Wyman (Jeff.)

AN ACCOUNT

OF THE

FRESH-WATER SHELL-HEAPS

OF THE

ST. JOHNS RIVER, EAST FLORIDA.

BY

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The St. Johns River, on the banks of which are to be seen the mounds described in the following pages, has, in several respects, a peculiar interest. It rises near the middle of the eastern half of the peninsula of Florida, in two series of lakes and swamps of great extent, one of which finds its outlet through the upper portion of the main stream, and the other through the Oklawaha, the largest of its tributaries. These waters are separated by land scarcely rising above their level, from another chain of lakes and swamps which have an outlet southwards through the Kissimmee, and thence into the great lake of Okee-Chobee, which has an area of about eight hundred square miles. Other waters, starting from the same region as the preceding, but separated from them by a low range of sand-hills, are discharged westwards into the Gulf of Mexico, chiefly through the Withlokootchee. Though extremely crooked, the general course of the St. Johns is somewhat to the west of north, and in its various windings is supposed to traverse a distance of three hundred miles. Its frequent enlargements, as at Lake Harney, Lake Monroe, Lake George, and its great breadth

from Palatka to its mouth, almost justify the designation of it as a chain of lakes rather than a river. Flowing through a region which is nearly of a dead level, its stream is necessarily sluggish.

There is much dry and arable land, but so little is this raised above the level of the river, that, were it depressed five or six feet, the ocean would reassert its sway over a large part of the eastern portion of the peninsula, leaving only narrow ridges along the sea-coast, and inland, here and there low islands. As it is, immense tracts are under water throughout the year, and the whole area drained by the St. Johns is a combination of dry land, swamps, lagoons, and creeks. Open prairies, pine barrens, palmetto hammocks, mixed forest growths, chapporals of saw-palmetto, thick jungles, and large tracts overgrown with tall reeds or rank grass vary the surface. From the absence of a change of level in the land, the distant views on the river are extremely monotonous, while the near ones are often of great beauty, because of the windings of the river, and the subtropical vegetation. The creeks and lagoons, with their rank vegetation, and also the wilder shores of the river, shelter vast numbers of water and shore birds, and also countless alligators, water moccasins, frogs, and other reptiles.

Of animals suitable for the food of man there is an abundance, as will be seen farther on, so that along the banks of the river and its tributaries, hunter-life could be easily sustained. The aborigines were, however, planters as well as hunters, for the first explorers found the land largely tilled, and the "Indian-old-fields" which can still be traced bear witness of the fact. Of all the American races none appear to have occupied a region more nearly equally divided between land and water, or one which had been more newly lifted above the level of the ocean, than natives of the shores of the St. Johns.*

*For a description of the physical features of the St. Johns River, the reader is referred to an article entitled *Cursory Remarks on East Florida.* By Major Henry

The shell-heaps we are now to describe were visited during the months of February and March, 1867, in company with Mr. G. A. Peabody, of Salem, Mass., and Mr. George H. Dunscombe, of Canada West, to both of whom the writer is largely indebted for aid in making explorations and for valuable contributions to his collections. The heaps are distributed over a distance of more than one hundred and fifty miles, between Palatka and Salt Lake, and are nearly all situated on knolls, seen here and there on the borders of the river, though a few are built in swamps or on dry land, at some distance from it. They are composed almost exclusively of one or more of the following species of shells, namely, *Ampullaria depressa* of Say, *Paludina multilineata* Say, and *Unio Buckleyi* Lea. Besides these, a species of Melania and a few Helices are found, but they, as well as a few marine shells, must be considered as accidentally present. The mounds vary much in size, from circular heaps fifteen to twenty feet in diameter, and a few inches high, to long ridges several hundred feet in length, and having a height from a few inches to four or five, and in some cases to fifteen feet. They are generally overgrown with oaks, maples, palmettos, bays, magnolias occasionally, and other forest trees, and not unfrequently with groves of the wild orange. The last, bearing a fruit both bitter and sour, has been supposed to be indigenous; but it would appear from the researches of Mr. G. R. Fairbanks, a gentleman thoroughly versed in the history of the peninsula, that they were introduced by the Spaniards.* We personally visited more than twenty-five of these heaps, but only a few of them

Whiting, U. S. A. American Journal of Science, Vol. XXXV, p. 47. To those who wish an introduction to, and a digest of, the literature pertaining to the whole State, the excellent work, *Notes on the Floridian Peninsula*, by Daniel G. Brinton, A. B., Philadelphia, 1859, is invaluable. This work also contains an account of the author's own investigations of the shell-heaps of the sea-coast.

* Mr. Fairbanks has observed that they are confined to the best camping-places on the river, and it does not appear that they are described or referred to in any of the Spanish records, which it is presumed they would have been, had the Spaniards found them there, since they so particularly mention other fruits. They are probably the Seville Orange run wild.

will be described, as they are nearly all essentially alike; an enumeration of the whole series will, however, be given at the end of the article.

The mounds of oyster-shells on the sea-coast of Florida have long since attracted attention; some of them have been described by Dr. Brinton, who has clearly set forth the grounds for the conclusion that they are of human origin.* The fresh-water shell-heaps have received but comparatively little notice, and have generally been supposed to be either fluviatile or lacustrine deposits, for which any one might certainly be excused for mistaking them at first glance. That they are the works of man the following observations are intended to show. Count Pourtales, however, visited the shell-heaps at Old Enterprise, Lake Monroe, in 1858, when he obtained from among the shells fragments of pottery, and of the bones of animals. He has not published an account of his observations, but informs me that he came to the conclusion that this mound was artificial.

