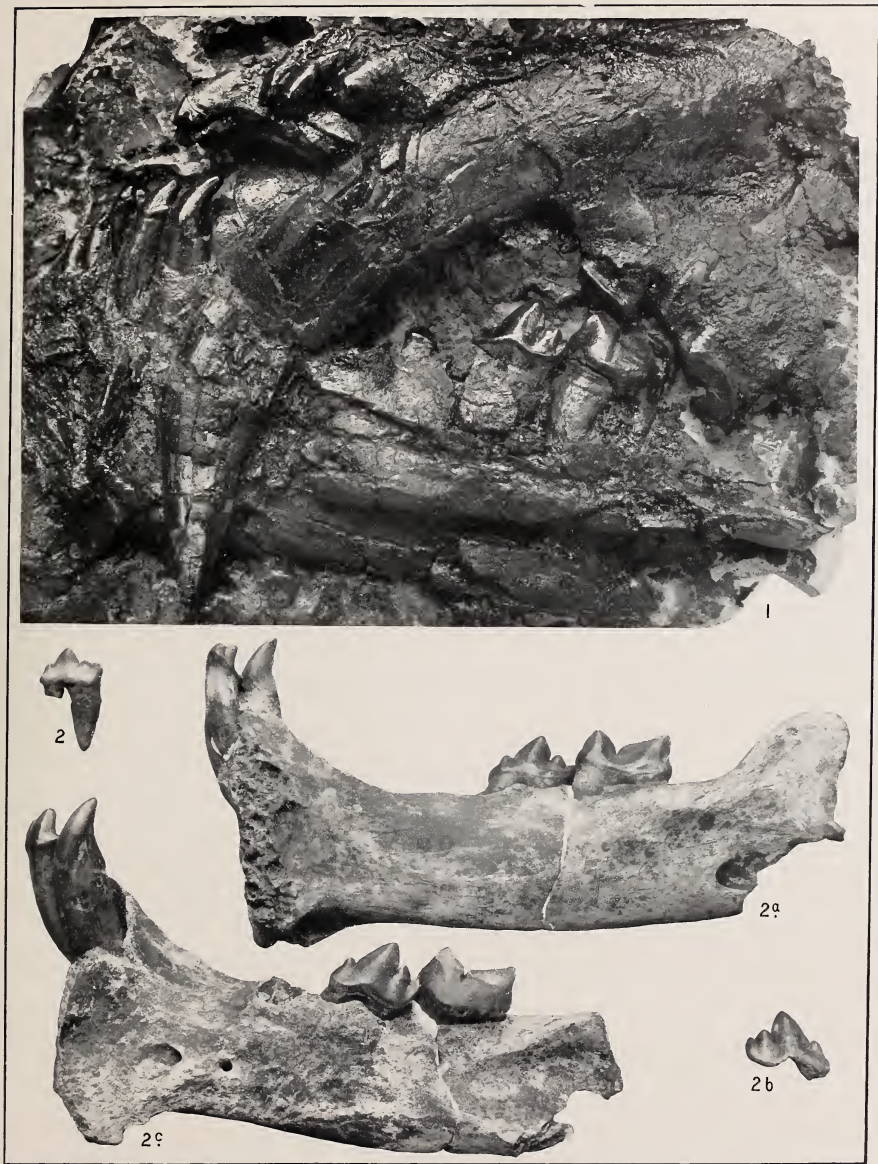




1. TOKASPIS ANGUILLULATUS. 2-2a. URSUS MAPLOODON.







1. SWILODON GRACILIS. 2-2c. SWILODON MERCERII.





1-1f. *UNCIA INEXPECTATA*. 2-2a. *LYNX CALCARATUS*. 3-3b. *MYLONHYUS TETRAGONUS*. 4-4a. *TELEOPTERNUS ORIENTALIS*. 5. *CARIACUS LEVICORNIS*.







SHUFELDT. OSTEOLOGY OF VULPES MACROTUS.



8.



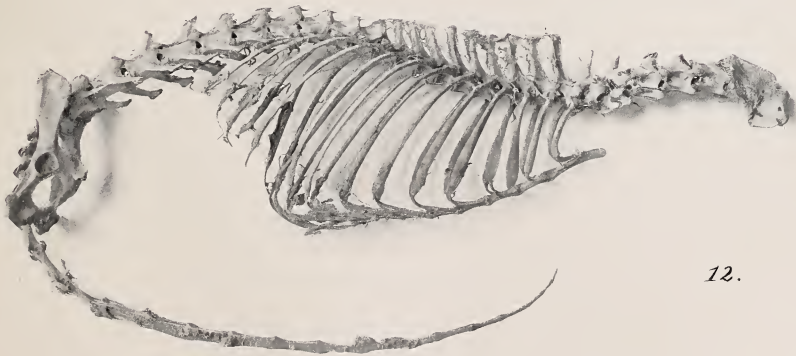
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10.



11.



12.

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