NOTES ON THE COPPER OBJECTS FROM NORTH AND SOUTH AMERICA, CONTAINED IN THE COLLECTIONS OF THE PEABODY MUSEUM

By F W. Putnam, Curator of the Museum

Native copper is pretty widely distributed throughout North America and some portions of South America, either in place or as boulders in the drift, and it can hardly be questioned that it was early noticed in the neolithic period and made use of by the various tribes who lived in, or visited, the districts whence it was obtained. It is also probable that the metal was obtained through intertribal trade, and that objects made of it would be regarded as valuable possessions which in course of time would find their way, by barter and as plunder, to many distant tribes. Thus we find, to-day, in our explorations, objects made of copper, as widely distributed and under nearly as many and varied conditions as stone implements of neolithic forms. It must not, however, be understood from these remarks that all the peoples of America, both North and South, had reached one and the same stage in manufacturing from copper the various objects for which they found it adapted, for the contrary is the fact.

In North America, outside of Mexico, before the coming of Europeans, there is no evidence, as yet, that copper was used otherwise than as a substance which could be hammered and cut into many desired shapes. In Mexico, Central America, Peru and Chili, there is no doubt that copper was both cast and hammered, and by some nations was also mixed with tin or with gold and cast in moulds, but the difficulty of melting and casting unalloyed copper is far too great to be easily overcome, and the statements about the discovery, in the United States, of copper implements which were unquestionably cast in moulds should be regarded as hasty conclusions until we have other information on the subject than seems yet to have been obtained.

1 I have called attention to this point in a short article in the Kansas City Review for Dec., 1881, in which I question the discovery of cast copper implements and of the moulds said to have been found in Wisconsin. Since that article was written, the supposed discovery of the moulds has been shown to be without the slightest foundation.
As these notes are intended simply as a brief account of the objects made of copper, to be followed by descriptions of others made of bronze, gold and silver, by the natives of America, and contained in the Museum, they are thus necessarily limited, and of course many forms of ornaments and implements known to archaeologists will not be mentioned as they are not represented in the Museum.

**Copper from the Mounds and Indian Graves**

Ornaments and implements made of copper have been found in considerable number in burial mounds in many portions of the United States, both in connection with inhumation and cremation, and also in the stone-graves of Tennessee as well as in Indian graves of a comparatively recent period. They have also been found on the surface of ploughed fields, and have been accidentally discovered in various ways. So far as relates to the collection in the Museum the copper objects, principally from the mounds and graves, can be grouped under the following headings.

**Beads**

These may be classed as cylindrical, convex and spiral. The most common and simple are the little cylinders made of small flat and thin pieces of copper which have been rolled up, leaving one edge slightly overlapping the other, or, if made from a larger piece, the copper is sometimes rolled once or twice on itself, in this way making a thicker cylinder.

Such cylinders are in the Museum as follows —

No. 20180. This lot consists of about a dozen small copper cylinders which were found with the neck-bones of a child in one of the Stanley Mounds on the St Francis River, Ark., by the late Mr. Edwin Curtis during the explorations which he made for the Museum. They evidently formed part of a necklace containing.

Of fact, I may also add that several copper implements, which I have seen supposed to have been cast, were unquestionably hammered.

The following extract from so-called Virginia, written about 1632, to which my attention has been called by Mr. Curtis, is of interest in this connection: and for copper, the hills to the northwest have that stone as the people themselves remembered in the first chapter, called the Boocoaminakes, are said to put the valuable metal from the stone, without fire, hollowed out in abatement and bent it into plates, the like whereof is hardly found in any other part of the world" — Page 112 in the publications of the Hakluyt Society. London, 1849.
also shell beads, pieces of flat and ornamented shells, shell pendants and a circular piece of perforated bone. Forty-eight pieces belonging to this necklace were saved. Notwithstanding the copper cylinders are very much corroded and are very brittle, several of them are still on the string, which has been preserved by the action of the copper, and alternating with these are shell beads, showing that probably all the beads and ornaments found with the neck-bones, which are copper-stained, were strung together as a necklace, portions of which are shown in fig. 1

* Cut from the plastron of a small turtle, and shown in the left lower corner of fig. 1
No 20133 The two beads catalogued under this number were also found by Mr Curtis, with the neck-bones of a child, in another grave in the same mound with the last. In this instance, while the neck-bones are much stained by the copper, only the remains of two cylinders were found in contact with about a dozen large shell beads. The most perfect of the cylinders is about one and one-half inches in length and contains a fragment of the twisted cord upon which it was strung.

No 22008 Four copper cylinders found with a number of large shell beads near the neck-bones of a young person, in the Rose Mound, on the St Francis River, Ark. Near this skeleton were two earthen bowls and a shell "pin." The cylinders are about one and a fourth inches in length and about one-fourth of an inch in diameter, and are much corroded. Collected by Edwin Curtis.

No 20396 A copper cylinder of about the same size and character as the four last described and considerably corroded. This was found in a mound on the Spoon River, Peoria Co, Ill., by Mr W. H. Adams.

No 20102 One cylinder about three-fourths of an inch in length and two small cylindrical beads, one of which is about one-half of an inch in length and the other a quarter of an inch, were taken from a second mound on the Spoon River. Four chipped knives or daggers and a mass of red ocher were near the beads. Also collected and presented by Mr W. H. Adams.

No 18995 The remains of a small cylindrical bead of copper with the twisted fibre upon which it was strung. This bead was found at the bottom of the Parker Mound, near Elmore, Ill., by Mr W. H. Adams.

No 20306. Two cylinders similar to those already described, although one is made from an irregularly shaped piece of copper, so that when it was rolled up one end of the bead was made larger than the other. These were found in a mound near Fort Lincoln, Dakota Territory, and as the copper still has much of its natural color and is but very slightly corroded, it is probable that these beads are far more recent productions than those already mentioned from the mounds in Arkansas and Illinois. In the same mound were found fragments of cord-marked pottery, two flint scrapers and two flint arrowheads, with several charred corn cobs. There are several reasons for believing the mounds about Fort Lincoln to be comparatively recent, and the condition of these
copper beads seems to corroborate the conclusion Collected by 
Mi Geo W. Sweet.

No. 6171. This lot contains sixteen copper beads varying from 
less than one-fourth of an inch to three-fourths of an inch in length. 
They are all considerably corroded. Fragments of the string are 
still preserved in one or two of the beads, and the lot evidently 
formed a portion of a necklace of the child about whose cervical 
vertebrae they were found. In contact with the copper beads and 
evidently forming part of the same necklace were twelve incisor 
teeth of the moose (No 6170), each perforated at the end of 

![Fig 2]

Nos. 6170 and 6171. Copper Beads, and perforated Teeth of Moose, forming part of 
necklace of a child Mound on St. Clair River, Mich

the root. When found one of the copper beads was adhering to 
one of the teeth, and Mi. Gillman thinks the teeth and beads alter-
nated on the string, as shown in fig. 2. From a mound on the 
St. Clair River, Mich. Collected by Mi. Henry Gillman. For 
an account of this mound and its contents, see Sixth Report Pea-
body Museum, p 16.

No 4898 About fifty small cylinders, one-eighth of an inch in 
diameter and from one-fourth to one-half an inch in length 
Nearly ten inches of the string, made of vegetable fibre, is pre-
served, and about half of the beads still remain upon it. Many of this lot of beads are considerably corroded. An account of the mound on the Detroit River, Mich., in which these beads were found by Mr. Henry Gillman, is given in the Sixth Report of Peabody Museum, p. 12. It is of interest to note that among the stone implements and other objects found in this mound were a beautifully polished double-edged axe made of jadeite, a small vessel of pottery about the size of a thimble, two cord-marked jars, and the small abnormal human cranium to which reference has been made by several writers.

No. 4764. This lot consists of five pairs of small copper cylinders about one-eighth of an inch in diameter and about one inch in length. These cylinders seem to have been fastened side by side in pairs, as each pair is now firmly united by the change that has taken place on the surface of the copper. A number of shell beads were received with these and also a small piece of buckskin fringe, preserved by the action of the copper. From a mound at Ferry Point on the Marlborough estate, Strafford Co., Virginia. Collected by Mr. B. R. Alden Scott.

No. 12292. Two specimens, the most perfect of which is about an inch in length and one-fourth of an inch in diameter, from an ancient burial place near Highgate, Vt., collected and presented by the late Professor J. B. Perry. These beads are two of a number found in contact with the neck-bones of a child. The two vertebrae received with them are copper-stained.

No. 17342. Twenty-three small copper cylinders or beads, each about one-eighth of an inch in diameter, and together measuring four and a half inches in length. From an Indian grave at Revere, Mass. Collected by Mr. L. K. Washburn. In the same grave with these beads, which are but slightly corroded, were found a stone pipe, the bowl of which had been repaired by a band of brass wrapped about it, a small knife made of brass, two triangular arrowheads made of brass; and two circular ornaments also of brass; which prove that the burial was after European contact. No other objects were found in the grave and we have no account of the condition of the bones of the skeleton.

No. 12868. In the year 1868 Dr. Edward Palmer collected from an Indian grave at Harpswell, Me., portions of buckskin, and fringe of vegetable fibre, which he considered as the remains of an Indian belt. On the fragments of buckskin there are many green
colored impressions which show that the belt was ornamented by a number of copper beads or cylinders. With the fragments of the leather and string there are an irregular and flat piece of copper, about two inches long by one in width, much corroded, and broken along all but one edge, and three cylinders of copper, which although they are much corroded still contain the twisted vegetable fibre upon which they were strung. The largest and most perfect of these cylinders is nearly two and a half inches in length and about one-fourth of an inch in diameter. The others seem to have been about the same size originally, but are now broken, and all are so much corroded as to be very brittle. In this instance we have a good illustration of the preservative power of the salts of copper, as the vegetable fibre, the skin and even the hair upon it, are preserved by contact with the copper pieces, while the latter are nearly decayed by oxidation.

No. 26618. During the explorations of the Ancient Cemetery at Madisonville, Ohio, copper ornaments have been found with skeletons, in or just under the leaf-mould, and also with the many other interesting objects from the singular "ash-pits." By far the larger number of these ornaments are simple cylinders of copper, but with them have also been found a few copper pendants of simple shapes, such as are described farther on, and a singular cell-like object which has been figured in the report on the explorations by the Madisonville Society, Part II, p. 32. As is the case with most of these copper ornaments, this interesting object was found with the skeleton of a child, between one and two feet from the surface, at or near the bottom of the leaf-mould.

Among the articles of copper obtained by the Museum during these explorations, are a number of cylinders most of which evidently formed portions of necklaces.

