LOVELOCK CAVE

BY

LLEWELLYN L. LOUD AND M. R. HARRINGTON

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EDITORS' PREFACE

In the fall of 1911, during the mining of some two hundred fifty tons of bat guano for fertilizer in a cave about twenty-two miles southwest of Lovelock, Humboldt valley, west central Nevada, numerous well preserved ancient Indian objects were discovered. Many of these were lost or destroyed; some went to the Nevada Historical Society in Reno; and the remainder passed into private possession. After the commercial exploitation of the cave had ceased, the University of California sent L. L. Loud to the cave to conduct archaeological excavations. Between April 1 and August 1, 1912, he obtained, unassisted, 10,000 specimens from the cave. This collection was divided between the University of California and the Nevada Historical Society. The lack of assistance and the fact that one of the joint claimants of the cave prohibited work in his end of the cave made stratigraphic work not feasible. An outstanding feature of Mr. Loud's collection was profuse textile material, which included over 1500 fragments of basketry and 1400 of matting, the total of 3324 pieces weighing 121 pounds.

The preservation conditions in Lovelock cave are unusually favorable, recalling those of Egypt and Peru and being equaled at only a very few sites discovered in North America. The material was also wholly pre-Caucasian. It was obvious on casual inspection that the ancient culture represented had strong relations with the native culture of California in historic times. The material secured was therefore of more than local interest. It gave a picture of a culture more or less coeval and cognate with that of the shellmound dwellers and other ancient peoples of California, but far fuller and more vivid because of richness in whole series of objects such as baskets and wooden implements of which only the barest traces, if any, remain in most archaeological sites.

Further, there were evident definite similarities with ancient material from the Southwest—sandals, woven bags, spear-throwers, and the like. Some of these objects suggested the Basket-Maker culture which preceded the Pueblos. There was thus indication not only of affiliations in another direction, but of the possibility of tying the Lovelock cave to the chronology being established for the ancient Southwest.

Fortunately the Museum of the American Indian, Heye Foundation, was able to conduct further excavations in the cave in 1924. M. R. Harrington was in charge. Mr. Loud was able to collaborate with him, and several workmen were employed. Happily, it proved possible on this occasion to make a stratigraphic study of part of the deposit. Credit is due Mr. Harrington for developing this opportunity, which established a culture change as having taken place during the utilization of the cave.

How far Mr. Harrington's interpretations of the age and relations of the Lovelock cave culture are to be followed, must be left to the judgment of the world of archaeology. It does seem desirable to present as full a picture as possible of this culture, in description and by illustrations, both to provide the evidence on which the interpretations can be judged, and for its intrinsic interest.

The plan followed in the presentation has been to make Mr. Loud and Mr. Harrington respectively responsible for the accounts of the work done and the material secured by each. The several accounts have then been arranged with a view to connectedness in the monograph as a whole, credit for each section being attributed to its author.

Mr. Loud, in 1912, obtained also some 1500 archaeological specimens from surface sites in Humboldt valley. An account of these constitutes Appendix 1, which supplements the main report not only by picturing the archaeological environment of the cave, but in dealing largely with objects of stone, which were rare in the cave.

The historic Indians of Humboldt valley are locally known as Paiutes, and in scientific literature either as Paviotso, their appellation in the Shoshone language, or as Northern Paiute to distinguish them from the Southern Paiute, a quite separate ethnic unit. During part of 1914 Gilbert Natches, a Northern Paiute from Pyramid Lake reservation, was at the University to aid in the study of his language. He is a "grandson" of Winnemucca, once the most important chief of western Nevada, and "great grandson" of Truckee, who accompanied John C. Fremont on his explorations. Mr. Loud secured from Natches data on the life of his people which further illustrate the culture of the cave. These constitute Appendix 2.

Appendix 3 is a native legend about Lovelock cave recorded by Sarah Winnemucca Hopkins, a Northern Paiute; with comments by Mr. Loud.

Appendix 4, finally, is the story of the Lovelock cave as told by Mr. John T. Reid, of Lovelock.

I. EXCAVATIONS AND CULTURE INTERPRETATIONS

BY

M. R. HARRINGTON

The Lovelock cave is situated in a small peak in an outcrop of limestone, forming part of the Humboldt mountains which rim the Humboldt valley on the southeast, and lies some two miles eastward of the bed of Humboldt lake, now drained and dry, and about twenty-two miles by road southward of the little town of Lovelock, Nevada. Its mouth is high above the level of the valley, and commands an extensive view of the old lake bed, the wide stretch of lowlands, and the Trinity range bounding the valley to the northwest.

Originally it was not a cave, but a long shed-like rockshelter, doubtless formed in the limestone by the waves of the ancient Lake Lahontan, whose beach lines can still be followed along the neighboring ranges. Earthquakes, and perhaps other natural agencies, caused huge masses of rock to drop from the roof, blocking the opening in front. When first seen by white men, the cave could be entered only through an opening near the southwest end, and the whole floor was covered with a mass of bat guano 3 to 6 feet deep, rising in hummocks under the crevices of the roof that were the favorite roosting places of the swarms of bats which then inhabited the cavern.

The Northern Paiute Indians who live in the vicinity have a legend,[1] which, as told to the writer, relates that the cave was once the home of a tribe to whom the Northern Paiute apply the name Sai-i, which they now give the Pit River (Achomawi) Indians of northern California. These people made their living from the lake, and were enemies of the Northern Paiute, among whom they made themselves especially unpopular by capturing the Northern Paiute women when the latter visited the northwest side of Humboldt lake to gather tule rushes for mats.

Deciding finally to exterminate the cave people, the Northern Paiute besieged them in their retreat, and tried a number of times to

[1] See also Appendixes 2 (Myths—The Ancient People), 3, and 4.

take it by assault. Time and again the cave-dweller bowmen drove the Northern Paiute back, until at last the besiegers conceived the idea of shooting fire-arrows into the cave, to ignite the dry tule bedding and smoke out their enemies. Clouds of smoke rolled from the cave, yet the cave-dwellers failed to appear. All night the place was guarded, and when morning came the Northern Paiute advanced again, only to find their prey flown and the cave empty. Some Northern Paiute maintain that their clever enemies had found their way out through some hidden underground passage, but others admit that they *might* have sneaked out past the guards in the middle of the night. Perhaps the guards were too confident that their opponents had been smothered and were none too vigilant. No date of course is given for this event; yet an old Northern Paiute man recently died at Stillwater who is said to have taken part in it, and to have had one eye shot out by an arrow in one of the charges on the cave mouth.

About 1911 Mr. James H. Hart and Mr. Samuel Pugh, of Lovelock, located the cave as a mining claim, and started to remove the bat guano, which was hauled to the railroad in wagons and shipped away for fertilizer. This stripped the floor of a layer, which Mr. Hart says varied from 3 to 6 feet deep, over most of the cave, but which thinned out on the west side near the great rockfall which blocks the mouth. Here only apparently was part of the original cave floor left after the miners finished. To facilitate removing the guano, a tunnel tapping the northeast end of the chamber was blasted through the rockfall, and a track for mine cars laid in it.

It was during the removal of this guano that the first Indian objects were found in the cave, and they were many—baskets, beautifully woven nets, sandals, and numerous other articles. Naturally only objects of a spectacular nature were saved as curios. The smaller, inconspicuous things were overlooked and lost. Many of the finer specimens eventually met with a similar fate. A perfect spear-thrower, or atlatl, went to a private collector in California, and at his death was lost. The best specimen of the adult mummies was boiled and destroyed by a local fraternal lodge, which wanted the skeleton for initiation purposes. Some things however eventually found a home in the Nevada Historical Society at Reno and in private collections. The guano digging stopped when the miners reached a level in the cave where the tule rushes, broken baskets, and refuse left by the ancient inhabitants formed such a large proportion of the deposit that the fertilizer could no longer be profitably screened from it.

In 1912 Mr. L. L. Loud worked out the entire northeastern end of the cavern down to bedrock. After he left, various private collectors visited the cave and dug over the deposits with varying degrees of success. Many of their finds have doubtless been lost or destroyed, but some of the best, including a large rabbit net and a most interesting ceremonial plume (pl. 20), were purchased by the Museum of the American Indian, Heye Foundation. It was through these purchases that Director Heye first conceived the idea of sending the writer to explore any deposits which might be left in the cavern.

I arrived at Lovelock on July 1, 1924, where I met Mr. Loud, whose services had been kindly loaned by the University of California. At a later date we employed several Indians to help with the excavating, including George and Willis Evans from the Pit River tribe of northern California, who soon developed a high degree of skill and interest in the work, and "Skinny" Pascal, a Northern Paiute Indian. After my return to the Museum Dr. Melvin R. Gilmore was kind enough to identify some of the plant material found.

THE EXCAVATIONS

When Mr. Loud and I approached the cave on July 3, 1924, we followed the road made by the guano-miners over gradually rising ground with only one really steep spot—a lake terrace—until we reached the base of the little limestone peak in which the cave is situated, a peak which forms a spur of the higher range behind it. Here we found ourselves at the base of a steep talus slope, at the top of which could be seen a projecting ledge in which the cave lay.

Ascending the talus we found ourselves at the mouth of the tunnel blasted by the miners through the northeast end of the fallen rock and other débris that blocked the entrance, and through this we passed back and down into the cave itself. It was much darker than I had expected, and the odor of the bats was almost overpowering at first, but our miner's carbide lamps soon provided sufficient light, and after an hour or so we no longer noticed the odor.

The cave is about 150 feet in length and some 35 feet wide at the widest part. It tapers almost to a point at the ends, and the longest axis lies approximately northeast and southwest, just about parallel to the face of the bluff and to the general trend of the Humboldt range at this point.

In the northeast end, where Mr. Loud had worked for the University, the original lime-powdered bottom of the cave was bare in spots, and here could be seen its general character—higher in the center of the cave and sloping gradually downward from the northeast end toward the southwest, and sharply downward 2 or 3 yards from the wall everywhere. This condition is doubtless due to rockfalls from the roof when the cave was forming, the fallen material creating a pile higher in the center than around the edge. The bottom was composed of such limestone from the roof, cemented together with a rather soft, white mineral substance which crumbles into fine granules when dug.

At first sight it appeared that the only undisturbed deposits remaining lay where the guano-diggers had left a runway, just inside the tunnel entrance, and along the base of the great fallen masses of rock which blocked the mouth of the cave; for Mr. Loud had dug the deposits in the northeast end down to the very bottom, and those at the southwest end seemed to have been torn to pieces by amateur relic-hunters. Consequently, the prospects looked anything but encouraging.

But when we examined the situation more closely, and moved some of the piles of refuse thrown out by previous diggers, we found that not only was there a stretch of undisturbed deposit along the base of the rockfall that promised well but that the bottom, which had been within a few feet of the surface over most of the cave, dropped toward the southwest end, allowing a very deep deposit here—deeper than most of the holes dug by the curio hunters. In fact we found enough undisturbed or slightly disturbed beds of aboriginal refuse to keep us busy more than 3 months.

In laying out the ground for excavation we were faced with a problem, for the irregularity of the deposits which remained made regular sections or trenches impracticable. So we decided to adopt the plan used by Mr. Loud in his previous work and designate each promising area as a "lot," numbering them in order of their investigation "lot 1," "lot 2," etc. The boundaries of these areas or "lots" were the natural walls of the cave, fallen masses of rock, and the holes left by previous excavators.

Our procedure in excavating was to start in at one edge of the area, digging with a trowel, or where the deposit was especially tough and compact, with a small pick, and reaching the bottom as soon as possible. The botton once found it was then followed throughout the digging of the "lot." By the light of miners' carbide lights the material forming the deposit was carefully dug down, an effort being made to keep the bank in front always perpendicular. The deposit

was carefully examined during the process, and again before it was shoveled out of the excavation. This examined material, or "back-dirt" was thrown upon areas that had already been dug over, or, if there were none such within reach, it was shoveled into a square of canvas and carried to some part of the cave where it could be dumped without being in the way of future digging.

When the deposit was especially deep, the "lot" had to be dug in levels; the upper 4 feet first, then the next, then the next. Lot 15, at the southwest end, was dug in 6 levels for stratigraphic purposes, in the only part of the cave where such a procedure might give some hope of yielding results.

The structure of the deposits was noted. Storage pits and grave pits were measured and recorded. The depth of each specimen of consequence and its position with respect to the median line of the cave, established for measurement purposes by Mr. Loud during his former stay, were recorded. The measurements of depth have only a relative value, because the original surface of the cave floor had been removed by the guano-diggers to varying depths, except for a narrow strip along the inner edge of the rockfalls blocking the cave mouth. But even if the surface had remained unbroken, the bottom was so irregular, and the deposit consequently so much deeper in some places than in others, that an object found at a depth of only 2 feet near the middle of the chamber might belong to an older horizon than one found 8 feet deep at the southwest end.

THE DEPOSITS

Refuse Layers

The deposits consisted of desert dust blown in from outside, fragments of stone of varying sizes fallen from the roof, lime dust from the same source, bat-droppings or "guano," all mixed with materials brought in by man or objects made by him, such as quantities of tule rushes and grass intended for bedding and other uses, sticks, arrow canes, pieces of broken baskets and worn-out mats, bones of food animals, bits of string and rope, hair, feathers, excreta, ashes, stray human bones, occasional implements of stone, wood, or bone, shell beads, sandals, and numerous other articles.

There was a strip of varying thickness, usually not more than a few inches, along the back wall where there was dampness enough to injure perishable objects, and the deepest deposits far under the over-

hanging rocks to the southwest and west were even damper; but aside from these places the deposits in the cave were perfectly dry. They were so dry that everything, even hair and feathers were well preserved unless attacked by insects or, in the case of the human remains, by rodents or coyotes.

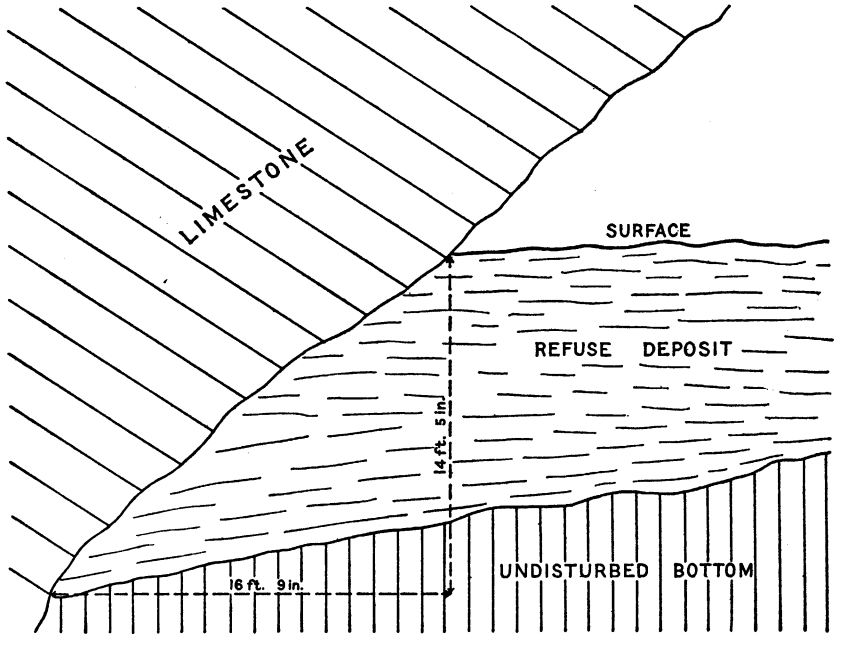


Fig. 1.—Situation of deepest part of deposit in Lovelock cave (1924 excavations).

In depth the deposits as we found them varied from a foot or so in the middle of the chamber to four or five feet along the back wall, and five or six along the base of the rockfall blocking the mouth of the cave; while, in the very southwest end, under the overhanging rocks, the layers containing examples of man's handiwork reached the extraordinary depth of 14 feet 5 inches from the surface. This was in one place only (fig. 1), but depths of 10 to 12 feet were general in this end of the cave.

For the greater part the deposits were easy to dig, but there were certain layers which were so tough and compact that a pick was required to loosen the impacted mass. We were sometimes able to lay bare one of these layers over several square yards when it was seen that the surface was smooth and that it bore every evidence of having formed part of the cave floor at one time (fig. 2).

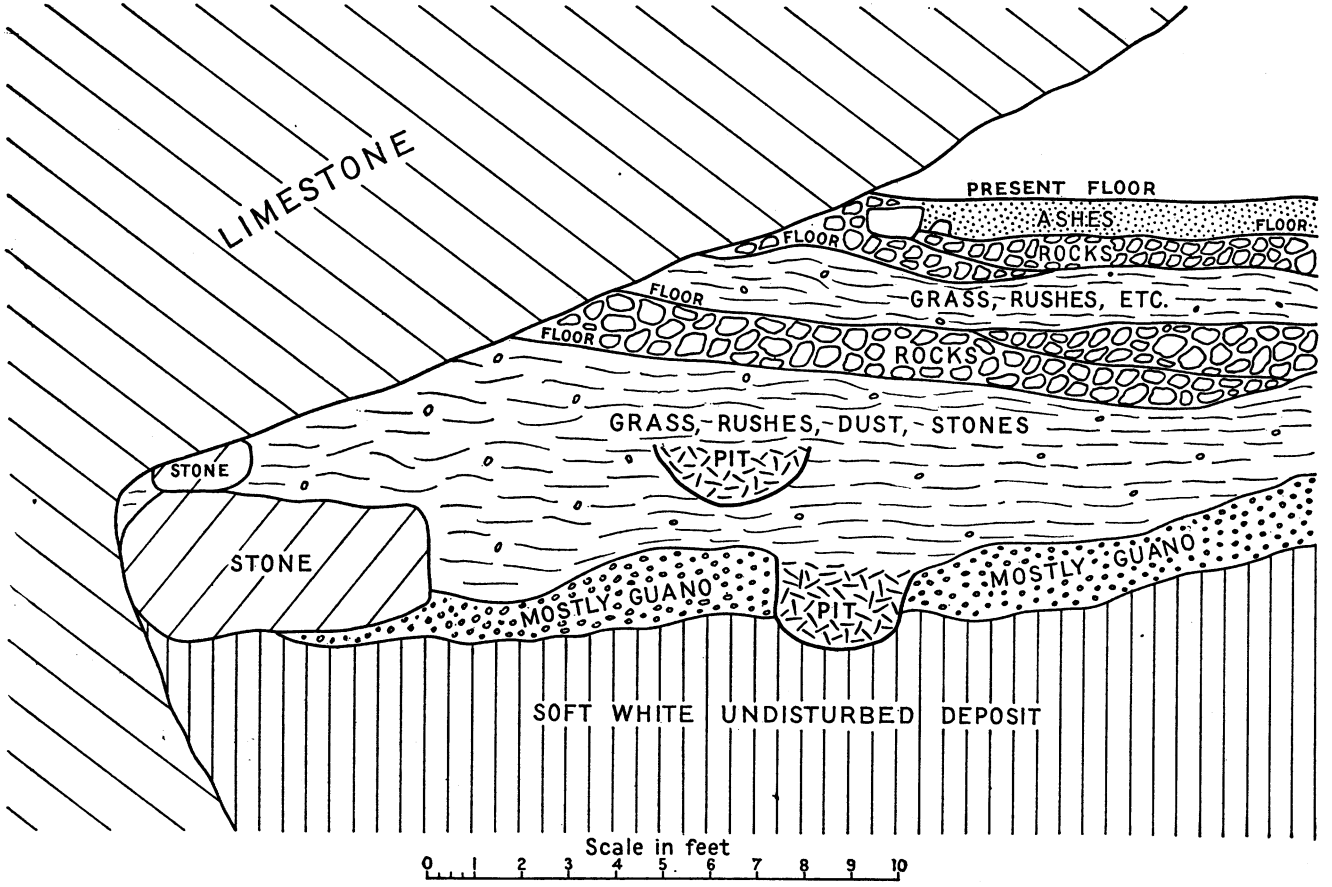


Fig. 2.—Section about 6 feet west of south wall (lot 12), southwest end of cave (1924 excavations).

Had the cave been undisturbed when we started to work it might have been possible to remove all the deposits down to the uppermost of these former floors, then all the deposits down to the next floor, and so on, keeping the specimens from each level and from the pits originating in it separate, in which case it would not have been difficult to determine the comparative age of any specimen or class of specimens. But unfortunately the deposits had been so dug into and disturbed that this could not be done. And in any event it might not have been possible to trace one of these floor layers over the entire cave, for such layers may have formed only in such parts as were most walked over.

Fortunately however we were able to make the stratigraphic study of one small area, lot 15, which, although not entirely satisfactory, gives us a key to the situation. On the basis of this study, plus observations recorded elsewhere in the cave, we can divide its occupancy roughly into three periods which we may call respectively the earlier, the transitional, and the later.

Rockshelter

Between the two entrances of the cave, on the outside of the fallen masses of rock which block its mouth, is a rockshelter, some 65 feet long and 30 feet high in front, with an overhang of about 25 feet, which gave sufficient shelter except in windy weather, and was dry enough for perishable articles to be preserved along its back wall. Here, just northeast of the slope leading down into the southwest entrance of the cave, was a deposit of dry camp refuse reaching a depth of nearly two feet.

The upper 4 or 5 inches was lime dust and rock fragments deposited since Indian days, and beneath this a stratum of charred grass a few inches deep containing many small round charred seeds, doubtless used as food by the Indians. Below this and against the back wall was a layer of unburned grass, rushes, and feathers, with some human hair, short and black. And in this layer was a nearly complete sandal, woven of rushes, part of another one, and the feather end of a wooden—not cane—arrow. In the refuse were many cat-tail rush spikes with the down mostly removed, and some felted cat-tail down. In the down were many of the tiny seeds of the cat-tail (*Typha*) doubtless used for food by the Indians of the cave, for we found dry human excreta containing them, as well as the round seeds before

mentioned. The use of these seeds is still continued by some of the Northern Paiute, especially those of the Stillwater band, whose Indian name "Toi-itkut" is said to mean "cat-tail eaters."

Storage Pits

Many artifacts were found during the course of the general digging in the deposits of refuse of the cave proper, but most of our best specimens came from the storage pits and from the graves.

The pits, called by some investigators cists, cache pits, or caches, were simply holes dug by the Indians in the cave floor of their day for the purpose of storing seeds, pine nuts, dried fish or other food, or for the storage of such valuables as fur robes, ceremonial plumes, decoys, and rabbit nets.

Usually these pits had been opened and the contents removed, presumably by the owners. Some showed evidence of having been used a number of times, but in a few cases the owner had never returned to recover his buried store, and the pit remained unrifled until our time.

In all, we opened 40 such pits in the Lovelock cave, exclusive of graves, of which there were 8. These pits varied in form from a shallow bowl-shape to a deep pot-shape, or in figures from 2 feet to nearly 5 feet in depth, with diameters ranging from 1 foot 10 inches to 4 feet. Some were oval and one of these had diameters of 5 feet 8 inches and 4 feet. The depths were not calculated from the surface of the ground, but from the *level of origin* when that could be distinguished, that is, the level which was the floor of the cave at the time the pit was dug. This is shown in the section (fig. 2). The lower pit must be considerably older than the upper one; in fact, it is evident that it was dug during the earliest occupation of the cave, when its floor consisted only of a thin layer of guano resting upon the lacustrine deposits left by the waters of Lake Lahontan. The upper pit to the left, on the other hand, was dug after the Indian deposits had accumulated to some depth. The same thing is revealed in figure 3 even more clearly, for pit 10 was dug from one distinct floor level, while pit 9, although almost equally deep when found, originated in another higher floor level, and is consequently not so old as pit 10. From such instances it appears that storage pits did not belong exclusively to one particular period of the cave's occupancy, but had been dug from time to time since it was first occupied.

To prevent the food or other things stored in each pit from becoming mixed with the dusty refuse in which it was dug a lining was provided, sometimes for the bottom only, sometimes covering the sides as well. Grass was the most frequent lining material, rushes next; then scraps of old baskets, pieces of rush mats, water plants from the lake, shredded bark, and a sort of felt made from the down of the cat-tail rush. In two instances sage twigs were employed. Sometimes two or more materials lined a single pit.

Some pits were used over and over again, being cleaned and relined to receive the new crop of seeds, pine nuts, or dried fish. Occasionally the cleaning was omitted, and the new lining laid upon several inches of dust and débris that had accumulated in the pit since last used. In the case of pit 12, a false bottom concealed the real treasure the pit was intended to house.

A description of all pits would entail repetition, so typical ones have been selected. Pit 4 lay in lot 7, near the northeast end of one of the great masses of fallen rock blocking the mouth of the cave. Its greatest depth from the present surface was 3 feet 10 inches, but when first made it was only 2 feet deep, for 1 foot 10 inches of refuse had been deposited subsequently upon its "level of origin." It formed a deep oval bowl, with diameters 2 feet and 2 feet 3 inches. In the bottom lay some downy feathers and the beak of a duck, possibly relics of storage of decoys or decoy parts. Then came a rectangular piece of rush matting forming a bottom and fragments of baskets forming the sides, all representing a later use of the pit. After this use the pit had evidently stood empty for some time, for several inches of loose trash had gathered. The next user simply laid a new bottom over the accumulated rubbish. This bottom consisted of a conical twined pack basket smashed flat, an old, worn-out, coiled, bowl-shaped basket, several fragments of twined baskets, and a small breechcloth or apron made of fiber, apparently shredded bark. Upon this lay 198 bunches of small feathers, each carefully tied together with strings. These represented the leavings of the latest recognizable contents of the pit. It appears that they were used in decoy making. The pit belongs to the later period.

Pit 9 was one of the deepest found in the front part of the cave, its bottom lying 6 feet below the present surface; yet it belongs to the later period, being dug from a level only 14 inches below the present surface, which makes the original depth of the pit 4 feet 8 inches. It is a good example of the pot-shaped type of pit, the diameter at the

top being 2 feet 8 inches, while at the bottom it is 3 feet 4 inches. One side of the pit is seen in figure 3. At the very bottom was a tightly packed 6-inch lining of grass, rush mat fragments, and pieces of baskets. This lining was possibly the first used after the pit was dug. Then came 14 or 15 inches of dusty rubbish, containing a hank

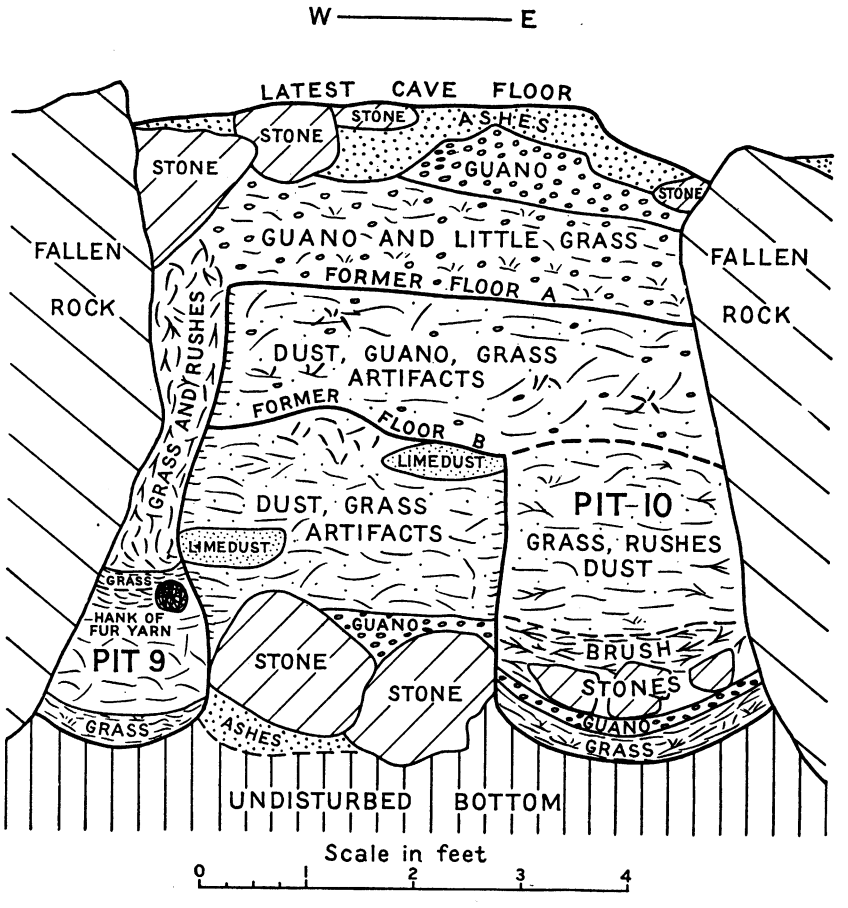


Fig. 3.—Section showing pits 9 and 10 (1924 excavations).

of yarn for blanket weaving. This yarn consisted of strips of fur and of downy bird skin twisted around a foundation of native strings and shreds of worn-out nets. Then came another grass layer, in which were 126 small dried fish, overlooked doubtless in the darkness of the cave by the last user of the pit. Above this the pit contained only the rubbish that had accumulated since its last use.

Pit 10, not far to the east of pit 9, was much older; in fact belonged to either the transitional or the older period as may be seen in figure 3, for it was dug from a level about 3 feet below the present surface. As the pit at that time was 3 feet 1 inch deep we find its bottom 6 feet 1 inch below the surface. Its diameter was 2 feet 6 inches. On the bottom was a 3-inch layer of tightly packed grass lining, upon which lay an inch or so of bat-guano, showing the pit had lain open a while, probably during a period when the cave was not occupied by man and the bats had it all to themselves. Above this lay a number of stones weighing 10 to 20 pounds, possibly deposited there to get them out of the way when the old tenants returned or new ones arrived. The next user, without removing the stones and guano laid a new bottom lining of sage-brush twigs and stems. In the dusty rubbish above this layer were bits of basketry and matting, plus the usual strings, etc.

There were many pits with yield as poor as pit 10, or poorer. In contrast to these were some rich ones, among them pit 12, which gave us the best single find of the season. It lay in lot 7 near the center of the front of the cave, just back of the great rockfall. Its bottom was 5 feet 1 inch below the present surface, but it had been dug from a level 2 feet 8 inches below the present surface; so its original depth was only 2 feet 5 inches. It was oval in outline, measuring 2 feet 8 inches by 2 feet 4 inches, the long axis lying east and west. At 3 feet 6 inches below the present surface, or 10 inches below the pit's "level of origin" lay a bag made of rush matting, flattened out, resting on two layers of mat fragments of similar material. Beneath this were three large pieces of twined pack basket and a large coiled basket bowl somewhat distorted. Underneath this were more pack-basket pieces; while similar fragments were laid around the walls, giving the whole thing the appearance of a well lined pit intended for seeds or other fine material. It was so cleverly arranged that looking in from above no one would guess that anything could be concealed beneath such a lining. On this bottom lay several large stones such as were frequently thrown into discarded pits, apparently to get them out of the way. When the layer of mats and basketry was removed it was seen to be a false bottom (fig. 4), for beneath it lay a bulky package wrapped in rush matting (pl. 7*a*). This contained eleven remarkable decoys made of rushes, most of them feathered and painted to represent ducks (pl. 7*b*); a rush bag full of feathers; feathers wrapped in a piece of mat; a bunch of feathers tied with string; and two bundles of snares made of string and twigs (pl. 48*a*, *b*), all in excellent con-

dition. Some water-fowl hunter had hid his decoys here against another season. He may have filled the pit with refuse as an added precaution, but if not, anyone who looked into it saw only the stones and the lining of an apparently empty storage cache. The age of this pit is transitional or later.

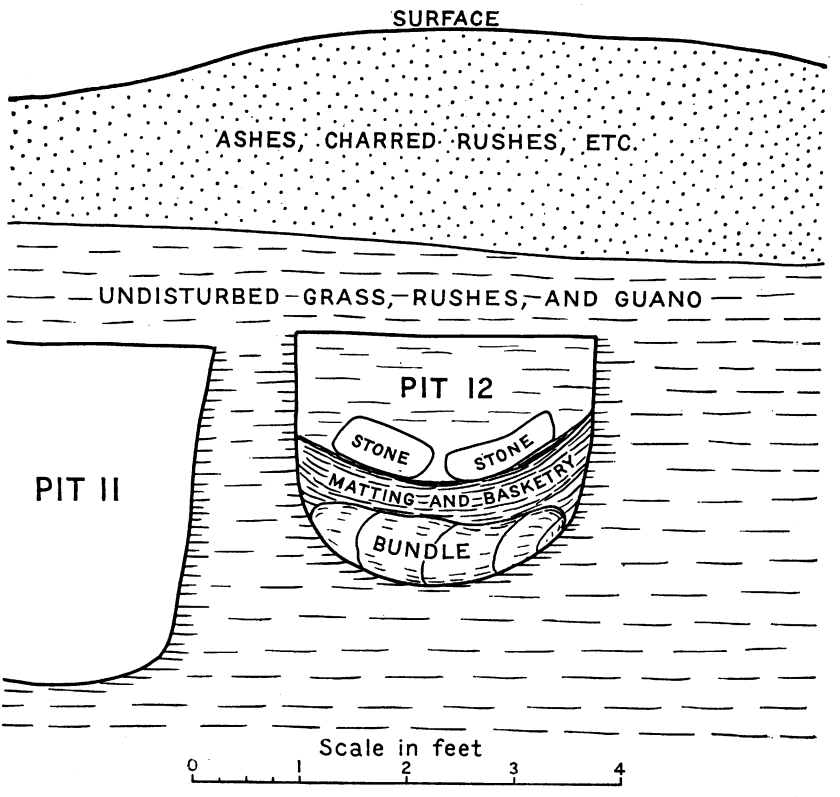


Fig. 4.—Section of pit 12, showing position of decoy bundle (1924 excavations).

Of a different sort was pit 31, in the southwest end of the cave. It was oval in form, with diameters of 5 feet and 4 feet 4 inches. Its bottom was 8 feet 9 inches below the surface. It was impossible to trace the level of origin, so its original depth and comparative age must remain unknown, although the contents seem to belong to the older period. It was an unusual type of pit, not only because of the bottom, which was flat and unprovided with lining, but also because of the contents—hundreds of feathers from eagles, pelicans, and other large birds, attached to heavy cord or light rope, for the most part made of rushes. Sometimes there were two or more feathers to each

piece of cord; but usually only one. In the pit were also found a bone awl, a bone implement with two perforations, and part of a bone carving apparently intended to represent a snake. To the west the pit extended 15 inches or so into a sort of lobe, also filled with feathers.

These feathers may be prayer plumes deposited in the cave as religious offerings after the fashion of Pueblo prayer sticks; or they may have something to do with the practice of shamanism, for today eagle feathers attached to a stick by cords or buckskin thongs form part of the Northern Paiute shaman's equipment for treating a patient; or they may have been strung up to form part of the chute in a rabbit drive.

Graves

All pits whether storage caches or graves were numbered consecutively as found; for which reason the 8 graves discovered were numbered 18, 20, 23, 29, 35, 36, 45, and 46.

The first grave (18) lay in lot 8, and extended along the back wall for 3½ feet, with a width of 1 foot 6 inches, and a depth of 6 feet to 6 feet 3 inches. The top had been disturbed by a later storage pit, and the level of origin could not be traced. On the bottom lay the trunk, arms, and hands of an adult mummy, apparently a woman; but the head and legs were missing. It had however headed westward. About the waist was a woman's apron-like garment made of strips of worn-out netting, dyed red, and in the vicinity were a number of short strings of *Olivella* shells, each terminating in a deer-hoof pendant. There were also some square shell beads, and in a burnt deposit directly west lay about 200 more of these, together with a few of disk shape, and more *Olivella* shells. Many of the square beads had been blackened by fire, and one was attached to a small fragment of charred flexible twined basketry. This basketry seems to indicate that the burial belonged to the early period.

The second grave (20) was also in lot 8. It lay just about opposite the first one, but 6 feet from the back wall of the cave. When first encountered we took it to be a storage pit, for it had the form of a circular disturbance about 2½ feet in diameter; but on reaching the depth of 5 feet we encountered a pile of six inverted coiled baskets, including a large, broken, coiled pack basket, the arrangement of which (pl. 8*a*) led us to suspect that a mummy might be underneath. Photographing these as they lay, and then raising them, we uncovered

the remains of a young child, wrapped in what had once been a woven fur robe, from which the fur had been eaten by insects, leaving only the strips of skin wrapped around the cords forming the foundation (pl. 8*b*). The mummy was flexed and headed southwest. The blanket enveloping the body had been tied with a net. The largest basket tray was decorated with zigzag and triangular patterns in brown; while several others showed traces of exterior feather decoration, and one had in addition a temporary exterior decoration drawn on it with what seemed to be meal of some kind, and more of the same meal still adhered to the inside. The feathered basketry, as will be seen later, puts an early-period date on this burial. The total depth was 5 feet 10 inches and the grave penetrated the undisturbed substratum to a depth of 1 foot 10 inches.

The third burial was in pit 23, a little farther southwestward, 20 inches from the wall, and about 6 feet deep. This was the upper part of the desiccated body of an infant, heading northwest. It was wrapped in a fine net and in a piece of tanned skin, probably deerskin. Near the spot where the feet should have been were two plumes made of numerous woodpecker feathers attached to wooden pins about 4 inches long. The pit was approximately 2 feet in diameter, but the upper part of the deposit had been disturbed and the pit's level of origin could not be determined, nor was there anything else to indicate the age.

The next grave, pit 29, lay still farther southwestward, against the back wall; and the skeleton, which had been calcined, lay at a depth of 11 feet from the surface. The deposit above had been so disturbed that it was impossible to determine the level from which the pit had been dug. Apparently however it was old, for the hole, 2 feet 9 inches wide and 4 feet 6 inches long, penetrated the lacustrine substratum, which probably would not have been considered necessary had there been at the time a deep refuse deposit. This burnt skeleton, that of an adult, lay flexed to the left, heading northeast, with knees almost extended and heels brought back to the hips. At the right side of the head was a knife blade of flinty stone, and on the left side a large knife blade of obsidian, minus the point. The body had been wrapped in a very fine fish net, charred fragments of which still clung to the crumbling bones, and were draped over the sides of the hole. About the skeleton was a considerable deposit of ashes, and the sides of the hole were smoked and burnt in such a way that it was plain the body had been burned after being deposited in the grave. Whether

this had been done purposely, or whether fire had accidentally ignited the filling of the grave and worked down after the body had become desiccated could not be determined.

The most interesting burial was found in pit 35, which was as clearly defined as any storage pit, and may have originally been one. It measured 5 feet 8 inches deep, and the diameters were 3 feet by 3 feet 4 inches, the long axis running east and west. The level of origin was in this case clearly marked, 2 feet 2 inches below the present surface, which makes the depth of the original grave 3 feet 6 inches. The grave was filled with grass, rushes, dust, guano, and loose stones, some of them almost too large for one man to handle; and beneath these a large coiled meander-decorated basket bowl, inverted (pl. 9*a*). Raising this we found the mummy, or rather desiccated body, of a young adult, probably a woman, lying on the back with head toward the west and legs flexed to the left. The body was wrapped in some sort of dressed skin, over which lay some fine nets, and a long, curved, flat implement made of mountain sheep horn (pl. 16*c*), its butt painted white. To the left of the head was a lump of white paint. The face was covered by an inverted deep basket bowl, and a shallow basket bowl covered the right side. Both were coiled and decorated in black. A similar but smaller specimen lay upon the right leg, and as before mentioned, the large basket, with meander pattern in light brown, made a roof over all. The smaller baskets were decorated in black. This mummy, protected from hungry coyotes by the stones forming a large part of the filling of the grave, was the best preserved; insects or rodents had partially destroyed the face, as may be seen in the photograph (pl. 9*b*). It probably belongs to the transitional period of the cave's occupancy.

Immediately to the northeast of pit 35 lay grave pit 36, filled with grass, rushes, and stones, 4 feet 8 inches deep and a little less than 3 feet in diameter. Its level of origin was 21 inches below the surface, making its original depth 2 feet 9 inches. In the bottom, burned to a crisp, lay a large coiled basket, inverted. Under this lay the burnt remains of a small child that had evidently been wrapped in a net, the charred cords of which were still visible. With this was part of a heavy buckskin moccasin with toe puckered to a tongue in "shoe-pack" style, and containing part of a downy bird-skin sock. This grave was a little later in age than the preceding.

The next regular burial to be found lay in pit 45, lot 19, in the northeastern end of the cave, right in the edge of Mr. Loud's former excavations. The pit was 4 feet deep, and 4 feet long from north to

south, but the east-west diameter was only 1 foot 8 inches. It extended down 10 inches into the lacustrine deposit of the cave floor. In the south end was a 4-inch lining of grass, the rest of which had burned, and with it part of the mummy of an infant, wrapped in netting. The little mummy had been so tied as to be easily carried. Tucked beneath the cord that bound it was a foreshaft for an atlatl dart with its obsidian point in place (pl. 45*c*). This and a stone ball found in the pit seem to link it with the older period.

Pit 46, which lay squarely in the runway left by the guano-diggers in front of their tunnel (lot 9) was approximately 6 feet long, 4 feet wide, and 4 feet deep, of oval form, and contained the partially desiccated body of an adult, a man, loosely flexed on the left side, heading westward. Over the legs lay the remains of a robe made of twisted bird-skin strips, woven in the same way as those made of strips of fur. The only other example of man's handiwork found in this grave was a wooden object, possibly the handle of some implement (pl. 16*e*). The level from which this pit was dug was not distinguishable, and consequently its period unknown, unless the bird-skin robe be taken as evidence of relative lateness.

That coyotes had dug up and devoured a number of the burials we deduced from stray human bones, many bearing teeth marks, scattered through the deposit, and from coyote excreta containing strings of shell beads, doubtless swallowed while feeding on a human body. The condition of a burial found a little over ten feet deep beneath the overhanging rock in lot 15 at the southwest tip of the cave may be an example of the coyote's work, for only the skull and a few disjointed bones remained. Beneath the bones and stretching out toward the west was a mass of decaying netting, perhaps once the wrapping of the mummy, and some strings of *Olivella*-shell beads. Near by lay a large digging stick, part of a big coiled basket, and many pieces of a fine-woven twined one. The most interesting artifacts were a headband of small bunches of black hair, fastened together with native string (pl. 52*c*), and a small complete rabbit-skin blanket with fur in good condition. All these things are undoubtedly early.

Of a similar character was the deposit found at the same depth but several feet farther back under the rock, in which human remains were represented by two adult skulls, some loose adult bones, an infant's lower jaw, and a few infant bones. These lay amid a mass of poles, identified as willow, service berry, and chokecherry. Near them were found a deep, coiled basket bowl, containing a woven bag,

a large flat coiled basket, many pieces of baskets, bags and nets, some peculiar wooden articles, possibly pendants (pl. 48*d–f*), 5 sickle-like implements made of mountain sheep horn, a wooden ball, and some *Olivella*-shell beads. Unfortunately the deposit far under the rock was slightly damp, and the artifacts were not in as good a state of preservation as usual; still, most of them were saved. All are early.

The other bones and fragments of mummies were mere strays and not worth recording—except a series of 3 human bones, found near the surface in lot 7 just back of the great fallen rocks blocking the mouth of the cave. These had been split to extract the marrow, as animal bones were split, and probably indicate cannibalism during a famine. These were the only artificially split human bones found during all our digging in the cave.

Stratigraphic Section

Our stratigraphic section, lot 15, did not yield results equal to expectations, but did shed a little light on the culture sequences of the cave. The lot was laid off on the southwest end of the cave floor where lay the only area large enough and apparently undisturbed. It was 6 feet wide from southeast to northwest and 8 feet long from northeast to southwest, where it touched the overhanging ledge. This was on the surface, but as the deposit was taken off level by level, the length increased, for the layers extended back under the ledge, until at the bottom lot 15 was nearly 16 feet long (fig. 5).

First level.—Surface to 18 inches deep. Level 1 consisted mostly of ashes and of rocks from the roof, with very few artifacts, except near the surface where relic hunters had thrown some rich "back dirt." On account of this back dirt, the origin of which was unknown and the limits of which were hard to trace, this cut was made only 18 inches deep, with the idea of ignoring its contents altogether, and starting afresh at 18 inches, in deposits we knew to be undisturbed. Only two articles in its contents, however, were obviously out of place. These were two large feathers attached to short lengths of rush rope, a type of artifact we had hitherto found in the lower levels. The other objects from this level were a stick bent into loop form to make a paddle for stirring mush, such as is still used by the Northern Paiute and the Washo; a bunch of vegetal fiber; 5 "quids" or "chews" of rush fiber; a piece of tanned skin, possibly buckskin; a strip of twisted dog skin, once forming part of a woven blanket; a strip of downy bird skin from a similar blanket; 4 pieces of baskets,

including a coiled one of rather coarse weave, made on a 3– to 4–rod foundation; another specimen of similar structure but much finer; and two pieces of stiff twined basketry, rod and splint, one piece a little finer than the other; 2 pieces of common twined rush matting; 1 piece of extra fine matting with fiber-cord, twined warp; 1 piece of a twined rush sandal; some twisted rush rope; some braided rush rope; a twisted rush ring; two pointed arrow foreshafts of greasewood; the sharp point of a digging stick; and a wooden fire-drill hearth.

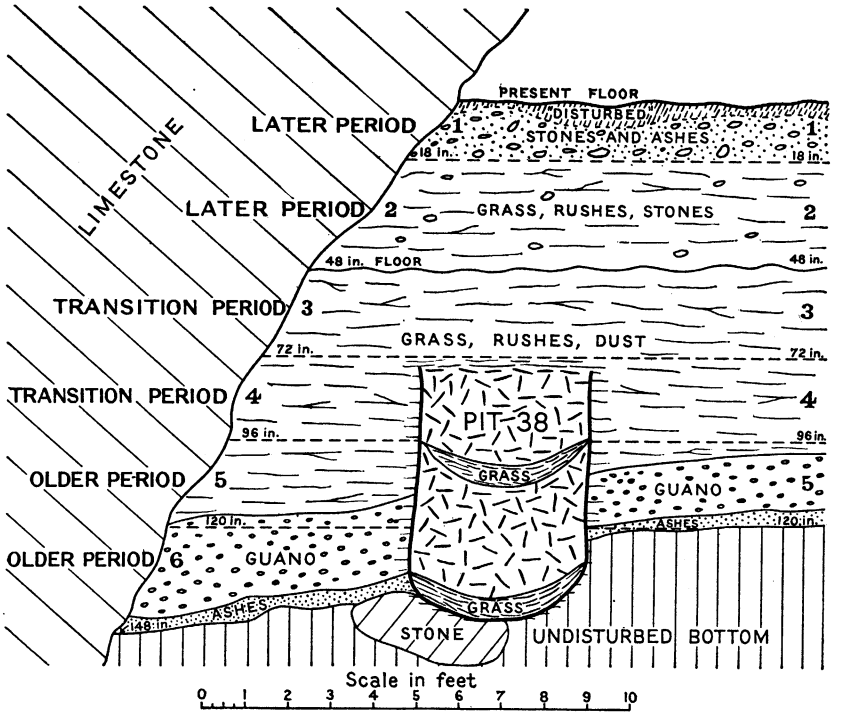


Fig. 5.—Diagrammatic section of stratigraphic area, lot 15 (1924 excavations), showing levels.

Second level.—18 inches to 48 inches deep. The second level extended from 18 inches to about 48 inches, where there was a distinct hard-packed floor, which formed the bottom of the cut. The depth was a little less than 48 inches on the northeast side, and a little more on the southwest side. This level contained many stones, large and small, fallen from the roof, and was not very rich in artifacts. The deposit showed no trace of disturbance.

The artifacts found included 14 fragments of cane arrows, 6 of which showed traces of feathering and 8 of which were still provided with their pointed foreshafts of greasewood; 12 such points or foreshafts without the cane shafts; and 11 basket fragments, including a coarse coiled weave such as was reported from the first level, another of finer but similar weave in stiff rod-and-splint twining, and some examples of rod-and-splint wicker weave. There were also the usual rush ropes twisted, and braided; the common rush matting held together with rows of rush twining; the quids or chews; and the bunches of fiber. Among the more unusual objects were: a bone awl; a bunch of feathers tied together; a pointed stick with a cord attached; a fragment of an object of soft stone with a groove near the point; two arrow foreshafts for flaming arrows, one wrapped with inflammable rush, the other having bound to it a piece of charred punky wood which had doubtless been burning when it was shot into the cave; several fragments of decoy birds made of rushes; a section of the dried windpipe of some animal; and some felted vegetal down.

Lastly, there was a complete rectangular bag or case woven of rushes and wrapped in a piece of rush mat, which lay on the floor of the level (about 48 inches deep) in the west corner of the "lot" at the base of a large fallen rock. This contained a skin bag of red paint, tied with a strip of old net; a small coiled basket; the horn of a mountain sheep; a wooden fire-drill hearth; a bundle of shredded sagebrush bark tinder; a number of greasewood sticks for making arrow foreshafts; several completed foreshafts; a small bag made of animal intestine; three green paint-stones and one white paint-stone.

Third level.—48 inches to 72 inches deep. The third level was made only 2 feet deep—that is, from 48 to 72 inches, not because we encountered a natural dividing layer as at the bottom of the second level, but because we encountered material of a somewhat different character. The material composing this level was mostly dust, grass, and rushes, with comparatively few stones, and with many more artifacts in proportion to the total bulk than in the second level.

The contents comprised a 3-feathered cane arrow with a wooden foreshaft, with decorations in green. Some of the fine transverse striping near the notch suggests the work of northern California tribes. Unlike most arrow foreshafts found here, this one was slotted for a point, but the point was missing. It had probably been a stone one. Two obsidian arrow points were found in this level, and one of these may have belonged to the arrow. Then there were 4 other pieces

of cane arrows, one of them with a wooden foreshaft in place, and seven separate, pointed foreshafts of greasewood.

Most interesting and suggestive was the finding in this level of two wooden foreshafts for atlatl darts.

Among the 25 basket fragments were multiple-rod coiled and pitched specimens, single-rod coiled specimens, and wicker rod-and-splint weaves, all similar to those in the preceding level; the only new thing in basketry being the openwork twined technique. In rush matting there were the common types, as in the rush cordage; but in addition there was fiber cordage, much of it of Indian hemp, and in one instance a heavy cord made by twisting together scraps of old nets. There were also fragments of netting, a strip of twisted downy bird skin from a blanket, and five bits of cord, wound with fur, from fur-cloth blankets. Some of this fur looks to be from the fox and some from a small rodent of rat type, but not muskrat. A piece of a bag woven of rushes; a bundle of straight plant stems, apparently of wild blue flax (*Linum lewisii*); a bundle of bark fiber; some pieces of sticks and cane burned at one end; some feathers; a piece of white paint; a bit of tanned skin; a deer hoof from a rattle or ornament; and a chip of crystal also appeared. Of slightly greater interest were two broken snares; a string from a feather-cloth blanket made by twisting downy feathers about a cord, the only example of this found in the cave; some disk beads of shell strung on a braided string; two wads of rushes used as stuffing for a decoy; a stuffed duck head, part of a decoy; a crudely chipped "fish knife" of slate such as were picked up by the dozen at aboriginal sites around Humboldt lake; a piece of the rib bone of some animal, serrated on the edges; and finally 3 bone awls made of animal shoulder blades, L-shaped, with a projection at the proximal end of the awl at right angles to the shaft forming a sort of handle.

Fourth level.—72 inches to 96 inches deep. The fourth level had no natural bottom, no dividing layer, to show us where to stop, so the 2-foot cut was made arbitrarily. The composition of the deposit was about the same as in the preceding level.

Two pits, numbers 38 and 39, originated in this fourth level and penetrated the white substratum forming the bottom of the cave. The exact point of origin of pit 39 could not be determined, but pit 38 was clearly dug from a point near the upper surface of the level. Measuring 4 feet 6 inches from north to south and 4 feet 2 inches from east to west, it reached a depth of nearly 6 feet below its level

of origin, or 12 feet from the surface. In the bottom was a typical grass lining, and about 3 feet above, another, showing that the pit had been used at least twice. It contained some large pieces of pine wood, brought from the distant high ranges, some shell beads, some fine strings, and a bundle of snares.

Pit 39, which lay just to the east, reached a depth of 10 feet 11 inches from the surface, and originated in the fourth level, so it might have been anywhere from 2 feet 11 inches, to 4 feet 11 inches deep when first dug. Its diameter was 3 feet 4 inches. The grass lining had been disturbed and mixed in the lower part of the pit, possibly when the owner removed the contents of which he overlooked a number of little dried fish.

The arrow fragments and foreshafts typical of the upper levels were not found in this one, but instead a single pointed foreshaft so large that it probably belonged to an atlatl dart rather than to an arrow, and also part of a typical atlatl dart foreshaft.

In basketry there appears for the first time, a fine twined, flexible weave, of the same type but different material as that made by the Klamath, Modoc, and Pit River Indians today. In addition there was the rather coarse coiled basketry made on a 3- or 4-rod foundation, the openwork twined basketry, and the rod-and-splint wicker basketry noted in the third level. A slight variation is seen in the introduction of occasional rows of twining in the wicker basketry. The matting, the rush cordage, the fiber cordage, and the pieces of rush bags were about the same as in level 3, but some of the netting was dyed.

For the first time in place were numerous feathers of eagles and other large birds, tied to pieces of rush rope. Among miscellaneous articles were bundles of grass and basket splints; strips from bird-skin and fur-cloth blankets; quids or chews of rush fiber; scraps of buckskin; *Olivella*-shell beads, some strung on a buckskin thong; a shell disk bead; some deer hair; a piece of animal bone with incised decoration; a flat oblong object of slate with a hole in the middle, suggesting the so-called "gorgets" found farther east; a well made stone ball, perhaps an inch in diameter; a broken stone knife or dart point; and a ball covered with interwoven leather strips (pl. 52*b*).

Fifth level.—96 inches to 120 inches deep. After digging a little way into this level the grassy refuse gave place to guano with a slight admixture of grass and rushes. This continued throughout except on the very bottom, where lay a stratum of ashes of varying thickness, resting on the white lacustrine deposit forming the bottom of the cave.

This bottom was found at about 120 inches deep, in some places a little more, in others a little less, over the northeast end of the "lot." Toward the southwest the whole deposit grew gradually deeper, until at the far western corner, it measured 148 inches in depth. Everything below 120 inches belonged to our sixth level.

Our fifth level contained few artifacts, except toward the southwest end, where it struck the upper part of a deposit of basketry and other articles, most of which lay in the level below. From the fifth level, there were neither arrows nor atlatl darts, but in basketry there were the finely woven flexible twined weave first noted in the preceding level, the rather coarse 3–rod coil found in all the preceding cuts, and two new things. One of them was a coiled basket, possibly a woman's hat, made on a flexible single-rod foundation which looks to be split rush. This had a braided rim and had once been covered on the outside with small dark downy feathers and quills, which had been woven into the basket as it was made. The other new find was a soft, flexible, twined bag with rounded bottom, somewhat torn, but still 10¾ inches wide and 13½ inches deep. The material has disintegrated to fiber, but looks as if it might be split rush.

The common rush matting was found, as was also twisted rush rope, fiber cordage, and net fragments, with the usual *Olivella*-shell beads; and various large feathers attached to rush rope such as appeared in level 4. There were also a piece of a stick for stretching nets, a bundle of very small canes, and a block of wood cut in cubical form which may have been used as a ball.

Sixth level.—120 inches to about 148 inches deep. The disadvantage of running arbitrary levels is well exemplified by the fact that the bottom of the 120-inch cut runs directly through a deposit of basketry, in the southwest end of the "lot," leaving part of the deposit in the fifth level and part in the sixth. The thickness of the sixth level, which lay directly upon the original bottom of the cave varied from nothing at the northeast end of the "lot" to 2 feet 4 inches at the southwest end. The composition was mostly guano with some admixture of stones, grass, rushes, and on the very bottom, ashes.

Of weapons we found only a large, heavy, pointed foreshaft of greasewood, larger than those commonly used for arrows, which may have been part of an atlatl dart. In basketry there were the same type of coarse coiled basketry on a 3– or 4-rod foundation, some finely woven flexible twined basketry with patterns in black, and pieces of another twined bag, showing patterns in black. There were also some

pieces of the common rush matting, some bits of netting (in part dyed red or brown), and a long stick for stretching nets, with some of the net still fastened to it.

There were other worked sticks in the deposit, some undoubtedly digging sticks, and one curved specimen with a piece of braided hair rope attached; a piece of worked pine bark; and six badly disintegrated "sickles" of mountain sheep horn, which when complete must have been like those illustrated on plate 16*c*. The usual *Olivella*-shell beads were present, some strung on cord; also a piece of shell; a broken L-shaped bone awl; and two wooden objects suggesting pendants, one perforated, the other grooved for suspension (pl. 48*f–d*). The best objects were a complete, though small, woven rabbit-skin blanket or cape, carefully rolled up and laid away, and a unique headband composed of many tufts of rather short black hair wrapped and strung together with native twine (pl. 52*c*), beneath which was tucked, in one place a tiny bi-pointed bone implement as seen in the figure.

The best of these things, as well as the best of those found in the fifth level, were found in connection with two deposits of skulls and loose human bones as described on pages 17–18.

Deeper than any of these things, at 154 and 158 inches in a near-by "lot," were some pieces of flexible basketry with decoration in porcupine quills. These have been described by Orchard in Indian Notes, 2:188–189, published by the Museum of the American Indian, Heye Foundation.

INTERPRETATION OF STRATIGRAPHIC SECTION

At first glance the contents of the different levels offer little in the way of culture sequence, for certain things like rush matting and cordage are found with little if any change in all levels. But certain other classes of objects yield some suggestive results and warrant dividing the occupation of the cave into three periods: Early, Transitional, and Late. Two levels may be assigned to each period.

For instance, in the case of weapons we have:

		Surface
1. Arrows (2 fragments)[2] No atlatls or darts		18 inches
2. Arrows (26 fragments) No atlatls or darts	(Floor)	48 inches

[2] The distinction between the arrows and the atlatl darts found in the Lovelock cave lies mainly in their diameters, the darts being distinctly thicker and heavier than the arrows. This is best brought out by the foreshafts, arrow foreshafts ranging from 3/16 to 5/16 inch in diameter (only one specimen measured over 4/16), while dart foreshafts run from 6/16 to 7/16 inch in diameter. Cane arrow shafts

3. Arrows (1 complete, 13 fragments)
   2 darts for atlatl — 72 inches

4. No arrows
   1 large point-foreshaft, probably for dart for atlatl — 96 inches

5. No arrows — 120 inches

6. No arrows
   1 large point-foreshaft probably for dart — 148 inches

The table suggests that the bow and arrow was the standard weapon after the floor at 48 inches was laid down, but that earlier the bow and arrow and the atlatl and dart were synchronous. From the presence of typical arrows no deeper than 72 inches we may guess that still earlier the atlatl and dart alone prevailed, but the evidence of our stratigraphic section is too slender to be satisfactory. Fortunately objects found in the adjoining "lots" at depths corresponding to the third, fourth, and fifth levels strengthen the evidence. These were unmistakable pieces of atlatls, foreshafts of atlatl darts, and curious crooked clubs often found associated with atlatls in the ancient Basket-Maker region farther east. As no arrows were found in the lower levels of the near-by lots either, it is clear that the atlatl with its darts was the typical weapon of the Lovelock cave people until the period represented by the third level, when the bow and arrow supplanted it.

Adding these additional data to our diagram, we have:

	Surface
1. Arrows (2 fragments) No atlatls or darts	18 inches
2. Arrows (26 fragments) No atlatls or darts (Floor)	48 inches
3. Arrows (1 complete, 13 fragments) Atlatl (1) Darts (2)	72 inches
4. No arrows Large point-foreshaft, probably for dart Darts	96 inches
5. No arrows Atlatl (1) Darts Crooked clubs of Basket-Maker style (4)	120 inches
6. No arrows Large point-foreshaft, probably for dart	148 inches

measured from 4/16 to 6/16 inch in diameter, while a typical dart shaft (the only one available for measurement at this writing) was 9/16 inch in diameter. It may be of interest to note here that typical Basket-Maker dart foreshafts from Grand Gulch, Utah, now in the Museum of the American Indian, Heye Foundation, range from 6/16 to 7/16 inch in diameter, and the dart shafts, which in this case are of wood and not cane, run from 7/16 to 8/16 inch.

A somewhat similar change is shown in basketry, as will be seen in the following diagram:

1. Coarse coiled basketry, 3- or 4-rod foundation	Surface
Fine coiled basketry	
Coarse twined basketry (rod and splint)	
Slightly finer twined basketry	
No flexible basketry	
No woven bags	18 inches
2. Coarse coiled basketry, 3- or 4-rod foundation	
Fine coiled basketry, 3- or 4-rod foundation	
Coiled basketry, single-rod foundation, coated with pitch	
Coarse and fine twined basketry (rod and splint)	
Wicker basketry (rod and splint)	
No flexible basketry or twined bags	48 inches
3. Coarse coiled basketry, 3- or 4-rod foundation	
Coiled basketry, single-rod foundation, coated with pitch	
Openwork twined basketry	
Wicker basketry (rod and splint)	
No flexible basketry or twined bags	72 inches
4. Coarse coiled basketry, 3- or 4-rod foundation	
Openwork twined basketry	
Wicker basketry (rod and splint)	
Same with occasional twined rows	
Fine weave twined basketry, *flexible*	96 inches
5. Coarse coiled basketry, 3- or 4-rod foundation, sometimes feathered	
Finer coiled basket on single flexible rod foundation, probably a hat, braided rim, outside once covered with dark downy feathers	
Fine woven flexible twined bag, brown	120 inches
6. Coarse coiled basketry, 3- or 4-rod foundation, sometimes feathered	
Fine twined basketry, flexible, patterns in black	
Fine flexible twined bag, brown with black patterns	148 inches

The rather coarse coiled basketry alone continues from start to finish. Differing from the weapon diagram, the transition period for basketry seems to be represented by the fourth level, for at that time the soft woven bags and flexible baskets hitherto used were given up, and stiff wicker and twined baskets came in—most of them pack baskets—and these lasted until the end; in fact they are still used by the Northern Paiute. This gives us two transition levels, the third for weapons, and the fourth for basketry.

The presence of a feathered coiled basket in the fifth level is interesting, and so is the single-rod pitched coiled basketry in the second and third levels; but their application, if any, to our problem is not clear.

A study of other specimens from different levels casts light on the relative ages of other characteristic products of the cave—the decoys, for instance. In the stratigraphic section they first appear in the transitional third level and seem to have lasted until the end. This

is backed by finds elsewhere in the cave, where it was possible to determine the horizon of the decoys. In general they are associated with the upper third, or at most the upper half of the deposits. Pits containing them originated well above the central level. Moreover, the stuffed type of decoy—one of the two types found—is still used by the Northern Paiute.

Another characteristic thing, the rush sandal, appears only in the top level of the stratigraphic section. This is not enough to establish its relative age, however, especially as we are not sure that all of the material in this uppermost cut really belongs where we found it. But throughout the cave, and outside in the rockshelter near the southwest entrance, rush sandals were found in the upper portion of the deposit, and we have no examples of them from the lower levels or from the deeper pits.

On the other hand, the feathers of eagles and other large birds, attached to rush ropes, appear in the fourth and fifth levels of our stratigraphic section and when found *in situ* elsewhere in the cave were always in the lower half of the deposit.

The stone balls (pl. 57*b*), of which one is recorded from the fourth level, seem also to be associated with the older half of the deposits, as are the ovoid and bi-pointed stones (pl. 57*d*) which, although not found in the stratigraphic section, are reported near by at depths of 130 and 139 inches.

Another characteristic product, and one of the most unique, the L-shaped bone awl, occurs in our transitional third level, and also in the sixth level, and in the older pits in other parts of the cave.

It seems certain that fur-cloth blankets were used during all the occupation of the cave. But there is a type of feather cloth, made by twisting strips of downy bird skin around a long cord or rope which was then woven into a blanket, that appears mostly in the upper levels of the deposit, although we have one piece as deep as the fourth level. The only piece of typical feather cloth, found in the whole cave, such as is associated with early Pueblo culture in the Southwest and was made by weaving together cords wound with downy feathers, not bird skin, was found in the third or upper transitional level of the stratigraphic section.

Still another early type is the sickle-shaped implement of mountain sheep horn, of which a number were found in the sixth level of the section, and a perfect example near by at 72 inches deep (pl. 16*d*).

Of the objects found throughout the deposit, plain matting was the most abundant. It had warp and weft both of rushes and the rows of twining two or three inches apart. In the top level a much finer weave of matting also appeared, the twining in this being fiber cord instead of rush. In the third level was a coarse type of matting woven entirely of rush, as usual, but with the rows of twining much closer together than in the ordinary type.

Netting was found in all levels except the upper one of this section, but it was found near the surface elsewhere in the cave, so doubtless it belongs in the upper level too. Little difference can be noted in the netting found at different levels, except that very fine netting occurs mostly in the older deposits, and here also there are more examples of nets dyed red or brown, than may be found elsewhere.

Rush ropes were abundant in most of the levels and no essential difference could be found between the older and the later ones. *Olivella*-shell beads and pointed digging sticks occurred from start to finish.

II. OBJECTS OBTAINED BY EXCAVATION IN 1912

BY

LLEWELLYN L. LOUD

The following account systematically describes the contents of Lovelock cave as revealed by the excavations made by the writer in 1912. Owing to the character of the deposit and the lack of assistance it was necessary to excavate the material in irregular masses, often bounded by large boulders fallen from the roof. These irregular masses have been called lots, shown in plates 2 and 3 and in figure 6. The lot from which each specimen came is recorded in the catalogue of specimens in the University of California Museum of Anthropology, but except where the fact seems pertinent to some problem it is not presented in the following account. Several thousand specimens were also obtained by working over the dump left by the guano crew. The catalogue numbers are preceded by 12– for human skeletal material and by 1– or 2– for artifacts, animal, plant, and mineral specimens.

Acknowledgments are due to Professor George D. Louderback, of the University of California, for determining the minerals from which some of the stone implements were made. Professor Joseph Grinnell, of the California Museum of Vertebrate Zoology, identified various samples of fur and extended to the writer every facility for the study of bird and mammal bones. Mr. L. M. Loomis, of the California Academy of Sciences, identified various mummified birds. Dr. Frank C. Baker, University of Illinois, kindly identified the mollusks. Botanical specimens were submitted to Professor W. L. Jepson, of the University of California. The manuscript dealing with special sciences was submitted for correction to various authorities: geology and mineralogy, Professor George D. Louderback; botany, Professor W. L. Jepson; vertebrate zoology, Professor Joseph Grinnell. To Professor A. L. Kroeber the writer is indebted for assistance in correcting manuscript.

LOVELOCK CAVE

Lovelock cave is situated fifteen miles in air line south-southwest of Lovelock, and about two miles east of the usual present-day shore of Humboldt lake (see site 18, pl. 1). It was on the beach of the Quaternary lake Lahontan at about the level of the Dendritic terrace, 320 feet (reckoned from the present level of Pyramid lake, one of the modern remnants of ancient lake Lahontan).

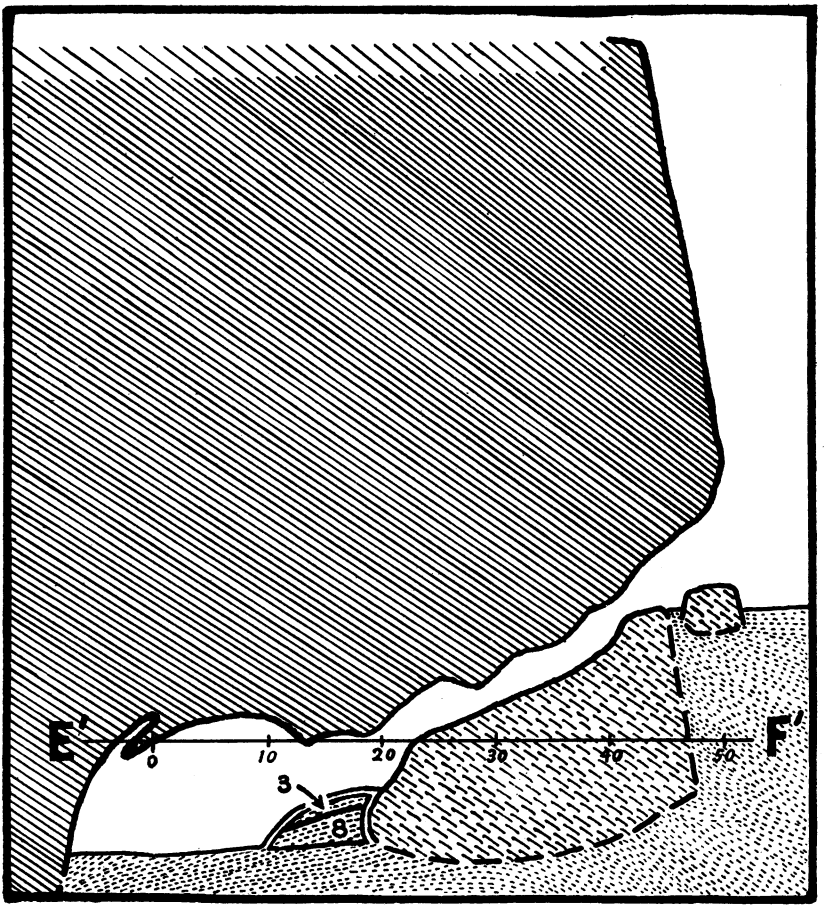


Fig. 6.—Cross-section in line E–F of plate 2 (1912 excavations).

Lovelock cave was formed in the cliffs just above the level of the Dendritic terrace. At time of storm the cliff was undermined by the waves until the roof of the resultant cave was perhaps a hundred feet high.

Toward the close of the ice age the ice cap of the Sierra Nevada range melted rapidly and filled the Lahontan basin with water to a depth of 520 feet[3] above the present level of Pyramid lake, which is approximately the level of Humboldt valley. The Lahontan beach is the least distinct of all terraces, indicating that the cave was submerged for only a relatively short time. The time was sufficient however to partly fill the cave with débris, which has been increased since, both by the crumbling of the overhanging rock and by the action of wind.

To enter the cave in recent times it was necessary to climb first to the top of the débris in front of the cliff, then descend into the cave by a narrow opening, so low that one could not stand erect. As seen from the plan and transverse and longitudinal sections, the cave is 160 feet long, 40 feet wide, and 20 feet high.

HUMAN REMAINS

It is difficult to estimate how many human bodies were left in the cave. It is quite likely that members of the crew excavating the guano took away bones, especially skulls. It would appear from a study of the skeletal material brought to the museum that the guano crew found at least 13 individuals. The remains were salvaged from the hillside refuse pile left by the guano crew.