The existence of shell-heaps in other regions consisting of the remains of fresh-water species, though from time to time noticed, have not been generally recognized. The first observation that we have seen with regard to them is by Atwater, who described mounds of mussel-shells on the banks of the Muskingum River, containing various articles of human workmanship.† Dr. Brinton, while connected with the Army of the Cumberland in the war of the rebellion, observed mounds of mussel-shells which had served to supply food to the Indians;‡ and during the last year the writer, in company with Mr. Ralph Waldo Emerson, Mr. Elliot Cabot, and others, examined a similar deposit on the banks of the Concord River, in Massachusetts, consisting of *Unio complanatus*, and containing charcoal, pieces of worked bone and flint.§ I am also informed by Professor J. D. Whitney, the

* Notes on the Floridian Peninsula, p. 166.

† Archæologia Americana, Vol. I, p. 226.

‡ Smithsonian Reports, 1866, p. 356.

§ Proceedings of the Boston Society of Natural History, Vol. XI, p. 243.

chief of the Geological Survey of California, and Dr. William H. Brewer, botanist to the same survey, that vast numbers of fresh-water shell-heaps exist there. Indeed there is an abundance of evidence for the belief that they are widely scattered throughout the United States.

I. SHELL-HEAPS.

King Philip's Town. This place was in a wild state until quite recently, and derives its name from a Seminole chief, who, it is said, once occupied it. The shell-heap, now converted into an orange grove, is on the left bank of the river, about a mile below the outlet of Lake Harney. Its situation is favorable both for hunting and fishing; the river is here sixty or seventy yards wide; opposite is the mouth of Deep Creek,* rising far to the eastward, and pouring into the St. Johns an excellent quality of water; to the rear and westward are open prairies and pine lands, and in the distance, to the north, is a large lake. The river contains an abundance of fish, but generally of a poor quality, except in the month of February, when vast numbers of shad pass on their way to Lake Harney, two hundred miles from the mouth, to spawn. While we were encamped here, the splashing of the water by shoals of these fish could be heard at all hours, from evening twilight to early dawn.

The shell-mound is about four hundred and fifty feet in length, and from a hundred to a hundred and twenty in breadth. It stretches at right angles to the river, borders a lagoon on the south, and on the north merges into cultivated fields, over which its materials have become somewhat scattered. Its greatest height is about eight feet. Fragments of pots may be picked up anywhere on the surface, and, with these, bones of various edible animals. As all such remains may have been deposited on the mound after its completion, excavations were made at many points from a few inches to

*There is another creek of the same name which enters the St. Johns on the right bank, between Pilatka and Picolata.

several feet in depth, to ascertain if similar objects were buried in its interior. The most unequivocal evidence that this mound, while in the process of formation, was occupied by the aborigines, was obtained from a pit between four and five feet in diameter, and from five to six feet deep, which was dug near the centre. Not only were fragments of pots and bones found at all depths, but at a depth of three feet the remains of an old fireplace were uncovered, consisting of a horizontal layer of charcoal, beneath which were perfectly calcined shells, and near these others more or less blackened with heat. Still farther off were fragments of the bones of deer, of birds, turtle and fish, all just as they would naturally have been left around a fire, where cooking had been for some time carried on. In addition to the above statement it may be mentioned as a matter of negative evidence, that not a single article was discovered which could have been attributed to the white man. Several excavations made in other portions of the mound yielded similar results.

Black Hammock. One of the largest shell-heaps on the St. Johns is to be seen here. It is situated on the borders of a large lagoon, on the left bank of the river just above the outlet of Lake Jessup,* and seven miles above Lake Monroe. Besides the principal deposit of shells, there are two smaller ones. At the westerly end is the first, a few inches thick, extending one hundred and fifty feet along the shore, and some thirty or forty feet inland. This is separated from the rest by a small watercourse, the outlet of a morass. The shore then takes a northerly direction for about two hundred feet, and consists entirely of sand; at the point where the shore again takes an east and west direction, is a second but smaller deposit, extending only a few feet to the eastward. One hundred and eighty feet from the point just mentioned is a small burial-mound, and a

*This lake was discovered by Lieutenant Peyton, of the U. S. Army, during the Florida war, and at first bore his name, which ought not to have been discontinued. It were better to preserve the Indian names if they can be learned, but if not, no one has a right to usurp a name which has been given by others in honor of the discoverer.

little more than a hundred feet from this begins the largest of the heaps, which measures about nine hundred feet in length on the river side, and has a breadth varying from one hundred to one hundred and fifty feet. It has been largely undermined, and sections, in some places from three to four feet in thickness, exposed. It is not improbable that originally this and the smaller deposits were continuous, the intervening portion having been washed away by the river. If this were so, the mound could not have been less than twelve hundred feet in length. It is intersected by a small stream near the centre, and is bordered by another at its easterly end, both outlets of small morasses in the rear of the mound.

That the Indians confined their encampments, or, at all events their cooking, almost entirely to these mounds, is proved by the fact, that fragments of pots were picked up in large numbers along the shore wherever the shells are seen in the bank, and, though careful search was made for them, not elsewhere. To make the evidence of the human origin of the whole deposit complete, pits were sunk at different points. One of these, about four feet in diameter, was dug entirely through the shells into the sand beneath, which was reached at the depth of four feet and three inches. Seventy-five fragments of pots and six pieces of the bones of the deer, thirteen of turtles, and two of the alligator were thrown out. These were scattered through the whole thickness of the shell deposit, but not a single specimen was found after the sand was reached. In a second pit of similar size, ninety-seven pieces of pots, six fragments of the bones of the deer, eleven of the turtle, and nine of the alligator were found. The shells found here are chiefly Paludinas, though Unios and Ampullarias are met with.

