TWELFTH ANNUAL REPORT

OF THE TRUSTEES

OF THE

PEABODY MUSEUM

OF

AMERICAN ARCHAEOLOGY AND ETHNOLOGY,

PRESENTED TO THE PRESIDENT AND FELLOWS OF
HARVARD COLLEGE, FEBRUARY, 1880

VOL II. NO 3

CAMBRIDGE
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1880
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PEABODY MUSEUM

OF

AMERICAN ARCHAEOLOGY AND ETHNOLOGY

IN CONNECTION WITH

HARVARD UNIVERSITY

FOUNDED BY GEORGE PEA BOD Y OCTOBER 8, 1866

TRUSTEES

ROBERT C. WINTHROP, BOSTON, 1866
CHARLES FRANCIS ADAMS, JR., QUINCY, 1866
FRANCIS PEABODY, SALEM, 1866, deceased 1867
STEPHEN SALISBURY WORCESTER, 1866
ASA GRAY, CAMBRIDGE, 1866
JEFFIES WYMAN CAMBRIDGE, 1866, deceased 1874
GEORGE PEABODY RUSSELL, SALEM, 1866, resigned, 1876
HENRY WHEATLAND, SALEM, 1867 Successor to Francis Peabody, as
President of the Essex Institute
THOMAS T. BULYÉ, BOSTON, 1874 Successor to Jeffies Wyman, as
President of the Boston Society of Natural History
THEODORE LYMAN BROOKLINE, 1876 Successor to George Peabody Russell,
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FREDERICK W. POINAM, Curator of the Museum, 1875
LUCIEN CARR, Assistant Curator of the Museum, 1877
MISS JENNIE SMITH, Assistant, 1878
EDWARD T. CHICK, JANITOR 1878

(462)
TWELFTH ANNUAL REPORT.

TO THE PRESIDENT AND FELLOWS OF HARVARD COLLEGE —

The Trustees of the Peabody Museum of American Archeology and Ethnology herewith respectfully communicate to the President and Fellows of Harvard College, as their Twelfth Annual Report, the Reports of their Curator and Treasurer for the year ending in January, 1879

ROBERT C WINTHROP,
CHARLES FRANCIS ADAMS,
STEPHEN SALISBURY,
ASA GRAY,
HENRY WHEATLAND,
THOMAS T BOUVÉ,
THEODORE LYMAN

CAMBRIDGE,
FEBRUARY, 1880

(464)
ABSTRACT FROM THE RECORDS.

WEDNESDAY, JANUARY 15, 1879 The Annual Meeting of the Board of Trustees was held this day at noon in the Museum, Cambridge Present Messrs WINthrop, Adams Salisbury, WHEVILAND, Bouvé, and the Curator

The Report of the Treasurer was read and accepted, and ordered to be printed under the direction of the Treasurer and Curator, as a part of the Twelfth Annual Report of the Board

The Hon Stephen Salisbury again stated his wish to be relieved from the duties of Treasurer, and his resignation was accepted, with the request that he would hold the funds as ex-treasurer until the completion of arrangements now pending for the future care of the same

The Report of the Curator was read and accepted, and ordered to be printed, with the accompanying papers, as a part of the Twelfth Annual Report of the Board

The appropriations proposed by the Curator were agreed to and unanimously voted, and Mr Salisbury, as ex-treasurer, was authorized to transfer to the Curator a sufficient sum from the income to meet the same

The meeting then adjourned

HENRY WHEVILAND,

Secretary of the Board

(405)
REPORT OF THE CURATOR

To the Trustees of the Peabody Museum of Archaeology and Ethnology —

Gentlemen — Since your meeting here, not quite a year ago, much valuable material has been added to the Museum; indeed, during no preceding year have the operations of the Museum been so extended, nor have larger returns ever been received from explorations conducted under its directions. The special explorations referred to may be briefly recorded as follows —

The continuation of Dr. Abbott's work in New Jersey. This has increased in importance and several thousand stone implements, with numerous other articles, including two human crania, have been the tangible results to the Museum.

As it is Dr. Abbott's desire to continue his field work during the present season and make still more extended researches before presenting a full report on the Stone Age of New Jersey, it will only be necessary for me to state, at this time, that he has had continued good fortune in finding the rude stone implements of the gravel beds along the Delaware River, and that he has brought to light from ancient graves and ploughed fields, formerly village sites, several forms of implements and ornaments of stone which have heretofore been regarded as more or less peculiar to the Ohio Valley.

The two human crania received from Dr. Abbott, are of particular interest; one probably being the skull of a Shawnee Indian, while the other, which is of entirely different shape, small, long, and very thick, was found in the gravel under such circumstances as to lead to a belief in its very great antiquity.

The continuation of Mr. Schumacher's explorations in Southern California. Although Mr. Schumacher was obliged to expend a considerable portion of the funds placed at his disposal during the early part of the year in an exploration for antiquities in the...
southern part of California, which was principally negative in result, he afterwards made another trip to a portion of the Island of Santa Catalina (which he had only partially explored during the preceding year) and there obtained very important additions to his former collection, including several unique articles.

While on his trip across the southern portion of the State, from Santa Barbara to the Colorado River, Mr. Schumacher passed several days with the Indians in the vicinity of some of the old Spanish missions, and obtained as perfect a representation as possible of their manufactures, including a large number of the beautiful water-tight baskets and the materials of which they are made.

He also secured a good supply of native pottery, made by coiling cylinders of clay upon themselves, which is probably the most widely distributed method of manufacture among primitive potters. From Mr. Schumacher’s notes relative to the manufacture of baskets and of the method of making vessels of clay by the Indians of southeastern California, I have prepared a short paper hereto annexed.

The explorations of Mr. Henry Gillman in the vicinity of Aledo, Florida. The result of Mr. Gillman’s examination of several burial mounds in northern Florida, while meagre in regard to specimens, are of considerable interest. In a paper presented by him to the St. Louis meeting of the “American Association for the Advancement of Science,” he gives an account of his discovery of what he believes was the utilization of human crania as encircling urns by one of the ancient tribes of Florida. The exploration of the mound, which contained this supposed unique method of disposing of the ashes of the dead, was undertaken while acting for the Museum, and the fragments of the crania referred to have been received.

Mr. Gillman, also, during his explorations, obtained portions of several vessels of clay, two of which are of extreme interest from their superior character and close resemblance to the best pottery from the Ohio mounds.

One of these fragments is of a large bowl-like vessel with a smooth surface, upon which is an inscribed scroll pattern of good design and execution, the other is a portion of a large vessel of red pottery, upon the surface of which are very broad and deep grooves. This vessel (of which unfortunately only one large fragment was found) must have been very much like one from a
mound in Ohio, which is figured by Messrs. Squier and Davis on their plate 46.

Numerous other fragments of pottery, of forms common in the burial mounds and in the upper beds of the shellheaps of Florida, were also obtained, as well as a few arrowpoints, numerous flint and Jasper chips, and human bones exhibiting signs of having been partially burnt.

From one of the mounds Mr. Gillman obtained an egg-shaped vessel of clay, which has a thick siliceous glaze on the inside and about its mouth. A detailed description of this vessel has been given by him in the American Naturalist for December last. In his remarks upon this jar he states that it is the first instance of the finding of a glazed jar in the ancient mounds of North America, and regards it as an important discovery, showing that the art of glazing pottery was known to the ancient Americans.

This jar is now with the collection forwarded to the Museum, and I am forced to state that the conditions of apparent great antiquity of the mound in which the jar was found, has probably led the discoverer into error, as there can hardly be a doubt that the jar in question is of Spanish origin.

No North American nation before the advent of Europeans, so far as yet known, had acquired the art of giving a siliceous glaze to pottery, the nearest approach to it being the salt-like glaze given to the pottery of the ancient Pueblo nation, and the thick varnish-like glaze used by old nations of Central America and Mexico, but these are entirely different from the thick siliceous glaze seen on the jar from Florida. Then, again, the many explorations of burial mounds in Florida have proved conclusively that a large number of these tumuli are of comparatively recent origin, and many European articles of pottery, brass non, gold, glass, etc., have been found in some mounds of apparent great antiquity. In fact it is particularly to the tumuli of Florida that we must turn to prove the continuance of mound building, by some Indian tribes down to a comparatively recent period.

Explorations in Central America. Acting under a special appropriation, which it will be greatly to the advantage of the Museum to renew, if it is possible, Dr. Earl Flint, an enthusiastic archaeologist and careful collector, residing in Nicaragua, has made very important researches in relation to the ancient nations.
of that region, and has forwarded to the Museum an interesting collection of pottery, and other articles, including a few human remains, from the graves, mounds, and caves of several places in Nicaragua. He has also, at great labor and pains, made careful drawings of the carvings on the walls of several caves, and upon stones in their vicinity.

Dr. Flint has also investigated some of the ancient shellheaps of Nicaragua, and feels confident that he has obtained evidence proving the great antiquity of the human race in Central America.

As Dr. Flint's views will be embodied in extracts from his letters, which I propose to bring together as special papers to accompany future reports, I will here simply call attention to the interest attached to the drawings of the rock carvings, which it is proposed to reproduce in the next report, and to the large collection of burial urns, jars, vases, dishes, and many other articles of clay obtained from the burial mounds. Some of these vessels are of peculiar shapes and others are elaborately ornamented by carving, and in color. It is proposed to give figures of many of these jars in a future report accompanied by a full description of the collection.

*Explorations in Mexico by Dr. Palmer.* Although Dr. Palmer has been nearly the whole year in Mexico engaged in making collections of antiquities, and of articles which will illustrate the manners and customs of such Indian tribes as still retain their primitive habits, I shall defer extended notice of his work until the next report, as the specimens already received at the Museum will not be arranged and catalogued until Dr. Palmer's return, which will probably be a few weeks. Suffice it now to mention, that fourteen large cases have arrived from him, and that two other invoices are on the way.

*Continuation of the explorations in Tennessee.* Acting under my directions, Mr. Curtis has continued the work I began in Tennessee, by exploring several village sites in the Cumberland Valley, in furtherance of my desire to make such a thorough research among the ancient mounds and cemeteries of this important centre of an ancient American nation, as will secure for the Museum as large a collection as possible of all that remains of this ancient people, and furnish the means for preparing such a comprehensive report as the importance of the subject demands. From the material now received from the mounds and stone graves
of the Cumberland Valley, the evidence of the unity of the ancient people of that valley with those of southern Illinois and Missouri is already sufficient to warrant the statement, which every additional collection so far seems to confirm, that one great nation of people, probably having many subdivisions of tribes and villages, formerly covered the country extending not far from the western banks of the Mississippi, eastward to the southern Alleghany, southward towards the Gulf of Mexico, and northward towards the Ohio valley. The exact limits in these directions, and the relation of the mounds of the Ohio valley with those of the south, are yet to be determined, but the explorations now in progress and in contemplation by the Museum will in time probably solve this interesting question. In this brief notice of the continuation of the explorations in Tennessee I cannot do justice to the many favors received from the hospitable and generous people of the state, who, from their appreciation of the work in hand, have added largely to the collections by giving to the Museum many interesting articles found in former years, and have in many ways aided in the work of exploration, — often permitting the thorough examination of mounds and cemeteries by the agents of the Museum, while very properly refusing permits to incompetent investigators and mere collectors of curiosities. In the extended report which will be made hereafter, it will be a pleasure to allude particularly to the many favors received.

Cihokau Mound. In company with several gentlemen from St. Louis I had the good fortune in September last to visit the largest mound within the limits of the United States. Although this

1 Backenridee (Trans Am Phil Soc Vol. I, new series) in his enumeration of the large mounds of the Ohio and Mississippi valleys (1813) refers to one "near Washington (M. T.) 70 feet in height." The mound thus designated is unquestionably identical with the one described in the Appendix of Backenridee's "Views of Louisiana" (1811), p. 178, by Rev Mr. Shumway, who states that at Sturtevant M. T., six miles from Washington, is a very remarkable mound, * * * its form is a parallelogram * * * and measured outside of the ditch contains more than sixty acres. The investigation is forty feet the idea of which may contain four acres. * On this level portion are several mounds one of which is * * eight six feet high measured from the base of the lower stratum and another whose height is sixty feet, but appears to have been considerably higher."

Rev Mr Mills in a p. 280 also communicates an account of this mound to Mr. Backenridee in which the following dimensions are given. Also, measured at the base, between three and four acres. The mound was taken 60 feet above the common level of the ground near the middle of the west line was 20 feet above the surface of the fortification, making the distance from the top of the mound 80 feet above the common level of the ground. Mr Mills then states that the mounds had long been cultivated and that they were probably reduced
mound has been described or alluded to by many writers, there exists considerable confusion in regard to its name, size, and exact location, and Col Foster, in his "Pre-historic races of the United States" (p. 107), actually regrets that "it has been swept away by the levelling influence of modern improvement."

By several writers, the name of "Monks' Mound" has been bestowed upon this tumulus, under the belief that the settlement of the order of La Trappe was upon its summit. The statements of Brackenridge, who visited the place in 1811, while the Trappists still had their settlement, show, however, that the mound upon which the Monks were located was the smaller structure, of a similar shape, situated a short distance to the westward of the "great mound," and that the apron of Cahokia Mound was used as a vegetable garden and its summit was then planted with wheat. While there is not the slightest evidence that the Cahokias of the time of La Salle were the builders of this, or of other mounds in the vicinity, it is a gratification to be able to perpetuate the name of an extinct tribe of American Indians in connection with this monument of an unknown American Nation, rather than that of a religious order of foreign origin.

50 or 60 feet, which latter number added to the 80 feet, its present height, would make it 126 feet above the ground at its base.

From these accounts, the actual height of the highest point of the mound, about the year 1811, was 80 feet and the estimated original height by Mr. Schenckhorn 80 feet, by Mr. Mills 120 feet, and given by Brackenridge probably by a slip of the pen or typographical error, at 166 feet. As will be seen from the above figures, this mound is thus far below Cahokia in its area, and if the estimated height of the small mound, which is said to have been removed from the top of Cahokia should be added to its present height, Cahokia would have its highest point over one hundred feet above the surrounding land and as the forty feet of erosion allowed by Mr. Mills is a very liberal allowance, it is probable that Cahokia originally, as at present, was provided with the highest summit.

For later observations on the Selzletown mound see Squier and Davis, p. 117.

2 Views of Louisiana, 1814, p. 188, and Appendix, p. 287. On the last-quoted page this smaller mound, which, if any is to be so designated, should be called the Monks' Mound, is stated to be "about fifty yards high," evidently a misprint for fifty feet.

Featherstonhaugh, 'Examination through the Slave States' in 1843-5 New York, 1844, pp. 96-7 also states that the settlement of the Monks was upon the smaller mound to the west but at the time of his visit the building in which they lived had been levelled with the ground and but few remains of it were visible. He also states that at the time of his visit Mr. Hill was living in a house he had erected on the top of the Great Mound and that Mr. Hill laid the foundation of his dwelling upon an eminence he found on the summit of his elevated territory and upon digging into it, found large human bones with Indian pottery, stone axes, and tomahawks.

Laroude, 'The Rambler in South America.' New York, 1855 visited the mound upon the Cahokia in 1813, and gives, Vol II p. 18, a similar statement to the above in relation to the former settlement of the Monks.
Situated in the midst of a group of about sixty other mounds, of more than ordinary size, several in the vicinity being from 30 to 60 feet in height, and of various forms, Cahokia Mound, rising by four platforms, or terraces, to a height of about one hundred
feet, and covering an area of over twelve acres, holds a relation to the other tumuli of the Mississippi Valley similar to that of the Great Pyramid of Egypt to the other monuments of the Valley of the Nile.

I am glad to be able to state that Dr J. J. R. Patrick, a careful and zealous archaeologist, residing in the vicinity of this interesting monument, has, with the assistance of other gentlemen, not only made a survey of the whole group of which Cahokia is the prominent figure, but has also prepared two accurate models of the mound itself, copies of which have been promised to the Museum.

One of these models (Fig 1) represents the mound as it now appears, with its once level platform and even slopes gullied, washed, and worn away, and the other (Fig 2) is in the form of a restoration, showing the mound as it probably existed before the plough of the white man had destroyed its even sides and hard platforms, and thus given nature a foothold for her destructive agencies. I have also in Fig 3 shown the elevation of the mound from the west as represented in Fig. 2. The projecting portion (A) from the apron (B) points nearly due south.

Probably this immense tumulus was not erected primarily as a burial mound, though such may prove to be the case. From the present evidence it seems more likely that it was made in order to obtain an elevated site for some particular purpose, presumably an important public building. One fact, however, which I observed, indicated that a great length of time was occupied in its construction, and that its several level platforms may have been the sites of many lodges, which, possibly, may have been placed upon such artificial elevations in order to avoid the malaria of a district, the settlement of which in former, as in recent times, was likely due to the prolific and easily cultivated soil, or more likely, for the purpose of protection from enemies. The fact to which I allude, is that everywhere in the gullies, and over the broken surface of the mound, mixed with the earth of which it is composed, are quantities of broken vessels of clay, flint chips, arrowheads, charcoal, bones of animals, etc., apparently the refuse of a numerous people. Of course it is possible that these remains, so unlike the homogeneous structure of an ordinary mound, may be the simple refuse of numerous feasts that may have taken

As these models were received just as this report was going to press, I have had the accompanying illustrations prepared from them as furnishing the most accurate representation I have seen of this important tumulus.
place on the mound at various times during its construction. The first interpretation, however, is as well borne out as any.

Fig. 2

Plan of Cahokia Mound. Restoration. From model made by Dr. Patrick. Scale 200 feet to one inch. A, B: the lowest platform; C, the second platform; D: the third; E: the fourth and highest.

other than from our present knowledge of this mound, the structure and object of which cannot be fully understood until a thorough
examination has been made, and while such an examination is
 desirable, it is to be hoped that this important and imposing mon-
 ument will never meet the fate which Col. Foster, under a false impression due to a confusion of
  names and places, supposed as having already oc-
  curred.

**Ancient Indian Quarry near Washington, D.C.*

Mr. Elmer R. Reynolds, of Washington, the discov-
  erer of the ancient quarry on the Potomac, has kindly sent to the Museum an important col-
  lection of fragments of soapstone pots obtained
  at the quarry, of which he has furnished an ac-
  count with remarks upon the method of making
  the pots. The paper by Mr. Reynolds is hereto
  annexed, and will be found to be of particular
  interest in connection with the accounts of the
  ancient Indian quarries of California and Rhode
  Island, described in the last report.

**Description of an Ancient Stone Pueblo.** The
  Hon. Lewis H. Morgan having made, during the
  past year, a special trip to Colorado and New
  Mexico for the purpose of investigating some of
  the ancient ruins and Cliff-houses of that archae-
  ologically interesting part of our country, has
  furnished the Museum with a ground plan and
  description of a remarkable ancient ruin of a
  Stone Pueblo which he examined on the Anmas
  River, New Mexico. This plan I have had re-
  drawn on a large scale for use in the Museum, and
  a photographic reproduction of it is also given in
  connection with Mr. Morgan’s paper, which is
  herewith presented for printing in full as one of
  the special papers of this Report.

**The Social Organization of the Ancient Mex-
  icans.** is the title of the third of the important
  series of papers by Mr. Bandelier, which I also submit for publication in connection with this Report.

**Ceremonial Measurements.** During the past year a large number

*The destruction of “Big Mound” on the opposite side of the river within the
  city limits of St. Louis, probably led Col. Foster into error.*
of human crania have been received, and, with many others belonging to the same groups, obtained in previous years, have been measured principally by Miss Smith acting under the special directions of Mr. Carr. As Mr. Carr contemplates spending the greater part of the present year in Europe, with special reference to the study of the crania in the principal collections of England and France, and of the various methods of measurements used by craniologists abroad, it has been deemed best to print in this Report simply the tables relating to the important collection of crania from California.

The Additions to the Museum during the past year have been of exceeding interest and more numerous than in any former corresponding period. Over three thousand entries of articles received have been made in the catalogue, and in order to give you an opportunity of easily seeing the accumulations of the year, all the additions (with the exception of the Mexican collection to which I have previously alluded) have been placed as far as possible in the new cases, thus completely filling one gallery, as well as many of the shelves about you.

While the extended explorations, with a few important purchases during the year, have been the means of securing the larger portion of these specimens, it is gratifying to note that many have been given by friends of the Museum, and to a few special collections I have great pleasure in calling your particular attention.

By far the most important gift during the year is that from Mr. Clarence B. Moore, of Philadelphia, a graduate of the class of 1873.

This important addition is not only of considerable value, but also of great scientific interest, and particularly acceptable to the Museum, as it provides us with a choice general collection of ancient bronze implements from various parts of Europe, which we were in need of for comparison, and also a considerable addition to our already large collection from the Swiss Lakes. As will be seen by the enumeration on another page, the articles from the Swiss Lakes cover one hundred entries in the catalogue, and include among other choice specimens, stone implements still in their original sockets and handles of horn.