Not only is there uncertainty as to the number which the guano crew found but there is also some doubt as to the number of individuals which the writer himself uncovered. The bodies were buried in close proximity to each other in straw, tule, and similar material which later caught fire and perhaps smouldered for some days, leaving the human bones in a more or less jumbled mass of calcined fragments. However, all this material was handled as carefully as possible with the result that the full number of individuals found by the writer in the cave is estimated to be about 32, making all told at least 45 individuals deposited in the cave.[4] This number may be excessive, due to the method adopted in some cases of reckoning an isolated bone as an individual. It includes mummies, more or less complete

[3] From the bed of Pyramid lake the ancient lake was 876 feet deep. It was even more if we count some hundreds of feet of sediments. Lake Lahontan at this stage had arms reaching from Walker lake almost to the Oregon line, 250 miles north and south, 180 miles east and west. It was about as large as Lake Erie in area and over four times as deep. I. C. Russell, Geological History of Lake Lahontan, a Quaternary Lake of Northwest Nevada, U. S. G. S. Monograph 11, 1885.

[4] Mr. Harrington found 12 further burials in 1924.

skeletons, isolated bones scattered about perhaps by carnivora, and calcined bones.

The measurements of crania obtained in Lovelock cave and Humboldt valley have been published.[5] Seven cave crania yield an average cranial index of 76.9, ten valley crania an index of 75.4. Four crania from Nixon, near Pyramid lake, have an average cranial index of 74.9. The average cephalic index of sixteen living Northern Paiute is 80,[6] equivalent to a cranial index of about 78. The modern Indian inhabitants appear slightly broader headed than the ancient inhabitants of the region, possibly due to admixture with the brachycephalic Sierra Nevada peoples to the west.

Several human mummies and parts of mummies were obtained by the guano crew and the writer. A well preserved adult male and a child a few years old were excavated by the guano crew and transferred by Pough brothers to the Nevada Historical Society. A third, partly complete mummy (12–2648) was left on the hillside dump by the guano crew. The writer recovered a perfect mummy (lot 33, 12–2669) of a newborn infant with a portion of the placenta still present (see pl. 11*b*).

A skeleton of a child, not quite six years old (lot 26, 12–2670), retained sufficient flesh and ligaments to bind the bones. The body was wrapped in a great quantity of fish net. Enclosed in the netting was an unusually excellent rattle (pls. 10, 14).

In the complete series of skeletal remains 29 adults and 16 children appear to be represented. Of adults 8 were identified as men and 2 as women, the rest undetermined.

MAMMAL REMAINS

Remains of 19 species of mammals were found in the cave: mole, *Scapanus latimanus;* wolf, *Canis gigas;* coyote, *Canis latrans lestes;* red fox, *Vulpes necator;* mink, *Mustela vison;* weasel?, *Mustela* sp.; Great Basin spotted skunk, *Spilogale gracilis;* badger, *Taxidia taxus;* wildcat, *Lynx eremicus;* meadow mouse, *Microtus montanus;* muskrat, *Fiber zibethicus;* pocket gopher, *Thomomys nevadensis;* woodchuck, *Marmota flaviventer;* beaver, *Castor canadensis;* jackrabbit, *Lepus californicus deserticola;* cottontail, *Sylvilagus nuttalli;* mule deer, *Odocoileus hemionus;* prong-horn antelope, *Antilocapra americana;*

[5] E. W. Gifford, Californian Anthropometry, present series, 22:382, 1926.

[6] *Ibid.*, 228.

bighorn sheep, *Ovis canadensis nelsoni*. The remains include mummies, bones, bone artifacts, horn artifacts, hoof artifacts, fur, articles of fur, and excrement. Unworked bones comprise 153 more or less fragmentary pieces with a weight of nearly 4 pounds (1720 grams). Worked bones were about half as abundant. Coyote bones totaled 92 pieces and weighed 1135 grams. Next most abundant was the jackrabbit: 27 pieces weighing 119.5 grams. Not more than 6 bone fragments of any other species were found.

Three-quarters of the bones at the southwest end of the cave and about its entrance were coyote bones. It is presumed that other animals were brought to the cave by coyotes to be eaten. Bones were comparatively scarce in the back portion of the cave. Probably very few bones other than artifacts were brought to the cave by the agency of man. The following remarks refer to non-artifact bones.

Carnivora.—Nearly two-thirds of the mammal bones, both as regards number of pieces and weight, are coyote bones. Probably at all times the coyote has been the most abundant of the larger animals in the region, and due also to the fact that they would seek shelter in the cave, their bones are well represented. Nearly all the bones which the writer excavated were found in the front of the cave where the animal has sought the light in its last sickness.

Next to the coyote, badger bones were the most numerous of carnivore bones, constituting 2.8 per cent by weight of all mammal bones, excluding artifacts. The bones of carnivores other than coyote and badger constitute 2.7 per cent of the mammal bones. A calcined 2½-inch fragment of a jaw, a 4-inch fragment of a humerus, and a rib appear to be wolf. In addition to these there was an artifact of wolf rib. There was a single mandible of a fox, probably the High Sierra red fox. This species has been obtained in Churchill county, Nevada. The bones of the skunk consisted of only part of a skull and jaw. A fragment of a pelvis is considered to be probably from a weasel though possibly from a small mink. A mink was represented by a head with skin sewed together.

Rodents.—Next in abundance to the coyote comes the jackrabbit (6.9 per cent). Of this species nearly as many bones were found along the back wall of the cave as near the entrance. A single femur, tibia, and mummified foot of a smaller rabbit, evidently the cottontail was found at the southwest end of the cave.

Other rodent bones constituted 6.4 per cent of all mammal bones. These included the mummy of a woodchuck, the skulls, femur, and

tibia of the muskrat, and skulls of the gopher. One beaver incisor was found.

Artiodactyla.—Bighorn, deer, and antelope together constituted 14.2 per cent of the mammal bones.

Excrement

The principal excrement in the cave was that of bats. Before the arrival of the writer 5 carloads of 50 (?) tons each had been taken from the cave for fertilizer. Besides this, a large quantity was left in the cave because it was so much mixed with other things that it no longer paid to ship it. Bat manure was sometimes found in nearly pure beds of perhaps several feet thickness. It was usually in a granular state, each oblong grain about 5 mm. in length. Possibly artifacts would not be quite so well preserved if in contact with bat manure as they would be if deposited in dust or straw. However, the bat manure was usually in a very dry state; nor does it readily absorb moisture from the atmosphere. Although there was so large a quantity of bat guano in the cave no bats were seen during the writer's stay; but a cowboy said that several years previously he had smoked out large numbers.

Samples of cave material were brought to the museum, measured for cubical capacity, and weighed. Twenty liters of carbonized bat guano weighed 27 kilos. A 34-liter sample of guano mixed with much windblown dust weighed 22 kilos. Samples, largely of ashes, 61 liters in quantity, weighed 58 kilos. A typical sample of pure unburnt bat guano was not obtained, but if from the above figures we assume guano to have the same specific gravity as water, 250 tons would have a capacity of 8000 cubic feet. This would make a depth of 26 inches over the cave floor area of about 3700 square feet. While his calculation is perhaps subject to the error of showing too small a quantity of guano, it is thought to present a fair picture of the quantity excavated for fertilizer. However, the guano was not in uniform beds but was mixed with far larger quantities of straw, tule, rushes, sticks, stones, ashes, and dust.

Another kind of excrement was found occasionally in beds of an inch or two in thickness. The oblong grains were from 10 to 12 mm. in length and are considered to be from pack rats. This manure easily absorbs moisture, and artifacts in contact with it are always ruined. Textiles in contact with it will fall to pieces of their own weight, while articles of wood will sometimes be a rotten soggy mass.

Two samples of coyote excrement contained twine 2 and 3 mm. in diameter running through it. Another sample contained twine 1 to 1.5 mm. in diameter. It is presumed that the coyotes consumed the flesh of human bodies deposited in the cave and along with the flesh had swallowed pieces of the garments in which the dead were clothed.

The human excrement in the cave reveals, on the part of the ancient inhabitants, an incredibly coarse diet of seeds, hulls, and tough plant fibers. Some of the excrement was over 2 inches in diameter.

BIRD REMAINS

The remains of birds found in the cave include bones, bone artifacts, loose feathers, bundles of feathers, quills, stuffed heads, and wearing apparel made from the skin of birds. There were at least 16 species. Some of these were determined by bones, others by feathers or stuffed heads: grebe; white pelican, *Pelecanus erythrorhynchos;* great blue heron, *Ardea herodias;* merganser, *Mergus americanus;* mallard, *Anas platyrhynchos;* widgeon, *Mareca americana;* sprig, *Dafila acuta;* ring-necked duck, *Marila collaris;* snow goose, *Chen hyperboreus;* white-fronted goose, *Anser albifrons;* Canada goose, *Branta canadensis;* whistling swan, *Olor columbianus;* California gull, *Larus californicus;* great horned owl, *Bubo virginianus;* western bluebird, *Sialia mexicana;* crow, *Corvus brachyrhynchos.*

Two hundred seventy-five bones weighing 821.5 grams were collected. Of these, 26 bones were artifacts, 25 of which were identifiable as to species. One hundred ninety-three non-artifact bones were not identified.

Bird bones were more evenly distributed than mammal bones. For this there seems no explanation. A superficial examination of the bones from the rear of the cave showed about the same proportions of heron, brant, ducks, owl, and songbirds as other portions of the cave. The pelican and swan were found perhaps only in the front end of the cave, doubtless brought thither by carnivores. The bones of all species appeared to be those of adult birds except those which were considered to belong to the heron. These were in all cases from young birds. It is considered that most bird bones other than artifacts were deposited in the cave by natural agencies, rather than by hand of man.

REPTILES AND FISHES

In the cave 9 series of snake vertebrae were found, from 2 to 7 cm. in length and bound together by ligaments.

The fish bones found in Lovelock cave were for the most part vertebrae bound together with ligaments, making 20 pieces ranging in length from 1 to 3 inches. These bones have a variety of form and range from 3 to 10 mm. in diameter, hence probably several species of fish are represented. One bone, apparently part of a skull, has a length of 7 cm. and a width of 2 cm. These bones were found in all parts of the cave, one-third being found in the far end.

The mummified fish consisted of one or two mummified fins and several whole fish. The whole fish ranged in length from 8 to 11 cm. In pit 9 of the 1924 excavation a cache of 116 complete mummified fish was found.

ARTIFACTS OF BONE

Bone Awls

Twenty-four awls made from the bones of mammals were found. The bones used are shown in the following list:

	Pieces
Scapula, artiodactyl (pl. 13*k*, *l*, *m*, *n*)	10
Ulna, artiodactyl	1
Cannon, artiodactyl (pl. 13*s*)	2
Radius, artiodactyl (pl. 13*o*, *q*)	3
Tibia, artiodactyl	1
Tibia, coyote (pl. 13*r*)	1
Ulna, coyote	1
Unidentified (pl. 13*p*, fig. 7*c*, *d*)	5

The artiodactyl bones are probably both deer and bighorn, and possibly in a few cases antelope. Of the 19 awls of identified bones 10 are made from the scapula. In this respect they differ from the bone awls of California, which are made from the cannon bone and ulna of deer and rarely from the penis bone of marine mammals and the limb bones of birds. Plate 13*j* to *n* is arranged with proximal ends of scapulas upward to show the part from which the awls are derived.

In a collection at the University from the cliff dwellings of Utah and southwestern Colorado, over half the awls are made from the various limb bones of birds. At least a dozen are surely and another dozen probably of the cannon bone of some artiodactyl species. Two

are from the ulna, and several are from the tibia, of an artiodactyl species. Four awls are made of coyote bones—2 from the distal end of a tibia, 1 from the proximal end of a tibia, and 1 from an ulna. Two awls were made from the radius of some animal smaller than the coyote. Although the resemblances of the Lovelock cave awls to the Cliff-dweller awls is not great, it appears closer than to the Californian awls.

Plate 13*s* shows a well worked awl from the proximal end of a cannon bone. Plate 13*p* is an even more finished article. In order to show the decorative incisions made upon one side of it, it is reproduced in outline in text-figure 7*d*. The specimen is 155 mm. long, with an oval cross-section having diameters of 6 and 8 mm. An incised wavy line on it resembles the so-called "blood grooves" on arrow shafts.

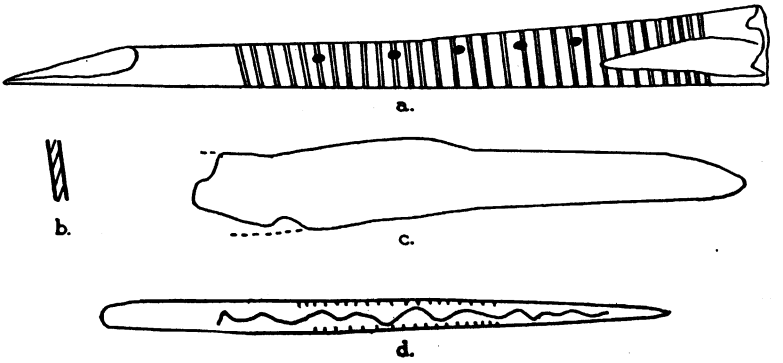


Fig. 7.—Bone implements. .5 natural size. *a*, whistle made from the ulna of a pelican, collection of J. H. Hart, Lovelock; *b*, detail of decorative incisions in *a*; *c*, flat, bluntly pointed, awl-like implement, 1–19316; *d*, bone awl, 1–19303, with decorative design.

Text figure 7*c* shows a bluntly pointed, awl-like implement, 150 mm. long, 13 mm. wide, and 4 mm. thick at the narrower end, and 20 mm. wide by 2 mm. thick at the wider end. At the wide end it is spoon-shaped, perhaps due to calcining. If flattened out it would be 32 mm. wide.

An awl made from the distal end of a coyote tibia is shown on plate 13*r*. Another specimen, 1–21638, was made by using nearly the full length of a coyote ulna, 17 cm., and simply sharpening the attenuated distal end.

Bone Tubes

Bone tubes were made from the bones of the coyote, wildcat, deer, pelican, swan, and Canada goose. The ends reveal two methods of attaining the desired length, viz., cutting and breaking.

Ends cut off	Pieces
Femur, coyote (pl. 13*c, d*)	4
Humerus, coyote (pl. 13*g*)	3
Radius, coyote (pl. 13*h*)	1
Tibia, coyote (pl. 13*f*)	1
Tibia, deer (pl. 13*i*)	1
Ulna, pelican (pl. 12*d, f*; text fig. 7*a*)	3
Incised bone, bird (pl. 12*i, j*)	2
Ends broken off	
Femur, coyote	9
Humerus, coyote (pl. 13*b*)	9
Tibia, coyote	3
Humerus, wildcat (pl. 13*a*)	1
Ulna, swan	1
Tibia, Canada goose (pl. 13*e*)	5
Ulna, Canada goose	5
Radius, Canada goose	5
Carpal, Canada goose	3
	56

Coyote bones with cut ends.—The most finished coyote bones are shown in plate 13*d*. The distal ends of the two femurs were cut off and smoothly polished. The proximal ends were roughly broken to make perforations. The length of each tube is 117 mm. They are strung to lie side by side. From one end projects twine about 9 cm. long and attached to a bundle of tule sufficiently small to be held in the palm of the hand. The object is perhaps a charm or rattle.

Plate 13*c* shows one of a pair of tubes found lying side by side. They are the right femurs of coyotes with both ends smoothly cut and polished to form tubes with lengths of 86 and 102 mm. Another similar tube of coyote femur had a length of 105 mm. Such objects are used as hair ornaments (motsikwa'a) by Northern Paiute men. The exterior diameters of these tubes are from 10 to 15 mm. and the interior diameters at least 6 mm., sufficient to allow a small braid of hair to pass through. Natches had seen some similar tubes that reached from the ear to the clavicle, but more often short tubes of 25 to 50 mm. length were worn.

Plate 13*f, g, h* shows a tibia, a humerus, and a radius of the coyote with both ends cut off to form beads; *h* has a length of 102 mm. and diameters of 11 and 7 mm. In these cases the edges were not polished. There were two other humeri similarly worked. Natches identified them as ornaments to be inserted in the septum of the nose.

Cut end of a deer tibia.—Plate 13*i* shows the distal end of an artiodactyl tibia, probably deer. The cut end is smoothly polished. The specimen forms a cup, 13 mm. inside diameter, and 40 mm. deep. Natches said similar receptacles among the Northern Paiute were for hair oil (cf. pl. 46*a*).

Bird-bone tubes.—Plate 12*f* shows the ulna of a pelican with one end cut off and the other broken off. The specimen is 23 cm. in length. Figures *i* and *j* of the same plate show two beads with incised decoration, in one case a spiral line, in the other a series of dashes arranged spirally. The longer specimen, 98 mm. in length and 8 mm. in diameter, is incomplete, being broken at one end. It is similar in form and size to the radius of a pelican. It is an ornament to be inserted in the septum of the nose, according to Natches. The smaller specimen, 20 mm. in length and 9 mm. in diameter, is a bead to be worn on the hair. Plate 12*d* shows the shaft of the ulna of a pelican with decorative incisions arranged spirally. The specimen is incomplete at one end, but shows that it had been cut off and polished at the other end.

Bones with broken ends.—It will be observed in plate 13*a, b, e* that the ends are very roughly broken off, undoubtedly with a stone hammer. In the case of 9 coyote femurs, 1 coyote tibia, 1 swan ulna, and 18 Canada goose limb bones, both ends of the bone were broken off, in what is considered the first stage in the manufacture of beads. It is also possible that they might have been strung in the rough state and used as a rattle. Two of the coyote tibias had only the proximal end broken off. In the case of 9 coyote humeri and 1 wildcat humerus only the proximal end of the bone was broken off. It was unnecessary to break off the other end, as the bones could be strung by passing a cord through the foramen in the distal end. Strung in such manner they would make an excellent rattle.

Bone flute.—Text figure 7*a* shows what is probably a flute. It is made from a pelican ulna, has five perforations, and is decorated with forty pairs of parallel encircling incisions. Between the lines forming each pair there are finer cross-incisions, as shown in text figure 7*b*. The specimen belongs to Mr. J. H. Hart.

Various Bone Objects

Other bone objects worthy of special description include the following 16 articles:

	Pieces
1–19250, split cannon, deer (pl. 13*t*)	1
1–19264, pendant, incised dots (pl. 12*h*)	1
1–19265, snake-like pendant (pl. 12*c*)	1
1–19266, perforated bighorn rib (pl. 12*b*)	1
1–19301, notched antelope scapula (pl. 13*j*)	1
1–19307, wolf rib, cord attached (pl. 12*a*)	1
1–19315, thick perforated bone (pl. 12*e*)	1
1–19317, spoon-like bone	1
1–21639, mink head with sewing (pl. 32*i*)	1
1–24319, fishhooks (fig. 8)	7
Total	16

Rib pendants.—Plate 12*a* shows what appears to be a section of wolf rib 115 mm. in length. A cord 1 mm. in diameter and 50 mm. in length is tied in a deep notch at one end. Perhaps it was a charm or an ornament. A similar conjecture applies to a section of bighorn rib, 110 mm. in length. The perforation, 4 mm. in diameter and near one end, does not show in the illustration (pl. 12*b*).

Incised pendants.—A pendant, 78 mm. long, 11 mm. wide, 4 mm. thick, and with dots and circles incised at one end, is somewhat suggestive of a snake (pl. 12*c*).

Another pendant 62 mm. long, 17 mm. wide, and 3 mm. thick has many small incised dots on one side, while the reverse side is flat and without decoration. This and the preceding specimen are possibly articles of personal adornment.

In addition to the pendants listed above there were two others attached to a rattle composed of numerous pieces of horn and hoof (fig. 11).

Scrapers.—Plate 13*j* shows the scapula of an antelope, or possibly a bighorn sheep. Although much sinew adheres to portions of the specimen, other portions are much polished from use. The bone has half a dozen smoothly worn, rounded notches.[7] Natches said it was probably used for scraping greasewood in making awls and arrow foreshafts.

[7] San Francisco Bay shellmounds produce notched bones, principally scapulas, some ribs (present series, 7:76, 393; pl. 9, fig. 17; pl. 46, fig. 6; 23:219, pl. 40. See also W. K. Moorehead, Prehistoric Implements, 236, fig. 363, 1900.

Plate 13*t* shows the longitudinally split and polished proximal end of the metacarpal of a deer. Natches thought the object had been used for scraping hair from hides, after the hides had been soaked and stretched on a pole. Scapulas were also often used as hide scrapers among the Northern Paiute.

Plate 12*e* shows a calcined bone object, $52 \times 24 \times 18$ mm., with a perforation 8 mm. in diameter. It is likely a polisher for arrow shafts.

Spatulas.—One spatula or spoon-shaped bone object has been included in the list of awls (fig. 7*c*). Another specimen, 1–19317, is $100 \times 34 \times 3$ mm. in size, calcined, and incomplete. It resembles in size and curvature specimens obtained from Californian shellmounds.[8]

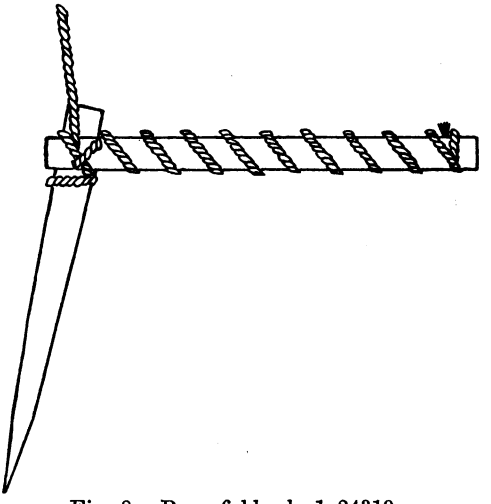


Fig. 8.—Bone fishhook, 1–24319.

Mink head.—In the collection of I. P. Richardson was a mink head, both skull and fur, the latter sewed with twine. This was probably obtained from the southwestern end of the cave.

Fishhooks.—Figure 8 shows an enlarged drawing of a fishhook obtained from Mr. Richardson. The fishhook comprises a section of bone 25 mm. long, broken from the side of a pelican ulna or humerus. This bone fragment is acutely sharpened and well polished. A twig of tough wood, 2 mm. in diameter, is split in half and folded over the blunt end of the bone. The extremities of the twig are brought together, pinching between them a cord .7 mm. in diameter. The cord then spirals about the two halves of the twig, securely binding them to the bone by several half hitches.

[8] Cf. present series, 7, pl. 8, fig. 5.

ARTIFACTS OF HORN AND HOOF

Twenty objects of horn and hoof were obtained. They are made principally from the horns and hoofs of the male bighorn sheep, *Ovis canadensis nelsoni,* to a less extent perhaps from the horn of the female bighorn, and to a still less extent from the horn of the antelope, *Antilocapra americana.* The list of objects includes the following:

Horn of bighorn sheep	Pieces
Straighteners, juvenile male ? (pl. 15*j*, *k*)	4
Spoons, male (pl. 15*b*, *g*; fig. 9*a*)	2
Spoon (pl. 15*i*)	1
Pendants, male (pl. 15*c*; fig. 9*d*)	2
Pendants (pl. 15*e*, *h*)	2
Flat objects, male (pls. 15*a*, 49*p*; fig. 9*b*)	4
Perforated disk (pl. 15*d*)	1
Fish-like carving (pl. 15*f*; figs. 9*c*, 10*a*)	1
Hoof of bighorn sheep	
Perforated for rattle	2
Horn and hoof, bighorn and antelope	
Rattle of 38 objects (pl. 14; fig. 11)	1
	20

Straighteners.—Straighteners are made either from the horn of the female bighorn or more probably from the horn of the juvenile male, which resembles that of the female and corresponds to the tip end of the horn of the adult male. Plate 15*k* is unquestionably from a juvenile male because of its large size, while figure 15*j* might be either female or young male. The horn is perforated with numerous holes varying in size from 6 to 12 mm. in diameter. From the appearance of some of the holes, especially one but partially completed, it would seem that they were made with the agency of fire. In close association with one of the horns were four sticks which exactly fitted the smallest holes, hence it is presumed that the perforations were intended to be used in polishing and straightening sticks for arrow shafts.

Spoon-shaped objects.—Of spoon-shaped objects there were three specimens, all shown on plate 15*b*, *g*, *i*. With the possible exception of one small specimen, probably all were made from horns of the male bighorn. Figure 9*a* shows the part of the horn from which the largest specimen was made. The three specimens have lengths of 148, 138,

and 117 mm., widths of 60, 40, and 25 mm., and thicknesses of 2 to 3 mm. Only one is sufficiently concave to hold liquid, but all are well adapted for eating porridge. The object in plate 15*h* might also have been used as a spoon, though it is more highly decorated with notches and hence has been classed as a pendant.

Pendants.—There were four pendants of horn, of which three are shown on plate 15*c, e, h.* The outline of the fourth specimen (1–19336, 107 by 45 mm., perforation at one end), as well as the part of the horn from which it was taken, is shown in figure 9*d.* The particular description of these specimens is as follows:

Plate 15*c,* 1–19326, 105 by 38 mm., 3 to 5 mm. thick, too thick and clumsy for use as a spoon, perforation at the narrower end, nearly flat, that is, without longitudinal curve.

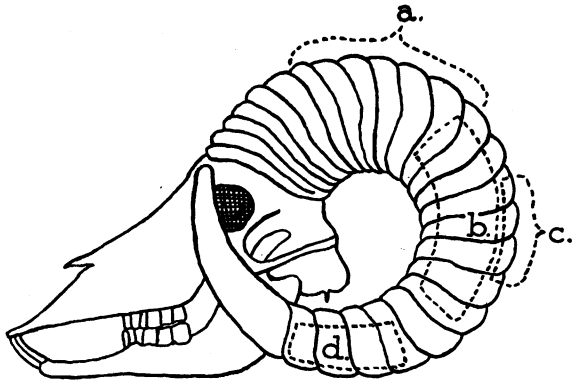


Fig. 9.—Skull of male bighorn sheep showing parts of horn from which artifacts are made. *a,* curved or spoon-shaped objects from top; *b,* flat sickle-shaped objects from side; *c,* fish effigy from back and part of side; *d,* short flat pendants from side.

Plate 15*e,* 1–19339, 130 by 12 by 2 mm., shows patches of bluish paint, two perforations at one end with twine inserted, one perforation at the other end.

Plate 15*h,* 1–19327, spoon-shaped object 83 by 26 by 2 mm., with numerous notches at both sides and both ends.

Flat objects.—There are included here four pieces of horn, perhaps but partially made into the object for which they were intended. The objects are only comparatively flat, having some longitudinal curve. Their flatness is due to their being cut from the side of the horn of the male bighorn (see fig. 9*b*), which is somewhat triangular in cross-section. The top of the horn is rounder and more suitable for spoons. The description of the specimens is as follows:

1–19330 (pl. 15*a*), 173 by 48 mm., 4 to 6 mm. thick.

1–19329, rectangular, 122 by 26 mm.

1–19337, rough somewhat rectangular, 125 by 55 mm.

1–21381 (pl. 49*p*) much weathered, wrapped in cat-tail leaves, 218 by 48 by 8 mm.

Perforated disk.—A disk of horn is shown on plate 15*d*. It is an earring 28 mm. in diameter and 2 mm. in thickness with five notches about the edges and a perforation 10 mm. in diameter.

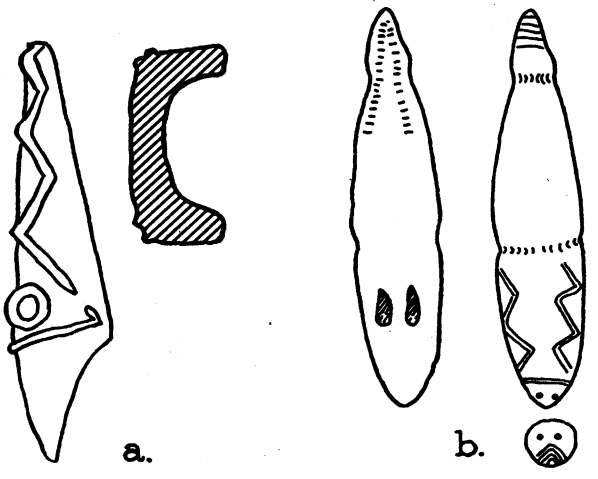


Fig. 10.—*a*, side view and cross-section of horn object, 1–19338, from Lovelock cave; *b*, bottom, top, and nose view of fish-like slate carving, from Humboldt valley, specimen in Museum of the American Indian, Heye Foundation.

Fish-like carving.—A fish-like object is shown on plate 15*f*. It was evidently cut from the rear portion of the horn of a male bighorn (see fig. 9*c*). Its length is 88 mm., width 43 mm. The object suggests a fish with pointed head. Two eyes are cut in relief, a central pit is filled with a black pigment, and wavy stripes extend down the sides. A side view, as well as cross-section of the object at the position of the eyes, is shown in figure 10*a*. The object has some similarity in ornamentation to a fish-like carving in slate found in 1924 on one of the valley sites (fig. 10*b*). The latter object resembles a fish more than the first. It has two fin-like depressions in the belly. The length is 85 mm. It is one of many objects that indicate that some at least of the valley sites were occupied contemporaneously with the cave.

Horn rattle.—Figure 11 shows in detail pieces of horn and bone composing a large rattle (1–19341) found with the body of a 5½ year old child (lot 26, 12–2670). The rattle weighs 1200 grams and con-

sists of 2 pieces of bone, 4 pieces of antelope horn, 10 pieces of horn from the bighorn sheep, and 22 hoofs from the sheep. These 38 objects were bound together chiefly with thongs but partly with twine. The ends of the thongs were inserted in perforations and knotted on the other side. Two pieces of sheep horn were decorated with incised dots on both sides. Three pieces had notches on edges, one of these having about 40 notches, possibly to form a rasping musical instrument.

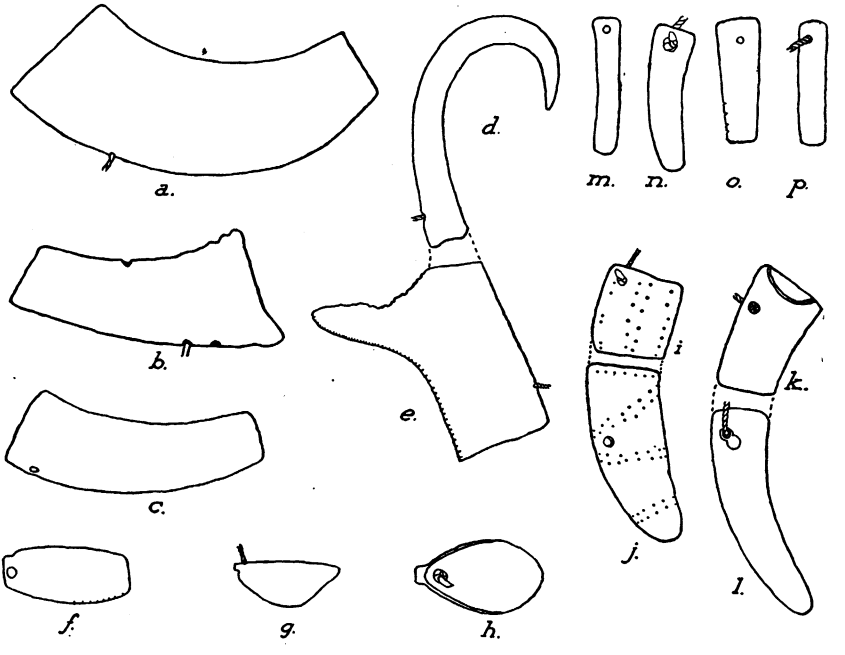


Fig. 11.—Pieces of horn and bone composing a rattle, 1–19341, shown on plates 10, 14. *a*, male sheep horn, 242 x 96 x 86 mm.; *b*, juvenile male sheep horn, 178 x 75 x 43 mm.; *c*, juvenile male sheep horn, 168 x 53 x 40 mm.; *d*, tip of antelope horn, 158 x 28 x 26 mm.; *e*, prong of antelope horn decorated with incised lines, 126 x 112 x 26 mm.; *d* and *e* drawn together in approximate natural position, although not cut from same horn; *f*, spoon-shaped pendant of sheep horn, 80 x 32 x 3 mm.; *g, h*, spoon-shaped objects of antelope horn, 67 x 30 x 26 mm. and 81 x 47 x 13 mm.; *i, j*, two pieces from same horn, decorated with incised dots—female or juvenile male sheep, 59 x 48 x 7 mm. and 126 x 44 x 7 mm.; *k, l*, two pieces cut from same horn—female or juvenile male sheep, 82 x 46 x 11 mm. and 141 x 36 x 9 mm.; *m*, horn pendant, 88 x 15 x 8 mm.; *n*, tip of sheep horn, 96 x 25 x 6 mm.; *o*, pendant of artiodactyl cannon bone, 80 x 28 x 6 mm.; *p*, bone pendant, 81 x 18 x 4 mm.

Objects *b* and *c* were cut from sufficiently near the tip of the horns of young males to form hollow tubes closed at one end. Objects *g* and *h* are spoon-shaped, unquestionably cut from antelope horn, but the part of the horn from which they are cut is somewhat puzzling.

Possibly they are from the horns of juveniles. Objects *i* to *n* were cut from the flat curved tips of the horns of young male sheep or from females, whose horns are similar. The hoofs show no workmanship other than a perforation.

Hoofs.—In addition to the 22 hoofs, having perforations and being attached by thongs and twine to the other objects of the rattle above described, there were found 2 other hoofs with similar perforations.

ARTIFACTS OF SKIN

It seems scarcely possible for skin to have been deposited in the cave by natural agencies, because, if attached to the carcass of a dead animal, it would either decay, mummify together with the flesh, or be eaten by some other animal. Hence it is assumed that all pieces of skin are artifacts. The removal of the skin from an animal by man would, even without any subsequent process of manufacture, render it an artifact. About half of the specimens possessed hair or feathers, while the other half had the hair removed by man. Aside from skin twisted into rope for making blankets, there were 45 pieces, listed below, weighing 831.8 grams.

	Pieces
Sandal or moccasin sole	1
Moccasin of deer fur (pl. 22*e*)	1
Beaded moccasins (pl. 21*i*)	2
Leather	7
Thongs (pl. 43*h*)	10
Sewed fur	2
Deer fur	4
Woodchuck fur	4
Unknown mammal fur	6
Bird skin	2
Sinew	3
Bladder and receptacle (pl. 21*h*)	3

Skin, Sinew, and Bladder

By far the largest single quantity of mammal skin was found wrapped together with fish nets about the body of an infant mummy (12–2669). The estimated weight of the skin (the fish net not being disentangled therefrom) is about 200 grams.

Two pieces of muskrat fur, laced together by a large sized cord so as to form a single piece, are about 20 by 30 cm. in size. Another piece of muskrat fur, 7 by 12 cm. in size, was sewed to a piece of deer fur of about the same dimensions. The sewing was roughly done

with cord about 1 mm. in diameter. One of four pieces of fur from the head of a woodchuck had several perforations and a piece of small sized cord attached. The largest piece was 5 by 20 cm.

Several pieces of deer leg skin were perhaps refuse fragments from moccasin making. Professor Joseph Grinnell says that the skin from the legs of deer is preferable for moccasins because of its toughness.

The few pieces of untanned leather found are of scant importance, being only several square inches all told. Ten bits of leather thongs, unattached to other objects, were found. These seem to be of the skin of an artiodactylian species.

Fur of the mole was abundant for such a small mammal, but the real quantity is undeterminable as it was to a considerable extent mixed with the fur of other mammals and with bird skin in the making of blankets. Most of these blanket fragments are also so old and dilapidated that the mammalian species cannot be determined. A few fragments of twisted mole skin were found alone.

Two bundles and fragments of sinew found are doubtless from artiodactylian species. Two bladders and a skin in which they were wrapped are undeterminable as to species.

Skin Moccasins

The sole of a sandal or moccasin is 24 cm. long and from 6 to 12 cm. wide. It had been repeatedly mended. There are no less than eight thicknesses of skin on the sides of the heel. Each thickness in turn was roughly sewed on with thongs, then worn until a hole developed at the center of the heel, when another thickness was added.

The moccasin shown on plate 22*e* is 19 cm. long and 10 cm. wide, hence a child's. It is made entirely of deer hide with the hair on, except for twine 3 mm. in diameter used in mending. The heel shows 6 thicknesses of hide. The specimen is too fragmentary to determine if the ankles were protected, though the covering for the toes is present.

Two moccasins were collected at the cave by Mr. Richardson. One is shown on plate 21*i*. It consists of a sole sewed to an upper to go about the ankles. The stitching is twine 1 mm. in diameter. Along all sewed edges there is a double row of small olive-shell beads attached with smaller twine. There is also a double row of beads passing over the arch of the foot. The size indicates a child's moccasin, but a very large amount of material is used for the upper. In comparison with moccasins from other regions the fitting to the foot and the sewing

are excessively crude, although the decoration with beads forms an attractive feature. Mr. Richardson's second specimen is very fragmentary although undoubtedly a mate to the first.

Bird Skin and Feathers

Strips of bird skin with feathers were twisted into rope which was woven into garments, mostly in very fragmentary condition. Stuffed bird heads, small patches of skin with feathers attached, and various artifacts of feathers were also obtained. Quills and feathers, probably of the pelican, were found attached to ropes of tule. A few of the coiled baskets also were decorated with feathers. Some of the feathers of a greenish tinge were probably from either the merganser or the mallard. Loose feathers of the following species, not identifiable as artifacts, were obtained; arranged in order of abundance: pelican, heron, owl, duck (greenish), bluebird, and goose.

Miscellaneous articles of feather are here listed and described:

1–21079, feathers wrapped in tule (pl. 21*e*)	1
1–21080, feathers tied in cat-tail (pl. 21*f*)	1
1–21081, feather wrapped in sinew	1
1–21082, knotted feather	1
1–21083, mat of quills (pl. 43*o*)	1
1–21084, feathers wrapped in bird skin	1
1–21137, feathers tied with a cord	1
1–21138, feathers tied with a cord	1

Bundles of feathers.—Plate 21*e* shows a bunch of pelican (?) quills wrapped in a one-strand rope of split tule. One end has been scorched, while the feather at the other end is moth eaten. Plate 21*f* shows another bundle of feathers, tied in a leaf of the cat-tail rush. There were two small bundles of feathers tied with cord and found with the child mummy. Here the feathers were scarcely more than an inch in length. The cord in one case was of the comparatively rare, left twist variety, being two-strand and about 1 mm. in diameter. With lot 25 there was a large bundle of pelican (?) feathers wrapped in a bird skin covered with white downy feathers. One end of the bundle had been burnt, but the portion remaining is 3 by 9 inches in size.

Mat of quills.—Plate 43*o* shows a mat, the warp of which is quills which are made into two-strand, left-twined cords 3.5 mm. in diameter. The longest of these warps is 17 cm., but one end has been burnt. The greatest width of the mat is 12 cm. but one edge has been burnt.

The woof courses are of cord made from plant fiber and alternate as pairs of courses and single courses, 4 cm. apart. A single course shows imperfectly in the illustration at the scorched end.

Knotted feathers.—A pelican feather had its upper portion twisted into a knot. It probably belongs in much the same class of objects as the knotted willow twigs shown on plate 50.

Stuffed Bird Heads

Plate 32 illustrates the method of stuffing the head and neck of water birds with tule, probably for use as decoys. There were 24 such specimens, comprising the following species:

Stuffed heads of birds	
Merganser (pl. 32*f*)	4
Sprig (pl. 32*g*)	1
White-fronted goose (pl. 32*e*)	1
Canada goose (pl. 32*a–d*)	8
Ring-necked duck	1
Tied bills	
Canada goose	8
Pelican (pl. 12*g*)	1
Stuffing	
Bundles of tule (pl. 32*h*)	25

The objects illustrated on plate 32 were prepared by taking the skin from the neck of the bird up to the skull, which was either taken out as in the case of the geese and sprig, or broken into at its base in the case of the merganser, in order to extract the brains. The beak was retained with the skin. The mandible was sometimes prevented from falling by tying it with a piece of split tule or cord passed through the nostrils. Some of the incomplete specimens consisted only of these tied bills. The head was stuffed with grass to give the correct form. Inserted in this grass and bent to give the proper arch to the neck was a bundle of tule about 10 inches in length as a rule. A total was obtained of 48 more or less complete specimens of stuffed heads of birds, or of stuffing identical in every respect to that found with the heads. The larger part, 25 specimens, were in a cache with lot 34 where the stuffed heads and the tule bundles were piled like cord wood.

Several specimens were obtained by Mr. Richardson, among them a specimen of the ring-necked duck, *Marila collaris*.

Presumably these objects were decoys, being perhaps kept in an unright position in the water by weighting or anchoring one end with a stone, although no evidence of such weighting was seen. Another supposition is that they were objects of talismanic value. A parallel case that suggests this is the mink head (plate 32*i*). In it the base of the skull had been broken to extract the brain, as in the case of the merganser. Although not stuffed there is little doubt about the intent to stuff. The head had been severed just behind the ears, and had been sewed to something, as shown by a piece of cord 1.5 mm. in diameter, and by perforations around the entire edge of the skin.

Plate 12*g* shows fragments of pelican mandibles wrapped loosely with poorly twisted fiber cord.

Blankets of Fur and Feather

Most of the articles of fur and feathers found were strips of skin twisted for making garments. The skins of birds and mammals, together with the feathers and hair, were cut into strips, 1 or 2 or rarely even 4 cm. in width, and twisted (usually contraclockwise) into ropes, which were then woven into blankets. In the list are enumerated the twisted materials as well as the completely woven articles. There were 243 whole and fragmentary specimens weighing 6286 grams.

Twisted strips of skin	Pieces
Unknown mammal fur, cord foundation	8
Unknown mammal fur, no foundation	4
Duck or grebe skin, cord foundation	1
Great blue heron	30
Bird and moleskin, cord foundation	1
Ball of fur strips (pl. 43*g*)	1
Woven strips of skin	
Blanket of muskrat fur (pl. 18*a*)	1
Blanket of meadow mouse fur (pl. 17*a*)	1
Belt of meadow mouse fur (pl. 19*d*)	1
Blankets of mole fur, cord foundation	5
Blankets of unknown mammal fur	19
Blankets of bird, moleskin, etc., cord foundation	2
Blankets of bird and unknown mammal skin	1
Bird-skin blanket, white downy feathers (pl. 18*b*)	1
Bird-skin blankets, brown feathers, perhaps heron	167

Twisted strips of skin.—When strips of skin were of a thin fragile nature they were twisted over cord of vegetable fiber. Similarly, in California, blankets were made of rabbit skin so thin and fragile that

a foundation of cord had to be used. The skin of the rabbit was used by the cave people, but it was often so soiled and altered in color that no reliable identification for statistical purposes could be made. It is included with the unknown mammal fur. However, mole, muskrat, and meadow mouse skins were identified. They generally had a loosely twisted, one-strand cord of vegetable fibers as a foundation about which they were twisted.

A small quantity of what is possibly muskrat fur had as a foundation a strip of bark. In the case of one specimen with an undetermined species of fur there was for a foundation a two-strand cord 1.1 mm. in diameter with overhand knots about a centimeter apart.

Plate 43*g* shows a ball 4 cm. in diameter made of twisted fur strips and securely bound with a thong and a cord. The fur is probably moleskin and it has a foundation of loosely twisted vegetable fiber. This specimen is the only example found of ropes of fur wound into a ball.

Bird skin sometimes has a foundation and sometimes not, more generally not. The strips of skin, both of bird and mammal, are sometimes twisted in single strands, sometimes in two or three strands. A very coarse, tough skin with brown heron-like feathers is always cut in wide strips, twisted in a single strand, and usually without any foundation of cord, although two small specimens were found in which there was a foundation made of old fragments of fish net twisted into cord. The bird skin with white downy feathers is also tough, but is cut in narrower strips and two or three strands twisted together.

Blanket of meadow mouse fur.—Plate 17*a* shows a twined blanket 38 inches wide and 40 inches long. The weight is 1697 grams. It contains about 210 feet of rope made from meadow mouse fur and about 10 feet of rope made from muskrat fur. This rope is the warp of the blanket, there being 60 courses of meadow mouse warp for the center and 3 courses of muskrat warp on each edge of the blanket, making a total width of 66 courses. The average width of each course of warp is 17 mm. The strips of fur forming the warp are twisted over a foundation of coarse vegetable fiber. The fiber is loosely twisted so as to form a one-strand cord nearly 1 mm. in diameter.

The woof is of cord, 1.6 mm. in diameter. The 13 courses of woof in the blanket are from 6 to 10 cm. apart, averaging 8 cm. At one edge of the blanket a small olive-shell bead is attached to the end of one of the woof courses. Each course of woof is two cords which twine about the warp exactly as in tule mats. At the top and bottom of the

blanket there is a cord 3 mm. in diameter running the full width of the blanket.

The specimen was found tightly bound up with another blanket of muskrat fur, the whole being inclosed in a receptacle of tule and securely tied with tule rope (pl. 17*b*). The bundle, which is about 16 inches long and 8 inches in diameter, was found buried alone in cave material, including considerable dust and straw. Although possibly hundreds of years old, these ordinarily perishable objects have undergone alteration only in color. In common with other fur and human hair found in various parts of the cave, they have assumed a reddish tinge.

Blanket of muskrat fur.—Plate 18*a* shows the second blanket referred to above. It is 26 inches wide, 36 inches long, and weighs 606 grams. It contains about 95 feet of warp in 32 courses, averaging about 2 cm. in width. The fur is twisted over a foundation of vegetable fiber.

The woof is of cord 1.4 mm. in diameter, arranged in 8 courses, with intervals of from 8 to 14 cm., the average being 11 cm. At the top of the blanket there is a cord 4 mm. in diameter, of compound twist, and at the bottom a similar cord 3 mm. in diameter.

Blanket of bird skin.—Plate 18*b* shows a dilapidated garment of twisted bird skin. The feathers are white and of soft downy thread-like texture. The skin was cut into strips 5 to 10 mm. in width and twisted in either one or two strands, but without foundation. The specimen is so incomplete that the original dimensions cannot be given with accuracy. In length it was some 30 or 40 inches, reaching from the breast to the knees. The width perhaps did not exceed 20 inches, or barely sufficient to half encircle the body. It might have been used to cover the front of the body, or as a cape to cover the back. There can be no question but that the intention was to suspend it from one shoulder, as there are two cords, 4 mm. in diameter, connecting the upper corners. The warp elements are about 1 cm. apart. The woof courses are 5 to 6 cm. apart, consisting of cord 1.5 mm. in diameter.

Belt of meadow mouse fur.—Plate 19*d* shows a specimen 6 by 20 inches in size, presented to the museum by Mr. J. H. Hart. The fur from meadow mice is twisted over a one strand foundation of vegetable fibers. The woof courses are about 8 cm. apart and composed of split tule rope. The cord, 1.5 mm. in diameter and 2 feet in length, seen in the illustration, is easily detachable from one end of the specimen. The purpose of the specimen is not clear. If it were a belt it would

fully encircle the body of only a child. The intervals of the woof courses and the open nature of the specimen would preclude its being the breechclout of a man. However it might well have served for the breechclout of a woman, or as a neck scarf.

Fragmentary blankets.—Fragments of blankets were found in all parts of the cave. With the mummy of a child, 12–2670, there were over a hundred fragments of fiber woof and of bird-skin warp, besides a quantity of coarse, large, heron-like feathers, the whole weighing 660 grams. There were also found 3 blanket fragments of heron-like skin, having the peculiarity of a woof 5 mm. in diameter, made of cat-tail leaves.

TEXTILES

One of the outstanding features of the collection from the cave is the large quantity of textile materials which includes 1528 fragments of basketry, 1418 fragments of matting, and 378 other articles including blankets and blanket fragments made of twisted strips of skin from birds and small mammals, and sandals. The total of 3324 pieces weighs 54,795 grams. The woven blankets of twisted skin have been described above.

Aprons of Plant Fiber

Plate 19*a, b, c* shows three specimens of aprons made of plant fiber. Two specimens of the loose fiber were also found which have the appearance of being the long, slender, creeping rootstocks of some grass-like species.

The specimen shown in plate 19*a* is about 9 by 10 inches in size. Some of the fibers are apparently 20 inches long, being bent at the middle to form the upper border of the specimen and secured by a course of woof twining. The woof is a cord about 3 mm. in diameter. Three centimeters below the upper border there is a second course of woof beneath which all the fibers hang loose. The mass of fiber is 1 cm. thick at the tightly bound upper border and 2 cm. thick where it hangs loose.

The specimen shown in plate 19*c* is about 5 by 5 inches in size and 1 to 2 cm. in thickness. The woof is of cord 2 mm. in diameter. The woof courses are arranged as in the previously described specimen. About one-third of the specimen (on the left of the illustration) was made of hair net with twine about .3 mm. in diameter and with the mesh 15 mm. square.

The specimen shown in plate 19*b* is about 4 by 4 inches in size with a thickness not much over half that of the other specimens. The woof,

2 mm. in diameter, is in two courses, one course near the upper margin of the garment, the other 1 cm. below the first. Intermingled with the usual plant fiber is a quantity of net with twine about .3 mm. in diameter and mesh 2 cm. square.

The largest of the specimens described above is undoubtedly the apron or skirt of a woman while the two smaller ones are probably those of girls. Somewhat similar diminutive garments have been found in the cliff ruins of Arizona and Utah. The University possesses one (2–5660) found in a cliff ruin in Canyon de Chelly. It is 75 cm. in length by 15 cm. in width, with only one woof course at the upper border. It is made of yucca fiber of sufficient bulk to constitute a thickness of 1 to 2 cm. when hanging loose.

Sandals

There are 87 specimens of what are considered to be sandals of tule and rush. Of these a half-dozen or more fragments may possibly be mats of the type shown in plate 24*b*, that is, mats with woof courses close together. However, in most cases of even fragmentary pieces there is little doubt, due to the fact that sandals are generally more or less worn on one side. About one-fifth of the sandals were made of rush (*Juncus*), the others of tule (*Scirpus*). Both tule and rush sandals can be divided into two types, one of fine weave, the other coarser and heavier. One-quarter belong to the finer type. Some were with, others without, a covering for the foot, which consisted of a rather loosely woven extension from the sole out beyond the toe of the sandal, so that it could be bent back over the foot, forming sort of an upper, but in no wise attached at the sides.

	Pieces
Tule, fine type	
Woof courses "V," foot covered (pl. 22*b*)	2
Woof courses "V," foot not covered (pl. 22*d*)	15
Tule, coarse type	
Foot covered	2
Foot not covered (pl. 23*b*, *c*, *d*)	51
Rush, fine type	
Woof courses "V," foot covered (pl. 23*a*)	2
Woof courses "V," foot not covered	2
Open weave, foot covered (pl. 22*a*)	1
Rush, coarse type	
Foot covered (pls. 22*c*, 23*e*)	3
Foot not covered (pl. 23*g*)	9
Sandal lining	
Cat-tail down (pl. 21*j*, *k*)	3

Tule sandals of finer type.—Sandals of this class are light in weight, are only about 5 mm. in thickness, and were probably used by women or possibly by men when about camp. They would not be sufficiently durable for rough wear on long journeys.[9] Plate 22*b* shows a specimen 25 cm. in length.

The sole of the sandal is nearly flat but turns up a little at the toes. The heel of the sandal also turns up about an inch and a half, so as to protect the sides and rear of the heel of its wearer. In weaving a sandal the starting point is at the rear of the heel, about an inch below the margin. The warp radiates out from this point. This same method of starting occurs in carrying cases (see pl. 26). The woof courses make successive circles about the starting point until an area 3 or 4 inches in diameter is woven. After this the courses are woven back and forth across the sandal until the toe is reached. The direction of twist in the woof courses, which are always in plain twining, is alternately clockwise and contraclockwise. This results in the woof of each pair of courses forming successions of V's. Each pair of courses is often somewhat separated from the adjacent pairs. There are from 13 to 17 courses of woof to 10 centimeters in length.

Rush sandals of finer type.—Light-weight sandals made of rush are closely similar to the tule sandals just described, being also about 25 cm. in length. They were supposedly worn by women. With one exception the woof courses are in pairs, forming successions of V's. There are 17 courses to 10 centimeters.

Plate 22*a* shows a sandal with a length of only 20 cm. for the portion resting on the ground, hence belonging to a child. The intervals of the woof courses vary from 1 cm. at the heel to 5 cm. at the ball of the foot.

Sandals of coarser type.—None of the coarser sandals have woof courses with V arrangement. They are from 10 to 15 mm. in thickness or 2 to 3 times as thick as those previously described and have commonly only 8 or 10 courses of woof to 10 centimeters, with no open spaces between courses. While most specimens are fragmentary, lengths of 25 and 28 cm. occur. As in the finer sandals, heel protection was provided to a height of an inch and a half, and weaving similarly began at the heel and proceeded to the toe.

Sandal linings.—The Northern Paiute used the down from the seeds of the cat-tail rush, *Typha latifolia,* for sandal lining. A

[9] It is reported that when traveling the Northern Paiute made a new pair of sandals daily. At other times sandals lasted a week or more.

quantity of this material (pl. 21*j*, *k*) was found in somewhat doubtful association with specimen 1–20117 (pl. 23*f*). Specimen 1–20138, a covered sandal of rush, did however contain a considerable quantity of fine cat-tail leaves.

Matting

No artifacts in the cave exceeded the quantity of matting except basketry. All matting is made in twined weaves. In 14 specimens the woof is of three strands but in all others two strands twisted (as is also the case with rope) in an anticlockwise direction. There were 1418 fragments of matting, weighing 17,720 grams, and occurring in the following varieties:

Tule warp	Pieces
Two-strand tule woof (pls. 24*a–e, g;* 25*a, f–i, m*)	883
Three-strand tule woof (pl. 25*c*)	10
Woof of 3-strand tule braid (pl. 25*b*)	4
Woof of *Juncus*	24
Woof of cord (pl. 25*k*)	5
Woof of willow twigs	1
Juncus *warp*	
Woof of *Juncus* (pl. 25*e, j*)	121
Woof of tule	1
Woof of cat-tail	2
Cat-tail warp	
Woof of cat-tail (pl. 24*f*)	44
Woof of *Juncus*	6
Woof of cord (pl. 25*l*)	19
Grass warp	
Woof of *Juncus*	4
Woof of tule	1
Woof of cat-tail (pl. 43*n*)	1
Woof of grass	1
Various matting	
Spike rush matting (pl. 25*d*)	11
Cane matting	7
Woof only, tule	225
Woof only, *Juncus*	48

Matting of tule.[10]—Presumably, *Scirpus lacustris*, the round-stemmed tule, is the most common tule of Humboldt valley and the species used most in tule matting. Triangular-stemmed species, of which *Scirpus nevadensis* is the commonest, were also used to less extent. Tule matting and rope exhibit considerable variety of mate-

[10] Northern Paiute name *suna*.

rial. Many mats are made of culms over one centimeter in diameter. At the other extreme culms of only 3 mm. diameter were also used. Some mats are made of culms that readily flatten to about the thickness of leaves, while other mats have a thickness of a full centimeter or more. The matting no doubt contains representatives of several species in both young and mature stages.

In over two-thirds of the tule matting the woof courses are from 4 to 9 cm. apart, the average 7 cm. A diminishing proportion have courses 10, 12, and 14 cm. apart. Plate 24*b* shows one type of weave quite distinct from the ordinary. It is a diagonal twine weave giving the effect of the warp strands crossing each other. The woof courses average 12 mm. apart, measured on centers. The size of the mat is 42 by 60 cm. There were several smaller fragments of similar weave.

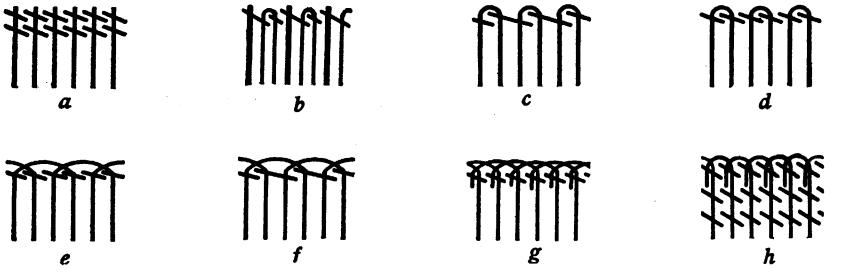


Fig. 12.—Selvages of tule matting.

Another specimen of exceptional weave is shown on plate 24*g*. Here the woof courses are double with one of each pair of parallel courses twisted clockwise. It is the only example of such twisting in the woof of mats, although it is commonly employed in making sandals. The specimen was 25 by 25 cm. in size, torn in half.

Although the collection of matting is large, its fragmentary condition makes it difficult to determine the size of finished mats. Of the 883 pieces of tule matting only 286 are sufficiently well preserved to show two or more courses of woof. None of the pieces are decayed, but they are torn into small fragments. Two specimens with unbroken warp were 120 cm. (pl. 24*a*) and 70 cm. in length. Plate 24*d* shows a nearly complete mat of peculiar oval shape. Its diameters are 47 by 32 cm.

Borders of tule matting.—In 32 per cent of all cases of matting showing margins there was only one course of woof at the border and the warp was cut off close to this course of woof. In 20 per cent the border was strengthened by having an extra course of woof. Thus

in over half of the cases there was no special selvage, the woof being prevented from slipping only by the indentation that it makes in the spongy mass of warp. This manner of making a border is shown in diagrammatic form in figure 12*a* (also see pls. 24*d*, 25*f*). A single specimen of mat (1–20146) had a selvage as shown in figure 12*b* where the warp has thick culms alternating with slender ones. The thick culms are cut off while the slender ones are bent back at the margin and woven into the body of the mat.[11]

Twenty-seven per cent of tule mats have a selvage as shown in figure 12*c* (pl. 24*d*; also *Juncus* mats, pl. 25*e*, *j*). This method is employed both with thick and with slender culms for warp, but is especially applicable where there are a multiplicity of slender culms in each space of warp as in plate 25*a*.

Selvage as shown in figure 12*d* (pl. 25*g*) occurred in only 2 cases. There were 8 examples, or 11 per cent of all cases as in figure 12*e* (pls. 24*g*, 25*h*). One piece of mat had the ends of the warp secured by being bent over and fastened by the woof as in figure 12*g* (pl. 25*i*). A modification of this form occurred in a tule bag to be described later (fig. 12*h*; pl. 17*b*). Figure 12*f*, representing two specimens (1–20146), completes the ordinary methods of selvaging matting.

There remain however two other examples of borders that cannot be readily depicted by diagrammatic drawings. One is shown in plate 25*m*. Here the long ends of warp that extend beyond the final course of woof are gathered and twisted into a rope 15 mm. in diameter. Plate 24*e* presents one of two pieces in which the warp ends were cut off, but the border strengthened by binding to the final course of woof a wad of *Juncus* rush 4 cm. in width by 3 cm. in thickness. The length of woof courses are 50 cm., and the length of warp as great or greater.

Ends of mats are strengthened by twisting the woof into rope which is generally 6 or 7 mm. in diameter (pl. 24*a*, *c*, *d*, *g*). In one specimen (pl. 24*a*) the final warp was a rope 10 mm. in diameter.

Three-strand woof.—The total amount of matting with both warp and woof of tule, but the woof of three strands, did not exceed three square feet. In several of the pieces some of the courses were of two

[11] In matting of northern California the most common selvage is type *c* for one edge of the mat. The Yokuts have a slightly modified form of type *h* on one edge. Generally in California one edge of the mat lacks selvage, as in type *a*. Nevada matting is so fragmentary that both edges are seldom preserved but presumably the same rule applies as in California, hence a fifty per cent occurrence of type *a* is to be expected.

strands and some of three. Woof courses were from 25 to 80 mm. apart. The amount of matting with the three strands interlocked as in braid was only about 60 square inches. In this braided form one side of the mat looks like ordinary two-strand woof twisted contra-clockwise, while the reverse side has a ridged effect like a rope twisted clockwise. The best examples of three-strand and three-strand-braid weaving are shown on plate 25*c, b*.

Tule mats with woof of cord.—This matting comprises only a few pieces. The woof is of some fine vegetable fiber twisted into a cord about 1 mm. in diameter. Three of the pieces are made of ordinary round-stemmed tule with woof courses 4, 5, and 6 cm. apart (pl. 25*k*). Two other pieces appear to be made of a small triangular-stemmed tule with woof courses 16 or 17 mm. apart. None has a selvage, the warp being cut off quite close to the final course of woof. However, on the ends of the mats there is some strengthening of the borders. The final course of warp is usually a three-strand braid, 7 to 10 mm. in width. Next to the braid are two warp elements twisted into a small rope. A border of braid is never found on any other type of mat, except a quite similar type made of cat-tail. In one specimen 48 cm. long one of the courses of woof is woven in a wavy line. None of the mats were complete as regards either length or breadth but judging from the length of braid two pieces had widths of 62 and 72 cm.

Matting of Juncus rush.—Various species of *Juncus* have been used for matting in several parts of the world, notably *Juncus maritimus* in Spain and Morocco, and *Juncus effusus* for costly mats in Japan. The University of California has also done some experimenting with *J. effusus* and *J. robusta* for mat making purposes. The species used by the Nevada Indians have not been determined.

Although *Juncus* is an excellent material for matting, the specimens obtained from the Nevada cave are disappointing because of their fragmentary condition. The two largest pieces obtained are 60 by 20 cm. and 45 by 45 cm. The intervals of woof courses range as in tule matting, the average being 6 cm. As for borders and selvages, 6 pieces were of type *c*, 5 pieces of type *a*, and 1 piece of type *e*.

Matting of cat-tail.—The ordinary matting made of cat-tail leaves, *Typha latifolia*, such as shown on plate 24*f* is in even more fragmentary condition than that made of *Juncus*. Woof courses are from 2 to 18 cm. apart, averaging 10 cm.

Matting with woof courses of cord 12 to 17 mm. apart was closely similar to tule matting with woof of cord. Borders of three-strand

braid, 7 mm. in width and made of cat-tail leaves, occur a
decorative courses of warp ends twisted into rope.

Matting of grass.—There was less than one square foot
matting, made for the most part of the culms of salt grass, *
spicata. A fairly representative piece is shown on plate 43

Matting of spike rush.—The culms of spike rush, *E*
palustris, make a soft pliable mat, but there was less than o
foot of this matting obtained. The woof is of *Juncus* with th
4, 5, and 6 cm. apart.

Matting of cane.—In marked contrast to the soft mats of s
are those made with the rigid culms of cane, *Phragmites c*
bound together with coarse woof of tule or *Juncus,* with cou
7 to 18 cm. apart. The largest piece obtained was 65 by 25 c

Wicker Basketry

One of the most common articles found in the cave wa
wicker basketry fragments. There were 1115 pieces. Not
whole basket was found. All but 12 of the pieces had less
square foot of surface. The larger pieces, with from one to fo
feet of surface, were all triangular, as shown in plate 28, wit
ing warp. The smaller pieces also show that if the warp r
extended they would converge. Hence, the conclusion is th
nearly all wicker basketry constitutes fragments of conica
baskets. There were three main varieties of weaving: loo
(pls. 27*e*, 28), 916 pieces; tight weave (pl. 27*f*), 130 piece
weave (pl. 27*a–d*), 69 pieces.

Warp.—The warp rods are peeled twigs from 2 to 4
diameter. The greatest strength being needed in the botto
basket, the butt ends of the warp always lie in this direction
bottom there may be as few as 18 warp rods to 10 centimet
toward the rim of the basket there may be as many as 28. T
of the baskets, judging from the length and convergence of
rods, was 75 cm. or more.

Woof.—The woof splints are remarkably smooth, thin,
form. The width varies a trifle, but averages about 3 mm.
ten splints to make a thickness of 4 mm. In one fragment
three square inches of surface there was only one thickness
In all other specimens one splint is superimposed upon ano
edge of the under splint showing more or less in the loos

while in some specimens and some courses the two splints lie side by side so that both are fully exposed to view. This is especially noticeable in plate 27*e*. In the ordinary loose weave there are from 32 to 38 courses of woof to 10 centimeters.

In one specimen with moderately tight weave (1–19985, fig. 13*e*), the largest piece of the entire wicker collection, and with about 4⅓ square feet of surface, there are 26 warp rods and 48 woof courses to 10 centimeters. Another specimen, with the woof courses impacted in a moderately tight weave (pl. 27*f*) has 58 courses to 10 centimeters, but in some other cases there are 70 or 80 courses.

Border weave.—As the rim of the basket is approached the warp rods are gathered in pairs by two courses of twined weave. At the rim each pair turns at right angles, passes over several pairs of warp rods, and begins weaving backward until the previously mentioned courses of twined weave are reached. The ends of the rods are firmly secured under the upper course of the twined weaving. Evidently the twining is employed for the two courses because it binds the elements more tightly than any other method of weaving. The border strips, where the warp rods also serve as woof after reaching the rim and turning backwards, are from 45 to 130 mm. in width, the average being 72 mm. At the rim of the basket, in several cases, the pairs of warp rods are twisted into a rope (pl. 27*c*). In several other cases (pl. 27*d*) the warp rods, after making the turn backward at the rim and serving as woof, are twisted into rope. A variation in the appearance of the rim is also made by passing a pair of warp rods over 1, 2, 3, 4, or 5 other pairs of warp rods before starting to weave as woof. In 60 per cent of cases two pairs are crossed (pl. 27*a*), but the crossing of four pairs is also common (pl. 27*b*, *c*). In two or three specimens of border weave the woof rods are impacted so as to appear like a very close twining weave. In rare cases a few courses of twining about single rods of warp are employed, either adjacent to the border or in the main body of the basket, probably for decorative effect.

Apex of the basket.—Plate 28 shows that at the apex three warps are gathered in a group secured by twined weaving of extra heavy splints. By combining three warps in a group, one warp can ride on the two others and help the attenuation of the apex. The twined weaving is two or three inches in width. In one case the final courses of woof were of cord 3 mm. in diameter. The hole, an inch or more in diameter at the apex, was closed by an interlacing of cord or thongs, or by a piece of leather. Apparently the conical, wicker, burden

basket was particularly subject to breakage at its apex. The few specimens obtained have been mended in one way or another.

Mending.—A very large proportion of the pieces show mending. It is usually the warp that is broken. In the smaller rents very neat mending is done with willow splints (pl. 27*f*). In more serious breaks there is a rougher mending with coarse willow splints, thick strips of willow bark, coarse cords, or leather thongs. As a last resort, before the basket was discarded, it was patched with another fragment of basketry or with a piece of leather or bird skin, the sewing being either with thongs or willow splints.

Designs on wicker basketry.—The majority of basket fragments show no design; still there is a considerable number of pieces in which a design is faintly discernible. By washing, the design may be seen more clearly. Where it was desired that a design appear, the woof splints retain a film of the dark brown bark. After much use of the baskets this film of bark wears away, partly obliterating the sharpness of the design. On the borders of triangle designs, where the dark design is replaced by the white of the background, the splint is given a half twist to hide its dark side and expose its white side. In the case of figure 13*d*, the twist shows, but usually it is more carefully done, making a sharp border to the design. The half-twist more commonly shows on the reverse side of the basket.

All the designs are simple in character—stripes, zigzag lines, wavy lines, and triangles. Yet with all the simplicity of each design, the combinations of the several elements and the spacing are decidedly pleasing. If comparisons be drawn between the cave baskets and those from California we find that Mono diagonal twined baskets come the closest in the general effect of their designs. The Mono have considerable preference for striped baskets, yet are decidedly inferior to the cave people in artistic sense of proportion. Comparing the designs of the cave baskets with Californian burden baskets alone, it may be said that the cave baskets are superior artistically to those of the Washo, Mono, Miwok, Kawaiisu, and Yokuts. Wicker basketry is not found in California except rarely among the Modoc and Pomo, but twined basketry and wicker basketry are adaptable to the same designs.

Seventy-five per cent of the designs are narrow bands. Half of the bands consist of only 2 lines of colored woof. Bands with 3, 4, 5, and 6 lines of colored woof become progressively less numerous. A pleasing effect is produced by the spacing of the bands and by the combination of the narrower and the wider bands, as shown in figure 13 (the draw-

ings were made by inking in the squares of coordinate paper). In the baskets the woof courses are narrower than the warp courses; consequently there is a vertical exaggeration of 30 per cent or more in the drawings, but the spacing is made to scale.

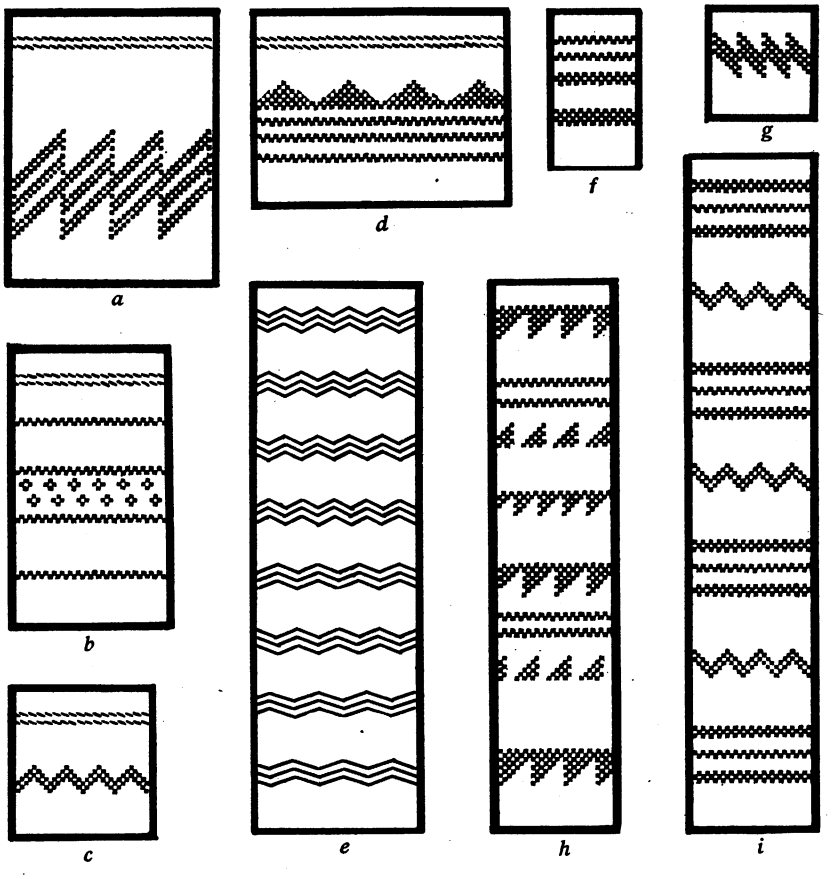


Fig. 13.—Designs of wicker basketry. *a*, 1–19957; *b*, 1–19999; *c*, 1–19979; *d*, 1–19990; *e*, 1–19985; *f*, 1–19975; *g*, 1–19975; *h*, 1–19915; *i*, 1–19914.