Old Enterprise is situated on the north-eastern shore of Lake Monroe, and forms a distinct bluff consisting entirely of shells. It has a front of about one hundred and sixty feet on the water side, and at the western end rises some-

what abruptly to the height of fifteen feet above the lake; on the top is a plateau, on which formerly stood a hotel and several outbuildings, and to the eastward the surface falls off by a gradual slope. On this side there is an extensive swamp, separated from the lake by a beach-wall of shells, consisting of the same species as those found in the bluff, and extending several hundred yards along the shore. As there are mingled with these shells the fragments of pots and bones of animals, they were all no doubt derived from the mound, and have been scattered by the action of the water. On the westerly side is a spring discharging highly sulphuretted water, and flowing into the lake through a small morass. The mound extends back from the shore about five hundred feet, but is of a very irregular shape, being much narrowed in its middle, and spreading out again in the rear portion into two unequal and irregular transverse ridges. While on the front the mound is composed of the three kinds of shells, the rest consists almost exclusively of Paludinas. That a large portion of this mound has been destroyed, and that the shore of the lake is receding, is obvious from its abrupt front, the distribution of its material along the shore, and the fact that twelve palmetto trees to the eastward of it are now surrounded by water, and their roots denuded to the depth of from two to three feet.

In consequence of the undermining of the front, and the looseness of the materials, which generally are neither compact or stratified, excavations were easily made. They were continued through several days, many cartloads of material were moved, and collections made from all depths below the surface, of whatever objects were mingled with the shells. These objects consisted of the articles already mentioned in connection with the other localities, and in addition various fragments of worked shells which will be described farther on. Although several arrow-heads and many flakes or "chips" of flint were picked up along the shore, none were actually found in the mound.

Excavations made in the ridges at the rear of this shell-heap did not yield precisely the same, nor so decisive results. The shells, consisting almost entirely of Paludinas, were much more compact, and the objects found in them much fewer. In certain directions there were appearances of somewhat extensive removals of material having been made, but whether by the Indian or the white man, we could not learn.

To the westward of Old Enterprise, which name applies to the bluff just described, is an orange grove, and beyond this an "old-field," which rests upon a thin deposit of shells, distributed somewhat uniformly over the surface. Excavations made here in many places gave the same results as were obtained at the bluff.

Horse Landing is a shell-mound on the right bank of the river a few miles above Palatka, and eight miles below Lake George; it is three hundred feet in length, one hundred in breadth in the widest part, and rises abruptly in every direction. On the front it shows a vertical wall about eight feet high, giving a good section of its whole structure, the result of the action of the river which here makes a sudden bend. Underneath the shells is a layer of sand rising about four feet above the water, which at the time we visited the locality, was not much below its highest mark. In its general appearance the mound has the aspect of a geological deposit, in consequence of the compactness of the materials, the greater decomposition of these than is seen elsewhere, and above all, from its distinct stratification. The upper portion of the sand on which it rests is more or less mixed with fragments of shells, and still higher are alternate layers of these, and of shells mixed with sand; it is this condition which gives the whole its stratified appearance. At one place six such alternations were counted, but in others they were less numerous. None of the strata extended continuously through the whole length of the mound. Two explanations of this appearance are suggested: first, successive overflows of the river; second, interrupted occupation of the

mound. The first seems quite improbable. The water is not now known to rise above the lowest limit of the shells, nor in fact could it rise much beyond this, since the configuration of East Florida is such, that any unusual flow of water becomes at once spread out over the immense tracts rising only a few inches above the level of the river. Nothing short of subsidence of the land could bring the water to the level of the highest of these strata. The second is the more probable, but in the absence of proof can only stand as a reasonable conjecture.

In view of these facts the search for the evidence of man's work was important, and especially as the mound had the appearance of great age. The whole front, in which all the objects were undisturbed, was therefore most carefully examined, and with the following results: First, excepting within a few inches of the surface and in the vegetable mould, not a fragment of pottery was discovered; second, a few bones of the deer, more or less broken, were found, and one of them burned; those of the soft-shelled turtle, alligator, and gar-pike, as also numerous fragments of charcoal, were obtained at various depths between the top of the mound and the sand on which it rested. If to these we add an ornament made of bone, to be described farther on, we have the scanty evidence derived from the materials, for the conclusion that the mound was built by man. Mr. Peabody, however, made an important discovery which confirms this conclusion. He observed a piece of flint projecting from the sand just beneath and quite near to the lowest deposit of shells. It is to be remembered that in this part of Florida flint does not naturally occur, in fact that there is nothing but sand in which even pebbles are seldom seen. Before the flint was removed, we both carefully examined all the surroundings, and were satisfied that the flint and the sand in which it was embedded had not been disturbed since the mound was begun. The front of the mound was vertical, the section was recent, and the small talus which forms below it is constantly removed.

Anything once detached is carried away by the current which is here somewhat brisk. When removed, the flint had all the evidence of having been "chipped," and was evidently the result of a rude attempt at an arrow-head. We cannot, therefore, in view of all the facts resist the conclusion that the mound was of human origin.