Near the bottom of the leaf-mould, about eighteen inches from the surface, with the remains of a skeleton of a child, there were found portions of a necklace made, in part at least, of three large copper cylinders, a number of spiral wire beads and a cross-like pendant, as shown in fig. 3. The cervical vertebrae, the collar bones, and a portion of the under jaw were much discolored by the action of the copper which was very much corroded and brittle. Several of the spiral beads were in fragments and even the pendant was broken in two pieces. The three large cylinders still preserved, and shown in the figure, are each one and a fourth inches long by three-eighths.
of an inch in diameter. In one of them is a small mass of what
seems to be the remains of a strip of leather or buckskin upon
which the several things forming the necklace were probably strung, and on
the outside of one is a substance which may possibly be the
remains of a piece of bark. Collected by F. W. Putnam in
connection with the Madisonville Explo-
ations.
No. 26638. Ten feet from the skeleton last mentioned, another of these
cylinders was found in the leaf-mould,
eighteen inches from the surface.
In this instance it was not associated
with human bones. Collected by F. W.
Putnam.
No. 26611. In
the leaf-mould with
the skeleton of an-
other young child,
the bones of which
were so much de-
cayed that none
could be saved, were
found ten small cy-
linders, two bits of
wire, a small flat
piece of copper, and
a small copper pendant. These several objects are shown in fig. 4. These little cylinders are each one-eighth of an inch or less than that in diameter, and vary very much in length, as shown in the figure. The three smallest together measure not much over half an inch in length, while the largest of the lot is an inch long. The action of the copper has preserved the fine two-strand string of twisted fibre which still holds them together. Collected by F. W. Putnam.

No. 26612. The flat piece of copper found with the fragments of a necklace, referred to in the preceding paragraph and represented in fig. 4 (lower figure on the right), is evidently a piece from which a small cylinder, like those last mentioned, was to be made, and I have therefore classed it with the beads. It consists of a piece of native copper, hammered until it is about as thick as ordinary writing paper, and afterwards cut into its present shape, as shown by its slightly rough or undulating edges. It is three-fourths of an inch long and one-fourth of an inch wide. Collected by F. W. Putnam.

No. 26824. Two copper cylinders are in the collection, which were obtained from two of the "ash-pits" during the exploration of the ancient Cemetery at Madisonville, by Mr. M. Britten. Like nearly all the other things obtained from the ashes in the pits, these cylinders are better preserved than those found in the leaf-mould, although they have turned green. One is nearly two inches long and one-quarter of an inch in diameter, and shows by the laminations upon it that two pieces
of copper were pounded together in order to make the cylinder of its present length.

No 26798. This second specimen from the ash-pits is about one inch in length and slightly more than one-eighth of an inch in diameter. Its surface is smooth and there is a decided patina upon it, such as is noticed upon very old bronze.

No. 26637. During the explorations of the last day of my work at the Ancient Cemetery at Madisonville, the skeleton of a woman was found in the leaf-mould, with which was the skeleton of a child, two or three years of age at the time of its death. With these skeletons were found twenty-two copper cylinders varying from one to two and a quarter inches in length, and about one-quarter of an inch in diameter. These cylinders are considerably decomposed and are very brittle. With these were found portions of a large bead made of bone, and three charred kernels of corn. Four copper rings, described on page 96, were on the finger bones of the woman.

I regret that owing to a heavy rain at the time this skeleton was uncovered a thorough examination could not be made of the contents of the grave while in place. Collected by F. W. Putnam.

No. 8992 In the year 1876, the late Prof. E. B. Andrews, acting for the Museum, explored a number of mounds in southeastern Ohio, of which a full account is given in the Tenth Annual Report. During these explorations a number of articles made of copper were found, among them the lot of beads to which reference is now made. Professor Andrews states that the mound in which these beads were found was on the land of Mr. George Connett in Wolf Plain. It had long been ploughed over, and at the time of its exploration was about six feet high and forty in diameter. About five feet from the top, charcoal and ashes were found, in which were the remains of a partially burnt human skeleton and about it the copper beads were placed. Their distribution was such as to lead Prof. Andrews to conclude that they were not worn as ornaments at the time of death of the person buried, but were simply deposited in the grave as property. With these were found about fifty beads made of shell, and a singular copper implement described on page 108. It is important to note that no other objects were found in the mound. For further details in relation to this interesting exploration, and for an account of the manner in which the body seems to have been burnt, I must refer to Vol. II, p. 59, of Reports of the Museum.
Prof. Andrews states that many of the beads had so far decayed that they could not be saved, and those collected show the action of fire upon them. Several are slightly warped or unrolled by the heat which was not sufficient to melt the copper, although the human bones, and wood surrounding them, were in places reduced to ashes. It is probably due to the fire and ashes that so large a number of copper beads with the other copper objects were so well preserved. The shell beads also show that they were subjected to great heat. The four hundred and eighty-two copper beads found in the mound were made in the same manner as the cylinders, already described, but they were formed from rather thicker pieces of copper, most of which were carefully cut so as to give even edges, and the length of each bead is about equal to its diameter. While many of them were made by simply rolling the copper so that one edge slightly overlaps the other, others show that the copper was rolled twice upon itself as represented in the foreground of fig 5. Between these two extremes are many variations, but as a whole the beads are well made, and were probably hammered as they were rolled over a twig of hard wood. The largest in the lot is half an inch and the smallest is about one-quarter of an inch in length. They form a string ten feet and nine inches in length, and weigh one pound six ounces. Several in the lot have become firmly united by the corroding process, like the two shown on the right in fig 5, which now have the appearance of one large bead.

A second form of beads, upon which much more labor was bestowed, was made by rolling up a small strip of copper, as in the case of ordinary cylinders, but these strips were first hammered so as to produce a thin edge on each side of a thicker central portion. A convex strip of copper was thus made, and when rolled up, so that one end slightly overlapped the other, a bead was formed which had a greater outside diameter in its centre than at each end, while
the hole through the bead was of a uniform diameter throughout. Two lots of such beads are in the Museum from mounds in Ohio. No. 8945. In 1875 a mound about eighteen feet high, in Wolf Plain, Ohio, was partly removed in order to build a schoolhouse upon its site. About eight feet from the top of the mound and about fifteen feet from the outer edge on the northwestern side, the

FIG. 6.

earth was found to be extremely hard and dry. In this dry earth, which probably had never been wet since placed on the mound, a fragment of an article made of the prepared skin of deer or buffalo, four layers in thickness, and eight or ten inches in diameter, was found. Upon the surface of this skin were probably two or three hundred of the carefully made convex-beads, which were strung
upon thongs of buckskin. The impressions of the beads on the fragment secured for the Museum by Prof. Andrews show that they were arranged in a symmetrical pattern over the surface of the skin as shown in fig. 6. Six of the seven beads still with the fragment are strung on two strips of buckskin and are considerably corroded. Prof. Andrews thought the object might have been a portion of an ornamental dress, but from the fact that the article was made of four layers of the dressed skin and that there are traces on the under side of a coarsely woven fabric of vegetable fibre, it seems to me probable that the fragment may have once formed a portion of a leather shield, the outer surface of which was ornamented by the hundreds of once bright copper beads. For the fragment in the Museum, represented in fig 6, we are indebted to Mr. Peter Martin.\(^3\)

No 15671. Six beads of the same character as those found with the fragment of skin, were received in the Wm. Clogston collection, and are marked “From a mound near Newark, Ohio.” These are much corroded but show more care in their manufacture than those from the schoolhouse mound. They are represented in fig. 7. The smallest is about one-fourth of an inch in diameter, and one-eighth of an inch long.

The beads which come under the third group are formed by coiling a piece of copper wire upon itself, like a spiral wire-spring. The wire was evidently made by rolling and pounding small pieces of native copper into compact masses of small diameter and of varying lengths. All of the beads of this character which I have seen were found in the Ancient Cemetery at Madisonville, Ohio, and are mentioned in the account of the explorations by the Madisonville Society.

No 26619 With the copper cylinders mentioned under No. 26618 and forming part of the necklace represented in fig. 3, were thirteen of the spiral wire-beads and a few fragments of others. Six of them, as shown in the figure, are united into one corroded mass, the others are better preserved and show that they were

\(^3\)For further details of this mound, see Prof. Andrews’ account in Reports of Peabody Museum, Vol II, p 65.
formed as described on the preceding page. In a few the wire is coiled twice or thrice upon itself, but most are made of a single coil. The wire is about the size of a pencil lead and the beads are about three-eighths of an inch in diameter.

No. 26613. On page 90, attention has been called to a number of copper objects found with the skeleton of a child during the Madisonville explorations, all of which are represented in fig. 4. Two of the objects there shown are probably portions of wire beads. The comparatively long undulating piece of wire represented on the right of the figure was probably once coiled up as a bead, and the semicircular piece shown on the left is probably a portion of a large spiral bead.

FINGER RINGS.

Nos. 26633, 26634. On the finger bones of the woman buried with a child in the Ancient Cemetery at Madisonville, and referred to when describing the large lot of copper cylinders on page 92, were found four rings made of copper. These rings were on the first phalanges of the first and second fingers of each hand. The bones are colored green by the copper. The rings, two of which are shown in fig. 8, are made of bands of copper three-quarters of an inch wide and two and one-half to two and three-quarters inches in length, which have been rolled up lengthwise with one end slightly overlapping the other. The rings thus formed are each about three-fourths of an inch in diameter. The native copper of which they were made has, in places, changed to azurite and malachite. The fingers of the woman were evidently long and slender, and all the bones of the skeleton indicate a rather slight person of middle age.
It is worthy of note that although nearly a thousand skeletons have been discovered in this old cemetery this is the only one with which finger rings have been found. That the custom of wearing rings was not very common among prehistoric people of the United States, is evident from the fact that this is the only instance which has come under my observation, although I have personal knowledge of the contents of several thousand ancient graves.

**Bracelets**

Several copper bracelets very similar in shape to the plain pen-annular bronze bracelets found in the old world, have been obtained from the ancient graves and mounds in the United States. One is in the Museum from a mound in Kentucky.

No 1385. The bracelet under this number, shown in fig. 9, was received in 1868 through Prof. N. S. Shaler from Judge Apperson, who presented it with several other articles from a mound in Mount Sterling, Kentucky, which was removed about twenty-five years before. This mound was about twenty feet high and one hundred in diameter. Only a single skeleton was found in it, with which were several stone implements, a broken pipe, a large copper "breast-plate," and the bracelet here recorded, besides other things which unfortunately have been scattered without a record having been kept. The bracelet is very much corroded and

*Report of Peabody Museum, III.*
has a thick coating of green rust. It is oval in shape, but the two ends are an inch apart. The longest outside diameter is about three inches, and the transverse is two inches. The piece of copper from which it was made was hammered round. The central portion is three-eighths of an inch thick, while the ends are only one-fourth of an inch in diameter.

Pendants

Under this heading I include such small ornaments as seem to have been worn about the neck, in most instances probably forming parts of necklaces.

No 25614 The simplest pendant consists of a thin flat piece of copper rounded at the top and perforated for attachment by a string. This pendant formed part of the necklace found with the skeleton of a child, already referred to on page 91, in the Ancient Cemetery at Madisonville and is represented in fig 4. This little ornament is very much decayed and broken on the edges, but when perfect it was seven-eighths of an inch long, and five-eighths wide. From such simple pendants there is a natural transition to the cruciform ornaments of which there are three specimens in the Museum.