Next to bands the zigzag or W-design (fig. 13*c*, *i*) is most common. Figure 13*i* is made from specimen 1–19914; which is 50 cm. in length, 90 cm. in width, and has 22 warp rods and 32 woof courses per 10 centimeters. The vertical scale of the drawing is consequently 45 per cent greater than the horizontal. But this amount of vertical exaggeration does not greatly alter the appearance of the design. Figure 13*c* shows the same W-design as it appears adjacent to the border of a basket (1–19979). The two courses of twined weave, that were pre-

viously mentioned as forming the border of a basket, are always of somewhat heavier splints than the ordinary and retain the bark; consequently in all of the drawings where designs are shown adjacent to the border, these two twined courses are drawn as a part of the design.

The designs with right-angle triangles as shown in figure 13*h* are about half as numerous as the W-designs. In the specimen drawn (1–19915) there are 22 warps and 32 woof courses to 10 centimeters. The warp is 38 cm. long. In the center, midway between two rows of triangles, were three decorative courses of twined weave, which are not represented in the drawing because the splints were not colored.

Designs similar to figure 13*g*, with either two or three diagonal lines to the design, occurred in three specimens (1–19975, 1–19967, 1–19978). Both varieties appear in the specimen illustrated on plate 28. This specimen, 62 by 45 cm., with 22 warps and 38 woof courses to 10 centimeters, shows the typical shape of the larger specimens with warp radiating from a common point.

Figure 13*d* represents part of the design in specimen 1–19990, 45 by 40 cm., with 28 warps and 36 woof courses to 10 centimeters. The vertical exaggeration of the drawing is consequently only 30 per cent. That portion of the design which has not been drawn consists of 16 bands arranged in 4 groups. Each band has 3 lines of colored woof; intervals between bands are 2 lines of white woof, and intervals between groups are 8 lines of white woof.

Figure 13*b* represents the design in a single small specimen, 1–19999, with 28 warp, 38 woof per 10 centimeters, vertical exaggeration 36 per cent.

Figure 13*a* shows part of the design in specimen 1–19957. This specimen, unlike any previously mentioned, has a moderately tight weave. There are 22 warp rods and 40 woof courses per 10 centimenters. The vertical exaggeration is 82 per cent, so the specimen itself with its more flattened design presents a somewhat different appearance than the drawing. Eight centimeters below the design drawn appears the upper edge of another identical design.

Figure 13*e* shows the design in a large specimen of the tightly woven variety of wicker basketry (1–19985). It has 26 warps and 48 woof courses per 10 centimeters. The drawing is in correct scale.

Coiled Basketry

Coiled basketry is next in importance after wicker basketry, there being 309 pieces weighing 10,797 grams. Of all these specimens only two were complete baskets, one being a bottle-shaped basket, the other a tray. Willow appears to be the exclusive material used. The types of foundation are multiple rod (type *a*) and single rod (type *b*). The quantity of each is shown in the following list:

	Pieces
Type *a*, split stitch (pls. 29*a*, *b*, *d*, *i*; 30*a*)	264
Type *a*, narrow stitch (pl. 29*g*, *h*)	15
Type *b*, roasting trays (pl. 29*c*)	28
Type *b*, bowls (pl. 29*e*, *f*)	2
Total	309

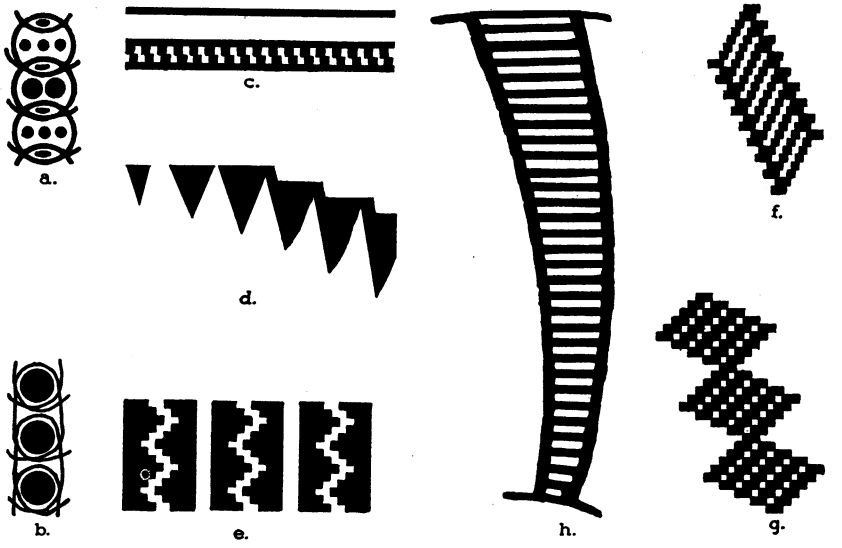


Fig. 14.—Coiled basketry. *a*, *b*, types of weave; *c* to *h*, designs; *c*, 1–20010; *d*, 1–20006; *e*, 1–20005; *f*, 1–20027; *g*, 1–20021; *h*, 1–20044.

Type a, split stitch.—The commonest weave is with a foundation of two rods and a splint arranged as shown in figure 14*a*. Sometimes there are three rods of smaller size in place of the two, both forms occurring in the same specimen. Baskets of this weave are comparatively flat.

Considering all types of coiled weave from the cave, 91 per cent of the pieces or 96 per cent of the weight are with split stitches on either one or both sides of the basket. Plate 29*a* shows both obverse and reverse sides of a typical specimen. The splitting of the stitches

is usually quite regular, but due to a design, irregularities show on the reverse side. This specimen is so old that the design is completely lost on the obverse side, but examination of the reverse side shows at least one common feature of designs, i.e., they run diagonally from the rim toward the center of the basket. Plate 29*b* shows a specimen in which both obverse and reverse sides have split stitches.

In California the split stitch is rather rare. It is seen in a few Washo baskets and to a still less extent among the Miwok. In such baskets only part of the stitches are bifurcated, indicating accident rather than intent. It would seem that bifurcating of stitches is a development of the plateau region.

Baskets of type *a* with split stitch have from 2 to 3 coils and 2 to 4 stitches to a centimeter. Thicknesses are from 5 to 8 mm. Plate 30*a* shows the upper, concave, or design side of a tray. Looked at from this position the direction of coiling is contraclockwise, and the stitches lean forward, like the letters in ordinary writing. This seems to be the usual direction of coiling and the usual slant of stitches. One specimen, however, had stitches in a backhand slant. The bottle-shaped basket (pl. 29*i*) as looked at from the bottom is also coiled contraclockwise.

Twelve pieces of type *a* with split stitches were fragments of bowl and bottle-shaped baskets. The curvature of some specimens indicate diameters of about 37 cm. The bottle-shaped basket (pl. 29*i*) is 10 cm. in diameter and stands 8 cm. high. The inside diameter of the neck is just 2 cm. while the capacity is 232 cubic cm. The specimen was found near the left scapula of partially mummified human remains (12–2652). It had been decorated with greenish feathers, possibly those of either the merganser or the mallard.

Apparently nine-tenths of the specimens were shelling and roasting trays. One side of the specimen is often very much charred from the heat of the coals used in roasting. The other side is either worn from rubbing or the spaces between stitches are filled with dirt, probably particles of food. Obviously any design on shelling and roasting trays would be useless as it would be obliterated. However, 7 specimens of trays, probably used for other purposes, showed designs.

Type a, narrow stitch.—In the finest specimen of this type (pl. 29*g*) there are 42 coils and 94 stitches to 10 centimeters. It is a fragment of a bowl-shaped basket decorated with a design (fig. 14*f*) and a few feathers. Nearly all specimens of this weave are fragments of bowls with 22 to 36 coils and 56 to 70 stitches per 10 centimeters.

Type b, roasting trays.—In this single-rod type, the sewing material binds the newly laid rod of foundation directly to the rod of the previously laid coil. Hence the effect is superficially that of diagonal twining. There are from 14 to 24 coils and 14 to 20 stitches per 10 centimeters. One side is generally much charred from burning with coals, and one or both sides is covered with a deposit of black material made while shelling the seeds. Specimens are from 9 to 11 mm. in thickness.

Type b, bowls.—There are only two small fragments of bowl-shaped baskets with single-rod foundation. Plate 29*f* is a specimen with 52 coils and 64 stitches to 10 centimeters. It has a speckled black and white design. The other specimen of this type (pl. 29*e*) has 40 coils and 11 stitches per 10 centimeters. That is, when a rod of foundation is sewed on to the basket 11 stitches to 10 centimeters are taken, but only a third of the surface of the rod is covered by these stitches. As another coil is added to the basket another third of the surface of the previous rod is covered with the stitches. In the finished basket a third of the surface of each rod is thus left exposed and as the spacing of stitches is carefully done the basket has a diagonally ridged effect.

Rims.—Coiled basket rims are about evenly divided between plain stitching and herringbone stitching. In about 6 specimens the final coil has 3 rods of foundation arranged to make the rim triangular in transverse cross-section. In several cases these rods are over twice the normal size thus giving greater strength to the rim. The commonest rim has a flat edge as the result of using a splint or split rod in the final coil.

Designs.—Most of the designs appear on bowl-shaped baskets, some on trays, but none on roasting trays. The designs are so few in number, only about a dozen specimens, that generalizations are hardly warranted. However, there can be said to be little resemblance to designs of Californian baskets. One exception is that figure 14*f* bears some resemblance to the millipede design of the Maidu. The majority of designs start near the rim and run diagonally down the basket.

Figure 14*c* shows the third, seventh, and tenth coils from the rim as dark bands. The eighth and ninth coils from the rim have alternate pairs of stitches in a dark color giving a "beaded" effect. Plate 29*h* has a similar design (too faded to show) where the fourth coil is a dark band and the fifth coil beaded. Both specimens are of bowl-shape,

apparently with diameters of 8 or 10 inches. Stitches were narrow, 6 and 7 to the centimeter.

In figure 14*d*, a series of triangles starts at the first coil below the rim and proceeds by steps diagonally downward to the right. This specimen was bowl-shaped and about 37 cm. in diameter judging by curvature of the fragment. It had narrow stitches, 42 to 10 centimeters, but nevertheless they were bifurcated on the inner side of the basket. The design shows equally well on both sides, an uncommon feature.

Figure 14*e* was made from a small fragment of a coarse split-stitch basket, apparently a tray. The design at the two sides and bottom extended beyond the limits of the fragment. There is a horizontal exaggeration of 17 per cent in the drawing.

Figure 14*f* (also pl. 29*g*) is made from a fragment of a small bowl-shaped basket with 42 coils and 94 stitches to 10 centimeters, the finest specimen of the collection. The drawing has a horizontal exaggeration of 10 per cent. Besides the design, the basket had been ornamented with a few feathers.

Figure 14*g* is made from a fragment of a very large bowl-shaped basket with coarse split stitches. The design starts 2 cm. below the rim and runs diagonally down the basket. The fragment has three parallel rows of designs. The space between designs is about one and a half times the width of the design. The drawing has a horizontal exaggeration of 26 per cent.

Figure 14*h* is made from a complete tray (pl. 30*a*) found over the pelvis and femora of human remains 12–2652. The tray is slightly concave, 66 cm. in diameter. Baskets often have a coarser weave at the rim than at the center. This basket has 20 coils and 26 stitches to 10 centimeters near the rim and 26 coils and 32 stitches to 10 centimeters toward the center. The thickness is 9 mm. Many of the stitches are split on the upper side, while all are split on the under side. A space 15 cm. in diameter at the center of the basket is without design. Radiating from this area are 17 ladder-like designs, one complete example of which is shown in the drawing.

Nine bowl-shaped baskets had been decorated with feathers which had worn away or been eaten by moths. Feathers were inserted in baskets only at wide intervals. In several cases the feathers were green, suggesting the merganser or mallard as their source.

Twined Basketry

Twined basketry was the least abundant of the three types. The list below includes 104 pieces weighing 1541 grams. Of this nearly a third of the weight is found in a single tray (pl. 10). A few of the fragments may be parts of sandals or mats instead of basketry.

	Pieces
Tule materials	
Plain twined (pls. 10, 31*d*)	10
Three-strand braid (pl. 31*c*)	1
Cat-tail materials	
Plain twined	6
Plain twined, lattice decoration (pl. 31*f*)	15
Plain twined, 3-strand decoration (pls. 30*b*, 31*b*)	3
Other pliable materials	
Plain twined (pl. 31*a*)	2
Three-strand woof (pl. 31*e*)	5
Rigid materials	
Plain close twined (pl. 31*k*)	13
Plain openwork twined	13
Two-rod warp, plain twined (pl. 31*h*)	9
Close diagonal twined (pl. 31*l*)	2
Openwork diagonal twined (pl. 31*g*, *i*, *j*)	25
Total	104

Tule materials.—The principal example of tule basketry is a tray (pl. 10) found beneath the partially mummified remains of a child about 5½ years of age. The specimen is 60 cm. in diameter. Both warp and woof are of tule, *Scirpus*. There are 20 warps and 24 courses of woof per 10 centimeters. The basket very faintly shows a design of narrow, encircling bands.

Two fragments of tule basketry had warp of two twisted strands (pl. 31*d*). A single small fragment, 5 cm. in length (pl. 31*c*), had for woof a three-strand braid. This weave is also found to a slight extent in mats of tule. Half a dozen specimens of plain twining having a thickness of one centimeter may perhaps be fragments of sandals instead of basketry, as the basketry ordinarily has a thickness of 4 mm.

Cat-tail materials.—A good proportion of twined basketry appears to be made from the leaves of the cat-tail rush, *Typha latifolia*. Plate 30*b* shows a fragmentary bottle-shaped basket of this material. The complete specimen was over 18 cm. in height and 12 cm. in diameter. There are 35 warps and 56 courses of woof per 10 centimeters. Several decorative courses are of three-strand woof. The largest fragment of

cat-tail basketry is nearly a foot square. It is so thin, only 2 mm., and so pliable that it has more the character of a bag than a basket. There are 36 warps and 56 woof courses per 10 centimeters. Other specimens made of cat-tail leaves have decorative courses of either three-strand woof or of lattice twining.[12] A single specimen had a design in black triangles.

Various pliable materials.—Plate 31*a* shows a specimen of basketry with very fine weaving, 34 warps and 64 courses of woof per 10 centimeters. The warp consists of two twisted strands and is only 1 mm. in diameter. The woof material is smooth and shiny, but the specimen is carbonized so the material cannot be determined. The material of several other specimens could also not be ascertained, but the woof of one piece seems to be cane, *Phragmites communis.*

Rigid materials.—Basketry made of tule and cat-tail is quite different in its thinness and pliability, from that made of willow, which is rigid. It has been previously mentioned that wicker burden baskets have a little twining at both the apex and near the border. Over half of the rigid twined basketry appears to be from burden baskets. An example of wicker weaving (pl. 28), shows the twined apex. Another form of twined weaving is the border of burden baskets (pl. 31*h*). Not only were the apices and borders of burden baskets made of twined weaving, but in a small percentage of cases the entire basket may have been of twining. There are several fragments of burden baskets, 15 to 20 cm. in size, with plain twining. There are 20 to 32 warps and 26 to 40 woof courses per 10 centimeters in such weaves. A small example is shown in plate 31*k*.

Some specimens of twined willow work in coarse openwork weaves may be mats, fish traps, or similar articles. A few, such as plate 31*i*, show borders. One specimen, 1–20110, 7 by 12 cm. in size, had the same form as the tule mat shown in plate 24*d*. In these specimens both woof and warp are whole twigs, not splints.

Willow twigs are also used in making certain small openwork baskets. Plate 31*j*, shows the elaborately woven rim of a basket 6 cm. in diameter.

[12] Among the Pomo of California many baskets are entirely made by lattice twining, otherwise known as tee weave. The weave also frequently occurs as decorative courses in baskets throughout the northern half of California. Decorative courses of three-strand woof commonly occur in both northern and southern California.

Various Woven Articles

There will be described here a few woven articles that cannot be readily put in the preceding classes of woven objects. The list includes forty pieces.

	Pieces
Tule carrying cases (pls. 17; 26*b*, *c*, *e*, *g*)	27
Juncus carrying cases (pl. 26*d*, *f*)	5
Juncus woven tubes (pl. 26*a*)	2
Diminutive mats (pl. 43*j–m*)	4
Crocheting	2
Total	40

Carrying cases.—There were several varieties of receptacles presumably either for the storage or transportation of various articles. The commonest is tubular or conical in form. At the starting point in weaving, the single course of woof forms a loop an inch in diameter. In this loop the warp is inserted and both ends are bent up to form the sides of the receptacle. The single course of twining woof starting from the loop makes a spiral around the receptacle as it weaves. The receptacles have a circumference as small as 12 or 15 cm. (pl. 26*d*, *e*) or as large as 60 cm. Length varies from 15 to 40 cm. but we cannot be certain that any specimen is complete, as no selvage is present.

The second type of receptacle has the form of a lady's hand bag or the carpet bag of former days. The weaving of the specimen illustrated (pl. 26*g*) starts at one end, as in the receptacle previously described. The woof makes a single spiral course about the end of the receptacle, but after that discontinues the spiral and meanders back and forth as in ordinary matting. One end of this specimen is perhaps not complete. The length is 43 cm., depth 17 cm. A rope of *Juncus* is attached.

There was one rectangular specimen (1–20237) like a large carpet bag, made of coarse tule with woof courses 12 to 15 cm. apart. The specimen had a depth of 37 cm. and a length, incomplete, of 60 cm. One course of woof at the complete end held the warp which was here bent to form the two sides of the flat receptacle.

The two beautiful blankets of muskrat and meadow mouse fur described earlier were tightly packed in a receptacle of tule (pls. 17, 18*a*). The receptacle is 40 cm. long and 66 cm. in circumference. The weaving started at the bottom end and the woof made a spiral as weaving progressed. Although the blankets are as fresh as the day

they were made the receptacle has seen much usage. It is torn in several places and mended with twine, thongs, and a small 4 mm. *Juncus* rope. The selvage of the upper border is shown in a diagrammatic drawing, figure 12*h*.

Woven tubes.—Plate 26*a* shows a tube of small diameter, in which the single course of woof makes a spiral as it binds the warp. The interior of this tube is only large enough to comfortably hold a pencil. The length is nearly 60 cm. A second similar specimen was 7 cm. long.

Diminutive mats.—Plate 43 shows four curious, diminutive, mat-like specimens. Plate 43*j* has one piece of tule for base and left side of the triangle. A second piece of tule starts at the upper apex, forms the right hand side of the triangle, then repeatedly makes a figure-of-eight movement, alternately making a turn first on the base and then on the upper apex of the triangle. The size of the triangle is 4.5 by 6 cm. Plate 43*k* consists of a single piece of coarse tule. It starts at the upper left apex, forms first the left, then the right side of the triangle. The free end of the tule culm then makes a figure-of-eight movement turning about the two sides of the triangle. In other words the free end alternately takes a half-hitch about the two sides of the "V" that has been formed. The triangle is 6 cm. high, 7 cm. wide, and 2 cm. thick.

Plate 43*l* is a slightly concave or spoon-shaped object of wicker weave, 42 by 87 mm. in size. The warp consists of 18 twigs apparently willow. The woof is a cord 1 mm. in diameter. The object might be called either a spoon or a diminutive model of a seed beater (cf. pl. 48*c*).

Plate 43*m* is a piece of twined weaving 4 by 8.5 cm. in size. The warp is of *Juncus,* the woof of tule. The object unmistakably suggests a diminutive sandal. Alternate courses of the woof, as in one type of sandal, are first twisted clockwise and then contraclockwise in weaving. There is a slight concavity in the "heel," and two loops at the margin of the "heel." The weaving began at the "heel" exactly as in sandals. Furthermore, the "toe" is pointed as in a sandal for the right foot.

CORDAGE

In this paper cordage is divided into three classes: (1) rope, which is made of coarse materials like rushes or grass; (2) twine, which is made of fine hair-like vegetable fibers; (3) braid.

Rope

Rope ranges from 3 to 40 mm. in diameter, while twine never exceeds 7 mm. and is usually much less.

Of 832 pieces of rope, weighing 2994 grams, only .6 per cent by weight has a right or clockwise twist. Twine as a rule has a twist in the opposite direction to that usually found in rope. The several varieties of rope are listed below.

	Pieces
Tule rope, left twist	
(*a*) 2 stalks (pl. 35*a*, *b*, *e*)	114
(*b*) 3 stalks (pl. 35*c*)	109
(*c*) over 3 stalks (pl. 35*d*, *i*, *n*)	158
(*d*) 3-strand compound (pl. 35*q*)	1
(*e*) split, 2 strands (pl. 35*f–h*, *j*)	55
(*f*) rope with feathers (pl. 21*b–d*)	39
Juncus *rope, left twist*	
4 stalks (pl. 36*g*)	13
2–strand compound (pl. 36*a*, *c–f*)	275
3–strand compound (pl. 36*b*, *i*, *j*)	7
4–stalk rope with feather (pl. 21*a*)	1
Various materials, left twist	
Tule and *Juncus* (type *c*)	4
Cat-tail 2-strand compound (pl. 35*m*)	31
Cat-tail 3-strand compound (pl. 35*r*)	1
Grass (pl. 36*k*)	1
Sagebrush bark (pl. 36*h*)	1
Undetermined material (pl. 35*k*, *l*)	11
Right twist	
Split tule, 2 stalks (pl. 35*o*, *p*)	9
Tule, 8 stalks, 2-strand, diameter 14 mm.	1
Cat-tail, 2-strand, diameter 4 mm.	1
Total	832

Rope is of two main classes as determined by size and use. Rope made of split tule (type *e*), of 4-stalk *Juncus*, and of undetermined materials forms one class, whose extremes of diameter are 3 and 10 mm. Although this is the extreme range in size, there being only a specimen or two at either extreme, practically all have diameters of either 4, 5, or 6 mm. About a third of the 126 specimens were attached to feathers. From this it is conjectured that possibly the entire class was used in connection with wearing apparel or as ornaments.

The remaining types of rope, types *a*, *b*, *c*, and *d* of tule, 2-strand and 3-strand of *Juncus*, and cat-tail, form the second class, and were

put to the various uses to which rope is commonly supposed to be put. Extremes of diameter are 4 to 40 mm. with an average of 12 mm., but while for a variety of purposes a variety of sizes are provided, 44 per cent of the rope is between 12 and 14 mm. in diameter. The second commonest size that was needed is 8 mm. in diameter, comprising 19 per cent of all the rope used, percentage in each case being based on number of pieces.

Rope of tule.—There are several types of rope made from tule, *Scirpus*. In type *a*, only two stalks of tule are used. The average diameter is 10 mm. A few pieces made of small young shoots are as small as 4 or 5 mm., while several of coarser tule are 16, 18, and 20 mm. in diameter.

In type *b*, two small or medium-sized stalks are first given a right or clockwise twist and then the resulting rope twisted to the left with a stalk of nearly the same size as the first two combined. In two or three specimens all three stalks are of the same size, but when this is the case the first pair of stalks are apt to remain straight while the third stalk turns about them in a spiral. The diameter of type *b* rope ranges from 7 to 16 mm., the average being a little greater than in type *a*.

In type *c* there is a true double, or compound, twisting. First, two to six stalks of small-sized tule are given a right twist, then two of the resulting ropes are twisted together to the left making a rope with diameter ranging from 8 to 30 mm., the average being about 14 mm.

The three classes of rope described above were probably put to the same uses, that is, the size and strength of the rope was probably more a determining factor in its use than the method by which it was made. Doubtless the last described class with its many small stalks and double twist would be the strongest. Examination of the preceding list of types shows that type *c* was preferred to either *a* or *b*. Ropes of type *a* and *b* were in the most fragmentary condition, each piece averaging about 15 cm. in length, while the greatest length of any piece was 88 cm. Type *c* averaged about 30 cm. in length with several pieces from 60 to 120 cm.

Rope of split tule.—Rope of type *e* is markedly different in character from that previously described, and presents some unsolved problems.[18] Including 39 specimens attached to feathers, 9 specimens

[18] It probably did not belong to the later culture period as culture periods are described by Harrington. The writer found typical specimens only at the southwest end of the cave.

of right twist, and 1 specimen of three-strand, we have a total of 104 pieces weighing 122 grams which were similarly made. The essential characteristic of this type of rope is that each of the strands is made by splitting the tule stalks in half, then twisting the half stalk so as to have nothing but the skin of the tule show on the surface of the twisted strand. Two of these strands are then twisted together in a direction opposite to that employed in the first instance. The result is an unusually tight twist making in the typical specimen a very rigid rope, quite uniformly of 5 or 6 mm. in diameter. A few specimens are less, being only 4 mm. in diameter, while at the other extreme some are 7 mm. in diameter or in a single case 10 mm. The various specimens average in length about 10 cm., but some are 30 to 35 cm.

So large a number of the pieces were found attached to feathers that it seems likely that most of these ropes were originally with feathers. Owing to the ravages of moths, nothing is left of the feathers but the quills. These appear to be the wing feathers of pelicans in many if not all cases. Among the modern Northern Paiute of the region eagle feathers are in higher repute for ceremonial paraphernalia. One of the unsolved problems concerns the nature of the complete specimens of which these sections of rope and feather are presumed to be only fragments, chewed and scattered by rats. Because of the way in which the rope is attached to the feather it is difficult to see how they could be made up into either a cape, skirt, or headdress.

In some cases the quill is perforated an inch or two from the base. In other cases there is possibly a perforation concealed by the wrappings, yet the perforation has no obvious use. Similar perforations are commonly found in the larger feathers throughout the cave.

As the illustrations in plate 21 show, the wrapping of the feather to the rope is at from 1 to 5 cm. from the base of the quill. The longest free end of the rope is sometimes to one side of the wrapping and sometimes to the other. With one exception the wrapping is always of *Juncus* rush. One end of the wrapping, and often both ends, are tucked under the wrapping in the manner known as whipping. In six cases the wrapping was tied at one end by overhand knots and in two cases by clove hitches.

A few rare specimens of split tule rope came from the northeast end of the cave but these lacked the characteristic rigidity of the class. One divergent specimen is shown on plate 35*j*. It is 4 mm. in diameter and composed of four small strands, instead of the usual two. The typical rigid split tule rope came only from the southwestern

half of the cave, and this occurrence constitutes the only case of cultural difference observed for different positions in the cave.[14]

Plate 20 shows a feather plume, which the writer saw when in the possession of Mr. Richardson. From hastily made notes it appears to be made of 50 independent parallel ropes of feathers. The central portion of each of these 50 units is stiffened by the tule rope of type *e*, 5 mm. in diameter.

Three-strand rope of tule.—Three-strand rope of type *d* occurred in only one specimen, shown on plate 35*q*. The component strands are made as described above by splitting a stalk of tule. Each strand is well twisted 3 to 4 mm. in diameter, while the completed rope is 9 mm. in diameter.

Rope of Juncus.—Possibly two or more species of *Juncus* are represented in the collection, and though the differences are more or less observable no attempt was made to segregate them. *Juncus* is such a strong material for rope that it is surprising a greater use was not made of it than of tule. It is one rush that is considerably used by white men, especially gardeners in tying bunches of vegetables, yet it is not well enough known to have any common English name.

The first type of *Juncus* rope listed comprises only four stalks used in a two-strand rope, 4 to 6 mm. in diameter. In size and rigidity it has some of the qualities of rope of split tule, yet it is not so rigid, and in only one case was it found attached to a feather. Plate 36*g* shows a specimen 4 mm. in diameter and 40 cm. in length.

The more usual type of *Juncus* rope is composed of many stalks depending in number upon the size of the rope. For example, a rope 15 mm. in diameter will contain 20 to 30 stalks. Sometimes the larger sized rope has a willow twig enclosed by the stalks of *Juncus*. Diameters range from 7 to 20 mm., with an average of about 12 mm. When the great strength of each individual stalk is considered, the strength of the combined stalks in a large rope must be great, especially when the rope is green. Specimens average 25 cm. in length with a dozen specimens from 60 to 120 cm. long.

Three-strand rope of Juncus.—Three specimens of three-strand *Juncus* rope are illustrated on plate 36. These have diameters of 12, 16, and 20 mm., they being the smallest, average, and largest pieces

[14] The above observation was made by the writer previous to the observation by Harrington that this class of rope was not found in the upper cultural level (see p. 74). If our combined observations are correct it indicates that the deposits of the northeast portions of the cave are somewhat more recent than those of southwestern portions. However such a conclusion holds little weight unless checked by other classes of objects indicative of cultural age.

to be found in this class of rope. There are in all only 7 specimens and the combined length of all is only 135 cm. Plate 36*b* shows an unusual specimen of two component strands, with diameters of 5 mm., well twisted in the direction contrary to the final twist of the rope. The third strand is itself a compoundly twisted rope 5 mm. in diameter, twisted in the same direction as the final twist. This is a mistake where a well twisted rope is desired.

Loops in rope ends.—Plate 36 shows two examples of loops found in the ends of rope, both of *Juncus* and of tule, type *c*. At the point shown by the bend in plate 36*j* the several strands divide and mingle with each other in a way comparable to braid and then form a loop 32 cm. in circumference, which however is kinked in the illustration. The rope above the point of division continues to be three-strand as in the main body of the rope but the diameter is decreased from 20 to 12 mm. In plate 36*a* we see an example of two-strand *Juncus* rope, 7 mm. in diameter, with a loop 25 cm. in circumference.

As a rule loops are found only in the larger sizes of rope, from 12 to 16 mm. or more in diameter. The loops are from 15 to 37 cm. in circumference, a size convenient for a hand hold. It would also be convenient in securing an object to be transported on the back without the necessity of tying a knot in the rope. The standing part of the rope could be passed around the object to be secured then passed through the loop and drawn tight. In one case a loop of usual size, 35 cm., was made by tying the end of an ordinary rope to the standing part by a reef knot.

Rope of cat-tail.—Although the leaves of cat-tail, *Typha latifolia*, may be a desirable material for making mats, it does not appear to possess the tensile strength of many other materials. Plate 35*m* shows a specimen 4 cm. in diameter, the thickest rope found in Lovelock cave.[15] Plate 35*r*, illustrating a three-strand specimen, shows that a rope of good appearance can be made by avoiding the use of the coarser leaves and thereby giving the component strands a better twist. Not only was the largest rope of the collection made of cat-tail, but of the comparatively few specimens of this material a high proportion had diameters of 20 and 25 mm., yet there were also some at the other extreme of size, from 4 to 8 mm. in diameter. This means that where strength was required size was a requisite; yet there were other uses for the rope that required little strength.

[15] A larger specimen 7 cm. in diameter, made of triangular stemmed tule, was obtained from the Ocala cave.

Rope of various materials.—Occasionally large-sized *Juncus* rope was shroud-laid, that is a twig of willow served for a heart or core about which numerous stalks of *Juncus* were twisted. The frequency of occurrence could not be determined without injury to specimens.

In a few cases rope was composed of both tule and *Juncus* in the proportion of a third, a quarter, or less of *Juncus*. Small-sized tule stalks were used.

A single specimen of grass rope and another of sagebrush bark are sufficiently described in the explanation to plate 36*k*, *h*.

Eleven small specimens, with diameters varying from 4 to 7 mm., complete our classes of rope. The material from which they were made could not be determined. Presumably they were made of the leaves of some lily, or *Carex* or other cyperaceous plant. There are undoubtedly a number of plants, even in so arid a region as Nevada, that could furnish material in small quantities for the making of rope.

Twine

In this paper the distinction between rope and twine is that rope is made of coarse materials like tule, rush, or grass, and is from 3 to 40 mm. in diameter. Twine is .4 to 7 mm. in diameter and is made of some fine, tough vegetable fiber, probably either dogbane, flax, or nettle.[16] Below is a list of the varieties of twine.

2-strand, right twist

.6 mm. in diameter	1
1 to 2 mm. in diameter (pl. 40*a*, *c*)	133
2 to 3 mm. in diameter (pl. 40*b*)	254
3 to 4 mm. in diameter	502
4 to 5 mm. in diameter	21
5 to 6 mm. in diameter (pl. 40*f*, part)	3
5 mm. in diameter, sagebrush bark	1

Objects of twine, 2-strand, right twist

.8 mm. in diameter, with rush rope (pl. 40*l*)	1
1 mm. in diameter, crochet work	1
1.5 mm. in diameter, loop pairs (pl. 40*m*)	5
1.5 mm. in diameter, chain	1
2 to 2.5 mm. in diameter, chain (pl. 40*j*)	7
2 mm. in diameter, fragment of a bag	1
Net of .4 to 1 mm. cord (pls. 41*a*, *b*, *d*, *e*; 42*a–c*)	878
Net of 1 to 2 mm. cord (pls. 41*c*; 42*d*)	138

[16] Gosiute Indians of Great Salt lake made cord of dogbane, *Apocynum androsoemifolium*, and of nettle, *Urtica holosericea*. The Klamath Indians of Oregon used nettle, *Urtica breweri*, and flax, *Linum lewisii*. R. V. Chamberlain, The Ethnobotany of the Gosiute Indians of Utah, Mem. Am. Anthr. Assoc., 2:329–415, 1911. F. V. Coville, Notes on Plants used by Klamath Indians of Oregon, U. S. National Herbarium Contributions, 5:87–108, 1897.

2-strand, left twist	
1 to 2 mm. in diameter	2
2 to 3 mm. in diameter	4
3 to 4 mm. in diameter (pl. 40*g*, *k*)	3
5 mm. in diameter, sagebrush bark	1
3-strand, right twist	
3 mm. in diameter (pl. 40*i*)	1
5 mm. in diameter (pl. 40*h*)	1
6 mm. in diameter (pl. 40*f*, part)	1
3-strand, left twist	
2.6 mm. in diameter	1
4-strand, right twist	
5 mm. in diameter	1
Compound twist	
2-strand, left, .8 mm. in diameter	1
3-strand, left, 3.5 mm. in diameter	1
3-strand, left, 4 mm. in diameter	3
3-strand, left, 7 mm. (pl. 40*d*)	1
4-strand, left, 2.5 mm. (pl. 40*e*)	1
9-strand, right, 4 mm.	1
Human hair, left twist	
2-strand, 4 mm. in diameter (pl. 43*g*)	2
3-strand, 3 mm. in diameter	1
	1,973

Right and left twist.—As shown by the list practically all twine is twisted to the right, or clockwise. As a rule rope is twisted in the opposite direction. In all specimens which had been twisted several times, designated "compound" in the list, the direction of the original twist was to the right. There are only 14 pieces which have a twist primarily to the left out of a total of 1972 pieces.

Two- and three-strand.—Nearly all twine is two-strand. Plate 40*f* shows about 5 feet of knotted twine, 5 mm. in diameter. It was found 95 feet southwest of the zero point (see pl. 2) at a depth of 3⅔ feet, beneath the edge of a boulder 25 feet in length. It is assumed that the boulder fell from the roof after the deposition of the straw and tule which contained the piece of twine. The twine is for the most part two-strand, but a central section about 22 cm. in length is three-strand. Three other pieces of three-strand twine are shown on plate 40*h*, *i*. An example of three-strand compound twist is seen in plate 40*d*.

Two-strand and spiral.—A quantity of garment fragments were found in the southwest end of the cave. The garment consisted of warp made from twisted bird skin, and a woof made of twine of

unique construction, as shown in figure 15. It consists of two-strand twine of ordinary make, around which, as a core, is wrapped spirally, contraclockwise, and nearly at right angles to the core, a twine .8 mm. in diameter. The whole makes a cord, 2 mm. in diameter, of strikingly beaded appearance.

Fig. 15.—Spirally wrapped twine, 1–20776.

Cord of human hair.—Specimens 1–21139 and 1–21140 are small quantities of human hair twisted into 2-strand cord, 4 mm. in diameter; 1–21139 is in a small bundle, so the length is undetermined (pl. 43*g*); 1–21141 is a 30 cm. length of 3-strand cord, 3 mm. in diameter. These specimens are of the unusual left twist. Sarah Winnemucca mentions artifacts of human hair coming from the cave. (See appendix 3.)

Fragmentary nature of specimens.—The fragmentary nature of the specimens can be gathered from an examination of plate 40. The specimen of large twine, shown on plate 40*f*, weighs 39 grams, or 2.4 per cent of the entire collection not counting net, while the small specimen in plate 40*c* weighs only .2 grams.

The great bulk of both netting and other twine was obtained with a skeleton of a child nearly six years of age (pl. 10). Here there were 1497 grams of net and 934 grams of other twine covering the skeleton, or 59 per cent of the entire twine collection.

The guano-diggers left near the tunnel entrance to the cave about 450 pieces (1–20663) of twine 3 mm. in diameter, weighing 307 grams. It is assumed that it was all found in one place by the workmen. Part of it is tied in a bundle, while of the other numerous fragments six of the longest were from 2 to 5 feet in length. As a rule, regardless of where found, twine seldom exceeds a few inches in length.

Strength of twine.—Wherever twine was in contact with bat guano, or more especially the manure of rodents, it became very fragile, because of salt and moisture. Specimens found embedded in dust or straw were better preserved and were tested for strength. Thus the specimens of twine, 3 mm. in diameter, mentioned in the last paragraph were found to sustain 42 pounds before breaking.

Plate 40*a* shows a piece of twine 1.5 mm. in diameter which sustained 20⅓ pounds before breaking. Another specimen of the same size sustained 26½ pounds. A test on twine 2.5 mm. in diameter,

found with the skeleton of the child, showed a strength of 44 pounds, while twine more nearly 3 mm. in size sustained 71 pounds.

The above examples of tests are those showing the greatest strength. The results of the tests with twine of different sizes are listed below. The strength of commercial cotton twine, and of iris-fiber twine made by the Yurok and Hupa Indians of northwestern California, is also given for comparative purposes. Some specimens were tested but once, while others were tested several times as will be seen in the following list:

Nets made of two-strand twine
1–20639, .4 mm., 3, 3.3, 3.7 pounds
1–20634, .5 mm., 3.5, 3.6, 4 pounds
1–20572, .5 mm., 3 pounds
1–20620, .6 mm., 4.1, 4.5, 4.5, 5, 5, 5.2 pounds.
1–20607, .6 mm., 5.7, 6.6 pounds
1–20608, .75 mm., 13.6, 14.6, 14.7, 15.7 pounds
1–20605, .8 mm., 5 trials 7 to 8; 8.3, 11 pounds
1–20570, 1 mm., 8, 9.7 pounds
1–20584, 1 mm., 12.6, 14.8, 16.1 pounds

Two-strand twine
1–20660, 1.5 mm., 19, 19.5, 20.3 pounds (pl. 40*a*)
1–20661, 1.5 mm., 12.6, 13.4, 15, 16.4, 25, 26.5 pounds
1–20721, 2.5 mm., 28, 44.1 pounds (pl. 40*b*)
1–20710, 2.5 mm., 46.2 pounds.
1–20663, 3 mm., 27, 42 pounds
1–20721, 3 mm., 71 pounds (pl. 40*b*)

Three-strand cotton twine
Commercial 1 mm., 14.7, 15.9 pounds

Two-strand twine of iris
1–1929, Yurok, .7 mm., 9.5, 11.4 pounds
1–960, Hupa, 1 mm., 11, 11, 12, 15 pounds

It is seen that twine 1–20584 from the cave is stronger than twine of either cotton or iris of the same size, and this in spite of the fact that the latter two are new. However, for the sample of iris twine 1–960 the first two tests are hardly fair, because the breakage occurred at knots, where the fibers crossed and cut each other. Also, owing to brittleness they more easily broke when subjected to a short bend.

Objects made of twine.—Nets are so numerous and important that they will be treated under a separate heading. Twine was also much used as the woof for garments made of strips of bird and mammal skin, and to a less extent as the woof of mats. These are described elsewhere. This leaves but a few objects, illustrated on plate 40, to be here dealt with.

Plate 40*j* shows a sample of cord, 2 mm. in diameter, looped so as to form a sort of chain similar to figure 17*c*. Seven fragments were found with the skeleton of the child. In these samples the twine is always double, that is, two pieces of twine side by side. The specimen shown on plate 40*j* is 30 cm. long. Two other specimens were tied into knots, with a sufficient length of chain to make in one case perhaps 300 cm. and in the other 450 cm. There is little doubt but what they were used as pack straps.

Plate 40*m* shows one of five objects whose use it is difficult to divine. The cord, which in all cases is 1.5 mm. in diameter, is knotted so as to form a pair of loops having, for the five objects, circumferences of 22, 25, 25, 38, and 68 cm. In four cases the knot was the mesh knot, while in the fifth case it was the overhand knot.

Plate 40*k* is a specimen of twine 3.5 mm. in diameter and 40 cm. long. It has a mesh knot at one end, an overhand and bow knot at the other end, with six more or less loosely tied overhand knots between. Some of these are tied about little knots of *Juncus* rush. Possibly this was some sort of mnemonic device like the knotted strings used by the Miwok as a day count when sending an invitation to a ceremony.

Plate 40*l* is an object of which nothing can be said in addition to the plate explanation of the figure.

A specimen of crochet work (1–20732) about an inch in length is too fragmentary to illustrate, but the technique appears the same as in a hand bag (1–2796) from the Pomo. A carbonized specimen of twine 2 mm. in diameter (1–20745) is apparently the mouth of a bag about 16 cm. in circumference.

Braid

An excellent variety of braid was obtained in the cave, there being 142 pieces weighing 1092 grams. However, the reader should not be misled in judging quantity by weight. The ancient straw material of which the braid is made is so light that it would require a two or three gallon measure to contain a couple of pounds of it.

Braid of Juncus *rush*	Pieces
3-strand (pls. 37*g–l*; 43*f*)	94
5-strand (pl. 37*f*)	3
6-strand (pl. 37*d, e*)	2
7-strand (pl. 37*c*)	2
16-strand (pl. 37*a*)	1
18-strand (pl. 37*b*)	1

Braid of other material	
3-strand tule (pl. 37*m–o*)	22
4-strand tule (pl. 37*t*)	1
3-strand cat-tail (pl. 37*p*)	5
3-strand grass (pl. 37*r, s*)	3
3-strand bark fiber	1
3-strand fine fiber (pl. 37*q*)	2
3-strand undetermined material	5
	142

Over 80 per cent of braid is of three strands. Extreme widths are 7 and 35 mm. All but a few pieces are from 10 to 20 mm. in width, the width in each specimen being about twice as great as its thickness. The one piece of four strands is circular in cross-section. Specimens of seven or more strands become flatter and have widths up to 50 mm.

Knots

The collection of knots from Lovelock cave is very full. The conclusion is that the aborigine was not a knot expert, but that he was probably as capable as the average white man, barring sailors, certain mechanics, and Boy Scouts.

In studying the knots, imitations were made in window cord. Considerable difficulty resulted from inability to follow the turns in the coarsely stranded aboriginal rope. Specimens too difficult to work out are classified as unidentified.

The list to follow includes 404 knots, weighing 1071 grams.

Mesh knots	Pieces
In tule (pl. 38*d*)	90
In *Juncus* (pls. 38*a, b*; 37*i*)	82
In tule and *Juncus*	5
In cat-tail (pl. 38*c*)	5
In tule and cat-tail	3
Overhand knots	
In tule (pl. 38*n*)	16
In *Juncus* (pls. 38*o, q*; 36*f, j*; 37*e, h*)	42
In cat-tail	8
In tule and cat-tail	15
In grass (pls. 38*p*; 36*k*)	2
In undetermined materials (pl. 35*k*)	....
Reef knots	
In tule (pl. 38*f–h*)	4
Granny knots	
In tule (pl. 38*k*)	10
In *Juncus* (pl. 38*l*)	11
In cat-tail (pl. 38*j*)	1

Slip knots	
In tule (pl. 39*a*)	10
In *Juncus* (pl. 39*b*, *c*)	4
Clove hitch	
In tule (pl. 39*g*)	1
In spike rush	1
"Neckties"	
In *Juncus* (pl. 39*h–k*)	44
"Wrap" knots	
In tule	....
In *Juncus* (pl. 39*e*, *f*)	12
Unidentified knots	
In tule	19
In *Juncus*	12
In cat-tail	3
In cat-tail and *Juncus*	1
In grass	2
Total	404

Knots broken from rope.—Plate 38*q* shows a specimen of rope which was broken close to the knot, perhaps due to special stress at that point increased by the bending of the rope. There are many such knots in the collection, examples being shown in plate 38*g*, *h*. Other knots that had served their purpose, and yet could not be untied, were cut from the rope so that it could be used again.

Utility of knots.—Any knot which is in rope or has been broken from rope has presumably served a utilitarian purpose in tying. However, the writer suspects that many of the specimens never served a utilitarian purpose but were especially made as objects of talismanic value.

Mesh knots.—This knot is variously known as sheet bend, hawser bend, becket bend, weaver's knot, and netting knot. As we are dealing with a fishing people we prefer the name mesh knot to the more common nautical terms. It is the one and only knot used the world over in making fish nets and was the knot with which the Indians of the cave were most thoroughly familiar. Mesh knots occur in a variety of materials and in a variety of sizes. In one case two tule stems are tied to a bunch of five large tule stems resulting in a knot 66 mm. in diameter. At the other extreme are two small tules, or a little wisp of cat-tail leaves, tied in knots of 15 mm. in diameter. All of the occurrences of mesh knots in rushes seem equally useless.

Overhand knots.—Overhand knots are second in number and, so far as usefulness is concerned, most important, at least for rope.

To prevent rope from raveling at the end several methods are employed. Plate 35*d*, *k* show where a strand is looped back and twisted in with the body of the rope. Plate 35*b* shows where one strand takes a half hitch over the other strand. Plate 35*h* shows the only occurrence of whipping with a fine vegetable fiber. Plate 35*k* has an overhand knot, but the most common method is where one strand only makes an overhand knot over the other strands, as plate 36*j*.

The overhand knot, clove hitch, etc., have been mentioned as used in binding feathers to type *e* tule rope. One method of tying two ropes together is to make an overhand knot in the end of each rope to serve as a knob to prevent slipping, then one rope makes an overhand on the other rope. This appears rather cumbersome but serves the purpose.

Reef knots.—The reef, square, or flat knot, although a most excellent knot, was little used.

Granny knots.—The granny or false reef knot was three or four times as common as the reef knot which shows that the Indian was not expert in the making of knots. The occurrence of the granny also shows that it was as poorly adapted to the Indian's needs as it is to our own. Due to slipping it takes on a variety of forms, making it the hardest knot to detect; hence undoubtedly the unidentified knots contain not a few grannies.

Slip knots.—The slip, halter, or running knot was fairly abundant, but always occurred in such poor material that nothing could be learned as to the purposes for which it was employed. It was possibly made more by accident than by design, as the knot is essentially an overhand knot.

Clove hitch.—The clove hitch (builder's knot, heaving line bend), or in other words two half hitches, occurred as shown in the illustration (pl. 39*g*) in a small piece of split tule stalk. There was also a little bundle of spike rush, *Eleocharis palustris,* about 12 cm. long by 2 cm. in diameter, tied in a little twisted strand of the same material. The clove hitch as used in binding feathers to rope has been previously mentioned.

"Neckties."—One of the most interesting knots is that shown on plate 39*h–k*. For want of a better designation it is named from its resemblance to a necktie. It most closely approaches the timber hitch in its manner of construction and possibly also in its use. In the timber hitch the end encircles the standing part once and then encircles its own part a time or two. In the "necktie" the end encircles the standing part (that which projects downward in the illustrations) two or three times and then is merely tucked into the bight where the pinch of an enclosed piece of wood or other object would hold it from slipping. This knot with aboriginal rope probably served the purpose of a timber hitch passably well, but it would most certainly be unsafe with our rope. However, the Indian's life did not depend upon his knot as do the lives of modern workmen at building construction.

In the "necktie" the standing part slips freely back and forth in the wrapping of the knot thus altering the size of the bight which encloses the object to be secured. In two illustrations the diameter of the bight is 4 cm., and an overhand knot in the standing part prevents the enlargement of the bight to a greater diameter, though it could be diminished by a pull on the standing part. Plate 39*i* has a bight diameter of 6 cm., and other specimens of 6, 7, 8, 9, and 10 cm. The overhand knot in the standing part was infrequently used, so far as the fragmentary specimens show; however, the standing part is often broken off close to the bight as in plate 39*h*, hence the overhand may have been more common than is apparent.

Few specimens were in as complete a state of preservation as those illustrated, but one specimen of 7 *Juncus* stalks, loosely twisted into a 2-strand rope 7 mm. in diameter, had a bight 9 cm. in diameter and a standing part of about 30 cm. length beyond the knot. Another specimen of 3-stalk tule rope 15 mm. in diameter had a standing part 2 cm. long and an end 45 cm. long, the end being coiled up as though it had encircled a pole of about 4 cm. diameter, while the bight could have contained a bunch of poles 8 cm. in diameter.

Considering all of the evidence there is a fair presumption that the "necktie" knot was used in tying bunches of sticks or poles for transportation, the purpose of the overhand knot in the standing part being to prevent the spreading apart of the bunch of sticks by enlarging the size of the bight. Our own choice of knots in the same situation would be a slip knot to cinch up the bundle, then with the standing part make a half hitch or two about the bundle.

"Wrap" knots.—Another knot used for the same purpose as the preceding knot has been christened the "wrap" for want of any other name. Apparently a handful of *Juncus* straws are laid on the ground; the bunch of sticks to be secured are laid on the center of the straws; the straws are then gathered over the sticks and twisted together as in making a rope, but so tightly that they kink up in the form of the cone-shaped knob shown in the illustrations (pl. 39*e, f*); and finally the end (which consists of both ends of the straws) is tucked into the bight to be held secure by the pressure of the bundle of sticks. After the bundle of sticks has been carried to its destination the straws composing the bight are broken.

Nets

Nets have already been listed under the heading "Twine," there being 1016 fragments weighing 2532 grams, not counting small quantities of indeterminate weight used in the making of blankets and aprons. The twine from which they are made is always of the two-strand right-twist variety. About 82 per cent by weight of this twine is .4 to .6 mm. in diameter. Nearly 60 per cent of all net was wrapped about the body of a child (pl. 10), but small quantities were found in all parts of the cave.

The varieties of net are listed below:

	Pieces
Mesh 10 to 20 mm. square	
15 mm. mesh, twine .26 mm. diameter (pl. 19*c*)	*
20 mm. mesh, twine .3 mm. diameter (pl. 19*b*)	*
Mesh 20 mm. square	
Twine diameter .4 mm.	19
Twine diameter .5 mm.	1
Twine diameter .6 mm.	3
Twine diameter 1 mm.	1
Mesh 30, 40, and 50 mm. square	
Twine diameter .4 mm. (pl. 42*c*)	39
Twine diameter .5 mm.	534
Twine diameter .6 mm. (pl. 42*a, b*)	152
Twine diameter .8 mm.	49
Twine diameter 1 mm.	32
Twine diameter 1.4 mm.	3
Twine diameter 1.8 mm.	2
Mesh 60 mm. square	
Twine diameter .6 mm.	2
Twine diameter 1 mm.	8
Twine diameter 1.4 mm.	69

Mesh 160 mm. square	
Twine diameter 1 mm.	1
Double nets	
60 mm. mesh, twine 1.4 mm. diameter (pl. 42*d*)	6
70 mm. mesh, twine 1 mm. diameter	10
80 mm. to 100 mm. mesh, twine .8 mm. diameter	70
220 mm. mesh, twine 1 mm. diameter	5
Hair nets	
5 mm. mesh, twine 1 mm. diameter (pl. 41*c*)	1
7 mm. mesh, twine .7 mm. diameter (pl. 41*b*)	3
8 × 20 mm. mesh, twine .8 mm. diameter (pl. 41*e*)	1
7 × 30 mm. mesh, twine .8 mm. diameter (pl. 41*d*)	1
18 mm. mesh, twine .8 mm. diameter (pl. 41*a*)	3
22 mm. mesh, twine .35 mm. diameter	1
Total	1,016

* Small quantity found incorporated in a garment.

Cord made from old nets.—When nets became too old and fragile to be used as such they were sometimes put to a secondary use by being twisted into cord; 13 pieces of such cord range in diameter from 2 to 7 mm. Only 2 pieces, 1–20603 and 1–20619, were made by twisting to the left. Two specimens are illustrated (pl. 42*a*, *b*).

Bird nets.—1–20586 is a knotted string 90 cm. long. The knots are mesh knots at intervals of 16 or 17 cm. At the knots there are tangents of twine 16 cm. long. The size of the mesh indicated, suggest a net for snaring water birds. In a cave near Ocala, 14 miles to the south of Lovelock cave, a net was reported with birds entangled in it. Barrett[17] also describes the capture of water birds at Klamath lake with nets.

Double nets.—All specimens of double nets are quite fragmentary, a typical example being illustrated on plate 42*d*. The twine is heavy and usually brown. Seventy fragments, with meshes 8 to 10 cm. square, were obtained in one lot (32). Five fragments consisted of only a single-mesh knot each, with eight radiating arms of reddish twine. These arms varied from 12 to 22 cm. in length. Hence we must conclude that the mesh was at least 22 cm. square. It is presumed that all double nets were for the snaring of water birds, or rabbits.

[17] S. A. Barrett, The Material Culture of the Klamath and Modoc Indians of Northeastern California and Southern Oregon, present series, 5:247, 1910.

Size of fish nets.—There are no whole nets. In measuring nets they were stretched and measured for extreme length, then stretched and measured for width. Afterwards the dimensions of the nets were computed as the net would lie in a natural position with the sides of the meshes forming perfect squares. Nets are more frequently torn crosswise than lengthwise, hence it is that certain net fragments appear wider than long. In a few cases it is possible to fit together fragments. This however can be done only where there are variations in size of mesh or variations in colors at irregular intervals. All of the largest pieces of the collection, or pieces which have margins on opposite sides or opposite ends, also all pieces from which any dimensions of a net might be computed, are given below.

Mus. No.	Mesh cm.	Twine diam. mm.	Twine, color*	Length, feet	Width, inches	Weight, grams
1–20561	3	.4	Brown	—	28	1.1
1–20562	3	.4	—	—	28	1
1–20566	3	.5	Brown	—	28	36.3
1–20570	4	1	Red	—	31	49
1–20589	4	.8	—	—	39	3.4
1–20590	4	1	Red	—	39	7.6
1–20592	5	.6	RW irreg.	—	48	33.9
1–20601	4	.8	Red	—	35	22.8
1–20604	5	.6	White	—	46	26.8
1–20605	4	.8	Yellow-Brown	—	42	13.1
1–20607	5	.8	Red	—	51	169
1–20620–27	4	.5–.6	2–4 BW, 2–4 RW	34	—	529
1–20628	4	.5–.6	RWB	31	76	234
1–20629	4	.5–.6	RWB	42+	67+	136
1–20634	4	.4–.5	RW BW	30	31+	68.5
1–20637	4	.5	RW	10	72	152
1–20639–49	4	.4–.5	Brown	10+	35	90.7
1–20650	4	.5	Brown	—	32	10.2

* R, W, B for red, white, black.

1–20637 is a fragmentary dip net gathered to a point at the bottom. The dimensions given, roughly 6 by 10 feet, are not strictly speaking length and breadth, but rather what would correspond to length and breadth in the ordinary flat rectangular net.

As the list shows, half of the nets are less than 3 feet in width, but there are several specimens with widths of 4 to 6 feet and over. Judging from a few cases where nets are torn lengthwise, it appears that they are generally from 30 to 35 feet long, although in one case a net exceeded 42 feet in length.

Color of fish nets.—The colors are now slightly faded, but are generally readily distinguishable. Originally they undoubtedly were very distinct. One type of net is made of a bright red twine,[18] which is always coarse, exceeding .8 mm. in diameter. Another type is made of a chocolate brown twine .4 or .5 mm. in diameter. Another type has two or three sharply contrasting colors regularly alternated. The colors employed are red, a dirty white, and black, designated R, W, and B in the formulas. Black twine is generally a little the finer, being sometimes .45 mm. in diameter while the associated red or white is nearly .6 mm. in diameter.

1–20629 has a margin on one end and on one side. It is 60 feet long when stretched. Of this 60 feet, 38 feet had a regular succession of courses in the order, red, white, black, red, white, black, etc. For the entire 60 feet there are only four interruptions of this regular order. In specimens where there is an interruption in the regular order it is often accomplished by omitting one course of a color thus: RWB' WBRWB.

Specimens 1–20620 to 1–20627 are a little more complicated in the succession of colors in the courses of twine. For the main portion of net the colors run as follows (the commas being inserted only as an aid to the reader in systematizing what appears at first as a wholly irregular order):

WWWWWWW RW RW, BW BW BW, RW RW RW, BW BW BW, RW RW, BW BW, RW RW RW, BW BW BW, RW RW RW, BW BW, RW RW, BW BW BW, RW RW RW, BW BW, RW RW RW, BW BW BW, RW RW, BW BW, RW RW RW, BW BW BW, RW RW, BW BW BW, RW RW RW RW, BW BW BW, RW RW, BW BW, RW RW, BW BW BW, RW RW, BW BW, RW RW RW, BW BW BW, RW RW, BW BW, RW RW RW, BW BW, RW RW, BW BW BW, RW RW RW, BW BW, RW RW RW, BW BW BW, RW RW, BW BW, RW RW RW, BW BW BW, RW RW, BW BW, RW RW RW, BW BW BW, RW RW, BW BW, RW RW RW, BW BW BW, RW RW, BW BW, RW RW RW, BW BW BW, RW RW RW.

There are 62 groups in the list above. Of these RW RW occurs 13 times, BW BW occurs 12 times, RW RW RW and BW BW BW occur 17 times each, and RW RW RW RW, BW BW BW BW, and WWWWWWW occur once each. Two to four courses of alternating red and white are followed by two to four courses of alternating black and white. In the extended formulas there are listed 327 courses (including 7 white courses at one end of the net), comprising the full

[18] The Northern Paiute made cord from fiber called wiha. It is reddish when new, but is colored a deeper red with pine bark which floats down the Humboldt river.

length of the net, which was 49 feet stretched or 34 feet unstretched. The width of each course (the length of one side of a mesh) averages about 4.5 cm. There were 8 large fragments and about 30 small ones, totaling 529 grams in weight. Of the larger pieces, 5 had margins at both ends, and were 49 feet long when stretched.

Hair nets.—Plate 41*a* shows a net torn crosswise with margins on two sides. The width from margin to margin when stretched is 23 cm. With the sides of the meshes forming perfect squares the width is 16 cm. The length of the fragment is 14 cm. stretched, or 10 cm. in natural position. Nets of similar width and with a length sufficient to fit the head are used as hair nets in California. The size of the mesh is 18 mm. square which is also the size usually found in Californian hair nets.

The other hair nets illustrated on plate 41 depart considerably in form and mesh from Californian examples. Plate 41*c* shows a net found with a quantity of hair. The size of the mesh is only 5 mm. square. The net is gathered together at one end and attached to a cord 4 mm. in diameter. Plate 41*b* shows one of several small fragments with slightly larger mesh.

Plate 41*d* shows a fragment of hair net with triangular meshes. It has a margin on both sides; its width in natural position is 11 cm., stretched 13 cm. The net has rows of small meshes 7 mm. square alternating with one or two courses of large triangular meshes. The two short sides of these larger meshes are 7 mm. in length, while the long sides are from 22 to 30 mm. long. The full length of the fragment when stretched is 42 cm. with a margin at one end. For nearly one-third of this length there are meshes 15 mm. square.

Plate 41*e* shows a specimen of hair net with triangular meshes whose short sides have a length of 8 mm. and whose long sides are from 15 to 20 mm. There are margins on opposite sides; the width of the net when stretched is 17 cm., or about 12 cm. in natural position.

Specimen 1–21142 is a 3-strand cord made of human hair and attached to it a 10-inch section of cord made from a net. This net has a mesh 22 mm. square and is made of twine only .35 mm. in diameter. It cannot be stated positively whether this is hair net or fish net. So far as is known hair net is always made of comparatively coarse twine, .8 mm. or more in diameter. On the other hand fish net is seldom if ever made of twine with a diameter less than .45 mm. The same remarks apply equally well to net made of .3 mm. twine used in aprons for girls (see pages 53–54).

BALLS AND BUNDLES

For some of the bundles of tule, cat-tail, *Juncus* rush, spike-rush, grass, and cane, no special use could be ascertained. The list of specimens (excluding one type of tule bundle used as stuffing for decoy birds) is as follows:

	No.
Cup and ball game (pl. 44*b–d*)	4
Elliptical balls of tule (pl. 44*e, f*)	6
Elliptical balls of cat-tail (pl. 44*h*)	1
Spherical balls of tule or cat-tail (pl. 44*g, i*)	2
Irregular bundles of cat-tail (pl. 43*a*)	8
Irregular bundles of tule (pl. 43*b, c, e*)	28
Irregular bundles of *Juncus*	4
Irregular bundles of spike-rush (pl. 43*d*)	4
Bundles of grass	3
Bundles of cane	3
Ball of water weed	1
	64

Cup-and-ball game.—Plate 44*b–d* shows examples of the cup-and-ball game. The specimens are made from the leaves of the cat-tail rush and are from 5 to 7 cm. in length. The ends of the balls are securely tied with small-sized rope probably of cat-tail leaves. In all examples obtained the needle and the string, by which it was attached to the ball, had been lost.

According to Gilbert Natches, the Northern Paiute played a game with a ball of tule attached by a string to a needle of wood. The player took one end of the needle in his fingers and swinging the ball into the air attempted to impale it upon the point of the needle. If the ball was struck below the center it counted differently than if it was struck above the center. In California the game is usually played with a string of perforated bones or salmon vertebrae, but the Klamath Lake Indians have balls similar to those from the cave.

Elliptical balls.—The purpose of the objects shown in plate 44*e, f, h* is unknown. They range in length from 6.5 to 8 cm. and from 2.5 to 4 cm. in diameter. Two are made of tule and one of cat-tail leaves. A suggestion is that they would serve well as stoppers for the mouths of basket water bottles or as floats for seine nets. They also might have been another form of the cup-and-ball game. The Northern Paiute made balls of tule for children to shoot at.

Spherical balls of tule and cat-tail.—The two large spherical balls shown on plate 44 may have served as hand balls for tossing and catching. They are of convenient size, 5 and 6 cm. in diameter, and firmly made.

Irregular bundles of tule and Juncus.—In the list above, irregular bundles of tule constitute the most numerous specimens. They assume a considerable variety in form and no use can be ascribed to them other than offerings to the spirits of the cave. Plate 43*c* shows a bundle of tule 18 cm. in length wrapped with cord 3 mm. in diameter. This is the only specimen wrapped in cord, but other specimens ranging up to 40 cm. in length are similarly wrapped in tule. Bundles of *Juncus* ranged in length from 9 cm. to 21 cm. The largest specimen was burnt at one end and showed a single course of woof binding together the individual stems of rush composing the bundle.

Bundles of spike-rush.—Two specimens of spike-rush are wrapped with *Juncus*. One is shown in plate 43*d*. Two other specimens are larger, one being 11 cm. long and 4 cm. diameter.

Bundles of cat-tail leaves.—The largest bundle of cat-tail leaves had a diameter of 8 cm., but one end had been burnt off at a length of 16 cm. One specimen 7 cm. in length may have been the handle for an awl.[19]

Bundles of grass.—The bundles of grass ranged from 1 to 6 cm. in diameter. One specimen is probably intended for the handle of an awl,[19] as it is closely similar to one used as such and shown on plate 50*h*.

Ball of a water weed.—A ball of fiber was shown to Gilbert Natches, who stated that a plant grew on the lake shores which at times of storm was gathered into balls and rolled in the water until they became a compact mass sometimes six inches in diameter. The specimen, 1–21220, is a lenticular mass 7 cm. in diameter and as solid as an apple. It is composed of many bristle-like plant fibers, each an inch or less in length.

Chewed fiber.—Wads of tough plant fiber with dimensions of about 1, 3, and 6 cm. occur. They seem just the right size to conveniently hold in the mouth as a quid. It is presumed that 10 specimens listed under this heading are the tough refuse fibers remaining after the plant juices had been extracted by chewing. All are of the same shape. One of the common foods of the cave people was the shoots of tule (*Scirpus lacustris*). In one shovelful of material in the 1924 excavation no less than 50 cuds or chews of tule were found. The cuds, which are of much the same nature as well chewed stalks of tough asparagus, are common throughout the cave.

[19] These may be foreshafts of fire arrows.

ARTIFACTS OF WOOD

The artifacts of wood include 310 specimens weighing 3988 grams. These are made of willow, greasewood (*Sarcobatus* and *Atriplex*), elder, cane or other woody material, and bark. A summary of the classes of articles is given in the table below.

	Pieces
Wrapped or knotted sticks (pl. 50)	59
Cradle sticks (pl. 47*t*)	11
Digging sticks (pl. 49)	6
Fire sticks (pl. 49)	42
Bows and arrows, and atlatl (pl. 47; fig. 16)	69
Knife handles, net weavers (pl. 47)	11
Awls, combs, etc. (pls. 47, 50)	14
Miscellaneous (pls. 43, 44, 47, 49, 50)	98
	310

Wrapped or Knotted Sticks

One class of objects, which would seem to have no utilitarian purpose, is sticks variously wrapped or knotted. These articles as a rule are not worked or shaped, but are any small twig or fragment of wood such as could be most easily found in the valley below the cave. The objects included under wrapped or knotted sticks are:

	Pieces
Willow twigs wound in hair (pl. 50*a*)	23
Willow twigs wound in cat-tail	2
Willow twigs wound in fiber (pl. 50*e*)	2
Willow twig wound in thong	1
Sarcobatus twig wound in tule	1
Sarcobatus twig tied in cord	1
Sarcobatus twig wound in sinew	1
Atriplex wound in rushes (pl. 50*k*, *l*)	2
Willow twigs knotted (pl. 50*n–q*)	24
Willow twigs split, in coils (pl. 50*m*)	2
Total	59

An interesting class of objects was straight willow twigs 3 to 6 mm. in diameter and 7 to 42 cm. long, wound with a loosely twisted cord of vegetable fiber and human hair. There is a decided uniformity in size of twig and amount of wrapping.

Willow twigs with wrapping of cat-tail leaves include one specimen superficially like the last mentioned class in appearance. Another specimen comprises a pair of twigs 9 mm. in diameter and 20 cm. long bound together with a cat-tail wrapping. The ends of the twigs were burnt off instead of broken off as in the case of other classes of twigs.

Plate 50*e* shows a split section of willow wound in a fine vegetable fiber. The bark had been peeled and the split surface worked with an implement leaving rasp-like marks. A similar split willow stick with bark on was bound in a coarse cord.

Several willow and *Sarcobatus* twigs from 5 to 9 mm. in diameter and 7 to 22 cm. in length were wound in thongs, tule, cords, and sinew.

Plate 50*k, l* shows two specimens of *Atriplex,* one wrapped in a stem of *Juncus* rush, the other in tule stem which has been split into strips.

Knotted willow twigs, 2 to 6 mm. in diameter and varying in length from a few inches to a foot or more, are usually twisted into small balls, but sometimes are tied in hard knots. Plate 50*q* shows a twig tied in a mesh knot.

Plate 50*m* shows a specimen of split willow twig, 7 mm. in diameter, coiled in a ring about 30 mm. in diameter.

With the exception of two specimens found near the back wall of the cave all of the wrapped or knotted sticks were obtained either from the refuse dump left by the guano-diggers outside the cave or from near the entrance to the cave.

Cradle Sticks

Ten willow sticks were found which are possibly parts of cradles. The one complete cradle is shown on plate 47*t*. It was found at the back wall of the cave (lot 33) covering a newborn infant. The cradle is composed of 8 willow sticks each about 15 mm. in diameter and 595 mm. long. Each stick is grooved in three places to accommodate the binding twine which is 2.5 mm. in diameter. Only three of the sticks were peeled, and all were crooked and knot covered. However, the cradle had perhaps never had any actual use, for the infant with which it was found was either born dead or died shortly after birth, as the placenta still adheres to the mummy.

Digging Sticks

Plate 49*l* shows a highly polished fragmentary specimen, 22 mm. in diameter. The point is flattened. The single complete specimen found is a crooked greasewood stick 677 mm. long and 22 mm. in diameter. Though a third of the length is well polished from use, the remainder is very crooked, knotted, and partly covered with bark. Besides the six specimens listed, three other specimens may have been

digging sticks also. All but one are of *Sarcobatus*. One specimen of willow 35 mm. in diameter had been burnt off at one end. The other end had a rounded, blunted point 20 mm. in diameter. It is counted as a digging stick because of its bruised character, adherent clay, and polish from use.

Fire Sticks

Fire sticks were found in all parts of the cave. Willow was most frequently used.

	Pieces
Drills of soft wood (pl. 49*a*, *b*)	4
Drills of hard wood (pl. 49*c*)	2
Hearths of cane (pl. 49*k*)	2
Hearths of cat-tail (pl. 49*i*, *j*)	2
Hearths of willow, etc. (pl. 49*d*–*h*)	32
Total	42

The drills were disappointing specimens for determining their original length. The diameters range from 10 to 13 mm. Plate 49*a*, *b* are drills, as shown by slightly charred rounded ends. Two specimens of *Sarcobatus* are doubtfully classed as drills. The one complete specimen has a length of only 21 cm.

The hearth of cane shown in plate 49*k* consists of half a dozen sections of split cane bound together with *Juncus* rush. It contains only one drill hole or socket which had so weakened the bundle as to cause it to break. A similar bundle of cane, wrapped in tule, 12 cm. in length, but burnt off at one end, is regarded as a hearth, though there is no socket. Cane was sometimes used as a drill as evidenced by one socket out of eight being flat or convex at the bottom or in a few cases with an encircling groove around the bottom. While a wooden drill containing a pith like elder might account for some of the sockets with convex bottom, other sockets could have been made only with cane.

Plate 49*i*, *j* show fire hearths made by splitting the flower stalk of cat-tail in half and binding four pieces together with a wrapping of cat-tail leaves. The specimens had two sockets with diameters of about 7 or 8 mm. There seems to have been no canal connecting the socket with the edge of the hearth, there being probably no necessity for tinder, as the cat-tail stem would furnish its own ignition material.

Most of the hearths were willow sticks 2 to 3 cm. in diameter and 4 to 50 cm. in length. These sticks were split in half, and the flat

side more or less filled with sockets. Most of the sockets are 9 or 10 mm. in diameter, though a few are as small as 7 mm. and as large as 13 mm. Sometimes the sticks were not split at all and even possessed their bark, but as a rule the sticks appeared greatly weathered, as though they were driftwood picked up from the lake shore. A fifth of all the specimens had been cut off square at one or both ends. This and the rough longitudinal splitting were the only attempts made to shape the hearths. All but two or three specimens are easily identified as willow, but a flat specimen $117 \times 78 \times 11$ mm., shown in plate 49*f*, and another measuring $206 \times 73 \times 14$ mm. are too large for willow. They may have been cottonwood. One specimen (1–21329), judging by the appearance of a somewhat pointed and bruised end, had apparently been used also as a digging stick.