The only shell-heap visited by us in which we failed to find satisfactory traces of man, was on the left bank of the river, a few miles below Hawkinsville (formerly Oceola). This deposit is one hundred and fifty to two hundred feet in length and eight feet high, has a swamp in the rear from which it rises very abruptly; on the front it has been so much undermined by the river that it presents a nearly vertical face, showing a good section through its whole length. A series of excavations had been made along the summit during the rebellion, for military purposes, so that there were unusually good opportunities for examination. Notwithstanding all this, we failed to find any pottery or other works of man at any point, except within a few inches of the surface. The contrast with Black Hammock and Old Enterprise was very striking. The mound was composed almost entirely of Paludinas, and, in some points, of these mixed with sand, forming a solid conglomeration. In this last we saw fragments of the tibia of a deer, which had been broken in the same manner as the bones from the other shell-heaps. The abruptness with which the mound rose from the level surface on the rear gave it the appearance, and this was the only circumstance which did, of artificial origin.

II. ARTICLES TAKEN FROM THE SHELL-HEAPS, SHOWING HUMAN AGENCY.

Pottery. In the old world no traces of pottery have been found associated with the earliest flint-implements, and it is therefore concluded that the men who wrought these were ignorant of it. When the European first came to America, some of the tribes were found to be destitute of this art. The

Patagonians had no earthen vessels either for cooking or holding water. Instead of such the Esquimaux used wooden bowls, and the natives of the North-west Coast, Oregon and California, water-tight baskets, substituting heated stones for the direct action of fire. But with few exceptions pottery, as an art, was practised by a large majority of the tribes.

If, as daily experience tends to show, man, when first introduced upon the surface of the earth, was at best a pure savage without experience, it follows as a natural consequence that there must have been a longer or shorter time when instruments were unknown to him. We have no adequate grounds for any other belief, than that his knowledge and his inventions have been progressively developed, and analogy, as we think, legitimately suggests that the most simple inventions are signs of actual progress, and point back to an earlier state out of which he has emerged. The discovery of the oldest of man's works, either in the form of worked flints, earthen vessels, and of fire-hearths, do not carry us back to his beginning; if we would attain to a knowledge of this, it must be sought for in the remains of his own body, older than all his works.

We have as yet no data for determining the time or the order of his inventions. But of all his works thus far discovered, flint-implements are the most ancient, and earthen vessels the next. The invention of fire and cookery appears to have preceded that of pottery, the proof of the existence of the former being the oldest. The determination of how, and the period when, fire was first made available as an agent, would be one of the most important contributions to the history of the early progress of the human mind.

The shell-heaps on the St. Johns River, like those from the other parts of the United States, show that those who inhabited them were not, strictly speaking, primitive men. They had already made some progress in the useful arts, and however rude their instruments, these were nevertheless inventions, and such, too, as could only have been the result of

experience extending through considerable periods of time. They not only used worked stone, bone and shell, but their pottery had passed out of the first and rudest stage into that of comely forms with outward ornament, and, as the following table shows, exhibits some little variety in the composition of the materials.

LOCALITY.	MATERIALS.			SURFACE.				
	Clay.	Clay and Sand.	Clay and Veg. fibre	Plain.	Traced.	Plain Stamped.	Complex Stamped.	Marked with Cord.
Lake Harney, ...	106	0	0	8	2	90	0	0
Burial Mound do., . .	38	0	2	32	1	7	0	0
Watson's Landing, . . .	62	0	15	67	0	10	0	0
Black Hammock, . . .	210	0	0	142	0	68	0	0
Old Enterprise, . . .	23	2	92	64	50	3	0	0
Old Town, ...	126	0	13	60	1	78	0	0
St. Johns Bluff, . . .	27	28	0	14	1	16	18	12
Total number of pieces,	592	30	122	387	55	272	18	12

For the purposes of comparison we have included in the enumeration, articles obtained from St. Johns Bluff, where the shell-heap is made up of salt-water species. The table shows that more than three-fourths, eighty per cent., of all the pieces were made of clay without the admixture of any other substance, and that when another substance was added, it was most commonly palmetto fibre. The use of sand was almost exclusively confined to St. Johns Bluff, where, too, is found the most highly ornamented work, characterized by the most complex figures. The only pieces marked with the impression of a cord were also found at the same place. This kind of ornament was extensively used over the United States, as we have specimens from Illinois and Massachusetts, and has also been observed on the pots from tumuli belonging to the Pre-Roman period of Great Britain.* We have seen no evidence that, as has been frequently asserted, these markings indicate that the pots had been formed in nets. Although the meshes are often regular, there are no signs of knots at the point of crossing of the threads, which there

*Sir John Lubbock. Prehistoric Times. London, 1865, p. 113.

certainly would have been if nets had been used. Traced pottery was confined almost wholly to Old Enterprise, the figures being made with a point, and consisting of combinations of straight lines. These were sometimes combined with indentations. We saw no specimens of pottery made in baskets, though frequently told that such are found. The absence of pounded shells, as one of the ingredients of their pottery, is worthy of notice, especially as shells were in daily use among the natives of the St. Johns.

The plain-stamped pottery was universally distributed, but was most abundant at Lake Harney and Black Hammock, and is characterized by square, oblong, or lozenge-shaped impressions, regularly arranged, the stamp being of sufficient size to make a large number of them at once, but very often the figures are confused in consequence of the instrument having been applied twice to the same region. In one case the apex of the spine of a Paludina had been used as a stamp. The complex figures on the pieces from St. Johns Bluff, consist of combinations of square, with more or less rounded or curved impressions, giving the whole surface an intricate series of markings, but which we were unable in any specimen found, to reduce to a definite plan. They, however, resemble in their general style the pottery described by Schoolcraft* as coming from the sea-coast, and remind one of Mexican forms.