No. 11852 The "cross," of which fig 10 is a representation, I found in a stone-grave on the hill near Nashville, Tenn., on which Fort Zollicoffer was erected during the civil war. In the account of my explorations about Nashville in 1877, Annual Reports of the Museum, Vol ii, p. 307, I called attention to this ornament, which was found on the breast-bone of an adult skeleton. In the
same stone-grave, or cist, there were fragments of an earthen dish. On the surface of the copper, which is considerably corroded, there are traces of a finely woven fabric with which the ornament was in contact, and a minute fragment of string is still preserved just above the hole. The length of this pendant is five and one-fourth inches from edge to edge. In my remarks upon the origin of this form of ornament, I have stated that it seems to be a simple design to make and one of natural conception, and there seems to be no more reason for considering it a symbol of Christianity than the "cross" on the tablet of Palenque. The modifications of this design, in the two other specimens, here figured, which have been since found in widely-distant places, seem to confirm this view.

No 22171 In this pendant as will be noticed by a glance at fig 11, the "arms of the cross" are represented by simple notched projections from the piece of copper, the lower end of which is also notched. It is slightly over three inches in length and about three-fourths of an inch wide. One surface of this ornament is considerably corroded, and traces of what may possibly have been a woven fabric can be made out with a lens. It was found by Mr. Edwin Curtis in the Rose Mound, on St. Francis River, Arkansas.

No 26620 The third cruciform ornament in the Museum was found with the skeleton of a child in the Ancient Cemetery at Madisonville, with several copper beads already described under numbers 26618 and 26619, and there can be but little doubt that it was the pendant of a necklace. The form of this ornament can be best understood by reference to fig 3. It is about three inches long and one and one-half wide across the "arms." The copper has changed to a red oxide and has become very brittle. When found it was broken in two and bent and cracked across the lower portion.

*Since this page was put in type I have been informed by Miss Alice C. Fletcher, that the Shaw, in some of their ceremonies draw the figure of a cross, which signifies the four winds, and it may be that the cruciform ornaments originated in this way and may have a special signification.*
An ornament of a similar character, found with another skeleton in this ancient cemetery, has been figured in the Report of the explorations by the Madisonville Society, Part II, p. 34. In some respects this pendant is nearer in form to the one in the Museum from Arkansas. Dr. Joseph Jones has also figured a copper pendant, on which is a figure having the form of a cross, which was found with three others in a stone-grave in Tennessee.

**Breast Ornaments.**

There are several copper ornaments which I am inclined to class under this heading simply because some of them were found resting on the breast bones of skeletons, and because others seem to be better adapted to such use than for any other purpose. It is well known, too, that the custom of wearing ornaments of various kinds in this way is one of the most common and widespread among nations. Our present Indians are much given to hanging various objects about the neck and allowing them to rest upon the breast, and in many of the descriptions of the Indians by the early writers such ornaments are mentioned.

No 1580. The large copper "breast plate" catalogued under this number, and shown of one-half its diameter in outline in fig.
12, was found in the mound at Mount Stilring, Kentucky, already referred to when describing the bracelet (No. 1586) on a previous page, and was also presented by Judge R. Apperson. It is made of a large piece of native copper which was hammered until reduced to a nearly equal thickness of about a sixteenth of an inch. As there are no signs of overlapping along the edges it is hardly to be doubted that the concave edges and rounded corners, producing its symmetrical form, were cut after the copper had been reduced to its present thickness. Unfortunately its surface has been somewhat rubbed since it was found. The two holes in the centre of the plate were drilled from the side opposite to that shown in the figure, and looked at from that side there are signs of a very slight smoothing or wearing of the holes as if by use, but as such a heavy plate would probably be firmly attached to the scut by which it was suspended, we could hardly expect to be able to detect decided signs of wear, and the slightly polished appearance of the holes may be the result of recent handling. The holes are one-eighth of an inch in diameter and just one inch apart. The distance from the edge of each hole to the concave margin above and below varies very slightly from one and one-half inches, and the distance measured to the side margin nearest each hole is exactly two inches, while the distance from the centre of either of the holes to the extreme edge of the two rounded corners nearest the hole is just three and one-fourth inches. The greatest length of the plate is six and three-eighths inches and its greatest width is four and three-eighths inches. Allowing for a loss of one-sixteenth of an inch in the process of rounding each corner and excavating the edges, we should have a plate of just six and one-half by four and one-half inches before the edges were cut and rounded.

Stone tablets of similar outline to this one of copper and with one or two holes, have been described as ornaments or as implements, according to the special fancy of the writer, and it is very likely that objects closely allied in shape may have served for various purposes at different times or with different peoples.

No. 12029. During my explorations of the ancient enclosure at Lebanon, Tenn., of which a detailed account is given in the Eleventh Report of the Museum, I found, in two of the sixty stone-graves contained in the burial mound, portions of two copper ornaments which have proved to be very interesting in show-
ing the advance the people of this old town had made in the art of working copper. These ornaments were found on the breast bones of adult skeletons in the graves, as mentioned on pp. 343-4 of Vol II of the reports. The largest fragment obtained of one of these ornaments is shown in fig 13. The several fragments saved of this interesting copper ornament show that it was circular in shape and from four to five inches in diameter, and that it was made of three layers of very thin copper, hardly thicker than ordinary writing paper, which were held together by small copper rivets passing through square or oblong holes cut in the thin plates of copper. Two of these rivets are shown in the central portion of the figure with three others below them. The thin plates of copper, which are very brittle, have a distinctly corrugated surface which, while greatly increasing the general effect of the object as an ornament, must have added very much to the labor in making it. In the same grave were an earthen pot, and three small arrowheads beautifully chipped from a dark variety of chert.

No 12021. The fragments of this specimen are extremely brittle, but they show that it was an ornament of about the same size and character as the one last described. The corrugations, how-
ever, are in the form of a series of concentric circles which are so evenly made that it seems as if they must have been formed over a pattern, possibly made of a coiled twig, like the bottom of a basket, over which the thin sheet of copper was placed flat and then pressed into the crevices. Some such process as this would produce the alternating rounded and grooved portions on the surface of the ornament. As already stated, I obtained this ornament from the breast bones of a skeleton in the same burial mound with the one last described, but it was in the lowest tier of graves and one of the oldest in the mound. The clavicles, sternum and upper ribs of the skeleton are colored green by contact with the copper. In the same grave were two vessels of pottery.

Dress Ornaments.

Among the copper ornaments in the Museum there are several thin and flat pieces which have two or more small holes, as if for fastening to some other object, presumably some portion of a garment, head-dress, or a belt. These I bring together under this heading.

No. 15914. This specimen is simply a thin sheet of copper about four by four and one-half inches, which has been slightly folded over some object so that it is not quite flat, and the central portion has rather indistinctly outlined upon it a lozenge shaped figure, as if caused by pressure from the under or concave surface. Near the centre of the piece there are two small round holes about a quarter of an inch apart, and half an inch from them on one side are two others. By passing threads through these four holes the piece of copper could be firmly secured to any other object. Two opposite edges are still straight and but little decayed, but the other two are much broken and ragged, from decay of the metal, which has become brittle by oxidation. This simple ornament was probably hammered out of a sheet of native copper. It was found by the late Mr. Edwin Curtis while continuing the explorations at Old Town, Tennessee, under my direction, in 1878. The mound from which this was obtained was of the same character as those I have described in the second volume of Reports of the Museum, p. 311, as made up of stone-graves placed in several tiers. The mound at Old Town, which was on Mr. Gray's land, was sixty by eighty feet in diameter and contained about one hundred and fifty
graves arranged in four tiers. Over fifty other stone-graves were also opened in the immediate vicinity of the mound. The copper ornament was found in grave No. 120, in which the bones of the skeleton were so much decayed that none were saved, and no other things were in the grave.

No. 15947. The specimen under this number is only a small portion, about one inch by half of an inch in size, of a band of thin copper, in which is one of the holes by which it was secured to some object. It was found in grave No. 107 of the mound on Mr. Gray's farm at Old Town, and within were three stone implements, several shell beads, the teeth of a comb made of bone, and pieces of mead.

No. 17280. On the farm of Mr. Rutherford in Sumner Co., Tenn., there was a collection of about one hundred stone-graves within a circular enclosure of earth, and about twenty more were found just outside the embankment. These graves were all opened by Mr. Curtis and in three of them copper objects were found. Grave No. 63, within the enclosure, contained two skeletons and with these were about twenty small and much decayed fragments of what seem to be the remains of a thin copper band. No other object was found in this grave.

No. 21454. From one of the graves in the Fortune Mound on the St. Francis River, Arkansas, Mr. Curtis obtained a pottery dish, on the edge of which, and forming a handle, was represented the head of a bird, also a small pot colored red, and three fragments of a small copper band about three-quarters of an inch in width and probably when perfect about two inches long. These fragments are thin and brittle but in one of the holes in one fragment, partly covered with a deposit of the copper, is a minute bunch of twisted vegetable fibers. Both of the other fragments are perforated, one in two places, and the other in one. One of the fragments shows that it was made of two layers of thin copper.

No. 21594. In a grave three feet from the surface of a burial mound on Mr. Halcomb's land on the St. Francis River, Ark., Mr. Curtis found the anterior portion of the skull of an adult person, across the frontal bone of which was a band of thin copper about one inch wide and three inches long, with two small holes at each end by which it was probably fastened to some kind of a head-dress or fillet. The place on the skull where the copper was lying is colored green, and there can be no doubt in this instance of the
use to which such bands were sometimes put. In the same grave was a perfect vessel of pottery.

No. 11017. Among the interesting results obtained by the late Professor E. B. Andrews during his explorations of mounds in Ohio, for the Museum, were those in connection with the "large mound" on Mt. Woodhull Connett's farm in Dover, Athens Co., a full account of which is given in Vol. II, p. 71, of the Museum Reports. This mound was eighteen feet high and eighty-five feet in diameter. It contained two deposits of burnt human bones, in the lower of which, and at the very bottom of the mound, were found two copper ornaments which had been burnt, evidently at the time the body was cremated, and were collected with the burnt bones over which the mound had been erected. One of the ornaments is a thin and much decayed band of copper about three inches long and one and one-half in width, with serrated edges and two perforations. The illustration given in Professor Andrews' report is here reproduced as fig. 14.

No. 11016. The figure of the other copper ornament found with the burnt bones and referred to in the last paragraphs reproduced here as fig. 15. This consists of a copper band folded upon itself, which was probably fastened through the four holes at the corners. It is slightly more than one inch in width and about the
same in its longest diameter at the end where the corners meet. Professor Andrews has suggested that it might have been an ornament fastened to the hair. A tube about six inches long and finely

![Fig 16, a](image1)

![Fig 16, b](image2)

No. 18313, a and b opposite surfaces, Copper Band From Mound, Franklin, Tenn.

made of oolitic limestone was also found with the burnt bones and these two copper ornaments.