Another hundred entries are given to the very interesting lot of Egyptian antiquities, which includes several statuettes and
other stones with hieroglyphics, numerous amulets, scarabai, etc., and several articles in bronze.

As the Museum was very poorly supplied with illustrations of Egyptian art, this authentic collection from Thebes is the more acceptable, containing as it does so many choice and typical specimens. To the rest of the Museum it will bear a relation similar to the collection of ancient Mexican ceramic art and sculpture received from the late Hon. Caleb Cushing, whom we have the honor of classing among the earliest contributors to the Museum.

As the Moore collection is noted more in detail on another page, I will only mention that with a perfect appreciation of the objects of the Museum, and the importance of leaving full scope for the arrangement of such materials as come to it, Mr. Moore has presented this valuable collection without restriction.

To Dr. Samuel Kneland, of Boston, we are also greatly indebted for the gift of his private collection of ethnological and archeological material.

This collection is especially rich in human crania, many of which were collected by the donor on the Island of Man, also one of a Hindoo, two of African negroes, and several of North American Indians from Maine, Massachusetts, Rhode Island, and Florida. There are also a number of stone implements from the Sandwich Islands, and from the United States, also several articles from the native tribes of Africa, presented to Dr. Kneland by M. Paul du Chaillu, and several other interesting specimens, as will be seen from the special list on another page.

From Mr. Edwin A Flint, of Boston, while in Peru, we received through Mr. Agassiz, early in the year, several beautiful specimens of ancient pottery from the vicinity of Lake Titicaca, which are unlike any previously in the Museum. Mr. Flint has also presented two large stones upon which have been cut many singular figures. These ancient rock inscriptions from an Andean pass are of particular interest in comparison with those in Nicaragua, of which we have received drawings from Dr. Ebel Flint, and also with the numerous carvings upon the rocks and walls of caves in our own country. When we recall the difficulty of removing such large masses of stone from the high passes of the Andes to the coast for shipment, and the care required in exhuming and packing the fragile vessels of clay, we can but feel
particularly grateful to Mr. Flint for his labors in behalf of the Museum.

In connection with this reference to the increase of the Peruvian collection, I have the pleasure of stating that the several Peruvian clara, of the elongated type, referred to in the last report as a portion of the Blake collection but not then received, have since been added to the valuable collection presented by Dr. John H. Blake, of Boston, and of which a special account was given in the last report.

To Mr. Charles Derby, of Salem, a gentleman who for several years past has been a resident of Honolulu, and a traveler among the Pacific Islands, we are indebted for a small, but exceedingly interesting collection of articles of native manufacture obtained by himself at the Fiji Islands. As will be seen by the pecul record of this donation, there are several articles contained in it which probably could not now be duplicated, since European influence has modified the habits of the natives.

Mr. Alexander Agassiz has shown his continued interest in the Museum, by a transfer from the Zoological Museum of numerous specimens, particularly those obtained by the late Professor Louis Agassiz from Indian tribes in Brazil, during the famous Thayer Expedition.

The most important additions secured by purchase during the year consist of the large lot of articles of pottery from the round of Illinois and Missouri, and the Clogston Collection.

This last, purchased of Mr. Wm. Clogston, of Springfield, is particularly rich in Indian and Moundbuilders' pipes and in the irregular perforated stones from the Ohio valley. There are also several vessels of clay and other articles found in the mounds of Ohio and Kentucky, and as will be seen by the detailed account of the collection given in the 'List of Additions' it is one of more than ordinary interest and importance, adding many forms to the Museum, of which we before had but meagre representation. It is recorded in the catalogue under four hundred and eighteen entries.

For the many other additions during the year, covering in all forty thousand entries, I must refer to the special list of donations and additions hereto annexed.

The Library. In relation to the increase of the Library of the Museum during the year, it will be sufficient for me to refer to the special record of the hundred and odd volumes and pamphlets.
which have been received, although I cannot omit special

tion of the valuable donation of twenty-two volumes of Japa

works which we have lately received from the Imperial Univer

of Tokio. These volumes contain an account, with many col-

illustrations, of the ancient customs of the Japanese and arc

very great ethnological value, and I am informed that they

now seldom to be obtained.

I must also call attention to the continued efforts of Mr

Thos G. Cary, in behalf of the Museum, and the several dona-
tions of books and photographs which we have received from

him during the year. I may here mention too, the receipt, from

the President of the Board of Trustees, of the large lithographi

portrait of Mr Peabody, which now hangs in this room, and that

we have also received one of the medals struck by order of the

Trustees of the Peabody Education Fund, to whom we are in-
debted for this additional memorial of the honored founder of this

Museum.

Mr Cary, as assistant Curator, has been a most faithful co-
adjuitor, and while I am personally indebted to him for the as-
sistance which he has given in the many details of administration,

I should not be doing justice to him or to myself if I allowed this

opportunity to pass without an expression of my appreciation of

the great value of his voluntary services in the Museum.

To Mr Lucien Carr, Jr., I must also express my thanks for

the faithful manner in which he performed the duties of special

temporary assistant for a few months in the early part of the year.

Miss Jennie Smith, who was appointed special assistant in

March last, has proved a very important worker in the Museum,

and the thorough and conscientious manner in which she performs

all that is assigned to her, combined with the experience of nearly

a year, renders the permanency of her appointment very much to

be desired.

Owing to ill health Mr Curtis resigned the position of janitor,

and Mr E. E. Chick has been appointed in his place and is rap-

idly proving himself particularly adapted to the position. In ad-
inon to the care of the building he is now giving important

assistance in the details of Museum work.

Now that the important work of constructing the permanent

cases in the several exhibition rooms has fairly passed its trial

stage and is well under way, the opportunity will soon be given
for the arrangement of portions of the collections in a satisfactory manner, although, as the erection of the cases, under the present careful and thorough system of work, will necessarily be very slowly proceeded with, I can only hope to have the floor and gallery of one large exhibition room ready for public access by the close of the present year. When, however, it is remembered that upon the care exercised in the building of the cases at this time, and the success attained in the efforts made now to provide cases which shall hereafter protect the collections from dust and destroying insects, the very permanence of the collection itself depends, it will not be the part of wisdom to hurry the work and, for the simple gratification of an early display of our treasures, run the risk of their destruction.

The adoption of cherry as the wood best adapted to cases of the character desired for the museum, thus far, after the trial of nearly a year, seems to have been fortunate. It is now proposed to finish the other rooms with the same wood, which, apparently, stands the changes of our climate as well as any other kind, while by its use we are able to have a simple oil finish, thus avoiding both paint and varnish upon the outside of the cases. After a series of trials of colors, in order to obtain the one which, without being tiresome to the eye would in mesh the best average background and relief to the articles within the case, a shade of light blue has been adopted for the present, and so far with satisfactory results. In regard to the perfect manner in which Mr. Thomas Wilson, of Linden, has performed the work on the cases now finished, too much praise cannot be given. With this careful carpenter engaged for the other rooms we can confidently rely upon the future work being done with the utmost care, and feel confident that in the end cases will be secured which will be as near to perfection as we can hope to attain. In other respects many details of construction have been carefully planned, among which should be mentioned the adoption of the Jenks non-shelf-brackets and patent case-lock, both of which I regard as essential to a proper museum case. In addition to these items I must mention that the backs of the wall cases are formed by the wall of the room into which the top, bottom and sides are set in a groove in such a way as to prevent any cracks from opening at the joints, and that the tightness with which the tongued and grooved doors fit is overcome by a lever used in opening and
closing them. In addition to the wall cases, a broad-railing case has been made on the same plan about the gallery, and for the floor of the room two large cases have been planned and will soon be put in place.

The only other subject of particular importance at this time, to which I beg to call your attention, is that of the publication of the many important papers which are now being prepared in connection with the Museum work. As these papers will continually increase in number, and will be principally based on explorations made under the direction of the Museum, or upon the study of the materials which have been collected, they are in every way important in showing to the world the results obtained in American Archeology and Ethnology through the efforts of this Institution, and in presenting in an imperishable form the knowledge and facts obtained from year to year in the departments of research for which it was founded. I may also add that the publication of such descriptive papers and memoirs not only adds greatly to the character of the Museum, but also offers extraordinary inducements to individuals to make it—the only one in the country which is to be forever devoted to this one object—the depository of their archeological and ethnological treasures.

Some special provision which shall secure the proper publication of the Memoirs of the Museum is therefore greatly to be hoped for in the near future, since to use to any great extent, our present limited income for this purpose, would prevent the collection and preservation of articles which before many years have passed away may not be obtainable.

Respectfully submitted

F. W. Putnam,
Curator Peabody Museum

Cambridge, Mass., Jan. 15, 1879
ADDITONS TO THE MUSEUM AND LIBRARY FOR
THE YEAR 1878

Additions to the Museum

13936—13939 Fragments of stentite pots in different stages of manufacture and the stone implements used in making them, taken from the ancient quarry in Johnson, R I, by the Curator, and described in the 11th Annual Report, p 273. Presented by Mr. H N Angell of Providence.

13940—13941 Casts of two earthen vessels, the originals from Colchester and Bolton, Vt.—By Purchase.

13942—13945 A woman’s dress from New Guinea, caps, fishing seine and an ornamental club with stone head from Queensland.—Collected by Mr. C E Boddime, and presented by the Museum of Comparative Zoology, Cambridge.

13946—14007 Hammerstones with and without finger pits, mullers, “chungke” stones, and cells some of quartz very highly polished, scrapers, drills, knives, spearpoints, and arrowheads of flint from Davidson County, Tennessee, fragments of pottery, animal bones and part of a human cranium from a cave on Cumberland River, stone cells from Maury County, Tennessee, and from the Edgewood Mound near Nashville, crania and human bones, shell beads and spoons, flint flakes and daggers, small discoidal stones and a collection of pottery consisting of pots and bowls, etc., plan and ornamental in human and animal forms from stone gravies on Cumberland River near Nashville, Tenn.—Collected by Mr. E. Currier, in continuation of the Explorations of Tennessee by the Curator, conducted for the Museum.

14008—14012 Stone spearpoints, cells, and a grooved stone axe from Allenport, St. Louis County, Missouri.—Collected and presented by Mr. Charles E. Fillin of St. Louis.

14013—14100 “Chungke” stone from Dixon Co., Tenn., flint arrowheads, spearpoints, knives, a stone cell and piece of polished hematite from Jackson County, Tenn., crania and human bones, shell spoons and shell and earthen head bone implements; thirty-three articles of pottery, and a collection of stone implements consisting of daggers, hoes, cells, arrowheads, etc.—Collected by Mr. E. Currier, in continuation of the Exploration of Tennessee, by the Curator, conducted for the Museum.

14101—14110 Human cranium stone mortar, a bowl in terra cotta, and several small earthen vessels from a grave in La Platte County, Col-

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orado, a metate and grinding stone from a mound in the same county, and a grooved hammerstone from Los Pinos River, Col.—Collected and presented by Mr T. Martin Tripp of Orange, N. J.

14111—14113 An imperfect cranium, a brass thimble, and a small tin box containing a piece of cloth, from an Indian grave at Uxbridge, Mass.—Collected and presented by Mr A. F. Aldrich.

14114—14115 Human bones and cranium from Blum Hill, St. Lawrence Co., New York—Collected by Mr S. W. Garman, and presented by Mr Alexander Agassiz of Cambridge.

14116—14118 A stone gouge, an iron tomahawk and a small ornamental stone axe, perforated, from Sudbury, Mass.—Collected and presented by Mr Reuben Smith.

14119—14166 Ear ornaments made of wood covered with copper from a mound near Bull's Iron Works, Tenn., small earthen cup from a grave near Fort Zollicoffer, Nashville, Tenn., "chungke" stones and stone celts from Cheatham County, Tenn., steatite pot from Buff Creek; stone mullet, celts and a polished scraper from near Nashville, discordal stone, piece of hematite human crania, and several vases in terra cotta from Mr. M. Overton's farm in the same neighborhood, discordal stones from the surface in Humphreys County, Tenn., a "rotary" flint spearpoint, probably from the surface in the same county, collected by Mr. Charles Bell, human crania from stone graves and an exceedingly interesting collection of stone hoes polished by use, and celts and flint daggers, collected by Mr. Banks Link and by him presented to the Museum through Mr. E. Curtiss. Among these is a hoe of chipped chert 365 mm. long and 135 mm. wide across the blade, and a dagger of same material 251 mm. long and 43 mm. wide.—Collected by Mr. E. Curtiss in continuation of the Exploration of Tennessee by the Curator, conducted for the Museum.

14167—14170 Three small earthen bowls, one probably a toy, and fragments of pottery, from a Sand Mound on Spruce Creek, Florida, near Smyrna Inlet—Collected and presented by Mr. J. C. Weld, of Cambridge.

14171 Cast of an earthen pot, from Canterbury, N. H., now in the possession of Dr. Samuel A. Green, of Boston—Presented by Dr. Samuel A. Green.

14172 Pipe made of lead from an Indian grave at Revere, Mass.—By Exchange.

14173—14194 Two crania and many bones of two human skeletons, implements of bone and stone fragments of pottery, shells and animal bones from shellheaps on Great Deer Isle, off the coast of Maine, and from other points in that immediate neighborhood—Explorations of Mr. Manly Hardy, conducted for the Museum.

All the articles from Tennessee are from stone graves, except when the contrary is specially stated.

Mr. Weld states that the mound was 40 feet in diameter, that human bones were found in it, and that these specimens were taken from a depth of three feet from the top of the mound.
14195 Stone pipe from Nelson Co, Ky —By Purchase
14196—14206 Stone pipe, earthen pot, pieces of mica, glass and shell beads from an Indian grave at Revere Beach, stone celts, arrowheads and a rude spearpoint from the surface at same place —By Purchase and Exchange
14207—1217 Grooved stone axe, arrowheads and spearpoints of stone from the surface near Sag Harbor, N Y a rude implement of stone from the grave and one of quartz from a shellheap at same place —Collected and presented by Mr Will Wallace Tooker of Sag Harbor
14216—14223 Stone scrapers, celts, drills, arrowheads, spearpoints, knives and hammerstones, polishing implements of stone and coal, disks of stone, coal, and terra cotta shell spoons, human crania, animal bones, beads of stone and terra cotta charcoal and charred corn, earthen pipes and a collection of pots, dishes, bowls, and bottles, ornamented and plain, some painted and others in human and animal forms from stone graves near Cain’s Chapel, Davidson Co, Tennessee —Collected by Mr E Curtis in continuation of the Exploration of Tennessee by the Curator conducted for the Museum
14224—14222 Earthen pipe and stopple, stone celts, spearpoints, and sharpening stone, paint, shell beads, and a collection of characteristic pottery, consisting of twenty-six specimens, from the mounds in southeastern Missouri —By Purchase
14223—14224 Arrowheads and rude implements of quartz from Catlett’s Station, Va —Collected and presented by Hugh Thomas Douglas, Esq
14325—14328 Stone celts, grooved hammerstones, and a stone axe from Lowell Mass, —region formerly occupied by the Pawtucket Indians —Collected and presented by Mr John M Batchelder of Cambridge
14329—14335 Stone knives, spearpoints and arrowheads from Monmouth and Middlesex Counties, New Jersey —Collected and presented by Mr C F Woolley
14330—14338 Grooved stone axes and stone celts, rude and polished, carved ornaments of polished stone, some of which are perforated, scrapers, sinkers, knives, drills, spearpoints and arrowheads, of various forms, in argillite quartz and Jasper, hammerstones round and oval with and without knaps pits, fragments of pottery and of earthen pipes and pipe stems, mica, human crania, glass and shell beads, bone implements, and a large variety of rude stone implements from the drift at Trenton, from Mercer, Gloucester Monmouth, Warren, and Morris Counties, New Jersey —Explorations of Dr C C Abbott, conducted for the Museum
14694—14696 Arrowheads and scrapers of stone from Trenton, N J —Collected and presented by Mr Ernest Ingersoll, of Jersey City
14697 Pipe made of ribbed slate very highly polished, a beautiful specimen of aboriginal workmanship from Trenton, N J —Collected and presented by Mrs Julia O Abbott
14698—14702 Rude stone implement from Chester Co, Penn, shell
heads from Mollisville, Pa., bone implement from Palatine Bridge, N. Y., stone implements from Beardstown, Ill., part of the lot of 1000 found by Dr. J. E. Snyder,1 stone hoe, showing marks of use, from Brandenburg, Ky.—Presented by Dr. C. C. Abbott of Trenton, N. J.

14703 Stone hoe from Evansville, Indiana.—Collected by Mrs. Whitney and presented by her through Dr. C. C. Abbott.

14704 Sandals made of braided straw from Hong Kong, China.—Presented by Miss F. W. Puxon of Cambridge.

14705–14716 Rude stone implements and pebbles, one of which shows marks of probable glacial scratching, from the surface, Trenton, N. J., jasper flakes and cores found buried in a meadow near the same place, rude stone implement from the gravel drift and another from the surface at Big Timber Creek, Salem Co., N. J., stone knives from Passaic, N. J., stone flakes from a shell heap on West Creek, Monmouth County, N. J., and east of a stone pipe found at Lewes, Delaware, and now in the possession of Dr. S. Haldeman.—Presented by Dr. C. C. Abbott.

14717 Photograph of a grooved stone axe.—Presented by Mr. A. F. Berlin of Reading, Penn.

14718 Twelve photographs of Indians of Chili.—Presented by Count L. F. Pourtalés of Cambridge.

14719 Photograph of a shell disk found in a mound in Southeast Missouri, interesting from its resemblance to certain ancient Mexican drawings.—Presented by Mr. A. J. Conant of St. Louis.

14720–14722 Blanket, white and brown with black stripes, made by the Navajo Indians and two belts, with figures in red and white, made by the Pima Indians.—Collected and presented by the Hon. John R. Burchill, Providence, R. I.

14723–14727 Cup and saucer of black pottery and three flower pots, white ground with black lines, made by the Pueblo Indians of New Mexico.—Collected by Mr. W. P. McCracken and presented by Mr. A. H. Thompson of Topeka, Kansas.

14728–14734 Seven human crania from an ancient cemetery on the Bay of Chalca, Peru, being a part of the collection described by Mr. Blake in the 11th Annual Report, p. 277.—Collected and presented by Mr. John H. Blake of Boston.

14735–14734 Shells, flint arrowheads and flakes, charcoal and fragments of pottery from Cahokia Mound, Illinois, fragments of ancient pottery and various articles of modern manufacture from a small mound in the same neighborhood, stone celts, hoes, spear points, and arrowheads from the surface between the Cahokia and Monks' Mounds, all situated on the river bottom opposite St. Louis.—Collected and presented by the Curator.

14735–14736 Rude flint implements from the surface near Sedalia, and a flint arrowhead from Allenton, Mo.—Presented by Dr. Geo. J. Engelmann of St. Louis, Mo.

1See Smithsonian Report for 1876, p. 433.
14757-14944 Fragments of soapstone pots, in different stages of completion and the stone implements used in their manufacture, found in the original quarry, \(^4\) stone mortars, pestles, conals, bowls, and pots, pipes, perforated stones of various sizes and shapes, knives, daggers, scrapers, and arrowheads of stone sharpening and polishing stones, whistles, daggers and awls of bone, teeth of animals, heads, fish-hooks and ornaments of shell, beads of stone brass and glass, arrowheads and spearpoints of black flint, paint and paint pots of stone and bone, human crania and bones, and a stone painted in red and white circles, all from graves and shell heaps on Santa Catalina Island, off the coast of California. In addition to the articles mentioned above, there is also a large collection of water-tight baskets and another of clay vessels, such as are now made by the Indians of Southern California \(^5\)—Explorations conducted for the Museum by Mr. Paut Schumacher.

14945 A stone fish 2413\text{\textmu}m long and 65\text{\textmu}m broad just back of the dorsal fin, perforation through the tail, from Salem Neck—By Purchase.

14946-14949 Stone arrowheads and knives from West Chester, Penn—Collected and presented by Mr. H. R. Kerley.

14950-14953 Fragments of pottery, stone arrowheads, spearpoints, knives, drills, scrapers, etc., from Piedmont, South Carolina—By Purchase.

14954-15050 A collection of pottery consisting of seventy pieces, of the typical forms found in Southeast Missouri, an earthen pipe, stone hoes, and shell heads from the same locality—By Purchase.

15060-15208 Earthen bowls, jars, and vases of different forms and colors, some with painted designs and others ornamented with grotesque human and animal forms, celts, mullers, spearpoints, knives, and disk of stone, beads of glass, stone, and pottery, small human and animal figures in stone and terra cotta, chips and knives of obsidian, all from the Island of Zapatero in Lake Nicaragua and from Nanduine Jinotepec Tenetepo, Duitama, and other places on the shores of the Lake, flint knife, perforated shells, and three human crania with other human bones from the cave of Cuicunam, fragments of vases, flint chips and cores, stone celts, and different kinds of shells from a mound at La Virgen, Nicaragua—Explorations conducted for the Museum by Dr. E. H. Fison.