Bows, Arrows, and Spear-thrower

All specimens of bows and arrows, and perhaps atlatl darts which were not recognized, were fragmentary. For arrows the general rule was a shaft of cane, *Phragmites vulgaris*, with a foreshaft of greasewood *Sarcobatus vermiculatus*. A list of specimens follows:

	Pieces
Sinew-backed bow fragment (pl. 47*m*)	1
Doubtful bow fragments	3
Sarcobatus foreshafts in cane (pl. 47*d–g*)	16
Hardwood foreshafts in cane (pl. 47*a*)	2
Sarcobatus foreshafts (pl. 47*h, i*)	32
Hardwood arrows (pl. 47*b, c*)	5
Soft wood arrow	1
Cane with feathering (pl. 47*k, l*)	3
Cane with sinew	3
Cane, probably parts of arrows	2
Spear-thrower (fig. 16)	1
Total	69

Insufficient material was obtained to determine much about the type of bow used. Fragmentary specimens which could possibly have been parts of bows were of soft wood apparently willow. One specimen 11 cm. in length was sinew-backed.

Plate 47*a* shows an exceptionally long foreshaft of some straight-grained knotless hard wood inserted in a section of cane, and secured with sinew. The projecting portion of the foreshaft measures 34 cm. Three shallow grooves in wavy lines run nearly the full length.

Among Plains Indians and Jicarilla Apache these are known as "lightning marks" or "blood grooves."[20] Diameter varies from 5 to 8 mm. The tip is notched for the accommodation of a stone point. Back of this for 16 cm. the foreshaft has been painted a dark brown.

Complete typical foreshafts were not found, but from numerous fragments a general description can be given. Exceptionally short specimens (pl. 47*i*) might be as short as 15 cm. Several specimens with points burnt off were 30 and 32 cm. long. The average foreshaft would be more than 22 cm. in length of which 9 cm. would be encased in the cane. To prevent the cane from splitting it was bound with a wrapping of sinew, or of fine cord, or in one case (pl. 47*e*) of cat-tail leaves. As a rule, the tip of the foreshaft has been broken. Apparently some foreshafts were never intended to have a stone point, but were sharpened instead. Foreshafts are uniform in diameter, 6 to 7 mm., and the end to be inserted in the cane is always sharpened. In a few cases the foreshaft was painted a dark brown.

As for the length or weight of the complete arrow nothing can be said. While non-artifact specimens of cane were common in the cave, the longest examples that had been used in arrow-making are the fragments illustrated on plate 47. Plate 47*l* shows a section of cane, at one end of which is a nock, 4 mm. in depth, cut at the node of the cane, which is strengthened by a wrapping of fine vegetable fiber. Three small feathers 7 cm. in length are bound to the cane with a very fine cord. The feathers make a spiral quarter-turn. The cane is painted a dark brown beneath the feathering. The second cane with feathering (pl. 47*k*) was unpainted and had three feathers, probably pelican's, 24 cm. in length. They were bound on with sinew, but were not arranged spirally. All feathers had been ravaged by moths.

A few "arrows" made of material other than cane seem rather heavy for good flight and are probably atlatl darts. Plate 47*b, c* show sinew-wrapped fragmentary examples with large deep notches for the accommodation of stone arrowheads. The smaller specimen of heavy greasewood is 9 mm. in diameter. The larger specimen, 10 mm. in diameter, is also heavy, even though it has a light pithy center. One fragmentary specimen (1–21471) of greasewood is 10 mm. in diameter, 57 cm. in length, and has a sharpened point.

[20] Bur. Am. Ethn., Bull. 30, pt. 1, p. 92.

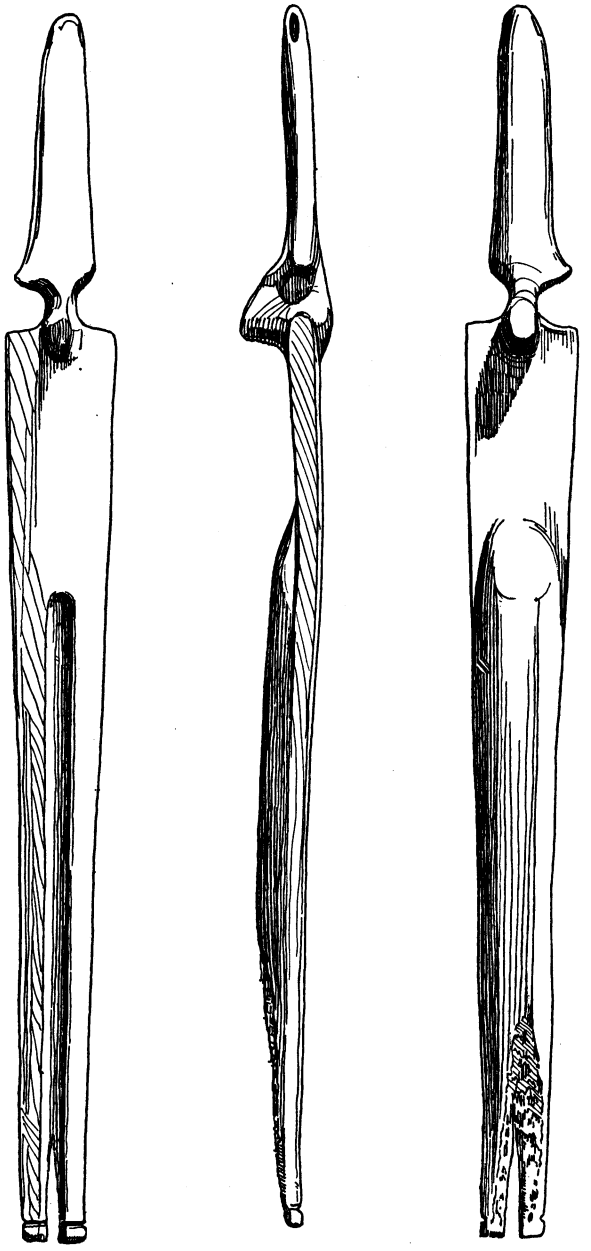


Fig. 16.—Spear-thrower of greasewood (*Sarcobatus vermiculatus*), collection of J. H. Hart, Lovelock.

A beautiful specimen of spear-thrower was found in the cave and for a time held by private parties in Lovelock. Later it came into possession of others, was taken to Los Angeles, and is now lost to science. Fortunately the writer made three drawings of the specimen in 1912 and from these he was able to carve out a model which is very close in every detail to the original. Text figure 16 is a drawing of this model. The original specimen had a length of about 45 cm., and was made of exquisitely fashioned and highly polished greasewood, *Sarcobatus*. The specimen was complete except for a small sliver that had been broken from the under side at the tip end.

Knife Handles and Net Weavers

Because of certain similarities two or three types of wooden objects are listed together as follows:

	Pieces
Knife handles, soft wood (pl. 47*n*)	2
Soft wood, sinew-wrapped (pl. 47*s*)	1
Net weavers, soft wood (pl. 47*r*)	6
Net weavers, *Sarcobatus* (pl. 47*p*, *q*)	2
Total	11

Plate 47*n* and one other specimen (1–21504), both with square ends, are certainly knife handles with lengths of 123 and 115 mm., and diameters of 20 and 15 mm. One specimen is wrapped with a cord 1.2 mm. in diameter. The other shows evidence of wrapping though it has been much chewed by rats.

Plate 47*s* resembles the foreshaft of an arrow but is probably from an atlatl dart. The pointed end has a file-mark roughness similar to many foreshafts. It is sinew-wrapped like a foreshaft, but has the unusual diameter of 11 mm. The length, 87 mm., compared to 150 mm. for the shortest arrow foreshaft, places it in quite a separate class.

Net weavers (?).—Gilbert Natches said that he had seen fish nets made. In tying the knots two sticks were used somewhat similar to that shown in plate 47*r*. One of the two sticks was slightly larger than the other. Eight specimens have a general similarity to the one shown as plate 47*r*. They are all bluntly pointed at one end; all but one is notched at the other end; diameters are uniformly from 10 to 13 mm.; and variation in length is not great, 103 to 167 mm. Plate

47*r* differs from the others in having some zigzag markings for a length of 4 cm. If this were an arrow foreshaft the markings might be "lightning marks."

Awls, Combs, Etc.

Various sharpened sticks, none of which appear to be foreshafts to arrows, are grouped in the following classes:

	Pieces
Awl-like, in tule bundle (pl. 50*i*)	2
Awl-like, in grass bundle (pl. 50*h*, *j*)	2
Double point with sinew (pl. 47*j*)	2
Miscellaneous, awl-like (pl. 50*f*)	7
Comb sticks (pl. 50*g*)	1
Total	14

Plate 50*h–j* illustrates a class of somewhat problematical objects. A stick of greasewood, 7 mm. in diameter and about 120 mm. in length, is roughly sharpened at one end and wrapped in bundles of tule or grass. The points of the sticks are not so well sharpened or polished as would be expected if they were awls wrapped for protection to the hand. Besides, if this were the purpose the wrapping would interfere with use by extending the full length of the stick. Probably they are to be identified as flame throwers, as mentioned by Harrington.

Plate 47*j* shows a highly polished stick of greasewood, 193 mm. long, 7 mm. in diameter, tapering at both ends, painted red, and wrapped at one end in sinew which held in place some small feathers. A similar, rougher, unpainted specimen was 139 mm. in length. Other miscellaneous, bluntly pointed, awl-like objects of greasewood ranged in length from 11 to 32 cm.

Plate 50*g* shows a bundle of nine double-pointed sharp greasewood sticks wrapped in *Juncus* rush. The sticks are about 3 mm. in diameter and 130 to 170 mm. in length. The article is most likely a comb, though more numerous sticks of a uniform length would be of better service.

Miscellaneous Objects

In the list to follow a few unique objects are enumerated, also basketry materials and other woody materials, such as bark and cane. All of these give proof of being artifacts, though the amount of work bestowed upon some objects is slight.

	Pieces
Snares of willow twigs (pl. 44*a*)	2
Bowed willow sticks (pl. 49*n*, *o*)	3
Model of fish trap (pl. 49*q*)	1
Flat rectangular stick (pl. 49*m*)	1
Notched section of willow (pl. 47*o*)	1
Talismanic effigies (pl. 50*b*, *d*)	2
Stick, plumb-bob shaped (pl. 50*o*)	1
Tubes of elder	3
Sharply cut willow twigs (pl. 50*r*)	52
Splints for basket making (pl. 43*i*)	6
Rims of wicker baskets	6
Willow basketry woof	9
Mat fragment	1
Willow bark	4
Artemisia bark	1
Cane in bundles, etc.	5
Total	98

Plate 44*a* shows what is presumed to be a bundle of 8 snares for catching very small animals. A slender willow twig, 2 mm. in diameter and about 25 cm. in length, is knotted at one end so as to make a small loop through which a cord can easily slip back and forth. The twig is then bent to inclose a rectangle about 2 by 9 cm. in size. A cord 8 mm. in diameter and 50 or 75 cm. long is securely tied to one arm of the snare, passes through the loop, and at the other end is attached to a little wooden pin 4 cm. in length.

The bowed sticks shown as plate 49*n*, *o* are problematical objects, unless they play some part in trapping of small game, for example, to be set in the ground as an arch under which the game is to pass. One specimen is a round willow stick 32 cm. long and 13 mm. in diameter. The two ends are roughly sharpened. The second specimen is a split section of willow 42 cm. in length.

Plate 49*q* is a woven object substantially made with willow twigs for the warp and for the spirally encircling woof. The dimensions of the interior pocket or cage is 4 cm. in diameter and about 10 cm. in length. The inside diameter of the orifice is 2 cm. No practical use can be conceived for such an object, hence it is considered as a model of a cage or fish trap, used as a plaything by children.

Plate 49*m* is a piece of soft wood 123 mm. long, 41 mm. wide, 8 mm. thick, and lenticular in cross-section. It is of little interest in itself, being perhaps only a rejected piece sawed from the end of a bow or some other object in the process of manufacture. The object is of much interest, however, in showing that a slab of wood to be cut in two

was first sawed to a depth of about 3 mm. on one side and then bent until it broke. The bowed stick shown in plate 49*n* had both ends cut in this manner, the total thickness here being 1 cm. Plate 47*o* also appears to be a rejected piece of wood, discarded because of a knot. It is a section of willow 23 mm. in diameter. To cut off the piece it had been sawed on all sides to within 4 mm. of the center and then broken.

Plate 50 shows several unique and problematical objects. Plate 50*b* might represent a talismanic effigy. The object is lenticular in cross-section with dimensions of 7, 23, and 92 mm. It has a head with two incised dots for eyes. A row of dots also make a spiral revolution of the body three times. The edge of the stick near the tail has eight notches. The upper extremity has a horizontal groove suggestive of a fish's mouth. The specimen is made of willow much scorched by fire.

Plate 50*d* is another effigy, perhaps representing a water bird. While the head is insect-like, the general shape of the body suggests a bird, especially a bird in the act of swimming with the feet kicking straight out behind.

Plate 50*c* is a well worked symmetrical object made of a fine-grained soft wood, diameter 2 cm., length 8 cm.

Three pieces of what is presumed to be elder (*Sambucus*) were obtained. One specimen was decorated with two parallel lines incised spirally about the tube. Gilbert Natches stated that among the Northern Paiute the pith of elder is punched out to make containers in which crickets are packed.

Plate 50*r* shows a type of specimen which was found to be quite common in surface deposits within the entrance to the cave. The specimens are peeled willow twigs 12 to 75 cm. in length and 4 to 9 mm. in diameter. They have all been cut diagonally across the twig with a sharp instrument, possibly of iron. If cut with an iron implement, they are positively the only evidence of European influence. Furthermore, they all present a clean white fresh appearance as though they had been left in comparatively recent times.

A considerable quantity of willow splints for making baskets were obtained in six different lots. One bundle tied in a willow withe had the splints smoothly cut on both sides but as a rule the cut was on one side only, with bark on the other. Splints are generally about 4 mm. in width and 1 mm. in thickness, but one lot was composed of splints 3 mm. or less in width.

While excavating in poor light many pieces of wood were saved for later examination. In about 300 specimens showing little or no proof of being artifacts, the percentage of materials was as follows: 44 per cent willow, 33 per cent *Sarcobatus,* 5 per cent *Atriplex,* 11 per cent cane, 4 per cent *Chrysothamnus* root,[21] 2 per cent *Artemisia.* A dozen or two of the willow sticks were artifacts to the extent of being split, while a score or two had quite likely been rims of wicker baskets. These were twigs 10 or 15 mm. in diameter, similar to 6 pieces found attached to wicker basketry. The rarest wood material in the cave was pine, there being in addition to a piece of bark only one split stick, 3 by 4 by 12 cm. in size.

Among the miscellaneous objects was a crude little mat 4 inches square made mostly of willow, but having some *Juncus* rush.

Four lots of willow bark are included among the artifacts. Some was the finely shredded inner bark. One piece of thick bark 15 mm. wide was tied in a mesh knot. Another piece 10 mm. in width had been the woof of some coarse textile. One piece of sagebrush bark is listed as an artifact because it is a finely shredded mass such as is reported as being used to carry fire for a distance.

There were several small bundles of cane tied with willow withes or with tule or *Juncus.*

In a paragraph above, the percentages of various wood species are noted for sticks showing little sign of being artifacts. The percentage of different species used in making artifacts is roughly the same. Of 310 pieces listed in the various tables, 62 per cent are of what appears to be willow, though doubtless some may be of cottonwood which resembles willow; 4 per cent is soft wood of indeterminate species, but not plainly showing the qualities of willow; 22 per cent appears to be *Sarcobatus,* though doubtless some other greasewoods are included; only 2 pieces are definitely recognized as *Atriplex,* though doubtless this greasewood is somewhat better represented in the collection; 5 per cent is cane. Of less importance numerically are 11 pieces of undetermined hard woods, 3 pieces of elder, and 1 piece of sagebrush bark.

[21] Rayless goldenrod (*Chrysothamnus*) was the commonest bush on the borders of Humboldt valley.

ARTIFACTS OF SHELL

There were 7 articles which were made of shells. All were used as articles of personal adornment and are listed as follows:

	Pieces
Necklace of olive shells (pl. 53*a*; fig. 17*a*)	1
String of olive shells (pl. 53*b*; fig. 17*b*)	1
String of olive shells (fig. 17*c*)	1
Abalone earring (pl. 53*c*)	1
Abalone hair ornament (pl. 53*d*)	1
Mussel shell ornaments (pl. 53*e*, *f*)	2

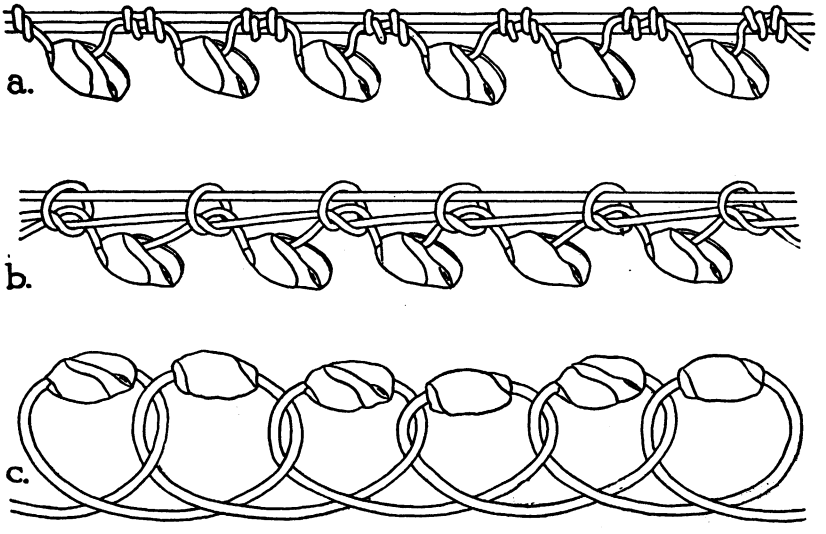


Fig. 17. —Methods of stringing olive shell beads. *a*, in 1–10345 (pl. 53*a*); *b*, in 1–19343 (pl. 53*b*); *c*, in 1–19344.

Olive shell beads.—Plate 53*a* shows a necklace of beads made from olive shells, *Olivella biplicata,* a marine univalve of the Pacific coast. This necklace was found about the neck of a partially mummified child 5½ years of age (pl. 10). The detail of the method of stringing the beads is shown in figure 17*a*. Two cords laid parallel form a flat background against which one side of the bead rests. A third cord is tied about these two in an overhand knot, is passed through a bead, and tied again in an overhand knot about the two parallel cords.

Two other small specimens of olive-shell beads were found. Each was strung in a different manner, as shown in figures 17*b*, *c*.

Abalone shell ornaments.—Plate 53*c* shows an earring, and 53*d* a hair ornament of abalone shell, *Haliotis,* a species derived from the

west coast. The Northern Paiute had hair ornaments of abalone similar to 53*d*. In attaching it to the hair a cord was passed through the two holes of the disk and tied to a braid of hair.

Mussel shell ornaments.—Plate 53*e, f* shows two fragmentary ornaments made of some thick species of mussel shell.

ARTIFACTS OF STONE

There were from the cave 22 artifacts of basalt, rhyolite, quartzite, slate, and similar granular stones, and 57 artifacts of obsidian and flint. A list of these articles is as follows:

Mortars, pestles, etc.	Pieces
Mortar fragment 13 ×14 inches, 1–19171	1
Mortar fragment 12 × 15 inches, 1–19173	1
Ice pick, 1–19176 (pl. 54*a*)	1
	3
Small stone articles	
Shellers (pl. 54*c, d, e*)	6
Perforated sinkers (pl. 55*c–h*)	7
Pipe, 1–19197 (pl. 55*i*)	1
Problematical object, 1–19186 (pl. 55*j*)	1
Problematical object, 1–19187 (pl. 55*k*)	1
Calcium crystal, 1–19189	1
Hammer stones (?), 1–19183, 1–19184 (pl. 54*b*)	2
	19
Chipped implements	
Obsidian knife, 1–19208 (pl. 55*l*)	1
Hafted obsidian knife, 1–19219) (pl. 55*b*)	1
Obsidian spearpoints, 1–19222, 19223 (pl. 56*p, q*)	2
Obsidian arrowpoints (pl. 56*a, d–g, k, n*)	7
Obsidian drill, 1–19203 (pl. 56*l*)	1
Obsidian slightly worked	5
Obsidian refuse	7
White flint knife, 1–19220 (pl. 55*a*)	1
White flint knife, 1–19228 (pl. 56*i*)	1
White flint drill, 1–19226 (pl. 56*m*)	1
Large flint knife fragments (pl. 55*n, o*)	3
Flint knife, 1–19213 (pl. 55*m*)	1
Flint spear, 1–19212 (pl. 56*h*)	1
Flint arrowpoints (pl. 56*b, c, j, o*)	4
Flint slightly worked	1
Flint refuse	20
	57

Mortars.—There were two mortar fragments found on the dump outside the cave. One was moss-covered and must have lain on the

hillside many years. The other had bat guano adhering to one side and had doubtless been brought from the cave by the guano crew. The two are of coarse vesicular basalt and of the usual V-type found in Humboldt valley and described beyond.

Ice pick.—Plate 54*a* (1–19176) shows the obverse and reverse sides and the cross-section of an ice pick found in the cave and presented to the Museum by J. H. Hart. It is closely similar in outline to one of the specimens from Humboldt valley shown on plate 64*g*, only instead of an encircling groove it has an encircling ring. Professor Louderback made a microscopic slide of the stone and found it to be a very tough, dark, somewhat metamorphic slate, containing a little sand. It is a marine deposit, probably of Triassic age.

Shellers.—There were 6 shellers found at the cave, including one moss-covered specimen on the talus slope in front of the cave. Three of these specimens have a uniform shape with cross-section as shown in plate 54*d*. These are all rounding on top, flat on the bottom, and of much greater thickness than any shellers found in Humboldt valley. One of these sent to the Nevada Historical Society is apparently of rhyolite tuff. The other two, of vesicular basalt, are shown on plate 54.

Three shellers were of the usual Humboldt valley types. One, of quartzite, was the only sheller found *in situ*. The second is of red basalt with small vesicles. The third (pl. 54*c*) is a conglomerate, principally of quartz sand and calcareous cement.

Perforated "sinkers."—Perforated "sinkers" found at the cave were far more perfect and symmetrical than any found in Humboldt valley. Plate 55*d, e* are distinct in that the perforations are small and uniform in diameter from one side of the disk to the other. For this reason the objects are better adapted as spindle whorls than any others. Plate 55*f* is of unique rectangular form and of a unique stone material, crystalline limestone with a fine grain and sufficient ferrous matter to give it a pale brick-red appearance. Plate 55*c* is made of a peculiar igneous rock, probably an ancient tuff of pre-Tertiary age. It is comparatively hard for tuff, is fine grained, and of a bluish tinge. Plate 55*h* has four incised lines on each side of the specimen. It is an uncrystalized argillaceous limestone of slate color.

Pipe.—The partially manufactured pipe shown (pl. 55*i*) is a beautiful specimen of soft, shiny, translucent calcium crystal, very easily cut.

Problematical stone objects.—Plate 55*j* shows a well polished chisel-shaped object, with incised zigzag lines upon one edge. It is too blunt and of too soft a stone to serve as a chisel. It is made of a slaty tuff, a tuff which has been given a slaty grain by compression. It is lenticular in cross-section. The upper end is broken.

Plate 55*k* of the same plate shows a flat rectangular object of uniform thickness. The sides are rough, as though it were an object of nature. However, the edges have been cut and polished. It is of slaty argillaceous limestone.

Calcium crystal.—A fragment of a large calcium crystal, similar to the pipe described above, was found. It is 37 mm. in length. Quartz crystals are commonly found in the shellmounds of San Francisco bay and are considered to have been used for shamanistic purposes.

Hammerstones.—Plate 54*b* is a fragmentary specimen of quartzite, doubtfully classed as a hammerstone. A second specimen, a naturally shaped pebble 8 cm. long, may have been used at one end as a hammerstone or paint pestle.

Knives.—Plate 55*a* shows a very thin knife of white flint variegated with streaks of pink and red. The specimen has a fine sharp edge but is irregular in outline. It is of sufficient length, 27 cm., to be classed with the ceremonial blades of northwestern California which are used principally as articles of wealth and display in dances.

Plate 55*b* shows a knife made of a material which, if obsidian, is of an unusually opaque quality. It is bound with sinew to a handle of wood. The dimensions of the knife blade are 80 mm. in length, 36 mm. in width, and 11 mm. in thickness.

Plate 55*l* shows a well shaped knife of obsidian, whose dimensions are given in the explanation of the plate. Plate 55*m* is an illustration of an unusually attenuated form of knife made of a drab colored flint. Plate 55*n, o* shows fragmentary specimens of what are apparently very large ceremonial knives.

The only other knife found at the cave is of white flint (pl. 56*i*). It has, in proportion to its width, an unusual thickness.

Spearpoints.—Only three specimens were found at the cave, two of obsidian, and one of a yellow flint mottled with brown (pl. 56*h, p, q*).

Arrowpoints.—All of the arrowpoints found at the cave are shown on plate 56. Seven are of obsidian and four of flint. Five are of the 3-notch type. Two have two notches and three have the single basal notch. One specimen (pl. 56*j*), is unfinished, the notches being absent.

Drills.—The two specimens of drill found at the cave are shown as plate 56*l, m.* The first is of very opaque obsidian. The second is a broken drill of a very attenuated form made of white flint.

CLAY AND PAINT

The few objects of clay and paint are listed below.

	Pieces
1–19229, globular clay ball	1
1–19230, globular clay ball (pl. 53*g*)	1
1–19231, elliptical clay ball (pl. 53*h*)	1
1–21212, red paint in a tule bundle (pl. 43*p*)	1
1–21213, yellow paint in a tule bundle (pl. 43*q*)	1
1–19232–19236, red paint	11
Total	16

Two well baked clay balls (Northern Paiute, widuno'o) were found in the cave in apparent association with a skeleton (12–2652, lot 32). Another clay ball was found elsewhere. Of the three specimens two were globular with diameters of 33 to 37 mm. The third specimen with pointed ends (25 mm. diameter, 42 mm. long) is closely similar in size and appearance to specimens found in shellmounds of Humboldt bay, California. Those at Humboldt bay and Smith river, California, and on Rogue river, Oregon, are described as used in playing a guessing game.[22] Gilbert Natches thought the cave specimens were used in a game such as the Northern Paiute play. One of the players is blindfolded while pebbles are hidden in sand. After removing the blindfold the player attempts to locate the pebbles hidden by drawing in the sand a circle several inches in diameter.

Specimens of paint found by the writer include two bundles of tule containing red and yellow paint which are shown on plate 43*p, q.* The red sample is an iron oxide obtained by burning yellow ocher. The yellow paint is a ferric-sulphate oxide. Red could not be produced from this sample by burning. Eleven small lumps, 48 grams, of red paint were found on the dump and elsewhere. Other specimens from the cave were seen in the possession of various individuals. Mr. I. P. Richardson had a sample of green paint about the size of a finger.

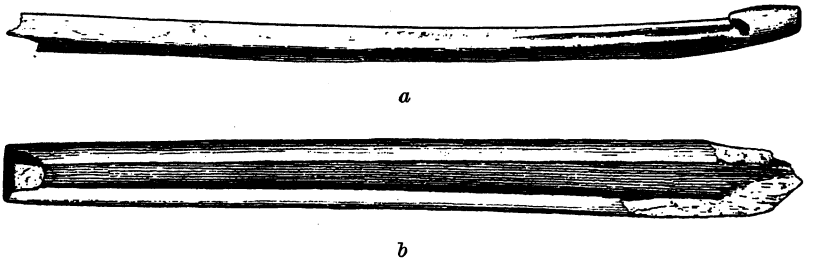
[22] Present series, 14:377.

III. NEW TYPES OF ARTIFACTS FOUND IN 1924

BY

M. R. HARRINGTON

The collection of artifacts excavated for the University of California by Mr. Loud was similar in most respects to that secured by the expedition under my charge. There were certain types, not found by Mr. Loud, which merit description here. The first to be discussed pertain to the Early Period of the cave's history, and include such things as atlatls or spear-throwers, the darts used with them, and a series of curious crooked clubs, all of which resemble products of the ancient Basket-Maker culture of the Southwest.



a

b

Fig. 18.—Pieces of spear-throwers, Museum of the American Indian, Heye Foundation.

We found no complete atlatls in Lovelock cave, although one was discovered during the guano digging and was given by Mr. Hart to a private collector in California, after whose death it was lost. This had a grooved top, according to Mr. Hart's description, a ridge along the bottom for greater strength, and notches near the butt to accommodate the user's fingers (see fig. 16).

Our expedition, however, was fortunate enough to find several broken pieces of atlatls (fig. 18*a*, *b*). None is precisely like the spear-throwers we have from the Basket-Makers, although resembling these in a general way. Figure 18*a* is 11 inches long and has a short groove, like most Basket-Maker atlatls, but the spur is projecting instead of

flush, and the shaft is a simple round stick, slightly flattened only on the top. Figure 18*b* is flat like a Basket-Maker weapon and is exceedingly well made; but the spur is projecting, and very near the distal end, and the groove is very long, extending the full length of the fragment we have, all of which features differentiate it from the Basket-Maker style. The spur is missing from another specimen in the collection, but the flat shape and the long groove are similar to the preceding. The wood of which these atlatls are made has not been identified.

Of the darts that were cast with the atlatl, we found no perfect specimen of the shafts and no specimen showing feathering; but featherless fragments of the cane shafts appeared occasionally, and one piece of wooden shaft; while wooden foreshafts for the darts were fairly abundant. Two of the best of these, still retaining their original points, are shown in plate 45*c, d,* one of black obsidian, one of a grayish flinty stone, bound to the foreshafts with sinew. The wood has not been identified.

Especially interesting are a series of bunts or blunt points, some of wood, some of bone (pl. 46*a, b*), used either as stunning points for the atlatl darts, or for practice purposes in place of the foreshafts with easily broken stone points. Kidder and Guernsey describe and illustrate one of these wooden bunts[23] found in place on the shaft in a Basket-Maker cave, Pepper[24] figures three examples of the bone-tipped type of dart-bunt from southeastern Utah, and in the Museum of the American Indian, Heye Foundation, are a number of these from Basket-Maker stations in Grand Gulch, in the same region.

The bone tips in our Lovelock cave specimens were cut from the ends of deer (?) tibias. The longer of the two shown in our figure measures 7¾ inches, while the longest wooden bunt is 4¼ inches.

Turning now to our crooked clubs (pl. 16*a, b*) we find them to furnish still another link with Basket-Maker culture, as they resemble strongly the typical club of that people as figured by Kidder and Guernsey[25] except that they are somewhat slenderer in form and have no longitudinal grooves. The proximal ends of our four clubs are missing except one, which terminated in a flat knob. The wood is considerably disintegrated, for the place where they lay, beneath the

[23] S. J. Guernsey and A. V. Kidder, Basket-Maker Caves of Northeastern Arizona, Papers of the Peabody Museum, Harvard University, 8:86, pl. 34, 1921.

[24] G. H. Pepper, The Throwing Stick of a Prehistoric People of the Southwest, Internat. Cong. Americanists, Sess. 13, N. Y. 1902, 126, 1905.

[25] *Op. cit.*, pl. 36.

large rockfall northwest of the stratigraphic section at a depth of 95 inches, was slightly damp. The clubs shown are about 19 inches long and about 5/8 inch thick. The wood has not been identified.

Another implement found in the older levels of Lovelock cave (72 inches deep), which is also associated with Basket-Maker remains farther south and east, is the sickle-shaped implement of mountain sheep horn shown in plate 16*d*. Its spread from tip to tip is 13 inches and the greatest thickness about 7/16 of an inch. The whole implement is flat with a slight twist, and is made from a piece split from a large horn. The edges are thin, but near the distal end of the horn, which was the proximal end of the implement, they are rounded enough to make a comfortable hold for the hand. The outside periphery of the curve or convex edge also shows a rounded but somewhat thinner edge; but the concave edge has apparently been sharpened like a sickle, and shows much wear. A very similar "sickle" was found by Nusbaum in a Basket-Maker cave, and is figured and described by Kidder and Guernsey in their appendix to his report[26] published by the Museum of the American Indian, Heye Foundation, for which institution the explorations were carried on. As to the use of this implement, if it is not an actual sickle for gathering rushes or something of the sort, I should suggest that it may have been a bark-shredder or a tool for preparing plant fibers for cordage.

Of probably similar use is the mountain sheep horn implement shown in plate 16*c*, measuring in spread 16 inches. It is thinner and better made than the preceding; it has more twist, and the concave edge shows wear, but no sharpening. For a distance of 1¾ inches from the butt it is painted white. Judging from the level of origin of the grave pit in which it was found, it probably belongs to the transitional rather than to the early period.

Belonging to the early period, and coming from the sixth level of the stratigraphic section itself, is the headband shown in plate 52*c*, which is unique in the writer's experience. To make this, rather short human hair was braided into a rope about 3/8 of an inch in diameter in such a way that the ends protrude on one side only in the form of tufts averaging 1¼ inches long and ¾ inch apart. This was coiled upon itself to form the headband, and bound together with Indian hemp strings in such a way that the tufts are all on the outside. The

[26] J. L. Nusbaum, A Basket-Maker Cave in Kane County, Utah, with Notes on the Artifacts by A. V. Kidder and S. J. Guernsey. Indian Notes and Monographs, Museum of the American Indian, Heye Foundation, p. 122 and pl. 61. New York, 1922.

completed headband has six rows of braid and is a little over two inches wide. Pressed together the whole thing is 11 inches long. It is shown partly spread in the figure. Tucked under one of the binding strings is a slender double-pointed bone object, well made and polished, about 1½ inches long, possibly the barb of a fishhook.

Of the wooden pendants (?) shown in plate 48*d*, *f*, 48*d* is 3 1/16 inches long and ⅜ inch thick, and 48*f* is 3⅞ inches long and ¼ inch thick. The other flat wooden object (pl. 48*e*) is of unknown use and is 2½ inches long. The fourth object (pl. 48*c*) is 4¼ inches long and between 1/16 and ⅛ inch thick. This last, which was found at a depth corresponding to our third level, is made of the stems of a small filiform sedge, bound together with Indian hemp cord. Its use is problematical.

Of tubular form, like Basket-Maker pipes, but differing from them in having a long bone stem, is the pipe shown in plate 52*a*, found at a depth of 70 inches. The bowl is of fine-grain, grayish stone, probably a limestone, and is 1 7/16 inches long and ¾ inch in largest diameter. It contained charred residue, but whether from a real tobacco or a substitute was not ascertained. The bowl was attached to the stem with a binding of sinew, covered with a dark colored gum or pitch, and in this gum were stuck two irregular bits of shell by way of decoration. The stem was made of a thin tubular bird bone with the mouthpiece end nicely rounded off. This was 5/16 inch in diameter, and the whole pipe measured 8⅜ inches in length.

The stone balls shown in plate 57*b*, ranged in size from ½ to 1½ inches. One of them appeared in our fourth or lower transition level, the others were found elsewhere in the older pits and deeper refuse layers. Perhaps they were used in games, or as shamans' charms, which was the most plausible use suggested by our Indian helpers for the ovoid and the bi-pointed stones shown in plate 57*d*. The material of the balls was usually fine-grain sandstone or limestone. They were often nicely finished, but not polished; while the ovoids and bi-points although of similar materials were sometimes highly polished. Another suggestion for the use of the latter two classes, especially the ovoids, is as "weights" or charms to attach to the backs of atlatls, as illustrated by Kidder and Guernsey.[27] The largest of these objects, plate 57*c*, is 2 3/16 inches long.

[27] *Op. cit.*, pl. 33.

Considering now the transition and upper levels, we find the decoys among the most remarkable and interesting of artifacts. Eleven were found in pit 12. Plate 7 shows the bundle that contained them, both in place and after opening.

The decoys found in the Lovelock cave fall into two types, the painted and the stuffed. In the former the body was formed by bending a bundle of 25 or 30 large bulrush (tule) stems (*Scirpus validus*) and binding them together as shown in plate 33*b*. The ends were then cut off to simulate the duck's tail, and a head was cleverly constructed of rushes and smoothly bound with the same material split, then sewed fast to the body, with evident care to attain a realistic pose. After the bend of the rushes has been smoothly bound over with split rush to form the breast, we have a result like plate 33*a*. To complete the decoy it was then only necessary to paint the head, breast, and tail to represent the bird, using black and reddish-brown native paints, and to cover the body with white feathers, the quills of which were stuck under the breast-wrappings, and held fast elsewhere with fine native cord of Indian hemp (*Apocynum cannabinum* L.). The completed decoy, representing a canvasback drake, is shown in plate 34*b*. This is 11 inches long.

Only ducks seem to have been represented by these painted decoys; but ducks, geese, and other water fowl were imitated by the stuffed type, which was commoner, easier to make, and is still manufactured by the Northern Paiute. The body of the stuffed type was made in approximately the same way as the painted type, but the breast was not bound, and instead of a rush head, a sort of rush stub or nipple projected from the body to which a complete stuffed head of the bird was fastened, with its natural skin, feathers, and beak. Sometimes there was enough body skin attached to the head to cover the rush body, but usually it had to be more or less supplemented by small bunches of feathers, the quills of which were stuck into the rushes. Plate 59*a* represents a female canvasback decoy of this type, made by the Northern Paiute of the Stillwater band. The bottom view of the same specimen is shown in plate 59*b*, and proves how closely the modern Indian decoy-makers follow the ancient patterns. This decoy is 14½ inches long. Some of the ancient decoys still show a loop of cord on the breast for the attachment of an anchor, and one had a short string under the tail, the loose end tied to the middle of a bit of quill, which doubtless served as a toggle for the attachment of an anchor cord on this end also.

The making of decoys seems to have caused such a development of the taxidermist's art among the Later Period dwellers in the Lovelock cave that they even mounted small birds as shown in plate 34*a*. This specimen, which is 4¼ inches long, has been nearly destroyed by insects, as were the other examples of this sort found. Possibly these were decoys also.

The snares shown in plate 48*a, b,* were found with the decoys in pit 12, and are therefore probably of the later period. They consist of a square-ended loop of twig, possibly willow, a piece of cord about 10 inches long, made of Indian hemp, and a wooden peg about ¾ inch long. The cord is attached to the end of one arm of the willow loop, runs freely through a knot tied in the twig itself at the end of the other arm, and terminates in the peg. These snares, of which the exact method of use is unknown, are somewhat similar to a Basket-Maker type, found in the Southwest, yet in this cave they appear in the Later Period deposits down to the upper Transitional level, and in one pit originating in the lower Transitional.

The wooden object shown in plate 16*e*, which was found with a mummy in pit 46, is 13½ inches long, and has been carefully made of hard, heavy wood. The work has been obviously done with stone implements. Unless it were a handle for some implement, its use would be difficult to imagine.

Another characteristic and interesting product of the Later Period is the woven rush sandal, described and figured by Loud.

Tending to confirm the Northern Paiute legend of the assault on the cave are the fire-arrow foreshafts shown in plate 46*c, d*. The inflammable parts are dry reed in one instance and grass in the other. Several were found in a partially burned condition, including one in which the inflammable part was a piece of dry rotten wood or punk which would glow and smoulder. The longest specimen shown is 7¼ inches. A very large number of arrow fragments were found in the crevices of the rockfall blocking the mouth of the cave, as if they had been shot into it, and in the rare cases where a part of the latest cave floor was found intact, the rushes and grass had been burned to the depth of a foot or so, as if fired by the flaming arrows mentioned in the legend.

The legend is confirmed thus far; but tending to refute it is the fact that the specimens of the Later Period are much more like Northern Paiute products than like those of the Pit River people who, the legend states, were the cave dwellers. In fact, if we wish

to find soft rush basketry like that produced by the Pit River, Modoc, and Klamath we must turn to the *lower* levels of the cave.

A type of bow belonging to the Later Period is shown in plate 45*a*. The material is probably the so-called mountain cedar (*Juniperus utahensis*), which is a favorite bow material of the modern Northern Paiute. As may be seen in the figure, the nocks are irregular and much worn and there is sinew binding about 3 inches below the tip. The fragment is 7¼ inches long. Of especial interest for comparative purposes is the fact that the belly is rounded and the back flat; and that it is narrow, resembling modern Northern Paiute bows, instead of broad and flat like northern California forms.

A hairbrush is shown in plate 52*e*. It is made of a bundle of quills so stripped that only an inch or less of the feather remains on the distal ends. The individual feathers are light brown, about six inches long, and from the tail of an unidentified bird. Many of the quills were split at the end used as a brush, but others were left intact for the sake of stiffness. About an inch and a half from the proximal end of the feathers, where the bundle is about 1¼ inches thick, is a binding of Indian hemp (*Apocynum*) cord over which was placed the long 2-inch binding of willow basket-splint with the bark on, as seen in the illustration. In the brush end are still entangled long black and dark-brown hairs.

Another curious specimen is the brown scoria ring shown in plate 57*a*, the length of which is 5⅛ inches, the width 3½ inches, and the thickness 2 inches. The perforation in the center, which is smallest in the middle, varies from 1⅛ inches to nearly 2 inches across. The projections on the ends are probably intended to represent bird heads, which are seen more plainly in the specimen itself than in the photograph. The pores of the scoria contain considerable yellow pigment, as if the object had once been painted yellow. It is rather light for a club head or a digging-stick weight, yet these are the only uses that suggest themselves.

The last Later Period specimen to illustrate is the bear claw shown in plate 52*d*, which evidently formed part of a necklace, judging by its two perforations. Its extreme length is 2⅞ inches and it appears to be a claw of a black bear, rather than a grizzly.

The objects described below were purchased and are unaccompanied by data as to the depth at which they were found.

The set-line, 22 feet long, shown in plate 51*a*, is a fine strong line, apparently of Indian hemp. Strung along its central portion at

intervals of about 7½ inches is a series of 5-inch snells made of still finer cord, to which are attached 12 fishhooks. Each consists of a shank of split rush and a barb of bone; the snell being attached at the junction of shank and barb, instead of at the extremity of the shank. To make the hook the strip of split rush was bent about the bone barb and wrapped tightly with fine cord. The finished shanks are 1⅛ inches long and the barbs 1 inch on the average. There is the possibility that this line was used for catching wild fowl instead of fish, but Northern Paiute Indians have described to me the use of such set-lines for catching fish.

Plate 51*b* illustrates another type of fishhook, with a shank of wood to which the bone barb is lashed, the barbs averaging about an inch in length and the shanks an inch and a quarter. These were not attached to a set-line, but each had a line of its own, a loosely twisted two-strand line, apparently of Indian hemp. Barbs were lashed to the shanks and shanks to the line with fine native cord which might be called stout thread.

A number of wooden handles for knives were found during the course of our digging, but the blades were missing. Among the purchases, however, was a fine complete knife (or perhaps spearhead), shown in plate 45*b*. This is 7¾ inches long, of which the blade, of mottled gray and yellow flinty stone, occupies 3¾ inches. The handle, apparently of willow, is round in section, except near the butt, where it is flattened. It is attached to the blade with pitch and twisted fiber cord. Near the middle of the handle is a transverse groove. It is difficult to imagine what the flattening was for, unless to facilitate the attachment of the knife to a long shaft for service as a spear, in which case the transverse groove would serve to prevent the cord lashing from slipping.

Probably the finest single specimen from the Lovelock cave is the remarkable, composite, ceremonial plume, illustrated in plate 20. The stem or foundation of this is the wing bone of a large bird, possibly a goose or a pelican, which shows at the bottom of the plume. To the end of this is fastened a large stripped quill extending to the top of the specimen, which is nearly 20 inches long. A tuft of beautiful white down covers the upper six inches of the quill, barring the last inch and a quarter. A little of this down may be seen near the top of the plume as shown in the picture. The quill and the down are surrounded by white feathers of swans or gulls or both, the inner ones twisted, the outer ones loose, neither of which appear in the picture.

The exterior of the large plume is composed of many small composite plumes, about fifty in all, each made on a twisted sedge (perhaps *Scirpus caespitosus*). The exposed part of each is about 11½ inches long. The lower 4 or 5 inches of each small plume is wrapped in duck skin, especially the iridiscent green plumage of the male mallard's neck. The foundation is wrapped with bobcat fur. At the tip of each small plume there is a bunch of small feathers, of many kinds and colors, among which are usually two upright stiff strings of twisted sinew, extending higher than the feathers. On one of these is strung an *Olivella*-shell bead. When found the whole plume was encased in a cover made from the skin of some animal, apparently a young bobcat. It seems probable that it was carried as a wand in the hand, possibly by a shaman, rather than worn on the head or attached to a staff.

IV. PROBABLE HISTORY OF THE CAVE

By M. R. HARRINGTON

Use of the Cave

The theory has been advanced that Lovelock cave was merely a place of ceremonial deposit and a cemetery, and not, in any sense of the word, a dwelling place; but with this I disagree. To my mind it was, first of all, a dwelling place, and secondly a storage place for supplies and valuables; but only incidentally and occasionally a burial place, and possibly once in a while a shrine for ceremonial deposits.

Every possible variety of camp refuse was found in the cave, ashes, rush, and grass bedding, rags of old fur, and feather blankets, bones of food animals, scraps of worn out baskets and mats, deer hair, cast-off sandals, discarded "quids" of rush fiber chewed by the Indians, and even the dried excreta of the ancient dwellers. The pits in many cases had been used again and again for storage purposes, each time having been emptied and refilled, which would probably not have been done had the deposits been of a ceremonial character. Certainly no primitive people living in a place could have left more to prove that they had really dwelt there.

The argument that no Indians would live in a cave full of dead men's bones falls down when we realize that the occupation of the cave was not continuous. A death might occur, an interment take place, and all the dwellers leave the cave in consequence. But nothing was left to mark the spot, and another band might come along and take possession without ever knowing that such a thing had happened.

The earlier period of the cave undoubtedly belongs to the Basket-Maker horizon, and may well represent a period three or four thousand years ago. We found the remains of only 12 individuals; Mr. Loud reports about 45 in 1912, so probably there were never more than 60 burials in the whole cave. Certainly an average of two burials per century would have very little effect in preventing residence within the cave.

And finally, how do we know that the Indians preceding the present Northern Paiute had the same feeling regarding the dead that they profess today? Speaking of the Northern Paiute, we have their own tradition to support the contention that the cave was used as a dwelling place, although by another tribe.

Probable History

From my own observation in the cave I should think that when first occupied it was still a rockshelter, for the great rockfalls blocking the mouth rest for the most part on beds of aboriginal camp refuse laid down before they fell, shaken loose by some forgotten earthquake.

From the fact that this camp refuse lies directly on the white lacustrine deposits left by Lake Lahontan, or at most is separated from them by a guano layer not more than 20 inches deep, it certainly looks as if the cave were first occupied soon after the subsidence of that body of water, perhaps within a hundred years, although of course there may be factors in the situation of which we are ignorant.

Kidder[28] estimates the Basket-Maker period along about 1500 to 2000 years B.C. Now the Early Period of our cave belongs to the Basket-Maker horizon, and therefore if Kidder is right an estimate of 1000 B.C. would be a conservative guess as the date of first occupation of Lovelock cave.

But when did Lake Lahontan subside? We find authorities[29] differing widely as to the age of Lake Lahontan, Jones dating it at only 1000 years ago and Antevs at 30,000 or 35,000 years. The first estimate seems far too low in the light of our archaeological knowledge, and the second even farther too high. Perhaps however conditions prevailed in the Lovelock cave for many thousands of years, conditions of which we are ignorant, which prevented the accumulation of débris upon its bottom before the bats and then the Indians took possession of it. It must be remombered in this connection too, that we found no bones of saber-tooth tigers, horses, or camels in even the oldest of our human deposits, although remains of these animals have been recovered from the Lake Lahontan shore gravels. The fauna we found, even in the deeper levels of the cave, was substantially the same as at present.

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[28] A. V. Kidder, An Introduction to the Study of Southwestern Archaeology (New Haven, 1924), 119.

[29] J. C. Jones, Geologic History of Lake Lahontan, p. 4. Ernst Antevs, On the Pleistocene History of the Great Basin, p. 77. Both papers in "Quaternary Climates," Publ. 352 of the Carnegie Inst. of Washington, 1925.

Who were the first occupants? They had basketry and woven bags somewhat like those of the ancient Basket-Maker culture of the Southwest, but not so well made nor so well decorated; they used the atlatl (or spear-thrower) to throw darts, as did the Basket-Makers, instead of the bow and arrow; they carried curious crooked clubs somewhat like those of the Basket-Makers, and used mountain sheep horn "sickles" similar to theirs. But these early Lovelock cave people, although so similar in many ways, knew nothing of Basket-Maker agriculture; in fact they had no agriculture at all, but were purely hunters, fishers, and, especially, gatherers of the natural products of the desert. They made more extensive use of rabbit and fish nets than the Basket-Makers seem to have done; and while their culture was much poorer than that of the latter people, they possessed some things, including one form of soft twined basketry but little stiffer than the twined bags, apparently unknown to the Basket-Makers, but resembling strongly the modern split rush baskets of northern California and Oregon. For that matter the twined bags of the Early Period in Lovelock cave resemble the modern twined bags of northern California and Oregon as much as they do Basket-Maker products.

Kidder on looking over our Lovelock cave collection was convinced that our Early Period "belongs to the Basket-Maker horizon," even if the products were more primitive and a little different.

It may well be that this culture exemplifies the hitherto hypothetical "basic culture" of the Southwest from which the typical Basket-Maker is thought to have developed after the acquisition of agriculture. Still, it might convey a mistaken idea to name it "Early Basket-Maker" for in this peripheral region a less-developed form might have been contemporaneous with the typical Basket-Maker culture farther east.

The term "Sub-Basket-Maker" might be more appropriate, or the name "Basket-Maker 1" suggested at the Pecos archaeological conference held in August, 1927, which the writer was privileged to attend. If this last term is generally accepted the typical Basket-Maker culture will be known as "Basket-Maker 2" and what has hitherto been called "Post-Basket-Maker" will be called "Basket-Maker 3."

At all events these early people lived in the Lovelock cave, probably not constantly, but from time to time when convenient, when the quest for food brought them to the shore of the lake, or during very

bad weather; and they stored their seeds, dried fish, and various possessions in it. As time went on the deposits of camp refuse were built up to a depth of four or five feet in favorable places. Then a foreign influence began to creep in, seen first in the presence of new kinds of basketry; but whether this means the actual presence of a strange people between the visits of our "Sub-Basket-Makers" or whether the latter simply acquired some new ideas is not made clear. This was the beginning of our Transition Period.

This foreign influence grew stronger and finally the bow and arrow entered. The atlatl and dart lingered on for a while but finally died out, leaving the bow and arrow supreme by the time the deposits had piled up a few feet more. Then follows the beginning of the Later Period.

When did this later period begin? We have no way of telling even approximately, unless we assume that the rate of deposit of refuse was reasonably uniform, and that there was no guano above our stratigraphic section. If we also assume that the date of the lowest level was about 1000 B.C., we are allowing 3000 years for the accumulation of 12 feet of refuse, or four feet per thousand years. Now the beginning of the Later Period is four feet deep; therefore if the above is true, it began about 1000 A.D. But of course this is mere speculation and may be far from the truth.

In the Later Period the culture was somewhat different, although many of the standard things continued much as before, such as rush matting with twined rush warp, one sort of coiled basketry, fur-cloth blankets, and fish nets and rabbit nets. But the bow and arrow was now the standard weapon, the arrow being usually made of cane with a greasewood foreshaft, the pointed distal end of which formed the point for the arrow; though once in a while the foreshaft is squared off and slotted for the reception of a stone point, and one-piece arrows of wood appear occasionally. In addition to the usual coiled basketry we now have a single-rod coiled type, sometimes pitched; and a stiff rod-and-splint twined, or a rod-and-splint wicker basket mostly in the form of pack baskets, which take the place of the earlier coiled pack baskets. Soft flexible split-rush baskets and soft twined bags disappear entirely, and sandals woven of rush appear. Belonging to the Transition and Later Periods are the decoys, already described, which were made in two styles, one of which persists at the present day among the Northern Paiute, especially the Stillwater and Walker Lake bands.

Most of the classes of articles found in the Later Period deposits have counterparts among the Northern Paiute, and conversely, I have seen very few Northern Paiute products that do not find their counterparts in the upper levels of the cave. Whatever their connection with the early inhabitants may have been, the latest dwellers in Lovelock cave were either Northern Paiute or their cultural, although possibly not linguistic, kinsfolk.

In its original state Lovelock cave was a real source-book of prehistory, probably unique in its richness and its scope. It is most unfortunate that some institution could not have made a complete study of it, and transcribed the information it had to offer, before irresponsible hands destroyed so many of its pages.[31]

[31] A remarkable coiled basket water bottle, found at a depth of 15 feet in the Lovelock cave and illustrated on plate 67, is on exhibition at the University of Nevada Museum. The diameter of this basket bottle is, in the mean, 18½ inches, its height is 14½ inches, and it has eight vertical rows of twined reinforcements. The diameter of the lip is 3⅜ inches and of the neck 2⅝ inches.

APPENDIX 1. ARCHAEOLOGY OF HUMBOLDT VALLEY

By LLEWELLYN L. LOUD

THE GREAT BASIN

The Great Basin of interior drainage comprises most of Nevada and large portions of Utah, Oregon, and California. It is bounded on the west by the Sierra Nevada range whose higher peaks range from 8000 feet to 14,898 feet in elevation. Even the mountain passes are above 7000 feet. On the east the Great Basin is bounded by the Wahsatch range which is as lofty as the Sierra Nevada and far more extensive. The area of interior drainage is separated by a low indistinct rim from the drainage basin of the Columbia river on the north and from that of the Colorado river on the south.

The Great Basin might be regarded as an elevated plain cut up by numerous distinct, parallel mountain ranges of general north and south trend. In western Nevada, the level floors of the intervening valleys are about 4000 feet above the sea, and generally about twice as wide as the mountain ranges which rise two to five thousand feet above them. The elevations of the principal mountains and mountain passes are given on the map of western Nevada, plate 68.

RIVERS

The longest river in Nevada is the Humboldt, which rises in the northeast corner of the state at an elevation of over 7000 feet. After flowing in a general west-southwest direction two-thirds of the way across the state, it finds an elevation of 3920 feet in Humboldt lake on the eastern side of which is Lovelock cave. At seasons of overflow the waters continue for a distance of twelve or fifteen miles and empty into Carson sink, where they evaporate.

At the water gauge station near Lovelock the river varied with the seasons in 1914 from 20 to 49 inches in depth, while the amount of water passing per second varied from 341 to 1080 cubic feet.[32] The

[32] U. S. Geol. Surv., Water Supply Papers, no. 390, 1914, published 1917.

drainage basin above that point is 14,200 square miles in extent and the annual discharge of water is sufficient to cover 344,000 acres to a depth of one foot. Usually the entire flow of Humboldt river is used for irrigation in the valley just south of Lovelock, so that no water reaches Humboldt lake. The Humboldt river carries a larger volume of water on its upper stretches than near its mouth, the waters being dissipated by evaporation, by irrigation, and by sinking into the underlying gravels.

Carson river rises in the Sierra Nevada and flows northeasterly for about 150 miles into Carson sink, six miles south of Humboldt lake. Thus it will be seen that Lovelock cave and the Humboldt valley archaeological sites lie near the center of a drainage basin, into which two rivers flow from opposite directions.

LAKES

Humboldt lake is merely an expansion of Humboldt river caused by a gravel embankment thrown across the valley by the currents of the ancient lake at a time when it was several hundred feet deep. The usual dimensions of the lake are about 2 by 6 miles, but in seasons of flood it is much larger and overflows into Carson sink. In 1882 the area was about 20 square miles with a maximum of 12 feet in depth.

Carson sink, just over the mountain range from the cave, and almost as accessible to the cave people as was Humboldt lake, is a shallow playa lake usually about 20 miles in diameter, but in some years it is only a broad mud-covered plain. Its waters were sufficiently fresh so that the Paiute band living on Humboldt lake regularly watered their horses when crossing the plain on the way to the pine nut mountains.

Pyramid lake, the largest lake of Nevada, is 30 miles long, 12 miles wide, 215 square miles in extent, and 361 feet deep. The ancient Lake Lahontan at this point had its greatest depth, at least 886 feet, not counting an unknown depth of sediments.

Several hundred years ago there occurred a complete desiccation of all of the lakes of northwestern Nevada, including Humboldt lake.[33] This desiccation was followed by a covering of the precipitated salts with silt. The new flood waters which later filled the basin and formed the present lakes were at first as fresh as river waters.

[33] I. C. Russell, Geological History of Lake Lahontan, a Quaternary Lake of Northwestern Nevada. U. S. Geol. Surv., Monograph 11, 1885.

Various waters of the Great Basin have been analyzed to determine degree of salinity. One liter of water from Humboldt lake weighs 1000.7 grams, compared to 1026 grams per liter of ocean water or 1230 grams per liter of water from the Dead Sea. The following list shows the number of grams of solids per liter of various waters from the Great Basin and elsewhere. The order of arrangement is the order of increasing salinity.

Lake Tahoe, Oct. 1872, .073 grams of solids per liter; Humboldt river, .362 grams; Humboldt lake, .929 grams; Carson lake, Oct. 1863, 1.473 grams; Walker lake, Sept. 1882, 2.516 grams; Pyramid lake, Aug. 1882, 3.499 grams; Winnemucca lake, Aug. 1882, 3.603 grams; ocean, 160 samples, 36.10 grams; Mono lake, July 1883, 51.9 grams; Great Salt lake, Aug. 1873, 147.9 grams; Great Salt lake, 1850, 260.7 grams; Dead Sea, Mar. 1864, 308.9 grams.

Pyramid lake is just reaching a degree of salinity sufficient to prevent human consumption, except near the mouth of Truckee river. Two independent mathematical calculations can be made for the age of the present lakes of Nevada. First, the total inflow of water for a period of 300 years, at the present rate of rainfall, would bring the same number of tons of salts as are now estimated to be contained in the waters of Pyramid, Walker, and Winnemucca lakes—lakes having no outlet. Second, at the present rate of evaporation on the lake surfaces, that is over 90 inches per year,[34] it would take 300 years of evaporation of river waters to leave behind the number of tons of salts now contained in the waters of the lakes. However, the period of complete desiccation should be placed 600 or more years ago instead of 300 years because following the period of complete desiccation the annual precipitation would gradually increase to the present relatively large amount. Submerged trees on lake shores prove that waters have gradually risen during the past century. The analysis of waters, given above, show that Great Salt lake was twice as salt in 1850 as it is now, or in other words the lake has been freshened by a larger inflow of fresh water.

CLIMATE

Temperature.—In summer the thermometer seldom rises above 95° Fahrenheit. The average number of days per year when the thermometer goes below the freezing point is 138. In 26 years the lowest temperature known is –28° F. At Winnemucca the mean annual tem-

[34] A. W. Greely, Irrigation and Water Storage in the Arid Regions, House Ex. Doc., Sess. 2, 51 Cong. 1890–91, vol. 38.

perature is 48°, the mean maximum 62°, and the mean minimum 35°. The mean for January is 27°, for July 71°.[35]

Snow is seldom over a foot deep in the valley and it never lasts long. On the river the flow in winter is seldom affected by ice. Some winters Humboldt lake freezes over. The swans, which ordinarily frequent Humboldt lake, then go to Carson sink which gradually freezes around the shore and in exceptional years even freezes in the center, after which the swans go to Pyramid lake which never freezes on account of its saltness.

Rainfall.[36]—The average rainfall in inches at Winnemucca, the recording station nearest Lovelock cave, over a period of 26 years was as follows: spring (2.4), summer (.5), fall (2.5), winter (3.1), total (8.5), highest (18.2), lowest (5.5).

Wind.—In some parts of the summer season winds arise with considerable regularity every afternoon. Whirlwinds, hollow dust columns a thousand or more feet in height, are then seen in considerable numbers moving across the valley, raising a sufficient amount of sand and alkaline dust to hide from view the whole landscape, including the mountain ranges towering on each side. Even with goggles the irritation to the eyes is unendurable.

FLORA

In the vicinity of Humboldt lake there are several distinct botanical zones. To the northwest of the lake between the railroad and the gravel ridge (pl. 1), there is a hard baked playa six or eight miles in length which is absolutely devoid of vegetation. Another playa of less extent is situated to the northeast of site 4 (pl. 1). A third extensive playa is near Lovelock, while the largest of all is around Carson sink. In addition to the playas, which are always without vegetation, there are several square miles of drifting sand to the north of Humboldt lake, also without vegetation.

To the north of the drifting sand lies a flat many miles in extent, covered with a rank, nearly impassable growth of tule, principally *Scirpus lacustris,* which stands high above one's head. During the writer's stay at Lovelock cave fires raged for several days at a time in thickets of tule at the north and south ends of the lake. Such fires present an imposing spectacle in early evening when they burn with

[35] U. S. Weather Bureau, Bull. Q, 87, 1906.

[36] U. S. Weather Bureau, Bull. D, 1897.

greatest fierceness. Later in the night they may die down to some extent only to be revived again under more favorable conditions the following morning.

Part of the floor of the Humboldt valley is covered with salt grass, which supports large herds of cattle and wild horses, while formerly it supported possibly equally large herds of antelope. On these grass plains is also tumbleweed, a common plant growing to a height of two or three feet—owing to numerous branches it has a globular form and is easily blown about when dry. It is said by the whites that the Indians made use of the seeds. Botanical lists give tumbleweed, *Amaranthus graecizans,* as an introduction from tropical America.

Adjacent to the salt-grass area lies the gently sloping aluvium skirting the mountain ranges. It is distinguishable by a strip several rods wide covered with bushes and small tree-like forms 5 to 15 feet in height. The bushes include several species of greasewood, rabbit brush, rayless goldenrod, and other compositae and Chenopodiaceae. These stands of bushes are so thick that there is difficulty in finding a passage for a wagon through them. The remainder of the alluvial fan, as well as the entire gravel- and sand-covered mountain ridges is clothed with a scanty growth of bushes, mostly 1 to 3 feet in height. In many localities sagebrush, *Artemisia tridentata,* is predominant, perhaps nine-tenths of all vegetation. Trees are lacking in the immediate vicinity, though the nut pine grows on the Stillwater range 20 miles to the east of the cave. The nut pine was an important source of food.

FAUNA

Mammals.—Small game is so abundant that some trapping for furs is conducted in the valley to the north of Humboldt lake. One resident of the valley spoke of the large amount of gunpowder supplied to Indian hunters between 1880 and 1890. However, large game was probably never more than a minor source of food supply to the Indians. The smaller mammals, especially rabbits and ground squirrels, undoubtedly furnished a much more abundant food supply in primitive times.

The animals seen by the writer during his four months stay included coyote, jackrabbit, badger, muskrat, and a small rat. The evidence afforded by the deposits in the cave shows that bighorn sheep, deer, and antelope were formerly to be found in the region in the order of abundance named.

Birds.—Song birds were plentiful in the thickets bordering Humboldt river. On the barren hills birds were not often seen by the writer, though a song bird built within the cave a nest which was robbed by rats. A hawk also reared a brood on the cliffs overhanging the cave. In early April the honk of the Canada goose was a familiar sound on Humboldt lake. In spring and summer many thousands of pelicans are to be seen at the lake or in large flocks high overhead.

Fishes.—Natches said that Humboldt lake yielded suckers and several kinds of minnows. It had great numbers of small fish which is confirmed by the thousands of pelicans who live upon its shores. The lake has no trout at present, though some Indians said that formerly there was a small mountain trout similar to the one now found at Elko.

Reptiles.—Rattlesnakes are quite common in Nevada, though none was seen within two miles of the cave. Several other snakes were seen sunning themselves near the entrance to the cave.

Several species of lizards were seen on the brush-covered hillsides. These included a dull brown species, a highly colored, long, round-bodied species, and the horned toad.

Mollusks.—Several years ago a large part of the valley was flooded. In consequence shells of fresh-water mollusks were exceedingly abundant. Samples secured were identified as *Anodonta oregonensis, Helisoma trivalvis, Stagnicola palustris nuttalliana, Lymnaea stagnalis wasatchensis,* and *Physa ampullacea.*

ARCHAEOLOGICAL SITES

Seventeen sites of former habitation by the Indians were found on or near the level floor of Humboldt valley. From the surface of these sites bones of 16 individuals, and 1464 implements, were found. All implements were found on the surface of the ground, uncovered by the shifting sands. In the case of the human remains sometimes only a bit of bone showed on the surface, and the remainder of the skeleton was excavated. However, all work of excavation on these sites was limited to only an hour or two one afternoon.

Skeleton remains were obtained from sites 8, 12, 13, 14, 15 and reported from sites 4 and 17. The sites are shown on plate 1. Measurements of crania from both the valley and the cave have been previously published.[37] A comparison with living Northern Paiute is discussed on page 32.

[37] E. W. Gifford, Californian Anthropometry, present series, 22:382, 1926.

The following table shows that the most numerous class of artifacts comprises 1052 chipped implements, most of them found on one site. The objects used in the preparation of seeds for food include shellers, grinders, "rubbing stones," metates, pestles, and large mortars. There is a total of 324 of these articles. This leaves a balance of 88 objects which include paint and medicine mortars, ice picks, sinkers of two types, hammerstones, flint crackers, pipes, various articles of stone, bone objects, and shell ornaments.

Among the stones used for shelling and grinding seeds it was found that sometimes one side of a stone was used as a sheller and the other side as a grinder. Of the shellers and grinders retained by the University there are 4 shellers to 1 grinder. It is assumed that nearly the same ratio would hold for the specimens which were sent to the Nevada Historical Society before being critically examined.

Site 1 was not visited by the writer, but he was informed by Mr. John Reed, of Lovelock, that Indians occupied the spot when he was a boy. He located it in section 29, township 26 north, range 31 east.

Sites 2 and 3 are quite large mounds or sand dunes on the Big Five ranch. Although both had been cultivated no one could be found who had done the plowing. Hence it is not known positively that they are archaeological sites. It may be said that a several-foot rise in the lake level would flood many square miles of the valley. Hence, any eminence, be it a sand dune or a gravel bar must at some time or other have been occupied by Indians.

Site 4 is a flat, rather widespread mound, perhaps some four or five feet higher than the general level of the plain. It is much less conspicuous than either 2 or 3, and is occupied by farm buildings. At one time the owner excavated a skeleton. About 1910 this mound was submerged by unusually high water, which gives further reason to believe that if site 4 were an archaeological site, the better situated and higher mounds 2 and 3, a mile away, were archaeological sites also.

To the east and northeast of site 4 there is low barren playa land, near which, and at the edge of the gently sloping alluvial fan washed from the mountains, is site 5, a low-lying patch of obsidian refuse, the remains from implement making. The Pugh brothers have obtained a cigar box full of specimens after much search but the writer was unable to find more than a half dozen.

The Northern Paiute lived near the railroad station at Toy, which constitutes site 6. The site appears to be only a few rods to the northeast of the station. Various implements at the station, including several large pestles, no doubt came from this site.

ARTIFACTS AND SKELETONS FROM SITES IN HUMBOLDT VALLEY

	Shellers	Grinders	Rubbing stones[a]	Metates	Mortars	Pestles[f]	Paint mortars	Hammer-stones	Flint crackers	Ice picks	Grooved sinkers	Perforated sinkers	Pipes	Problematical[b]	Chipped implements	Bone	Shell	Total artifacts	Human remains
Site 5														1	5			6	
Site 6		1					1	1		1	2							6	
Site 7															16			16	
Site 8	2		1			1	2								1			7	4
Site 9					1	4					1	2						8	
Site 10	5	2	8	4		1[f]		1										21	
Site 11	6	4[c]	9	1	4	4									8[g]			36	
Site 12	5	1[c]	5	1		1					1			1				15	2
Site 13	33	8[d]	41	1		7	4[h]	2	10	1		13	2	3	982	16	12	1135	4
Site 14	24[i]	6[e]	30	8[j]	4	26		1[l]							16			115	1
Site 15	8	2	10	2[k]	2	28	3[m]				1?							56	2
Site 16						1[f]				1			2		24		1	29	
Various[n]	1		2		3	6	1[m]					1						14	3
Total	84	24	106	17	14	79	11	5	10	3	5	16	4	5	1052	16	13	1464	16

[a] Shellers and grinders catalogued as "rubbing stones" and sent to Nevada Historical Society before critical study.

[b] Objects of unknown use, see plate 65 *j–n*.

[c] One specimen used as a grinder on one side and as a sheller on the other side.

[d] Two specimens used as both grinders and shellers and a third specimen of grinder made from a broken pestle.

[e] Two specimens used as both grinders and shellers.

[f] All pestles are of the V-type except those from sites 10 and 16 which are cylindrical.

[g] Exact site not recorded, but 10, 11, or 12.

[h] One mortar made in the broken end of a pestle.

[i] One sheller made from the broken side of a pestle.

[j] One fragment put to a secondary use as a sheller.

[k] Two small metate fragments put to a secondary use as shellers.

[l] Put to a secondary use as a grinder.

[m] Made in the broken ends of pestles.

[n] Specimens insufficiently labeled, all however not far from the shores of Humboldt lake.

At site 7 there is a patch of ground covered with obsidian and flint refuse and it was here that the writer found 16 chipped implements, besides a modern shoe button having a concretion of limestone about the iron eyehole. This would be an indication that the site was occupied by Indians in quite recent times, and even after they had adopted the civilized dress, as the chances for a white woman to have lost a shoe button exactly on an Indian campsite in the midst of a wide expanse of desert is rather remote. It is quite probable that careful search would reveal Indian relics at most any point along the ancient Lahontan gravel bar reaching south from Granite point. However, it would be only at certain spots that implements would be most common. A few objects were obtained from the end of this ridge near the lake, site 8 of the map.

Sites 9 to 16 are to the north of Humboldt lake. They are patches of ground several hundred feet in diameter strewn with artifacts and rock refuse fragments. In some cases the area of the site is one or two feet above the general level of the drifting sands. With a slight rise of water in the lake they are flooded. The pestles and mortars are then moved about by the waters over a radius of a quarter of a mile or more. There are, no doubt, other sites in this area, not located by the writer or buried in drifting sand. While all of the sites are much alike several have marked individual characteristics. Site 13 was noted for the manufacture of chipped implements, of obsidian and brightly colored flints, probably either siliceous sinter or chalcedony. There were many bushels of refuse chips exposed and the writer collected about a thousand worked specimens. Another site, located in 1924 on the Decker ranch, was apparently a manufacturing site for objects of slate, the source of the material probably being in the Humboldt range a few miles to the south.

Site 17 is a burial ground at the foot of a cliff on a rock outcrop 9 miles northeast of the lake. (Sec. 13, T 25N, R 31E.) In prospecting for nitrate deposits at the base of the cliff half a dozen skeletons have been found. Pictographs on the cliff were also uncovered. Northern Paiute Indians formerly visited the place to lick the nitrate salts from the face of the cliff, hence it was known as "Medicine Rock."[38]

[38] H. S. Gale, Nitrate Deposits, U. S. Geol. Surv., Bull. 523, 1912. Gale also reports a cave (or more properly a rockshelter) a mile to the southwest, used as a burial ground. The writer confirmed the report by a visit in 1924 and found human bones.