The size of the vessels, as indicated by the curvature of the fragments, varied from between two and three to twelve inches. The more common kinds appear to have been either shallow like a common pudding-dish, or deep enough to be used as seething-pots, and both are figured in the illustrations to the *Brevis Narratio* of LeMoyne.†

Fig. 1, Pl. 10 (natural size), represents a rude attempt at ornament, consisting of two irregular parallel spiral lines starting from the same point. From Old Enterprise.

*North American Indians, Vol. III, Pl. XLV.

†De Bry, Hist. Amer. Francforte ad Mœnam. Pars. 2da, pp. 4 and 5.

Fig. 2, Pl. 10 (natural size), also from Old Enterprise. In this, as was not unfrequently the case at the locality just mentioned, straight lines are combined with indentations made with a round point.

Fig. 3, Pl. 10 (natural size), represents one of the instances of complex figures from St. Johns Bluff. This was made either by one large complicated stamp, or by a series of different stamps, since none of the details are exactly repeated.

Articles of Shell and Bone. The natives of the upper portions of the river were in constant communication with the coast, and, as might be expected, carried marine shells into the interior, some of which were converted into useful articles, especially *Strombus gigas*, *Pyrula carica*, and *P. perversa*, the last acquiring a length of from twelve to fourteen inches.

Fig. 4, Pl. 10 (half natural size), one of the most common instruments, is made of a triangular piece cut from *P. carica*, so as to comprise a portion of the rostrum, serving as a handle, and a portion of the swollen part of the body, which is the useful part of the tool. The sides and apex are smoothed and rounded, while the base is regularly curved and ground to an edge like that of a gouge, but with the bevel on the inside. A specimen presented to me by Dr. H. P. Bowditch, and which he obtained at Old Enterprise, shows quite clearly that it was detached from the shell by first cutting a groove, and then breaking off the fragment. Length from 80 to 90 m. m., breadth from 60 to 70 m. m.

Fig. 5, Pl. 10 (half natural size), represents a species of Pyrula, with thick and heavy walls; the lip and nearly the whole of the rostrum are ground off, and a somewhat irregular oval hole with rounded edges is made between the first and second row of tubercles, and quite near to the mouth. Though such an instrument would give resonance to the voice, the position of the hole is not such as to adapt it most favorably to be used as a horn. It may, nevertheless, be the instru-

ment which Bartram states was still in use when he visited the St. Johns, and with which, he says, "on one and the same day, early in the morning, the whole town is summoned by the sound of a conch-shell, from the mouth of the overseer, to meet in the public square," for the purpose of entering upon the work of cultivating the soil.*

Fig. 6, Pl. 10 (natural size), is a portion of the rostrum of Pyrula, 60 m. m. in length, the two ends of which have been obliquely ground.

Fig. 7 (natural size), a piece of bone with a central cavity, into which a hole has been drilled at each end. This was found at Horse Landing, midway between the top and base of the shell-heap, and was the only object found actually within the shell-heap, which was clearly the work of the human hand. Nearly similar forms are figured in the plates of the *Brevis Narratio*, as forming a part of the necklace worn by the natives.†

Fig. 7.

Fig 8.

Fig. 9.

Fig. 8, front view; fig. 9, side view (natural size), represents an instrument made of shell, which, from the exterior markings seen in some, and the thick ridge on the inside in nearly all, appears to have been cut from the borders of the mouth of *Strombus gigas*. Several of these were found, but all more or less broken. When whole the length was about 150 m. m., breadth from 50 to 60, and the thickness 25 to 30 m. m. The broad end is ground to a blunt edge like that seen in most of the stone chisels from the other States, and the other as ground to a blunt point. The

*Travels in Florida. Philadelphia, 1791, p. 512.
†Plates XXXVI, XXXVIII, XXXIX.

instrument closely resembles the shell-adze used by the Kingsmill islanders, specimens of which, with their handles attached, can be seen in the Smithsonian collections. One of the specimens has been twice perforated by a Lithodomus, and thus so far weakened as to lead to fracture. These perforations were undoubtedly made before the instrument was wrought. Its outer surface is largely bored by worms.

A large specimen of *Pyrula perversa*, from which the interior whorls had been broken out, was found at Blue Spring. Such as this were used as drinking horns, and are mentioned by Le Moyne, though his figures, drawn from memory, as might be expected, do not agree with this or any other species.

Besides the implements of bone already mentioned, a portion of the radius of a bear, which had been divided by cutting a groove around the outside and breaking the rest, was found at Old Town; and Mr. Bowditch gave me the antler of a deer which had been similarly treated, and which he found at Enterprise.

Articles of Stone. The collection of stone implements was quite small, only twenty-five or thirty pieces, nearly all of which were picked up on the shores near Old Enterprise, only a few being actually dug from the mounds. A single chisel of the ordinary form, and with a remarkably sharp edge, was found at Old Town, but all the other articles were either arrow or spear-points, and none of them had unusual shapes. No pipes or fragments of them were found at any place.

Fig. 10, Pl. 10 (half natural size), represents the rude attempt at an arrow-head, mentioned on p. 403, and found by Mr. Peabody under the lowest portion of the shell-heap at Horse Landing.

We will add to the above two pieces of worked shell, both of which were, however, taken from the burial-mound at Black Hammock, near the shell-heap, but were undoubtedly in common use among the natives.