15209 Fragment of a large terra cotta vase showing human face surmounted by a bird's head—Collected by Gov. F. P. Barren, of British Honduras and presented by Dr. A. H. Lyman, through Mr. Stephen Salisbury, Jr., of Worcester.

15210 Earthen bowl in human shape from a stone grave near Nashville, Tenn—Collected and presented by Mr. Griswold of Boston.

15211-15265 Fifteen human crania and several leg bones, among them a femur showing a fracture and the subsequent overlapping and union of the parts, thirteen earthen pots and vases of the usual variety.

\(^4\) For a special account of several of these articles see the paper by Mr. Schumacher in the 11th Report, p. 278.

\(^5\) See the paper by Mr. Schumacher on a following page.
of forms, disks of shell, stone, and terra cotta, shell and earthen heads, shell spoons, flint dagger, stone tablet, drills, celts, knives, arrowheads, and spearpoints of flint, from stone graves and on the surface in Car's field near Nashville, Tenn.—Collected by Mr E. Curtiss in continuation of explorations by the Curator.

15367—15317 Twenty-four cranial from Man, Sandwich Islands, two of Negroes from Africa, one of a Hindu, seven of North American Indians, and several casts, stone celts from Nashville, Tenn., New Mexico, Massachusetts, and the Sandwich Islands, Tobacco pouch, and a garment of striped cloth made by the Mandingo tribe of Africans—an iron pointed spear, shawl, and mats made by the Eams in Central Africa, collected by Mr P. F. Du Chaillu—Collected and presented by Dr S. Kneeland of Boston.

15318—15333 War club, cannibal’s fork, woman’s comb and ear-ring, flute, musical pipes, earthen drinking vessel, liku, a garment worn by women, and specimens of twine and tapa, or native cloth, from the Fiji Islands, stone celt from Oahu, Sandwich Islands—Collected and presented by Mr Charles Derby of Salem, Mass.

15334—15351 A jar, glazed on the inside and around the mouth, probably of Spanish manufacture, stone celts, scapula, arrowheads, knives, flint chips and broken stone implements, fragments of pottery stamped, incised, and cord marked, some painted, and one showing two or more layers of clay, fragments of human cranial and other human bones from burial mound on an island in Santa Fé Lake, Florida, and other mounds on the shores of the same lake and at Orange Point, Hickory Pond, and Cade’s Pond, Florida—Explorations conducted for the Museum by Mr Henry Gillman.

15372—15377 Spearpoints, arrowheads and chips of flint from Albany, Georgia, handle of jar in terracotta, and fragments of stamped pottery from a shell mound on Halifax Inlet, East Florida—Collected and presented by Mr S. C. Clarke.

15378 Cranium of an Indian from G. A. Tapley’s farm near Revere Beach, Mass.—Collected and presented by Mr A. A. Tapley, Revere, Mass.

15379—15384 Basket and matting made of the inner bark of the cedar, fishhooks, and a fishing line made of hemp from Puget Sound—Collected and presented by Dr David Mack of Belmont, Mass.

15385—15397 Grooved stone axe, hammerstone, stone celt, pestle, sinker, spearpoints, and arrowheads, fragments of pottery, incised and cord marked, from Delaware Water Gap, Penn.—Collected by Mr L. W. Brodhead of that place, and presented by him through the Hon. Robert C. Winthrop.

15398—15316 This collection is composed almost exclusively of articles found within the limits of the United States, and chiefly in the Ohio Valley. It is especially rich in stone pipes, twenty of which are of aboriginal workmanship, and in stone ornaments polished and perforated, of which there are thirty-three specimens that are perfect. Besides these
there are thirty-two grooved stone axes, thirty one celts and gouges, and some hundreds of knives, mullers, pestles, scrapers, disks, arrowheads, and spearpoints of the patterns common in the Ohio Valley, with here and there a form that is new. It also includes copper beads from a mound near Newark, Ohio and a celt of the same material from Lewiston, Maine, several implements of hematite and specular iron more or less highly polished from the Ohio Valley, fifteen vessels of pottery from Southeast Missouri, West Virginia, a mound on Massie’s Creek near Xenia, Ohio, Henderson Ky, and from different places in Indiana. Among the articles from mounds near Xenia and Newark, Ohio are five pipes and several stone implements of special interest. There are also stone pipes from Canada, a perforated stone axe from Denmark, shell fishhooks and a native hair brush from the Fiji Islands — By Purchase from WM. CLEGG.

15817—16030 Thirty human crania, fifty specimens of pottery, including pots, bottles, bowls, jars, etc., some plain, some ornamented, and others painted or moulded into human, fish, frog, and bird forms, heads, spoons, plain and carved disks of shell, bone combs, stepplers, dishes and beads of pottery, spindle whorls, disks and celts of stone flint diggers, knives, arrowheads and spearpoints, "clungke" and sharpening stones, all from stone graves at Old Town, Williamson Co., Tennessee. Six stone hoes, a disk, "clungke" stone and other implements also of stone from the farm of Mr. BAYLESS Link in Humphreys Co., Tennessee — Collected by Mr. E. CURTIS in continuation of the Exploration of Tennessee by the Curator, conducted for the Museum.

16031 An iron-pointed Comanche arrow from Texas taken from a human body — Collected and presented by Mr. JOHN ALLAN, WARE of Longview, Texas.

16042 Small celt of serpentine — Presented by the Hon. ROBERT C. WINSHIP of Boston.

16043 Amulet from Egypt — Presented by Mr. WILLIAM JOHN POTTS of Camden, N. J.

16044—16057 Lantern spool, piece of a bronze blade, fragments of pottery and mosaic work in marble from the ruins of Mycena — Collected and presented by Mr. ALFRED W. CARY of Cambridge.

16048—16049 A bridle and pad of spurs, modern Peruvian, hobble for horses from Uruguay, saddle, latte and bridle bit from Mexico — Collected and presented by Mr. THOMAS G. CARY of Cambridge.

16044—16047 Stone pestle from Lake George, New York, grooved stone axe from Lynn, Mass., stone gouges from Ipswich, grooved stone sinkers from Salem Neck, arrowheads, sinkers, gouges, and seven grooved stone axes from Marblehead, Mass. — By Purchase.

16071—16074 Celt hammers, hoe, and spearpoint, all of stone, from West Ridge, N. H. — Collected and presented by Mr. G. E. WARE, Boston, Mass.

16075—16091 Fragments of steatite pots and the implements of quartz and slate used in making them, found in the quarry four miles from Wash-
ington City. These articles are similar to those found on Santa Catalina Island by Mr. Paul Schumacher, and to those taken from a quarry near Providence by the Curator—Collected and presented by Mr. Elmer R. Reynolds, of Washington.

16092. Clam shell of an Indian from an island in the Mississippi River near McGregor, Iowa—Collected and presented by Mr. Henry Davis of McGregor.

16093—16445. In this collection there are a number of grooved axes, stone celts, pestles, arrowheads, and spear points from Greenwich collected by Dr. E. Holmes; arrowheads, celts, hammerstones, and a hoe, from Glassboro collected by Mr. W. H. Bicker; and Dr. J. D. Heritage, stone daggers, arrowheads, and knives from Newark, N. J., collected by Mr. W. T. Lowthorp; stone knives, drills, scrapers, and ornaments, and fragments of pottery, stamped, incised, and cord and cob marked, from Salem, collected by Mr. Robinson. In addition to these there is a large number of specimens from the neighborhood of Trenton collected by Dr. Abbott in person. Summing up the result of his explorations for the year it will be seen that they run through 622 distinct entries in the catalogue and number over 5,500 specimens. Among them are 104 'paleolithics,' seventy-two grooved stone axes of different sizes and shapes, some highly polished and one 'inscribed,' sixty-five celts of various forms and degrees of finish, with arrowheads, scrapers, knives, and the other implements common to this locality by the hundred, both in Jasper and in argillite. Of stone ornaments, polished and perforated, there is also a fair representation, including several of the so-called gorgets, axes, a bun, and other forms that are altogether new. Perhaps one of the most interesting discoveries of the year is the 'work shop' that was found buried eighteen inches below the surface, and under a tree that was two feet in diameter. It consists of several pecks of chips, cores, and nodules of Jasper and quartz, with quantities of broken and unfinished implements of the same material, and several hammerstones all found mixed together just as it was probably left by the ancient workman—From the Explorations of Dr. C. C. Abbott conducted for the Museum.

16346. Sixteen stone sinkers notched at sides, found together in one lot, from Trenton, N. J.—Collected and presented by Master Richard M. Abbott.

16347—16349. Stone knives collected by Dr. E. Holmes, of Greenwich, Cumberland Co., N. J., stone ornaments, perforation unfinished, and a coil.

6. A description of this ancient quarry and of the articles here recorded will be found in the following pages of this Report.

7. This name has been given to the rude implements found in the drift at Trenton. In this connection it may not be out of place to say that in September last, in company with Prof. J. D. Whitney, of Harvard College, I visited Trenton and that we were fortunate enough to find several of these implements in place. Prof. Whitney has no doubt as to the antiquity of the drift, and we are both in full accord with Dr. Abbott as to the identical character of many of these implements—Lucas Carr, Assistant Curator Peabody Museum.
of clay, probably the beginning of an earthen jar, from Trenton—Collected and presented by Dr. C. C. Abbott.

16350 Human arm with wrist and fingers tattooed, from Ancon, Peru—Collected by the late Prof. Louis Agassiz during the Hasselt Expedition and presented by the Museum of Comparative Zoology.

16361—16369 Small stone pot, small disk of gold, sixteen earthen vases of different patterns, some painted, and one in animal form, from Tiwanaku, Lake Titicaca. Also two inscribed stones found near Atequía, Peru—Collected and presented by Mt. E. A. Fenn of Boston.

16370 Glass beads and fragment of human clavium from an Indian grave at West Chester, Penn—Collected and presented by Mt. Jerome B. Gray.

16371—16374 Stone celts from the Sandwich Islands, and a small basket used by the Indians of the Yo Semite Valley, in which to keep worm bait alive—Collected and presented by Dr. S. Kirkland and Boston.

16375—16377 Stone implements, arrowheads, knives, scrapers, grooved axes and spearpoints, of the various patterns usually found in New Jersey and the Ohio Valley clavium of Seminole Indian and fragments of human and animal bones from shellmounds in Florida, small human figure in terra cotta from Mexico, tweezers and fragment of ornament in copper and a monkey’s head in pottery from Peru, earthen lamp vase and laces (Athene), glass tea vessel from Greece, four lamps in terra cotta from Peru and fragments of glass and glazed pottery from the ruins of Balbec Syria, earthen lamps and vases, glass tea vessel, a bronze greave, and other implements and weapons of bronze and iron from different places in Italy, earthen lamp and human figure and a pair vessel of glass from Arles, France, rude stone implements—palaeolithics—from Abbeville, stone celt from Nice, bronze celt from Brittany and flint core and flakes—stone celt and beads, fragment of a bronze blade and a beautiful bronze celt, all dredged from the Seine at Paris, France, stone celts and arrowheads from the Giant’s Causeway and celts and spearpoints of bronze from the River Boyne, Ireland, bronze bracelets, spearpoints, hangers, celts, pin and weaping hook from prehistoric stations in Austria, a choice collection of specimens, twenty-five in number, illustrative of the stone and bronze ages of Sweden and Denmark, mumified bodies and young crocodiles feet and hands of human mummies, and fragments of cloth in which they were wrapped, earthen lamps and several small vessels of the same material, human and animal figures in wood, and a series of fifty amulets, five bead necklaces and numerous ornaments made in pottery and painted scarabaei, in stone and terra cotta alabaster vase in the shape of a kneeling human figure, and several fragments of stone statues, some of them with hieroglyphics inscribed on them, all from Egypt. In addition to this very handsome collection there is a large number of specimens from the Swiss lakes but chiefly from Lake Briene. Among these are forty-three stone celts, and numerous knives six of which are mounted in horn handles, flint flakes, hammers, spindle whorls and other implements of stone, bone daggers and needles, awls, celts and perfor-
ated ornaments of the same material, a ring, vase and spindle whorls of pottery, numerous specimens of teeth and bones of animals, etc., bones of birds and many other articles of use and ornament such as are usually found on the sites of the ancient Lake Dwellers. From Lake Bourget, Aix Les Bains, there are horn sockets, heads and spindle whorls of pottery, stone implements, and pins. fish-hooks, and vases of bronze. The entire collection, a gift from Mr. Clarence B. Moore, of Philadelphia, (Harvd '73), comprises 346 entries and consists of specimens drawn literally from the four quarters of the globe, in point of time it has representatives from the rude stone implements of France, all the way down through the successive ages of polished stone and bronze to the time of iron in the comparatively recent past. Covering such a vast extent of country and extending through all the earliest periods of the growth of the human race it forms a small Museum in itself and is of special value for purposes of comparison — Collected and presented by Mr. Clarence B. Moore of Philadelphia.

16722—16730 Fragments of pottery and stone arrowheads from an island in Lake Mendota, Wis., a perforated human skull, and other human and animal bones, with fragments of pottery from a mound near the same lake — By Purchase.

16731—16744 Stone celt, horn sockets, fragments of pottery and animal bones from the lake dwellings at Conise, Switzerland, small southern vases from Paestum, Italy, shells and pieces of mosaic and glass from the Sybil’s Cave at Cumae, and from Rome, Italy, arrowheads and spearpoints of quartz from Washington City, D C — Collected and presented by Count L. F. Potocki of Cambridge.

16745—16801 Fibres of different plants with cloth and garments made from them—head-dresses, belts, necklaces, and other ornaments made of feathers, whistle flute, bracelet, and necklace of bone baskets paddles, wooden mortar and mangle graters, arrows with cane, horn and bone points, some poisoned, ziaquatana, or blow gun, with a quiver of poisoned arrows and a package of wound poison, all from the Amazon River, and such as used by the present Indians — Collected by the Thayer Expedition under the direction of the late Prof. Louis Agassiz, and presented by the Museum of Comparative Zoology.

16802—16803 Fragments of pottery and stone chips from a rock shelter at Hudson, Ohio — Collected and presented by Mr. M. C. Read.

16804 An obsidian arrowhead from the valley of San Juan New Mexico — Collected and presented by Mr. Charles Amiduch.

16805 Old Spanish olive jars for comparison — By Purchase.

16806—17163 This exceedingly valuable collection, made on Omotpec Island, Lake Nicaragua, from a mound at Tola and at other points on the shores of the same lake, consists in part of forty burial jars, some of them exceedingly small, others very large, about two hundred and thirty other articles of pottery in different colored clays, some plain, some painted, whilst others are ornamented with moldings of grotesque heads and figures, and several are fine pieces of incised work. Among them are
found a great many different patterns of jars, bowls, and vases executed in such a manner as to give a good idea of the high development reached in the ceramic art by this ancient nation. Some of the forms are easy and graceful, while in plastic ornamentation the taste of the ancient potters seems to have been often towards the grotesque. In addition to these articles in terra cotta there are heads of stone, bone, and shell, celts, pestle, sinkers and millers of stone, three large stone metates, one ornamented with an animal's head and the other with bird's heads, human and animal bones, spindle whorls, whistles, and stands in terra cotta, flint scrapers and knives, grinding stones, a knife of jade and flakes of obsidian from different places on Omotepec Island and along Lake Nicaragua.

—Exploration of Dr. Earl Fitch conducted for the Museum

17164—17177 Flint arrowheads, spearpoints, drills, knives, and scrapers, of the forms usually found south of the Ohio, from Bales' Mills, Lee County, Va.—Collected and presented by Mr. F. T. Buitts.

17178—17205 Calumet from a rock house near Pineville, Ky, and one from a cave in Lee County, Va., human bones, grooved axe, and stone celts, "chungke" stone, arrowheads, spearpoints, and knives of flint, ring of slate, piece of hematite, and a small disk of pottery, from Lee County, Va.—Exploration conducted for the Museum by Mr. Charles B. Johnson of Gibson's Station, Lee County, Va.

Additions to the Library

From the Author—Pseudo, by S. W. Garman, Cambridge Pamphlet 1877

From the Academy of Natural Sciences, Davenport Iowa—Lithograph of a Stone Tablet recently discovered in the neighborhood of Davenport.

From the Society—Thirty-first Report on the Archaeology of Schleswig-Holstein, by Heinrich Handelmann with wood cuts Pamphlet 1878.

From the Society—Proceedings of the Archaeological Society of Athens, Greece, from January 1877 to January 1878 Pamphlet Athens, 1878.


From the Trustees of the Peabody Education Fund—A bronze medal struck in honor of George Peabody. On the obverse is the head of Mr. Peabody, with the words, 'George Peabody, born 16 Feb., 1795—died 4 Nov., 1869.' On the reverse is the inscription: "Education—a debt due from present to future generations," and also, in somewhat smaller characters, "The Trustees of the Peabody Education Fund."

at the opening of the Lewis Brooks Museum, at the University of Virginia June 27, 1878 1 vol, 8vo pp 53 Richmond, Va., 1878

From the Academy The Transactions of the Academy of Science of St Louis Vol III, No 4 1878

From Prof. Henry Ward Pool Silabario de Idioma Mexicano por el lic D Faustino Chimalpopocalt Pamphlet, 17 pp Mexico, 1849

By Purchase Cuadro descriptivo y comparativo de las Lenguas Indigenas de México, por D Francisco Pimentel 2 vols, 8vo Mexico 1862-5

The Scandinavian Races, by Paul C Sinding 1 vol 8vo, pp 493 New York, 1878

From the Society Annual Report of the Minnesota Historical Society, for the year 1877 Pamphlet, 8vo, 24 pp Proceedings of the Minnesota Historical Society, from Nov., 1849, to May 11, 1858 Pamphlet, 21 pp The Sixth Annual Report of the Geological and Natural History Survey of Minnesota for the year 1877 1 vol, 8vo, pp 225

From the Author Report on the Geographical and Geological Survey of the Rocky Mountain Region Outlines of the Philosophy of the North American Indians, by Major J W Powell, Washington City 2 pamphlets, 8vo 1877

From the Author Ancient Earthworks in Northern Ohio, by Col. Charles Whittlesey Pamphlet, 8vo, 7 pp 1878


From the Academy Proceedings of the Davenport Academy of Natural Sciences Vol II, part 1 1877

From the Society Berichte zur Anthropologie und Urgeschichte Bayerns, organ der Munchener Gesellschaft fur Anthropolgie, Ethnologie und Urgeschichte Zweiter Band, 1, 2, 3 Heft Munchen, 1878
From Prof. William Everett Traditions of Decoada and Antiquarian Researches, by William Pidgeon. 1 vol, 8vo, 334 pp. New York 1853

From the Author Vortrag über den Mexikanischen Calender-stem, gehalten von Prof. Ph. Valentum. 30 April, 1878, in Republican Hall, New York City, vor dem Deutsch ges Wissenschaftlichen Verein Pamphlet, 32 pp, 8vo 1878


From the Society Annual Address of Chief Justice Daly LL D, President of the American Geographical Society on the Geographical Work of the World. 101 1877 New York Pamphlet, 8vo 76 pp. 1878

From the Society Reports and Communications to the Cambridge Antiquarian Society, Nos XVII and XIX, being No 3 of Vol III and No 1 of Vol IV, An Annotated list of Books printed on Vellum, to be found in the University and College libraries at Cambridge England, by Samuel Saunders, M A of Trinity College Pamphlet, 8vo Cambridge and London 1878

From the Society Proceedings of the Literary and Philosophical Society of Liverpool No XXXI 1 vol, 8vo, pp 423 London and Liverpool, 1877

From the Association Proceedings of the Central Ohio Scientific Association at Urbana. Ohio Vol I, part I 1878

From the Academy Annual Report of the Chicago Academy of Sciences for 1878 Pamphlet

From the Museum The Illinois State Historical Library and Natural History Museum Pamphlet Springfield 1877

From Principal J. W. Dawson, Montreal The Leisure Hour for 1874, bound 1 vol. Continuing his series of Archaeological papers

From W. Wallace Tooker, of the Library New York The Legends of Montauk, by J A Ayres, with an Historical Appendix. Hartford 1849 1 vol., 8vo, pp. 127

From the Academy Proceedings of the California Academy of Sciences Vol VI, and Part I of Vol VII San Francisco 1876-7

From the Society Journal of the Cincinnati Society of Natural History Vol I Part 2 July, 1878

From the Author Promenade Onomatologique sur les bords du Lac Léman Beine, 1867 Indian Languages of the Pacific States and Territories New York, 1867 Analytical Reports upon Indian Dialects spoken in Southern California Washington, 1876 Remarks upon the T'Ókawa Language Philadelphia 1876 The Tinumna Language and Sequel Philadelphia 1877-8 Five pamphlets by Albert S. Gatschel. Washington City, D C

From the Society Proceedings of the American Antiquarian Society No 31 Worcester, 1878

From Prof. John Robinson, Salem Journal of the Shanghai Literary and Scientific Society No 1, 1st June, 1858

From the Museum The Seventh Annual Report of the Curators of the...
Museum of Wesleyan University, including a visitor's guide to the Museum Pamphlet, pp 24 1878

From the Author Poetical Works, by Levi Bishop 1 vol, 8vo, p 517, Detroit, 1876

From the Society Baltische Studien Herausgegeben von der Gesellschaft fur Pommersche Geschichte und Alterthumskunde Parts 1, 2, 3 4, 5 Vol XXVIII Stettin 1877

From the Author Aboriginal Structures in Georgia, by Charles C Jones, Ji Pamphlet, 13 pp Washington, 1878

From the Board of Agriculture The 22nd Annual Report of the Maine Board of Agriculture for 1877 1 vol, 8vo, pp 328

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From the Society Archivio per l'Antropologia e la Etnologia Organo della Societa Italiana di Antropologia, Etnologia e Psicologia comparata, Firenze, Italy Ottavo volume, Fascicolo secondo 8vo 1878

From the Museum Annual Report of the Curator of the Museum of Comparative Zoology at Harvard College, for 1877-78 Bulletins Nos 9 and 9 Vol V, Cambridge, Mass 1878

From the Smithsonian Institution Report for 1877 1 vol, 8vo, pp 500 Washington, D C 1878

From Thomas G Cory, Esq, Cambridge, Mass Recuerdos de la Campana de Buenos Aires 1 vol, John Japanese Sketches of Costumes and Scenes 2 vols A series of outline maps

From Count L P Poniatows Monuments de l'Ancien Eveche de Bale Par A Quinet 1 vol, 8vo, pp 427, with plates and maps 1864

From the Author Origin of the Chinese Race, Japanese Wrecks on the North Pacific, Early Maritime Intercourse of the Ancient Western Nations, three pamphlets by Charles W Brooks, Esq, San Francisco 1876


From the Imperial University of Tokyo Twenty-two volumes, containing illustrations and text, Ancient Customs and Costumes of the Japanese

From the Author A Handbook of Boston by Moses King 1 vol, 8vo, pp 292 1879

From the Author Some Early Notices of the Indians of Ohio To what Race did the Mound Builders belong? Pamphlet by Judge M F Force, 8vo, 75 pp 1879

From the Author Relic Hunting on the Mohawk, by S L Frey, Palatine Bridge, N Y Pamphlet, 9 pp 1878

From Prof H H Straight Report of the State Normal and Training School, at Oswego, New York 1878

MEASUREMENTS OF CRANIA FROM CALIFORNIA

By Lucien Carr, Assistant Curator

In the following tables the measurements are given of about one hundred and fifty crania of the Indians of the coast and islands of Southern California, obtained, within the past three years, by Mr. Paul Schumacher during his explorations for the Museum.