Site 18 of the map is Lovelock cave, previously described, while site 19 is Ocala cave, 10 miles to the southwest. Textiles, cordage, decoys, etc., were obtained from the latter cave and will be described later.

ARTIFACTS OF STONE

Mineralogical Classification

Like the stone artifacts[39] of San Joaquin valley, many are incrusted with a layer of limestone precipitated at times when Humboldt lake has flooded the valley. In some cases this crust is as thick as an eggshell; in other cases it merely fills the pores and has the effect of hardening the surface of the stone. In a few of the finer specimens this coating was dissolved away in an acid bath. The encrusted objects make clear that Indian occupation of the valley must have been interrupted by rises in the lake level.

Typical examples of stone were selected and taken to Professor George D. Louderback of the University of California for identification. Three microscopic slides were made, as follows: 1–17494 (pl. 64*e*), a hammerstone of hornfels, a metamorphic slate or shale, produced near the contact of granite diorite or rock of similar type probably during the Triassic period; 1–17620 (pl. 63*a*), a grinder of coarse granular diorite of pre-Cretaceous age; 1–17629, a shelling stone of quartzite.

By comparison with 30 specimens from the valley sites and a few specimens from the cave identified by Professor Louderback, the writer has increased the identified specimens to 221, as shown in the following table. Approximately half of each class of implement was sent to the Nevada Historical Society before the mineral identification was made. For this reason the following table lists only slightly more than half as many specimens as the preceding table, but it includes some twenty specimens sent away whose mineral composition is known with sufficient accuracy.

Rhyolite is the most commonly used stone material and is the favorite material for pestles, about three-fourths being made of the various varieties, while the remainder are made of a compact basalt.

Rhyolite tuff is commonly employed for shelling stones, although rapidly wearing away with use. A small sized mortar and pestle, perhaps carried when traveling, were made of a fine-grained tuff material of unusual compactness. This use of tuff is exceptional.

[39] E. W. Gifford and W. E. Schenck, present series, 23:115, 1926.

MINERAL MATERIALS OF ARTIFACTS

	Shellers	Grinders	Rubbing stones	Metates	V-type mortars	Paint mortars	V-type pestles	Ice picks	Hammer	Flint crackers	Big sinkers	Perforated sinkers	Pipes	Various	Total
Compact basalt	1	3[c]		1			10							1[a]	16
Black vesicular basalt	1	1			7							2			11
Red vesicular basalt	7	1	1												9
Rhyolite (red or pink exterior)	3			1	1	4	12[b]		1		1	1			24
Rhyolite (gray exterior)	7[d]	2[e]		2	1[f]	1	14[g]		1	1	1[h]	2[h]			32
Vesicular rhyolite (hard)	13			2[i]											15
Rhyolite tuff (soft)	15			1	1[j]		3				2	1	2		25
Various metamorphic stones	1[k]	2[l]		1[m]				2[n]	1[o]						7
Granite	7	8	7	1					1[p]						24
Quartzite	22[q]	6[r]	1	2[s]						4	1	4		2[t]	42
Limestone										2		2	1	3[u]	8
Lahontan conglomerate	4			1											5
Slate								1				2			3
Total	81	23	9	12	10	5	39	3	4	7	5	14	3	6	221

[a] 1–18633 (pl. 65*l*), a compact black stone with a few small white crystals, general appearance of basalt, but possibly some metamorphic stone like diorite.

[b] 1–17833, of light brick red, altered granitic appearance with conspicuous mica grains; one specimen, 1–17666 (pl. 60*d*), best pestle in the collection, dense flinty chocolate colored rock filled with quartz crystals.

[c] 1–17621 (pl. 63*h*), doubtfully classed as basalt.

[d] 1–17399 (pl. 62*c*), 1–17415, 1–17623, pea green in color; 1–17416, 1–17511 of granitic nature.

[e] 1–17397 of altered granitic appearance with numerous small obsidian (?) grains.

[f] 1–17449, possibly rhyolite tuff.

[g] 1–17376, granitic appearance, numerous grains of obsidian; 1–17670, 1–17671, 1–17680, fine grained rock, numerous specks of mica.

[h] 1–17825 (pl. 64*b*), 1–18629 (pl. 65*f*), decomposed granite or more probably rhyolite.

[i] Broken metates, 1–17700, 1–17702 (pl. 62*a*) put to a secondary use as shellers.

[j] 1–17731 (pl. 60*g*).

[k] 1–17729, medium granular diorite.

[l] 1–17612, 1–17620 (pl. 63*a*), coarse granular diorite.

[m] 1–17758 (pl. 60*q*), cross between basalt diorite and hornfels.

[n] 1–17597 (pl. 64*h*), hornblende granite or granodiorite; 1–17822 (pl. 64*i*), felspar decomposed but specimen appears to be hornblende syenite.

[o] 1–17494 (pl. 64*e*), hornfels.

[p] 1–17388 (pl. 63*b*), put to secondary use as grinder.

[q] 1–17517, 1–17635, sandstone, chiefly of quartz.

[r] 1–17522 (pl. 63*j*), one side grinder, one side sheller; 1–17526 (pl. 63*e*), primarily fragment of a pestle.

[s] 1–17426, metate fragment used as a sheller.

[t] 1–17719 (pl. 65*j*), 1–17760 (pl. 60*a*), cylindrical pestle.

[u] 1–17531 (pl. 65*m*), 1–18589 (pl. 65*n*), 1–18635 (pl. 65*k*).

Perhaps the only artifact for which tuff is well adapted is the tobacco pipe. Gilbert Natches spoke of marble as the favorite Northern Paiute material for this purpose. However, the kind of pipe known in Northern Paiute as atsa-tohizA, "red-pipe," was made of brick-red tuff. Only two pipes of tuff were found (pl. 65*o, p*). One is brick-red, the other is drab. Practically all other specimens of tuff are gray.

Vesicular rhyolite is hard, almost glassy, yet easily worked into shape, as a light tap with a hammerstone breaks down the walls of the vesicles. Two fragmentary specimens of diminutive metates (pl. 62*a*) were made of this material. It ranks third in favor as a material for shellers, and the crudest of all these implements are made of it, as is seen in plate 61*c*.

Quartzite is one of the most common materials used. It is durable and not easily broken. Shelling stones of quartzite are generally roughly rectangular and used on both sides. In only a small minority of cases does there appear to be a definite attempt to fashion these implements into pleasing form. Quartzite is however, along with marble, a favorite for making small objects of aesthetic form. It also makes the best small hammerstones used for the cracking of flint.

Granite was preferred for grinding stones. Natches said volcanic tuff and lava did well enough for shellers, but that rock such as granite (muatepI) was needed for grinding. In the preceding table one-third of the grinders are listed as granite. This is misleading, since the greater wear of the granite grinders indicates more extensive use in comparison with the scant wear of the grinders of other materials. Granite grinders are also more carefully shaped. Quartzite grinders stand second to granite grinders in frequency, but are much inferior in workmanship. Close-grained basalt was a favorite material for pestles.

The large V-type mortars, with but few exceptions, are of very hard, durable, coarse vesicular basalt. The steam holes near the rim in some specimens are over a centimeter in diameter, while at the bottom they are much smaller. Doubtless these holes interfered with the perfect grinding of all the seeds, but otherwise the material is well adapted.

Vesicular basalt of brick-red color is commonly employed for shellers, of which two specimens are shown (pl. 61*a, b*).

Specimens of slate consist of one ice pick, 1–17823 (pl. 64*g*) and two perforated sinkers, 1–17644 (pl. 65*d*) and 1–18630. The three specimens from the valley sites, as well as several from the cave, are

black in color and so tough that they break with great difficulty. Another specimen is a hammerstone (pl. 64*e*) made of flinty hornfels altered from slate.

The seven specimens made from various metamorphic stones are among the finest specimens in the collection. The two grinding stones, for instance, are in no wise inferior to those made of granite.

Seed Grinding Implements

Stone shellers.—Nearly two-thirds of the shellers (TUSU) are used on one side only. As a rule the side used is flat. Four specimens, two of which are shown in cross-section in figures 19*a* and 19*c*, are convex on the side used. These had been used to shell seeds on the concave surface of a metate, while as a rule shelling was probably done on a perfectly flat basket huller and in consequence the surface of the sheller would be worn perfectly flat.

In five specimens one side of the stone is flat for use as a sheller, while the other side is rounded for use in grinding the seeds after being shelled. Plate 62*a* shows a fragment of a small metate used as a sheller; figure 19*c* shows a cross-section of the same. Besides this specimen there were two other small metate fragments similarly used as shellers. Plate 62*b* shows a fragment from a large V-type pestle. It is another illustration of the tendency to use broken implements for some new purpose. It had been used on a concave surface as a sheller.

In few cases are shellers beautifully and symmetrically fashioned. Those shown on plates 61 and 62 are picked specimens, rather than average. The majority are roughly rectangular or elliptical, but irregular shapes are frequent. In specimens where only one side is used there is seldom any shaping of the upper surface.

Plate 62*c* shows the finest specimen in the entire collection both as regards beauty of form and quality of stone. It is of beautiful fine-grained rhyolite of pea green color. Two or three other specimens approach it, but have less pleasingly rounded upper surfaces.

The accompanying text figures show cross-sections of the largest and smallest, the thickest and thinnest of shellers, as well as grinders, in the collection. There is in these regards great variability. If the seeds were small with comparatively soft shells then the shelling stone was of small size, while for larger and harder shelled seeds a heavier stone was used. The specimen of rhyolite mentioned above is

the largest, having the dimensions of 232, 153, and 56 mm., and weighing 3003 grams (106 oz.). It was identified by Natches as the kind used to shell the seed of the triangular-stemmed tule. The second heaviest specimen, 2313 grams (82 oz.), 1–17495, was suitable to shell the seeds of bunch grass (wai). It is of hard compact gravel conglomerate, and roughly rectangular in form, with the dimensions of 247, 170, and 33 mm.

Typical specimens made of rhyolite tuff weigh about 30 ounces. Ten specimens of quartzite average 21 ounces, while those of vesicular rhyolite are lighter.

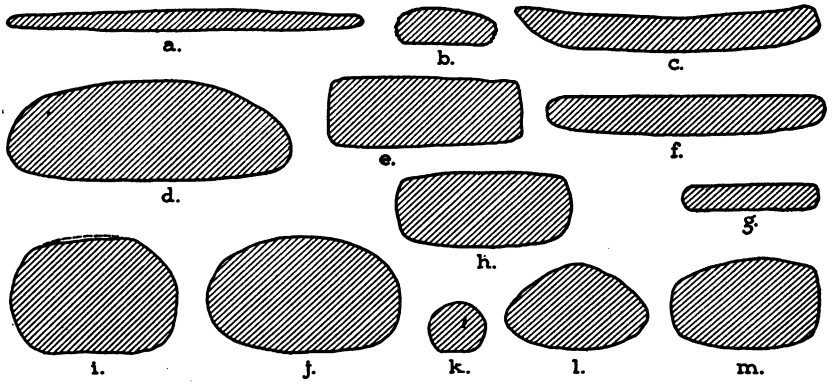


Fig. 19.—Cross-sections of shellers (*a–g*) and grinders (*h–m*). *a*, plate 61*a*; *b*, pl. 65*h*; *c*, 62*a*; *d*, 62*c*; *e*, 62*f*; *f*, 61*e*; *g*, 61*g*; *h*, 63*f*; *i*, 63*b*; *j*, 63*a*; *k*, 65*l*; *l*, 63*d*; *m*, 63*h*.

Three of the five lightest specimens are shown on plates 61 and 62 and weigh as follows: 1–17432, red vesicular basalt, 328 grams; 1–17521, black vesicular basalt, 321 grams; 1–17720, quartzite, 254.3 grams. Natches said that the last was probably used when traveling. Both sides are perfectly flat and parallel (fig. 19*g*). The dimensions are 126, 74, and 15 mm.

A specimen of sandstone, 1–17527, which is probably a sheller, has the peculiarity of notches or finger holds on opposite edges. The dimensions are 122, 70, and 22 mm. Its weight is 305.5 grams. It resembles a Californian disk-shaped, notched sinker.

The edges of shellers have no regulation form. In the case just noted there is a notch on opposite edges for the accommodation of the thumb and fingers. One specimen, plate 61*d*, has serrate notches, 8 on one edge and 14 on the other. Many specimens have definitely shaped vertical edges of which text figures 19*e* and *g* are good

examples. A great number have irregular edges sloping toward the bottom as in plate 62*b, d*. A few have rounding edges like plate 62*c* (also fig. 19*d*). Some shellers have had long use and are worn very thin with sharp edges as in plate 61*c*. The smallest sheller weighs 73 grams. It is shown on plate 65*h*, also figure 19*b*. It is so diminutive, 55 by 50 by 21 mm., that it may be a child's toy. Its lower surface is perfectly flat and highly polished by much use. It is made of gray vesicular rhyolite.

Grinding stones.—The muller or grinding stone (Northern Paiute, wikwano) for grinding seeds into meal, is not flat on the used surface, but is rounding, as shown in figure 19*h, i, j, l, m*. While the sheller is employed with one hand, moving lightly over the seeds with a rotary motion, the grinder is used with both hands, bearing heavily upon the seeds with a rolling motion. The seeds are placed on the narrow end of a metate (see pl. 60), and as they are ground, the meal is gradually driven by the rolling, pushing motion toward the opposite end of the metate. The grinder is usually an elongated rectangle, as shown on plate 63*d*. Humboldt valley, however, shows an unusual number of elliptical and nearly square grinders.

Plate 63*j* is a convex grinder on one side and a flat sheller on the other. Primarily it is a sheller for use on a small flat basket. The grinding surface is but slightly rounding and probably had been used to but a limited extent as a grinder. Five others were put to similar double use being shellers on one side, and grinders upon the other. In three cases both sides were used to some extent for grinding. Plate 63*i* shows one of these. It is of pale granite with ferrous stains. The Northern Paiute used this type to crush medicinal roots and also to mash a small red berry (weyupuie).

Plate 63*b* shows an example of a hammerstone used on one side as a grinder. Figure 19*i* shows the extent to which it has been flattened by use. The upper side has lost a little of its original symmetry due to the weathering and flaking of the stone surface. Plate 63*e* shows what appears to be a fragment of a pestle used as a grinder. In plate 63 all figures except *i* and *j* show the upper face rather than the used surface.

Plate 63*d* is symmetrically triangular in cross-section, as shown in text figure 19*l*. It is the finest specimen of the collection. The dimensions are 172, 77, and 47 mm. It is of granite and weighs 1028 grams. The average weight of the 10 specimens shown on plate 63 is 945 grams, the range being from 1690 grams for figure *b* to 452 grams for figure *j*.

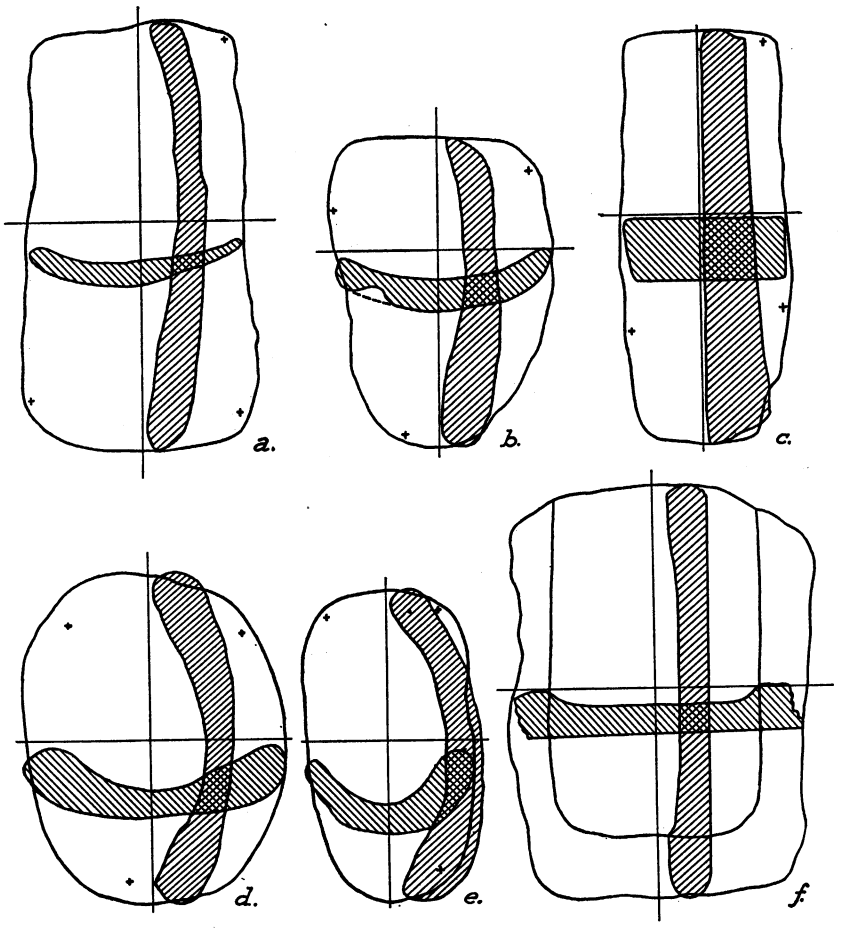


Fig. 20.—Outline and cross-sections of metates. Small crosses indicate three highest points on upper surface; straight lines, the places cross-sectioned and the relative position of the plane of the three highest points in reference to the cross-sectional drawings. *a*, 1–17756, site 10, length 600 mm., width 320 mm., height 84 mm., depth of basin below plane of 3 highest points 55 mm. (pl. 60*n*); *b*, 1–17758, site 10, length 440 mm., width 306 mm., height 85 mm., depth 36 mm. (pl. 60*q*); *c*, 1–17733, site 11, length 560 mm., width 227 mm., height 90 mm., depth 3 mm. (pl. 60*p*); *d*, 1–4197, "*said*" to have been found in 1862 under 20 feet of calcareous tufa in the auriferous gravels of Gold gulch, Tuolumne county, Calif., associated with other stone artifacts and with fossil bones of the mastodon and other extinct mammals, described and illustrated as no. 13 of C. D. Voy collection by W. H. Holmes, Ann. Rept. Board Regents Smithsonian Inst. 1899, pl. 3, length 470 mm., width 375 mm., height 108 mm., depth 74 mm.; *e*, 1–4199, from auriferous gravels (?) of El Dorado county, Calif., mentioned by Holmes (*op. cit.*) as no. 15 of Voy collection, length 450 mm., width 230 mm., height 123 mm., depth 80 mm.; *f*, 2–9691, from Silver creek, east central Arizona, length 600 mm., width 420 mm., height 55 mm., depth 22 mm.

When either grinder or metate becomes smooth, it does not perform its functions so well as when rough. Hence, among the Northern Paiute, from time to time, their surfaces are pecked.

Metates.—After seeds have been hulled and the hulls winnowed out, the kernels are placed on a metate (Northern Paiute, mata) to be ground into meal. The metate was usually oval in shape and was placed on a buckskin or in more recent times on a piece of canvas. The seeds were placed on the narrow end of the metate, which was toward the person grinding. As the grinding progressed the meal was pushed away, the finished product falling upon the buckskin.

There were 11 complete metates, of which 5 are shown on plate 60, ranging in length from 16 to 24 inches, in width from 8 to 16 inches, and in thickness from 2 to 4 inches. Figure 20*a–c* shows forms and cross-sections of three typical specimens. It will be seen that there is no symmetry of form, such as is usual in the Pueblo region. Some are roughly rectangular, although the oval form is a favorite. The end toward the operator is thicker than the opposite end. The Klamath Lake Indians appear to have had metates not essentially different from those of Humboldt valley.

In the table of "Artifacts and Skeletons" three specimens are listed as metates which after being broken had been put to secondary use as shellers. One specimen is shown on plate 62*a* and figure 19*c*. Natches said that small metates of this type were used for grinding roots or leaves for medicine.

Mortars.—The two classes of mortars (Northern Paiute, paha) are shown on plate 60. The large mortars are with few exceptions made of a coarse-grained, black, vesicular basalt.

The largest and finest mortar is shown in plate 60*f*, a cross-sectional view in figure 21*a*. It is 47 cm. high, 42 cm. in diameter, and weighs 188 pounds. The inside diameter of the bowl is 26 cm. and it is 31 cm. deep. The bowl has a peculiar shape, running to a point in the bottom.

Although there are many variations in the form of mortar pits, most of them can doubtless be placed in four types which we will designate as the V-type, the O-type, the U-type, and the W-type. All mortars of the Great Basin region, used for grinding seeds, are of the V-type, so far as known. They are used with a pointed pestle which produces a deep V-shaped pit as shown in figures 21*a* to 21*d*. In the O-type the bottom of the pit is rounded as in figures 22*b–f*. Many Californian mortars are of the U-type, that is, with a pit having

vertical sides and a comparatively flat bottom, or of the W-type with the bottom of the pit flat but the sides sloping like the sides of the letter W.

The V-type of mortar is known in eastern Oregon. Specimens of the same shape though smaller in size are found on the western slope of the Sierra Nevada in at least ten counties—Modoc, Lassen, Tehama, Yuba, Placer, El Dorado, Amador, Tuolumne, Mariposa, and Fresno.

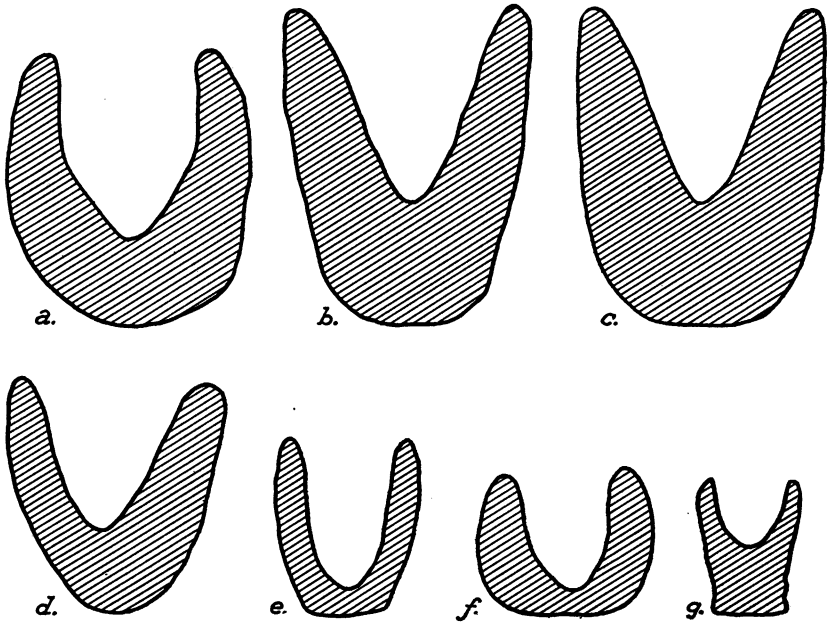


Fig. 21.—Vertical sections of large mortars. *a*, 1–17713, depth of pit 315 mm. (pl. 60*f*); *b*, 1–22214, unknown provenience, brown vesicular basalt, diameter 425 mm., height 535 mm., depth 330 mm.; *c*, 1–22213, unknown provenience, red rhyolite, diam. 450 mm., height 540 mm., depth 315 mm.; *d*, 1–17830, Humboldt valley, Nevada, vesicular basalt, diam. 375 mm., height 390 mm., depth 250 mm.; *e*, 1–4902, Big valley, Lassen county, Calif., compact basalt, diam. 241 mm., height 290 mm., depth 248 mm.; *f*, 1–4205, Gold Springs gulch, Tuolumne county, Calif., rhyolite, diam. 300 mm., height 240 mm., depth 195 mm.; *g*, 1–4214, Shingle springs, Eldorado county, Calif., sandstone, diam. 166 mm., height 230 mm., depth 114 mm. All figures drawn to same scale, about $\frac{1}{12}$ natural size.

This probably means that the type is found throughout the entire length and on both sides of the Sierra Nevada. Whether it reaches the lower levels of the Sacramento and San Joaquin valleys is not known, though it has been found in Tehama county, at Vina, near the junction of Deer creek with the Sacramento river. West of the Sacramento the type is also found in Yolo, Napa, and Sonoma counties.

Specimens have been derived from San Nicolas and San Clemente islands off the southern Californian coast. The type is widespread, though Californian specimens do not exceed medium size. The very largest, such as those shown in figures 21*e, f,* are quite diminutive compared with the enormous specimens typical of Nevada.

Among the older collections of the University of California are two mortars of unknown provenience, though perhaps from Nevada, shown in cross-section in figures 21*b, c.* The first, made of a brown rhyolite with large bubble holes, stands 21½ inches high and weighs 170 pounds. It has been symmetrically fashioned outside as well as inside. It was only roughly blocked out with a heavy hammerstone, leaving rough faces several inches square. The second specimen, made of red rhyolite, is of the same height and weighs 212 pounds. Like the large specimens from Nevada, it was made from a natural boulder and has never been subjected to any precess of shaping on the outside.

As regards the use of large mortars, Natches said that after cattail seeds had been gathered and the "wool" burnt from them (see page 159), they were placed in a big mortar "two feet high" and the largest sized pestles used in cracking the shells. Then the seeds were again subjected to heat and the shell separated, after which the meal was ground fine on a metate. A band of people, men, women, and children, could produce four or five sacks full of meal by a day's strenuous labor. Often meal from two or three kinds of seeds was mixed with it when it was cooked into porridge.

One of the smaller mortars of vesicular basalt is shown in plate 60*e.* It is 30 cm. high and 37 cm. in diameter, with a pit 21 cm. deep. Plate 60*g,* shown also in cross-section in figure 22*a,* is 23 cm. high, is made of rhyolite tuff, and was said to be of the regular type used by the Northern Paiute when traveling. Two perforations near the rim, 8 mm. in size, were for the purpose of suspension. The weight of the mortar is 14 pounds, and of the associated pestle (pl. 60*h*), 2.56 pounds.

V-type pestles.—The Northern Paiute name for pestle, regardless of size or type, is podano. The characteristics of the pestle here described are (*a*) the unusually large size of many specimens; (*b*) a great bulging in the center with a tapering toward both ends; (*c*) the V-shape of the end that is used for grinding, a shape adapted to fit the V-shape pit of the mortar; and (*d*) either a rounded or flattened top suitable for fitting in the palm of the hand while the extended fingers cling to the sides, much as the rays of a starfish would grasp a stone.

The largest complete specimen obtained in Nevada (pl. 60*d*) is 43 cm. long, 42 cm. in circumference, and weighs 23.5 pounds. Like many pestles of this type it is slightly elliptical in transverse cross-section, with diameters of 12 and 14 cm.

Although the table lists 77 pestles, most of them were broken. On the basis of 8 typical specimens which are nearly complete it is estimated that the average pestle would weigh about 20 pounds, would be 37 cm. in length and 40 cm. in circumference. The greatest length of any specimen is 45 cm. The greater circumference, unfortunately that of a broken specimen, is 47 cm. As a rule the circumference is from 2 to 6 cm. greater than the length.

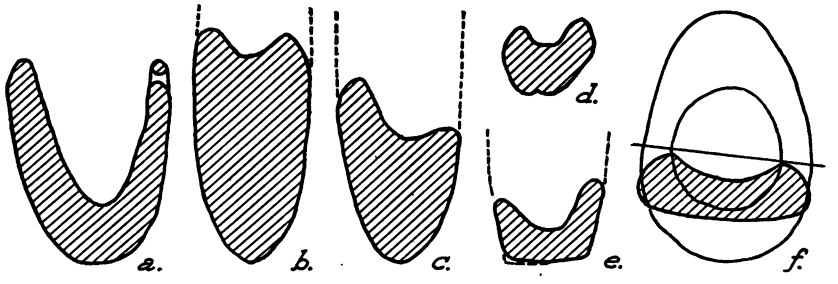


Fig. 22.—Vertical sections of small mortars from Humboldt valley. *b, c, e,* paint and medicine mortars made in broken ends of pestles; *f,* also outline of medicine mortar. *a,* pl. 60*g*; *b,* 60*m*; *c,* 60*l*; *d,* 64*f*; *e,* 60*j*; *f,* 60*s*. All figures drawn to scale of about ⅛ natural size.

The specimens illustrated (pl. 60*b, k*) were selected because of their abnormally small size. The smallest (pl. 60*k*) is 25 cm. in lengh, 31 cm. in circumference, and weighs 6.81 pounds. The very smallest V-type pestle was found inside of an inverted mortar, which had perforations near its rim, so that it might be suspended when traveling. The two specimens are shown as plate 60*g, h*. The pestle is crudely fashioned of an unusually compact rhyolite tuff. Its dimensions are: length, 23 cm.; circumference, 22 cm.; greatest diameter, 8 cm.; least diameter, 5 cm.; weight, 2.56 pounds.

Plate 60*i* is one of two specimens which belong to the older collections of the University. Their provenience is not known. They, as well as one of the mortars previously described, came from an arid region and had lain upon a playa bed, as they are saturated with alkaline salts. Therefore, if they are from California, they must either have come from east of the Sierra Nevada or from the arid regions of southeastern California. The specimen illustrated weighs

26.5 pounds. It is 65 cm. long, with major and minor diameters of 13 and 14 cm. It is illustrated because so large and perfect, and because it is so typical in every respect of the common pestle of Humboldt valley.

Cylindrical pestles.—There are only two specimens of the cylindrical type of pestle, although three other specimens which we have classed as hammerstones might perhaps be regarded as pestles. The specimen illustrated as plate 60*a* is uniform in diameter from one end to the other. It is elliptical in cross-section with diameters of 7 cm. and 6 cm. The length is 28 cm. and it weighs 2066 grams (4.5 pounds). It is made of quartzite. The second specimen, 1–17792, now in the possession of the Nevada Historical Society, is of similar proportions, 21 cm. in length by 6 cm. in diameter. Both have flat ends. Natches said that the Northern Paiute used both the small cylindrical flat-end type of pestle and the large V-type of pestle.

Paint and Medicine Mortars

As is shown on plate 60*j, l, m,* paint mortars were often made in the broken ends of pestles. The longitudinal sections of these specimens are shown in figure 22*e, c, b*. Figure 22*d* shows also a sectional view of a paint mortar made from an irregularly shaped pebble of red rhyolite; it has an encircling groove as is shown on plate 64*f*. Plate 60*s* and figure 22*f* show a flattish stone of pink rhyolite, on the side of which there is a shallow mortar depression for the grinding of medicine, according to the statement of Natches.

Implements of Percussion

Hammerstones.—Five hammerstones are listed in the table of "Artifacts and Skeletons." Where an object was put to two uses, it is listed with the rarer. Thus, 1–17388 is placed with the hammerstones though it has been illustrated on plate 63*b* (also fig. 19*i*), and partially described as a grinder. It is made of granite, has a length of 16 cm., a maximum diameter of 5.6 cm., and weighs 1690 grams.

A second hammerstone, 1–17494 (pl. 64*e*) has been mentioned as being of a tough black hornfels. Despite its exceeding toughness, it has been subjected to such hard usage that large chips over 7 cm. in length have been broken from one side as is seen in the illustration, which also shows the marks made by the mineralogist's hammer when he broke off a small chip for a microscopic slide. Four or five blows

were required to break off the little fragment. The specimen is a naturally shaped pebble, except for the striking end which was worked down to a convex pestle-like surface. Such work must have required considerable skill and labor. The object has a length of 16 cm., a maximum diameter of 7.5 cm., and a weight of 1280 grams.

Plate 64*d* shows a hammerstone of gray rhyolite, 13.5 cm. long and weighing 1557 grams. In cross-section it is not round, but has four convex sides. The minimum diameter is 85 mm., the maximum diameter 92 mm. A hammerstone of closely similar size and proportions, 145 mm. long, 85 mm. in diameter is now with the collections of the Nevada Historical Society.

The fifth specimen of hammerstone, 1–17493, is a natural pebble of red rhyolite, 19 cm. in length, elliptical in cross-section, with diameters of 73 and 58 mm., and weighing 1200 grams.

Flint crackers.—Flint crackers are very small hammerstones. Though they might possibly be put to other uses than cracking flint, this is undoubtedly their chief use. There are 10 specimens, all found on site 13, the great chipped-implement manufacturing site, where nearly a thousand worked specimens of obsidian, chalcedony, etc., were found along with bushels of flint refuse. The largest flint cracker, 1–17648, is a naturally shaped, flattish, elongate, oval limestone pebble, 88 mm. in length, weighing 163 grams. Next in size are two similarly shaped pebbles about 8 cm. in length, 1–17650, and 1–17651. One of these is made of quartzite, and is 80 grams in weight. The other is of gray rhyolite and is 70 grams in weight.

Four flint crackers are shown on plate 65*i, r, s, t*. Size and weight are given in the explanation of the plate. Plate 65*i* is a knife-shaped object of somewhat problematical use. Natches was unable to say what it was. It may be a fragmentary object or the fractures seen at the widest end may have been caused by its use as a hammer. Plate 65*r* shows a beautifully shaped object of marble, which is unquestionably a flint cracker used in light work, as it has bruise marks at both ends caused by hammering. It is the lightest specimen of the flint-cracker class, 27.2 grams. Plate 65*s* shows a naturally shaped pebble except for the ends. One end has been flattened and shows pecked marks over an area 16 mm. in diameter, while the other end shows similar marks over a somewhat smaller area. Plate 65*t* shows an object of quartzite which has been deliberately shaped. It has a flattened area 15 mm. in diameter at the end, where it was employed in hammering. No. 1–17649, in the possession of the Nevada Historical Society, is of closely similar shape, but flattened at both ends.

From site 13 there are 7 specimens each catalogued as "cylindrical pebble, 2¼ inches long," or "round, elongate, oval stone, 3⅛ inches long," or in words of similar meaning. Some of these sent to the Nevada Historical Society may be natural pebbles used as flint crackers and showing such evidence at their ends, or they may not be artifacts at all. A reexamination would be necessary to determine the facts, but at any rate at least ten objects found on site 13 are undoubtedly flint crackers as would be judged not alone from an examination of the specimens, but also from the testimony of Natches.

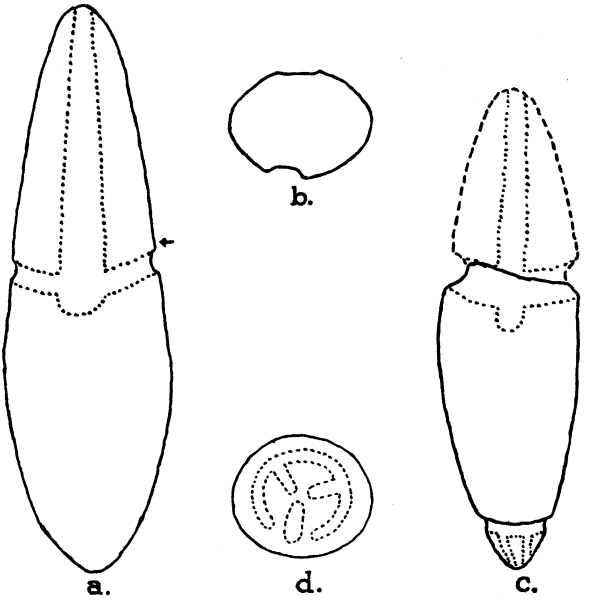


Fig. 23.—Ice picks from Humboldt valley. *a*, pl. 64*g*, purchased at Toy; *b*, cross-section of *a* at arrow; *c*, pl. 64*i*, restored; *d*, lower end of *c*.

Ice picks.—Fishing in the winter often required that holes be broken in the ice. Three specimens of ice picks are illustrated on plate 64*g, h, i*. One is undoubtedly from site 6 or some near-by locality in the valley. The other two specimens were found on sites 13 and 16. A fourth specimen from the cave is shown on plate 54*a*.

The three specimens from the valley are of tough durable stone. Natches said that such stone belonged to the Pit River Indians, or in other words, the traditional ancient people. Natches stated that specimen 1–17823 (pl. 64*g*) was attached to a stick for a handle and used to break ice or anything that was difficult to break, that is to say, it was used as a sledgehammer. Sometimes it might be attached to a handle and used as a pestle for grinding seeds in large mortars.

All three of the specimens illustrated on plate 64 have both longitudinal and encircling grooves for the purpose of attaching handles. Plate 64*g* is shown again in figure 23*a, b*. In addition to the grooves entirely girdling the pick near the center, it has one longitudinal groove in front and another in a corresponding position in the back. Plate 64*i* shows a fragmentary specimen. Figure 23*c* is a hypothetical restoration. It has a very deep encircling groove and one, probably two, longitudinal grooves in similar positions to those of plate 64*g*. The striking end of the pick has grooves arranged in a pattern as shown in figure 23*d*. Plate 64*h* appears to be an ice pick, but is of different construction from the others. The pointed end is undoubtedly the end that was used, as it is slightly bruised. It has one encircling groove and one longitudinal groove.

Sinkers

Grooved sinkers.—Natches said that the specimens, shown as plate 64*a–c,* were sinkers. They lie still upon the bottom of the stream in eddies where the water is swift. The largest is 23 cm. long and weighs 3.8 pounds. It has a roughly pecked encircling groove 4 or 5 mm. in depth for the attachment of a cord. The smallest specimen, 155 mm. long and weighing .82 pound, has a slight constriction in the center. The third specimen is described in the explanation to plate 64*c*. A fourth specimen, 1–17824, is in the possession of the Nevada Historical Society; is 21 cm. long, 8 cm. in diameter, and is shaped like plate 64*c,* but has an encircling groove 4 or 5 mm. in depth. The fifth specimen, 1–17712, is fragmentary and doubtfully classed as a sinker.

Perforated net sinkers.—The first seven figures of plate 65 show the perforated type of net sinker called natepI by the Paiute. An examination of plate 65 and its explanation shows a considerable range in size. The object of smallest diameter, plate 65*f,* is one of the thickest. Natches said it was intended for a sinker, but the perforation had not been completed. The specimen in plate 65*g* was broken before the perforation was completed.

Plate 65*n* shows a fragmentary specimen resembling the net sinkers. It is a well polished, symmetrically shaped piece of marble with a small perforation at the broken edge and a longitudinal groove on one side. It is thin and light in weight. Natches could not identify it.

As seen in the preceding tables, perforated net sinkers are very common and are made of a variety of minerals. The most perfectly

shaped specimens are of marble and slate. The average diameter of 20 specimens from both the valley and the cave is 64 mm., and the average thickness is 14 mm. The average weight of 15 of these is 85 grams. Closely similar objects from Arizona and New Mexico have been described as spindle whorls.

Pipes

Pipes, Northern Paiute, tahizA, are among the rarest of objects in the valley north of Humboldt lake. Three specimens are illustrated on plate 65*o*, *p*, *q*. The same are shown in longitudinal section in figure 24*a–c*. Natches stated that the Bannock had crooked pipes thus implying that the Paiute had only the straight-bowled type.

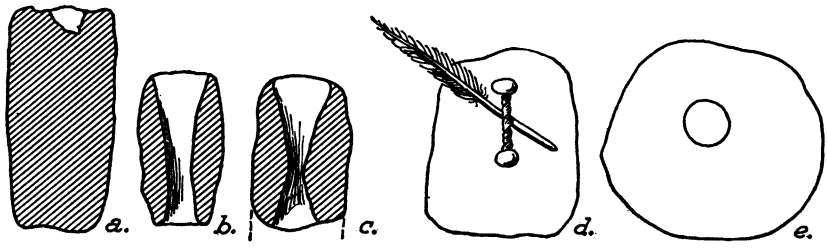


Fig. 24.—Sections of pipes, and abalone ornaments. *a*, pl. 65*q*; *b*, pl. 65*o*; *c*, pl. 65*p*; *d*, 1–18656, abalone ornament showing manner of tying to hair braid and of attaching feather ornament; *e*, 1–18654, ear ornament of abalone.

The bowls are often very short. For this reason a stem of willow is inserted. Plate 65*p* is an incomplete specimen, while the perforation of the specimen shown in plate 65*q* has only been begun.

Problematical Objects

The table of "Artifacts and Skeletons" lists 5 problematical objects, all shown on plate 65. The dimensions and weights are given in the explanation of the plate. Plate 65*j* is an object of quartzite pecked and ground into rectangular shape. The maximum thickness is 14 mm. but the object is somewhat lenticular in both cross and longitudinal section, the minimum thickness near the edges being 7 mm. It cannot be surmised for what purpose it could have been used. It has never been used as either a sheller or a grinder, as pecked marks show on both faces.

Plate 65*k* is a limestone pebble black in color and having a shallow groove encircling it.

Plate 65*l* is of the shape and size of flint crackers, but it shows no bruised marks upon either end and one side is flat as shown in the cross-sectional drawing, figure 19*k*. One suggestion is that it might be a child's toy grinder.

Plate 65*h* has already been described as a possible toy sheller, though plate 65*h, l* might be abrading implements.

Plate 65*m* shows a fish-shaped object made of marble. It has two longitudinal grooves and a groove encircling it at one end, as if it were intended for suspension by a cord. There is a short groove at the other end shaped like a fish's mouth. The object is probably a pendant.

Plate 65*n* has been described with perforated net sinkers which it superficially resembles.

ARTIFACTS OF BONE

Bone awls.—The Northern Paiute name for awls, needles, punchers, and drills whether made of stone, bone, or wood is witE. Of the objects called oho-witE, "bone-awls," 15 were found on site 13. Although no attempt was made to identify the animals from which the bones were derived, they are undoubtedly from one of the three artiodactylian species common to the region, deer, antelope, or bighorn sheep. Seven specimens of bone awls from site 13 are shown on plate 66. They are in general rather crude in design. Plate 66*e* shows one with a spiral incision making six turns. There are also about twenty short notches on opposite edges of the upper portion of the awl, making about forty notches in all.

Problematical bone object.—Plate 66*h* shows a flat rectangular piece of bone having the dimensions of 43, 26, and 4 mm. It is polished on all sides and has 10 faint notches on one edge. A fragment has been broken from the other edge, but it still shows 5 notches.

ARTIFACTS OF SHELL

The following list shows 13 objects of shell. All except one perforated olive shell disk came from site 13. The single exception was found on site 16.

	Pieces
Olive shell bead (pl. 66*i*)	1
Perforated olive shell disks (pl. 66*j*)	5
Abalone earring (fig. 24*e*)	1
Abalone hair ornaments (pl. 66*l, m*; fig. 24*d*)	4
Abalone ornament, fragmentary	1
Mussel shell hair ornament (pl. 66*k*)	1

Olive shell bead.—Olive shells, *Olivella biplicata,* were derived from the Pacific coast by trade with intervening tribes. The entire shell is used as a bead by removing the top of the spire, so that the shell may be strung.

Perforated olive shell disks.—The sides of large olive shells are broken out and perforated for beads. In California they have the form of concave disks, rectangles, or irregularly shaped bodies. The 5 specimens from Nevada are all roughly circular in form.

Abalone earrings.—Abalone, *Haliotis,* like the olive shell, was derived from the Pacific coast. Both men and women among the Northern Paiute wore a considerable amount of abalone shell ornaments which were obtained by trade from the California Indians. Figure 24*e* shows the outline of an abalone object with a single perforation. This is an ornament for the ears, naaka-goa'a, "ear-ring," or perhaps more correctly "ear-disk."

Abalone hair ornament.—Plate 66*l, m* shows two pieces of abalone shell, each with two perforations. When shell objects have two holes they are intended as ornaments to be tied to braids of the hair. Feathers can also be lashed against the shell between the holes, as shown in figure 24*d*.

Mussel shell hair ornament.—Plate 66*k* shows the only specimen of hair ornament made from some unknown shell, presumed to be freshwater mussel. Dead shells of *Anodonta oregonensis* are very common in the parts of the valley which are sometimes flooded. The peculiarities of the specimen illustrated are its extra long rectangular form and serrated edges.

OCALA CAVE

Ocala, cave, situated 3 miles southeast of Ocala (pl. 1), is of small size compared to the large Lovelock cave, yet it yielded two carloads of bat guano in 1912. After the guano crew had finished their work the writer visited the cave and in a few hours obtained 77 artifacts as follows:

Matting	Pieces
Tule (pl. 58*d*)	18
Tule warp, *Juncus* woof	2
Tule warp, woof of cord	1
Juncus	8
Cat-tail leaves	4
Salt grass	1

Other textiles	
Tule sandal	1
Tule carrying case	1
Wicker basketry	11
Coiled basketry	3
Twined basketry, openwork	3
Cordage	
Rope, round tule	6
Rope, round tule, type *e*	1
Rope, triangular tule (pl. 58*f*)	2
Rope, *Juncus*	3
Braid, 3-strand, *Juncus*	1
Braid, 5-strand, tule (pl. 58*e*)	1
Net, 7 cm. mesh, .6 mm. twine	1
Various	
Stuffed heads, mud hen (pl. 58*a*, *b*)	4
Stuffed head, gull (pl. 58*c*)	1
Bundle, cat-tail leaves	1
Bundle, willow twigs	1
Digging stick, 55 cm. long, *Sarcobatus*	1
Cat-tail down, sandal lining	1
Total	77

In general the types of artifacts are identical with those found in the Lovelock cave. The rarer types in Lovelock cave are also rare in Ocala cave, for example: (1) tule matting with woof of cord (pl. 25*k*), (2) matting of grass (pl. 43*n*), (3) triangular-shaped mats (pls. 24*d*, 58*d*), (4) tule carrying case (pl. 26*c*), and (5) split tule rope of type *e* (pl. 21*b*, *c*). It is of interest to note that the stiff split tule rope was considered as belonging only to the older cultural strata of Lovelock cave. The objects new to Ocala cave are stuffed heads of mud hens and gulls, five-strand tule braid, and rope of exceptional size made of triangular stemmed tule. The stuffed bird heads were found wrapped in cat-tail down. The sandal also had some cat-tail down for lining.

APPENDIX 2. NOTES ON THE NORTHERN PAIUTE

BY

LLEWELLYN L. LOUD

The territory within the limits of Nevada now inhabited by the Northern Paiute includes the counties of Washoe, Humboldt, Pershing, Churchill, Lyon, Storey, Ormsby, Douglas, and Esmeralda, a total of 37,239 square miles, or one-third of the area of the state. Within these counties there was, in 1910, an Indian population of 3353, including 536 Washo and 60 Mono.[39a] This would make 9 Indians per 100 square miles. How the present population compares with the population of primitive times is a matter for speculation.

NORTHERN PAIUTE BANDS

The Northern Paiute were divided into numerous bands of one hundred or more individuals each, so that individuals of one kin kept together in their seasonal travels in search of food. The Handbook of American Indians lists 61 of these bands,[40] but only about half of them are really Northern Paiute, the others being located in Mono or Shoshoni territory. Natches gave a list of bands, or "families" as he called them, as follows.

sai'i, short form of sai-duka'a, "tule-eaters," a mythical people formerly living in various parts of Nevada. The Handbook gives what appears to be the same name, Saidyuka, as a band of eastern Oregon.

neme, "people" or "person," the Northern Paiute name for their own people from Walker lake, Nevada, to Snake river, Idaho. They call their language numa. Another name for themselves, at least those from Humboldt lake to Oregon, was agitsi'i.

[39a] Indian Population United States and Alaska, 1910, pp. 23, 28. U. S. Census Bur., 1915.

[40] Handbook of American Indians, Bull. 30, Bur. Am. Ethn., pt. I, 1907; pt. II, 1912. Names of bands and data regarding them are found in articles as follows: Mono-Paviotso (including Snakes and Saidyuka of Oregon), Paviotso, Sawagativa, Itsaatiaga, Toiwait, Kosipatuwiwagaiyu, Kuyuidika, Pamitoy, Laidukatuwiwait, Genega, Watsequeorda, Winnemucca (The Giver), Warartika, Tonoyiet, Torepe, Wahi, Tupustikutteh, Tubianwapu, Hadsapoke, San Joaquin's Band, Odukeo, Petodseka, Tosarke, Poatsituktikuteh.

sawa-kate, "sage-tip," name of Winnemucca mountain. Handbook gives Sawagativa, "large hill," as the band about Winnemucca.

idza'a-teaga-tekade, "Coyote-canyon-eaters." Name taken from a canyon near Unionville, where there are many squirrels. Equivalent of Itsaa-tiaga of the Handbook.

kepA-tekade, "squirrel-eaters" of Granite Spring valley.

toi-tekade, "cat-tail-eaters," the Indians of Stillwater slough. Natches knew of Indians living on a sand hill in the level plain near the stage station. Within half a mile of the slough there are many sand hills which were formerly inhabited, especially by the people who fought Wolf and Coyote (see page 161). The Handbook gives Toi-wait as a band of 400 living in 1870 about the lower sink of the Carson. kusi-pa'a-tepiwakayukU, "muddy-water-village," is a more correct orthography of Kosi-pa-tuwiwagaiyu, "muddy water place" given in the Handbook as a band, but more properly a village.

woitsi-tekade, "Wadsworth-eaters," the people living on Truckee river near Wadsworth, which has the Northern Paiute name of woitsi.

kuyui-tekade, "sucker-eaters" of Pyramid lake. The Handbook gives the same name Kuyui-dika as a band living near the site of Wadsworth and otherwise known as "Wunamuca's band."

podi-tekade, "Mason valley-eaters," probably the same band as those called in the Handbook the "Pam-mi-toy, 'western tule eaters.' A Paviotso band formerly in Mason valley, W. Nev.; so called because a lake in this valley, now dry, formerly yielded tule." However, toy is the cat-tail, *Typha latifolia,* not tule.

agai-tekade, "trout-eaters," of Walker lake.

MANNER OF LIVELIHOOD

Gilbert Natches, the Northern Paiute informant, said that he was born to the north of Humboldt lake, at Toy. The name of the place is ŏ-tĭ-ga-du-tU, which is presumed to be site 6 of plate 1, although ŏ-tĭ-ga-du-tU is also the name for the gravel ridge opposite Toy (see sites 7 and 8 and dotted areas of plate 1). The band of which Natches was a member lived at this point and sometimes at the outlet of the lake. From these bases the band journeyed far and wide with the seasons.

Hunting.—Game was hunted more or less in all seasons. In early spring they went to the mountains to get ground squirrels. It was not

stated what mountains, but it is presumed that the Pine Nut mountains east of Carson sink furnished their principal supply. Granite Spring valley, northwest of Lovelock, and Coyote canyon, near Unionville to the northeast of Lovelock, were noted for ground squirrels, but appear to be the territory of other bands of Indians. It is probable that various mountains were visited to get small game. Two Tips was especially mentioned as a place where they got woodchucks.

In shooting birds, rabbits, or any small ground animal, arrows tipped with the hard greasewood, *Sarcobatus,* were used; never arrows tipped with stone, which were reserved for large game. Different tribes made their arrows differently, so as to know them. Natches was of the opinion that Northern Paiute arrowpoints were always small. He thought that the spearpoints obtained in the valley must be the work of another people, who will be mentioned later under the heading Myths. The Bannocks had spears, but Natches never heard tell of Northern Paiute using them; neither did they spear fish.

Sarah Winnemucca Hopkins[41] mentions the hunting of bighorn sheep, deer, and antelope. The antelope, which fed on the low grass plains in herds during winter and in the spring as late as April, were said to be "charmed" by two men who went around the herd on five successive nights with torches made of sagebrush bark. Half a dozen large mounds of sage brush were built, near which at early morning and again at evening smoking, drumming, singing, and other magic acts were resorted to. On the fifth night the antelope were said to be charmed so that they followed the men with the torches up to the piles of brush where they could be easily killed. Though the Indians believed that success was due to magic, in reality the animals were made victims of their own curiosity.

After the Indians came into possession of horses they would chase deer and antelope into the valley, and when one horse gave out another man with a fresh horse would be ready to take up the chase.

Trapping.—It would seem that much of their small game was obtained in traps. Traps were also made weighted with stones sufficient to kill coyotes, wolves, and wild cats. For the smaller animals a single large stone with a flat undersurface was tilted and set with one edge against an upright post so as to easily become loosened and crush the animal beneath (fig. 25*a*).

[41] Life Among the Piutes: Their Wrongs and Claims. Edited by Mrs. Horace Mann, and printed for the author. Boston, 1883.

The same principle was used for catching coyotes. A post was firmly set in the ground, against which was tilted a large platform of poles covered with stones; figure 25*b* will convey a better idea than words of how the weight was released.

Natches said that bears were never seen in central Nevada, not even in the timber of the Pine Nut mountains. The Northern Paiute never wore robes made of bear skin, although the Bannock wore them. It is said that the ancient people at the cave had blankets made from

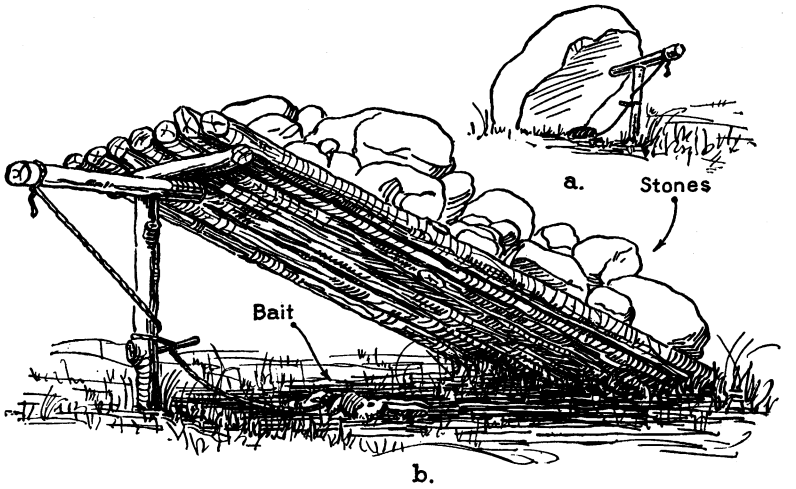


Fig. 25.—Traps. *a*, single large stone for crushing ground squirrels and small game; *b*, trap for coyote and wildcat: post set in ground; bait is attached to unstably set trigger; cord wrapped once about the post and attached at lower end to trigger, at upper end to pole, unstably balanced on top of the post; platform of poles covered with rock to crush the entrapped animal.

twisted strips of mud hen skin. Only poor people would dress that way. Usually the Northern Paiute wore rabbit skin robes, also robes of the skins of mice and other small game. After the acquisition of the horse a few of the richest Northern Paiute, those who were good hunters and great travelers, came into possession of buffalo skin blankets. But these were obtained from the regions to the east. Panthers were never seen in central Nevada and although plentiful on the timbered mountains of California, were so difficult to kill that no one could hope to possess a blanket of panther skin.

To catch jackrabbits the whole band of Indians, men, women, and children, lined up across the valley, beat the bushes, and drove them into a corner near the river. The rabbits would not swim, but would follow the bank till they were caught in a seine net stretched across a 30-foot gap between the stream and a hill.

Cottontail rabbits were snared as they passed along their trails under willow bushes. A willow was bent over and secured with a string which choked the cottontail when the willow was released.

Eggs and young birds.—After the Northern Paiute had obtained a supply of ground squirrels in the mountains, they returned to Humboldt lake in late spring to secure bird eggs, and young ducks before they were able to fly. The greasewood bushes near Perth were especially mentioned as a good place for the securing of duck eggs. At this season also pollen from the cat-tail rush was gathered to make candy.

Fishing.—As soon as the willows began to put forth their leaves, the Northern Paiute went to Truckee river. At just about the same time that the young birds began to fly, the kuyui fish that wintered in Pyramid lake went up the river as far as Reno. The river is so steep that the fish got tired after spawning and hence did not go all the way up to Lake Tahoe. During the entire summer the Indians stayed on Truckee river and at Pyramid lake and dried large quantities of fish to take to their homes at Humboldt lake. After ice had formed in the river a stone ice pick was used to cut an opening across the stream in which was placed a seine net. A few men would be stationed at the net, then all the remainder of the band, women and children as well as men, would go up the river and then come down over the ice stamping and pounding with stones to scare fish downstream. When the crowd reached the net each person participating in the drive took a fish from the men stationed at the net.

From the names employed, it would appear that the Northern Paiute recognize four classes of fish and about nine species, doubtfully identified from the description by Natches as follows:[42]

1. awago.—Red sucker, 6 to 10 inches long in Humboldt lake, and 12 to 14 inches long in Pyramid lake. *Catostomus tahoensis.*

2. tui-pagwI.—A minnow or sucker, 3 inches long in Humboldt lake, and sometimes 5 to 6 inches long in Pyramid lake. The last part of the name is the root word, as Natches said, for all kinds of fish, while the first part seems to be descriptive of a variety. *Siphoteles obesus* or *Lencidius pectinifer.*

3. hu-pagwI.—Minnow, 2 to 3 inches long in Humboldt lake; found also in Truckee river. *Richardsonius egregius.*

4. kow-pagwI.—Minnow, 2 inches long in Humboldt lake; also in Truckee river. *Agosia robusta.*

5. agai.—Mountain trout, found at Elko and said to have formerly been in Humboldt lake; 10 to 12 inches long, weighing 1½ pounds. In Lake Tahoe it is larger weighing 2 pounds and having a maximum diameter of 4 inches. *Coregonus williamsoni.*

[42] J. O. Snyder, The Fishes of the Lahontan System of Nevada, *in* Bull. U. S. Bureau of Fisheries, 35, Document 843, pp. 31–86, 1917. Ten genera and 14 species of fishes native to the Lahontan basin are described.

6. agai.—Big trout of Pyramid lake, the very smallest weighing 2 pounds and commonly 25 to 30 pounds, 4 feet in length, with the maximum diameter of 7 to 8 inches, the body being lens-shaped and narrower from side to side than from back to belly. *Salmo henshawi.*

7. tana-agai.—"Spring-trout," at Pyramid lake, so named because it is caught in the spring, 18 inches long. *Salmo henshawi.*

8. kuyui.—Black-skinned fish of Pyramid lake, gray-skinned variety of Winnemucca lake, body round in cross-section, 4 inches in diameter, 20 inches long. *Chamistes cujus.*

The following quotation from Snyder shows the great importance of the last mentioned species as food:

In former times the coming of the "cui-ui" was a great event, not only for the Pyramid Lake tribe but also for other Paiutes from far to the south, who sometimes reached the fishing grounds in such a starved condition that many were unable to survive the first feast. At present numerous little camps may be seen along the river during the spawning period. The fishes are caught in large numbers and tons of them are dried for later use.

Mollusks.—Whether or not mollusks were sufficiently numerous to constitute a source of food supply was not learned. The river mussel (osapE), *Anodonta oregonensis,* was made into ornaments. Natches said that if California Indians who traveled to the borders of the Northern Paiute country wore any ornament of abalone or olive shell, the Northern Paiute would desire it the minute they saw it and would trade for it. The shamans had so great a use and desire for olive shells that they would dream about them. Both men and women wore abalone and olive shell ornaments in considerable quantities. The abalone, *Haliotis,* is called puidua'a. Olive shells, *Olivella biplicata,* are known as potE. Possibly the word potE or pote may be generic for any species of univalve, since the local fresh-water *Lymnaea stagnalis wasatchensis* and *Helisoma trivalvis* are also called potE.

Plants.—Following is a list of a few Northern Paiute names of plants and their uses as learned from Gilbert Natches. The Gosiute equivalent as taken from Chamberlin[43] is also given whenever it is in anywise similar.

pamahape, bog-rush, *Juncus.* Gosiute, pa'hwap, pa-ma-wûp.

pipobE, triangular tule, *Scirpus nevadensis?,* seeds eaten.

sai, tule, *Scirpus lacustris.* Gosiute name, saip.

sawipi, sâwapI, sagebrush, *Artemisia tridentata.* Bark used for sandal padding, also to carry fire from place to place; compare Shoshoni word wa-ap, to burn, and Gosiute words, wap, wá pi, juniper.

[43] R. V. Chamberlin, The Ethnobotany of the Gosiute Indians of Utah, Mem. Am. Anthrop. Assoc., 2:329–405, 1911.

sebI, willow, *Salix*, used in making baskets. Name shortened to se in composition; for example se-osa, "willow-bottle," or bottle-shaped basket. Gosiute word for willow sí-opi.

sikopi, sikupI, rayless goldenrod, *Chrysothamnus*. If a worm gets in the stem of a young plant it causes a bulbous swelling just above ground. Girls will search diligently for these, in order that they may obtain a chewing gum.

suno, tumble-weed, *Amaranthus graecizans*. The small, flat, leaf-like seeds are hulled and eaten. Gosiute su-no is the name for *Atriplex*. Tumbleweed is supposed by botanists to be an introduced species of modern times.

taEpi, greasewood, *Atriplex torreyi*. Short sections of the crooked, hard, thorn-like twigs are pealed and attached at a crook to a string for use as a fishhook (ohotetema) for catching minnows. A great many of these hooks are left in the water overnight. In the roots of this bush there are yellow worms an inch in length which "smell good and are good to eat." They are also used as fish bait.

tibipi, nut pine, *Pinus monophylla*. The nuts which are gathered on the Stillwater range, are called tibi. Gosiute, ti'-ba-wa-ra, nut pine, and ti'-ba, pine nuts.

tegapo, for making of coarse string. Compare Gosiute tin'-ai-gop, nettle, *Urtica holosericea*.

toi, toy, cat-tail rush, *Typha latifolia*. The pollen, tsima, is gathered, inclosed in the leaves of the rush and roasted in the ashes, causing it to become hard and sweet like candy. Pollen is also used for face paint. The down is used for sandal padding. The seeds are eaten. The Gosiute name of the plant is to'-iump.

toibE, spike-rush, *Eleocharis palustris*.

tonobI, donobi, greasewood, *Sarcobatus vermiculatus*. Fishhooks are made from the twigs, which however, are inferior to those made from the twigs of *Atriplex*. The roots are also infested with the same worm as found in *Atriplex*. Arrow points for small animals and birds were made from greasewood. *Sarcobatus* was a favorite wood for the manufacture of various articles found in the cave. It is very hard and close grained. Gosiute, to'-no-pi.

wai, bunch grass with a small seed which was eaten. Gosiute wai signifies mountain rice, *Oryzopsis cuspidata*.

wekwekobE, cane, *Phragmites communis*.

weyupuie, a red berry smaller in size than small peas and containing little seeds. The berries are washed before using. They grow upon a gray-leaved thorny bush, 6 to 12 feet tall. The description agrees well with that of the buffalo-berry, *Shepherdia argentea*.

wiha, a plant growing along the rivers under willows. It has a straight stem the size of a pencil with branched top about 3½ feet high. The fiber is used in making fish nets. Chamberlin states that the spreading dogbane, *Apocynum androsaemifolium*, a plant answering our description, is that from which the Gosiute obtained a strong fiber for string and rope. Natches also gave the name tegapo for cord 4 mm. in diameter. Possibly this is the word for coarse cord rather than the name of some other fiber plant, as he stated that wiha was made into cord 4 mm. in diameter to be used for the top of a fish net. The fiber is reddish when new but is colored a deeper red with pine bark which floats down Truckee river.

Gathering seeds.—By October various seeds were ripe. The seeds of the triangular-stemmed tule, *Scirpus nevadensis,* were especially mentioned, also the seeds from the cat-tail rush, *Typha latifolia.* The fine down to which the cat-tail seeds are attached is spread upon the hard ground of a playa to the depth of 1 or 2 inches and over a space of 5 to 10 feet in diameter. It is then burned. More of the down is gradually added and continually stirred with sticks in order that it may be fully consumed. At the end of a hard day's labor there may be a sufficient quantity of seed upon the ground to fill several sacks. The method of removing the nut-like shell of these and other minute seeds is explained in discussing the various implements. It was a common thing to make porridge of several seed meals mixed.

The one-leaf piñon, *Pinus monophylla,* a tree 8 to 25, or rarely 45, feet in height, is found on the range east of Carson sink at an elevation of over 1000 or 1500 feet above the valley. It formed so important a source of food that different bands of Northern Paiute held proprietary rights to certain tracts. Winnemucca claimed the particular mountain on which is located the mythical "Weasel trail," described later (p. 160; no. 1, pl. 68). Late in autumn the nuts were gathered and secreted in piles until opportunity presented itself for transportation.

Basketry.—The typical Northern Paiute hulling basket (tema) is a flat triangular tray, while other tribes, as well as the cave people, had circular hulling trays. A layer of seeds is placed upon such a basket, and pressure applied with a circular motion with a flat stone. This cracks the nut-like seed coverings, after which the kernel and shells are separated by winnowing. A hulling basket may be of coiled (pl. 30*a*) or other weave, but it must be a tight weave, as it is used to hull small seeds. Tema baskets are also used in roasting seeds, either before or after hulling, by placing them on the basket with coals and shaking. For the hulling of pine nuts and the larger seeds a coarser basket called yata may be used.

A flat wicker tema basket, triangular in shape, 24 by 30 inches in size, was found several miles north of Lovelock cave, at the base of a cliff, at an elevation of some 300 feet above the level of the plain. It is undoubtedly a Northern Paiute specimen left on the spot in recent decades. It is made of willow, there being 32 warp rods and 40 courses of woof to 10 centimeters. The woof is single, unlike that in baskets found in the cave, and passes over two warps at a time, giving the basket a superficial appearance of being of diagonal twined weave.

At the base of the basket, for about a dozen courses, as well as a few decorative courses elsewhere, there is twined weaving. A patch, 10 by 15 cm. in size, sewed on the basket with a coarse cord, is also of twined weave. The basket has a decorative design in dark brown, consisting of narrow bands six inches apart.

Water-tight baskets for soup and other fluids are called tsida. Bottle-shaped baskets made of willow and coated with pitch from the nut pine are used for water, and are called seosa, a compound of the words sebi, willow, and osa, bottle-shape.

MYTHS

Besides myths regarding geographical features, a few references to supernatural beings and extinct peoples were obtained in the process of showing specimens and making inquiry regarding the material culture of the Northern Paiute. For example, when Natches described the clothing of the Indians, he stated that they never wore robes of bear skin. Then he went on to say that bear meat was never eaten, because bears are just the same as a person. They understand our language and know when they are being talked about even at a distance. They are respectfully called "aunt."

The Weasel Trail

About the center of the Stillwater range is a mountain 7800 feet high, or 3800 feet above the level of the Carson Sink plain. The mountain lies just back of the Copperreid mine due east from Carson sink (no. 1, pl. 68). There is a white streak, many miles in length and so high up the sides of the mountain that it is said to be visible over the gap in the Humboldt range as far away as Lovelock, 25 miles distant. Quite likely the explanation of it is that it is either a fault line or an exposed stratum of some white rock such as limestone or gypsum. Back of this mountain lies Hare canyon at the head of which is a spring called su-pa-A, "vulva-water." The sides of the canyon look very much like the parted legs of a person in a recumbent position.

The Northern Paiute explanation is that Skunk and his younger brother Weasel were at play. Skunk ran after Weasel who went into his small hole in the ground. Skunk dug in after him and so opened up a ditch many miles in length over the mountain side. The Indian name for the ditch is babigipō or pabitsipo. The whites, hearing the story from the Indians, call it the Weasel trail.

Wolf and Coyote

The chief theater of action of Wolf and Coyote in the story to follow was in the Shoshone creek region. Once when a boy, Natches had visited the place, going by horseback. He made some rough sketch maps, recalling as best he could the location.

There was a cave in the mountain range next east of the Stillwater range, from which one could look across a basin and see several columns of stone. The basin is undoubtedly Humboldt salt marsh into which Shoshone creek empties. On the west side of the marsh, a mile or so from the mouth of Hare canyon, there are known to be hot springs (no. 3, pl. 68). Hence there is a high degree of probability that the stone columns are situated here, they being a deposit of lime from the springs. If this supposition is correct the cave would quite likely be to the southeast of the marsh on Willow creek, the water seepage of which would account for the presence of trees which are mentioned. The entire basin in Pleistocene times formed a fair-sized lake without outlet.

All the people from Carson sink and Humboldt lake, in fact all the people from the Pine Nut mountains (Stillwater range) and all those to the west, came to fight Wolf and Coyote. It would appear that Coyote was the younger brother and was considered too young to fight, so Wolf shut him in the house while he went out to fight alone. The people stayed on one side of the basin, while Wolf fought them from the other side. He killed some of the people. They can be seen to this day as rocks, some standing and some fallen just as they were when killed across the basin from where Wolf's house is situated. The people were clothed in robes made of twisted strips of skin from the mud hen, woven together with thongs of buckskin. There were scattered about over the ground fragments of black rock, looking just like the skin of the mud hen.

Wolf himself was killed in this engagement and his head cut off. You can see his headless form and his entrails all scattered about (no. 5, pl. 68). Meantime Coyote was a prisoner in the house, but he made repeated attempts to get out by climbing up through the smokehole. At last he succeeded in getting out just as Wolf was killed. When Coyote saw what had happened, he fell over and rolled down the slope, pretending that he was dead, and for further deception he also made some weeds grow out of his head. He can be seen there now with the weeds, which are trees, growing around him. The house

is now a cave with trees in the opening. They are the obstruction that Wolf put up to keep Coyote in (no. 4, pl. 68).

After pretending to be dead for a while, Coyote got up and chased the people. In their haste to escape the people took Wolf's head and threw it over the Pine Nut mountain. It landed on the plains north of Carson sink, a distance of 20 miles or more, and now is a rock about 200 feet high called mosi'i (no. 6, pl. 68). Coyote chased the people out of the country, brought back his brother Wolf's head, put it back upon the body and brought him to life again.

Somewhere in the vicinity of the cave called Wolf's house is a natural bridge of rock over a canyon. This is known as Coyote bridge (no. 7, pl. 68). On that same mountain is a rock known as isa-kwe'a, Wolf penis. There is a second isa-kwe'a, described as the highest mountain in the chain west of Pyramid lake and visible from Reno, 30 miles away. It is undoubtedly Tule peak, 8700 feet in elevation.

The Ancient People

The Northern Paiute have accounts of an extinct people living in various localities in Nevada which recall the beliefs in northwestern California regarding an ancient now extinct race of supernatural beings. However, there seems to be the difference that the former people of Nevada were ordinary human beings living an entirely rational human life. It is barely possible that further inquiry might bring out supernatural traits, but of all the numerous references made to them, there are no characteristics mentioned but what might well be possessed by some tribe hostile to the Northern Paiute. All mention of them partakes of the nature of historical tradition, yet the author is not prepared to accept the accounts as real traditions. They should be regarded as an attempt by the Northern Paiute to explain the archaeological remains of a cultural period preceding their own.

Characteristics of this ancient people are that they made some of their implements differently from the Northern Paiute and of different stone materials. They had spears and no arrows, while the Northern Paiute had arrows but no spears. They were mean, contemptible, foolish, degraded cannibals, had red hair which they were excessively fond of decorating with bone ornaments, and yet were so poor that they dressed in robes made of the skin and feathers of the mud hen. In a collection of specimens from Nevada every object which is unfamiliar to a Northern Paiute is attributed to them.

In the mind of the Northern Paiute they are often associated with the Pit River Indians among whom a remnant are even supposed to exist today. The Pit River Indians are called by the Paiute sai'i, which is also the name of the ancient people, but the possible reason for this is that both peoples are held in contempt.