No. 18313. In 1879, Mr. Curtis opened a mound on the farm of Mr. F. S. Glass, in Franklin, Tenn, which was twenty-one feet
high and of a similar character to the one just referred to in
Ohio, inasmuch as the deposit of human bones found in it
were the remains of a body which had been cremated, and this
mound was also remarkable for the several copper objects which
it contained. Eight feet from the top of the mound were the
burnt human bones, principally fragments of the cranium, with
which were found the spool-shaped objects (18310) described
further on, and two small shell beads. Near the bottom of the
mound, in the centre, was a large piece of mica, and six inches
under the mica, in a bed of ashes, were the copper axe described
under No 18314, and the copper band represented of full size
by the two views in fig. 16. Just under the ashes, at the very
bottom of the mound, was a small cavity covered by a stone,
in which was a small amount of red oxide of iron and a large
piece of mica. At various depths in the mound, there were found
a bone implement, a large crystal of galena, a piece of burnt
limestone, a small mass of burnt clay, and a number of animal
bones which were not burnt.

The copper band is four and one-half inches long and a little
over one and a half inches wide. It is very brittle and at both
ends on the grooved side the copper has turned to a green carbonate
and is considerably decomposed. This band was probably made
from thin sheets of native copper which were pounded together,
and in some places two layers of copper can be traced by the
laminations, although its thickness is not more than double that
of good letter paper. The sheet of copper thus prepared was
a square of four and one-half inches. Two deep grooves were
then made parallel to each other, and extending the whole length
of the piece, leaving a central raised portion about a quarter of an
inch wide, between them as seen in fig. 16, b.

The band seems then to have been folded over a piece of wood
half an inch in thickness, to which it was secured, as indicated by
four holes at the corners where the band overlaps, on the surface
opposite the grooves, as shown in fig. 16, a. Portions of the wood
are still preserved within the band.

Of course it is impossible to determine the exact use to which
such an object as this was put, but it seems probable that it was
an ornament of some kind, and it is not unlikely that it was at-
tached to a belt or some other part of the dress of the owner.
No 8993. On page 92 reference has been made to the exploration of a mound on M. George Connell's land on Wolf Plain, Ohio, by Prof. Andrews in which were found, in connection with human remains, a large number of copper beads, described under No 8992.

In the ashes near the middle of the human skeleton, Prof. Andrews found the copper tube described by him on page 61, Vol. II, of Reports of the Museum. As the reduced figure given on that page is not quite correct it is here represented of full size as figure 17. Prof. Andrews thought that this tube was made by first cutting the flat sheet of copper, which is about a sixteenth of an inch thick, so as to leave it much wider at the flattened end, but it seems to me more probable that the copper sheet was of about equal width throughout, and that it was simply rolled upon itself until one edge overlapped. The overlapping edge was closely united to the other by hammering over a piece of hard wood placed in the tube. One end of the tube was then flattened and widened by hammering, the central portion being kept open, and the end
turned over, thus closing the tube at one end, but through the copper at this end a hole about one-eighth of an inch in diameter was cut, or punched, a little to one side of the centre. The tube so formed is very evenly and symmetrically made, and is five and a half inches long. It is three-quarters of an inch in diameter in the circular portion and two inches wide at the flattened end. The copper is much oxidized and in places has changed to a green carbonate.

We do not know the purpose for which stone and copper tubes, of the general shape of the one here figured, were made. They were probably ornaments, but as their shape closely resembles that of the tubular smoking pipes, we must not overlook the possibility of their being pipes. Although the form of the tube here described may seem inconvenient for a pipe, yet if it were fitted with a mouth-piece of wood or bone, it would be as well adapted for smoking as the conical tubes of stone found in California graves, which are unquestionably pipes.

**Spool-shaped Ornaments**

Among the copper objects found in the mounds from time to time, exhibiting careful and painstaking work, are the several ornaments which, for want of a better name, have been designated “spool-shaped.” The use made of objects of this character has not yet been determined. Were they from Mexico or Peru they could with reason be considered as ear ornaments, similar to the large disks represented in the ears of men in the ancient terra-cotta figures from both these countries. While they resemble such objects, however, it is hardly probable that they were so used, for in the human figures in terra-cotta which I have seen from the mounds and stone-graves in the United States the ears are represented as pierced with small holes for the suspension of objects, and not one shows anything placed in the lobe of the ear, so common in the terra-cotta from Mexico and Peru. They could have been fastened to the ears, however, as pendants, and both specimens before me have a mass of fibre wound about the central axis, over which are the remains of buckskin strings, one of which still shows a loop as if to suspend the ornament, but this will not warrant their classification as earings until other facts indicating their use as such are obtained, and it will be best for the present
to continue to call them "spool-shaped" ornaments, as Dr. Rau has designated the one he has figured in the account of the collection of the National Museum.

No 18310 The two ornaments recorded under this number were found by Mr. Curtis in the mound on the farm of Mr. F. S. Glass, in Franklin, Tenn., of which a brief account has been given on pp. 106 and 107. They were discovered about eight feet from the surface of the mound, near some burnt human bones, principally consisting of small fragments of a cranium.

These objects exhibit a degree of skill in working copper into symmetrical forms which goes far to prove the advance that some American tribes had made in the ornamental arts. The method of their manufacture seems to have been nearly as follows:

A circular piece of copper was hammered over a wooden pattern, until the metal was shaped into the concavo-convex form shown in fig. 18, a, outer surface, and 18, b, inner surface (natural size). Two such circular pieces formed the upper and under portions of the ornament and were held in place by being closely fitted and slightly folded over two similarly shaped but smaller pieces. These two inner pieces were held together by passing a cylinder of copper through holes punched in
their centres, the ends of which were clinched before the outer pieces were put on. As a further means of securing all the parts firmly together a small and thin cylinder of copper, closely fitting the margins of the holes in the upper and lower pieces, was passed through the connecting cylinder, and forced apart a little at each end so as to hold firmly the outside pieces like a hollow rivet. Around the central axis of each specimen a fine vegetable fibre has been closely wound, increasing the diameter of the axis to about five-eighths of an inch and around this, in both instances, a piece of prepared skin has been wound and tied, as shown in fig 19, which represents the smaller of the two specimens of natural size. In this specimen the buckskin thong ends in a loop as if for suspension of the object. The copper of which these ornaments were made is now very brittle and has turned into a green carbonate. The fibre and skin about the central axis have been preserved by the action of the copper upon them.

Copper-sheathed Ornaments

The great value of copper in ancient times in North America is apparent from its being so extensively employed for ornaments, but of all its adaptations for ornamental purposes, there are none which show better that the soft and malleable nature of the metal was understood than the copper-covered wooden objects of various shapes which have been found in the mounds and stone-graves. The copper with which these wooden objects were sheathed was hammered into very thin sheets and folded closely over the wood.
In every instance that has come under my observation the alteration of the thin plates of native copper to the green carbonate of copper is complete, and although the metal has become very brittle, and has in some instances nearly disappeared by oxidation, its penetration of the wood has been generally sufficient to preserve the form of the object. Great care is necessary, however, when taking such ornaments from the graves and in handling them afterwards.

These ornaments are not only interesting from the manner in which the copper was used, but equally so in furnishing the evidence that wood was carved, and from the few wooden things thus fortunately preserved we certainly have the right to draw the inference that wood was probably largely used for other purposes, as it is more than probable that a people who could cut and carve wood into shapes such as these would also make use of it in many other ways. Although the specimens of these copper-sheathed ornaments could be grouped as beads, earrings, and button-like ornaments, I have thought it best to bring them together for the purposes of description under one heading.

No 14119 There can be but little doubt from their character, and from the positions in which they were found, that the two remarkable objects recorded under this number were attached to the ears of the person whose skeleton they were found, one on each side of the skull. The stone-grave from which they were taken was one of a number in a mound which was situated on the bluff of the Big Harpeth River, two miles above Bell's Iron Works, and was opened in 1878 by the late Mr. Edwin Curtis, while continuing the explorations in Tennessee under my direction. Their shape will be better understood by a glance at figs. 20 and 21. They are made of wood which, after being carefully
shaped and smoothed, was split lengthwise for the purpose of making a symmetrical and smooth oval cavity, as shown in fig 21, a, and 21, b. In this cavity small pebbles of quartz were placed, as represented in fig 21, b, which would give a slight jingling sound as the head of the wearer was moved about. The two pieces were then put together and held in place by a covering of very thin plates of copper, which were firmly united by pounding and rubbing until an even and smooth surface was secured. Through the upper end a hole was made by which the pendant was fastened to the ear. The copper covering has become detached in places and on some portions has nearly disappeared by oxidation, leaving a green stain on the wood. The shape, symmetry, and skill displayed in these ear-pendants.
are evidence of thoughtful design and careful and laborious execution. They are, also, so far as I can recall, the only ancient ornaments found in the United States which can be classed, almost beyond question, as earrings, using that term for all ornaments in any way fastened to the ear. I have already called attention to the custom of perforating the ears as shown in the ancient pottery from the mounds, and I may add that a fine large jar in the Museum, which was found in a mound in Arkansas, represents a human head with the rim and lobe of the ear perforated in six places as if for the purpose of attaching many ornaments.

These ear-pendants are each three and a half inches long by one and a quarter wide, and not quite an inch in thickness through the central portion. Not over an eighth of an inch in thickness is left in that part of the wood hollowed for the reception of the pebbles. Each pendant is curved at the small end which gives a finish to the ornament not shown in the illustrations.

No. 22132. In the same mound on the Rose plantation on the St. Francis river, Arkansas, in which the cruciform pendant No. 22131 was found, Mr. Curtis obtained, four feet from the top of the mound, the copper-covered object catalogued under this number. It was not found associated with the bones of a skeleton, but on a mass of ashes in a place where the clay comprising the mound had been burnt red. Several such five places were found in the mound. In shape this is identical with several of the large ear ornaments represented upon pottery figures from Central America and Peru, and had it been found in either of those countries I should have little hesitation in considering it an ear ornament, but, as already stated, I do not know of any facts to show that such ornaments were worn in the ears of the people who made the mounds in our western and southern states. It must therefore remain for the present in the group of ornaments about which we hope for more information. It is made of a cylindrical piece of wood which in its present dry and shrunken condition is about half an inch in diameter at the smallest end, and nearly an inch measured at the rim of the rounded or convex portion, as shown in fig. 22.
22 Over this wood three pieces of thin sheet-copper have been wrapped. One piece covered the convex portion with its edges folded down over the rim of wood. The second piece was about an inch and a quarter wide and was rolled about the smaller portion extending from the rim to the opposite end. The third piece covered the small end. The wood was thus completely enclosed by copper, but the metal has changed to a green carbonate and in some places has disappeared, leaving a green stain on the wood. About the part close to the rim a string had been wound, as shown by the minute portions of copper-charged vegetable fibres which are faintly indicated in the illustration.