As I have already furnished you with a paper to accompany your Report to Lt. Wheeler on the Archaeological Collections obtained in Southern California by the party acting under his direction, in which I have endeavored to present a full discussion of the results of the measurements here given, combined with an equally large number published by Dr. Otis, Curator of the Army Medical Museum, it is only important, here, to publish full tables of those measurements in order to continue the record of the Crania belonging to the Museum.

In these tables the number of crania measured is given in small figures at the head of each column, and only the skulls of adults have been included. The effort has also been made to place the skulls of males and females in different tables but, of course, with only approximate results.

The metric system is used in all the measurements, the length, breadth, etc., being given in millimetres, and the capacity in cubic centimetres.

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I CRANIA FROM SANTA CATARINA ISLAND, CALIFORNIA MALES.
## Crania from Santa Catalina Island, California: Females

| Museum Number | Capacity | Length | Breadth | Height | Index of Breadth | Index of Height | Wall of Brachial | Length of Face | Length of Cephalic Suture | Breadth of Nasal Bridge | Best Measured | Tongue | Pre-eon | Nasal Index | Cephalic Index | Height of Orbit | Width of Orbit | Orbital Index | Zygomatic Diameter |
|---------------|----------|--------|---------|--------|----------------|----------------|----------------|---------------|-----------------------------|------------------------|---------------|--------|--------|------------|---------------|----------------|---------------|--------------|--------------|------------------|
| 12131         | 1098     | 170    | 122     | 119    | 717            | 706            | 91             | 16            | 48                          | 28                     | 92            | 8      | 8      | 32         | 102           | 93             | 77             | 22            | 205           | 100              |
| 12266         | 1120     | 170    | 121     | 113    | 686            | 758            | 90             | 19            | 26                          | 35                     | 95            | 8      | 8      | 33         | 102           | 93             | 77             | 22            | 205           | 100              |
| 12257         | 1133     | 170    | 124     | 116    | 704            | 656            | 92             | 16            | 48                          | 28                     | 92            | 8      | 8      | 32         | 102           | 93             | 77             | 22            | 205           | 100              |
| 12249         | 1173     | 170    | 132     | 124    | 678            | 656            | 96             | 16            | 48                          | 28                     | 92            | 8      | 8      | 32         | 102           | 93             | 77             | 22            | 205           | 100              |
| 12236         | 1171     | 170    | 142     | 124    | 678            | 656            | 96             | 16            | 48                          | 28                     | 92            | 8      | 8      | 32         | 102           | 93             | 77             | 22            | 205           | 100              |
| 12234         | 1244     | 170    | 134     | 124    | 747            | 656            | 96             | 16            | 48                          | 28                     | 92            | 8      | 8      | 32         | 102           | 93             | 77             | 22            | 205           | 100              |
| 12253         | 1244     | 170    | 134     | 124    | 747            | 656            | 96             | 16            | 48                          | 28                     | 92            | 8      | 8      | 32         | 102           | 93             | 77             | 22            | 205           | 100              |
| 12250         | 1244     | 170    | 134     | 124    | 747            | 656            | 96             | 16            | 48                          | 28                     | 92            | 8      | 8      | 32         | 102           | 93             | 77             | 22            | 205           | 100              |
| 12280         | 1244     | 170    | 134     | 124    | 747            | 656            | 96             | 16            | 48                          | 28                     | 92            | 8      | 8      | 32         | 102           | 93             | 77             | 22            | 205           | 100              |
| 12285         | 1244     | 170    | 134     | 124    | 747            | 656            | 96             | 16            | 48                          | 28                     | 92            | 8      | 8      | 32         | 102           | 93             | 77             | 22            | 205           | 100              |
| **Average**   | 1279     | 170    | 134     | 124    | 747            | 656            | 96             | 16            | 48                          | 28                     | 92            | 8      | 8      | 32         | 102           | 93             | 77             | 22            | 205           | 100              |
| **Maximum**   | 1279     | 170    | 134     | 124    | 747            | 656            | 96             | 16            | 48                          | 28                     | 92            | 8      | 8      | 32         | 102           | 93             | 77             | 22            | 205           | 100              |
| **Minimum**   | 1279     | 170    | 134     | 124    | 747            | 656            | 96             | 16            | 48                          | 28                     | 92            | 8      | 8      | 32         | 102           | 93             | 77             | 22            | 205           | 100              |
| **Range**     | 1279     | 170    | 134     | 124    | 747            | 656            | 96             | 16            | 48                          | 28                     | 92            | 8      | 8      | 32         | 102           | 93             | 77             | 22            | 205           | 100              |
### CRANIA FROM SAN CLLEMENTE ISLAND, CALIFORNIA MALES

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**Average:**
- Length: 152.8
- Breadth: 128.6
- Height: 134.1

**Range:**
- Minimum Length: 12.0
- Minimum Breadth: 11.0
- Minimum Height: 7.0

**Standard Deviation:**
- Length: 10.2
- Breadth: 9.6
- Height: 8.4

**Coefficient of Variation:**
- Length: 6.7%
- Breadth: 7.6%
- Height: 6.3%

**Significant Differences:**
- Length: 0.01
- Breadth: 0.01
- Height: 0.01
### IV. CRANIA FROM SAN CLEMENTE ISLAND, CALIFORNIA  FFEMALES

| Museum Number | Capacity | Length | Bi-radii | Height | Index of Breadth | Index of Height | Width of Frontal | Length of Face | Length of Nose | Breadth of Nose | Basal Length | Basal Width | Pearson | Nasal Index | Glabellar Index | Height of Orbit | Width of Orbit | Orbital Index | Pterygoid Diameter |
|---------------|----------|--------|----------|--------|----------------|----------------|-----------------|----------------|---------------|----------------|--------------|-------------|-----------|----------|-------------|----------------|----------------|---------------|----------------|----------------|---------------|------------------|
| 11346         | 1140     | 116    | 113      | 128    | 720             | 727            | 68              | 68             | 48            | 25            | 92           | 96          | 18-15     | 51        | 104          | 39              | 88            | 124           | 27            | 123           |
| 11347         | 1144     | 117    | 115      | 125    | 743             | 747            | 71              | 71             | 37            | 23            | 94           | 90          | 17         | 46        | 95           | 36              | 86            | 123           | 27            | 123           |
| 11333         | 1168     | 117    | 115      | 122    | 738             | 743            | 94              | 94             | 54            | 24            | 96           | 90          | 17         | 46        | 95           | 36              | 86            | 123           | 27            | 123           |
| 11774         | 1195     | 121    | 118      | 121    | 728             | 732            | 89              | 89             | 54            | 24            | 96           | 90          | 17         | 46        | 95           | 36              | 86            | 123           | 27            | 123           |
| 11506         | 1160     | 119    | 116      | 121    | 728             | 732            | 89              | 89             | 54            | 24            | 96           | 90          | 17         | 46        | 95           | 36              | 86            | 123           | 27            | 123           |
| 11502         | 1174     | 117    | 115      | 127    | 730             | 734            | 89              | 89             | 54            | 24            | 96           | 90          | 17         | 46        | 95           | 36              | 86            | 123           | 27            | 123           |
| **Average**   | **1155** | **119** | **116**  | **122** | **728**         | **732**        | **90**          | **90**         | **54**        | **24**        | **96**       | **90**      | **17**     | **46**    | **95**     | **36**         | **86**         | **123**       | **27**        | **123**       |
| **Minimum**   | **1152** | **118** | **115**  | **120** | **725**         | **729**        | **86**          | **86**         | **50**        | **24**        | **92**       | **90**      | **17**     | **46**    | **95**     | **36**         | **86**         | **123**       | **27**        | **123**       |
| **Range**     | **8**    | **8**   | **8**    | **5**   | **730**         | **729**        | **6**           | **4**          | **5**         | **5**         | **8**       | **2**      | **9**     | **13**    | **13**     | **13**         | **13**        | **13**        | **13**        | **13**        |

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**503**
### CRANIA FROM SANTA CRUZ ISLAND, CALIFORNIA: FEMALES

| Museum Number | Capillarity | Length | Breadth | Height | Index of Maternal | Index of Head | Width of Frontal | Length of Face | Breadth of Nose | Basioseptal Length | Basioseptal Basioccipital Length | Prominence | Nasal Index | Gondolin Index | Height of Orbit | Width of Orbit | Orbital Index | Zygomatic Diameter |
|---------------|------------|--------|---------|--------|-------------------|---------------|------------------|---------------|----------------|-----------------|---------------------|-----------------------|------------|-------------|----------------|----------------|----------------|---------------|-----------------|
| 9109          | 11739      | 121    | 111     | 47     | 11867            | 123           | 769              | 775           | 82             | 89              | 96                  | 113                   | 110        | 86          | 82              | 90              | 82              | 82            | 90              |
| 9110          | 11740      | 122    | 112     | 48     | 11868            | 123           | 769              | 775           | 82             | 90              | 96                  | 114                   | 113        | 89          | 83              | 93              | 85              | 85            | 93              |
| 9111          | 11741      | 123    | 113     | 49     | 11869            | 123           | 769              | 775           | 82             | 90              | 96                  | 115                   | 114        | 86          | 87              | 92              | 90              | 92            | 92              |
| 9112          | 11742      | 124    | 114     | 50     | 11870            | 123           | 769              | 775           | 82             | 90              | 96                  | 116                   | 116        | 89          | 90              | 94              | 94              | 94            | 94              |
| 9113          | 11743      | 125    | 115     | 51     | 11871            | 123           | 769              | 775           | 82             | 90              | 96                  | 117                   | 117        | 91          | 92              | 96              | 96              | 96            | 96              |
| 9114          | 11744      | 126    | 116     | 52     | 11872            | 123           | 769              | 775           | 82             | 90              | 96                  | 118                   | 118        | 92          | 94              | 98              | 98              | 98            | 98              |
| 9115          | 11745      | 127    | 117     | 53     | 11873            | 123           | 769              | 775           | 82             | 90              | 96                  | 119                   | 119        | 93          | 96              | 100             | 100             | 100           | 100             |
| 9116          | 11746      | 128    | 118     | 54     | 11874            | 123           | 769              | 775           | 82             | 90              | 96                  | 120                   | 120        | 94          | 98              | 102             | 102             | 102           | 102             |
| 9117          | 11747      | 129    | 119     | 55     | 11875            | 123           | 769              | 775           | 82             | 90              | 96                  | 121                   | 121        | 95          | 100             | 104             | 104             | 104           | 104             |
| 9118          | 11748      | 130    | 120     | 56     | 11876            | 123           | 769              | 775           | 82             | 90              | 96                  | 122                   | 122        | 96          | 104             | 108             | 108             | 108           | 108             |
| 9119          | 11749      | 131    | 121     | 57     | 11877            | 123           | 769              | 775           | 82             | 90              | 96                  | 123                   | 123        | 97          | 106             | 110             | 110             | 110           | 110             |
| 9120          | 11750      | 132    | 122     | 58     | 11878            | 123           | 769              | 775           | 82             | 90              | 96                  | 124                   | 124        | 98          | 108             | 112             | 112             | 112           | 112             |
| 9121          | 11751      | 133    | 123     | 59     | 11879            | 123           | 769              | 775           | 82             | 90              | 96                  | 125                   | 125        | 99          | 110             | 114             | 114             | 114           | 114             |
| 9122          | 11752      | 134    | 124     | 60     | 11880            | 123           | 769              | 775           | 82             | 90              | 96                  | 126                   | 126        | 100         | 116             | 118             | 118             | 118           | 118             |
| 9123          | 11753      | 135    | 125     | 61     | 11881            | 123           | 769              | 775           | 82             | 90              | 96                  | 127                   | 127        | 101         | 122             | 124             | 124             | 124           | 124             |

**Average:**
- Capillarity: 11801.05
- Length: 122.12
- Breadth: 112.26
- Height: 48.5
- Index of Maternal: 11899.78
- Index of Head: 123.11
- Width of Frontal: 76.72
- Length of Face: 77.5
- Breadth of Nose: 82.12
- Basioseptal Length: 90.54
- Basioseptal Basioccipital Length: 96.15
- Prominence: 11909.74
- Nasal Index: 82.16
- Gondolin Index: 91.9
- Height of Orbit: 80.13
- Width of Orbit: 90.16
- Orbital Index: 11899.78
- Zygomatic Diameter: 11899.78

**Maximum:**
- Capillarity: 11859.75
- Length: 127.1
- Breadth: 120.1
- Height: 55.8
- Index of Maternal: 11909.75
- Index of Head: 127.1
- Width of Frontal: 80.18
- Length of Face: 82.15
- Breadth of Nose: 85.9
- Basioseptal Length: 96.18
- Basioseptal Basioccipital Length: 102.1
- Prominence: 11909.75
- Nasal Index: 85.9
- Gondolin Index: 102.1
- Height of Orbit: 102.1
- Width of Orbit: 102.1
- Orbital Index: 11909.75
- Zygomatic Diameter: 11909.75

**Minimum:**
- Capillarity: 11701.7
- Length: 117.1
- Breadth: 107.7
- Height: 41.7
- Index of Maternal: 11701.7
- Index of Head: 117.1
- Width of Frontal: 70.1
- Length of Face: 72.1
- Breadth of Nose: 75.8
- Basioseptal Length: 82.1
- Basioseptal Basioccipital Length: 88.1
- Prominence: 11701.7
- Nasal Index: 75.8
- Gondolin Index: 88.1
- Height of Orbit: 88.1
- Width of Orbit: 88.1
- Orbital Index: 11701.7
- Zygomatic Diameter: 11701.7

**Range:**
- Capillarity: 1588.0
- Length: 22.0
- Breadth: 14.0
- Height: 17.0
- Index of Maternal: 1571.0
- Index of Head: 19.0
- Width of Frontal: 116.0
- Length of Face: 150.0
- Breadth of Nose: 20.0
- Basioseptal Length: 20.0
- Basioseptal Basioccipital Length: 20.0
- Prominence: 1571.0
- Nasal Index: 20.0
- Gondolin Index: 20.0
- Height of Orbit: 20.0
- Width of Orbit: 20.0
- Orbital Index: 1571.0
- Zygomatic Diameter: 20.0
### VII  CRANIA FROM THE SANTA BARBARA ISLANDS AND MAINLAND NEAR SANTA BARBARA, CAL.  MALES

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| Average       | 13.9     | 174    | 14.9    | 189    | 726             | 631             | 53             | 24            | 98            | 104            | 15-12        | 15-106                 | 14     | 16          | 14            | 14             | 16            | 16            | 16             |

### VIII  CRANIA FROM THE SANTA BARBARA ISLANDS AND MAINLAND NEAR SANTA BARBARA, CAL.  FEMALES

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| Average       | 13.7     | 172    | 14.9    | 189    | 726             | 631             | 53             | 24            | 98            | 104            | 15-12        | 15-106                 | 14     | 16          | 14            | 14             | 16            | 16            | 16             |
FLINT CHIPS

BY CHARLES C. ARBOUR, M. D.

Under this general term may be considered the various flakes, splinters, chips, cores, and all such refuse of those minerals that have been used in the manufacture of chipped implements, as knives, scrapers, spearheads, arrowpoints, and drills or perforators. Wherever any of these or allied forms of finished implements occur it is usual to find chance specimens of this refuse material, and, when thus met with, they have, I think, much more archaeological significance than is generally supposed, but to this, I will refer, hereafter. When, however, vast quantities of such chippings occur, in a very limited area, they indicate without doubt, that at such a locality the various forms of weapons and implements were there made in quantities, and, doubtlessly, by a system of trade among adjoining tribes, were in time dispersed over a large extent of country.

Such accumulations of this refuse material are met with under two quite different circumstances, as where a suitable exposure of living rock occurs that is adapted to the ready chipping of the various forms of implements, which are, in such cases, necessarily of a like mineral and present, curiously enough, a very uniform appearance in the pattern adopted, although the mineral is readily chipped into other and more delicate forms, as shown by broken specimens in the refuse heaps where a boulder of this same rock has been utilized; and again, we have such accumulations, where selected minerals, in small masses, have been brought together, and from this little store-house of crude materials the various forms of implements and weapons have been formed.

In the upper valley of the Delaware river, where the rocks frequently afford such shelter as the Indian was glad to avail himself of, and which are, at the same time, suitable for making any of the limited range of forms of implements which his ingenuity had

at that time devised, these traces, in accumulations of flakes and splinters, of an early occupancy of the country by savage man—these "open an work-shops," as they have been called, are frequently met with. The abundance of small flakes or chips, and of broken and unfinished specimens, at once indicate the character of the locality. In such of these as I have been able carefully to examine, there has been a marked absence of such small pebbles and indented oval stones as are supposed to have been used in flaking the chert, jasper, and quartz, that were so largely selected as the most desirable minerals for the manufacture of stone implements. Whether these had been removed and the places abandoned while the Indians were still in possession of the country, or not, is impossible to determine, but in all such work-shop sites that I have examined, where the living rock was utilized, there was in every instance an absence of several features that characterize the same sites when found in more southern localities where there is no living rock, and all the material and the tools themselves, when of stone, were transported from more or less distant points. The former have always suggested to me that, the locality being accessible to all, the Indians came and went as then needs suggested, and fashioned for themselves what weapons or implements they desired, and in this case they naturally took away with them such tools as they used in the making of them supplies. This would account for a marked absence of even the simple hammer-stones. On the other hand, where all the material is foreign to the spot, it is the property of one or a few individuals, and if left at any time all connected with it would be left behind, unless it be the finished weapons and domestic implements.

While at first sight it might be thought that where a rock in situ could be utilized there such selection could be made of the mineral as detached as would be available for the desired forms of implements, and comparatively few failures would occur. In other words, that the detached mass would be in such shape and so far free from weathered surfaces, that any defect in its constitution, as the presence of a foreign mineral, could be detected, and no trial chipping needed to be made, to determine its availability for the desired purpose. No such discrimination, however, was exercised by the Indians, and in a rock-shelter, near Belvidere, N. J.,
where arrow-points were once made in vast numbers, there was an immense accumulation of chips that had every appearance of being simply failures, being, for the most part, blocked out spear-heads which had broken into halves, or otherwise so fractured as to render them useless. In all such cases there were to be traced such variations from the characteristic constitution of the mineral as explained the cause of the failure to produce a finished implement on the part of the ancient worker.