Of the ancient sai'i there were two bands. The first band, which is conceived, like any band or "family" of Northern Paiute, to consist of only a few hundred individuals, lived at Humboldt lake until exterminated by the Northern Paiute. The second band lived on Pyramid lake and at a later date were driven toward Pit river. The story is that the Northern Paiute used to capture these people, cut off the fingers, penis, and ears, and tie these to the blankets of the girls, or throw them into the midst of a group of girls playing games, to tease them. After the ancient sai'i were driven out of Nevada, the Northern Paiute and Washo fought together against the Pit River Indians.

An incident illustrates how the ancient people are associated in the minds of the Northern Paiute with the Pit River Indians. One day while the writer was at Toy packing stone specimens, some Indians passed in a wagon. Although the specimens were typical Paiute implements the Indians disclaimed all knowledge of them, saying that they must have been made by the Pit River Indians.

NOTES ON GEOGRAPHY

Besides the places described in the myths, Natches mentioned a few other points of interest. The figures refer to locations on the map, plate 68.

10.—Near the Pyramid lake agency buildings there is said to be a cave once occupied by the sai'i. Around Pyramid lake there are many rockshelters and in the vicinity of Pyramid island a cave (no. 11, pl. 68), where legend says this "other" people used to live. They are called fish eaters, agai-tsi'i.

12.—On the west side of Winnemucca lake, back from a point projecting into the lake there is a cave, in front of which was a village of the ancient people, occupied before the Northern Paiute drove them from the country. Their houses of stone can still be seen.

13.—To the southwest of Perth there is a cave or perhaps more properly a concave cliff which is easily seen from the railroad. It is understood there are pictographs there, some of them crudely resembling letters of the alphabet. The name of the place is tohateka.

14.—A few hundred feet northeast of the station buildings at Toy there is a village site, called otigadutU, where Natches was born. The gravel ridge shown as a dotted area on plate 1 is also called otigadutU. On both sides of the ridge

there are absolutely barren level playas. The size of the ridge was not ascertained, but from memory the writer would say it is 10 or 15 feet in height, several rods in width, and 10 miles long. It is covered with sagebrush and is visible 6 or 8 miles away. It was caused by a gravel wash in the Pleistocene lake. In fact Humboldt lake itself owes its existence to a gigantic dam of gravel wash, over a hundred feet in height, built entirely across the valley by the old lake.

15.—There are two caves to the south of the lake, opposite Ocala. On the ridge near the cave, marked 19 on plate 3, Natches said that there is a "stone house." In the hill to the west of this is situated the other cave.

16.—Near Hazen on the side of Black butte there is a cave of considerable size called pusia-tipogI, "louse-cave."

17.—Soda lake, near Fallon, covers an area of 268 acres and is 147 feet deep. It has a crater rim built up above the level of the desert, so that the total depth of the old crater is 312 feet. Natches said that there was an old story that it once burst open in an eruption. This may be a historical tradition, as Russell shows that although volcanic activity began before the Dendritic stage of Lake Lahontan, its last outbreak is post-Lahontan in date.

18.—A mountain nine miles northeast of Wadsworth and famous for its supply of woodchucks is called waha-kutakwA, "two-tips." The English name, Two Tips, is a translation.

19.—The southern end of the range in which Two Tips is located is called pahino-motsata, "hot spring rock-point." The word for the rock deposited by hot springs is pahinopE.

20.—At present there are several hot springs at the base of Pyramid island, from which steam issues with a noise. The island is knob-like in form with an elevation of 320 feet, composed entirely of rock deposited by the hot springs. There is a tradition that there was formerly a hole in the top of the island which is now entirely filled by the steam deposit.

APPENDIX 3. SARAH WINNEMUCCA'S ACCOUNT OF LOVELOCK CAVE

Northern Paiute tradition peoples Humboldt valley with another people, sometimes identified with the Pit River, or Achomawi, Indians. The story told Natches by his grandmother, who got it from her grandfather, is that anciently both the Northern Paiute and the other people lived north of Humboldt lake. The other people lived on islands in the lake, doubtless meaning the gravel ridge shown on plate 1. They also lived on tule rafts. They spoke a language different from Northern Paiute. When the Northern Paiute hunted ducks in the tules about the lake they fell a prey to the other people. Individuals who became isolated never returned. In consequence warfare between the two peoples continued for many years and at last the Northern Paiute burnt the tule and drove the other people into the lake. Later, when they took refuge in Lovelock cave, the Northern Paiute smoked them to death. Sarah Winnemucca writes of this ancient people and their extermination in the cave as follows:[44]

> Among the traditions of our people is one of a small tribe of barbarians who used to live along the Humboldt River. It was many hundred years ago. They used to waylay my people and kill and eat them. They would dig large holes in our trails at night, and if any of our people travelled at night, which they did, for they were afraid of these barbarous people, they would oftentimes fall into these holes. That tribe would even eat their own dead—yes, they would even come and dig up our dead after they were buried, and would carry them off and eat them. Now and then they would come and make war on my people. They would fight, and as fast as they killed one another on either side, the women would carry off those who were killed. My people say they were very brave. When they were fighting they would jump up in the air after the arrows that went over their heads, and shoot the same arrows back again. My people took some of them into their families, but they could not make them like themselves. So at last they made war on them. This war lasted a long time. Their number was about twenty-six hundred (2600). The war lasted some three years. My people killed them in great numbers, and what few were left went into the thick bush. My people set the bush on fire. This was right above Humboldt Lake.

[44] Sarah Winnemucca Hopkins, Life Among the Piutes, 73–75. The book was written while the author was on a lecture tour of the East, sent by her people to protest against the corruption of the Indian agency system. The book, while enlightening, shows the handiwork of an editor unfamiliar with the geography and ethnology of Nevada.

Then they went to work and made tuly or bulrush boats, and went into Humboldt Lake. They could not live there very long without fire. They were nearly starving. My people were watching them all round the lake, and would kill them as fast as they would come on land. At last one night they all landed on the east side of the lake, and went into a cave near the mountains. It was a most horrible place, for my people watched at the mouth of the cave, and would kill them as they came out to get water. My people would ask them if they would be like us, and not eat people like coyotes or beasts. They talked the same language, but they would not give up. At last my people were tired, and they went to work and gathered wood, and began to fill up the mouth of the cave. Then the poor fools began to pull the wood inside till the cave was full. At last my people set it on fire; at the same time they cried out to them, "Will you give up, be like men, and not eat people like beasts? Say quick—we will put out the fire." No answer came from them. My people said they thought the cave must be very deep or far into the mountain. They had never seen the cave nor known it was there until then. They called out to them as loud as they could, "Will you give up? Say so, or you will all die." But no answer came. Then they all left the place. In ten days some went back to see if the fire had gone out. They came back to my third or fifth great-grandfather and told him they must all be dead, there was such a horrible smell. This tribe was called people-eaters, and after my people had killed them all, the people round us called us *Say-do-carah*. It means conqueror; it also means "enemy." I do not know how we came by the name of Piutes. It is not an Indian word. I think it is misinterpreted. Sometimes we are called Pine-nut eaters, for we are the only tribe that lives in the country where pine-nuts grow. My people say that the tribe we exterminated had reddish hair. I have some of their hair, which has been handed down from father to son. I have a dress which has been in our family a great many years, trimmed with this reddish hair. I am going to wear it some time when I lecture. It is called the mourning dress, and no one has such a dress but my family.

Certain features of the cave may have given rise to the Paiute story in case that story is pure fiction. (1) There are strata of grass and tule in the cave which are carbonized. Fires started by sparks from torches of bold explorers may have smouldered for days in such deposits. (2) Much of the hair found on the mummies in the cave is reddish. Similar hair is known from mummies from the Pueblo region, Peru, and elsewhere, the color being due to age or chemical action. (3) The smell of the cave with its immense deposit of bat guano suggests burnt bodies, and made Ishi, a Yahi Indian, reluctant to enter a room at the museum where cave specimens were stored.

There is some doubt that Say-do-carah in Sarah Winnemucca's story means "conqueror" or "enemy." The Northern Paiute applied to the ancient people the name sai-duka'a, "tule-eaters," a name which might be applied to any people with this habit. This may account for the application of the name or its shortened form sai'i to the Pit River Indians and the form Saidyuka to Indians of eastern Oregon.

APPENDIX 4. JOHN T. REID'S ACCOUNTS OF LOVELOCK CAVE

John T. Reid,[45] a mining engineer in Lovelock, Nevada, gives the following history of Lovelock cave.

I recall that along about 1887, when I was about 16 years old, Captain Natches, two other Indians, one known locally as "Coffee Charley," the other as "Mustache Charley," and myself had undertaken to catch some wild horses that roamed in the neighborhood of the Carson and Humboldt sinks. In due time we came in contact with the wild horses, and then the chase was on. After running those horses all day long we were obliged to camp over night near the southern end of the Humboldt sink and on its eastern shore. The next morning we resumed the chase, following the horses over into the Carson Sink desert. But here we had to turn around, homeward bound, since we had no fresh saddle horses available to pursue the mustangs further.

On the way back we passed Lovelock cave, and the hour being late we decided to camp there for the night. Later, Captain Natches related to me the great calamity which had occurred in that cave to another race of people who had been exterminated by the Piutes.

In the tale that Natches related, with the other two Indians aiding him in bringing out all of the material facts that had any connection, I was informed that about four or five generations back the Indians had fought to extermination a people who were redheaded and who spoke their own language. The fact that these two people spoke the same language suggests that they had lived together for a long period of time.

Natches assigned no reason for the origin of the trouble between the two races, and I doubt if he knew or had a history, although his sister, Sarah Winnemucca Hopkins, states that these people were cannibals and ate the Piutes.[45] This is hardly compatible with her further statement that the Piutes had taken some of these people into their own families.[46]

Annie Lowry, a half breed, who married an Indian named Mr. Sanny, assigned as a reason for the trouble between the two races that these people had stolen their women and taken their wild rice seed away from them.

I rather think that the matter of food was the trouble and the Piutes decided after a period of droughts that they would exterminate the other people who were consumers of the small amount, that was all the while getting smaller and smaller, of food that was available in the form of wild seeds and wild fowl that visited the lakes.

Natches stated that these people had come from the southwest. A battle had waged for a long time on the Carson sink at some sand hills on the east and west

[45] Reid's father ran a general merchandise store at Lovelock from 1883 to 1895, in which the son worked as a clerk. Through this work he came into intimate contact with all of the Indians of that region, old and young.

[46] Life Among the Piutes, pp. 73–75.

side of the Carson river, after which the Piutes had driven these people northward into the region of the Humboldt lake, thence across the lake to the cave, some going into the cave while others went northward.

From what I learned through Natches, and from numerous others of the old Indians, I have deduced that this redheaded people had long occupied the territory about the cave before the Piute Indian had come from elsewhere.

Natches further related how the Piute Indians had gathered sagebrush in great quantity around and about the hills adjacent to the cave and assembled it on the bluff above the cave. Then they had lighted and thrown it down immediately in front of the cave. The Piutes staid on either side of the cave, at a safe distance, and watched for the people within to come out for food or water, or to escape the smoke which in part penetrated the cave. As they came out they were dispatched with well-directed arrows.

The following account was obtained by Mr. John T. Reid from James H. Hart in regard to the first excavation of Lovelock cave.

In 1911 I heard David Pugh of Lovelock tell of an old Indian cave some twenty miles south of Lovelock. He said that it was full of bat guano in which he had dug down four feet. When a boy he had learnt from the Indians where the cave was. There had then been fires in it for there was much smoke on the walls. Realizing that if the cave was as large as described the guano might be of value, I arranged with Pugh to file a mineral location upon it and ship out the guano. This we did, working from the fall of 1911 to the spring of 1912.[47] We drove a small tunnel into the mouth of the cave, or rather to one side of it, the natural opening being too small to work through. We took out about five carloads of guano which were shipped to the Hawaiian Fertilizer Company of San Francisco. We soon began to discover Indian relics, and notified Dr. J. C. Merriam of the University of California, who took the matter up with the University of Nevada and the Nevada Historical Society. We also wrote to the Smithsonian Institution, but they advised that they had no funds for collecting, receiving only donations. After some of the best specimens had been destroyed, we received word from the State Historical Society that, in conjunction with the University of California, they would send an investigator. This was Mr. Loud. We gave him all possible facilities for collecting. Many objects had been destroyed by the weather and others had been taken away. I recall many boas or ropes of fine feathers. As these lay strewn about in the open end of the cave in the way of the workmen they were irreparably damaged. Some of these boas were found perfectly preserved. All the Indian objects began to appear about four feet below the surface of the guano.

In the south end of the cave, "about twenty feet deep," we unearthed some skeletons. In the north-central part of the cave, about four feet deep, was a striking looking body of a man "six feet six inches tall." His body was mummified and his hair distinctly red. There was a grass rope about his neck with a knot under the left ear. The rope was about eight feet long. The feet were bound together from the ankle to above the knees with stout rope. The mummification was complete except for a part of the abdomen. The other mummies all had red hair—I think there were either four or five. Those that appeared to be women were small, something like a Japanese woman in height.

[47] The original says 1912–13, but as the Loud excavations were made in 1912 the actual dates must have been as given.

This was not altogether due to the shrinking of the bodies in mummifying, because the man was "a giant." The women had on moccasins which reached clear to the knees; the buckskin was beaded with shells. Two of them had on a kind of buckskin coat (gown) that came down to the knees. These bodies were from the deep south end of the cave.

There were no bats in the cave when we went there to work.

Besides David Pugh there worked in the cave Samuel Pugh, Hanson, Cummings, and perhaps one or two others. We screened the guano through a three-quarter inch mesh, discarding everything that did not go through the screen. Probably all objects that passed through the mesh were shipped away with the guano.

After we got through working the cave one George Stautts worked on what was left in the cave for a while. He probably shipped out about a carload of guano.

EXPLANATION OF PLATES

WITH MUSEUM NUMBERS AND DIMENSIONS OF SPECIMENS ILLUSTRATED[48]

ARCHAEOLOGICAL MAP

Plate 1.—Map of archaeological sites in Humboldt lake region, Nevada.

LOVELOCK CAVE: PLAN, VIEWS, EXCAVATIONS

Plate 2.—Ground plan of Lovelock cave. Scale shown in feet along base lines A–B, E–F, and G–H. Lines A′–B′ and G′–H′, of plate 3, are the same lines as A–B and G–H. Heavy black lines indicate limestone walls of the cave as found April 1, 1912; diagonal lines, rock, including fallen boulders. University of California excavations of 1912 are shown in red; those of the Museum of the American Indian, Heye Foundation, in 1924, in black; in both cases the "lot" areas and numbers are given.[49]

Plate 3.—Lovelock cave, cross-sections in lines A–B and G–H of plate 2. *a*, longitudinal section along back wall of cave, showing numbered lots and line A–C–B as in plate 2. Line M–N, probable original level of guano before excavated by Hart and Pugh. Line P–Q, probable original level of guano along the back wall of the cave. Lot numbers indicate excavations near the back wall by Loud in 1912. *b*, cross-section in line G′–H′ and its projection to include the talus slope exterior to the cave. On this talus slope a platform was erected for sifting the guano. Boulders brought from the cave formed a rock pile at the upper portion of the talus slope, while halfway down the slope there is a dump of straw, tule, sticks, etc., brought from the cave. The pocket marked 37 indicates excavation 37 in 1912 as in plate 2. The boulder at *e* is in cross-section. Line R–S, probable original level of guano before excavated by Hart and Pugh.

[48] Prefix 1– indicates University of California Museum of Anthropology; prefixes 12– and 13– indicate Museum of the American Indian, Heye Foundation, except that prefix 12– on skeletal material indicates University of California Museum of Anthropology. All lot numbers in plate explanations refer to 1912 excavations, pit numbers refer to 1924 excavations.

[49] Messrs. Hart and Pugh excavated in 1911 that portion of the cave south of a line running through the following points, leaving a vertical wall of straw and guano four to five feet high, beginning in the northernmost part of lot 3 (1912 excavations), running easterly through lot 9 and its extension, passing through boulder north of the 70 foot mark, curving thence through lot 10, then swinging in a semicircle southerly nearly to the 60 foot mark, then turning abruptly northward and crossing the line H–G just south of the 10 foot mark, and after one slight dip southward terminating near the big boulder east of the line G–H.

Plate 4.—Humboldt range, Humboldt lake, and Carson sink. *a*, looking SW from a position on the Humboldt range several miles north of Lovelock cave. The position of the cave is indicated by the cross. Humboldt lake is in the distance above and to the right of the cross. To the left is a sharp peak about 900 feet in elevation above the level of the plain. The top of the peak intersects the shore line of Carson sink, faintly shown by white lines in the distance. A small white playa of several acres extent is seen among the mountains to the right of the peak. The triangle marks the position of a high basaltic mountain from the top of which the photograph in *b* was taken. *b*, looking west from the position indicated in *a* by the triangle. To the right is seen Humboldt valley through which the river meanders and spreads out its flood waters in irregular shallow pools. To the left is Humboldt lake. Trinity range is seen across the valley. To the left is a portion of the Humboldt range. Near the center marked with a cross is a low-lying limestone hill which contains Lovelock cave.

Plate 5.—Views of a small limestone hill containing Lovelock cave. Crosses in *a* and *b* indicate the position on a basaltic mountain, about 800 feet above the level of Humboldt lake, on which the photograph shown in plate 4*b* was taken. *a*, white limestone hill as seen from half a mile to the west. Entrance to the cave is at the top of the talus slope. To the right are seen several terraces marking the beach of Lake Lahontan as it existed at various levels during the Pleistocene age. To the extreme upper right corner is seen a cliff of red rhyolite eroded by wave action when the lake was at its upper levels. In the foreground are also terraces marking the beach of the ancient lake at various levels. *b*, view from the southwest. *c*, view from quarter of a mile to the northwest. Note in the background the red rhyolite cliff with talus slope in front and a beach line of the old lake below. *d*, a near view showing in the center the dump of straw, tule, etc., taken from the cave.

Plate 6.—Views of Lovelock and Ocala caves. *a*, view of the cliff in front of Lovelock cave, showing the dip of the stratified limestone which was undermined by wave action at the time when the ancient lake stood at this level. Later as the lake rose to a still higher level débris was piled in front of the cave as the waters swirled about the submerged hill. *c*, entrance to Ocala cave and specimens of tule mats, rope, etc., obtained from the cave.

Plate 7.—Duck decoys. *a*, bundle of duck decoys *in situ*. *b*, duck decoys with wrappings after removal from cave.

LOVELOCK CAVE: BURIALS

Plate 8.—Mummy bundle. *a*, baskets over mummy, pit 16. *b*, mummy of child after removal of baskets.

Plate 9.—Mummy bundle. *a*, baskets over mummy, pit 35. *b*, mummy after removal of baskets.

Plate 10.—Two views of burial of a child (six-year molar not yet cut), 12–2670. Partially mummified body was resting on a twined basket tray, 1–20088,

and completely covered with 1497 grams weight of fish nets and 934 grams of other twine. This net and twine constitutes 59.3 per cent of the net and twine obtained in the cave. There was also a quantity of dilapidated garment of bird skin and a large rattle, 1–19341, the whole constituting lot 26.

Plate 11.—Skull of man and mummy of baby. *a*, two views of a male skull, 12–2653, found with lot 32. *b*, new-born infant, 12–2669, found buried beneath a dilapidated cradle of willow sticks, 1–21318 (pl. 47), lot 33. Measurements in Gifford, this series, 22:382.

LOVELOCK CAVE: OBJECTS FOUND

Plate 12.—Bone pendants and bird bones. *a, d*, found with lot 3; *e*, with lot 37; *f*, with lot 38; and all other figures from unknown portions of the cave. *a*, length 113 mm.; *b–j* to same scale. *a*, 1–19307, right thoracic rib of a carnivore, probably wolf, *Canis gigas*, with a notch and a cord 1 mm. in diameter attached. *b*, 1–19266, perforated rib, probably of a female bighorn sheep, *Ovis canadensis nelsoni*, but possibly of a deer. *c*, 1–19265, perforated bone pendant with decorative incisions. *d*, 1–19306, shaft of the ulna of a pelican, *Pelicanus erythrorhynchos*, with decorative incisions. *e*, 1–19315, perforated and calcined bone. *f*, 1–19319, shaft from the left ulna of a pelican. *g*, 1–19267, pieces from the lower bill of a pelican wrapped with fiber. *h*, 1–19264, perforated bone pendant with incised decorative dots. *i, j*, sections from the shaft of bird limb bones with decorative incisions, *i*, 1–19262, to be worn as an ornament in the septum of the nose, *j*, 1–19263, as an ornament for the hair.

Plate 13.—Limb bones (*a–i*) with ends cut or broken off; awls and other implements (*j–t*) made from the scapulas and limb bones. *a*, length 126 mm.; *b–i* to same scale. *j*, length 212 mm.; *k–t* to same scale. *b, e, f, g, h, j*, found with lot 30; *c* with lot 25; *d* with lot 18; *k* with lot 6; *l* with lot 3; *m* with lot 11; and other figures from unknown portions of Lovelock cave. *a*, 1–19261, left humeras of wildcat, *Lynx eremicus*. *b, g*, 1–19273, 1–19268, right humerus of coyote, *Canis latrans lestes*. *c*, 1–19323, right femur of coyote, used as hair ornament. *d*, 1–19312, femurs of coyote attached by a cord 1.6 mm. in diameter to a bundle of tule. *e*, 1–19296, left tibia, probably of goose, *Branta canadensis*. *f*, 1–19271, left tibia of coyote. *h*, 1–19272, left radius of coyote, used as an ornament in the septum of the nose. *i*, 1–19251, left tibia probably of deer, *Odocoileus hemionus*, cut so as to form a small cup suitable to contain hair oil (cf. pl. 46*a*). *j*, 1–19301, notched scapula, probably antelope, *Antilocapra americana*. *k*, 1–19311, awl made from the shaft of a scapula, probably of the deer, *Odocoileus hemionus*. *l*, 1–19240, awl, probably shaft of the left scapula of a bighorn, *Ovis canadensis nelsoni*. *m, n*, 1–19245, 1–19247, awls made from the scapulas of deer, antelope, or bighorn. *o*, 1–19304, awl from the distal end of a right radius of a bighorn. *p*, 1–19303, awl with decorative incision. *q*, 1–19242, awl from the distal end of a right radius of a deer, bighorn, or antelope. *r*, 1–19243, awl from the distal end of left tibia of a coyote, *Canis latrans lestes*. *s*, 1–19241, awl probably from the proximal end of a cannon bone of a deer. *t*, 1–19250, tanning implement from the front cannon bone of a deer.

Plate 14.—Two views of rattle of horn, hoof, and bone from antelope and bighorn sheep. 1–19341, found with skeleton of a child (pl. 10). For explanation of individual objects marked *a* to *p*, see text figure 11, "*a*" of which is 242 mm. long.

Plate 15.—Objects of horn and wood. *d, e, f* found with lot 31; *g* with lot 6; *k, l* with lot 25; and other figures from unknown positions in the cave; *a, b, c, g* from the bighorn male; *j, k* from the bighorn female or more probably from a juvenile male; *e, f, h, i* and probably *d* from the bighorn, sex unknown; *l* of wood. *a, i,* 1–19330, 1–19328, flat pieces of horn. *b, g,* 1–19325, 1–19335, spoons of horn. *c, h,* 1–19326, 1–19327, pendants of horn. *d,* 1–19340, perforated disk of horn to be worn as an earring. *e,* 1–19339, pendant or ornament with perforations in end inserted with cord. *f,* 1–19338, piece of horn probably carved to represent a fish. *j, k,* 1–19331, 1–19342, horn with perforations for securing and straightening sticks. *l,* 1–21468, one of four scoured sticks of greasewood, *Sarcobatus vermiculatus,* found in association with *k.*

Plate 16.—Horn and wooden objects. *a,* club from lower levels, 19 inches long, 13–4802. *b,* club from lower levels, 19¼ inches long, 13–4803. *c,* mountain sheep horn implement (13–4524) found with mummy in pit 35. *d,* mountain sheep horn implement with 13 inches greatest width, found at depth of 72 inches. *e,* wooden implement (13–4610) found with mummy in pit 46.

Plate 17.—Blanket and receptacle from lot 12. *a,* 1–20794, blanket 38 by 40 inches in size, chiefly of twisted fur strips from the meadow mouse, *Microtus montanus.* Border at both edges of twisted fur strips from the muskrat, *Fiber zibethecus.* *b,* 1–20795, receptacle, 16 inches long, 8 inches in diameter, made of tule, *Scirpus.* The receptacle contained two blankets, 1–20793 (pl. 18), and 1–20794.

Plate 18.—Muskrat and bird-skin blankets. *a,* 1–20793, blanket, 26 by 36 inches in size, of twisted muskrat fur strips, *Fiber zibethecus,* found with objects shown on plate 17. *b,* 1–20747, garment of twisted strips of bird skin.

Plate 19.—Aprons and fur belt. *a,* 1–21068, woman's apron of plant fiber, 9 by 10 inches in size. *b,* 1–21070, girl's apron of fiber and netting, 4 by 4 inches in size. *c,* 1–21069, girl's apron made in part of plant fiber and in part of netting, 5 by 5 inches in size. *d,* 1–20800, belt of woven twisted strips of meadow-mouse fur, *Microtus montanus,* 6 by 20 inches in size.

Plate 20.—Feather plume and skin receptacle, 12–4151. Length of plume 19⅞ inches.

Plate 21.—Bladders, footwear, and objects of feather and hair. *a* with lot 3; *b, c, d* with lot 6; other figures from unknown parts of Lovelock cave. *a,* 1–21074, feather with *Juncus* rope 6 mm. in diameter. *b,* 1–21075, feather with split tule rope, type *e,* diameter 9 mm. *c,* 1–21075, feather with split tule rope, type *e,* diameter 6 mm. *d,* 1–21076, feather with split tule rope, type *e,* diameter 5 mm. *e,* 1–21079, bundle of feathers wrapped in tule. *f,* 1–21080, bundle of feathers tied in cat-tail leaves. *g,* 1–21140, bundle of cord, 2-strand, left twist, 4 mm. in diameter, made of human hair. *h,* 1–21151, two bladders wrapped in a piece of skin. *i,* 1–21640, leather moccasin ornamented with *Olivella*-shell beads. *j,* 1–21231, down from the cat-tail rush, said to be used as sandal lining, and found in somewhat doubtful association with sandal 1–20117 (pl. 23*f*). *k,* 1–21233, cat-tail down for sandal lining.

Plate 22.—Sandals. *a,* 1–20143, lot 25, covered sandal of rush (*Juncus*), 20 cm. length, top and bottom shown. *b,* 1–20135, lot 6, covered sandal of tule (*Scirpus*), 25 cm. length, top and bottom shown. *c,* 1–20127, lot 9, covered sandal of rush of coarser type, 25 cm. length, top and bottom shown. *a', b', c',* undersides of *a, b, c.* *d,* 1–20131, lot 3, fragmentary sandal of tule. *e,* 1–20144, lot 22, child's covered sandal of deer skin, 19 cm. in length.

Plate 23.—Sandals mostly of coarser type, from Lovelock cave. *a*, 1–20132, covered sandal of rush (*Juncus*) of finer type, length about 26 cm., found with lot 3. *b*, 1–20114, sandal of tule (*Scirpus*). *c*, 1–20115, sandal of tule (*Scirpus*). *d*, 1–20113, sandal of tule. *e*, 1–20126, fragmentary covered sandal of rush. *f*, 1–20117, sandal of tule, length 28 cm. *g*, 1–20126, fragmentary sandal of rush.

Plate 24.—Matting. *a*, 1–20200, tule mat, 48 by 20 inches, woof courses 120 mm. apart. *b*, 1–20236, tule mat, 13 by 11 inches, woof courses 11 mm. apart. *c*, 1–20245, tule mat, 24 by 24 inches, woof courses 33 mm. apart. *d*, 1–20202, tule mat, 19 by 13 inches, found with lot 31. Woof courses 5 cm. apart. Selvage at upper edge of type *c* (fig. 12*c*). *e*, 1–20173, tule mat fragment with woof courses 9 cm. apart. Border of *Juncus*. *f*, 1–20218, mat of cat-tail (*Typha latifolia*) leaves, 17 by 7 inches, woof courses 120 mm. apart. *g*, 1–20155, tule mat, 9 by 5 inches, woof courses 4 to 5 cm. apart. Half of woof twisted in the unusual clockwise direction. Selvage of type *e*.

Plate 25.—Matting. *a*, 1–20205, mat of tule (*Scirpus*), 15 by 12 inches. Woof courses 6 to 9 cm. apart. Selvage of type *c* (fig. 12*c*). Found with lot 31. *b*, 1–20219, mat of tule, 10 by 7 inches. Woof of 3 strands braided, courses 30 mm. apart. Found with lot 34. *c*, 1–20206, mat of tule, 18 by 10 inches. Woof of 3 strands, courses 36 mm. apart. Found with lot 31. *d*, 1–20166, mat of spike rush (*Elocharis palustris*), 13 by 5 inches. Woof courses of *Juncus*, 4 to 6 cm. apart. *e*, 1–20223, *Juncus* mat, 6 by 4 inches. Selvage of type *c*. Woof courses 4 cm. apart. Found with lot 16. *f*, 1–20147, tule mat selvage of type *a*. *g*, 1–20146, tule mat selvage of type *d*. *h*, 1–20146, tule mat selvage of type *e*. *i*, 1–20146, tule mat selvage of type *g*. *j*, 1–20209, *Juncus* mat selvage of type *c*. *k*, 1–20210, tule mat 18 by 10 inches. Woof courses of cord 3 to 5 cm. apart. Final warp of border is 3-strand braid, 10 mm. wide and 25 inches long. Found with lot 31. *l*, 1–20196, mat of cat-tail (*Typha latifolia*). Woof courses of cord 16 mm. apart. Border warp of rope 1 inch long, 5 mm. diameter. Found with lot 6. *m*, 1–20152, tule mat. Selvage with ends of the warp twisted into a rope 15 mm. in diameter.

Plate 26.—Matting. *a*, 1–20108, tube of *Juncus*, 10 to 15 mm. in diameter, 60 cm. long. Woof courses about 4 cm. apart. *b*, 1–20092, beginning of a tule receptacle. *c*, 1–20099, tule receptacle, 7 cm. in diameter, 34 cm. long; woof courses 8 to 10 cm. apart. Found with lot 31. *d*, 1–20107, receptacle of *Juncus*, 5 cm. in diameter, 15 cm. long. Woof courses 12 to 25 mm. apart. Found with lot 13. *e*, 1–20106, receptacle of tule, 5 cm. in diameter, 18 cm. long. Woof courses of *Juncus* 2 to 3 cm. apart. *f*, 1–20100, receptacle or conical carrying basket of *Juncus*, about 21 cm. in diameter. Woof courses 7 cm. apart. Found with lot 31. *g*, 1–20104, carrying case of tule, 40 cm. long. Woof courses 6 cm. apart. Handle of rope 8 to 15 mm. in diameter made of tule and rush. Found with lot 23.

Plate 27.—Wicker basketry, probably fragments of burden baskets. *c*, found with lot 18; *b* and *e* with lot 30; and *a* and *f* with lot 31. *a*, 1–19962, to *d*, 1–19930, show types of basket borders, two courses of twined weaving followed by the border with double warp which turns backward at the rim to become the woof. *b*, 1–19940, *c*, 1–19954, typical wicker weave is shown below the two twined courses. Warp rods 28 to 10 centimeters spaced singularly. Average of about 36 woof courses to 10 centimeters consisting of thin superimposed splints. *e*, 1–19938, example of unusually loosely woven specimen where splints are but slightly superimposed. *f*, 1–19958, example of tight weave with 22 warps and 56 woof courses to 10 centimeters. Example of neat mending.

Plate 28. Typical fragment of a wicker burden basket, 1–19978, found with lot 34. 22 warp and 38 woof courses to 10 centimeters. At the apex are a dozen courses of twined weave typical of all burden baskets. Design emphasized by inking in. Size 18 by 25 inches.

Plate 29.—Coiled basketry. *a*, 1–20021, obverse and reverse sides of a sample of split stitch weave, a fragment from a tray about 26 inches in diameter. Twenty-two coils and 30 stitches to 10 centimeters. A completely faded design is revealed by irregularity of stitches on reverse side. With herringbone rim. *b*, 1–20042, sample of tray with stitches similarly split on both sides. Thirty coils and 24 stitches to 10 centimeters. *c*, 1–20012, sample of 1-rod foundation shelling and roasting tray. Sixteen coils and 14 stitches to 10 centimeters. *d*, 1–20053, sample of a shelling and roasting tray with split stitches. Eighteen coils and 26 stitches to 10 centimeters. *e*, 1–20014, specimen of bowl-shaped basket with 1-rod foundation. Forty coils and 16 stitches to 10 centimeters. *f*, 1–20029, specimen of bowl-shaped basket with 1-rod foundation and narrow stitches. Fifty-two coils and 64 stitches to 10 centimeters. Stitches alternately black and white except for central area where all white. *g*, 1–20027, specimen of bowl-shaped basket with narrow stitches. Forty-two coils and 94 stitches to 10 centimeters. See figure 14*f* for design. *h*, 1–20024, specimen of bowl-shaped basket, 9 or 10 inches in diameter, with narrow stitches and herringbone rim. Thirty coils and 70 stitches to 10 centimeters. Band and "bead" design on 4th and 5th coil. *i*, 1–20043, bottle-shaped basket, 4 inches in diameter, found with human remains; lot 32, decorated with feathers, herringbone rim, 28 coils and 28 stitches to 10 centimeters.

Plate 30.—Coiled and twined basketry. *a*, 1–20044, coiled tray found with lot 32 over the pelvis and femurs of partially mummified human remains, 12–2652. Two-rod and splint foundation, split stitch, diameter 26 inches. For detail of one of the 17 designs radiating from the center see figure 14*h*. *b*, 1–20083, fragment of a plain twined basket with decorative courses of three-strand woof. Warp and woof of cat-tail leaves, *Typha latifolia*. Found with lot 32 near the chin of human remains 12–2652. Both .58 natural size.

Plate 31.—Twined basketry. *b* and *f* of cat-tail leaves, *Typha latifolia; c* and *d* of tule culms, *Scirpus; a* and *e* of undetermined pliable materials; and *g* to *l* of willow. *a*, length 197 mm.; *b–f* to same scale. *g*, length 208 mm.; *i–l* to same scale. *a*, 1–20070, plain twined weave. Warp of two twisted strands. *b*, 1–20085, plain twined weave with decorative course of three-strand twined woof. Found with lot 32. *c*, 1–20066, woof of three strands braided. *d*, 1–20091, plain twined weave with warp of two twisted strands. With lot 29. *e*, 1–20063, woof of three strands. Warp of two twisted strands. *f*, 1–20084, plain twined weave with decorative courses of lattice twined weave. With lot 32. *g*, 1–20067, diagonal twined. Woof courses 12 mm. apart. *h*, 1–20086, twined border to a burden basket. The warp after ascending to the rim makes a horizontal turn and becomes woof. With lot 34. *i*, 1–20073, diagonal twined. Woof courses 2 cm. apart. With lot 11. *j*, 1–20075, rim of an openwork basket 2.5 inches in diameter. With lot 6. *k*, 1–20058, typical plain twined weave as found in a few burden baskets. *l*, 1–20062, diagonal twined weave.

Plate 32.—Duck decoy heads and mink head. *a*, *b*, *c*, and *h* found with lot 34 as part of a cache of 13 bundles of stuffing without bird skin, 7 stuffed heads of Canada goose, and 5 bills of the same species. Other figures from unknown parts of the cave. All .31 natural size. *a–d*, 1–21130, 1–21127, 1–21129, 1–21642, Canada goose, *Branta canadensis*. *e*, 1–21643, white fronted goose, *Anser albifrons*. *f*, 1–21103, merganser, *Mergus americanus*. *g*, 1–21644, sprig, *Dafila*

acuta. h, 1–21115, bundle of tule, *Scirpus,* such as *a–e* are stuffed with. *i,* 1–21639, mink, *Mustela vison,* skull and skin sewed with cord 1.5 mm. in diameter.

Plate 33.—Tule body of duck decoy, 13–4513. *a,* side view, 12¼ inches long. *b,* bottom view, 11 inches long.

Plate 34.—Decoys. *a,* 13–5010, decoy of passerine bird, composed of grass, tule, and a bird skull, from tip of tail to top of beak 4¼ inches. *b,* 13–4512, decoy canvasback drake of tule and rush, covered with feathers and paint, 11 inches long.

Plate 35.—Rope of tule (*Scirpus*), cat-tail leaves (*Typha latifolia*), and of undetermined materials. *o* and *p* right twist, all others left twist. *b* found with lot 30; *f* with lot 6; *j* with lot 31; *p* with lot 3; other figures from unknown parts of the cave. *a,* 1–20249, rope of tule, type *a,* 2 stalks, 8 mm. diameter. *b,* 1–20345, rope of tule, type *a,* 2 stalks, 10 mm. diameter. One strand takes half hitch on other strand. *c,* 1–20260, rope of tule, type *b,* 3 stalks, 10 mm. diameter. *d,* 1–20250, rope of tule, type *c,* 4 stalks, 14 mm. diameter. *e,* 1–20248, rope of tule, type *a,* 2 stalks, 18 mm. diameter. *f,* 1–20372, rope of split tule, type *e,* 6 mm. diameter. *g,* 1–20371, rope of split tule, type *e,* 7 mm. diameter. *h,* 1–20371, rope of split tule, type *e,* 3 mm. diameter. End whipped with vegetable fiber. *i,* 1–20251, rope of tule, type *c,* 4 stalks, 8 mm. diameter. *j,* 1–20429, rope of split tule, type *e,* 4 stalks, 4 mm. diameter. *k,* 1–20272, rope of undetermined material, 7 mm. diameter, overhand knot in one end. *l,* 1–20276, rope of undetermined material, 5 mm. diameter. *m,* 1–20334, rope of cat-tail, 2–strand compound, 40 mm. diameter. *n,* 1–20263, rope of tule, type *c,* 7 stalks, 25 mm. diameter. *o,* 1–20297, rope of split tule, 2 stalks, right twist, 6 mm. diameter. *p,* 1–20364, rope of split tule, 2 stalks, right twist, 3 mm. diameter. *q,* 1–20265, rope of tule, type *d,* 3-strand compound, 9 mm. diameter. *r,* 1–20264, rope of cat-tail, 3-strand compound, 15 mm. diameter.

Plate 36.—Rope of rush, *Juncus,* except for *h* and *k,* from Lovelock cave. All left twist. *a,* 1–20290, rope, 2-strand, 6 stalks, 8 mm. diameter, with a loop. *b,* 1–20339, rope, 3-strand (5, 5, and 7 stalks each), one strand being itself a 2-strand rope of 7 stalk with an overhand knot in one end. Diameter 12 mm. *c,* 1–20381, rope, 2-strand, 17 stalks, poorly twisted to about a 20 mm. diameter, with lot 6. *d,* 1–20479, rope, 2-strand, 9 coarse stalks, 15 mm. diameter, with lot 38. *e,* 1–20365, rope, typical of well twisted 2-strand, 25 small stalks, 10 mm. diameter, with lot 3. *f,* 1–20381, rope, 2-strand, 6 stalks, one stalk makes an overhand knot in one end, diameter 10 mm., with lot 6. *g,* 1–20293, rope, 4 stalks, 4 mm. diameter. *h,* 1–20296, rope make of bark of sagebrush, *Artemisia tridentata.* Diameter 10 mm. *i,* 1–20418, rope of very greatly frayed *Juncus,* 3-strand, 17 mm. diameter, with lot 31. *j,* 1–20493, rope, 3-strand, with one strand making an overhand knot in one end. Other end with a loop 13 inches in circumference. Diameter 20 mm. With lot 25. *k,* 1–20398, two ropes of grass with one making an overhand knot over the other. Diameter about 20 mm. With lot 17.

Plate 37.—Braid of rush, tule, and grass. Three-strand braid, *g* to *s;* 4-strand braid, *t;* 5-strand braid, *f;* 6-strand braid, *d, e;* 7-strand braid, *c;* 16-strand braid, *a;* and 18-strand braid, *b. a* to *l* of rush, *Juncus; m* to *o* and *t* of tule, *Scirpus; r* and *s of* grass; *p* of cat-tail leaves, *Typha latifolia;* and *q* of undetermined fiber. *a,* 1–20503, 50 mm. wide. *b,* 1–20504, 40 mm. wide. *c,* 1–20505, 35 mm. wide. *d,* 1–20507, 10 mm. wide. *e,* 1–20525, 15 to 25 mm. wide. *f,* 1–20552, with lot 16. Width 25 mm. *g,* 1–20513, loosely braided 10 to 25 mm. wide, with end twisted and whipped. *h,* 1–20530, with lot 30. Width 30 to 35 mm. *i,* 1–20548, with lot 14. Width 10 mm. *j,* 1–20508, 6 mm. wide. *k,* 1–20511, 4

to 8 mm. wide. With loop. *l*, 1–20528, two pieces 25 mm. wide bound by a third piece 7 mm. wide. *m*, 1–20542, with lot 6. Width 8 mm. *n*, 1–20517, 5 mm. wide. *o*, 1–20519, 18 mm. wide. *p*, 1–20520, 30 mm. wide. *q*, 1–20523, 12 mm. wide. *r*, 1–20545, with lot 18. Width 15 mm. *s*, 1–20524, 25 to 30 mm. wide. *t*, 1–20549, circular cross-section, 10 mm. diameter.

Plate 38.—Knots of rush, *Juncus* (*a, b, l, o, q*); of tule, *Scirpus* (*d, f, g, h, k, n*); of cat-tail leaves, *Typha latifolia* (*c, j*); and of grass (*p*). *f* found with lot 18; *g* with lot 6; other figures from unknown parts of the cave. All .40 natural size. *a–e*, mesh knots. *a*, 1–20301; *b*, 1–20301; *c*, 1–20319; *d*, 1–20325. *f–i*, reef knots. *f*, 1–20411; *g*, 1–20385; *h*, 1–20330. *g* and *h* made in 2-stalk tule rope of 12 and 7 mm. diameters. *j–m*, granny knots. *j*, 1–20320; *k*, 1–20327; *l*, 1–20305. *n–r*, overhand knots. *o* and *q*, made in *Juncus* rope of 12 mm. diameter. *n*, 1–20326; *o*, 1–20310; *p*, 1–20322; *q*, 1–20310.

Plate 39—Knots of rush, *Juncus*, except *a* and *g* of tule, *Scirpus*. *c* found with lot 34; *g* with lot 16; other figures from unknown parts of the cave. *a*, length 149 mm.; *b–k* to same scale. *a–d*, slip knots. *a*, 1–20328; *b*, 1–20309; *c*, 1–20457. *a*, made in type *c* tule rope of 12 mm. diameter. *e, f*, "wrap" knots. *e* and *f*, 1–20308. *g*, 1–20466, clove hitch, the technique of which is shown in the drawing below. *h–k*, 1–20307, "neckties," a modification of the timber hitch. The drawing shows the detail of *i*. *j* and *k* also have each an overhand knot in the standing part.

Plate 40.—Cord. *a–c*, two strands twisted to the right (clockwise). *d*, three strands twisted to the left. *e*, two compound strands twisted to the left, but the original cord from which they were made is of two strands twisted to the right; *k* and primary strands of *g* twisted to the left, all others twisted to the right (clockwise). *a*, 1–20660, cord, 1–5 mm. in diameter. *b*, 1–20721, found with lot 26. Cord 2.5 mm. in diameter. *c*, 1–20685, with lot 3. Cord 1.5 mm. in diameter. *d*, 1–20676, cord, 7 mm. in diameter. Each of the three strands 3.6 mm. in diameter. *e*, 1–20671, cord 2.5 mm. in diameter. Each of the four strands 1 mm. in diameter. *f*, 1–20677, with lot 9. Cord for most part two-strand, 6 mm. in diameter, but central portion three-strand. *g*, 1–20700, with lot 6. Two cords (each 3 mm. in diameter and of left twist) loosely twisted together. *h*, 1–20675, three-strand cord, 5 mm. in diameter. *i*, 1–20718, with lot 37. Three-strand cord, 3 mm. in diameter. *j*, 1–20742, with lot 26. Two-strand cord 2 mm. in diameter, woven into a six-strand chain. *k*, 1–20734, two-strand cord, 3.5 mm. in diameter, knotted about small lumps of *Juncus* rush. *l*, 1–20735, two-strand cord, .8 mm. in diameter, attached to ropes of rush 5 mm. in diameter. *m*, 1–20736, with lot 18; two-strand cord, 1.5 mm. in diameter, tied into a pair of loops 25 cm. in circumference.

Plate 41.—Hair nets made from cord about .8 mm. in diameter. *b* found in association with the mummy of a child, 12–2670, lot 26. All other figures from unknown portions of the cave. *a*, 1–20557, mesh, 17 mm. square. *b*, 1–20613, mesh, 7 mm. square. *c*, 1–21142, human hair with net having a mesh 5 mm. square. *d*, 1–20588, triangular mesh, 30 mm. in length by 8 mm. in width, smaller meshes, 5 mm. square. *e*, 1–20587, triangular mesh, 22 mm. in length by 10 mm. in width.

Plate 42.—Fish nets and old nets utilized in making cord. *a*, found with lot 31. All others from unknown parts of the cave. *a*, 1–20603, net made from cord .6 mm. in diameter, mesh 55 mm. square. Net made into cord 6 mm. in diameter by twisting to the left. *b*, 1–20563, net made from cord .6 mm. in diameter,

mesh 30 mm. square. Net made into cord 6 mm. in diameter by twisting to the right. *c*, 1–20561, net made from cord .4 mm. in diameter, mesh 30 mm. square. Net made into cord 2 mm. in diameter by twisting to the right. *d*, 1–20582, net made of double lines, from cord 1.4 mm. in diameter, mesh 60 mm. square.

Plate 43.—Miscellaneous bundles and diminutive mats. *a*, 1–21210, bundle of cat-tail leaves, 14 cm. long. *b*, 1–21175, bundle of tule, 15 cm. long. *c*, 1–21211, with lot 13. Bundle of tule, 18 cm. long, wrapped with cord of 3 mm. diameter. *d*, 1–21164, spike rush wrapped with *Juncus*, 9 cm. long. *e*, 1–21208, with lot 13. Bundle of tule, 10 cm. long. *f*, 1–21163, 3-strand braid of *Juncus* wrapped with *Juncus*. *g*, 1–20772, ball of fur strips bound with thongs and cord. Diameter 4 cm. *h*, 1–20773, bundle of leather thongs. *i*, 1–21257, with lot 18. Coiled willow basket splints wrapped with *Juncus*. *j*, 1–21153, diminutive triangular mat, 4 by 6 cm. *k*, 1–21154, diminutive triangular mat, 6 by 6 cm. *l*, 1–20111, spoon-shaped object of wicker weave. Willow warp and woof of cord. Size 42 by 87 mm. *m*, 1–20112, miniature model of a sandal. Twined weave, warp of *Juncus*, woof of tule. Size 40 by 85 mm. *n*, 1–20193, with lot 3; mat, warp of salt grass, woof of cat-tail. *o*, 1–21083, with lot 37. Mat made of quills twisted into cord 3 mm. in diameter. *p*, 1–21212, bundle of tule containing red paint. *q*, 1–21213, bundle of tule containing yellow paint.

Plate 44.—Snares and bundles used in games, etc. *b*, *c*, *e*, *h* with lot 3; *a*, *g*, *i* with lot 6; *j* with lot 11; *k* with lot 17. *a*, length 110 mm.; *b–l* to same scale. *a*, 1–21283, bundle containing 8 sets of willow snares, one of which is shown separately. A bent twig is attached to a wooden needle by a cord .8 mm. in diameter and 20 to 30 inches long. *b*, *c*, *d*, 1–21216, 1–21217, 1–21215, bundles of cat-tail leaves (*Typha latifolia*) used in cup-and-ball game. *e*, 1–21198, ball of tule (*Scirpus*) and spike rush (*Elocharis palustris*) possibly used as a cork for a bottle-basket. *f*, 1–21197, elliptical bundle of tule. *g*, 1–21203, globular ball of cat-tail and *Juncus*. *h*, 1–21200, elliptical bundle of cat-tail, possibly a float for a seine net. *i*, 1–21202, globular ball of tule. *j*, *k*, 1–21218, 1–21219, rings of cat-tail. *l*, 1–21174, coil of tule.

Plate 45.—Bow and darts. *a*, 13–4532, end of bow, length 7¼ inches. *b*, 12–4193, knife or foreshaft of spear with stone point, length 7¾ inches. *c*, 13–4960, foreshaft of atlatl dart, length 7¼ inches. *d*, 13–4552, foreshaft of atlatl dart, length 7⅝ inches.

Plate 46.—Dart and arrowpoints. *a*, 13–4551, 2 atlatl dart foreshafts with stunning ends of bone, longest 7¾ inches. *b*, 13–4518, 6 wooden bunts, longest 4¼ inches. *c*, 13–4579, arrow foreshaft bound with grass for ignition, length 7 inches. *d*, 13–4579, arrow foreshaft bound with tule for ignition, length 7¼ inches.

Plate 47.—Arrow shafts, pointed sticks, bow fragment, knife handles, etc. *a* and *r* found with lot 30; *c* with lot 31; *d*, *o* with lot 18; *e*, *g*, *q* with lot 6; *i* with lot 11; *t* with lot 33; others from unknown parts of cave. *a*, 1–21477, hard wood foreshaft inserted in cane. Diameter 7 mm. Length front of cane, 340 mm. One-half painted red. Three wavy "blood grooves." *b*, *c*, 1–21427, 1–21475, fragmentary arrows of hardwood. Diameters 9 and 10 mm. *d–i*, 1–21458, 1–21443, 1–21422, 1–21445, 1–21435, 1–21442, arrow foreshafts probably all of greasewood, *Sarcobatus vermiculatus*. Variation in diameter 6 to 8 mm. *d–g* foreshafts inserted in cane. *d* has black painted stripe near the head. *j*, 1–21485, double pointed, red painted, hardwood stick with sinew holding small feathers. Diameter 7 mm. Length 193 mm. *k*, *l*, 1–21479, 1–21480, butt end of arrows. Cane with

feathers attached. *m*, 1–21418, fragment of sinew backed bow. *n*, 1–21503, knife handle of soft wood. Diameter 20 mm. Length 124 mm. *o*, 1–21384, notched and sawed piece of willow. *p*, *q*, *r*, 1–21494, 1–21493, 1–21499, objects described as possibly being net weavers (but cf. with atlatl darts, pl. 45*c*, *d*). Diameters 10, 13, and 11 mm. Lengths 160, 120, and 167 mm. *r* of soft wood with decorative "lightning marks." Other specimens of *Sarcobatus*. *s*, 1–21500, sinew-wrapped, soft-wood stick, a possible arrow foreshaft, but of unusual type. Diameter 11 mm. Length 87 mm. *t*, 1–21318, cradle, length 595 mm, found covering infant mummy, pl. 11*b*.

Plate 48.—Various. *a*, bundle of snares tied with piece of rush found with duck decoys in pit 12, length 4 inches. *b*, 13–4517, two of the snares, each 3¾ inches long. *c*, 13–4570, flat rectangular basketry (?) object, bound with cord, length 4¼ inches (cf. pl. 43*l*). *d*, 13–4930, wooden pendant, length 3 1/16 inches. *e*, 13–4545, small wooden tablet, length 2½ inches. *f*, 13–4929, wooden pendant, length 3⅞ inches; *c* to *f* from 6th level, stratigraphic section.

Plate 49.—Fire drills, hearths, and various articles of wood and horn. *d*, *k* found with lot 9; *e* with lot 27; *g*, *m*, *o* with lot 30; *h*, *p* with lot 6; *l* with lot 35; *n* with lot 25, and *f*, *i*, *j*, *q* from unknown parts of the cave. *a*, 1–21320, fragmentary soft-wood fire drill, 10 mm. diameter. *b*, 1–21319, fragmentary soft-wood fire drill, 10 mm. diameter. *c*, 1–21322, complete fire drill (?) of *Sarcobatus*, 10 mm. diameter, 216 mm. long. *d*, 1–21346, fire hearth, 127 by 27 by 16 mm. *e*, 1–21357, fire hearth, 84 by 27 by 25 mm. *f*, 1–21342, fire hearth, 118 by 78 by 10 mm. *g*, 1–21348, fire hearth, 170 by 16 by 13 mm. *h*, 1–21353, fire hearth, 125 by 22 by 14 mm. *i*, 1–21343, fire hearth, composed of four pieces of split cat-tail stem bound by cat-tail leaves, 113 by 16 by 14 mm. *j*, 1–21344, fire hearth, same material as *i*, 205 by 27 by 12 mm. *k*, 1–21347, fire hearth of cane bound in *Juncus* rush, 260 by 22 by 18 mm. *l*, 1–21306, fragmentary digging stick of *Sarcobatus*, diameter 22 mm. *m*, 1–21378, piece of wood lenticular in cross-section like a bow. Dimensions 123 by 41 by 8 mm. *n*, 1–21388, bent stick of willow, 440 by 30 by 10 mm. *o*, 1–21376, bent stick of willow, 13 mm. in diameter, 330 mm. long. *p*, 1–21381, much weathered piece of horn, 218 by 48 by 8 mm., wrapped in cat-tail leaves. *q*, 1–21284, model of a fish trap (?), 40 cm. long, 6 cm. diameter, made of willow.

Plate 50.—Various objects of wood. *a*, *b*, *d*, *e*, and *m–r* of willow; *c* of soft wood; *f–j* probably of greasewood, *Sarcobatus vermiculatus;* and *k*, *l* probably of greasewood, *Atroplex torreyi*. *c* found with lot 19; *d* with lot 6; *f* with lot 31; *g* with lot 30; *h* with lot 14; *j* with lot 16; *m* with lot 34; and *q*, *r* from unknown parts of the cave. *a*, 1–21293, twigs of willow wrapped with human hair. *b*, 1–21369, carved figure incised with dots, 92 by 23 by 7 mm. *c*, 1–21385, plummet-shaped stick, probably blunt point for atlatl dart, 21 mm. in diameter, 79 mm. long. *d*, 1–21383, carved talismanic effigy, 58 by 30 by 25 mm. *e*, 1–21361, willow stick, 114 by 12 by 6 mm., wrapped with fine strong vegetable fiber. *f*, 1–21491, bluntly pointed stick, 11 mm. in diameter. *g*, 1–21375, comb sticks, each about 3 mm. diameter, 13 to 17 cm. long. *h*, 1–21386, arrow foreshaft for flame throwing, 7 mm. in diameter, 12 cm. long, bound with a *Juncus* rush in a bundle of grass. *i*, 1–21374, same, 6 mm. in diameter, bound with tule. *j*, 1–21387, twig, 7 mm. in diameter, wrapped in a ball of tule and grass. *k*, 1–21371, twig wrapped with tule. *l*, 1–21372, twig wrapped with *Juncus* rush. *m*, 1–21292, split willow twig in a coil. *n–q*, 1–21286, 1–21286, 1–21286, 1–21287, willow twigs twisted into knots. *r*, 1–21296, peeled willow twig sharply cut perhaps with a metal knife.

Plate 51.—Fishlines and hooks. *a*, 12–4181, set line with 12 hooks with bone barbs and fiber shanks, line 22 feet long. *b*, 12–4177, 2 fish barbs with points averaging 1 inch in length (cf. fig. 8).

Plate 52.—Various. *a*, 13–4531, tubular stone pipe with bone stem and inlay, length 8⅜ inches. *b*, 13–4897, ball of leather strips, diameter 1½ inches, from 4th level, stratigraphic section. *c*, 13–4944, headband of tufts of hair, diameter 8 inches, from 6th level, stratigraphic section. *d*, 13–4568, perforated bear-claw pendant. *e*, 13–4678, hairbrush of stripped feathers tied with strip of root, length 6¾ inches.

Plate 53.—Objects of shell and clay. *c, e, f* with lot 6; *a* with lot 26; *g, h* with lot 32. *a*, 1–19345, necklace of *Olivella-shell* beads found about the neck of a 5½-year-old child, 12–2670. For detail of stringing see figure 17*a*. *b*, 1–19343, string of *Olivella* shell beads. See figure 17*b*. *c*, 1–19347, abalone shell (*Haliotis*) ear ornament, 30 mm. diameter. *d*, 1–19346, abalone shell hair ornament, 43 mm. in diameter. *e, f*, 1–19349, 1–19348, ornaments of mussel shell. *g*, 1–19230, globular clay ball, 32 mm. in diameter. *h*, 1–19231, elliptical clay ball, 42 mm. long and 25 mm. in diameter.

Plate 54.—Ice pick and shellers. *a*, 1–19176, obverse and reverse sides of slate ice pick, and cross-section at position indicated. Dimensions 330 by 107 by 72 mm. *b*, 1–19183, fragmentary hammer of quartzite, 86 by 45 by 40 mm. *c*, 1–19179, fragmentary sheller of lacustrial conglomerate, 117 by 95 by 30 mm. *d*, 1–19178, flat side and cross-section of a sheller of brown basalt, 144 by 137 by 50 mm. *e*, 1–19181, sheller of black basalt, 145 by 135 by 42 mm.

Plate 55.—Various stone objects. *a, b* found with lot 32; *c* with lot 30; *f* with lot 25; *j* with lot 3; and *k* with lot 6. *a*, 1–19220, white flint knife, 274 by 57 by 9 mm. *b*, 1–19219, black flint knife, 186 by 36 by 25 mm. *c*, 1–19195, sinker made of a greenish ancient pre-Tertiary tuff. Diameter 82 mm.; thickness 12 mm. *d*, 1–19191, sinker of slate. Diameter 71 mm.; thickness 11 mm. *e*, 1–19190, sinker of slate. Diameter 60 mm.; thickness 13 mm. *f*, 1–19196, sinker of red limestone. Diameters 80 and 60 mm.; thickness 9 mm. *g*, 1–19193, sinker of quartzite. Diameters of 69 and 49 mm.; thickness 11 mm. *h*, 1–19192, fragmentary sinker of argillaceous limestone. Diameter 60 mm.; thickness 10 mm. *i*, 1–19197, cross-section and view of a partly finished pipe of calcium crystal, 41 by 23 mm. *j*, 1–19186, incised chisel-shaped stone of slaty tuff, 77 by 36 by 8 mm. *k*, 1–19187, rectangular stone of slaty, argillaceous limestone. *l*, 1–19208, obsidian knife, 140 by 47 by 11 mm. *m*, 1–19213, drab flint knife, 126 by 26 by 7 mm. *n*, 1–19216, fragment of chocolate flint knife 56 mm. wide. *o*, 1–19215, fragment of a knife, 40 mm. wide, of mottled flint.

Plate 56.—Chipped implements. *d, m* found with lot 37; *i* with lot 22; *j* with lot 11; other figures from unknown parts of the cave. *a*, 1–19206, obsidian arrowpoint, 51 by 25 by 6 mm. *b*, 1–19210, black flint arrowpoint, 52 by 18 by 6 mm. *c*, 1–19211, black flint arrowpoint, 56 by 23 by 4 mm. *d*, 1–19221, obsidian arrowpoint, 41 by 26 by 5 mm. *e*, 1–19201, obsidian arrowpoint, 18 by 13 by 4 mm. *f*, 1–19207, obsidian arrowpoint, 45 by 27 by 5 mm. *g*, 1–19204, obsidian arrowpoint, 44 by 22 by 7 mm. *h*, 1–19212, yellow flint spear point, 84 by 26 by 6 mm. *i*, 1–19228, white flint knife, 110 by 21 by 8 mm. *j*, 1–19217, mottled flint arrowpoint, 63 by 21 by 5 mm. *k*, 1–19205, obsidian arrowpoint, 32 by 16 by 5 mm. *l*, 1–19203, obsidian drill, 41 by 13 by 6 mm. *m*, 1–19226, white flint drill, 46 by 10 by 7 mm. *n*, 1–19202, obsidian arrowpoint, 36 by 18 by 7 mm. *o*, 1–19209, brown flint arrowpoint, 49 by 18 by 6 mm. *p*, 1–19223, obsidian spear point, 76 by 40 by 7 mm. *q*, 1–19222, obsidian spear point, 60 by 35 by 6 mm.

Plate 57.—Scoria ring and balls. *a*, 13–4667, scoria ring, possibly a club head. *b*, 13–4781, 6 stone balls, diameter of largest 1½ inches, of smallest ½ inch. *c*, 13–4784, cylindrical polishing stone. *d*, 13–4786, 2 bipointed stones.

OCALA CAVE

Plate 58.—Objects found at Ocala cave (site 19 of pl. 1), Churchill county, Nevada. All figures about one-third natural size. *a*, 1–21594, neck of mud hen, *Fulica americana*, stuffed with salt grass. *b*, 1–21593, head and neck of mud hen, stuffed with salt grass. *c*, 1–21590, head of gull, *Larus californicus*, stuffed with grass. *d*, 1–21563, triangular-shaped mat of tule, *Scirpus*. The pointed end is broken off. *e*, 1–21576, about 54-inch length of 5-strand tule braid rolled up in a coil. *f*, 1–21587, rope 70 mm. in diameter made of triangular tule, *Scirpus nevadensis*.

MODERN DECOY

Plate 59.—Modern duck decoy of canvasback skin over a tule form, 13–4189, length 14½ inches, Northern Paiute, Stillwater, Nevada. *a*, side, *b*, bottom.

HUMBOLDT VALLEY ARCHAEOLOGY

Plate 60.—Mortars, pestles, and metates from the valley north of Humboldt lake (except *i* of unknown provenience). *j*, *l*, and *m*, pestle fragments put to secondary use as paint or medicine mortars. *a*, 1–17760, cylindrical pestle of quartzite, 280 mm. long, 70 mm. diameter, 4.56 pounds weight. *b*, 1–17488, basalt pestle, 320 mm. long, 110 mm. diameter, 10.56 pounds. *c*, 1–17735, rhyolite pestle, 345 mm. long, 127 mm. diameter, 13 pounds. *d*, 1–17666, red rhyolite pestle, 433 mm. long, 145 mm. diameter, 23.5 pounds. *e*, 1–17789, basalt mortar, 290 mm. high, 395 mm. diameter. *f*, 1–17713 (fig. 21*a*), vesicular basalt mortar, 460 mm. high, 420 mm. diameter, 188.5 pounds. *g*, 1–17731, mortar of rhyolite tuff with perforations for suspension (fig. 22*a*), found bottom up with pestle (*h*) inside; 235 mm. high, 185 mm. diameter, 14 pounds. *h*, 1–17732, pestle of rhyolite tuff, 235 mm. long, 85 mm. diameter, 2.56 pounds. *i*, 1–22219, pestle of brown vesicular rhyolite. Provenience unknown but from an alkaline region, 655 mm. long, 140 mm. diameter, 26.5 pounds. *j*, 1–17815, paint mortar of rhyolite (fig. 22*e*), 90 mm. high, 120 mm. diameter, 2.3 pounds. *k*, 1–17380, pestle of gray rhyolite, 260 mm. long, 103 mm. diameter, 6.8 pounds. *l*, 1–17662, paint mortar of rhyolite (fig. 22*c*), 200 mm. long, 130 mm. diameter, 7.2 pounds. *m*, 1–17491, paint mortar of rhyolite (fig. 22*b*), 255 mm. long, 130 mm. diameter, 10 pounds. *n*, 1–17756, metate of rhyolite (fig. 20*a*), 31 pounds. *o*, 1–17759, metate of basalt, 420 mm. long, 300 mm. wide, 37 pounds. *p*, 1–17733, metate of quartzite (fig. 20*c*), 47 pounds. *q*, 1–17758, metate of basalt diorite or hornfels (fig. 20*b*), 28 pounds. *r*, 1–17367, metate of rhyolite, 485 mm. long, 355 mm. wide, 28 pounds. *s*, 1–17777, medicine mortar of rhyolite (fig. 22*f*), 275 mm. diameter, 9.6 pounds.

Plate 61.—Stones for hulling nut-like seeds, from Humboldt valley. *g* from site 12; all others from site 14. *a*, 1–17434 (fig. 19*a*), red vesicular basalt, 194 by 128 by 12 mm., weight 336 grams. *b*, 1–17432, red vesicular basalt, 132 by 107 by 18 mm., 327 grams. *c*, 1–17436, vesicular rhyolite, 253 by 120 by 18 mm., 501 grams. *d*, 1–17396, rhyolite tuff, 163 by 123 by 15 mm., 434 grams. *e*, 1–17439 (fig. 19*f*), vesicular rhyolite, 197 by 150 by 22 mm., 697 grams. *f*, 1–17430, quartzite, 137 by 95 by 16 mm., 392 grams. *g*, 1–17720 (fig. 19*g*), quartzite. Small size for use when traveling. 127 by 74 by 15 mm., 254 grams.

Plate 62.—Thick heavy stones for hulling hardest shelled seeds. Objects from sites north of Humboldt lake. *a* is a small metate fragment and *b* a pestle fragment put to a secondary use as shellers. *a*, 1–17702, vesicular rhyolite (fig. 19*c*), 165 by 118 by 22 mm., 465 grams. *b*, 1–17398, rhyolite tuff, 173 by 113 by 42 mm., 826 grams. *c*, 1–17399, greenish rhyolite (fig. 19*d*), 232 by 153 by 56 mm., 3004 grams. *d*, 1–17710, vesicular basalt, 112 by 108 by 55 mm., 366 grams. *e*, 1–17637, rhyolite tuff, 157 by 120 by 30 mm., 963 grams. *f*, 1–17772, gravel conglomerate (fig. 19*e*), 166 by 106 by 40 mm., 1220 grams. *g*, 1–17521, basalt, 98 by 80 by 27 mm., 320 grams. *h*, 1–17422, granite, 168 by 150 by 28 mm., 1310 grams.

Plate 63.—Stones for grinding seeds, from Humboldt valley. *d*, obtained from telegraph operator at Toy, all others from sites 13 and 14, north of Humboldt lake. *b* primarily a pestle or hammer, one side of which was used for grinding seeds. *e* primarily a pestle fragment. *j* used both as huller and grinder. *a*, 1–17620, coarse granular diorite (fig. 19*j*), 130 by 105 by 55 mm., 1499 grams. *b*, 1–17388, granite (fig. 19*i*), 160 by 92 by 56 mm., 1690 grams. *c*, 1–17393, granite, 144 by 92 by 56 mm., 1122 grams. *d*, 1–17828, granite (fig. 19*l*), 172 by 77 by 47 mm., 1028 grams. *e*, 1–17526, quartzite, 137 by 75 by 37 mm., 570 grams. *f*, 1–17390, granite (fig. 19*h*), 140 by 96 by 44 mm., 1022 grams. *g*, 1–17444, basalt, 117 by 96 by 35 mm., 588 grams. *h*, 1–17621, possibly basalt (fig. 19*m*), 102 by 80 by 52 mm., 766 grams. *i*, 1–17391, granite, 100 by 83 by 47 mm., 719 grams. *j*, 1–17522, quartzite, 100 by 85 by 29 mm., 452 grams.

Plate 64.—Stone objects found north of Humboldt lake. *a*, 1–17717, heavy sinker for fishing in swift eddies. Rhyolite tuff, 236 mm. long, 77 mm. diameter, 3.8 pounds. *b*, 1–17825, sinker of rhyolite or possibly decomposed granite, 155 mm. long, 47 mm. diameter, .82 pounds. *c*, 1–17783, sinker of rhyolite tuff, 200 mm. long, 70 mm. diameter, 2.3 pounds. *d*, 1–17827, hammerstone of rhyolite, 135 mm. long, 90 mm. diameter, 3.4 pounds. *e*, 1–17494, hammerstone of hornfels, 160 mm. long, 75 mm. diameter, 2.8 pounds. *f*, 1–17826, small paint mortar made from a pebble of red rhyolite, with vertical groove on sides and bottom, 90 mm. diameter, 1.25 pounds, cross-section fig. 22*d*. *g*, 1–17823, pick of slate for breaking holes in ice for fishing (fig. 23*a*, *b*), 355 mm. long, 103 mm. diameter, 8.2 pounds. *h*, 1–17597, ice pick of hornblende granite or granodiorite, 202 mm. long, 88 mm. diameter, 3.47 pounds. *i*, 1–17822, site 16, ice pick of hornblende syenite with incised design (fig. 23*c*, *d*), 193 mm. long, 85 mm. diameter, 3.23 pounds.

Plate 65.—Sinkers, pipes, flint crackers, and problematical stone objects found north of Humboldt lake. *e*, from site 9; *h* from site 15; *j* from site 12; *n* from site 5; *q* from site 16; all other figures from site 13. *a*, 1–17529, sinker of vesicular basalt, 90 by 77 by 15 mm., weight 125 grams. *b*, 1–17530, sinker, limestone, 90 by 80 by 15 mm., 186 grams. *c*, 1–18632, sinker, quartzite, 90 by 53 by 19 mm., 160 grams. *d*, 1–17644, sinker, slate, 75 by 53 by 15 mm., 86 grams. *e*, 1–18599, sinker, red rhyolite, 51 by 14 mm., 40 grams. *f*, 1–18629, sinker, gray rhyolite, 49 by 45 by 22 mm., 72 grams. *g*, 1–18628, sinker, rhyolite tuff, 64 by 30 by 27 mm., 48 grams. *h*, 1–18622, sheller (?), vesicular rhyolite (fig. 19*b*), 55 by 51 by 22 mm., 73 grams. *i*, 1–17655, flint cracker (?), quartzite, 86 by 37 by 10 mm., 56 grams. *j*, 1–17719, rectangular stone, quartzite, 147 by 60 by 14 mm., 239 grams. *k*, 1–18635, incised limestone pebble, 28 by 23 by 20 mm., 18 grams. *l*, 1–18633 (fig. 19*k*), flint cracker (?), basalt (?), 64 by 30 by 25 mm., 76 grams. *m*, 1–17531, pendant, marble, 83 by 20 by 13 mm., 32 grams. *n*, 1–18589, fragment of perforated stone, marble, 33 by 29 by 8 mm., 11 grams. *o*, 1–18639, pipe, red rhyolite tuff (fig. 24*b*), 43 by 23 mm., 19 grams. *p*, 1–18640, pipe,

rhyolite tuff (fig. 24*c*), 37 by 28 mm., 25 grams. *q*, 1–19167, partly made pipe, marble (fig. 24*a*), 65 by 30 mm., 92 grams. *r*, 1–18634, flint cracker, marble, 42 by 22 mm., 27 grams. *s*, 1–17646, flint cracker, quartzite, 64 by 30 mm., 77 grams. *t*, 1–17532, flint cracker, quartzite, 72 by 32 by 27 mm., 90 grams.