No 21520. A thin piece of wood, preserved by the action of copper upon it, was found by Mr. Curtis in a mound on Mr. Fortune's place in Cross Co., Arkansas, in connection with a human skeleton and a spoon carved from the shell of a Unio. As this bit of wood seems to be a portion of a circular disk, it is very likely the remains of one of the button-like objects such as are mentioned further on from the stone graves in Tennessee.

No 11564. A thin piece of copper, about one inch in length and half an inch in width, which seems once to have been part of the covering of a convex surface, was found in a grave near Gibson's Station, Virginia, in 1876, by Mr. C. B. Johnson, who presented it to the Museum.

No 18479. In 1879 Mr. Curtis opened about seventy stone-graves on the farm of Miss Williams in Dover, Tenn., from which many things of interest were obtained. In grave No. 8 of this lot, two circular pieces of wood, about an inch and a half in diameter and an eighth of an inch in thickness, were found with the human bones. One of these is shown in Fig. 23. These disks are covered with thin copper on one surface only, the edges of which were folded over the wood. It may be that the two disks, which are of the same size, were fastened together by something passing
through the hole in the centre of each, but as the surface opposite to the one having the copper upon it, in both instances, is stained with a red pigment, as if they were once painted, it is as probable that each disk formed a separate ornament.

No. 18467. In grave No. 57 of the lot opened on Mrs. Williams' farm, mentioned on the preceding page, Mr. Curtis found a piece of copper-stained wood, which seems to be a segment of a disk which was two inches in diameter, and a quarter of an inch in thickness. On one edge of the fragment two small bits of copper still remain, showing that the wood was probably covered with the metal. In the same grave were fifteen beads made of shell, and a piece of white quartz.

No. 17248. In the fourteenth grave of the lot of about one hundred inside the earthwork on Mr. Rutherford's farm, in Sumner Co., Tenn., of which mention has been made on p. 104, were found a shell bead, two vessels of pottery—one of which was a jar, the upper part representing the head of an owl—and the stud-like ornament recorded under this number Fig. 24 represents the object as seen in profile, but the broken edges of the wood, and the crumbling copper-covering of the upper part make it difficult to represent it in a satisfactory way without exaggerating by giving smoother lines than now exist. The upper portion of this stud-shaped piece of wood is circular and regularly convex, and is covered with a very thin piece of copper which is folded over the upper edge made by the groove separating the upper from the lower half of the stud. The lower portion of the wood, not having been covered with copper, is somewhat decayed and irregular, but it evidently was once a thin circular base. It is about three quarters of an inch in diameter and one quarter of an inch in thickness. A hole about the size of a pencil-lead passes through the centre from top to bottom.

No. 18414. On the Perkins farm on the Cumberland River, about one hundred miles below Nashville, Mr. Curtis explored a small burial mound containing about forty stone-graves, at-

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*On page 41 of his "Explorations of the Aboriginal Remains of Tennessee." Smithsonian Contributions, 1870. Professor Jones mentions copper-covered objects of wood which he found in stone graves near Nashville.*
ranged as already described on p 103. In one of these graves he found two spherical beads cut from wood, one of which is represented of natural size in fig 25. These wooden beads were once sheathed with thin copper, as shown by the minute fragments of green carbonate of copper still remaining upon them, and the green stain over the wood. The beads are carefully made, and are fine specimens of wood cutting. The hole passes lengthwise through the bead, and is three-sixteenths of an inch in diameter.

No 11837. In the fall of 1877 I explored a large mound on the estate of the Love family near Nashville, Tenn., of which a short account is given on page 357 of the second volume of Reports of the Museum. Near this mound there were formerly many stone-graves. This old cemetery had long been ploughed over and fragments of human bones and pottery were scattered over the field. There was one grave, however, that had not been disturbed. On examination of this grave I found the skeleton nearly decayed, but close to the remains of one of the temporal bones there was a small circular mass of green carbonate of copper, which seemed to be the remains of a copper-covered wooden bead or spherical ornament about three-quarters of an inch in length.

No 17264. An ornament of great interest, and the only one of the character of which I have knowledge, was found by Mr. Edwin Curtis in the thirty-third stone-grave which he opened inside of the earthwork on Mr. Rutherford's farm in Sumner Co., Tenn.
Reference has already been made to this burial-place when describing the objects under Nos 17248 and 17280. In the same grave with this ornament were the shell of a Busycyon, several shell-beads, a small stone-disk, a crystal of quartz and one of galena, several small stones, fragments of shells, and broken bones of animals.

Fig. 26 represents the outer surface of the ornament of full size. The under portion, or base, is made of a disk of wood, one and three-quarters inches in diameter and one-eighth of an inch thick, from which there rises a central boss about an eighth of an inch. The upper surface of the wood is covered by a thin sheet of copper folded over the edge of the wood into a groove. Through the centre of the boss is a small hole. Over this copper-covered surface was placed a circular piece of buffalo horn, nearly two and a half inches in diameter, and not over a sixteenth of an inch thick. The central portion of this disk of horn has been evenly cut out, leaving a hole seven-eighths of an inch in diameter, through which rises the copper-covered boss of the wooden disk. The copper on the wood is now much decayed and turned to a green carbonate, and the horn has become dingy and stained, but when placed in the grave this object was probably one of considerable beauty as well as of complicated design, and is another instance of the skill and labor bestowed on personal ornaments by the people who buried their dead in the stone-graves of Tennessee. The broken edge of one portion of the disk of horn is probably the place where two holes were made for suspending the object, and as a few fragments of horn were found with it, which seem to have been detached from this portion, there may have been a slight projection of horn at that part of the disk. The under surface of the wood is rough, and it is probable that it was fastened to some material which has since decayed.

**Implements**

Under this heading I record the few copper implements in the Museum from North America, without the limits of Mexico. Beyond question they are all made from masses of native copper, simply by hammering, as shown by the lamination, or by the irregularities of the surface so characteristic of small masses of the native metal. It is probably in part the irregular and granulated surface
of the native copper, and in part the oxidation of the metal, that has led to the inference that some of the copper axes were cast. Mr. E. G. Squier, on page 78 of his excellent memoir on the Aboriginal Monuments of the State of New York, published in the Smithsonian Contributions, Vol. II, 1850, has given a figure of a copper axe ploughed up in Cayuga county, N. Y., of which he says "from the granulations of the surface, it appears to have been cast in sand," and argues that it was either obtained from Mexico or Peru, or made by some Indian artisan after intercourse with the whites had instructed him in the art of working metals. A careful study of all the copper implements I have seen, in many collections in the country, has convinced me that what Mr. Squier has considered as evidence of casting in the specimen he describes is the natural surface of the copper, from the reasons stated above. A very interesting copper axe in the State Geological Museum of Indiana is of particular value in showing the primitive way of treating copper, as this specimen was evidently made from a mass of native copper, which, while it was finished with an edge by hammering and rubbing, has a groove around the central portion, apparently made by pecking in the same way that the grooves about many of the stone axes were formed. Some writers have suggested that many of the copper axes were made by placing a mass of native copper in a form or mould cut in stone, and then hammering the metal until it assumed the shape of the mould. This, however, implies a far greater labor than is necessary to accomplish an end which could as well be reached by simply hammering the mass into shape on any flat stone, and until we find at least two specimens of exactly the same size and shape, bearing evidence of being produced in that way, it is not necessary to look beyond the most simple means for the formation of all the implements of copper that I have seen.

No. 15398. This copper axe was received in a collection made by Mr. W. C. Clogston, and the only information we have regarding it is that it was found in Lewiston, Maine. I own of three.

*Since this was put in type I have learned from Mr. Chris Ran a pamphlet containing a reprint of his papers with a number of notes in the preface. In one of these notes Dr. Ran states that he saw the axe in question several years since, and that a portion of it had been cut off by an expert for examination, which had proved it to be made from native copper, simply by hammering.*
other similar copper axes found in New England, and there is no reason to doubt that this was obtained from Maine. It very closely resembles the axe found in Cayuga county, N. Y., to which I have referred above as described by Mr. Squire. It is three and a quarter inches long by two and a quarter in width across the edge and a quarter of an inch in thickness in the middle. Fig 27 represents the implement of full size and shows its irregular outline. In producing the edge the hammering was more on one side than the other, and either the maker was satisfied with a very blunt edge or else it has been dulled by use. The signs of hammering are distinctly traceable in the lateral expansion of the blade, and in the foldings along the edges of the two broad surfaces. The end opposite to the cutting edge is wedge-shaped, and slightly grooved, as shown in the figure. The whole surface is very much corroded and, except where it seems to have been recently rubbed off in cleaning the
specimen, is covered by a green carbonate. The original irregularities of the mass of native copper, from which it was made, though reduced by hammering and oxidation, are in places distinctly traceable. Judging from its shape, this little axe was probably fixed to a wooden handle by passing it through a slit in the wood and then lashing it into place.

No 18314 A small copper axe, of much better finish than the last, was found by Mr. Curtis in the mound on the farm of Mr.

Glass in Franklin, Tennessee, to which reference has already been made on pages 106, 107, 110. This specimen is represented of its full size in fig 28. It is a quarter of an inch thick in its central part and about half as thick at its flat end or head, which distinctly shows where the ragged edge of the mass of copper from which it was hammered out was turned over and hammered down as represented in the figure. The edge is two and a quarter inches wide, well formed, and finished by hammering equally on both sides. Its length is two and three quarters inches. On both broad surfaces distinct laminations of the copper can be traced.
although the places where they occur have been very much hammered so as to connect the laminations firmly with the rest of the mass. The front and back edges are smooth and flat. There is a slight battering of the cutting edge as if from use, and over the whole surface of the implement, which was made very smooth by hammering, the metal has changed slightly to a green carbonate.

No. 2949. The long slender copper axe catalogued under this number could as well be called a chisel, were it not that the cutting edge has been expanded laterally by hammering, in the same way as in the two small blades previously described, and from the resemblance it has to them except in its length. Fig 29 represents the implement of one-quarter size, or of one-half its length and width. The measurements are: length, seven and three-quarters inches, width at the blunt end, one and a half inches, in the middle, one and three-quarters, and across the cutting edge a little more than two and a quarter inches. Its greatest thickness in the central portion is a little less than a quarter of an inch, and at the blunt end is slightly less. It is very roughly made, evidently from an irregularly shaped sheet or rather thin mass of native copper which has been folded over and hammered together, leaving the laminations and the line of union where one portion of the copper was folded upon another distinctly defined, as shown in the figure. The cutting edge was made by pounding on both sides of the blade and is slightly expanded by this process. One corner has been broken off and is battered as if by use.