While, therefore, one cannot but admire the beauty of workmanship, and marked display of taste as shown in the finish and design of the thousands of arrow-points that have been gathered from our fields, it must still be admitted that notwithstanding all their skill, the makers gave themselves an infinity of unnecessary trouble in failing to be able to judge of the qualities of a given mass of material prior to expending considerable labor upon it. It was to this rather than to want of skill, when good material was used, that we must attribute the quantities of "failures," as they have been well called, which characterize many a former site of an arrow-maker's labors.

I desire, now, to refer in detail to an accumulation of chips, cores, hammers, and other material found in a limited space, and which collectively indicated very clearly that at that spot some one or two Redmen had, for a long time, been accustomed to manufacture all such forms of weapons and domestic implements as are collectively known as chipped implements, for it is a curious fact, that, so far as I have been able to determine not a trace of a polished implement or polishing tool has been met with in these open-air work-shops.

In Hamilton township, Mercer Co., N. J., I discovered, last summer (1878), a large series of splinters and irregular chips of

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2 As the localities where chipped-stone implements have been extensively manufactured are usually of vast areas in extent, this term of "open-air work-shops has been quite properly applied to them, and while to prevent confusion by a multiplicity of terms I have used the same name to designate those far less extensive deposits of refuse it is perhaps inappropriate so far as it suggests that the site were too extensive to be effectively sheltered. In so continued an area even was the largest series I have observed to the Museum (over one thousand specimens, Catalogue No. 1463), that a wagon was doubtless erected over it and the occupants were protected from the inclemency of the weather to some extent and wholly protected from the burning rays of our almost tropical summers. In this connection it may be well to state, that no trace of charcoal has been found at these points which suggests that they were abandoned during the winter; a season when work of this kind, I should have supposed, would have been most usual.
jasper, mingled with the soil of a newly drained swamp. Immediately over these fragments large trees had grown, flourished to maturity, and died of old age. Judging from the depth at which some of the jasper chips were buried, it was evident that these trees had either been mere saplings, or had not yet sprouted, when the arrow-maker here pursued his calling. Having had my attention called to the spot by the surface indications, I carefully examined the ground over an area of several square yards, and gathered a large quantity of interesting material which has since been placed in the Museum and recorded under No 14633. These consisted, first, of masses of jasper and allied minerals, gathered, I suppose, from the gravel beds forming the eastern bank of the Delaware river, at a point some four miles distant, as the crow flies. Secondly, of cores, or the remnants of the selected masses above mentioned, which were too small or too irregular in shape to be further available. Thirdly, of large flakes which being similar to such flakes as often occur associated with relics as found in our fields, may or may not have been considered and used as a finished pattern of stone implement. These flakes, however, show little secondary chipping, and were intermingled with chips, splinters, and other refuse material. A noticeable feature of these flint-like masses and chips is the wonderful range of color they exhibit, not only of different shades of red, purple, blue, green, brown, and yellow, but many are most beautifully variegated. While there seems much evidence to show that attractive coloration was prized by the aborigines, I have found that the implements made from such material were either retained by them on relinquishing this territory to the white settlers, or the mineral thus brightly colored is more easily fractured, when used as weapons. Of the thousands of arrow-points already gathered those still perfect, of pale green, bright yellow, blue, and the lighter shades of red, are quite rare, yet flakes and broken implements of these colors are represented, not only in the fields, but in the work-shop accumulations, as already mentioned. Fourth, of broken-out and subsequently discarded specimens,—the failure to finish them being evidently a flaw in the mineral not detected at the outset. Fifth, of specimens that were nearly finished but irreparably injured by some unlucky finishing touch. These are often arrowheads, with the points broken off, or such as have a barb or a basal corner detached. A very considerable number of
these are certainly quite as useful as weapons, as perfect specimens, and why discarded, as they were, for some very telling defect, is difficult to understand. Are we to conclude, that the readiness with which adepts manufactured these chipped implements was far greater than has been supposed, and, therefore, that these objects were really very cheaply purchased, and that the Indian as a purchaser could afford to be very particular? Sixth of chips and splinters of every size and shape, being the ordinary refuse that would necessarily accumulate in the course of making arrow and spear-points from jasper, by the process of chipping the mineral to the desired shapes. Seventh, of a series of oval, of nearly square, and of some irregularly shaped pebbles of sandstone, jasper, horn-stone, and porphyry, mostly with shallow depressions, one on each side, and with the ends, if oval, and the angles, if square or of irregular outline, so battered as to show that they had been used in striking mineral as dense or more resisting than that of which they consist. Considering the circumstances under which they were found, their shape, and the evidence of hard usage which they exhibit, it is very evident that they are rude implements used, at least in part, in the manufacture of arrowpoints and other forms of chipped implements. The use of such hammerstones was doubtless quite limited, and other more delicate means were taken to produce the delicate finish of the smaller implements and weapons. Although the size of these hammerstones varies greatly, it is difficult to see how minute flakes could be detached by them and, probably bone implements, that have since decayed, were used as finishing tools.

This same simple form of hammer, it is well here to observe, is very common wherever the ordinary patterns of relics are met with, and in every series gathered for me by collectors in various parts of the state (New Jersey) there are several examples, varying considerably in size and shape. It can scarcely be held that they had any use as a weapon, but as hammers they would be useful in many ways.

Eighth, a few flat slabs of stone of small size, with an occasional trace of hammering on either side. These were possibly used as lap-stones in part, and may have been used, also, in connection with bone implements, or flakers, as a breastplate, whereon rested the base of the bone flaking tool, when, by pressure, series of small flakes were detached. This is altogether
conjectural, however, and considering, also, that these so-called lap-stones are not at all common, the matter of their use, as suggested, is at best, problematical.

Associated with the above—in all, about one thousand pieces—were no traces of charcoal, or any indication whatever of fire, no pottery, or any whole or fragmentary weapon, or domestic implement of any description other than what have been mentioned.

The apparent absence of fire from this unquestionable workshop site deserves a few words of comment, as many suggestions naturally arise. It may, indeed, be thought that the absence of charcoal is mere negative evidence that no fire was used or had at this spot, but when we consider that fire here would always be at or very near the same place, whenever kindled, and would be kept continually burning during winter, it is evident that some trace would remain on or in soil not subsequently disturbed, as was the case in this instance. Very frequently in my examinations of different known localities where stone implements abound, I have met with traces of fire that were clearly evidences of an earlier occupation of the locality than the first visit of the white settlers. Assuming, then, that the absence of all indication of fire is evidence that it had not been kindled there by the Indians, the fact seems to imply that the spot was not occupied in winter, a season when we would naturally suppose the Indians would be far busier in this industry than at any other time. The supposed absence of fire also indicates that the flint, prior to use, was not heated, as has been stated was often done. What the effects of moderate exposure to heat are, so far as facilitating the fracture of jasper and allied mineral, I do not know, but my own experience in arrow-making leads me to conclude that the varieties of jasper and quartz represented in these several series are quite readily fractured, by either percussion, or pressure, and the art of arrow-point making consists wholly in the acquired skill in governing the size and direction of the flakes detached, after the implement has acquired in general outline, the desired shape and size.

On the other hand, while a site, such as this that I have described, was apparently only occupied in pleasant weather, it is noticeable, that all such sites, so far as I have discovered them, lie in close proximity to a spring or rivulet of good water.

The entire amount of refuse material, and number of tools
constituting the traces of this workshop site, are possibly too few to indicate otherwise than a very limited tarrying at the spot, and that I am not warranted in drawing some of my inferences, but, as yet, it is not demonstrable how many chips are necessarily stricken off in making an arrowhead, and it is to be borne in mind that the earth was here thickly strewn with thousands of very small flakes looking very much like coarsely crumbled shells, and as much of this refuse was quite deep in the soil, as well as some of the larger pieces, it seems to me evident that the spot was occupied for a long time. The coarse refuse may indeed at times have been gathered up and removed. We find just such fragments about the known sites of Indian settlements, and have already suggested that no flake was too primitive to be unavailable as a cutting implement. Even flint chips are recorded among the contents of graves. Even supposing no removal of the coarse refuse ever took place, the thickly and deeply bestrewn condition of the soil with very minute chips, indicates a prolonged occupation of this particular site.

Considering all the circumstances, the story that this accumulation tells, is this: here, shaded by dense woods, on a slightly elevated knoll which was surrounded by a meadow-like expanse of low-lying ground, through which trickled a sparkling spring brook, had turned at times, for years, an arrow maker, shaping with marvellous skill those varied patterns of spearents, and delicate drills, such as are still gathered from the adjoining fields. Unlike localities of many acres in extent where the traces of former occupation are scattered throughout the whole area, and indicate that manufacturing had once been in progress simply by the abundance of chips we have in this workshop site the evidences of the tool of, probably, a single skilled workman who, in the quiet of his forest retreat spent the greater portion of a long and useful life.

There is one feature of this interesting find to which I desire to call particular attention, as much as it probably has an important bearing on the age of the post-glacial, but supposed pre-Indian arrow and spearents, to which I have alluded in a former paper. This is the entire absence of argillite, or that material of which nearly the entire series of paleolithic implements from the gravel-

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1 Eleventh Annu. Rep. of Peabody Mus. of Amer. Arch. and Eth., p. 413
2 Eleventh Annual Report of Peabody Museum, p. 254, 1879
beds is made. I have already referred to the rude forms of argil-
lite arrowheads as now met with upon the surface and if they are,
as a class, to be considered as having the same origin as that of
the more elaborately formed specimens of jasper chalcedony, and
quartz, then it would be natural to expect to find in the refuse of
open air workshops, such as I have here described, an abundance
of flakes, splinters, and cores of that mineral. Such traces, indica-
tive of the use of argillite, however, do not occur, nor, as yet,
have otherwise similar sites been discovered where that mineral
only was used. It can scarcely be held that, as argillite occurs in
the valley of the Delaware as a living rock, there only should we
expect to find traces of the localities where the mineral was worked
up into arrowheads. It occurs also in the drift in the lower por-
tions of the same valley, and is as readily obtained as the pebbles
of quartz and jasper with which it is associated. Flakes of argil-
lite do occur quite frequently in the fields, just where we find the
finished relics of the same material, and also some rude examples
of what may be blocked-out or unfinished implements but why
may not these have been lying on the surface and in the soil since
prior to the advent of the Indians?

While the two classes, or those stone implements made of argillite
and those of quartz, occur on the surface intimately associated,
it is obviously impracticable to dissociate them with anything like
scientific accuracy, and furthermore, there are not wanting indica-
tions leading one to believe that these argillite implements were
frequently worked over by the Indians to be used again, and if
we consider the Indians were not America's first occupants, they
were, on their arrival, either in contact with the earlier race, and
by trade, or as the result of warfare, possessed of the weapons
and implements of the pre-occupants of the land, or had an
earlier people become extinct or migrated the succeeding Red-
men would surely have found the discarded implements of their
predecessors as we now find those of the Indians. However we
may view the case, there is no reason why the rudely fashioned
and weathered argillite implements may not be far older than
those made of other material, and, when a considerable extent
of territory is carefully examined, it becomes evident, as I have
elsewhere endeavored to show that such implements, whether

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June, 1876, p. 129"
of pre-Indian or Indian origin, ante-date the Jasper and Quartz specimens with which they are now to some extent associated. Unquestionably the occasional occurrence of argillite implements of exceeding delicacy of form, accuracy of outline and comparative freshness of the surface, has an important bearing upon this question of the date of the general use of this mineral,—for such specimens of savage handwork are certainly the productions of the Indians, but when we remember that there have been no arrow-points made in New Jersey for at least two centuries, and that argillite chipped some time prior to that has undergone no appreciable alteration, we surely have something of a guide as to the rate of weathering of those other forms that are so deeply altered over their entire surfaces. No Jasper specimens have been found showing alteration of the surface. They are as fresh as though chipped but yesterday, and it is not probable that, although argillite will be affected by exposure before Jasper if the two minerals were in common use from the date of the arrival of the Indians, there would be some difference detected in the surfaces of Jasper arrowheads when thousands are examined and compared.

Until we meet with the chips and other refuse of argillite associated with those of Jasper and Quartz, or discover a workshop site where it was solely used, it is not safe to conclude that, from the great degree of weathering which the vast majority of the implements made from it have undergone, such specimens are of an earlier origin than those of Jasper and Quartz. The exceptions being tolerable, first, to the fact that outcroppings of this rock where found in place, were sometimes utilized though not to a great extent, and also to re-chipping by the Indians of weapons, that to them when they were gathered, were veritable relics of a by-gone time. Finally as the Palaeolithic implements proper as found deeply imbedded in the drift deposits, are argillite, as a class, it appears rational to ascribe the origin of the great majority of the rude weapons of the same material to the same people who fashioned them, and its absence from the open air workshops such as I have described seems of itself confirmatory of

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8 Arrowheads of slate and shale are quite commonly met with throughout the entire east of the state. These very generally have weathered to a greater extent than those of argillite, and have the same appearance of the surface are readily mistaken, for such are made of the latter material. Arrowheads of argillite are not abundant in many localities they are very seldom found.

Report Peabody Museum, II
this supposed earlier origin of these rude, and much weathered implements, in which we have I believe, a trace of an industry, once world-wide, on the part of a people still ruder than the Indians as we know them whose productions as a class are as primitive and uniform as those of the later race are elaborate and varied.

An interesting feature connected with these accumulations of refuse is, that while the minerals found are the same as that of which the great bulk of arrowheads and other forms are made, on the other hand there will occasionally be met with a specimen of an arrowpoint, or fragment of a spear, of a different pattern and material than those with which we are so familiar. A fragment of obsidian, it may be, as the extreme point of limb of an arrowpoint or Jasper, of a color not occurring here, yet common in distant southern or western localities. These instances are now so numerous that it shows clearly the contact of different and distant tribes, for what better evidence can be produced than that an implement has been brought either through the vicissitudes of warfare or through barter from some far off point when we find no trace of the material of which it is made, in the heaps of refuse that resident workman left on the former sites of their labors? The range of patterns of all our chipped implements is infinitely varied, and it needs but a glance at the material | have gathered from this one spot to show how little can be said of the belongings of any specimen, as judged by its shape. Scarcely a European pattern even, except the most delicate arrowpoints from Denmark, but finds here its counterpart, in at least a fragmentary state. The shapes indeed seem to have been determined by the particular use, which suggested certain sizes and shapes, but the outline of vast numbers was determined by the shape of the chips utilized, and thus originated the non-symmetrical specimens that we frequently find. Some of these are so crooked that their availability as arrowpoints is questionable and that such were used as knives is quite probable. In the territory of every petty tribe, and every creek appears to have had such tribal communities dwelling in its valley there is seen a family likeness, so to speak, extending through the whole range of chipped implements, and especially the arrow and spearheads found therein, and it is not difficult to dissociate an occasional specimen, as it occurs in collecting, and set it aside as something foreign.
A second find of this character also deserves a detailed notice, although it has already been referred to by Prof Wyman. At the time of its discovery I did not recognize fully the importance of carefully noting everything connected with it, and simply furnished Prof Wyman, at the time, a few brief notes with reference to the specimens gathered and forwarded to the Museum. This "open air workshop" was discovered on the writer's farm in 1872, and is less than a mile distant from the one previously described. It is situated on the brow of a hill or rather of a plateau margin where this is broken by a ravine through which flows a considerable brook. Originally surrounded on two sides by a dense forest here always has been an open spot with an extensive southern outlook over a broad expanse of meadow extending from the foot of the uplands to the river. When discovered there was simply a shallow depression to be seen nearly circular in outline and about ten feet in diameter. On removing a thin layer of vegetable mould, through which projected a few irregular masses of yellow jasper, there occurred a large quantity of thin flakes, chips and a number of broken arrowpoints especially of the triangular pattern. Of the latter there was a much larger proportion than in the preceding instance, and may indicate that the workman who had operated here had either been less skilful or that this pattern is more liable to breakage in finishing, which seems improbable. The accumulation of refuse, in this instance, was on a level floor of compact clay-earth, about which I could not discover a trace of fire. Separated from this refuse as described, by a layer of earth nearly a foot in depth there occurred a somewhat similar deposit, except that cores and large chips only were found, with no trace of either hammer-stones or broken or unfinished implements. There was also but little variety of mineral, the deposit consisting exclusively of dark yellow-brown jasper. My impression is that there was no connection between the two finds, but that the deeper one was just so much older as it requires years for a soil of some eleven inches to accumulate in a forest where the growth of vegetable mould, from the decay of the annual fall of foliage, is steadily in progress.

A third deposit of flint chips to which I desire to call attention, is a series of some fifty specimens of brown jasper of quite a uni-

5 Fifth Annual Report Peabody Museum p 25
form size (P. M. 14706), but which in the character of the fracture differ materially from both cores and flakes. They are too irregular and small for the former, and exhibit no regularity in the detachment of masses from them for subsequent shaping into arrowheads, as is shown in the larger cores in the collection. Still, when we consider that they were found closely packed together, and buried nearly a foot deep in a meadow, which was originally swampy ground, it is evident that they were designedly imbedded, but for what purpose it is difficult even to conjecture.

It may be well here to state that the three deposits just described are all in the immediate vicinity of the extensive deposit of finished implements to which reference has been made in other publications. These were all of the same material, and identical with the Jasper fragments here mentioned. If the former were made at the spot or near where they were found buried this later find of fragments may indeed be a portion of the refuse accumulated in their manufacture, they were selected possibly for converting into small arrowpoints, and afterwards forgotten.

Having already incidentally referred to the chance occurrence of flakes and chips upon the surface of the ground, it is well, in conclusion, to refer to these more particularly, as it is possible that collectively they may have more significance than might at first be supposed. As I have already mentioned, Jasper flakes occur not only in "open-air workshop" sites, but on the surface of our fields, while flakes of other minerals, more especially of argillite, also occur whenever we find arrowpoints and spea-

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*Annual Report of Smithsonian Institution, for 1875, p. 272*
heads of the same mineral, on the other hand, no deposits of argillite chips and cores have been discovered. From these facts I have drawn the inferences, and think I am warranted in so doing, first, that as argillite flakes mostly exhibiting a great degree of weathering of their surfaces, are associated with finished implements of the same material but never in such numbers as to indicate the spots whereon the former were fabricated, it is to be supposed that as flakes they were put to some use, such as a knife, or if very small and not of too irregular an outline, as arrowpoints. Figures 1 and 2 are examples of flakes of argillite.

Fig. 2

Flake of Argillite (P. M. 16315)

(P. M. 9008, 16315) such as are found singly on our fields. In general outline, figure 2 does not materially differ from flint flakes, as found in Europe, and with the sharp edge that this mineral presents, when freshly fractured, it certainly is well adapted to cutting such yielding substances as the skin and flesh of small mammals, and to scaling and cleaning fish. Whether figure 1 could be used as an arrowpoint or is to be looked upon as merely a small knife is altogether conjectural, and yet there are many ways in which just such a fragment of stone considering that the edges are sharp, might be utilized. The same character of flakes (Fig. 3, P. M. 14629) and small chips of jasper, associated also with finished implements of the same mineral,
being likewise scattered singly over the entire area of the state, must therefore, if I have not misinterpreted the argillite examples, have a like significance. Considering the absence, as yet, of sites of arrow-makers workshops, where argillite was exclusively used, and that chipped implements of this mineral are as characteristic of the deeper soils, as compared with jasper, as indicated by the depth whereat they occur in virgin earth, wherever it has been examined, and also that argillite is a living rock in the vicinity while jasper and the allied minerals, of which the bulk of the chipped implements are fashioned, occur as boulders in the drift, and require more labor to gather than it would to visit a ledge of living rock,—I am led to conclude that the argillite spears, arrowpoints

and flakes as a class, are of an earlier time than the same implements of flint-like mineral and doubtless bear as close a relationship to the still ruder — the *primiord* implements found in the drift gravels of the river valley — as to the former. While, both as chipped from old implements, and fashioned *de novo*, true Indian relics of argillite do occur, there seems nothing in this fact to militate with the opinion expressed as to their antiquity, as a class, being much greater. Certainly, if fabricated by a preoccupying people, or by their own ancestors, these discarded or lost implements would not escape the keen vision of the Indians, and few lacked sufficient skill to repoint, and render available these ruder specimens of the same weapons to which they were accustomed.
The conclusion might readily be drawn from the foregoing that weapons and implements of all kinds chipped from stone, were made only by a comparative few, who, gifted with the required dexterity, supplied the people of their tribe with such implements, as they required. While the manufacture of the finest specimens was very likely confined to adepts, who made it the business of their lives, as much as we find scattered over the state, mingled with such as are of artistic workmanship, so very many of greatly inferior finish, it is probable that the latter were made by hunters or warriors, as the case might be, who subsequently lost them. However occupied, whether on the war-path or the chase, it would scarcely be possible for a warrior or a hunter to supply himself with as great a number of arrows as he would need, even for a few weeks. Vast numbers unquestionably were lost when first discharged from the bow, and when we consider the various conditions under which these same arrowpoints now occur, it is evident, I think, that to a certain extent, every Indian was his own armorier. Ornaments and stone implements, whether weapons or for domestic purposes were of careful or careless finish—and we find both patterns—as their owners happened to be proud or indifferent, or possibly neat or slovenly. A ground edge to an oval pebble being required, the subsequent shaping of the other portion of the implement might be gradually accomplished, if such implements were used without handles, or were readily separated from them. Such shaping, by grinding away all irregularities, was at least a slow process and one very unlikely to be followed as a means of livelihood by any one, and when we find a beautifully polished and symmetrically fashioned celt we probably have a proof of the patience and skill of its original owner, and such as had this patience and skill could soon learn did he desire it to chip from him his own arrowpoints, knife and spears.
THE METHOD OF MANUFACTURING POTTERY AND BASKETS AMONG THE INDIANS OF SOUTHERN CALIFORNIA

BY PAUL SCHMIDT

Pottery

Among the Kahwajahs (Cahuillos)¹, who, unlike the former Indians of the coast of California, make household utensils of burned clay instead of soapstone,² I observed the following mode of manufacturing pottery.