Fig. 11, Pl. 10 (natural size), is an ornament cut from that portion of a Pyrula, namely the suture, where one whorl joins the preceding, and is bent to nearly a right angle; the length of the upright portion is 45 m. m., and the disk at the bottom measures 31 by 24 m. m.

Fig. 12, Pl. 10 (natural size), a disk of shell, 18 m. m. in diameter, and 5 m. m. thick, with a hole drilled through the centre. A similar one is figured by Schoolcraft.*

Remains of Animals. The subjoined table gives a complete list of the different kinds of animals, indicated by the bones found in the different mounds. The species most commonly met with are the Deer (*Cervus Virginianus*), the Terrapin (*Emys Floridana*), Soft-shelled Turtle (*Trionyx ferox*) and the Alligator (*Alligator Mississippiensis*). The condition of the bones in many instances, particularly those from Old Enterprise and Horse Landing, indicated that they had been long buried, inasmuch as they had lost nearly all their organic matter, and when exposed to heat scarcely changed their color. In many instances they were incrusted with a deposit of lime, and had the shells in which they were embedded cemented to them. The bones of birds are quite rare, even those of the wild turkey and of the various species of ducks, which in the winter frequent the rivers and lakes in immense numbers. Of fishes, the species most commonly represented are the gar-pikes (*Lepidosteus*), and a cat-fish (*Pimelodus*).

In the illustrations to the *Brevis Narratio* of LeMoyne, Pl. XXIV represents a fire over which is built a frame, and on this, exposed to heat and smoke, are several animals, among which can be recognized the deer, a small mammal, the mouth of which resembles that of the opossum, an alligator, an eel or a snake, and several species of fish. Several Indians are standing near, one fanning the fire, and another holds an alligator under his arm. On Pl. XXIII, natives are represented carrying food in baskets, one of which con-

* Notes on the Iroquois. Albany, 1847, p. 243.

tains a deer, a fish, and an alligator. This is quite too large a load for one basket, and too much importance must not be attached to these plates, since they were drawn from memory, but they may be taken as an indication of what the kinds of food were. In the text, the writer states that they "ate freely of the flesh of the alligator, which is white and clean, and which we should have eaten often had it not been too redolent of musk."* This objection we have found from personal experience to be a valid one.

SPECIES OF ANIMALS FOUND IN THE SHELL-MOUNDS.	Lake Harney.	Watson's Landing.	Black Hammock.	Enterprise	Blue Spring.	M'd above Osceola.	Oldtown.	Horse Landing.
Deer, *Cervus Virginianus*,	*	*	*	*	*	*	*	*
Bear, *Ursus*,							*	
Raccoon, *Procyon lotor*,				*	*		*	
Opossum, *Didelphys*,		*		*				
Turkey, *Meleagris gallopavo*,						*	*	
Birds, not known,	*	*					*	*
Terrapin, *Emys Floridana*,	*	*	*	*	*	*	*	*
Soft-shelled Turtle, *Trionyx ferox*,	*	*	*	*		*		*
Species of Turtle not known,	*					*		
Alligator, *Alligator Mississippiensis*,	*	*	*	*		*	*	*
Catfish, *Pimelodus*,	*					*		
Gar-pike, *Lepidosteus*,	*			*		*	*	*
Fish, not known,	*			*				

That the animals of the shells which form the materials of the mounds were used as food, there seems to be no reasonable doubt. Unios are known to be edible, and, almost exclusively, form the shell-heaps on the borders of other rivers as the Ohio,† the Tennessee,‡ the Concord, etc.§ We are not aware of any evidence that Ampullarias and Paludinas have been so used elsewhere than in Florida, but their association with pottery, and charcoal, and the bones of edible animals, seems to be decisive. If the inference we have drawn be correct, then it follows that the animal food of the ancient inhabitants of Eastern Florida was very largely derived from these species, and especially the Paludinas, since

* Ibid., p. 5.

† Atwater, Archæologia Americana, Vol. I, p. 226.

‡ Brinton, Smithsonian Publications, 1866, p. 356.

§ J. Wyman, Proceedings of Boston Society of Natural History, Vol. XI, p. 243.

the remains of fish, turtles, alligators, and deer, form so insignificant a portion of the whole heap.

In view of the vast number and size of the shell-heaps now known to be scattered along the Atlantic coast,* and the vast quantities of shells which compose them, it is quite clear that the aborigines must have depended largely upon shell-fish for food. In fact such was obviously the case with the early inhabitants of the old world as well as new. Of the extent to which vegetable substances were made use of, the shell-heaps offer no evidence; but it seems certain, that until the bow and arrow, the trap or the net were invented, the animal food must have of necessity been derived from such species as could most easily be obtained, and among these the shell-fish and the more sluggish reptiles would first attract attention.

III. AGE.

No satisfactory data were found for determining the age of the shell-heaps. The appearance of great age which some of them have, as at Horse Landing and Old Enterprise, is important; the same may be said of the fact that the bones embedded in them had lost nearly all their organic matter, and at both of these places were incrusted with calcareous deposits, in some instances forming a conglomerate. The time required for these last results is not necessarily very great, but the organic matter of bone is destroyed very slowly, and is largely present in those of some of the extinct animals. We have obtained a larger quantity of animal matter from the bones of the Mastodon than from those of the deer at Old Enterprise.