The surface of the copper appears to have been partially protected, as in places it remains smooth and is of the natural red-copper color, while other parts are changed by oxidation and the surface has turned to a green carbonate. Over about one-half of the flat surface, opposite to that shown in the figure,
there are many very fine lines in relief which, under a powerful lens, have the appearance of delicate feathers, and it may well be that the implement was enclosed in wrappings of which the skin of a bird made a part, in a similar manner to some of the copper axes found in Illinois, described and figured by Dr. Farquaharson, which were wrapped in cloth. This rude but interesting implement was found by the Rev. E. O. Dunning in 1871, while making explorations for the Museum in eastern Tennessee, of which an account is given in the Fifth Annual Report, page 11. The mound in which this axe was found is known as the "Lack Creek Mound." It is situated about fifty yards from the Creek, near its junction with the Nolachecky River. It was originally about thirty feet high and seventy-five feet in diameter. The remains of about sixty skeletons were found in the mound and with them a large collection of objects of various kinds, including pottery, pipes, carved shells, a great quantity of shell beads and many stone implements, of which an account is given in the report referred to. In the centre of the mound the remains of two chambers, or tombs, apparently made of cedur logs, were found, one above the other a few feet apart, and in each were the remains of a single skeleton. With one of the skeletons the copper axe was found with a number of other articles. It is unfortunate that the exact position and the association of the many objects are not indicated in the account of this mound, from which so many interesting things were obtained.

No. 26182 During the present year the Abbott Collection in the Museum has received many interesting additions and among them are two copper spearheads which were found by Mr. F. DeCou in a field near Dr. Abbott's house. These are the last copper implements found in the vicinity, although thousands of stone implements have been collected in the same and adjoining fields, the relics from which have become so well known through the researches and writings of Dr. Abbott, and the collection he has made for the Museum.

In their general shape and in having notched tangs, these spearheads closely resemble one in the State Historical Society of Wisconsin, figured by Dr. Emil Schmidt, Plate iv, fig. 11, but the Wisconsin specimen has the point serrated while in those from New Jersey the edges are smooth. Fig. 30 represents one of the spears of full size, and it will be noticed that it resembles many of the large, leaf-shaped points chipped from chert and jasper which
have been found in various parts of the United States. This specimen was dug up while cultivating the field. It was made from a mass of native copper, hammered into shape, as shown by several small laminations which can be distinctly traced notwithstanding the surface was pounded quite smooth and flat. The edge was afterwards sharpened all around, including the base of the tang, by rubbing on a stone. The two deep notches on each side defining the tang, and indicating that this point was fastened to a shaft by lashings, were evidently cut after the edge had been sharpened. On the surface of the left lower portion, there is a slight ridge which was probably formed by the rolling up and breaking off of a small thin layer of copper. The base on the right has at some time been torn by a blow which has caused a fracture extending nearly to the end of the lowest notch on that side and almost detaching the piece. On a line with this fracture there is a slight indention which leads me to think the fracture was caused by a plough, although this portion is as much changed as the rest by oxidation. The notch near the point is probably due to a natural fold in the copper which broke out in hammering. The original native copper has become partly changed to the green carbonate and red oxide, and over the surface are many little granulations, as if grains of sand had become fastened to the metal by the oxidation of the copper. The specimen is three and seven-eighths inches long, and one-eighth of an inch in thickness except where the edge has been rubbed down.

No 26480 The second spearpoint received from Dr Abbott was ploughed up within a few feet of the place where the other was turned out with the spade, and it is very likely that they were
once together in a grave and became separated during the long
cultivation of the field. This spear is longer and more slender
than the one just described, and also differs from that in having a
raised central ridge its whole length on one side, as shown in fig
31. The opposite surface is flat with
the exception of a slight concave por-
tion about an inch in length at one side
of the centre, where the copper is not
quite as thick as in other parts. It was
evidently made from an irregularly
shaped and thin mass of native copper
which had been folded upon itself and
hammered until the edges were closely
united, but then lines of union can be
traced in several places, particularly
along the edge represented on the left
in the figure, and on the lower part of
the tang, where a portion of one layer
of the metal has been detached. The
central ridge was probably formed by
pounding the copper towards the centre
while forming the thin and comparati-
vely sharp edges. The point is rounded
and shows signs of considerable wear.
As will be seen by reference to the
figure the tang has three broad notches
cut upon one side and two upon the
other, with two small indentations be
low them as if the tang had once been
symmetrical but had been broken in use.
The implement is four and one-fourth
inches long, one and three-eighths wide
in the centile and about three-sixteenths
of an inch in thickness measured through
the central ridge.

No 4903 This long and pointed implement may be classed as
an awl, or a pin. It is ten and a quarter inches long and was made
by pounding a mass of native copper so as to form an implement
with a square end and four flat surfaces, each one-eighth of an inch
wide, for half its length, then rounding the copper and gradually
producing a point at the opposite end. In a portion of the rounded part there are two splits in the copper where portions have separated, as shown in fig. 32 which represents the specimen of one-half its length and width. It has a thin coating of green carbonate of copper. This implement was found by Mr. Henry Gillman in the mound on the Detroit River, Michigan, from which was obtained the singular human cranium already alluded to on page 88 when describing the copper beads No. 4898.

No. 2180. In the collection of objects from Alaska, there are three harpoon points made of native copper by the present Indians. They are of particular interest as reproductions in metal of an early form of bone harpoon. They were made by hammering and cutting the metal into shape. Each is provided with a hole, cut near the sharpened and rounded base, for the purpose of securing the point by a string to the shaft, in the same manner that points of bone of a similar pattern are fastened. The smallest of the three, fig. 33, is five and a half inches long and has four long barbs, all on one side, as is the case with the others. The second specimen is six and three-quarters inches long and has five barbs. The third is seven and a quarter inches in length and has six barbs. The early explorers...
of the Northwestern Coast mention that copper was used by the natives for various purposes, and it is likely that such barbed points as these have long been made by the fishermen of the coast from copper obtained by barter with the interior tribes.

**Masses of Copper.**

Several explorers have mentioned the discovery of masses of native copper in the mounds of the western states, and it is very probable that masses of the metal were collected, or obtained by barter and retained as valued possessions for the purpose of working into desired objects. There are two small masses in the Museum under the following catalogue number:

No. 9865  From "an Indian grave" near Burkesville, Kentucky, collected by Mr. C. L. S. Mathews. These two small irregular masses of copper are about half an inch in length, and while they have the appearance of small nuggets of the native ore, their bright glossy surfaces give to them the appearance of having been slightly melted or fused in contact with some other substance. There is no record of the condition of the skeleton in the grave in which they were found, or of other objects in the grave.

**Copper Implements from Mexico**

When Dr. Valentini was writing his very instructive and valuable paper on Mexican Copper Tools, published in the Proceedings of the American Antiquarian Society in 1879, he regretted that he had not been able to see a single specimen of a copper or bronze implement from Mexico, and all the writers of recent times, when alluding to Mexican copper tools, have to turn to the meagre notices of the three specimens figured by Du Paix in 1806, for their principal information, although mention has been made of the discovery of several deposits, or hoards, of copper implements in the country. It is, therefore, particularly important that the eight specimens in the collection of the Museum, and five others for the use of which I am indebted to Mr. Stephen Salisbury, Jr., should be described in detail. One of the axes has been subjected to a careful analysis by Prof. S. S. Sharples who reports that it is
made of pure copper, and one of the hoes was tested at the Chemical Laboratory with the same result. As the other specimens agree with these in color and hardness, there is every reason to believe that they also are of unalloyed copper. The fact that the specimens analyzed consist of pure copper is also of importance in indicating that it was either made from native copper or from metal obtained from a nearly pure ore which could be reduced by the primitive methods within the means of the people. Beyond the fact that copper is found scattered through Mexico to a considerable extent, consisting of vitreous and red oxide ores, with native copper in a limited quantity, I can find but little information that is of importance in relation to the probable methods by which the Mexicans obtained the metal. As there can be no doubt, however, in relation to the knowledge that they had of tin, which they must have obtained by smelting the ore, it is not reasonable to deny to them the knowledge of smelting copper.

Dr. Valentum, who has entered at considerable length upon a discussion of the evidence in support of the statements about the metals mentioned by Cortez and Bernal Diaz, quotes the following words from a letter by Cortez: "I have seen for sale trinkets made of gold and silver, of lead, bronze, copper and tin," and as he has brought out so much of interest from the meaning of the ancient Mexican picture-writings, and from the authors of the period of the Conquest, I cannot do better than refer to his paper for further information on this subject. He has, however, made the suggestion that the *laton*, which was said to be a copper alloy, consisting either of a mixture of tin (true bronze), or of gold or silver, was a natural mixture of the ores, and was known to the natives simply as soft or hard copper of different colors, but this will hardly stand a scientific scrutiny, and in connection with the suggestion it is well to recall the analysis of a Mexican chisel given in the *Anales del Museo de Mexico*, Vol. 1, p. 117, as quoted by Evans, *Ancient Bronze Implements of Great Britain*, p. 166, which is stated to contain "97 87 copper and 2 13 of tin.

In future notes upon the metallic objects in the Museum, I shall have occasion to mention numerous articles from South America which are of cast bronze, and also of alloys of copper and gold, but so far as our specimens from Mexico go, they simply prove that the

* Dana gives the composition of sulphur of tin as sulphur 30, tin 27, copper 30, iron 13, and states that this ore has only been found in Cornwall.
copper implements we have were wrought into their present shape by the hammer from pure copper. This may have been obtained in a native state, but there can be little doubt that it was melted and cast into bars and sheets from which the implements were formed by hammering, although these exhibit greater skill in the work and nicety of finish than those recorded on previous pages from the United States.

Notwithstanding the abundance in Mexico of axes and other objects made of copper at the time of the conquest, and the subsequent finding of several large hoards, there is no doubt about their present rarity in collections, both in and out of Mexico, and it is evident that in common with the gold and silver ornaments very few have been saved from the melting pot. Mr. Ad F. Bandelier called my attention to the rarity of copper implements in Mexican collections, and Dr. R. H. Lamborn has written me to the same effect from Mexico, in answer to my request that he would look for them particularly during his visit. In his letter he states that he has seen but three copper implements of unquestionable antiquity, although he made many inquiries. Two of these were needles, originally about as thick as ordinary knitting needles and about four inches in length. They were much decomposed, but one still showed a large and well-formed eye, like that in a common darning needle. These were said to have been found in a tomb near the pyramids. The other implement was a small well-molded chisel or axe, five inches long and one and three-quarters wide across the cutting edge. This was in the extensive collection of the late St. Baches, and was the only copper object contained in the collection.