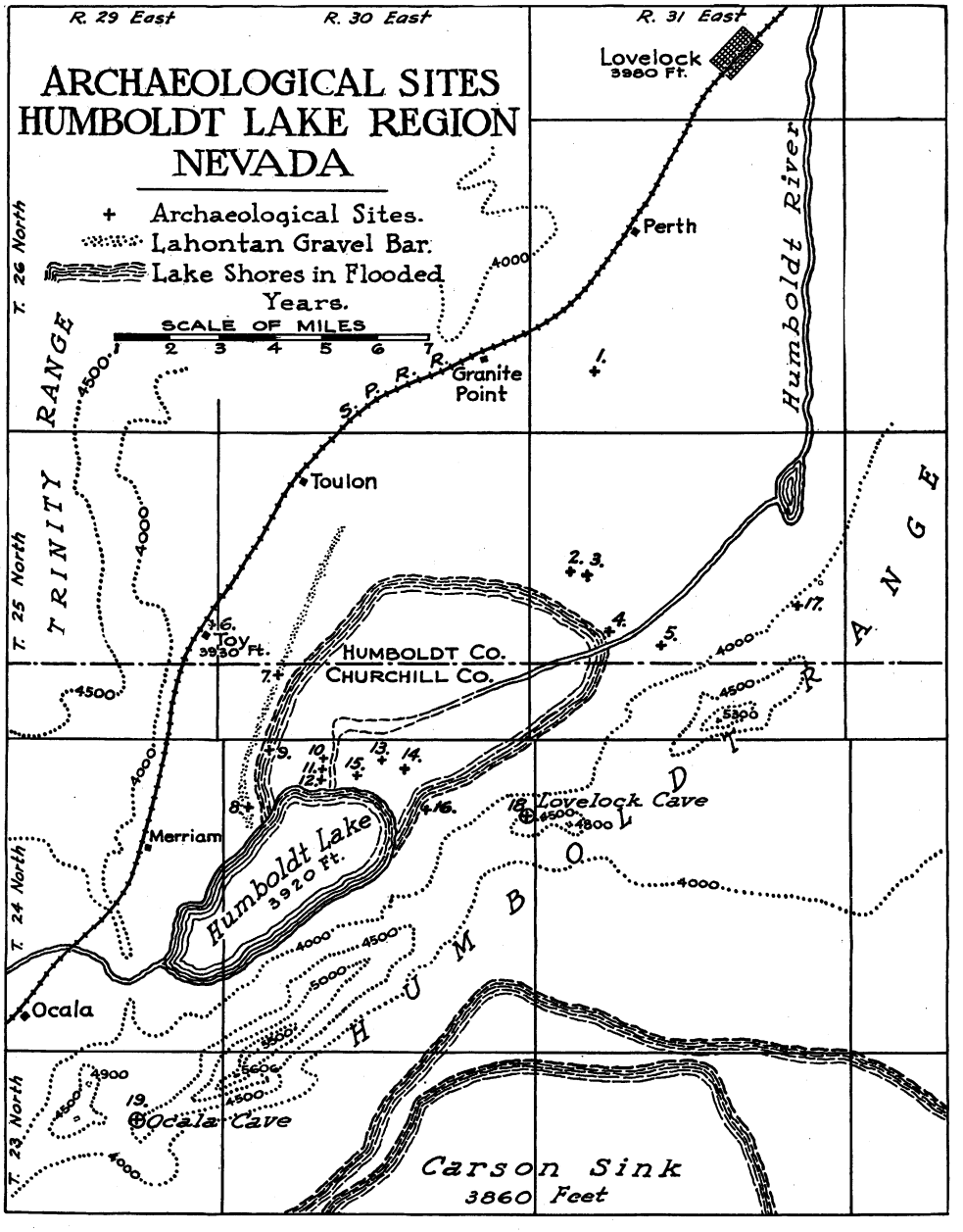
Plate 66.—Objects of bone and shell from site 13, north of Humboldt lake. *a*, length 97 mm.; *b–g* to same scale. *a–g*, awls made from bones of deer, antelope, or bighorn sheep. 1–17838, 1–18644, 1–17533, 1–18645, 1–18641, 1–18643, and 1–18647. *h*, 1–18648, flat rectangular bone object with the dimensions of 43, 26, and 4 mm., one edge has 11 notches, other is broken, but shows 5 notches. *i*, 1–18652, olive shell bead, *Olivella biplicata*. *j*, 1–18653, bead made from the side of an olive shell. *k*, 1–18659, serrated shell object made from fresh-water mussel, *Anodonta*. The two perforations indicate that it was probably used as a hair ornament. *l*, 1–18655, *m*, 1–18657, doubly perforated hair ornaments made of abalone shell, *Haliotis*.

WATER BASKET

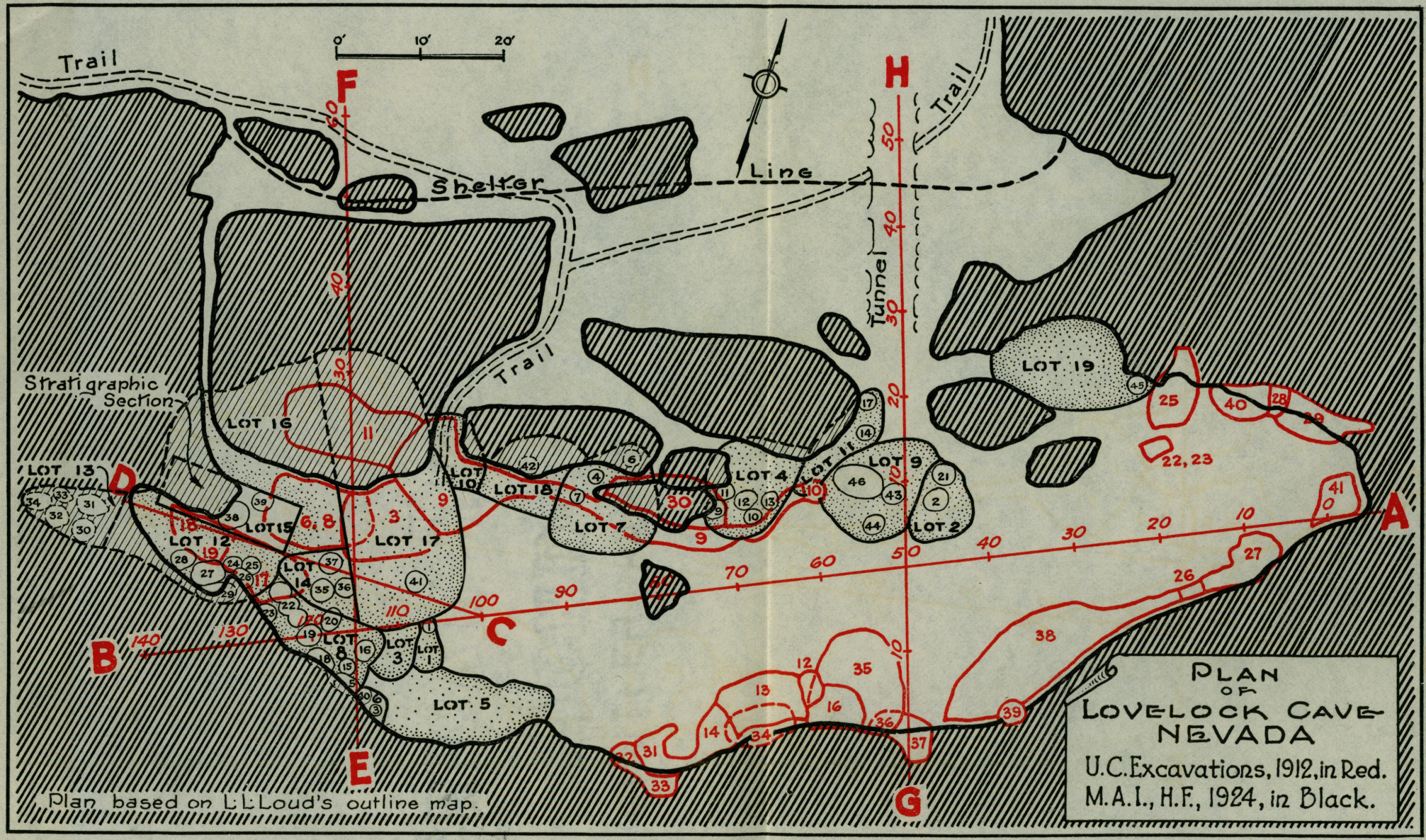
Plate 67.—Coiled basket water bottle from Lovelock cave, said to have been found at a depth of 15 feet, now in the Mackay School of Mines, University of Nevada. Diameter, in the mean, 18½ inches; height, 14½ inches.

ETHNOLOGICAL MAP

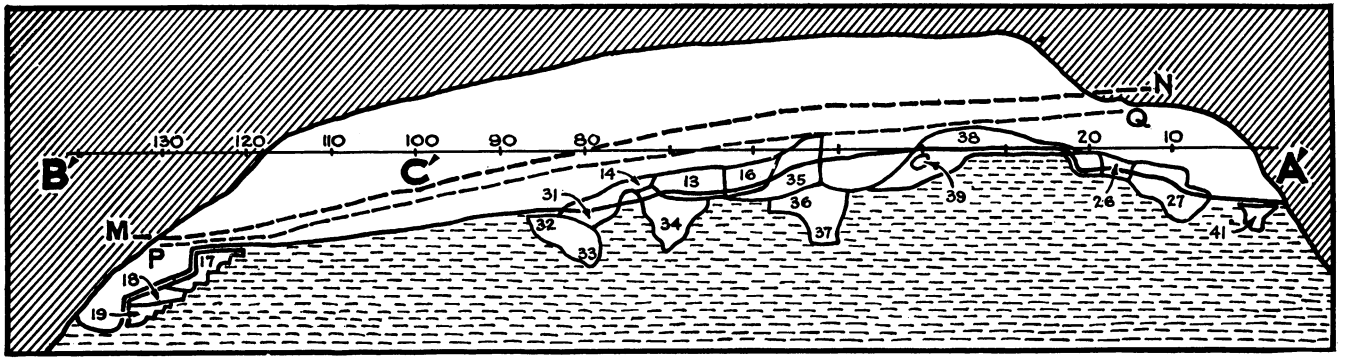
Plate 68.—Map of western Nevada showing points of mythological interest, 1 to 12, and points of ethnogeographical interest, 13 to 20. (1) Weasel trail or ditch, pabitsipo, made by Weasel and his brother Skunk. (2) su-pā-A, "vulva-water," a spring at the head of Hare canyon. (3) Hot springs, probable location where people were killed by Wolf and turned to stone. (4) cave called isa-kani, "wolf-house." (5) headless body of Wolf turned to rock. (6) Wolf's head, mocia, a rock some 200 feet high. (7) natural bridge, location doubtful but near wolf house, idza'a-posake, "coyote-bridge." (8) Tule peak, isa-kwe'a, "wolf-penis." (9) Lovelock cave where the "Ancient People" took refuge and where the writer made excavations. (10, 11) caves occupied by the Ancient People. (12) cave in front of which are houses of the Ancient People turned to rock. (13) cave called tohateka, near Perth. (14) otigadutU, birthplace of Natches, near Toy, also a gravel ridge in the lake opposite Toy. (15) 2 caves near the southern extremity of Humboldt range. (16) cave in Black butte, pusia-tipogI, "louse-cave." (17) Soda lake, said to have once broken out in eruption. (18) Two Tips mountain, waha-kutakwA, "two-tips." (19) pahino-motsate, "hot spring rock-point," at the southern extremity of the mountain range. (20) Pyramid island, 320 feet high, of hot spring formation.



MAP OF HUMBOLDT LAKE REGION



PLAN OF LOVELOCK CAVE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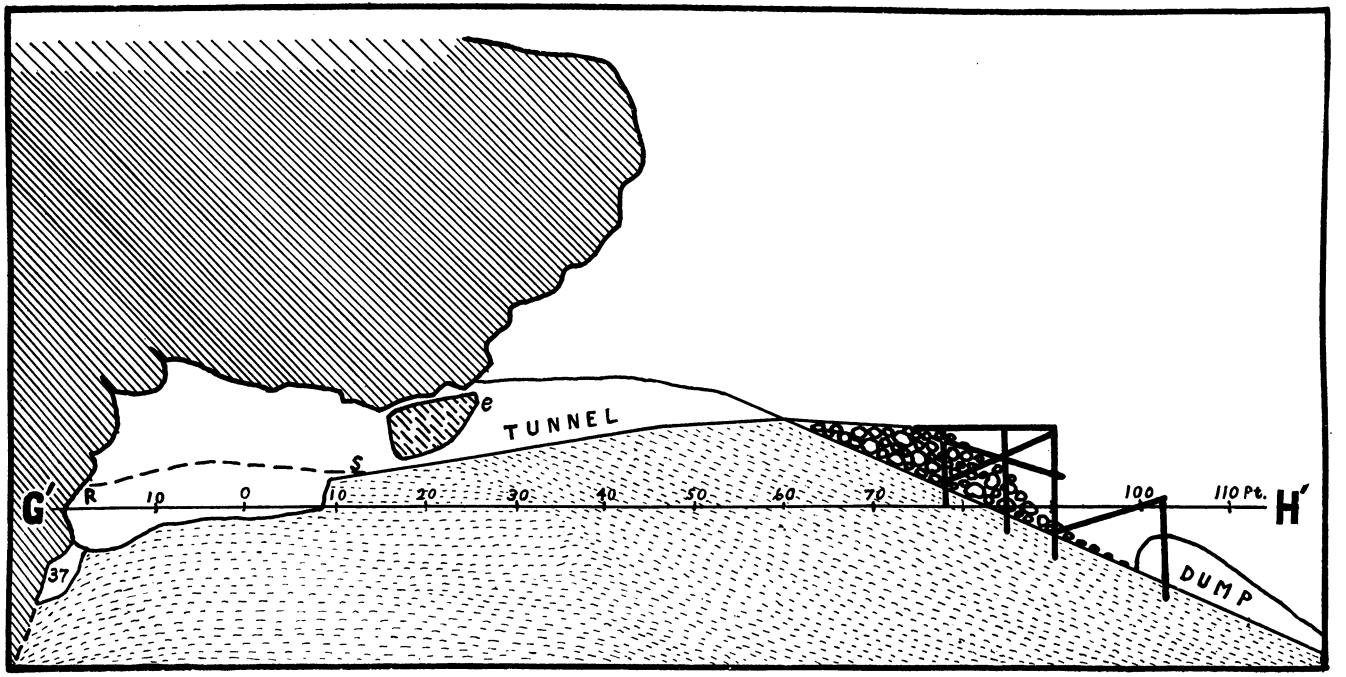
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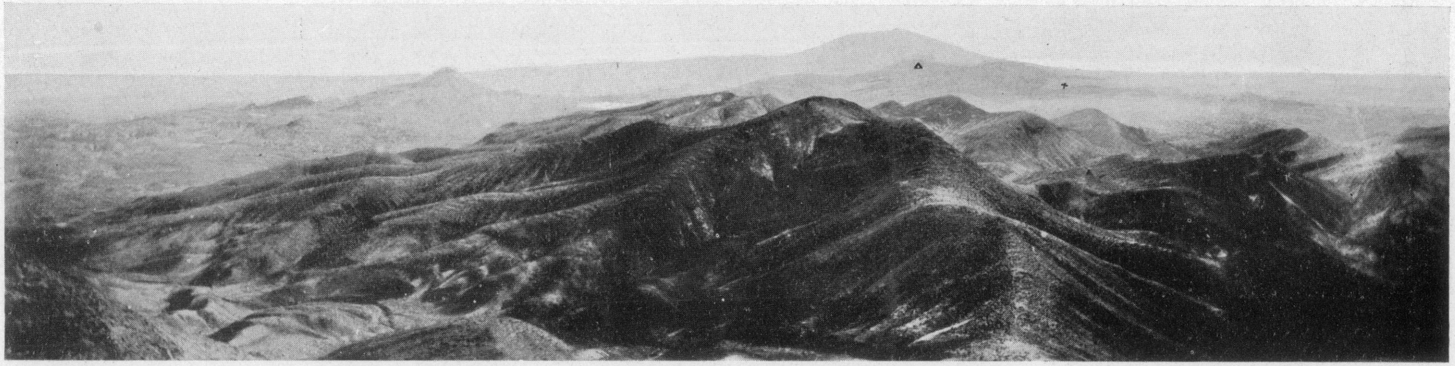

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HUMBOLDT RANGE, HUMBOLDT LAKE, AND CARSON SINK

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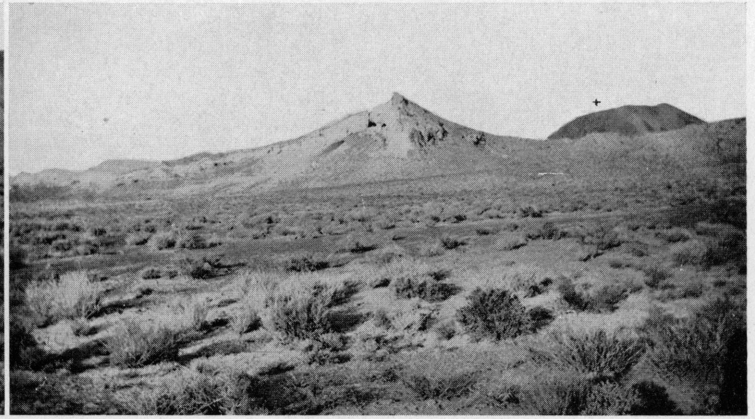

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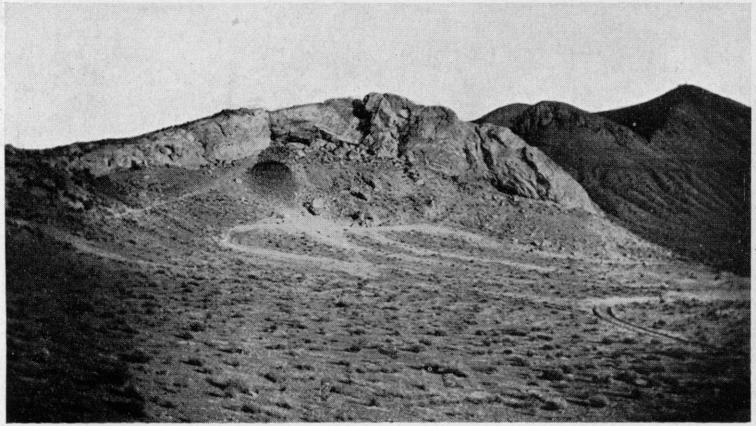

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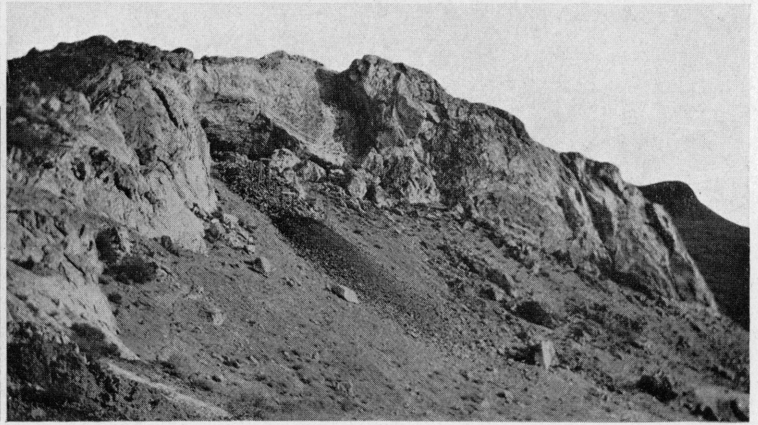

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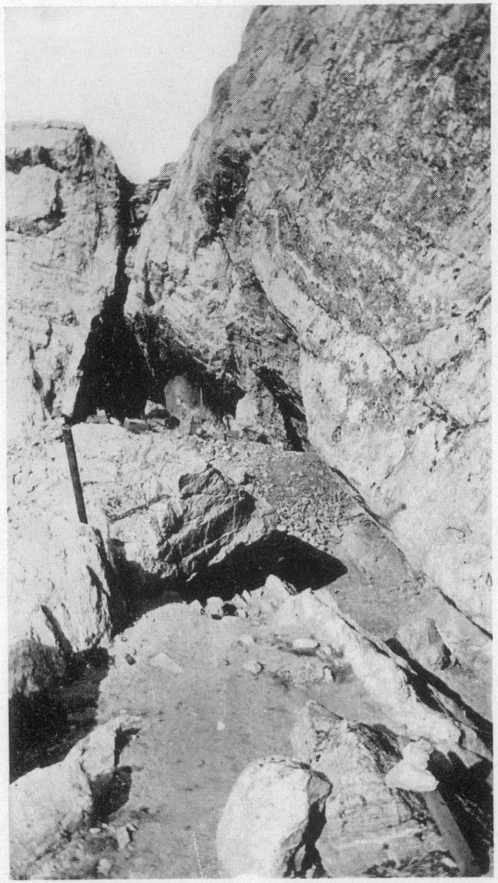
VIEWS OF LOVELOCK CAVE FROM OUTSIDE



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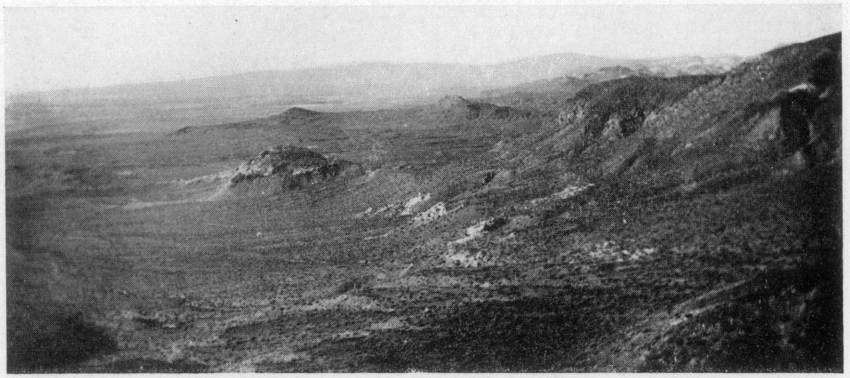

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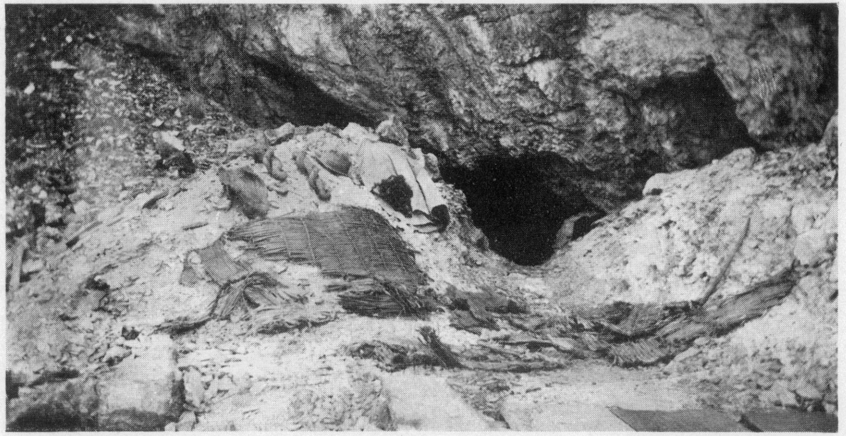

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VIEWS OF LOVELOCK AND OCALA CAVES

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b

EXCAVATIONS OF 1924—DUCK DECOYS

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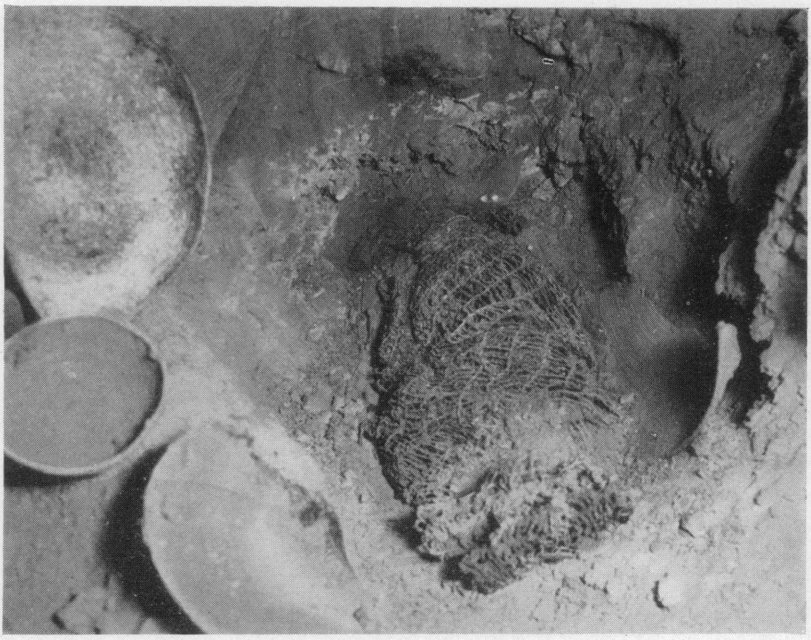

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EXCAVATIONS OF 1924—MUMMY BUNDLE, PIT 20

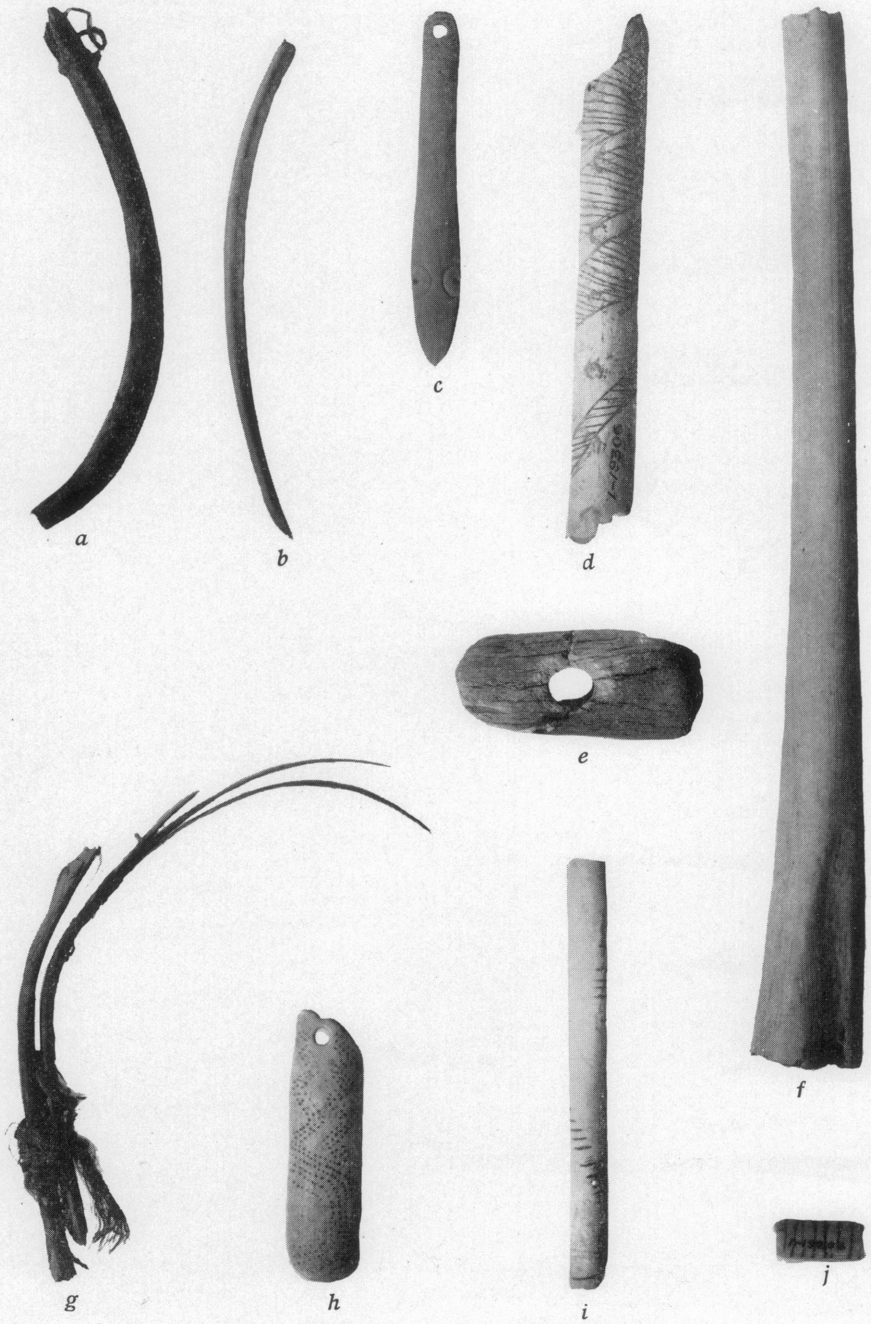
a

b

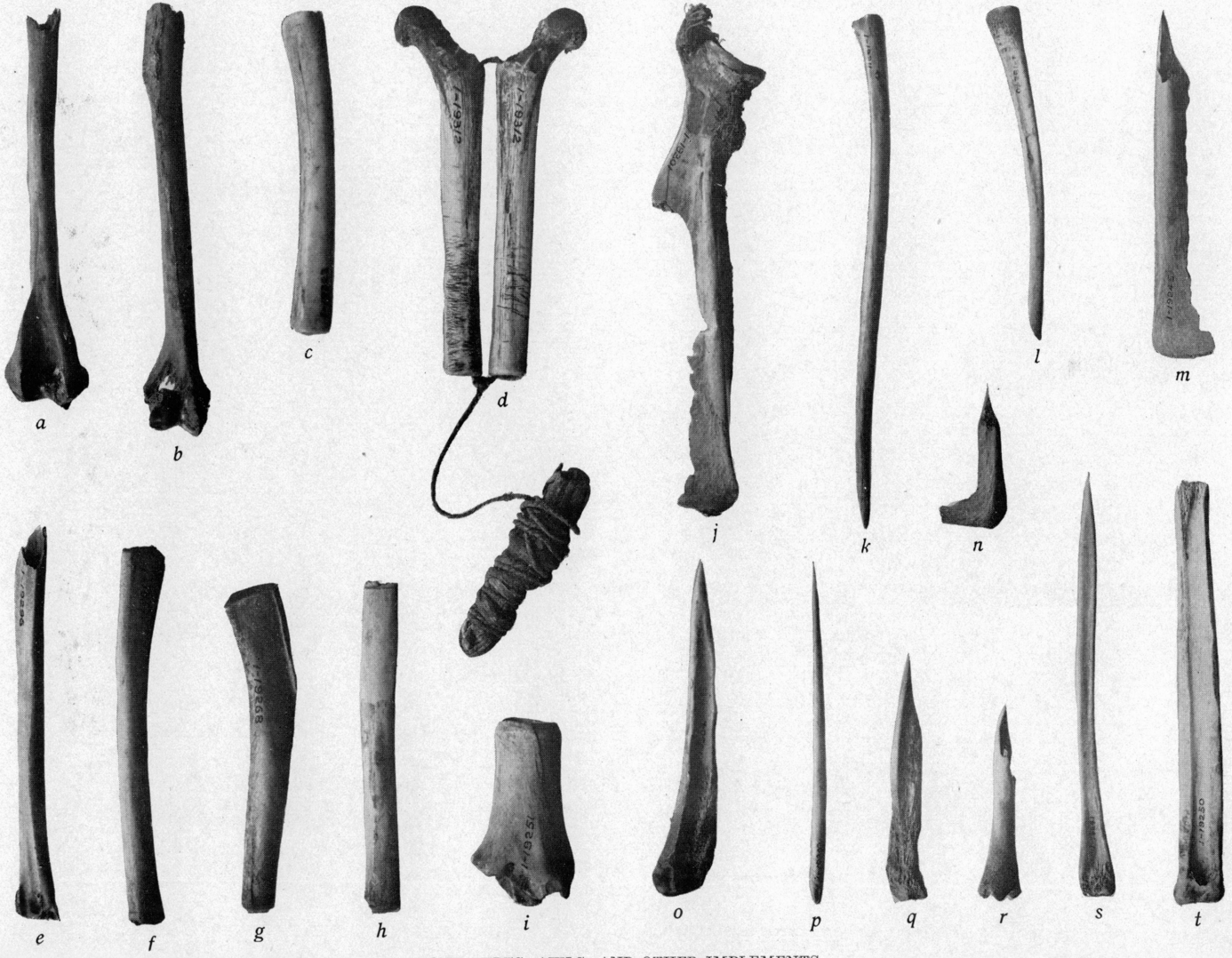
EXCAVATIONS OF 1924—MUMMY BUNDLE, PIT 35

PARTIALLY MUMMIFIED CHILD

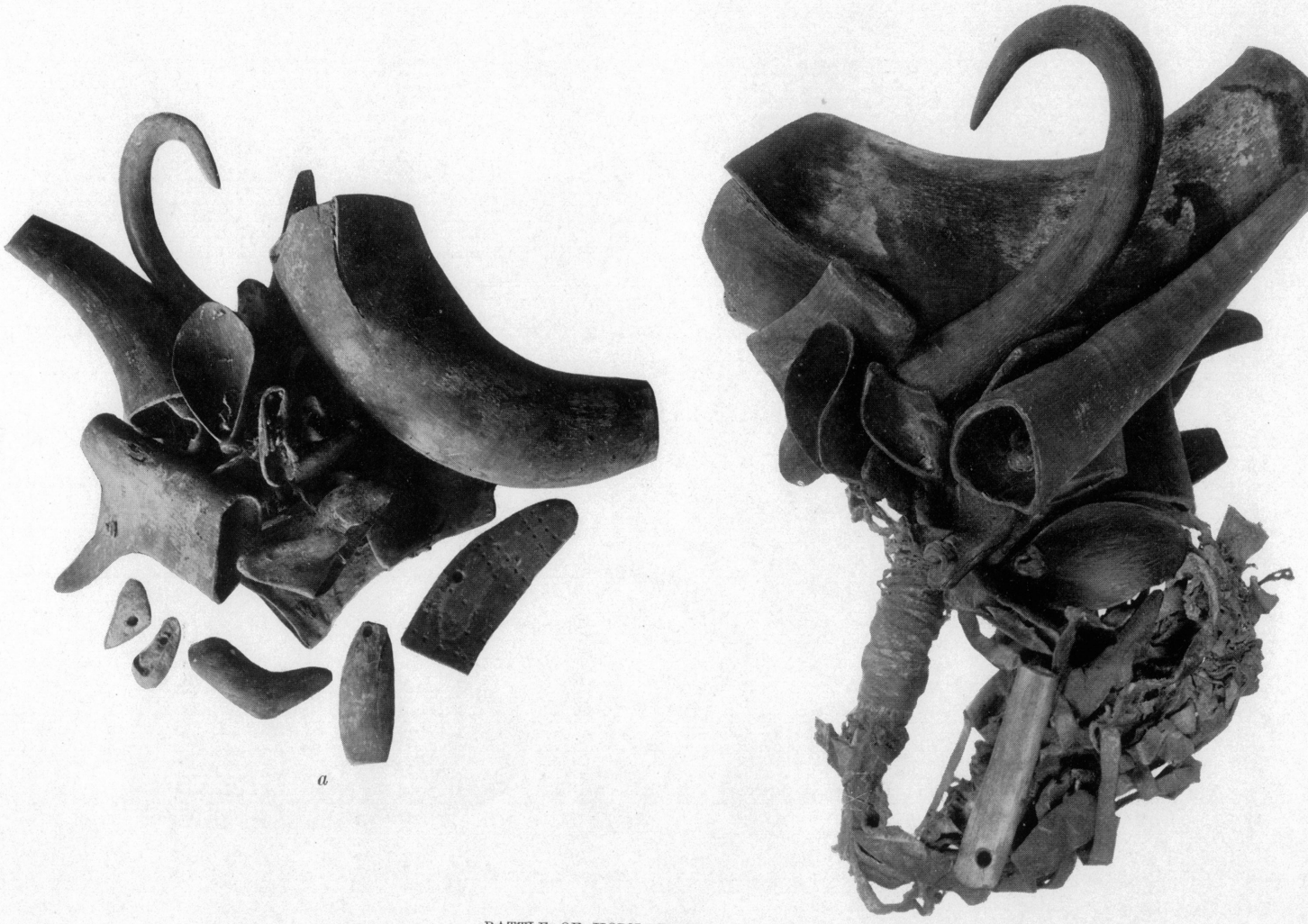
SKULL OF MAN AND MUMMY OF BABY



BONE PENDANTS AND BIRD BONES



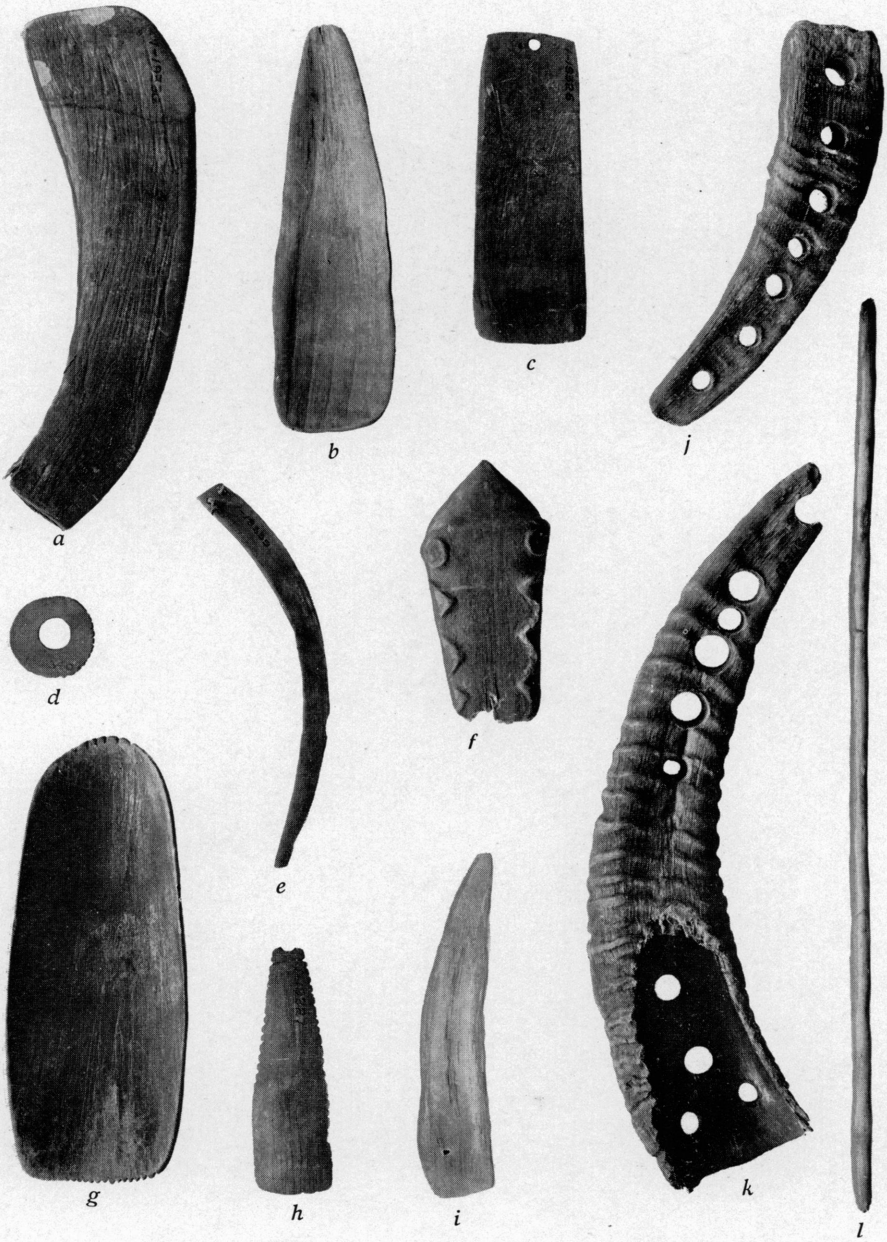
BONE TUBES, AWLS, AND OTHER IMPLEMENTS



a

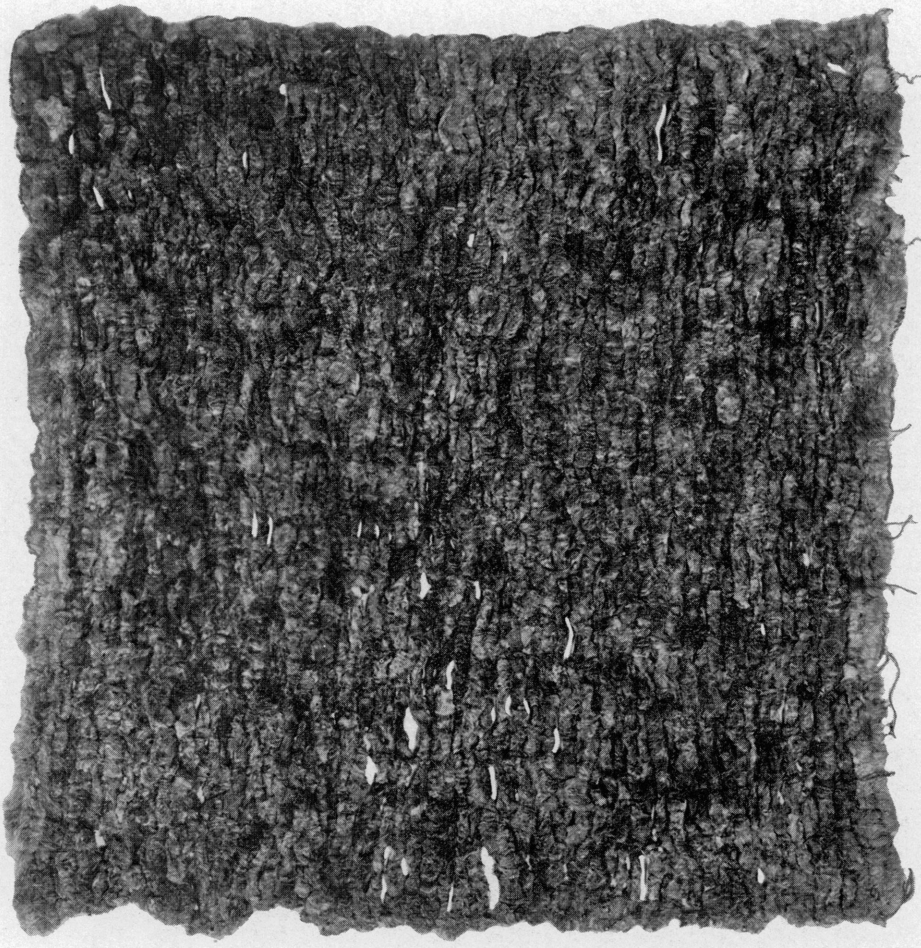
b

RATTLE OF HORN, HOOF, AND BONE



OBJECTS OF HORN AND WOOD

OBJECTS OF HORN AND WOOD



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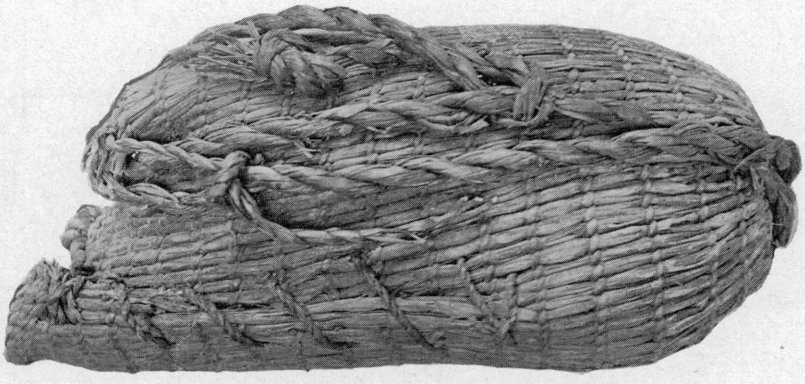
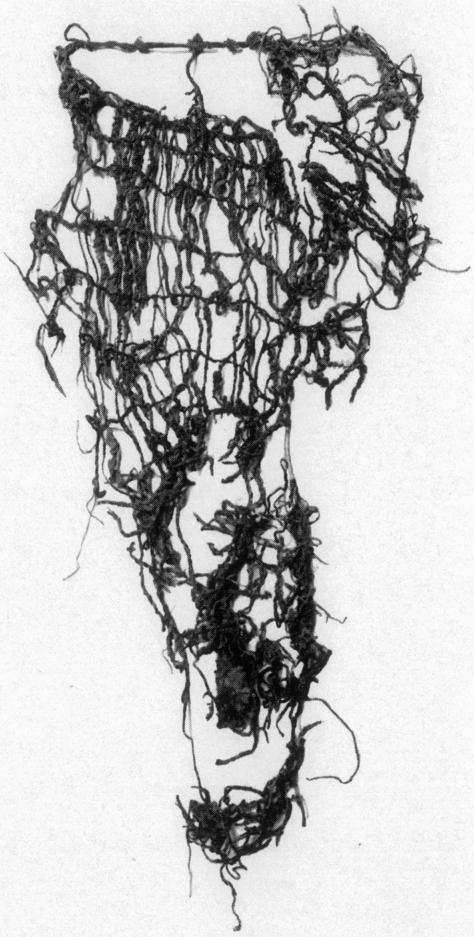


b

MEADOW MOUSE BLANKET AND RECEPTACLE

a

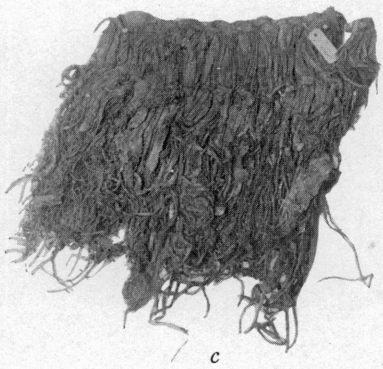


b

MUSKRAT AND BIRD-SKIN BLANKETS

a

b



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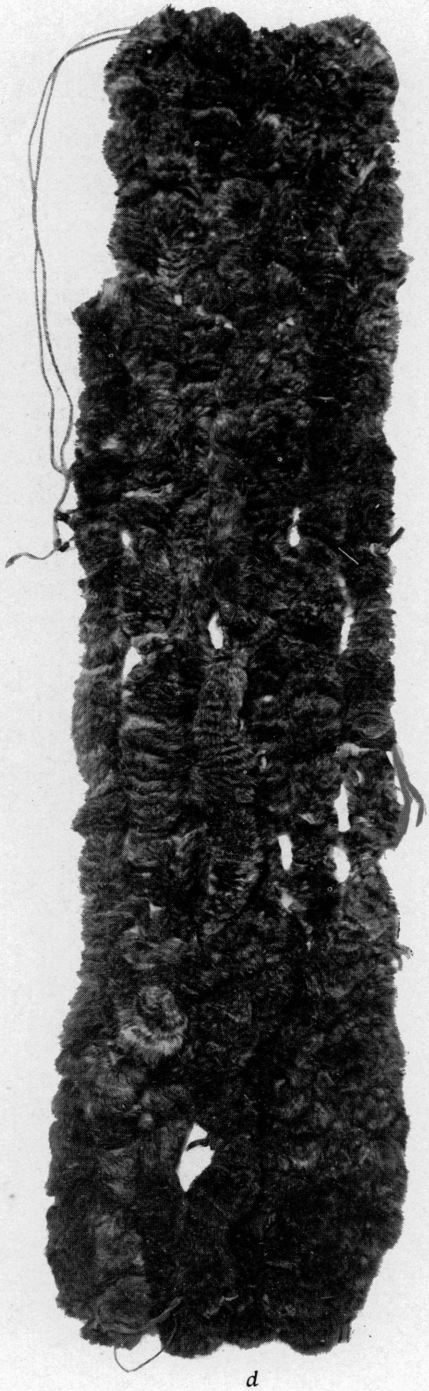

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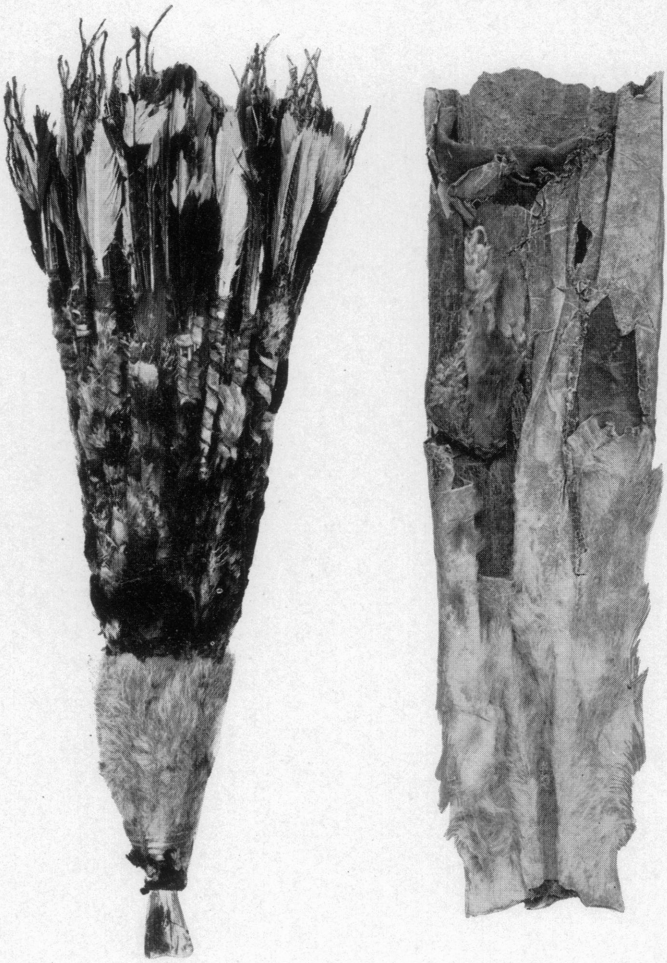
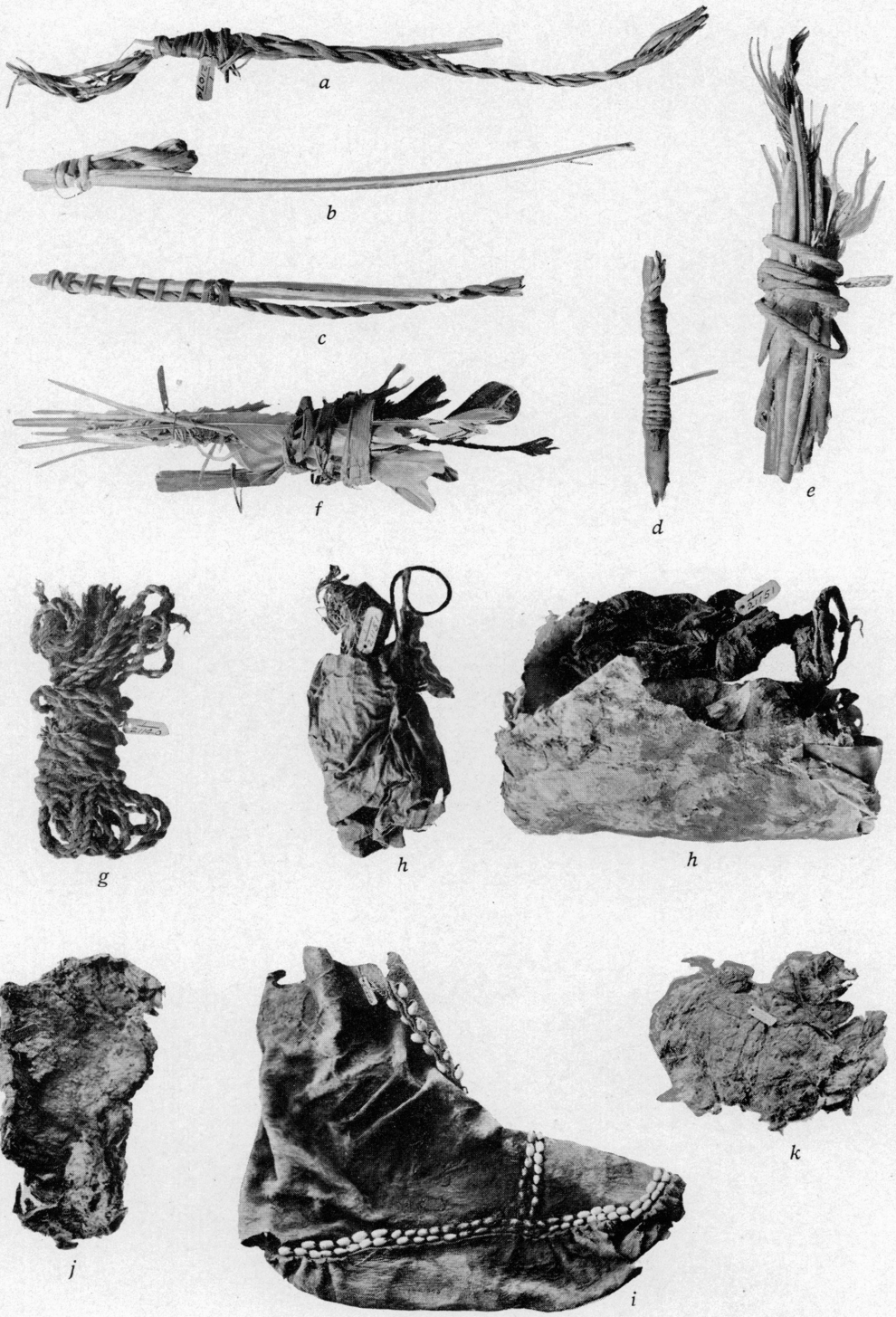
APRONS AND FUR BELT

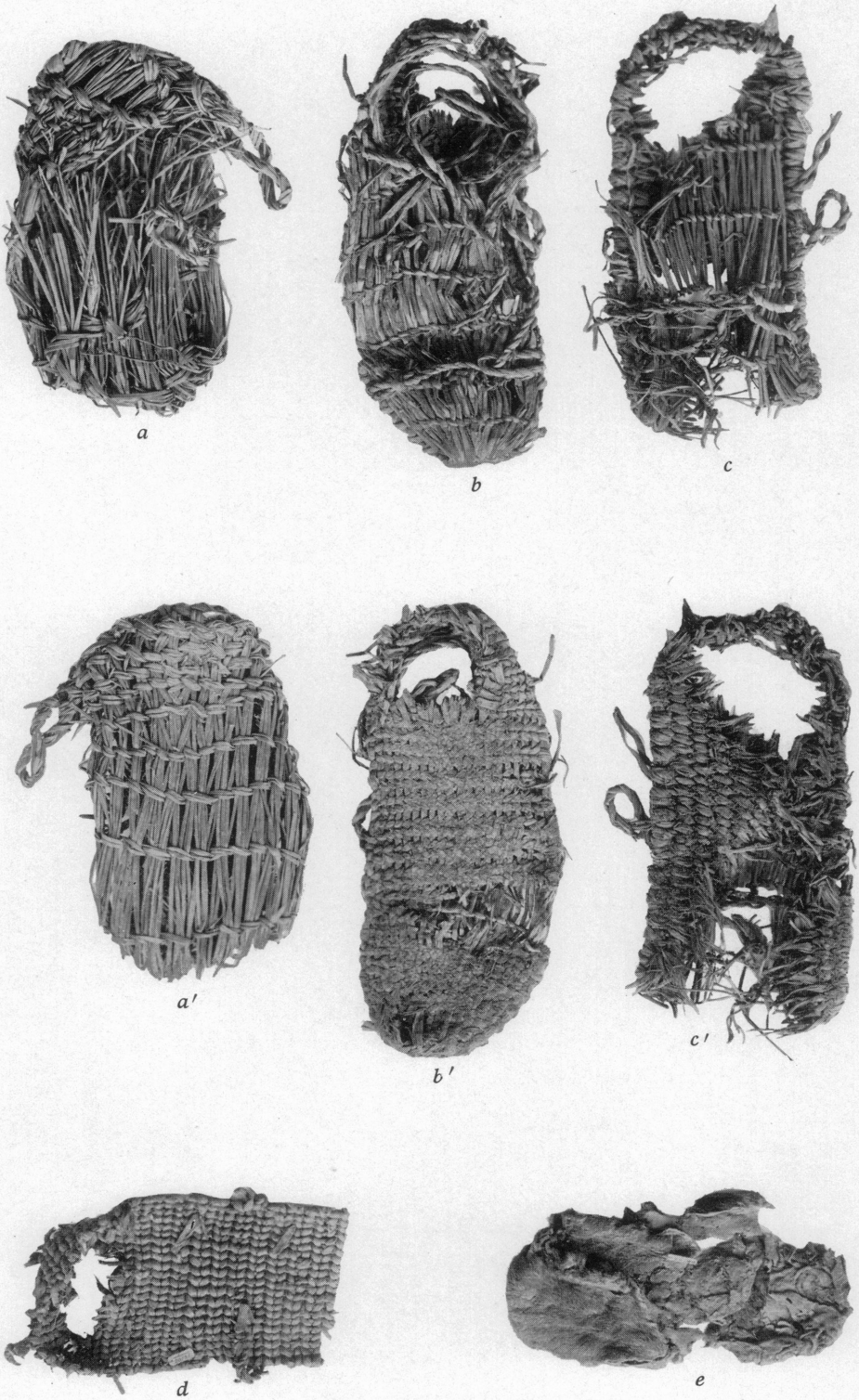


a *b*

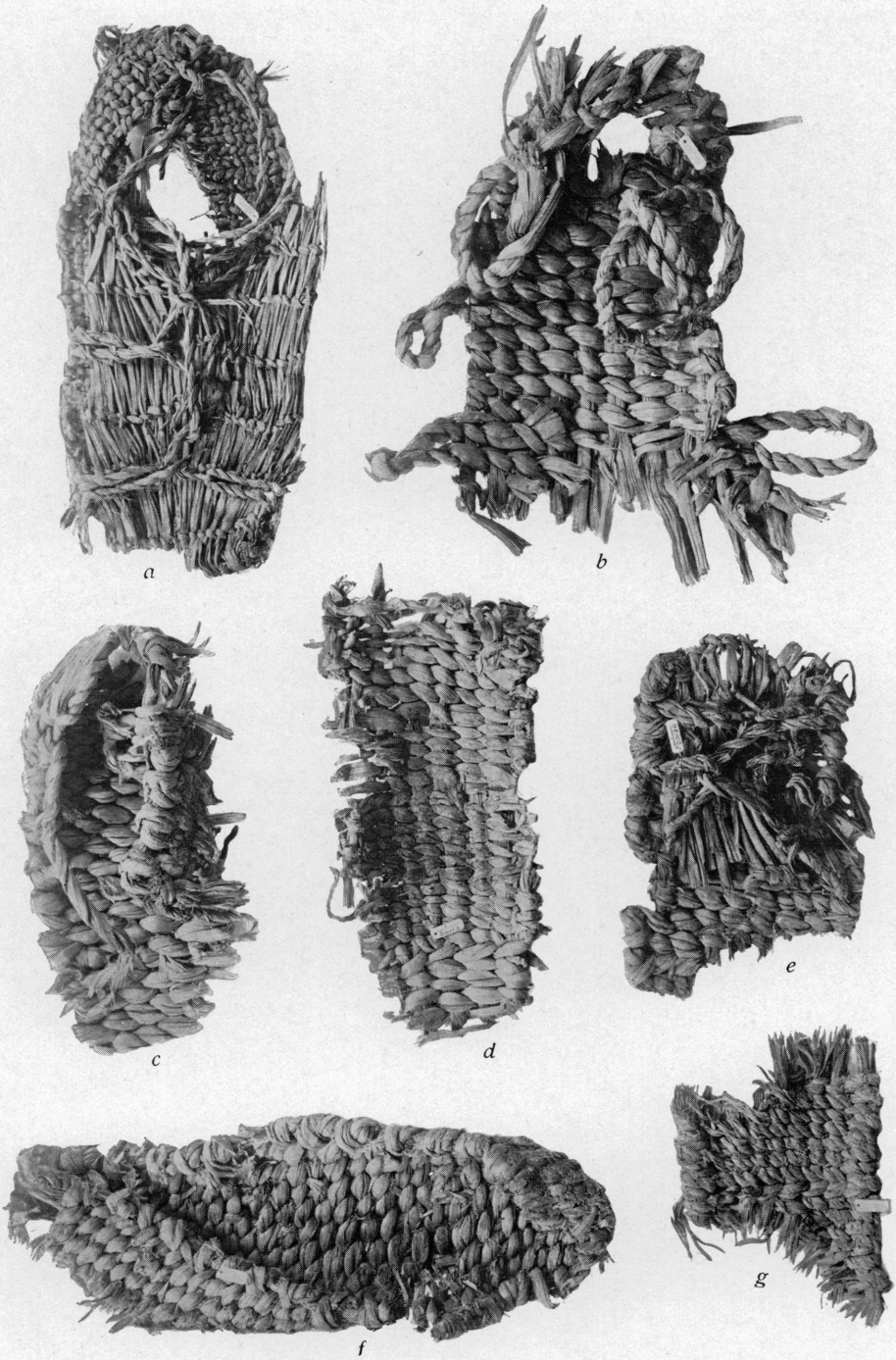
FEATHER PLUME AND SKIN CASE



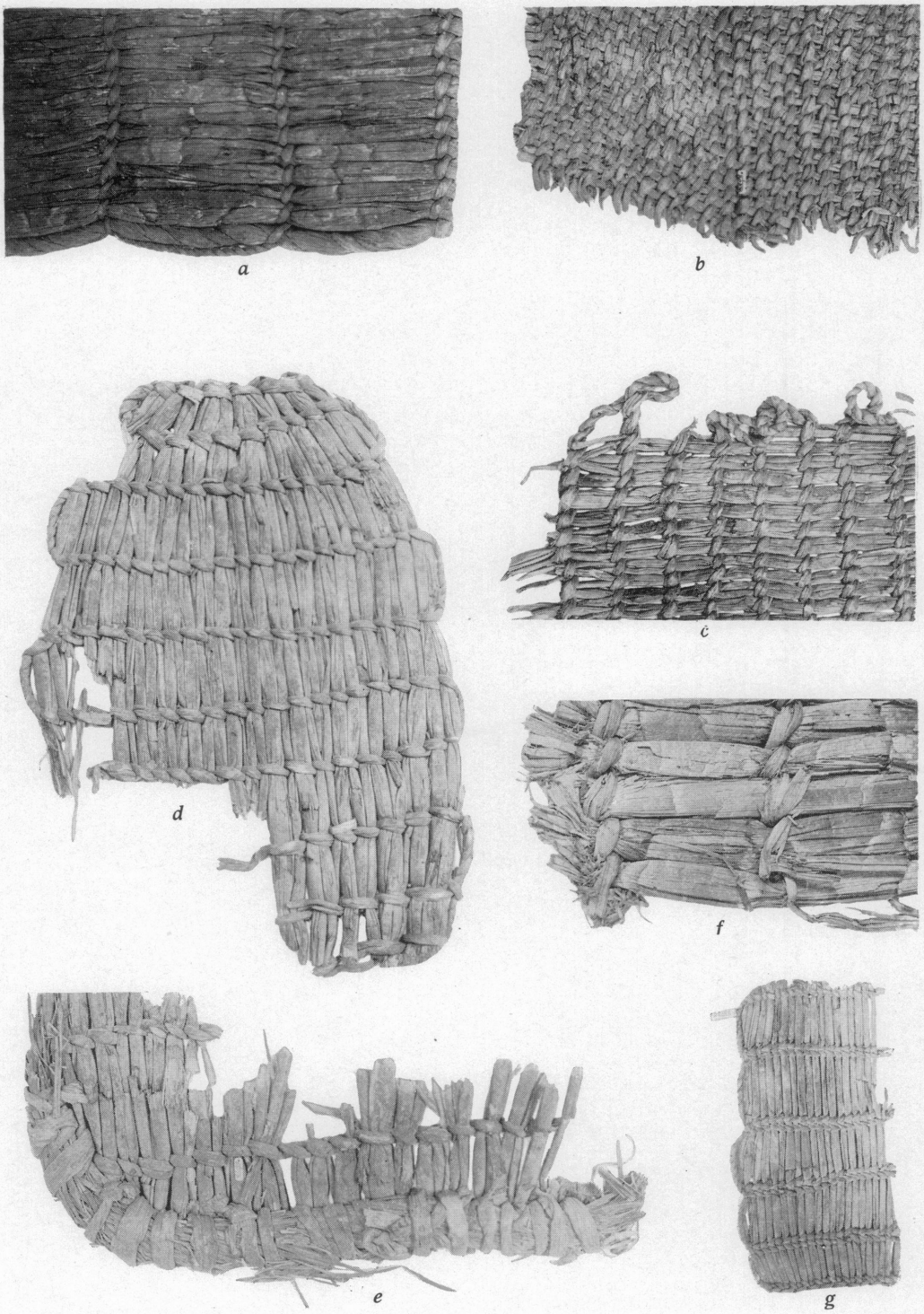
SKIN AND FEATHER OBJECTS



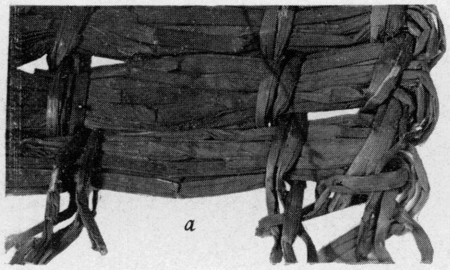
SANDALS OF FINE TYPE



SANDALS OF COARSE TYPE



MATTING



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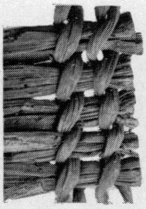

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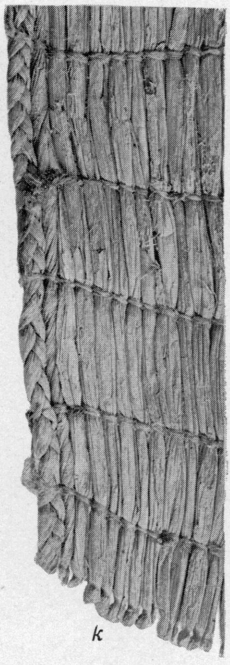

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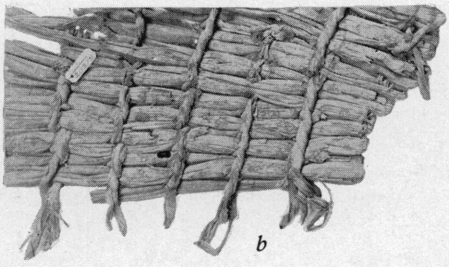

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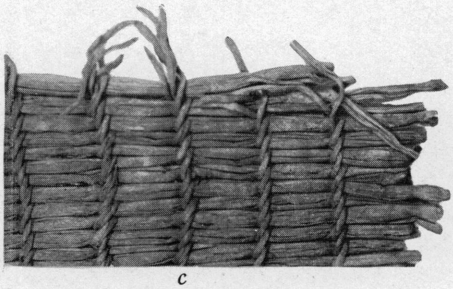

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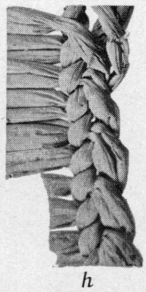

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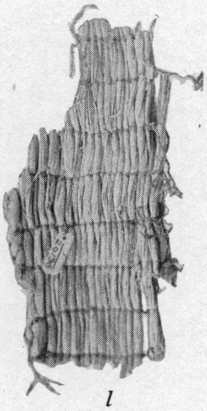

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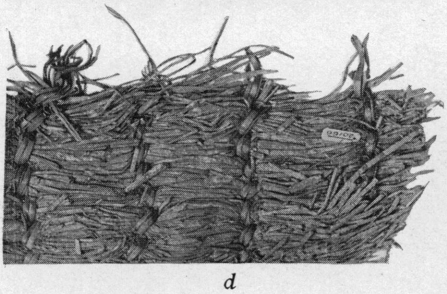

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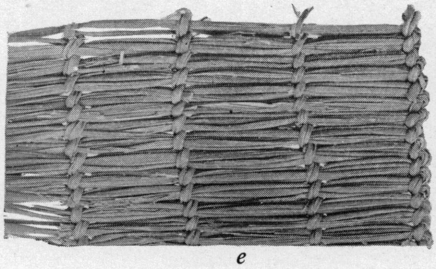

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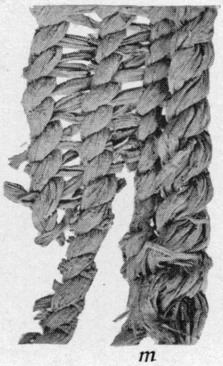
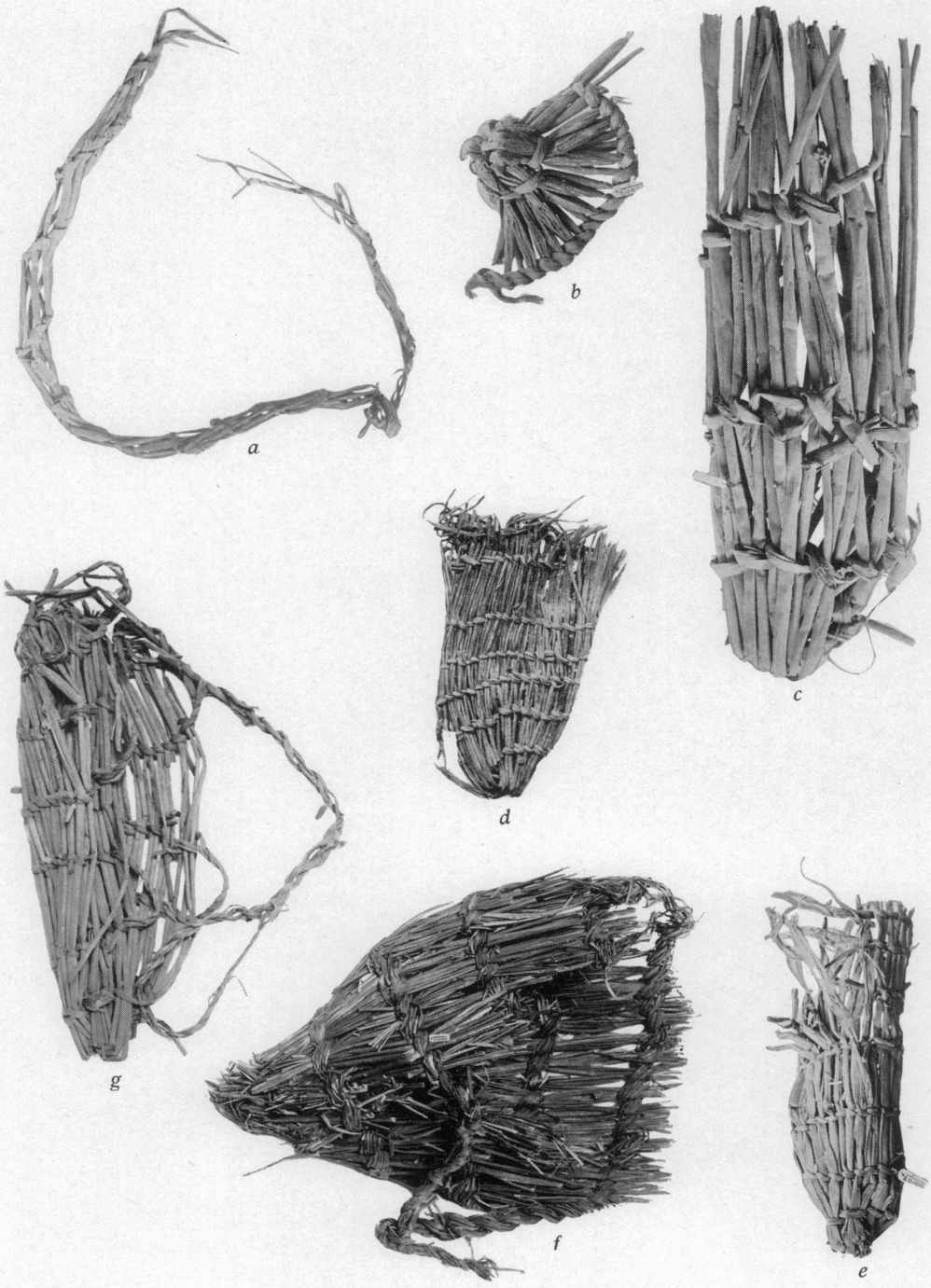
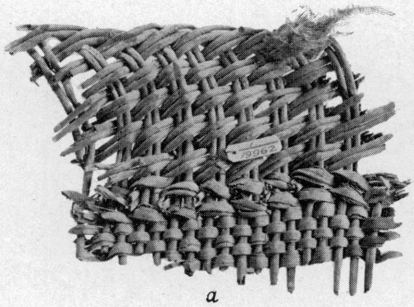


m

MATTING



MATTING BAGS



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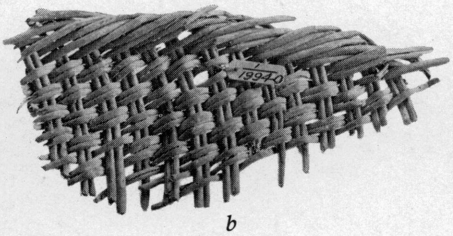