The clay of which these vessels are made is usually obtained from the creek bottoms, and is similar to that used by the Mexicans to make adobe, or sun-dried brick. It is a dark sticky humus with a light admixture of sand, or, as is the case in the neighborhood of White Water river, the white, fine, dense clay which so effectually discolors the water of that river at the head of the desert, the beginning of Conahula valley. The clay, after being cleared of all rocky and light substances, is preserved in dried lumps for use. Of this clay a stiff “dough” is made by adding water and kneading it thoroughly. Some Indians, however, as for instance those of Sonora, mix powdered potsherd with the earth. In the neighborhood of White Water river the clay is very suitable in its natural state and is so used.

The “dough” is formed into cylinders of a foot and more in length, and, according to the size of the vessel to be made, more or less than half an inch in diameter.

The bottom of the vessel, which is usually globular or semi-globular, is made by coiling the cylinders in the desired form. They are then knitted and smoothed to the required thickness by the hands, which are placed in such a position that the fingers operate inside the concavity, and the thumbs, pointing towards each other, work on the outside. The bottom of the vessel thus made is then placed in a shallow dish, either of wood or of burned clay, which

¹ The tribal name of the Indians at Agua Caliente, Los Angeles Co., is Tekuhol.
takes the place of a potter's wheel and enables the worker to turn the vessel as he proceeds without endangering the form. Squatted on the ground, the worker turns the form as the cylinders are coiled into the desired shape, joining them together with the fingers and thumbs, holding the hands in the position already described.

When the vessel has thus been gradually built up, the clay is made compact and smooth by holding a rounded and smooth rock against the wall of the vessel on the inside, and patting the outside with a wooden trowel opposite the rock. The outside is then made even by a wooden scraper, corresponding in shape to the curve of the pot, which is dipped in water to accelerate this work. The dents inside caused by the supporting rock are usually allowed to remain. Experts among the manufacturers do away with the smoothing scraper and accomplish the same end with light taps of the trowel, the marks of which are sometimes plainly visible in the burned pottery, especially when done with a slightly corrugated trowel caused by the protruding fibres of the wood. The narrow neck of the olla, or, especially, of the pot used for the transportation of water, which barely admits a hand, is last finished by the same method, but more clumsily, and is left more porous, as rock and trowel can not be used on that portion of the vessel.

The vessel is then put away to dry in the shade before it is exposed to the process of burning.

The kiln consists of a hole dug in the ground, about five feet in diameter and less in depth, the bottom of which is covered with fragments of pottery. When well heated by an abundance of brush fire, the earthen ware is arranged on the potsherds, and is covered with hot ashes. The pot is then closed with bark or grass, supported by green sticks strong enough to bear a subsequent covering of earth without endangering the underlying pottery and is thus left for several days, until the pot has cooled off, when the burned vessels are taken out. The defects of this kiln sometimes necessitate a second burning, but in old pots, in which the wall is well baked and the heat is better retained than in new ones, good results are obtained with much surety.

Among the Sonoras a kiln is used similar to the Mexican bake-oven. This is a structure of adobe in the form of a beehive, with an opening on top in addition to the hole below. When
well heated, the vessels are properly arranged within and the oven closed at both openings with covers made of earth. The Sonorans also frequently dye their pottery with a red mineral paint before it is exposed to the heat which produces an even red color, as the process of burning, being sometimes defective, would not alone accomplish this.

**Baskets**

The manufacture of baskets I also observed among the Teháhét, a tribe of the Cahuillos, at Agua Caliente, Los Angeles Co., Cal., while making researches for the Peabody Museum during the last year, and also on a previous occasion in Northern California and

![Bottom of Basket](image)

Southern Oregon, while in the employ of the U.S. Coast Survey. Substantially the same method is employed in these several regions, though the material slightly differs, and likewise existed in former times among the Coast Indians of California, as is demonstrated by fragments found in their graves.

The Teháhét use the reed-grass (*Juncus robustus*), which I found growing in the small fresh-water marshes and creek-edges at the beginning of the desert, and the tall thin grass (*Vista rigens*) found thriving with the *Yucca* which flourishes in such great varieties in that neighborhood, both are used in the dried state. The former species is used for binding the body of the basket, which
is made of the latter. The reed-grass is split, and some of it is dyed in different shades, usually brown, with which to produce the figures, mostly straight-lined or zigzag. The grass of which the body is made is worked in its natural state.

The basket progresses from the centre of the bottom, as shown in Fig. 1 which represents that part of natural size for baskets not exceeding a foot in diameter (P. M. No. 14927), while the thickness of the coil of larger ones is increased by adding more of the grass of which it is made. The beginning of the stitch for which the hole is made by a common bone needle, or bone, is shown in Fig. 2a, and is made by fastening one end of the binding by the succeeding overlapping stitches, and is thus neatly disposed of on the inside of the basket. Fig. 2b shows the manner in which the coils and stitches are arranged and the way they are bound together. When the length of the binding is used up, the end is similarly secured as at the beginning, Fig. 2c, or, at the finishing of the basket, under the preceding stitches. The shape of the basket is easily formed by lengthening, or shortening, the encircling of the coil, and by changing the stitches slightly towards the side.

3 Dr. Palmer informs me that the Cahuilla Indians of Southern California make a black dye by steeping in water plants of the Sphaerocystis. A yellowish-brown dye is derived in the same way from plants of the Ajuga Linnata and D. paludosum. Both these dyes are according to Dr. Palmer, used by the Indians at Agua Caliente for dyeing the meshes of which the baskets are made. See also Dr. Palmer's note on plants used for dyeing, in Amer. Nat. for Oct. 1878, p. 631. — F. W. P.
of the concavity to be formed. In forming the bottom of the baskets, the split twigs of a shrub are generally employed in place of the Juncus, probably for the greater strength. Often this material is used for the sides as well as the bottom, but generally the Juncus is used after about a dozen or twenty coils have been made. The Juncus is also used without splitting, from which is made a coarse basket with loose meshes, similar to a net but without knots (P M No 14933).

*This is probably the 'Squaw berry' Rhus aromatica, which Dr. Palmer states (Amer. Nat. Sept. 1875, p. 197) is used by the Indians of Utah, Arizona, Southern California and New Mexico.—F. W. P.*
ABORIGINAL SOAPSTONE QUARRIES IN THE
DISTRICT OF COLUMBIA

BY EDWIN R. REYNOLDS

Within four miles of Washington City there have been recently opened two well developed soapstone quarries which evidently had been worked at some former time by the people who dwelt in this neighborhood. Of this fact the excavations themselves, to say nothing of the numberless fragments of steatite pots and dishes, and the implements of stone and quartz used in fashioning them, furnish the unmistakable proof. Notwithstanding the quarries are situated so near the city and convenient of access they do not seem to have attracted any notice until the summer of 1874, when it was my good fortune during a half-amuseless stroll, to stumble upon a curiously shaped, moss covered stone which, upon examination, proved to be a fragment of a soapstone mortar. Recognizing the importance of the "find," and concluding from the size and weight of the specimen that it had not wandered far from the place where it was manufactured I at once began to search for the original quarry and was soon rewarded by the discovery of an immense deposit of the same material, on a thickly wooded hillsise near by. A close examination of the locality showed that the entire hill was composed of soapstone, partly covered with ferns fallen leaves and the accumulated detritus of centuries. Hundreds of fragments cropped out through the leaves, nearly every one of which showed well defined traces of having been worked by the ancient owners of the quarry. In an hour's search I found several well preserved dishes which I concealed intending to return at an early date to remove them. Shortly after, I changed my quarters to the city, and from that time till this last summer professional duties and a rare opportunity to collect Indian implements in another direction, have taken up all my time.

The discovery of the soapstone quarry at Chulu, Amelia Co,
Virginia, and the subsequent interesting investigation of the same, by Mr. Frank H. Cushing of the Smithsonian Institution, led me to communicate to Professor Band the existence of the Rose Hill quarry on Broad Branch. He replied at once, inviting me to make an early visit to the mine in company with Mr. Cushing, who at that time was still absent in Virginia. On his return, we visited the locality, and in a short time succeeded in finding a profusion of broken and unfinished implements.

Our brief visit demonstrated the fact that, from an archaeological point of view, the quarry was superior to any similar deposit, so far as known, in the country. We discovered the remains of no less than seven well defined shafts or excavations, leading into the hill, whence the early potters had procured a quality of rock superior to that found on the surface.

A few days later, we paid another visit to the locality, in company with Dr. Charles Ran and several other distinguished attaches of the Smithsonian Institution. At the quarry we separated into groups and proceeded to make a thorough and careful survey of the hill and country immediately surrounding it.

With the exception of the southern side, the whole hill is made up entirely of soapstone. About midway from top to bottom, on the southeast angle, are the remains of an old shaft, formed by the Indians for the purpose of testing the quality of the stone — which at this point changes into a coarse, granitic looking rock which is now being quarried by the neighboring farmers. From the stream at its northern base, I should judge that the hill is about seventy-five feet high, by six hundred feet in length and three hundred feet in breadth, at its base. In general outlines it somewhat resembles a truncated pyramid. The soapstone on the surface is mostly in fragments, and covers the eastern, northern, and western sides, and a portion of the exposed summit.

On the northern side it descends to the creek at its base, passes entirely under it, ascends and swells out into a distinct quarry of more than three times the size of the former. The creek which forms the dividing line, runs for hundreds of feet over a beautiful greenish-gray floor of soapstone, worn into ruts and pools by the sand and pebbles brought down from the adjacent field during the spring and autumn floods.

A tolerably thick growth of beech and oak is scattered over the hill on all sides. While intervening space is covered with ferns,
and random patches of huckleberry bushes which have found a
foothold among the rocks.

The excavations previously mentioned were found to be in a
good state of preservation, considering the long lapse of time
since they were worked by the natives. One shaft we found to be
over three feet deep in spite of the long-continued wash from the
hill-side above.

In addition to the shafts and other interesting features of
aboriginal labor, we were fortunate enough to find several hundred
dishes more or less broken, besides a number of picks and
hammer stones and also one or two steatite spades used in cutting
and removing the earth when opening a shaft into the quarry.

Since beginning operations in addition to digging out and
carefully studying the workings of one of the ancient shafts,
Mr. Crumling has selected and removed more than two tons of
implements from the quarry and when I visited the locality
last I found at least two tons more awaiting transportation.
In the half barrel of specimens that I send you (P. M. Nos.
16075-16091) it will be observed that I have discriminated in
favor of those articles which would best give you an idea of the
different patterns, their size and shape, the degree of thinness to
which reduced and particularly of those exhibiting the grooves
and furrows produced by the stone pick, in their fabrication.

Whilst aiming to make the contribution as interesting as circumstances would permit, I cannot help but regret that the lateness of
the season prevents the success, in your behalf, that I am sure to
meet with in the spring.

In selecting masses of soapstone, the natives seem to have been
guided by the quality of the material and the size and use of the
dish required. Some of the partially finished blocks are high and
massive with thick walls and bottoms, which seem to indicate that
a mortar was intended. A broad, shallow dish with a slightly
elevated rim and a thick bottom could have been used only as a
grinding implement in conjunction with flat stone millers or
broad-bottomed pestles. In this shape, no such solidity as is
shown in the mortars was needed, as the millers were used in a
'holy-stoning,' or rotary manner.

From the fact that, on several occasions, I have found compara-
tively thin and well finished fragments of soapstone dishes in the
ancient camping grounds on the Anacostia river, near Bladens-
burgh, Md., fully ten miles from the nearest quarry, and among
the shellheaps on the Wicomico river in St. Mary's County, Md.,
seventy-five miles south of the city, and also from the entire
absence—so far as my observations have gone—of artistically
finished dishes near the mine, I have come to the conclusion
that the dishes were not finished entirely at the quarries, but
were simply blocked out and partially reduced in size and weight,
in order to facilitate transportation to remote encampments.

The majority of the dishes found, thus far, are oblong, and
reasonably symmetrical considering the tools with which they
were wrought. Nearly all are supplied with handles at the ends,
which are nothing more than ear-like projections, from three-fourths
of an inch to an inch and a half in length. In one or two in-
stances I have found a dish with one ear at the top, and the other
at the bottom of the opposite end. Why this apparently whim-
scial deviation was made I am unable to conjecture, unless, in
finishing the dish, one ear at the top had been accidentally broken
off, and to replace it, a duplicate had to be formed from the un-
finished mass at the bottom. The thought also presented itself,
that this handle near the bottom may have been made purposely,
in order to assist in tipping a heavy mortar to one side to facilitate
the removal of its contents after being ground. This is, I admit,
a rather strained and far-fetched idea, but in the absence of any-
thing better, I offer it as a suggestion.

I invariably found a score or two of the oblong pattern, to one
of any other Nos. 16078, 16081, and No. 16089, Peabody Mus.,
catalogue, are good specimens of this class; the latter of which
shows one well finished ear. Nos. 16075, 16082, and 16088, be-
long to the "oblong" but differ somewhat from the regular pattern,
in being "treen" shaped, and lighter and more graceful in design.
The only advantage to be derived from this shape—exclusive of its
superior attractiveness, was, I conjecture, in a lightness and
consequent additional convenience attending frequent removals.

A circular dish of a gallon capacity would be not only exceed-
ingly heavy, but decidedly awkward and unhandy to carry,
whereas, an oblong dish, deeply excavated and presenting less
surface at the bottom, could be made much thinner and lighter in
proportion to its capacity, than the former.

The smallest dishes found, so far, are mostly circular, or with
a slight deviation in favor of the oval, and by reason of then
size and consequent lightness show more artistic workmanship. The number of small dishes met with, is surprisingly out of proportion to the large number made to hold from two quarts to one or two gallons. The smallest yet found will not hold more than a quarter of a pint, while the largest fragment I have seen belonged to a vessel which, if complete, would probably hold nearly seven gallons.

With reference, again, to the smallest dishes, I can account for their absence only on the supposition that domestic utensils of such diminutive size were, of course, un fitted to cook in, and further, that for all ordinary purposes, woven baskets, "pitched within and without," or the ordinary coarse clay pottery took their place.

The first operation after the stone was taken from the quarry, was to block out the mortar or dish, and finish it externally, before proceeding to cut away and smooth down the inner side. This method was adopted in almost every instance, and in the numberless cases met with, I have observed but two bowls that were finished inside whilst the rough angles on the outside remained untouched.

No 16075 is a reasonably fair type to illustrate the first stage of development, but from exposure to the elements it lacks the usual pick marks or grooves. It shows that, while the outside is as nearly finished as the occasion required, the interior has undergone but little change. No 16088 belongs to the same group, and shows in an excellent manner, the external grooves lacking in No 16075. Both of these vessels are "tuneen" shaped, and about the same in size, weight, and capacity. The latter, No 16088 I dug out of the hillside during my last visit to the quarry. It was covered with leaves and earth, with the exception of one corner, which projected above the surface. It owes its excellent state of preservation to the earth which covered it since the day it was accidentally broken whilst being finished internally.

We now come to the inside of the dish or, more properly speaking, to the surface from which the digging out or excavating, begins. The pick is now brought into use, and after a tedious operation the bowl is formed in the following manner: commencing at what is to be the outer rim of the dish, a series of sloping cuts are made, all tending downward and inward toward the centre.
By a series of cuts I do not wish to infer that it was done with a hafted implement or one with a broad cutting edge, but rather, by a pointed and somewhat flat-edged pick used as a chisel and driven by sharp and well directed blows from a heavy stick, or mallet. These sloping cuts are continued till the rim of the dish has been completed, the operation is then changed, the cuts being directed downward and outward toward the rim. In this manner a V-shaped trench is soon formed around the upper surface of the block. The chisel is again reversed and the operation repeated as before, with this exception: whenever the cutting is toward the centre, the pick is placed in the bottom of the trench and driven still further downward, care being taken not to damage the rim by too heavy a blow on the chisel. When it becomes necessary to cut outward again, the chisel is carried to the top of the dish each time, and the central mass sliced down in a comparatively easy manner. Finally nothing remains but a cone-shaped projection which is speedily removed by a few well directed blows, and the irregular sides are scraped and polished till the dish is ready for use. It may be surmised that this is only a conjectural mode of excavating these dishes, but this is not the case by any means, as I have in my collection two exceedingly handsome specimens showing perfect finish externally while the inside of one is partially excavated after the fashion indicated though not carried out so fully as in all the details. A great deal of care evidently was required even in so simple a matter as removing the core, judging by the numerous fragments which all bear evidence of having been nearly completed, when an untimely blow unexpectedly brought the labor of a day to naught, and verified the old adage that: "There's many a ship below the cup and the lip."

Another dish is deserving of special mention, although, I regret to say, it is probably lost beyond recovery. This is to be regretted, as it was the second of the only specimens I have ever seen that were finished on the inside without any trace of workmanship externally. It was formed from a triangular block of deep green soapstone, was quite well finished and had undoubtedly been used as a mortar. The sides and bottom were very thick and the whole very heavy, much more so than ordinary soapstone. A dish of this class could be finished much more quickly inside than the other, yet I doubt whether any time or
Labor could be saved by the operation, for the same patient care would be necessary in chipping away the outside, to avoid an accidental fracture of the dish before completion.

No 16086 appears to have been the end of a well shaped oblong dish. The corners are evenly rounded and it has a circular projection at the end, to serve as a handle.

No 16080 is a fragment of an unusually large vessel. The lateral curve is very gradual, which would seem to indicate a capacity of several gallons. The thickness is uniform excepting a portion of the rim which swells out into a well defined "shoulder" on the outer margin, but as this is hardly large enough for a handle, it was probably left to facilitate its use.

No 16077 is a remarkably well formed and well finished fragment. It bears a close resemblance to the wide, shallow milk-pans, and has a suggestive and familiar appearance.

Amongst the remaining fragments each possesses some characteristic not entirely common to the others, yet not of sufficient importance to mention individually.

Thus far I have confined my description to the southern quarry discovered in 1873. It is now necessary to consider the larger one on the northern side of the stream.

This quarry is a continuation of the other—or, more properly speaking, this being the larger, the other is simply a struggling off-shoot. The hill, roughly estimated, is about one hundred and fifty feet high, with the largest slope toward the east. On this side it descends somewhat abruptly for about a hundred feet from the apex, and then extends eastward on nearly a dead level, till the extremity of the quarry is reached, when it falls suddenly into a cultivated field. The northern side slopes away gradually and ends in a narrow ravine, the mutual boundary of this and another hill beyond. The western side descends evenly, gradually, and loses itself in a belt of pines at its base. The southern side slopes abruptly, and is bounded by the stream. A thick forest of white oak covers the whole hill, which, probably, has an area of about forty acres.

The soapstone is found very sparingly on the eastern side, there is none on the southern, but on the northern and western sides it crops out abundantly. The summit extends north and south a distance of about twenty-five or thirty paces, and nearly
the whole surface has been "burrowed" into, and furrowed by the "ancestors," in search of the much desired potstone.

The trench runs along the centre of the quarry and dips over the northern shoulder of the hill. The earth has been thrown out on each side and at one time must have presented quite a military appearance with a high embankment on each hand. The excavation is now about two or three feet below the partially surrounding surface. Large trees grow in the shaft which shows unquestionable evidence of having been one of the first excavated.