No. 18117 In 1878, Dr. Edward Palmer, while engaged in explorations for the Museum, opened a small tumulus three miles from Veracruz, in the state of San Luis Potosi. He there found several of the terra-cotta images, ornaments and spindle-whorls, so common throughout the country. With these were three vessels of pottery, a stone ornament, a number of obsidian flakes, a crystal of quartz, two grinding stones, a stone mortar, and the small copper axe recorded under this number. This small mound was evidently the site of an ancient dwelling, and there can be no doubt of the considerable antiquity of the objects found. The axe is wedge-shaped, with a flat head which is three-eighths of an inch in thickness and seven-eighths in width, gradually becom-
ing wider and thinner to its cutting edge, where it is an inch and three-quarters wide. It is, judging from its red color and softness, of pure copper. Over its whole surface are unmistakable signs that it was wrought by hammering, either from a mass of native copper or from a short bar of the cast metal. In compactness and homogeneity it is like the other copper axes we have from Mexico, and decidedly different from those I have described from the United States. It is this fact that suggests that the implement was wrought from a block of the metal about two inches long which had been formed by casting. A small cavity and slight fracture on the head of the axe also have the appearance of a flaw in casting the metal. There is, however, no doubt that its present shape was produced by hammering, and in doing this the edges were expanded and have only been partially hammered down as can be distinctly seen by the hammer marks on the still existing edges. The cutting edge is slightly rounded as shown in fig. 34, a, and was formed by working on both sides as shown in fig. 34, b. About a third of the edge, on the left as represented.
in the figure, is much battered by use, and taken altogether, this little wedge-shaped axe looks as if it had done considerable service for its former owner. The only figures I can recall of a Mexican axe of this shape are the one on the left of the three axes from Yucatan, reproduced from the Dresden Codex, in cut 8 of Dr. Valentini's article, which is represented as set in a slightly curved handle; and fig 58 of Mr. Squier's paper on American Copper Implements, in the Smithsonian Contributions, Vol. II, copied from a Mexican painting.

Nos. 26023 and 26206. In August, 1881, a number of copper axes, all of nearly the same size and of one pattern, were found near Tlacolula, Oaxaca, but the circumstances relating to the discovery I have been unable to learn. Soon after they were found, Mr. FREDERICK ÖBER was travelling through the country, and six of them were given to
him by the owner, who prized them simply on account of their being pure copper, as he had discovered by slightly filing one side and cutting a small piece off the blade of each. Some of them had been cleaned of the green carbonate of copper with which they were covered, by scraping and filing, but others were fortunately left untouched, except, as above stated, on the edge of the blade. Four of the six specimens brought home by Mr. Ober were obtained for the Museum. A short time afterwards Mr. Alexander Agassiz was travelling in Mexico and met with two axes of the same lot, which are filed and cut in the same way as the Ober specimens, but are otherwise uninjured and are still covered with the coating of green carbonate and have a slight patina. These specimens Mr. Agassiz presented to the Museum with a number of other interesting objects which he obtained during his travels from Yucatan to the city of Mexico. Mr. Stephen Salisbury, Jr., has also received three axes from the same lot, from Mr. L. H. Aymé, and has kindly let me have them for comparison with the others. I have, therefore, the opportunity of studying nine specimens of this important lot of axes which are of the form most usually represented in the ancient Mexican picture writings, where they are shown as set in wooden handles which are usually curved. This method of mounting the implement in an eye near the end of the handle shows them to be axes beyond question. They are also represented without handles in the pictures illustrating the tribute of different towns to the controlling power. Both of these forms of representing axes can be seen in cuts 1 to 6 of Dr. Valentinii's article to which I have several times referred. They also resemble the axe from Quilapán, figured by Du Parx, but are not quite as broad, and are a little longer.

As already stated, these nine axes are all of the same general pattern and nearly of the same size. The largest of the lot is represented of full size in fig. 35, and the smallest in fig. 36 of which fig. b is a section. No two are of exactly the same dimensions, but when placed in a series the variations from one to the other are very slight. The largest is slightly less than five and three-quarters inches long and a little over two and a half inches wide, measured from point to point across the rounded blade. The smallest is slightly more than five inches in length and is two and a quarter inches in width across the blade. The gradations between these two extremes are best illustrated by the series of outlines...
given in fig. 37. In width at the flat butt-end, or head, there is still less variation, that being three-quarters of an inch in some, and not quite seven-eighths of an inch in others. In thickness in the central part they vary from one-quarter to three-eighths of an inch.
Fig 37.

The principal variation in thickness is at the extreme end or head of the axe, which in one of the two presented by Mr. Agassiz and also in one of Mr. Salisbury's specimens is a full quarter of an inch in thickness, while all the others are about two-thirds as thick. In all, this end is considerably thinner than the central portion as will be seen by looking at the section given in fig. 36, b. In all but the Agassiz specimen with the thickest end, which has the lateral edges slightly rounded off, the edges and the broad surfaces are flat and smooth. From these remarks it will be seen that while the variations between the nine specimens are so slight that they can all be said to be of one pattern and of about the same size, they are yet sufficient to show that they were not all made in one and the same mould. To exemplify this I have introduced fig.
which shows the outlines of the nine specimens placed one over the other. They might, however, have been rough cast in two or three moulds of nearly the same size, and then finished with the hammer, as were the ancient bronze implements of Europe, but it seems more likely that if any casting was done it was simply in the form of bars about five inches long, three-quarters of an inch wide and a quarter of an inch thick, and that from such bars the axes were wrought entirely by the aid of the hammer. That they were hammered there is not the slightest doubt, as the foldings of the copper where it expanded along the edges can be traced here and there on all the specimens, although such expansions have been carefully hammered down. In one of Mr. Salisbury's specimens which has a much thinner blade than any of the others, there are fractures at the two points of the blade which were unquestionably caused by the great expansion of the metal while making the thin blade with a hammer. Another of Mr. Salisbury's specimens has the but-end considerably battered as if from long use. Analysis has proved that one specimen was of pure copper, and as the color and hardness of the others are the same as the one analyzed, there can be little doubt that they were all of pure metal, and we must either believe that they were made from rough cast bars or from compact masses of native copper. The smooth compact surface of these specimens is entirely unlike the laminated and granulated surface of the copper axes from the United States already described.

It is stated that Cortez employed the Mexicans to cast for him eight thousand arrowheads of copper, and it is also known that he obtained from them copper and tin, which led him to the discovery of the source of the tin in the province of Tachala, from which place he secured sufficient tin to mix with the copper he had received from the natives to cast several small bronze cannon. With these facts before us it seems probable that the Mexicans aided their manufacture of axes by casting bars as near the desired shape and size as was most convenient. The fact that they used moulds in making ornaments and spindle-whorls of terra-cotta, as shown by such moulds in the Museum, tends to confirm the statement of the early writers that moulds were used for the casting of metals.

No 26024 Captain De Pare gives a figure of natural size (Kingsborough, Vol iv, Pl. 1, 25, fig. 75,) of a copper implement four and a quarter inches long, by five and three-quarters in width,
from point to point of rounded blade. Of this he makes the following statement (Kingsb Vol vi, p 446): "In Zochs, a town in the vicinity of Oaxaca, I was shown a copper implement, in the house of an Indian laborer named Pasqual Bartolano, who a short time before my arrival [1806] discovered, when ploughing his field, twenty-three dozen of these tools, contained in two large earthen pots, in very good preservation, they are all of cast metal, and of similar form, they only differ from each other a little in length but appear to be of equal thickness." He then states that the use of these instruments was unknown. Afterwards he was led from a picture which he saw at Mitla to believe they were the blades of hoes.

The T-shaped pieces of copper mentioned by several early writers as native coins were very likely such copper blades, and Mr. Bancroft, in his Native Races of the Pacific States, Vol. iv, 383, alluding to the specimens described by Du Paix considers them as used for money, and further adds that he has a precisely similar article from one of the Mexican ruins. As regular articles of tribute or as implements in constant demand, these implements would unquestionably have a standard value among a people so far advanced in the arts as the ancient Mexicans; but I fully agree with Dr. Valentini in his conclusion that objects of this character were not manufactured for the purpose of serving as coin.

Mr. Omer, while at Teotitlan del Valle, a town between Oaxaca and Mitla, in 1881, had a similar copper implement given to him, and was told that it was found, with many others like it buried in a large earthen jar. This specimen I obtained for the Museum, and it is represented of one-quarter size (one-half diameter) in fig. 38. It is six and a quarter inches long and five and three-quarters wide, from point to point of the circular blade. It was evidently cut from a sheet of copper about a sixteenth of an inch thick, and the blade has been thinned by hammering, until a thin but not a sharp cutting edge was produced. That the implement was cut from the copper sheet is shown by the slight irregularities or

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5 Du Paix also gives a figure of a round chisel flattened at its circular cutting edge which he obtained near the city of Oaxaca (Kingsb Vol iv, Pl. r, 25, fig. 77, and text Vol iv, p 446). On the same plate he also represents a polished mass of copper pyrites which has had two holes bored into it as if for its attachment to some other object. This is interesting in indicating the kind of one which may have been smelted and also from its resemblance to a similar ornament of sulphuret of iron in the Museum from Peru. Du Paix also mentions (p 457) that while at Mitla he obtained several copper implements of various sizes and shapes.
notches made by the cutting tool along the concave or upper margins of the blade, from each point inward. Above this part, for the whole length on both sides and across the top, the copper has been evenly hammered so as to form a considerable ridge bordering the flat surface of each side of the implement. This has resulted in widening the edge to about an eighth of an inch, around what may be called the shank. This part of the implement is one and three-fourths inches wide where it merges into the blade and one and three-eighths at its end. Were it not that the semicircular edge of the blade is too blunt to answer for cutting purposes it would be natural to call the implement a knife, to be held in the hand. The figure given by Du Paix represents the borders of the shank turned over in the same manner as in our specimen, which is not the case in the copies of the figure given by Suer, and particularly so in the one given by Valentini, which represents this part as rounded. As already stated Du Paix finally concluded that implements of this character were hoes, and that is very likely the
purpose for which they were made. They could easily have been fastened to the end of a pole, and in soft ground would serve very well as hoes. The circular edge in our specimen, if examined with a lens, shows many little abrasions and a high polish, as if from long use. It also has several notches, and the two points of the blade are folded over as if caused by rough usage, all of which lead to the conclusion that Du Paux has correctly designated the implement as one for agricultural purposes.

Another indication that the implement was fastened to a handle is a slight indentation of the central portion of the shank, as if there had been a strain at that point which has caused the copper to bend a little. This blade is made of pure copper, so far as can be judged from its color and hardness, and it has the appearance of copper which had been cast in a thin sheet and then hammered. At one point there is a place where a portion of the metal has been hammered down, which has the appearance of a flaw in the casting, although if the implement were made from a mass of native copper a similar appearance would result from the compression of a ragged edge of the metal. When found this interesting copper implement was coated by a green carbonate which has been partly removed.

In Mr. Salisbury's collection there are two implements of this character which were lately sent him from Oaxaca by Mr. L. H. Aymé, and probably came from the same lot as the specimen in the Museum obtained by Mr. Ober. One of these varies but slightly from the one represented in fig. 38. It has a little shorter and broader shank and the curve of the blade is not quite as long. One of the tips of the blade was broken off, probably while in use, and the other was folded over and so nearly detached that it fell off during my examination and was taken to the Chemical Laboratory for analysis, which proved it to be pure copper. This specimen is five and three-quarters inches long and the same in width across the blade, allowing for the broken points, and is one and a half inches wide at the end of the shank. Its surface is pretty well covered by a green carbonate of copper in more or less extended blotches. Like the Museum specimen both of Mr. Salisbury's exhibit the slight indentures on their shanks as if they had once been held fast in handles, and they also have evident signs of wear along their edges.