The most trustworthy records are found in the forest trees growing upon the mounds. These give us a minimum age with some approach to accuracy. The live-oaks (*Quercus*

*Dr. Joseph Leidy, Proceedings of Academy of Natural Sciences, 1866, has described the shell-heaps at Cape Henlopen, and should have been cited in our communication in the NATURALIST for December, 1867, but at that time we had not seen it.

virens) are not only long-lived, attaining an age of many centuries, but their wood is the most durable of all the forest trees of the United States. One of these, which had fallen from the effects of age, lies upon the top of a mound in the woods near Blue Spring, and measures five feet and six inches in diameter. As it was on the summit of the mound, it could not have begun to grow until the mound was nearly or quite finished; it *may* have begun many years later. It had been dead for a long time; its bark, all of the small and most of the large branches had disappeared. These trees after they are dead still remain erect for many years. Some of them girdled more than thirty years since, can still be seen standing firmly in the Indian-old-fields. It certainly would not be extravagant to say that the tree in question had been dead more than half a century. Fragments of pottery were found in the earth and shells contained in the upturned roots of this tree, and on sinking a pit in the place formerly covered by the upright trunk, others were found at a depth of from two to three feet. We had neither the tools nor the aid for making a section of this trunk to count the number of annual rings. Through the kindness of Commodore John Rogers, of the United States Navy, we have received a section from a tree nearly a century and a quarter old, and find that at the beginning of the second century there are about fifteen rings to the inch. In later periods of the life of the tree they would of course be more numerous. Assuming fifteen to the inch as the average, a half diameter of thirty-three inches would give 495 rings, or nearly five hundred years; if to this we add fifty years for the time since the tree died, there can be no doubt that the mound was substantially as complete as now more than a century before the discovery of the country.

We know of no data based on the quantity of materials of which the mounds were formed, on which to estimate the time required to build them; to this end, it would be necessary to know the number of persons occupying the place,

and the daily or annual consumption of food. If, as is the case of mounds built up in the swamps, they were resorted to only by those who could find camping conveniences upon them, the number must necessarily have been very small.

The later aborigines had no traditions with regard to these shell-heaps, or the burial-mounds which are sometimes near them. They ascribed them to a former race. Florida, however, has been more than once overrun by exterior tribes, and the absence of traditions might in this way be accounted for, since these would be likely to be lost with the change of inhabitants. Under the most favorable circumstances traditions form an uncertain basis for history. If, therefore, on the one hand there is no proof of great antiquity, it may still be claimed that there is nothing inconsistent with it, and that the appearances of the mounds, and facts connected with them, largely favor it.

IV. ST. JOHNS BLUFF.

It was the special object of this paper to describe only fresh-water shell-heaps, but as we have visited two deposits consisting of marine species, chiefly oysters, we will add a few words with regard to them, especially the above-mentioned locality. The one at Fernandina, on the northerly end of Amelia Island, has already been described by Dr. Brinton,* who has given the most satisfactory proof of its human origin, and of other similar deposits on the Atlantic and Gulf coasts of Florida. The result of our own observations at Fernandina are confirmatory of what Dr. Brinton has recorded, and afford some additional evidence from the earthworks thrown up during the rebellion, and the mounds over the soldiers' graves in the rear of Old Fernandina, in making both of which, portions of the shell-heaps were uncovered, and the contents, similar to those previously noticed, exposed.

St. Johns Bluff has a twofold interest, for it was not only

* Floridian Peninsula, p. 177.

a favorite resort for the Indians, but was the scene of two of the most tragic events in the early history of the continent.* It is situated on the right bank of the river, and about five miles from the mouth. Like all the adjoining shores, it is composed of a fine yellowish silicious sand. It is about forty feet high on the front, and at the eastern end rises quite abruptly out of a marsh, and to the westward, *i. e.* up the river, descends at first by a rapid, then a gentle slope, which merges into a nearly level plain, backed by the thickly-wooded hills; beyond this is a marsh, which, still farther to the westward, is bordered by a creek.† The base of the bluff is washed by a swift current at every tide, so that it is constantly undermined, and is rapidly disappearing. Earth-works thrown up on top during the rebellion have already begun to fall. I was told by a man living near by that an oleander tree, which I saw lying at the water's edge to the westward of the bluff, a few years since was thirty feet from the shore in the middle of a garden.

At present the bluff itself must greatly differ from what it was when the French came, and it is highly probable that more of it has been destroyed than remains. The site of Fort Caroline has not been identified, and has probably disappeared. The bluff presents a front of clear sand, is overgrown with trees except where military works were thrown up, and beneath the vegetable mould, a few inches thick, is a layer of oyster shells, with a very slight admixture of sand, extending from two to three hundred feet along the more easterly portion, and varying in thickness from a few inches to three feet. A second and much thinner layer is seen to

* It was here that the French, under Jean Ribault, in 1564, built Fort Caroline with a view to establish a Huguenot colony, which in less than eighteen months Menendez, with the purpose of impeding the progress of Protestantism captured, put the garrison to the sword, and set up the inscription, "not as to Frenchmen, but as to Lutherans." Two years later Dominique de Gourgues avenged the atrocity, by retaking the fort, killing the captives, leaving behind attached to a tree another inscription, "not as to Spaniards or mariners, but as to traitors, robbers, and murderers." See Parkman, Pioneers of France in the New World. Boston, 1865, p. 157.