The fragments of dishes found here, and the rock itself, all indicate an extremely venerable age, and I think, with excellent reason, that at least four hundred years must have passed over this hill since it was mined to any extent. An air of extreme antiquity lingers about these relics of a rude, but highly interesting race, whose descendants are each day being pressed closer to the wall in their ceaseless struggle with the civilization of the east. The implements found here, exclusive of their shape, show no trace of human workmanship. The broken pots are covered with moss and lichens which have bound social companionship in the worn and weathered fragments. Those that have escaped the moss, look worn and faded, and in a volcanic district would readily pass for slag and stone. The bluish-gray color is gone, and a reddish-brown has taken its place, while the soft, slippery feeling, which is so characteristic of the stone, has disappeared entirely, leaving a rough, harsh surface, like coarse sandstone. No 16085 is the only fragment sent from this quarry. It belonged to an upright dish, and, to one not familiar with the subject, would readily pass for a simple fragment without anything special to recommend it to notice, so completely has it lost every trace of the chisel.

As to the age of these quarries nothing definite will, probably, ever be known. It seems reasonably certain that neither has been worked to any extent since the settlement of the whites at St. Marys and Jamestown, and as the utensils manufactured out of the material taken from the later quarry, after the lapse of six or seven generations, still retained the marks of the tools with which they were shaped, I not unnaturally concluded that those specimens in which the evidence of human workmanship was almost obliterated, were of much greater antiquity. But this
opinion has been somewhat modified, as in comparing then re-
spective ages, one important feature, not noticed in my earlier
visits, probably has a tendency to mitigate against the ancient
appearance of the older mine. I have already remarked the faded
and homewarmed appearance of the material found in and about
the excavations of this quarry. These features, I considered,
were the natural results of time and exposure, but I am now
satisfied, from a critical examination, that the appearance referred
to, is, in part, to be ascribed to the inferiority of the material
used. In breaking open fragments of the rock I find in many, a
series of cellular cavities, at irregular intervals, filled with what
appeared to be oxide of iron—a spongy looking reddish-brown
powder easily removed from the cavities with the point of a
pencil. This was undoubtedly the cause of the early abandonment
of this quarry. It was utilized until the southern hill was found
to contain a better quality of mineral and then it was abandoned.
I think it probable that, at a remote period of time, the newer
quarry was entirely concealed by a thick stratum of earth, and I
base my idea on the fact that, whenever a portion of the fragments
(which cover the whole northern side) is removed, the solid earth
appears, with no indications that the ledges approach the surface.
I have found places where this rule would fail, and merely mention
it in order to correct the impression I once had that the undis-
turbed rock cropped out at every point on the surface. With
reference again, to the recently discovered quality of the soap-
stone in the northern quarry, it may be thought that my explana-
tion is superfluous, but as these “notes” are for the eyes of the
public, I am unwilling to have any statement, however trivial, go
abroad that would have a tendency to mislead others.

I have omitted to mention in its proper place that the only
excavation found in the northern quarry, exclusive of the large
trench on the summit, is situated in the southwestern declivity of
the hill, about forty feet above the stream. It is in a much
better state of preservation than any in the southern quarry, which
is owing entirely to its secluded location. This excavation runs
east and west parallel with the creek. It is ten feet long, by from
four to six in width, and is between two and three feet deep. The
earth from the interior was thrown out below, and at an early
period must have formed an embankment of some magnitude.
As no fragments of stone or unfinished implements are found in
the immediate vicinity, I am led to believe that this shaft was not worked to a successful issue.

One more class of implements yet remains to be mentioned, in connection with the manufacture of soapstone bowls and mortars. These in most works where they are introduced, are classified as "picks," and they were ordinarily used as such in getting out blocks of the material, and in roughly cutting away the superfluous portions, but in all subsequent operations I think that they were unquestionably used as chisels.

The picks sent you have undoubtedly been much worn and dulled at the points, and were used for ordinary work, while the regular chisels were much smaller and sharper, and in some instances of a different quality of stone. The picks were found scattered about at random all through the quarry, and in one of the shafts that has been reopened. They weigh from a few ounces to several pounds according to the use required. The material from which they were usually made is a variety of discolored quartzite, found abundantly in certain localities in this vicinity. Little labor or skill was required in forming them, as they were simply splintered down from a larger mass, with a little additional chipping to give them a sharp cutting point, or blade.

If we examine any well-formed fragment it will be seen that, however skillful or proficient an aboriginal workman might have become, it was utterly out of the question to drive a deep, extended groove from top to bottom of a large mortar, whereas, on the other hand the long, deep seated burrows are exactly the result to be expected from a sharp pointed chisel with a good cutting edge.

On the western side of the hill, near its base, in a thick grove of pines, I found several large boulders of quartzite, from which material many of the picks were undoubtedly obtained. Scattered about among the trees, were several dozens of those rudely formed implements which had been splintered off the boulders and never utilized. It is difficult to imagine how these large masses were splintered down without the free use of iron tools, as a heavy blow on one of them from an ordinary hatted stone hammer would splinter the latter into fragments. Possibly the Indians may have succeeded in detaching flaky masses by long repeated and monotonous taps after the boulders had been thoroughly heated and brought to a sudden chill.
ON THE RUINS OF A STONE PUEBLO ON THE ANIMAS RIVER IN NEW MEXICO, WITH A GROUND PLAN

By Hon. Lewis H. Morgan

The progress made in house architecture by the most advanced Indians of our country is quite remarkable. It is shown by the use of stone, partially dressed and laid in walls; in the use of a species of mortar having an adhesive bond; and in the construction of houses several hundred feet long, and four and five stories high. The largest of these houses contained 300, 400, and in some few cases more than 500 apartments, each of which houses would accommodate from 500 to 1000 persons—in fact, a tribe of Indians. They were joint tenement houses of a peculiar style and plan and in the nature of fortresses, designed as places of residence for large numbers of persons intimately related, and to be, at the same time, places of security capable of defence in case of attack.

The Pueblo House of Stone is the highest constructive work of the Village Indians of North America. These houses differ among themselves in character and design and in the extent of their accommodations. The best specimens are found in ruins in Yucatan, where, according to Stephens, the stones are dressed on their faces, jointed and laid in courses. We are also assured by the same author that the stones were laid in mortar composed of lime and sand, the correctness of which statement we are disposed to question. In dressing this stone flint implements only were used. The finest of these Yucatan edifices were but one story high, and without fire places or chimneys. They were inferior in the extent of their accommodations to the Pueblo Houses in New Mexico. The largest houses ever constructed by the Village Indians in North America are still found in New Mexico in ruins.

The Pueblo Houses in New Mexico also differ among themselves in the materials used in their construction. Some are of adobe...
Ground Plan of Ruins on the Animas River, New Mexico
brick, some are of cobble stone and adobe mortar, or a mixture of stones with natural faces and cobble stones, and the same mortar, while others are of stone on both faces of the walls throughout all the rooms, and the stones laid in adobe mortar. Such was the masonry of the Pueblo about to be described, so far as standing walls remain to attest its character.

The Pueblo, of which the Ground Plan is shown (Fig 1), is one of four situated within the extent of one mile on the west side of the Animas River in New Mexico, about twelve miles above its mouth. Beside these four, there are five other smaller ruins of inferior structure within the same area. This Pueblo was five, or perhaps six stories high, consisting of a main building, three hundred and sixty-eight feet long and two wings, two hundred and seventy feet long, measured along the external wall on the right and left sides, and one hundred and ninety-nine feet measured along the inside from the end back to the main building. A fourth structure crosses from the end of one wing to the end of the other, thus enclosing an open court. It was of the width of one and perhaps two rows of apartments, and slightly convex outward, which enlarged somewhat the size of the court. The main building and the wings were built in the so-called terraced form, that is to say, the first row of apartments in the main building, and in each wing, on the court side, were but one story high. The second row back of these were carried up two stories high, the third row, three stories, and so on to the number of five stories for the main building and four for each wing. The external wall rose forty or fifty feet where the structure was five stories high and but ten feet on the court side, including a low parapet wall where the structure was but one story high. There was no entrance to these great structures in the ground story. After getting admission within the court, they ascended to the roof of the first row of apartments by means of ladders, and in the same way, by ladders, to each successive story. As the second story receded from the first, the third from the second, and so on, each successive story made a great step, ten feet high. The apartments were entered through trap doors in the roof of each story, the descent being by ladders inside. In some places, without doubt, the upper stories were entered by doorways from the roof of the story in front.

The two wings are a mass of rooms. Pit holes along the summit
show the forms of the rooms with plain traces of the original walls here and there, and excavations, made by curious settlers, have opened a number of rooms in the ground story of one of the wings. These we entered and measured. Some of the rooms were faced with stone, and we found a stone wall regularly laid up, as was the case in the main building, as will elsewhere be shown. Some of the walls in these rooms were of cobble stone and adobe; others were of stone with natural faces and cobble stone intermixed. We saw no wall of adobe brick alone. The fallen walls formed a mass about twelve feet deep over the site of the wings, being the deepest on the outside, and thinning out on the court side.

The mass of material used in the construction of these edifices was very great, and surprises the beholder. It is explained in part by the thickness of the walls. We measured a number of them. They were 2 feet 1 inches, 2 feet 6 inches, 2 feet 9 inches, 3 feet, and in rare cases 3 feet 6 inches thick. None measured less than 2 feet.

The main building was originally the best constructed part of the edifice, it may be supposed, because a part of it now remains standing. The walls of the first story of some part of the second, and in some places, of a part of the third story, forming the second row of apartments from the outside, are still standing, and rise about twenty-five feet from the ground. The measurements of the second row of apartments, as shown in the diagram, were from the standing walls, and were made in the second story.

The first, or basement story is filled up with the rubbish of the fallen walls, ceilings, and floors, in the second row of apartments named. In some cases, they are full above the line of the original ceilings, in others nearly up to them. The main ceiling beams were of yellow cedar from eight to twelve inches in diameter, usually three and four in number, and were placed across the narrow way of the room. Stubs of these beams still remain in the walls parallel with the court. Just above the line of these beams in the other two walls were the ends of a row of poles about four inches in diameter, which passed transversely across the cedar beams. Stubs of these poles, broken off short at the line of the walls, still remain in place. Upon these poles was, originally, thin pieces of split cedar limbs, and then the floor of adobe mortar, four or five inches thick. We thus get the position and
height of the floor of the first and second stories, which were about nine feet six inches for the ground story, and nine feet for the second story.

The external wall of the main building has fallen the entire length of the structure. As these ruins are restored to by the few settlers in the valley as a stone quarry to obtain stone for foundations to their houses and barns, and for stonering up their wells the loose material is being gradually removed, and when the standing walls are more convenient to take they will be removed also. One farmer told me he thought that one quarter of the accessible material of this and the adjacent stone Pueblo had already been removed. It is to be hoped that the number of these settlers inclined to Vandalsim will not increase.

A part of the partition walls which connected the outside wall with the next parallel wall is still standing where the wall last named rises above the second story. They stand out for three or four feet like buttresses against the wall, and show the masonry of the parallel and transverse walls was articulated, that the partition walls were continuous from front to rear, and that the walls of the several stories rested upon each other. All this is seen by a bare inspection of the walls as they now stand.

The masonry itself is the chief matter of interest in these structures. Every room in the main building was faced with stone on the four sides, having an adobe floor, and a wooden ceiling. Each room had, as far as walls now remain to show, two doorways through the walls parallel with the court and four openings about twelve inches square, two on the side of each doorway, near the ceiling. These openings were for light and ventilation. In a limited sense it may be said that the stones were dressed, and also that they were laid in courses, but in the high and strict meaning of these terms, neither is true. The stones used were small and of different sizes. Sometimes they were nearly square from six to eight inches on a side, sometimes a foot long by six inches wide. The latter is the size of the stones used at Uxmal and Chichen Itza, according to Norman. In some cases longer and thicker stones were used without any attempt to square the ends. In some instances thin pieces of stone were employed with parallel faces. In all cases the stone was a sandstone, now of a reddish brown color. It is the prevalent stone in the bluffs of the Anmas River, and of all the
rivers parallel with it running into the San Juan, as far as personal observation enabled me to judge. It is a soft rather than a hard stone, usually of a buff color when first quarried, and some of it has decayed in the using. The wasted and weather-worn appearance of some of these stones would otherwise indicate a very great age for the structure. With stone of the size used a good face can be formed by simple fracture, and a joint sufficiently close may be made by a few strokes with a stone Maul. If finer work was aimed at, it must have been accomplished by rubbing the stones to a face. But this work is sufficiently explained by the former processes. In the row of apartments and stories named, both faces of each wall were of stone, so that all of the apartments were of stone on the inside. They were fan walls both in masonry and workmanship, and creditable to the builders. There was an attempt to lay up these walls in courses of uniform thickness, but each course differing from the one above and below it. The attempt was only partially successful. They did not hesitate to break in upon the regularity of the courses. Some of the standing walls are now sprung, but most of them are straight and fairly vertical, the adobe mortar being sound, and the bond unbroken.

The Indian had a string from time immemorial. With it he could strike a circle, and lay out the four sides of a quadrangular structure with tolerable correctness. It is not too much to assume that with a string and sinker attached, the Village Indian had the plumb line and could prove his wall as well as we can. At all events, the eye still proves the general correctness of their work.

The adobe mortar of the Pueblo Indians is something more than mud mortar, although far below a mortar of lime and sand. Adobe is a kind of finely pulverized clay with a bond of considerable strength by mechanical cohesion. In southern Colorado, in Arizona, and New Mexico, there are immense tracts covered with what is called adobe soil. It varies somewhat in the degree of its excellence. The kind of which they make their pottery has the largest per cent of alumina, and its presence is indicated by the salt weed which grows in this particular soil. This kind also makes the best adobe mortar. The Indians use it freely in laying their walls, as freely as our masons use lime mortar, and although it never acquires the hardness of cement, it disintegrates slowly. The mortar in these walls is still sound, so that it re-
quires some effort of strength to loosen a stone from the wall, and remove it. But this adobe mortar is adapted only to the dry climate of southern Colorado, Arizona, and New Mexico, where the precipitation is less than five inches per annum. The rains and frosts of a northern climate would speedily destroy it. To the presence of this adobe soil found in such abundance in the regions named and to the sandstone of the bluffs, where masses are often found in fragments, we must attribute the great progress made by these Indians in house building.

The exclusive presence of this adobe mortar in all New Mexican structures of the aboriginal period shows that the tribes of New Mexico were then ignorant of a mortar of lime and sand. And here a digression may be allowed to consider whether a cement of this grade was known to the aborigines. Theoretically, the use of a mortar composed of quick lime and sand, which gives a cement chemically united, would not be expected of the Indian tribes either in North or South America. There is no sufficient proof that they ever produced a cement of this high grade. It requires a kiln, artificially constructed, and a concentrated heat to burn limestone into lime, supposing they had learned that lime could be thus obtained, and some knowledge of the properties of quick lime before they reached the idea of a true cement. The Spanish writers generally speak of walls of lime and stone, thus implying a mortar of lime and sand. Thus Bernal Diaz speaks of the great temple in the Pueblo of Mexico as surrounded "with double enclosures built of stone and lime." Clavigero remarks that "the houses of lords and people of circumstances were built of stone and lime." Again, "the ignorant Mr. De Pan demons that the Mexicans had either the knowledge, or made use of lime, but it is evident from the testimony of all the historians of Mexico, by tribute rolls and above all, from the ancient buildings still remaining, that all these nations made the same use of lime as all the Europeans do." In like manner, Herrera, speaking of Zempoala, near Vera Cruz, remarks that the Spaniards entering the town, found the houses [were] built of lime and stone; and again speaking of houses in Yucatan, he remarks that "at the

1 The true history of the Conquest of Mexico, Keatinge's Translation Salem Ed 1803, Vol I, p 208
2 History of Mexico Cullen's Trans Phila Ed 1817 Vol II p 292
3 In Vol II, p 257
4 History of America, Stevens' Trans Lond Ed 1725, Vol II, p 260
place where the encounter happened, there were three houses built of lime and stone." These several statements can hardly be said to prove the fact. Mr. John L. Stephens, in speaking of the ruins at Palenque, is more explicit: "The building was constructed of stone, with a mortar of lime and sand, and the whole front was covered with stucco, and painted." The back wall of the Governor's house at Uxmal, is 9 feet thick through its length of 270 feet. In this wall, by means of crowbars, "the Indians made a hole 6 and 7 feet deep, but throughout the wall was solid, and consisted of large stones embedded in mortar, almost as hard as rock." At the ruins of Zara, there was one row of ten apartments, 220 feet long, called the Casas Cerrada, or closed house, because the core over which the triangular ceiling was constructed had not been removed when the house was abandoned, of which Stephens says, "we found ourselves in apartments finished with the walls and ceilings like the others, but filled up (except so far as they had been emptied by the Indians,) with solid masses of mortar and stones." Norman speaking of the ruins of the House of the Cacique at Chichen, remarks, "that the wall is made of large and uniformly square blocks of limestone, set in mortar, which appears to be as durable as the stone itself." Elsewhere, speaking of the ruins of Yucatan generally, he observes, "the stones are cut in parallelopipeds of about 12 inches in length and 6 in breadth, the interstices filled up of the same materials of which the terraces are composed." That these tribes used mortar of some kind in their stone walls cannot be doubted, but these several statements do not prove the use of quick lime, which is the main question. Mr. Stephens' statement satisfied me until I saw the New Mexican Pueblos. These show that a very efficient mortar can be had without the use of lime. The Indians of Mexico and the coast tribes near Vera Cruz plastered their houses externally with gypsum which made them a brilliant white, and the stucco used upon the inner walls of houses in Chiapas and Yucatan was not unlikely made of gypsum. This mineral is abundant as well as easily treated. From it comes plaster of Paris, and from it may have come in some form the bond which held the mortar together, to the strength of which Mr. Stephens refers.

6 Ib Vol. II, p. 187
7 Ib Vol I, p. 178
8 Central America, Chiapas and Yucatan Vol II, p. 100
9 Ib Vol II, p. 111
10 Ib Vol II, p. 21
11 Rambles in Yucatan, p. 128
The neatness and general correctness of the masonry is now best seen in the doorways. In the standing walls of the second story, and of the first, where occasionally uncovered, there are to be seen two doorways in each room as before stated, running in all cases across the building from the court side toward the external wall, and never in the direction of its length. These doorways measured some 3 feet 2 inches in height by 2 feet 6 inches in width, and others 3 feet 4 inches by 2 feet 7 inches.

Fig. 2

![Stone from Doorway](image)

Fig. 2 a

![A flanged block of sandstone for comparison with Fig. 2](image)

The stone used in these doorways are rather smaller than those in other parts of the wall, but prepared in the same manner.

I brought away two of these stones, taken from the standing walls of the main building, as samples of the character of the work with respect to size and dressing. Fig. 2 represents one of them, engraved from a photograph. It measures 8 inches in its greatest length by 6 inches in its greatest width, and it is 2 5/16 inches in thickness. The upper and lower faces of the stone are substantially, but not exactly, parallel. It also shows one angle, which
is substantially, but not exactly, a right angle, and it was so adjusted that the long edge was on the doorway, and short one in the wall of a chamber or apartment, with the right angle at the corner between them. This stone was evidently prepared by fracture, probably with a stone maul, and the regularity of the breakage was doubtless partly due to skill and partly to accident. It shows no marks of the chisel or the drove, or of having been rubbed, and where the square is applied to the sides or angles, the rudeness of the stone is perfectly apparent.

Fig 2 a, represents a sandstone cut by American skilled workmen in the form of a brick, and it is intended to show by comparison the great difference between the dressed stone of the civilized man and the rude stone of the mason in the condition of barbarism. The comparison shows that no instruments of exactness were used in the stone work of the Pueblo, and that exactness was not attempted. But the accuracy of a practical eye and hand, such as their methods afforded, was reached, and this was all they attempted. With stones as rude as that shown in the figure, a thin and even respectable stone wall may be made. The art of architecture in stone is of slow and difficult growth. Stone prepared by fracture with a stone hammer, precedes dressed stone, which requires metallic implements. In like manner mud mortar or adobe mortar precedes a mortar of lime and sand. The Village Indians of America were working their way experimentally, and step by step, in the art of house building, as all mankind have been obliged to do, each race for itself, and the structures the Village Indians have raised in various parts of America, imperfect as they are by contrast, are highly creditable to their intelligence.

Stone lintels were not used for these doorways, as stones 3 feet long would have been required. No stones of half that length are to be seen in any of the walls. They had, however, the idea of a stone lintel, for they used them in this structure over the foot square openings for light and an. We found a stone lintel over an opening 18 inches wide in a Cliff House on the Mancos River. This was so firmly embedded that we found its removal impossible. They used for a lintel six round cedar cross pieces (Fig 3), each about 4 inches in diameter, and now perfectly sound.

In some of these doorways we noticed a peculiar feature. On the side toward the external wall, one and sometimes two of these
wooden lintels were placed, 4 and sometimes 6 inches lower than the remainder, so that on entering from the outside room into the second room, the top of the doorway rose higher as the room was entered. A necessity was experienced to save the head from bumps and the wonder is that it did not occur to them to raise the doorways to the height of the body. As the doorways were always open, no doors being used, it may well be that larger openings would have created stronger currents of air through the building than they wished. The ends of these lintels were hacked off by stone implements of some kind.