The other specimen belonging to Mr. Salisbury is of particular
interest as it still more closely resembles the one figured by Du Paix. It is only four and one-half inches long, and the blade, which is not nearly as deep as in the others, is six inches in width, allowing for the broken point on one side. The end of the shank is not hammered so as to form a ridge on both sides, as in the others, and is two inches in width, the hammered sides have an edge three-sixteenths of an inch in width in the centre formed by hammering the thin edge of the copper so that it projects on both sides. This widened edge extends slightly along the curve of the blade where it joins the shank, but does not continue quite to the end of the shank. The variation in these details from the Museum specimen can best be understood by comparing figures of the two, and for this purpose fig. 39, representing the implement of one-half diameter, is introduced, although the specimen does not belong to the Museum. Nearly the whole surface of this specimen has been changed to a red oxide of copper, over which, particularly on the blade, is a coating of green carbonate which in several places has a decided patina. By viewing this figure so as to look at it with the curved blade uppermost, its resemblance to the letter T is very marked, and in that position the implement will then answer for "the thin copper coins shaped like the Greek Tau," as stated by the old writers.
Copper Ornaments and Implements from Peru.

The reports by Pizarro and his followers about the immense wealth of the rulers of Peru at the time of the Spanish conquest, although they were probably exaggerated, have been in a measure substantiated by the large number of articles made of gold, silver, copper and bronze, which have since been discovered among the ancient ruins and burial places, by explorers and treasure-seekers, and nearly every museum of antiquities contains numerous examples of the metallic work of the ancient Peruvians. Unfortunately, comparatively little of the ancient gold and silver work has escaped the melting pot, although a sufficient number of objects have been preserved to show the character of the work and the method of using the metals.

Rivero and Tschudi, who wrote their "Antiquities of Peru" over thirty years ago, state that "we have no accounts of the mode of extracting the copper which is seldom found in the native state in Peru," but Squier, who examined the ruins of Chimú several years later, gives an account of the remains of furnaces in which were still to be seen the slag derived from the smelting of silver and copper ores, and he also informs us that "tin and copper ores of great purity are found in southern Peru and Bolivia, between the ranges of the Cordilleras and the Andes. They occur in the singular form of little nodules in the drift strata."

In the volumes of these authors there are numerous references to metallic objects. Rivero and Tschudi state that in the Lima Museum "there are vases of copper, very thin, some idols, instruments, and two solid staves a yard long, with serpents mired, which were recently discovered in the department of Puno." A description is also given of an ornamented copper staff, six inches in length and an inch in diameter, and Squier, when describing the metallic objects found about Chimú, several of which he figures, states that "many implements and weapons of bronze have been found in and around Chimú, and have been collected by the tons in former times." In fact, the evidence of all recent writers, and the many specimens in collections, prove that copper, tin, silver and gold were extensively used in ancient times in many regions from Chili to Mexico, and that in some places within this wide
area the ores were smelted and the metals cast, either pure or with alloys.

The collections in the Museum from these several regions contain a number of objects made of gold, silver, bronze, and gold and copper alloys, which I hope to describe in a future paper. Several of these are of great interest as they are proofs of the higher development in the art of working metals reached by several ancient American nations. The specimens now described are probably all of pure copper.

Nos. 24030 and 24031. In the Peruvian collection presented to the Museum by Dr. W. Sturgis Bigelow, there are two circular pieces of thin copper each about an inch in diameter which were taken from the mouths of mummies. One is still attached to the tongue and is partly embedded in a black pitchy substance, which ignites readily and burns with a quick flame, leaving a black ash. Unfortunately the place where the mummies having the disks came from is not known, but judging from the general character of the associated articles it is probable that they were obtained from some of the ancient burial places not far from the coast of Peru, very likely from Pachacamac, and Squier mentions that he found a small thin piece of copper in the mouth of the body of a fisherman which he took from a tomb at that place. In the wrappings about this body, Squier states that besides a fishing net and lines, he also found fish-hooks and a sinker of copper. Bollaert also mentions copper fish-hooks among the articles found by him in the huacas at Iquique and Molle. Rivelo and Tschudi mention that disks of gold, silver or copper are found in the mouths of mummies. Bollaert, referring to this fact, states that Mr. Fairus while at Atacama, between 15° and 16° S., found disks of gold with the human face represented upon them in the mouths, ears and nostrils of mummies. Stevenson says “any small piece of gold which was buried with the bodies at Huara is generally found in their mouths.” Hutchinson also records the finding of copper disks in the mouths of mummies.

No. 8709. During his visit to Peru in 1874 and 5, Mr. Alexander Agassiz secured a large and important collection of antiquities which he presented to the Museum. A large part of the collection was made by his assistant, Mr. S. W. Garvan, in the ancient cemetery at Ancon, where so many interesting things have been obtained. At this place the bodies are found at various depths.
below the surface, done up in large bundles. The specimen catalogued under this number was found in the wrappings of one of the bodies. It is a very thin disk, probably an ornament, of pure copper as determined by an analysis kindly made for me by Mr. C. F. Mabery of the Chemical Laboratory. The diameter of this disk is three and a quarter inches. There are two small holes in it, one near the margin, and the other in the centre. The mar-

![Diagram of an ornament of copper]

original hole has smooth edges, but in the central hole the metal forced to one surface, by punching the hole through from the opposite side, is rough and split into several small points as if for the purpose of fastening the disk to a piece of cloth or some other material. The surface of both sides of the disk was highly polished, and is now of a yellow, almost brassy color which may be
patina. On breaking a small piece out of the margin for analysis, the fractured edge showed the red-copper color and a granulated structure like cast metal. The surface in places, more particularly on one side, has a coating of green carbonate of copper.

No. 8710. This horseshoe-shaped ornament of thin copper has the same character of surface and internal color similar to the disk described above. It was found by Mr. Garman under the same circumstances, and was presented by Mr. Agassiz. There can be little doubt that this ornament and also the copper disk were cut from thin sheets of cast copper. As will be seen by reference to fig. 40, which represents the ornament of full size, there are two small
holes punched through the sides, and the ends are notched as if to aid in fastening the ornament to a piece of cloth. In the green carbonate of copper, which has formed on one surface more than on the other, there are a number of fine lines which have the appearance of hairs, and it is probable that the ornament was in contact with the head of the person with whom it was buried.

No. 7322 Fig. 41 represents, of one-half diameter, an implement cut from a sheet of pure copper, as shown by analysis made by Mr. MABERY. It was obtained by Prof. Louis Agassiz from Ancon, Peru, in 1873, during the Hassler expedition, and given by the Museum of Comparative Zoology with many other things obtained by the expedition in Peru. It is twelve and a half inches long, about seven inches wide across the blade from point to point, and two and three-quarters wide at the opposite end. It is of uniform thickness of about a sixteenth of an inch. The copper is now a red oxide, with nearly all of one surface and portions of the other covered by a green carbonate. In places, particularly at the end of the handle, as shown in the figure, the threads of a piece of woven cloth with which it was in contact, have been preserved by the action of the copper. On page 176 of his volume on Peru, 9 Squier gives a figure of an implement of this character which he calls a trowel, of which he writes: "Vast numbers of a kind of implement, of which an example is here given, are found not only in Chimu, but along the whole Peruvian coast. Although varying in dimensions from a few inches to nearly two feet in length, they are unvarying in shape. They are cut, apparently, from thin
but stiff sheets of bronze, and the curved lower edge is invariably sharp as is the upper one occasionally." In our specimen the edges have not been sharpened, but the circular edge shows a slight polish as if the blade had been used like a spade or trowel, and it is very likely that such implements were potters' trowels. As already stated, our specimen is made of sheet copper, and not of bronze as Squier implies. There is a general resemblance be-

**FIG. 43.**

No 8767 Club head of Copper. From Ancon, Peru.

between this implement and the T-shaped implements from Mexico, which, following Du Paux, I have considered as hoes.

No 8767 A common form of weapon along the Pacific slope of South America consists of a club-head, made either of stone or metal, with several points or rays projecting from the perforated central portion, which was mounted on a handle of wood. Of such a pattern is the one represented by figs 42 and 43, which was found in a grave at Ancon, Peru, and presented by
Mr Agassiz. In fig. 42 the head is represented on its short handle of hard wood pointed at one end, and is tightly fitted by a wrapping of coarse cloth. In this figure the weapon is shown of a little less than one-third its length. In fig. 43 the outline of the star-shaped head is represented of full size. An analysis of small shavings taken from one of the points was made by Mr. Mabery, and although the quantity was too minute for satisfactory results no other metal than copper was traced. This club-head was probably cast in a mould and afterwards smoothed and finished by cutting and rubbing. The six rays are each about an inch in length, and the hole for the handle about the same in diameter. The total width across from point to point of opposite rays is three and a half inches. The length of the head is one and one-eighth inches. The wooden handle is twenty-one and one-half inches in length. The surface of the copper is smooth and dark-colored, with a few patches of green carbonate, which in two or three places, particularly near the points of the rays, has formed over fragments of cloth with which the weapon was in contact while in the grave. The points are slightly battered as if from use.

In a chapter upon perforated stones of many kinds, in which I have brought together all the facts I could obtain about weapons of this character I have alluded to this particular specimen and also to others of stone and metal from various places, and I refer the reader to the volume for numerous descriptions and figures of implements of similar forms. Squier has also given a figure of a similar metallic club-head from China.

No. 24134. The last of the copper objects to be described in this paper is the interesting club-head from Peru, given by Dr. W. Sturges Bigelow. A bit of metal was cut from this specimen and given to Mr. Mabery for analysis, and he reported that so far as he could ascertain from the small quantity given him it was pure copper. This club-head, like that from Ancon, has six rays, but they are broad and flat and terminate in rounded points. As will be seen by reference to fig. 44, each ray represents a human head, the face on one surface and the hair and back of the head on the other, so that the three alternate rays as seen in fig. 44,
each shows a face, and each of the other three the back of a head.
In the collection of the late Mr. William S. Vaux of Philadelphia, there is a similar Peruvian club-head, in which the human head is represented in the same way as on the one here figured. There can be no doubt about our specimen having been cast in a mould, as the line of union of the two parts of the mould can be traced along the sides of the rays, although it has been cut and smoothed. There are also slight imperfections in the casting where the metal did not flow smoothly, and there are here and there indications that the copper was cut in order to correct similar imperfections in the cast. The mould was probably filled with the melted metal at the end of each point and the burr afterwards rounded off. The grooves around the points were evidently cut, and as will be seen
in the figure, they are not exactly the same on each point. This club-head is about three and three-quarters inches wide from point to point, and half an inch thick. The hole for the handle is not quite an inch in diameter. The surface has probably been cleaned since it was found, but all the cavities still retain a coating of green carbonate of copper. This specimen is a good illustration of the knowledge which the ancient Peruvians had of the methods of working metals and of the difficult art of casting copper.
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PEABODY MUSEUM
OF
AMERICAN ARCHAEOLOGY AND ETHNOLOGY
IN CONNECTION WITH
HARVARD UNIVERSITY.
FOUNDED BY GEORGE PEABODY, OCTOBER 8, 1866.

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