† Mr. Parkman's description of St. Johns Bluff, in the work already cited, is admirable for its portrayal of the general landscape as well as the individual details.

the westward, where the land rises only eight or ten feet above the water. It is not improbable that the two deposits were originally connected, the intervening portion having been washed away. Fragments of pottery which have fallen from the banks are scattered along the whole shore in front of these deposits, and on examining fresh sections made by the falling of the bluff, and also in making excavations in undisturbed portions, similar fragments were found in place, and so there can be no doubt that the shells and pottery were simultaneously deposited. After careful search no flint or other implements were found during my visit, either in the bluff itself or along the shore, neither were the bones of edible animals found mingled with the shells. Flint implements have, however, been obtained in considerable numbers, and an arrow-head was given me by a negro, who had picked it up near by. The various excavations for military purposes, revealed the existence of shells several hundred feet to the rear of the present front of the bluff, and beyond the creek to the westward of the marsh is a farm, where pottery and shells may be seen loosely scattered over a tract of many acres in extent, wherever the plough has turned up the soil.

The shell-mounds of the sea-coast, as well as of the interior, seem to have passed almost unnoticed by the early writers on Florida. Dr. Brinton quotes a single passage, the only one met with by him relating to the subject, from Cabeza de Vaca, in which it is stated that the houses of the Indians were "built of mats on heaps of oyster shells."*

ENUMERATION OF THE SHELL-HEAPS VISITED.

Besides those mentioned in the following list, there are many others not visited by the writer, some of which are said to be of even larger dimensions than any seen by him.

The localities are mentioned in the order in which they stand on the river, beginning with those nearest the sources.

1. Rattlesnake Hammock, on Salt Creek, right bank, and near the union of the creek and the St. Johns.

*Floridian Peninsula, p. 179.

2. Solee's Landing, right shore of Lake Harney.

3. King Phillip's-town, left bank of the St. Johns, a mile below the outlet of Lake Harney. There is a large burial-mound near this locality.

4. Another shell-heap, one mile below preceding.

5. Watson's Landing, right bank between Lakes Harney and Jessup.

6. A mound one mile above preceding, on the same side of the river.

7. Black Hammock, left bank, just above the outlet of Lake Jessup. There is a small burial-mound here.

8 & 9. Two mounds on the right bank and below the preceding, but separated from the river by a large lagoon.

10. Spear's Landing, about five miles above Lake Munroe, left bank. There is a burial-mound at this place.

11. Buzzard's Roost, left bank, near entrance to Lake Munroe.

12. Doctor's Island, right shore of Lake Munroe, above Enterprise.

13. Old Enterprise, right shore of Lake Munroe.

14. Outlet of Lake Munroe, right bank.

15. Wekiva, right bank.

16. Blue Spring, right bank.

17 & 18. Two mounds in the woods below Blue Spring, with a wide swamp between them and the river. A third but small mound was found about a half mile from them.

19. Mound above Hawkinsville, left bank formerly, and still ought to be called Osceola, or, as Dr. Brinton writes the name, Ass-se-he-ho-la, Rising Sun, after the celebrated chief who was prominent in the Florida War.

20. Mound below preceding, left bank, having the usual appearance of the other shell-heaps, but in which we failed to find signs of its artificial origin.

21. Old Town, left bank, seven miles below Hawkinsville.

22. Small mound in the woods in the rear of the preceding.

23. Mound above the outlet of Lake Dexter, left bank.

24. Mound below the outlet of Lake Dexter, right bank.

25. Fort Butler, left bank.

26. Volusia, right bank.

27. Rope's Island, right bank, entrance of Lake George.

28. Drayton's Island, now Rembrandt's Island, at the outlet of Lake George, left bank.

29. Horse Landing, right bank, eight miles above Palatka.

30. Palatka, left bank, one hundred miles from the mouth of the river.

31. St. John's Bluff, right bank, five miles from the mouth of the river.

32. Old and New Fernandina, at the northern end of Amelia Island.

Fig. 3.

Fig. 1.

Fig. 2.

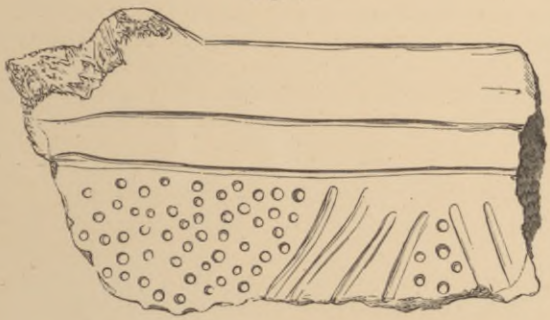

Fig. 5.

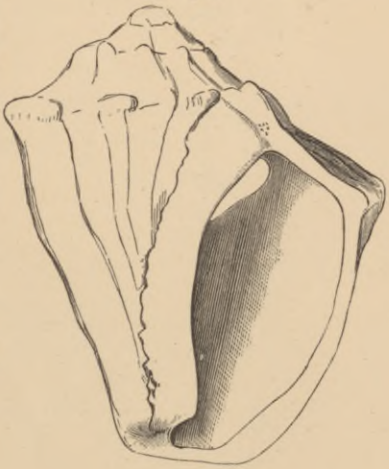

Fig. 12.

Fig. 6.

Fig. 11.

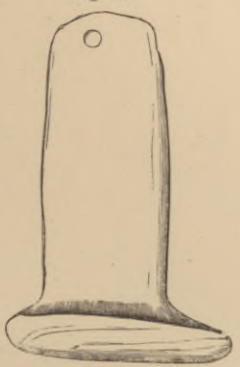

Fig. 10.

Fig. 4.

WYMAN ON THE SHELL-HEAPS OF FLORIDA.