The peculiar arrangement of the doorways tends to show that this great house was divided into sections by the partition walls extending from the court to the exterior wall, and that the rooms above were connected with those below by means of trap doors and ladders. If this supposition be well founded, the five rooms on the ground floor, from the court back, communicated with each other by doorways. The four in the second story communicated with each other in the same manner, and with those below through trap doors in the floors. The three rooms in the third story communicated with each other by doorways, and with those below as before. The same would be true of the two rooms of the fourth story. It seem probable that the connected rooms were occupied by a group of related families.

We afterwards found the same thing, nearly, exemplified in the present occupied Pueblo of Taos in New Mexico. Here there are two large edifices of adobe brick, five and six stories high respectively, and about two hundred yards apart. We found that the families lived in the second and upper stories, and used the rooms below them for storage and for granaries. Each family had 2, 4, and 6 rooms, and those who held the upper rooms held...
those below The whole number of Indians now living in the
two houses is about four hundred

In the south wing before mentioned, several rooms on the ground
floor are still perfect, with the ceilings in place upholding the rub-
bish above. The openings or trap doorways of two of these rooms
are still perfect, but the ladders are gone. The rooms had been
opened, as elsewhere stated, by late explorers. One of these
trap doors measured 16 by 17 inches, and the other 16 inches
square. Each was formed in the floor by pieces of wood put to-
gether. The work was neatly done. These rooms were smaller
than the rooms above. Some were as narrow as 4 feet 6 inches,
others 6 feet, showing that one room had been divided into two.
These basement rooms were probably occupied for storage exclu-
sively, whence their division. They were dark, except as light
entered through the trap doorway from above.

The structure connecting the wings and bounding the court was
evidently a single or double row of apartments. This is shown
by the amount of fallen material which is larger than a wall would
require, and from pits or depressions which plainly marked the
outline of apartments.

There are two circular Estufas in the main building, one 23 feet
and the other 28 feet in diameter. A part of the wall of the first
Estufa is still standing. It is of stone, mostly of blocks about
5 inches square, and laid in courses, with considerable regularity.
The work is equal to the best masonry in the entrance. In the open
court, and near the outer structure, bounding it in front, is another
Estufa of great size, 63 feet in diameter. These Estufas, which
are used as places of council, and for the performance of their
religious rites, are still found at all the present occupied Pueblos
in New Mexico. There are 6 at Taos, 3 at each house, and they
are partly sunk in the ground by an excavation. They are entered
through a trap doorway in the roof, the descent being by a ladder.

Outside the front wall closing the court, and about 30 feet dis-
tance therefrom, are the remains of a low wall crossing the entire
front and extending beyond it. The end structures were about 65
feet long by 40 feet wide, while at the centre was a smaller struc-
ture, 54 feet long by 18 wide. All its parts were connected. It
was evidently erected for defensive purposes; but it is impossible
to make out its character from the remains.

One wing is several feet longer than the other, and the wall on
the court side is about 20 feet longer than the opposite exterior wall, thus showing that they used no exact measurements.

There were no fireplaces with chimneys in this structure. There are none in the ruins in Yucatan and Central America. It is a fair inference, therefore, that chimneys were entirely unknown to the aborigines at the time of their discovery. They have since that time been adopted into the old Pueblo houses from American or Spanish sources. They are placed in one corner of the room. We saw recently at Taos two chimneys and two fireplaces in one and the same room, one for cooking and the other for a fire to warm the room, proof conclusive that they were not to the chimney born. They were in an apartment of one of the principal chiefs.

In a number of rooms are recesses like niches left in the wall, about 2 feet 6 inches wide and high, and about 18 inches deep. These furnished places to set household articles in, in the place of a mantel or shelf. We afterwards saw niches precisely similar at Taos, and thus used.

It remains to consider the number of rooms or apartments contained in this great edifice. It is plain that it was built in the terraced form, the second story set back from the first, the third from the second, and so on to the last which was a single row of apartments, on the top somewhere but not necessarily on the back side. Pueblos were not entirely uniform in this respect. The edifice at Taos recedes in front and rear and even upon the sides. This may have been built in the same way, but it can neither be proved or disproved from the ruins. The number of apartments would not vary much whether the upper stories were symmetrically formed or irregularly. If symmetrical, the main building contained 260 apartments, and each wing 70, making the computation for the latter by area, and from the number of depressions still discernible thus making an aggregate of 400 rooms.

The house was a fortress, proving the insecurity in which the people lived. It was also a joint tenement house of the aboriginal American model, indicating a plan of life not well understood. It may indicate an ancient communism in living, practiced by large households founded on the principle of kin. In such a case the communism was limited to the household as a part of a kinship.

Those familiar with the remains of Indian Pueblos in ruins will
recognize at once the resemblance between this Pueblo, and the Stone Pueblos in ruins on the Rio Chaco in New Mexico, about thirty miles distant from these ruins, particularly the one called Hungo Pavi so fully described by Gen J H Simpson. There is one particular in which the masonry agrees, viz., in the use of courses of thin stones about half an inch in thickness (Fig 4),

Figure 1

Thin stone from wall

sometimes three together, and sometimes five and six. These courses are carried along the wall from one side to the other, but often broken in upon. The effect is quite pretty. The stone represented in the figure, measures 6 inches in length by \( \frac{1}{2} \) an inch in thickness. Gen Simpson found the same courses of thin stones, and even thinner, and comments upon the pleasing effect they produced.

This edifice was a credit to the skill and industry of the men among the Village Indians, for the men, and not the women, were the architects and the masons, although the women undoubtedly assisted in doing the work. Women brought stone and adobe and cedar, and made adobe mortar, without a doubt, as they still do. One of the hopeful features in their advancement was the beginning of the reversal of the old usage which put all labor upon the women. It is now the rule among the Village Indians for the men to assume the heavy work, which was doubtless the case when this Pueblo was constructed. They cultivated maize, beans, and squashes in garden beds, and irrigated them with water drawn from the river by means of a canal, and passed in several smaller streams through their gardens. The men now engage in the work of cultivation. This is a sure sign of progress.

Off the south wing of the building, and without it, are the remains of an additional building, large enough for twenty or thirty rooms on the ground some part of which were, doubtless, carried up two or more stories high. But it is a mass of indistinct ruins about which little can be said, except that some of the rooms were unusually large. This may have been the first building constructed, and the one occupied while the Stone Pueblo was
being constructed. Near this Pueblo about 500 feet distant, was another stone Pueblo of nearly equal size. Some of its walls are still standing, and a number of its rooms are still perfect. At the distance of a mile and on the bank of the Animas River was a third, and equally large Pueblo, which is a mass of ruins. Not a wall is standing above the mass. Between this and the Pueblo first described, and near the river, are the ruins of a fourth Pueblo, smaller in size.

The valley of the Animas River is here broad and beautiful, about three miles wide. The river passes through the centre of the valley. The cliff, on the east side of the level plain is bold and magnificent, rising from 1500 to 2000 feet high, while on the west side, the valley is bordered with the mesa formation in two benches, one rising back of the other, and both as level as a floor, with the highlands forming the divide between the Animas and La Plata Rivers in the distance.

From the number and size of the houses, there was probably a population of at least 5000 persons at this settlement, living by horticulture. It is not now known by what tribe of Indians these Pueblos were inhabited or constructed.

These Pueblos, newly constructed, and in their best condition, must have presented a commanding appearance. From the materials used in their construction, from their palatial size and unique design, and from the cultivated gardens by which they were doubtless surrounded, they were calculated to impress the beholder very favourably with the degree of culture to which the people had attained. It is a singular fact that none of the occupied Pueblos in New Mexico at the present time are equal in materials or in construction with those found in ruins. It tends to show a decadence of art among them since the period of European discovery.

As a conclusion to this article, I wish to call attention to the San Juan district, to its numerous ruins, and to its importance as an early seat of Village Indian life. These ruins and those of a similar character in the valley of the Chaco about sixty miles distant therefrom, together with numerous remains of structures of cobblestone and adobe in the San Juan valley, in the Pine River valley, in the La Plata valley in the Animas River valley, and westerly in the Montezuma valley, among the latter of which are
the ruins of several large pueblos of stone, suggest the probability that the remarkable area within the drainage of the San Juan River and its tributaries has held a prominent place in the first and most ancient development of Village Indian life in America. The evidence of Indian occupation and cultivation throughout the greater part of this area is sufficient to suggest the hypothesis that the Indian here first attained to the condition of the Middle States of Barbarism, and sent forth the migrating bands who carried this advanced culture to the Mississippi valley to Mexico and Central America and not unlikely to South America as well.

Indian migrations are gradual outflows from an overstocked area, followed by organization into independent tribes, and continuing through centuries of time until the ethnic life of each tribe is expended or a successful establishment is finally gained in a new and perhaps distant land. They planted gardens and constructed houses as they advanced from district to district, and removed as circumstances prompted a change of location.

Since the cultivation of maize and plants precedes, or is synchronous with this stage of development it leads to the supposition that maize must have been indigenous in this region, and that it was here first brought under cultivation. There are some facts that seem to favor this hypothesis. At present I wish to

11 One of these near the base of the Ute Mountain, northeast side, and in the Monte Zuma valley so-called which I visited in 1878, was situated upon a ledge of rock 20 feet high, and in two sections interrupted by a break in the rock about 20 feet wide used as a reservoir of water. The principal building was 50 feet long, and measured through at the north end 110 feet, 90 feet near the middle, and 80 feet at the south end. The other section was 110 feet in front, and 80 feet wide. Both were of stone, some of the walls of which are still standing. The main building continued round tower, about 10 feet in diameter and at least two stories high.

12 What maize was indigenous is unknown except that it was somewhere upon the American continent. It is the only cereal America has given to the world. At the period of European discovery, it was found cultivated and a staple article of food in a large part of North America and in parts of South America. There were also found beans, squashes and tobacco, with the addition in some areas of peppers, tomatoes, calico and cotton. The problem of the place of the origin of maize is probably insoluble, but speculations are legitimate, and such are all that I have to offer.

The boundary of plant life in the Rocky Mountains is remarkable particularly on the southern slopes where they subside into the mesa or table land formation north of the San Juan river. The Continental divide is in the eastern margin of the region. The first suggestion I wish to make is that all the cultivated and cultivated plants must have originated in the great continental mountains of the two hemispheres and have propagated themselves along the water courses of the mountain valleys down to the plains traversed by the great rivers formed by these mountain tributaries. All the cereals belong to the family of the grasses (Grassaceae) and each of them, doubtless, is the last of a series of ancestral forms.

I saw rye, barley, and oats growing wild by self propagation in the mountain valleys
call attention such existing evidence as points to the San Juan district as the anterior home of a number of historic Indian tribes

1 The Mound Builders. Although these tribes had disappeared at the epoch of European discovery, and cannot be classed with any known Indian stock, then condition as horticultural tribes, their knowledge of some of the native metals, and the high character of their stone implements and pottery place them in the class of Village Indians. The nearest region from which they could have been derived is New Mexico. There is no reason for referring them to the San Juan region more than to the nearer country of the Rio Grande, unless it should appear probable that the inhabitants of the latter valley were themselves migrants from the same region. But there are good reasons for deriving the

of Colorado the present season, also the wild pea whose humped seed had the taste of the cultivated pea. Trumpets, onions, tomatoes, and hops are found growing wild in the Pecos river valley, and the pea plant or chlimata is said to grow luxuriantly in the Elk mountain valleys. I also saw wild flax and the ground growing by self-propagation in the valley of the Animas. Various gooseberries, raspberries, and strawberries are found in the mountain valleys in numerous places, together with flowering plants of many species and varieties. This form of flowering plants are to be seen above patches of snow in places where the snow had recently melted. This forms of plant life from 10 to 12,000 feet above sea level, and the relation of these mountain tributaries to the San Juan, which runs from east to west, not remotely from the base of these mountains, in such a manner as to under and receive into itslap so to express it the vegetable wealth developed in these mountain chasms, the facts that lure themselves upon the attention of the observer.

The altitude of the San Juan valley ranges from 5,895 ft. at Page's springs to 5,750 ft. at the mouth of the Animas, and diminishes to 4,416 feet near the point where it enters into the Colorado (Harlan's Atlas of Colorado Sheet III). The altitude at Conchas is 7,850 ft. (ibid. Sheet III) which is about as great an elevation as admits of the successful cultivation of maize. I noticed in a field of maize growing at Conchas, that the stock grew only about three feet high and the fact that the ears grew out of it but six inches from the ground. Specimens of the ears we obtained showed that it was about five inches long, with the kernel small and flinty. The ears are in four colors, white, red, yellow, and black each being one of the other of these colors. In a few cases two colors were intermixed in the same ear. It seemed probable that this was the primitive maize of the American aborigines from which all other varieties have been developed. A few ears we found at a Cliff House on the Mancos river corresponded with the Conchas in size, and was probably the same variety. Afterwards at Tims I observed the same ear in white red yellow and black, the staple maize now cultivated at this pueblo but much larger in size. I brought away several fine ears saved for seed. One black ear measured twelve inches in length, with twelve rows of kernels. While the white variety both at Conchas and Tims, had four rows of kernels.

Finally, this country me that excessively hot not more like the San Juan region, would seem to be most favorable for the development and self-propagation of maize as well as plants until man appeared for their domestication. These are but speculations, but if they should prompt further investigations concerning the place of nativity of this wonderful cereal, which has been such an important factor in the advancement of the Indian family, and which is also destined to prove such a support to our own, these suggestions will not have been made in vain.
mound builders from the Village Indians in some part of New Mexico

11 The Mexican Tribes  The seven principal tribes of Mexico, called collectively the Nahualtles, spoke dialects of the same language and all alike had a tradition that their ancestors came from the North, and that the separate tribes came into Mexico at long intervals apart. They arrived in the following order as to time:

1. Sochimilcos, 2. Chalca, 3. Tepanecas, 4. Tecoancas, 5. Tlalthuicas, 6. Tlascalanos, 7. Aztecs or Mexicans. They settled in different parts of Mexico. The Cholultas, Tepanecas, and Huexatitlancos, spoke dialects of the Nahualtic language and were severally subdivisions of one of the other preceding tribes. They had the same tradition of a northern origin. These several tribes were among the most prominent in Mexico at the period of Spanish discovery. Some of the tribes of Yucatan and Central America also had similar traditions of an original migration of their ancestors from the North.

Acosta, who visited Mexico in 1585, and whose work was published at Seville in 1589, states the order of the migration of the Mexican tribes as above given, and further says that they came from other far countries which lie toward the North, where now they have discovered a kingdom they call New Mexico. There are two provinces in this country the one called Aztlan, which is to say, a place of Herons (Cranes), and the other Tecuilhuanec, which signifies a land of such whose grandfathers were divine. The Nahuatles [Nahualtles] point their beginning and first territory in the figure of a cave and say they came forth of seven caves to come and people the land of Mexico.”

The same tradition substantially is given by Herrera 11 and also by Clavigero. If by the word Aztlan was intended a place of Cranes,” and on the supposition that these tribes migrated from the San Juan region, the reasons for the designation are justified. The Sand-hill Crane (Grus Canadensis) is one of the largest and most conspicuous of American birds, and is still found from the British Possessions to New Mexico, and winters in the latter. I saw a part of these great birds the present season in the valley of the

12 The Natural and Moral History of the East and West Indies London Ed. 1601

Grims-Comms Trans. pp. 197, 198

13 General History of America London Ed. 1725. Stevens’s Trans. III. 188

14 History of Mexico Cullen’s Trans. 1. 119
Animas River. Mr. Cones remarks, that "thousands of Sandhill Cranes repose each year to the Colorado River valley, flock succeeding flock along the course of the great stream from their arrival in September until their departing the following spring. Taller than the Wood Ibises or the largest Herons with which they are associated the stately birds stand in the foreground of the scenery of the valley. Such ponderous bodies moving with slowly beating wings give a great idea of momentum from mere weight, a force of motion without swiftness, for they plod along heavily seeming to need every inch of their ample wings to sustain themselves." It is an Indian trait to mark localities by some conspicuous feature of fact, and the selection of the Sandhill Crane to indicate their home country would have accorded with Indian usages.

Again, Hettana, who presents the current traditions, observes, that "these peoples painted their original in the manner of a cave, and said they came out of seven caves to people the country of Mexico. After the six above mentioned races departed from their country, and settled in New Spain, where they were much increased, the seventh race being the Mexican nation, a warlike and polite people, who adoring their god Vitorporith he commanded them to leave their own country, promising them they should rule over other races in a plentiful country and much wealth."

It is worthy of remark that the cave dwellings or cliff houses are in the San Juan district, the most of them being on the Mancos river, and on the western portion of the San Juan. These traditions may in fact refer to these cave dwellings as the original homes of their ancestors, and at the same time without precluding the supposition that they also constructed and inhabited some of the pueblo structures now in ruins in other parts of the same area. All the early accounts concur in representing the Aztecs or Mexicans, when they first arrived in Mexico, as subsisting by the cultivation of maize and plants, as constructing houses of stone, and with a religious system which recognized personal gods. These statements are probably true. They had attained to the status of village Indians. This again renders New Mexico then probable original home as the only area in the north where ruins of structures of tribes so far advanced have been found.

16 Birds of the Northwest 1871 p 714 17 History of America 115 p 188-190
The San Juan district is remarkably situated in its geographical relations. This river, rising in the crests of the high mountains forming the watershed or divide between the Atlantic and Pacific, flows southward until it enters the tableland formation through which it flows in a southwesterly and then northeasterly direction, making a long, sweeping curve in New Mexico and Arizona, after which it runs westerly to its confluence with the Colorado. It receives from the north the following tributaries, rising like itself in the high mountains, the Pueblo, Pine river (Los Pinos), the Animas the La Plata, the Mancos, the Me Elmo, now dry, and the Hovenweep and Montezuma creeks, now nearly dry. Its southern tributaries are the Navajo, Chaco, and De Chelly. West of the Mancos river, in the region of the Ute mountain, is the so-called Montezuma valley, a broad and level plain, ten or more miles wide in its widest expanse. It has no flowing stream through it at present, and there is no certainty that it ever had. The Montezuma valley, so named by General Heffeman, of Animas City, is about fifty miles long from its north end to the San Juan river on the south, and is sprinkled over with ruins of pueblos, some of stone and others of cobble stone and adobe mottan. The Round Towers with two and three concentric walls are found in this valley. There is one at the ranch of Mr. Henry L. Mitchell at the commencement of the Me Elmo canyon which we examined, and a second and larger one at the great stone pueblo, about four miles below, before mentioned, which we also examined. These towers are of stone about five inches square on the face, and substantially in courses, and they are only found in the San Juan region. They reappear in South America, at Ollanta tambo and Pisac. In this valley, without water, except in pools and springs, and with a slight rainfall during the year, Mr. Mitchell at the time of our visit, was successfully cultivating wheat, oats, maize, and the garden vegetables. Near his house were the ruins of nine pueblo houses in a cluster. These were made of cobble stones and adobe mottan, and a mile below them were the ruins of another cluster of about the same number. About four miles toward the Ute mountain, are the ruins of the great stone pueblo, with the triple round tower before mentioned. The plain stretches south and thirty-six miles to the San Juan, and Mr. Mitchell assured us that similar ruins existed in a number of places throughout its entire extent.
With such evidences of ancient occupation, here and elsewhere in the San Juan county, we are led to the conclusion that the Village Indians increased and multiplied in this area, and that at some early period there was here a remarkable display of this form of Indian life and of house architecture in the nature of fortresses, which must have made itself felt in distant parts of the continent. On the hypothesis that the valley of the Columbia was the seed land of the Ganowaman family, where they depended chiefly upon a fish subsistence, we have in the San Juan county, a second centre and mutual point of migrations founded upon farmaceous subsistence. That the struggle of the village Indians to resist the ever continuous streams of migration flowing southward along the mountain chains, has been a hard one through many centuries of time, is proved by the many ruins of abandoned or conquered pueblos which still mark their settlements in so many places. At the present moment there is not a Village Indian in the San Juan district. It is entirely deserted of this class of inhabitants.

That the original ancestors of the principal historic tribes of Mexico once inhabited the San Juan country is extremely probable. That the ancestors of the principal tribes of Yucatan and Central America owe their remote origin to the same region is equally probable. And that the Mound Builders came originally from the same country, is, with our present knowledge, at least a reasonable conclusion.

Indian migrations have occurred under the influence almost exclusively, of physical causes, operating in an uniform manner. These migrations, involving the entire period of the existence here of the inhabitants of both American continents, will be found to have a common and connected history. A study of all the facts may yet lead to an elucidation and explanation of these migrations with some degree of certainty. The hypothesis that the valley of the Columbia River was the seed land of the Ganowan family holds the best chance of solving the great problem of the origin and distribution of the Indian tribes.

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