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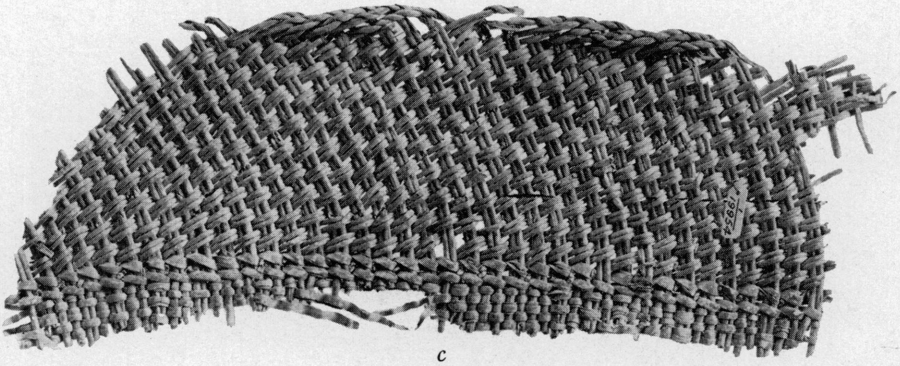

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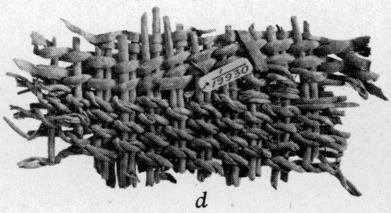

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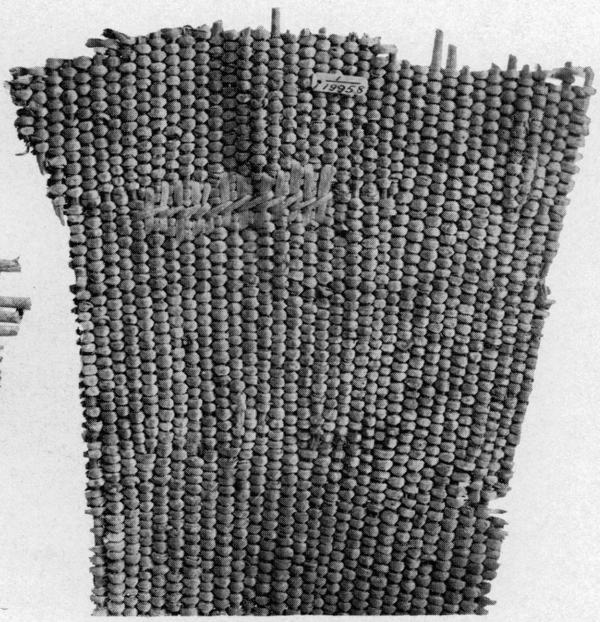

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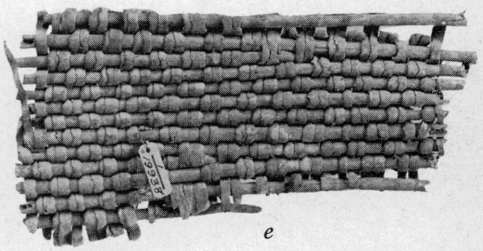

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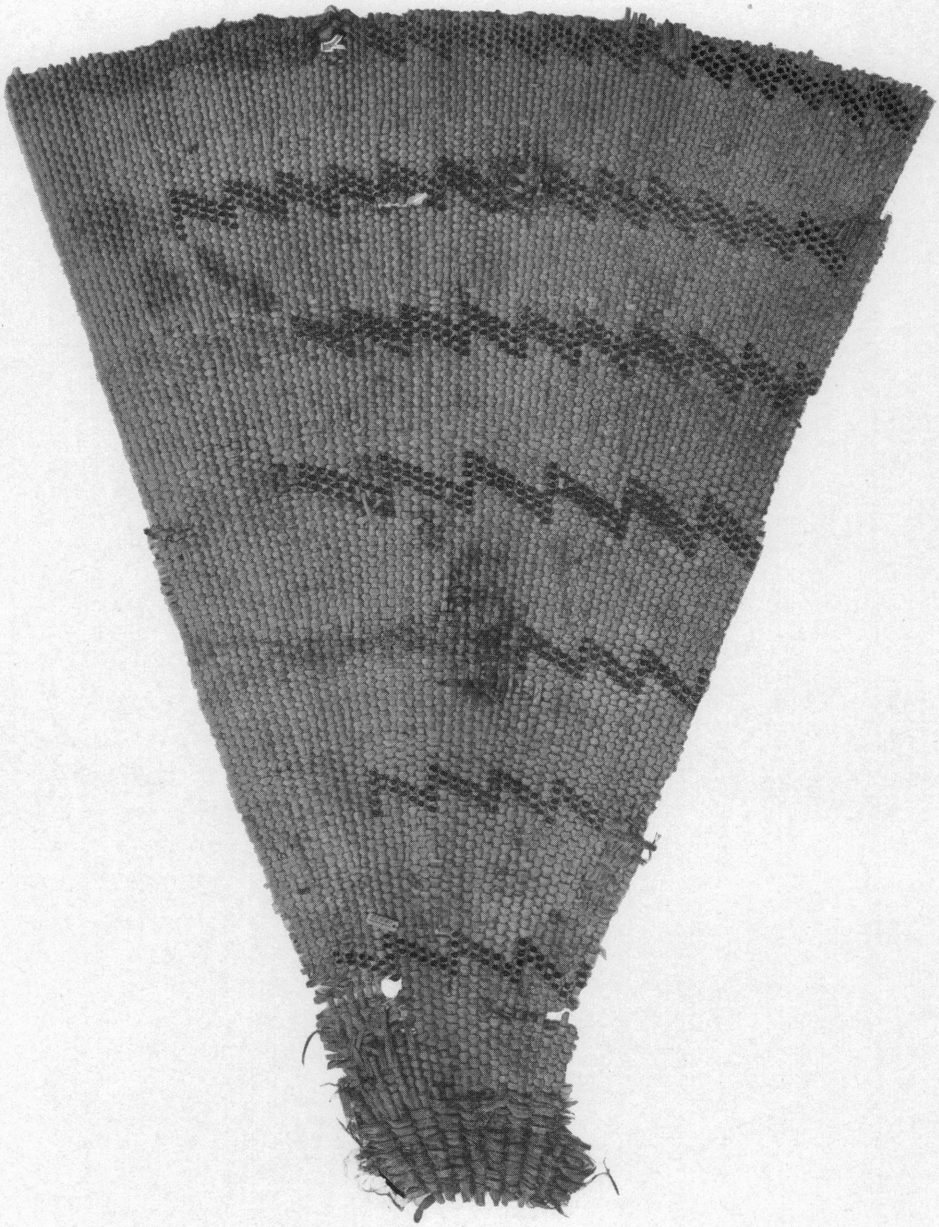
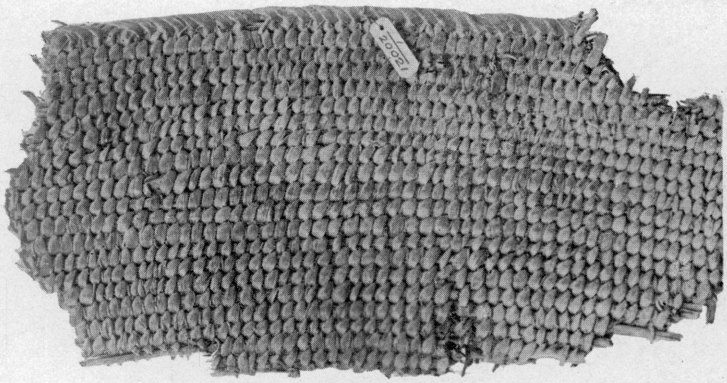
WICKER BASKETS



WICKER BASKET



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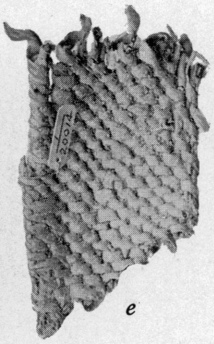

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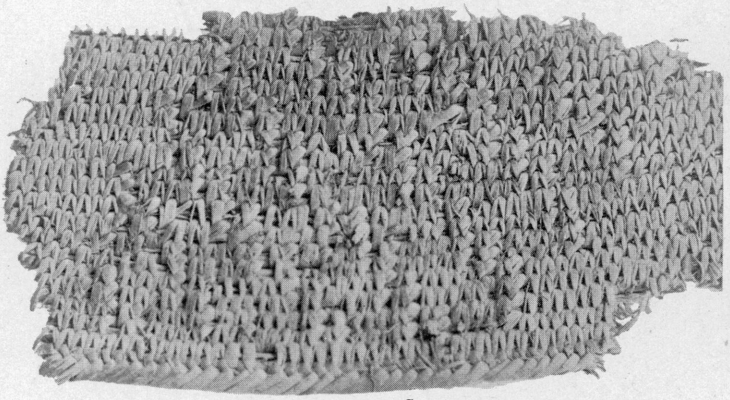

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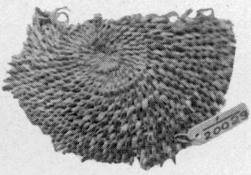

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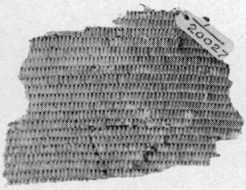

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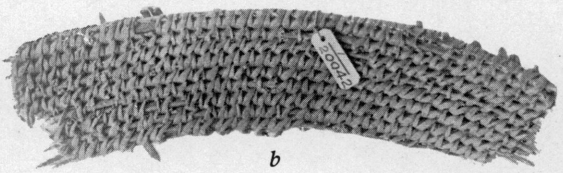

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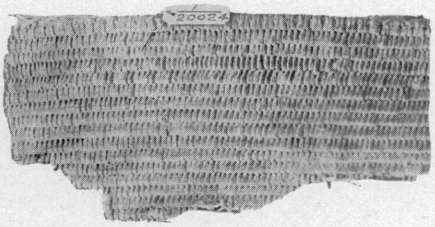

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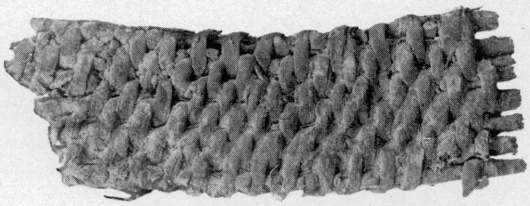

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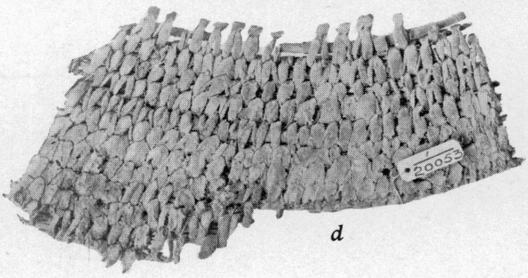

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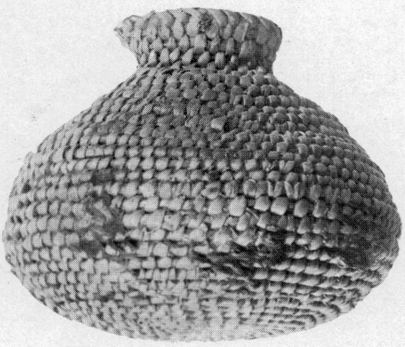
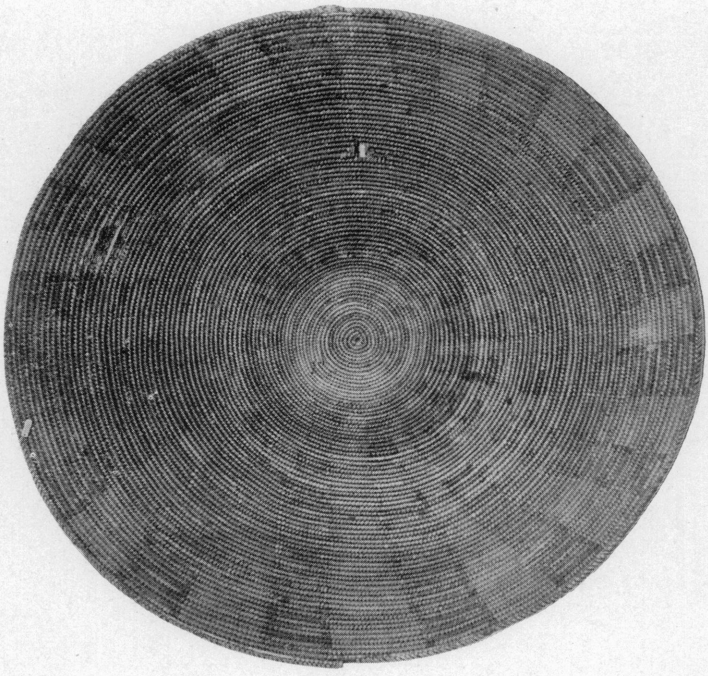


i

COILED BASKETS



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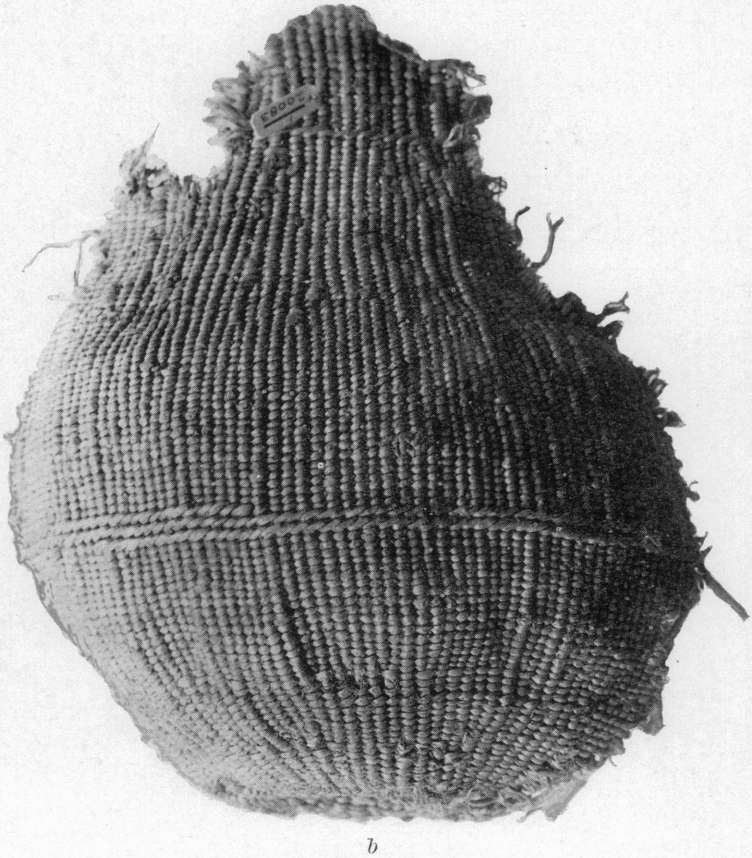
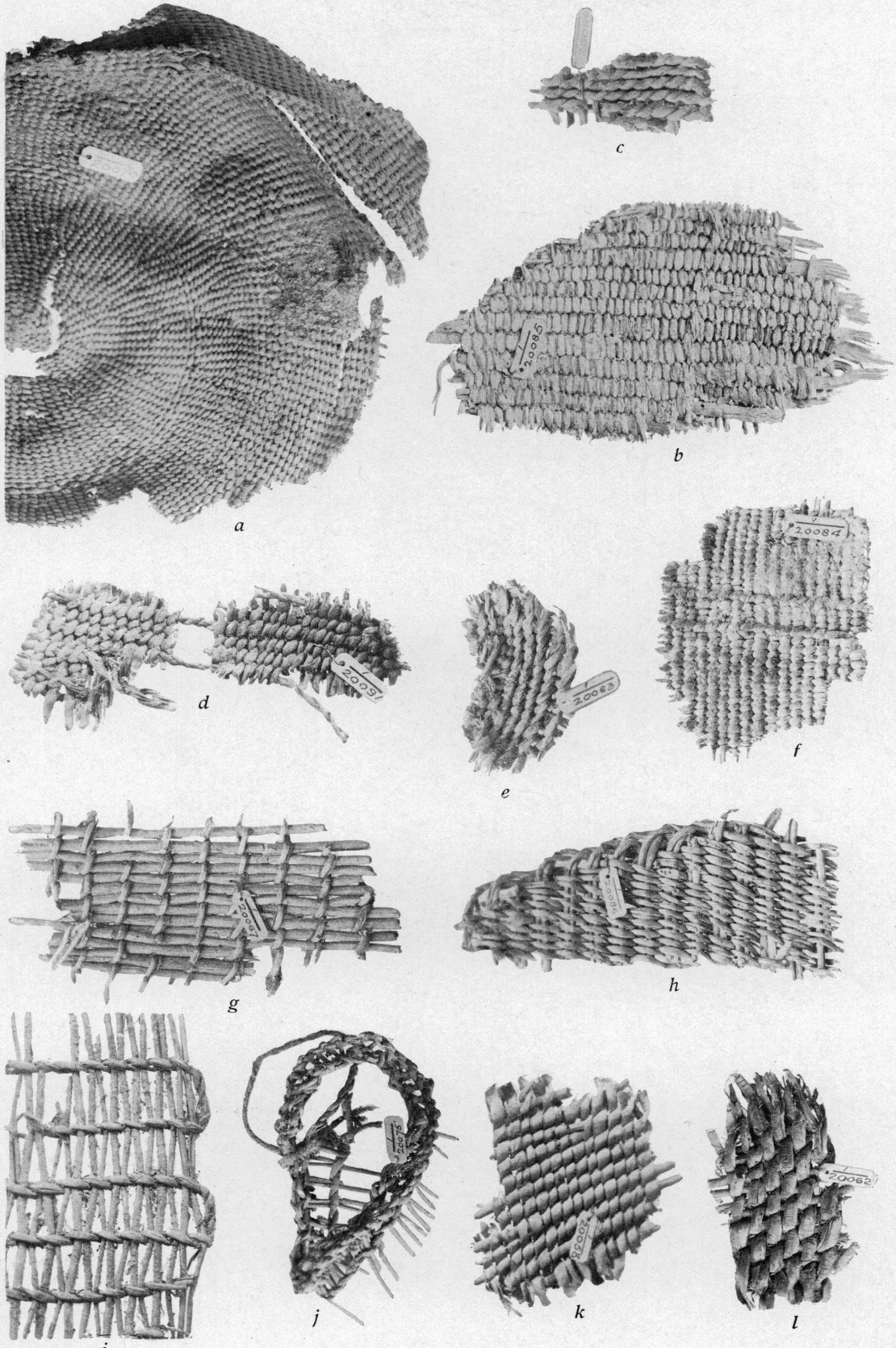


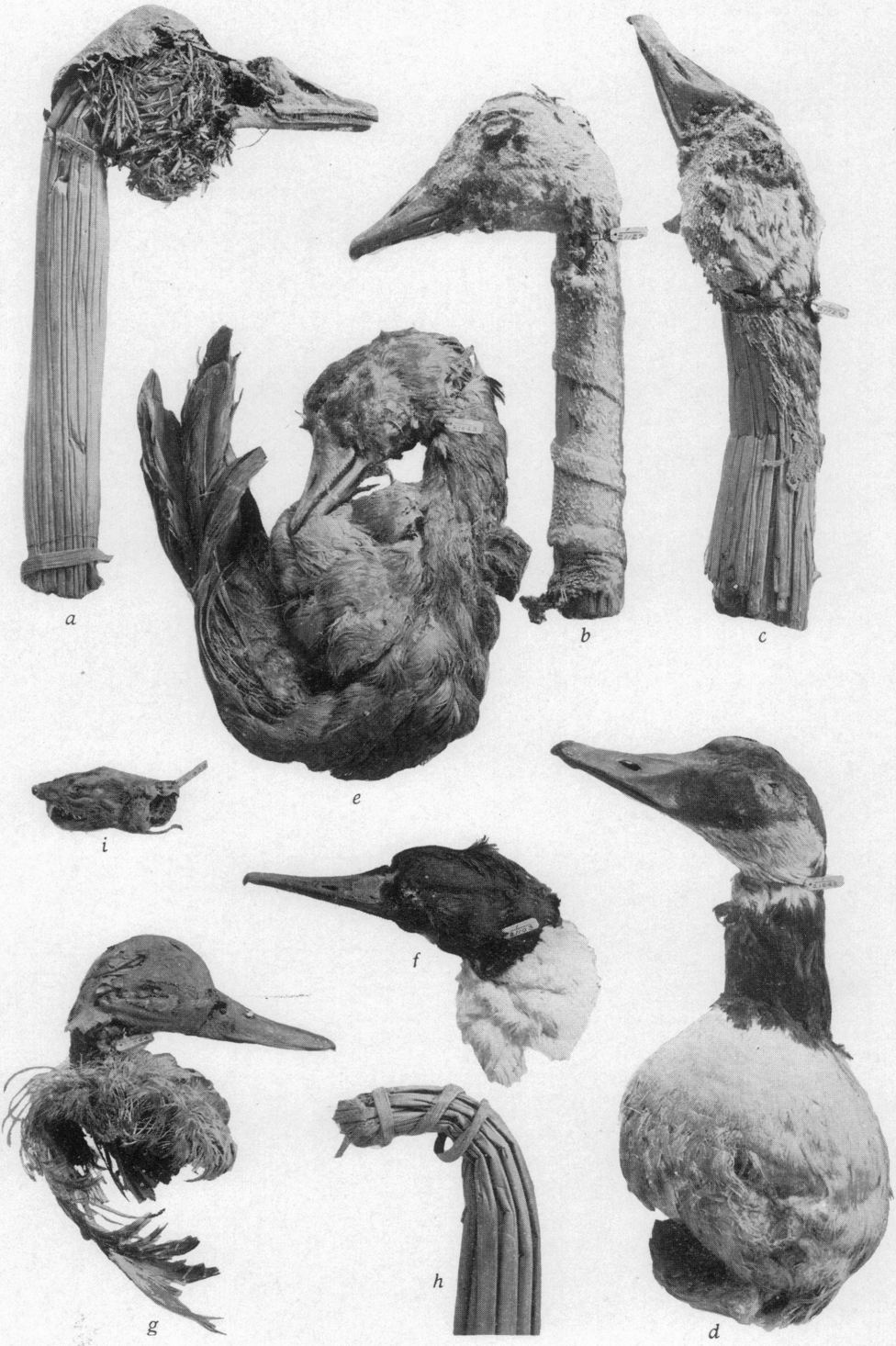
b

COILED AND TWINED BASKETS

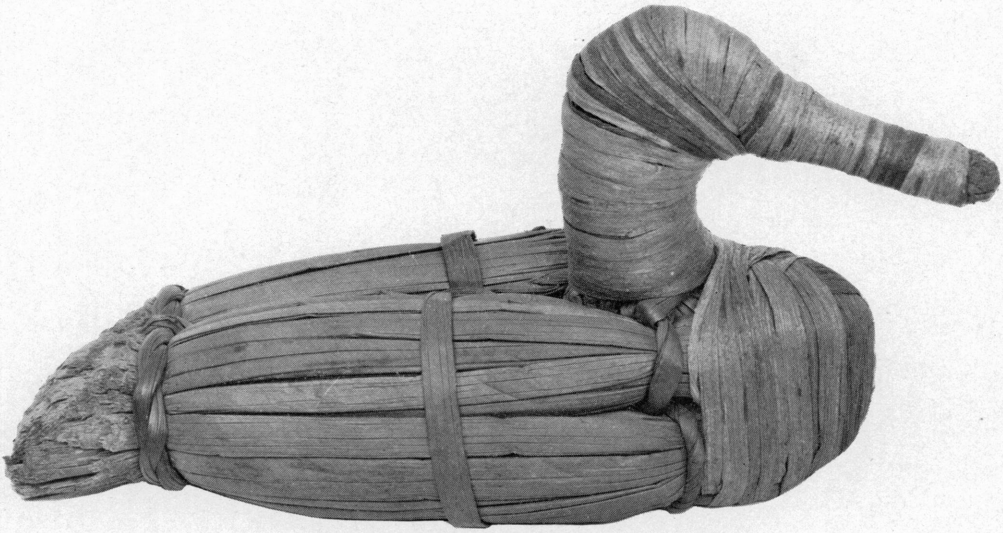


a b c d e f g h i j k l

TWINED BASKETS



DUCK DECOY HEADS AND MINK HEAD



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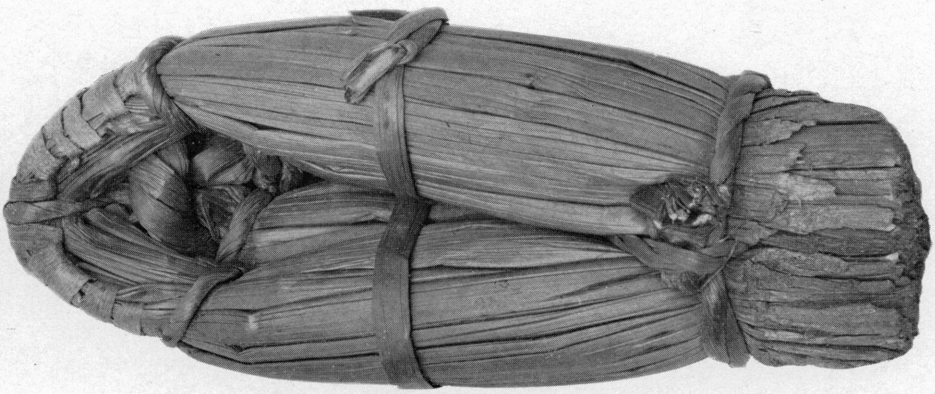
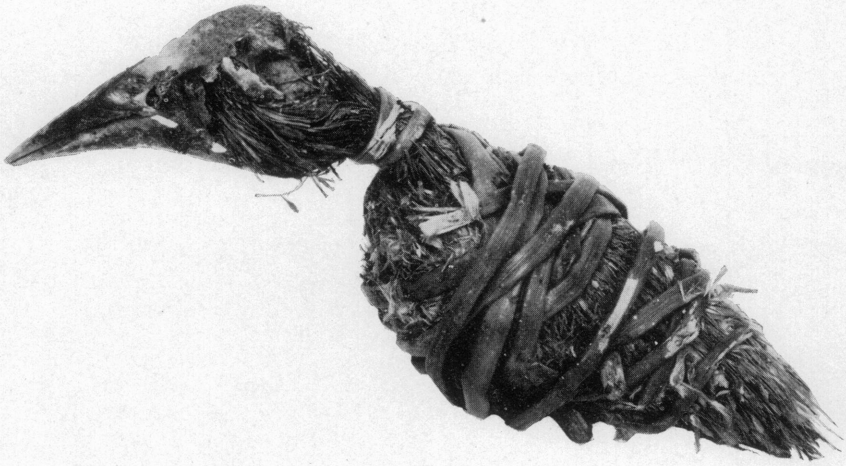


b

DUCK DECOY BODY OF TULE



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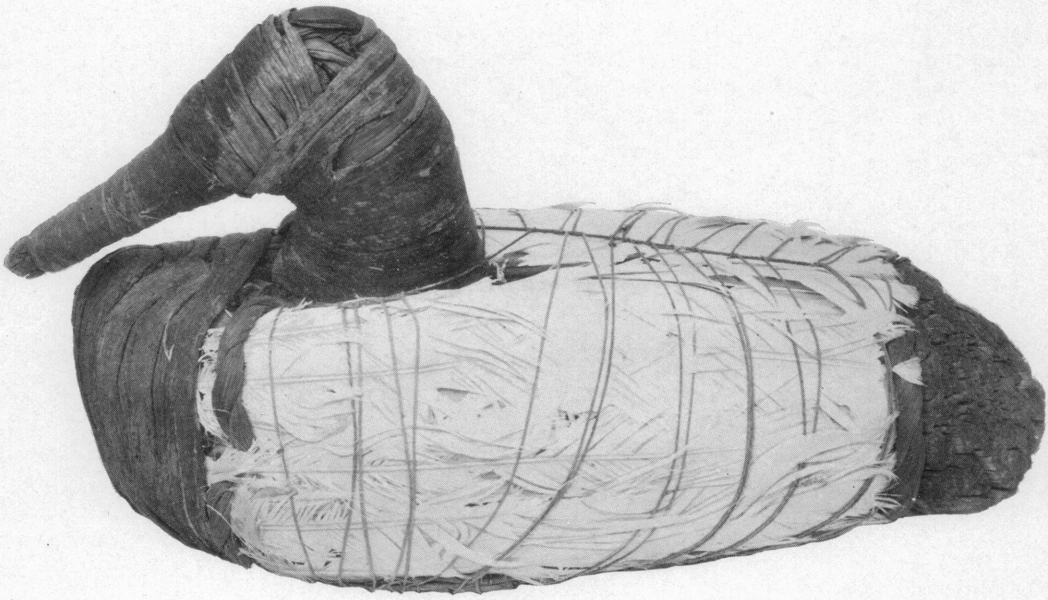
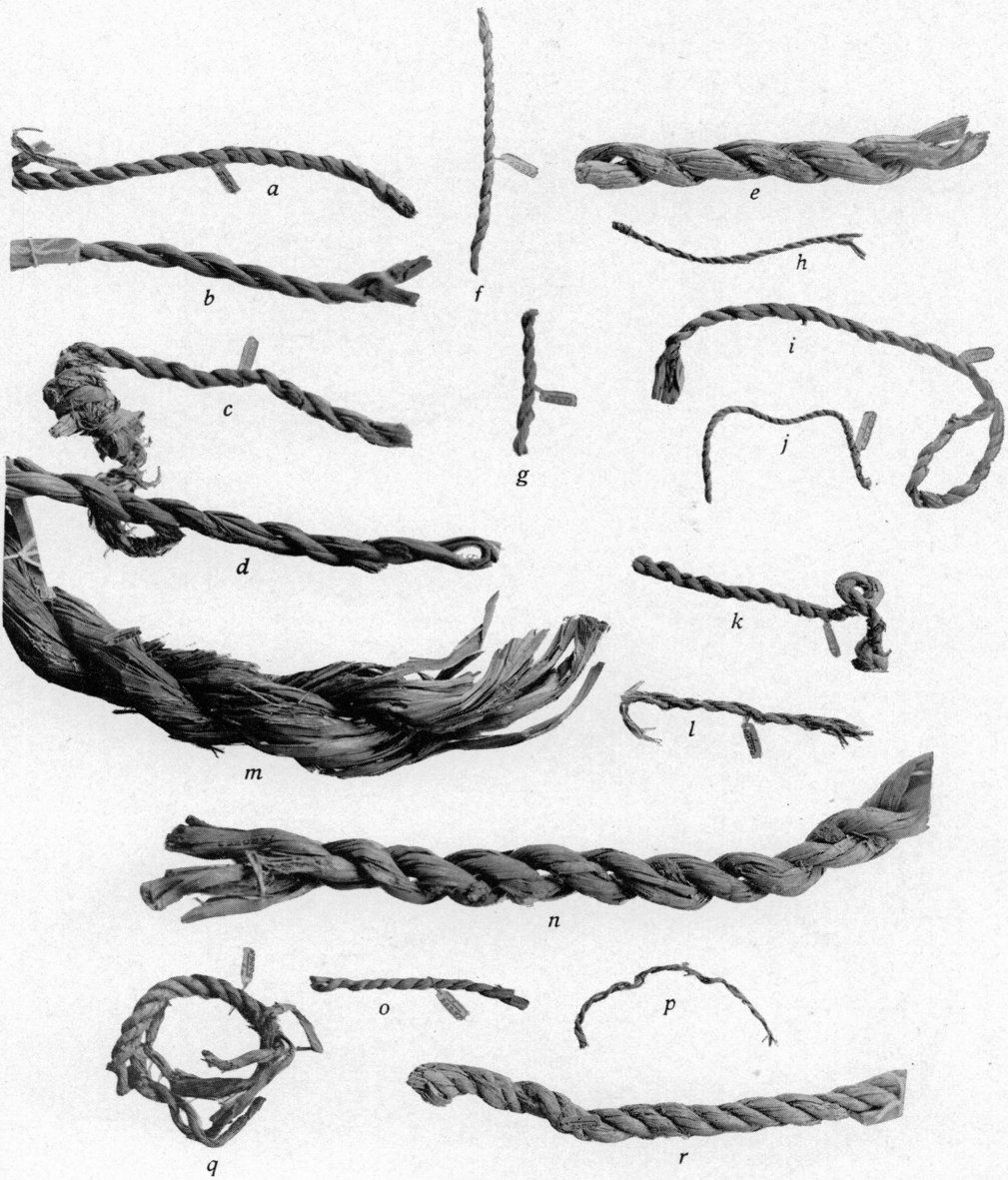


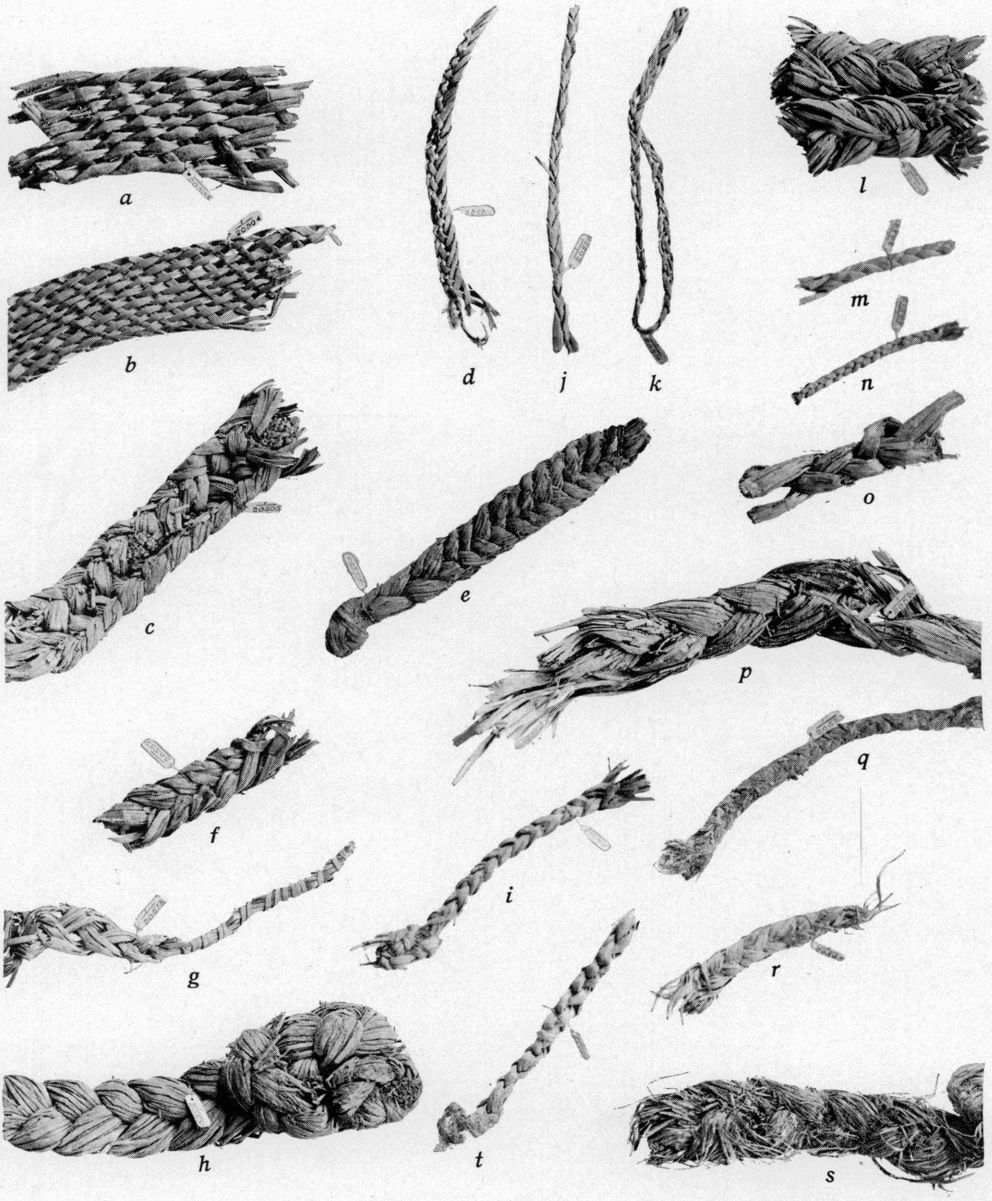
b

DECOYS OF PASSERINE BIRD AND CANVASBACK DRAKE



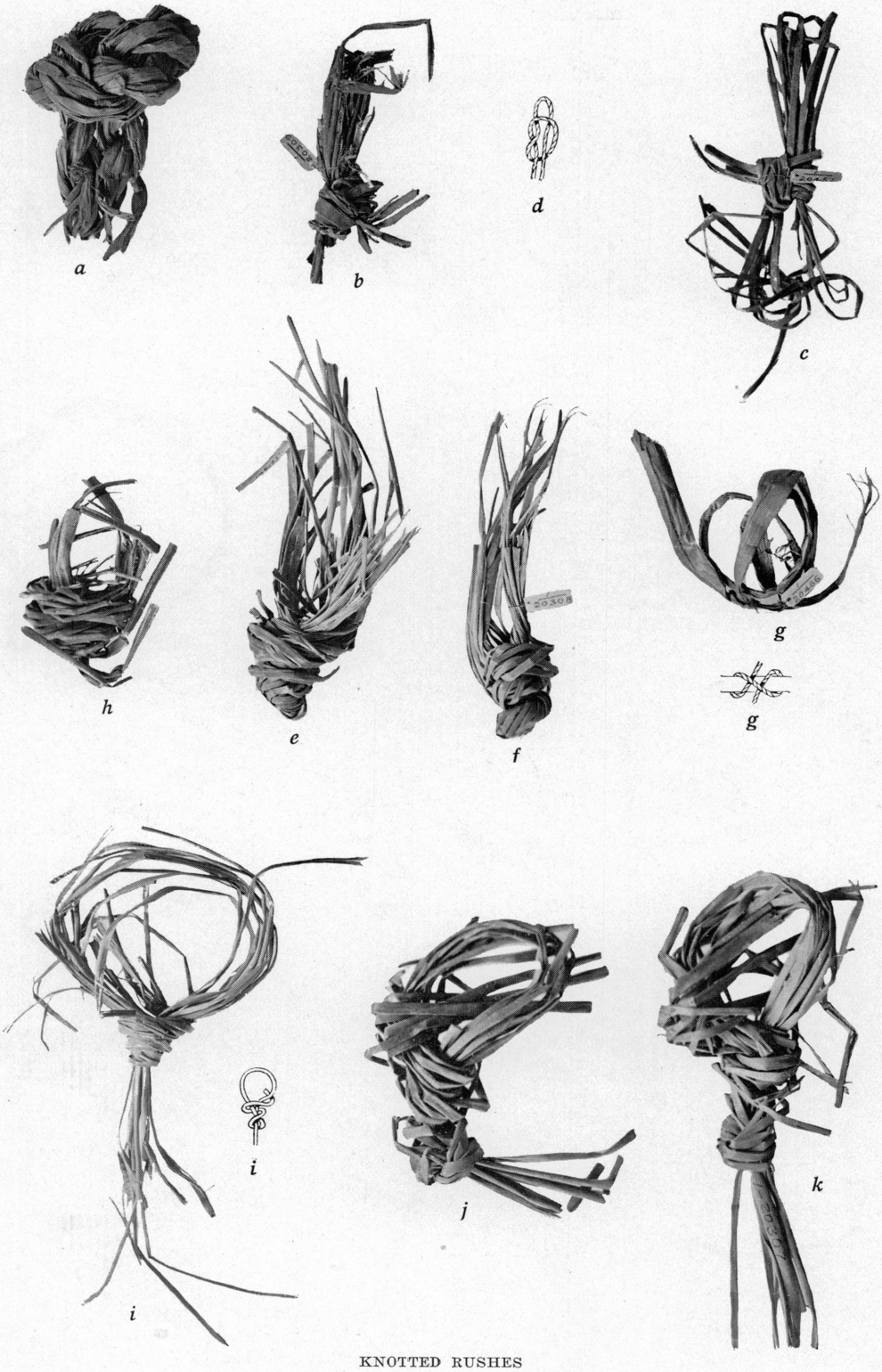
ROPE OF TULE

ROPE OF RUSH, GRASS, AND BARK

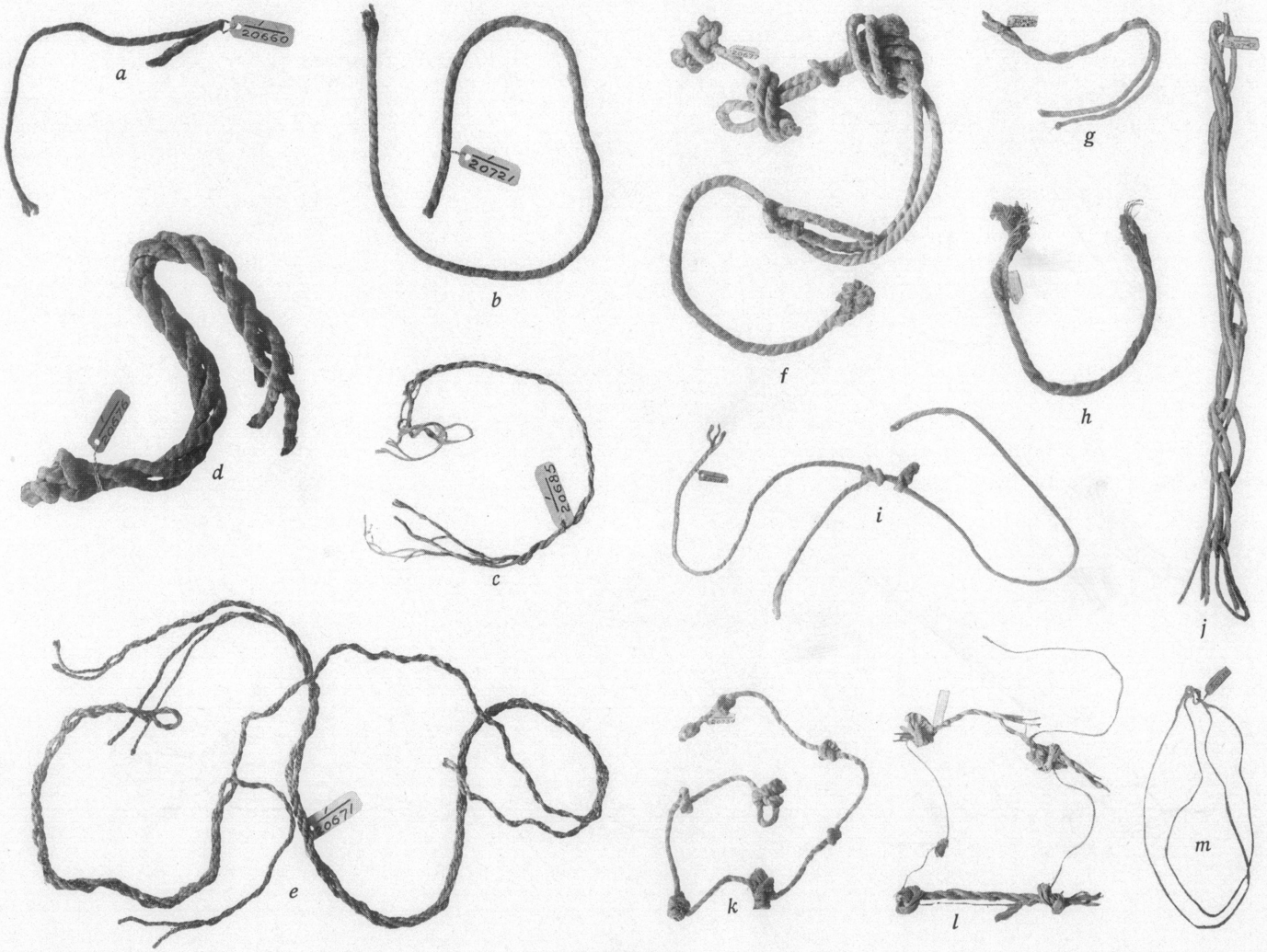


BRAID OF RUSH, TULE, AND GRASS

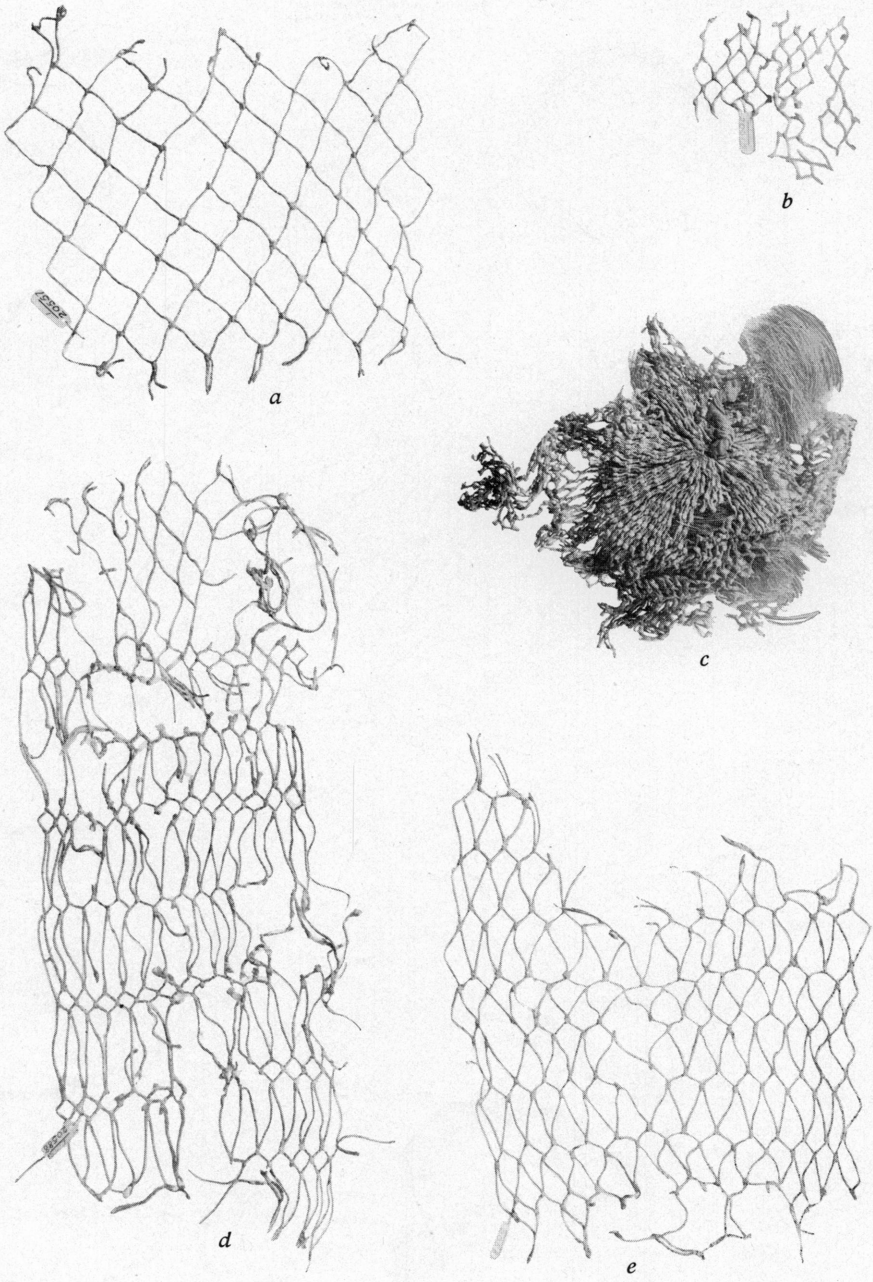
KNOTS—MESH, REEF, GRANNY, OVERHAND



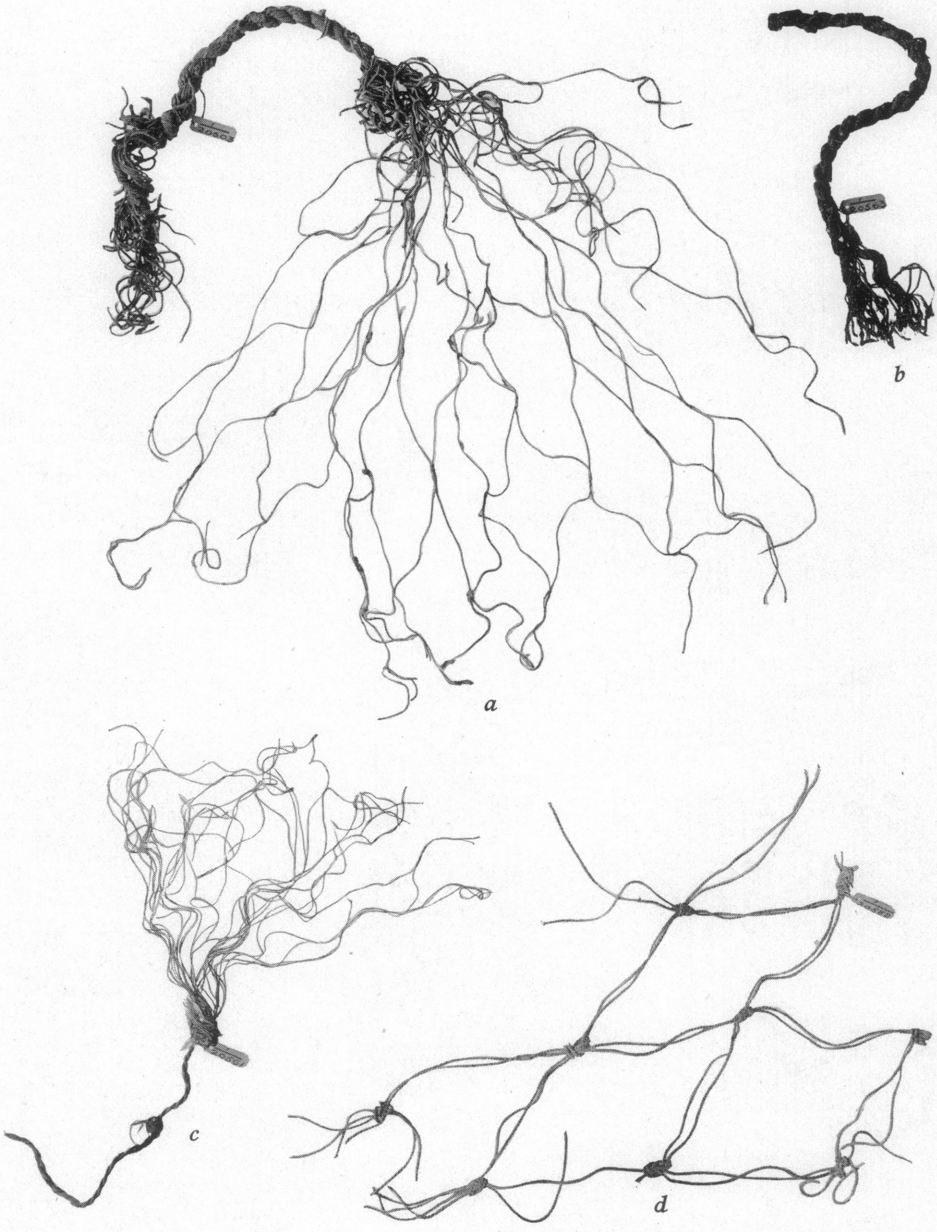
KNOTTED RUSHES



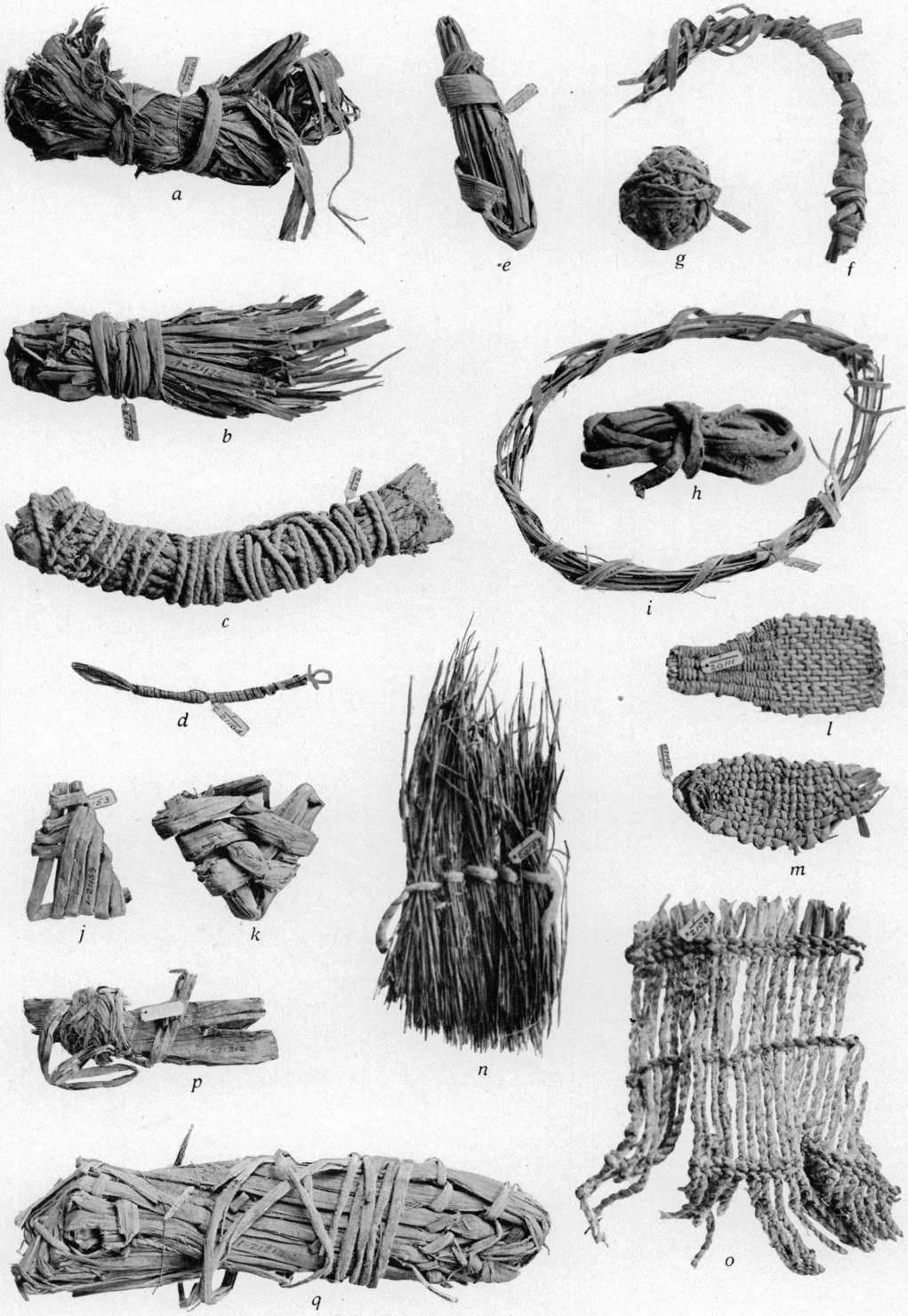
CORD



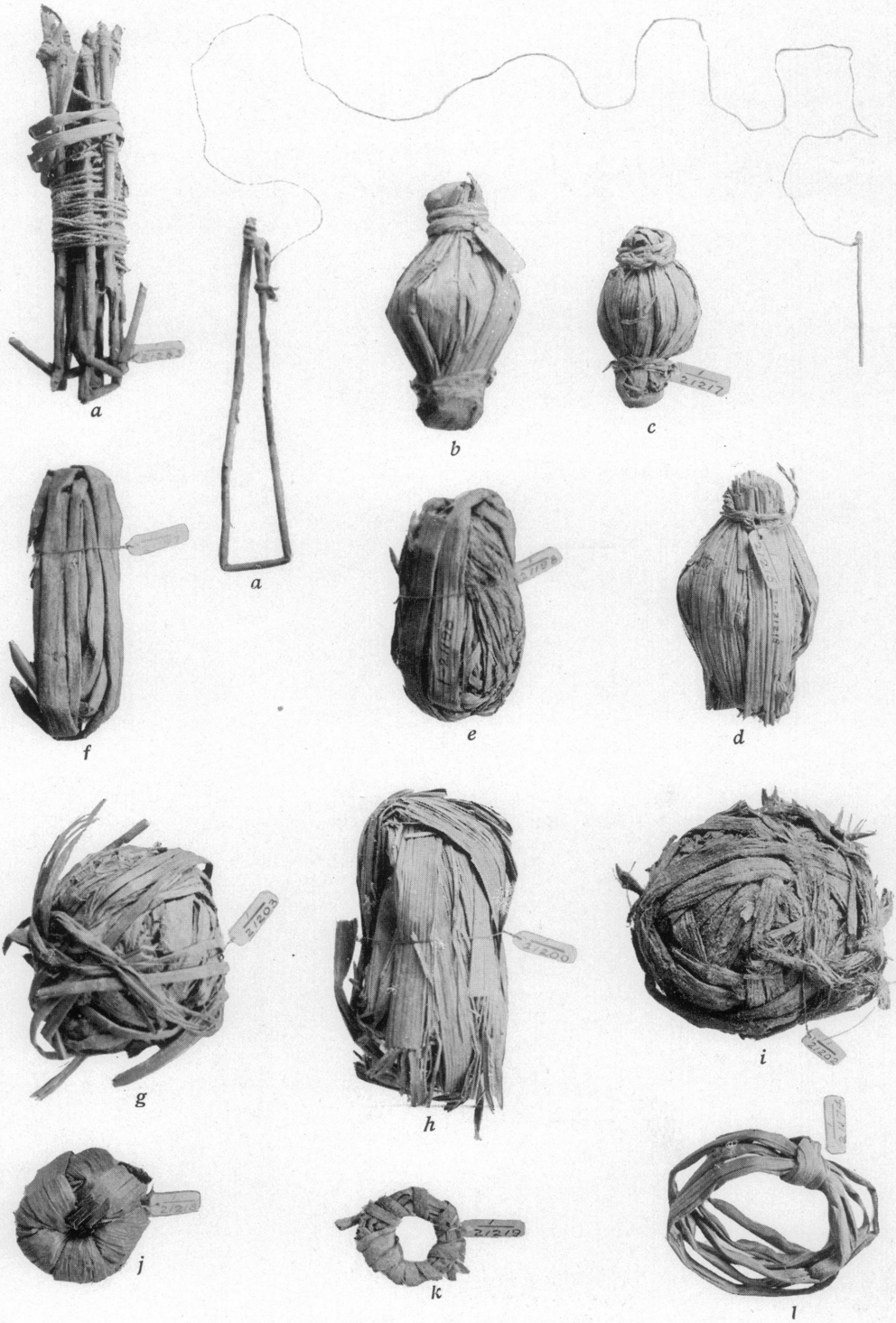
HAIR NETS



FISH NETS



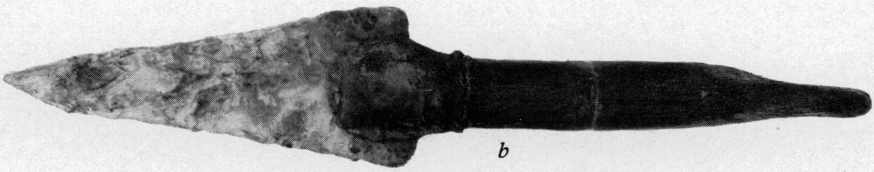
BUNDLES AND SMALL MATS



a a b c d e f g h i j k l

SNARES, GAMES, AND BUNDLES

a



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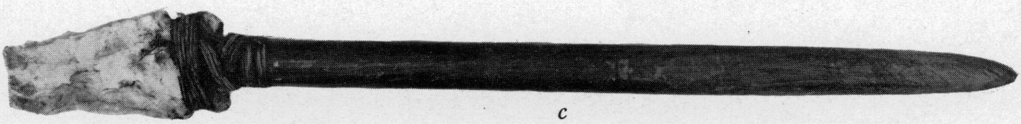

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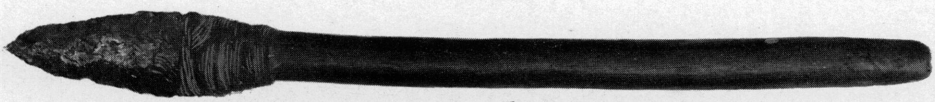
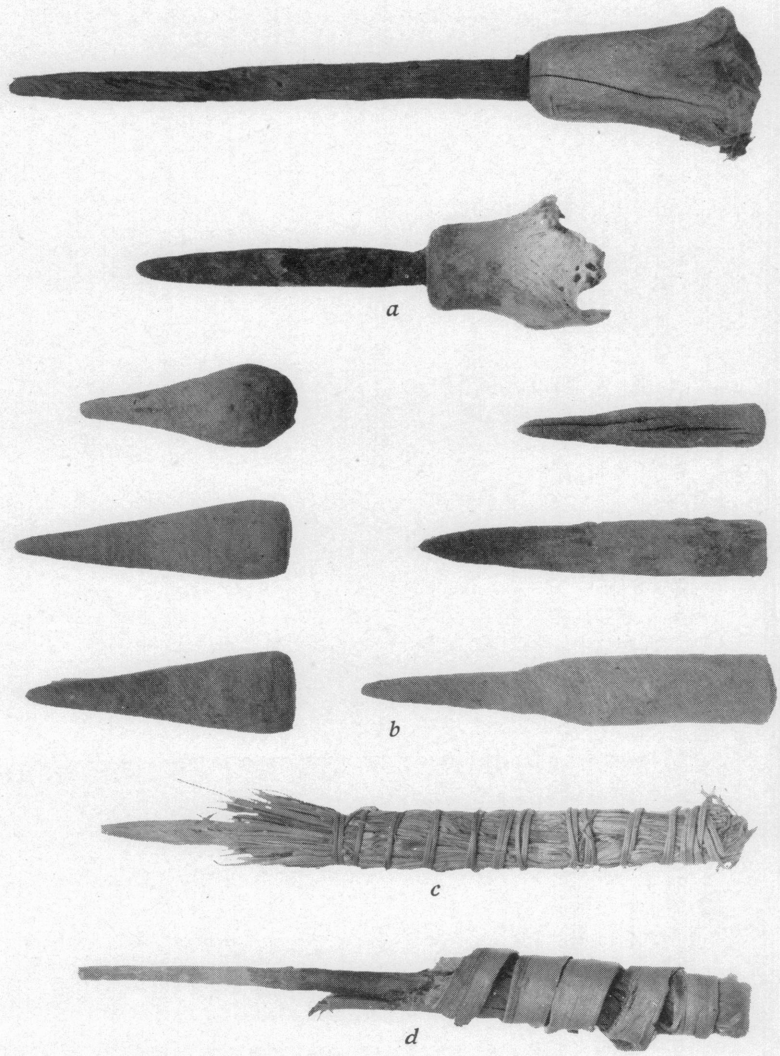
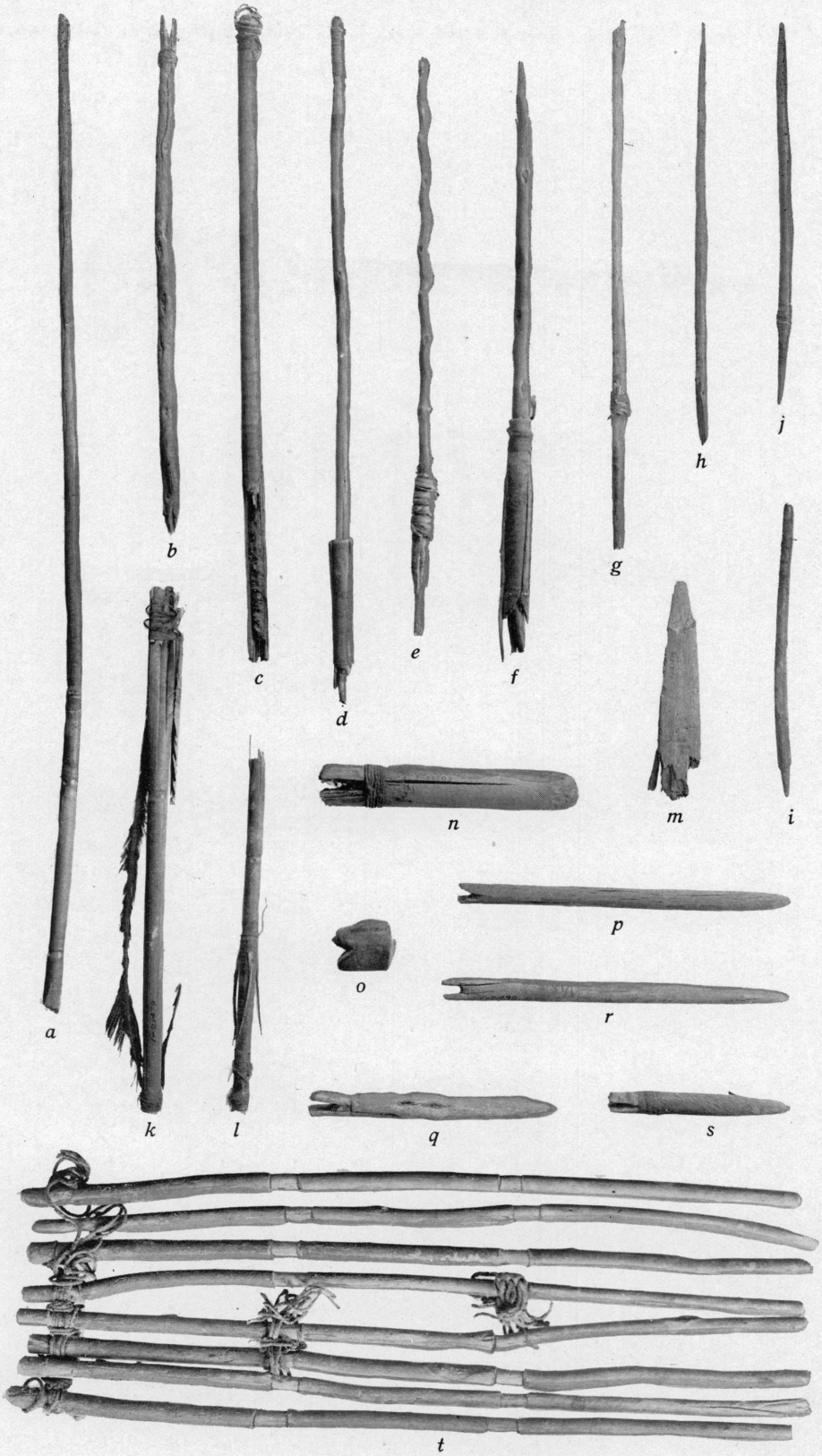


d

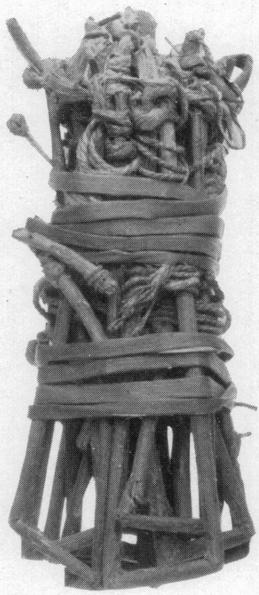
BOW, SPEAR, AND ATLATL DARTS



ATLATL DART AND ARROW FORESHAFTS



ARROW SHAFTS, KNIFE HANDLES, CRADLE, ETC.



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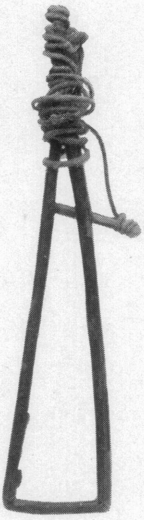

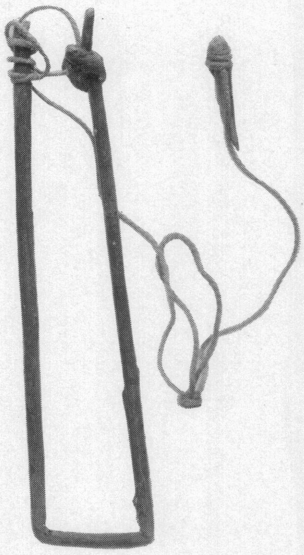

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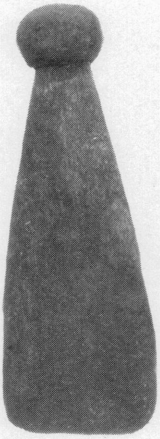

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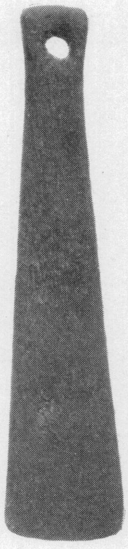

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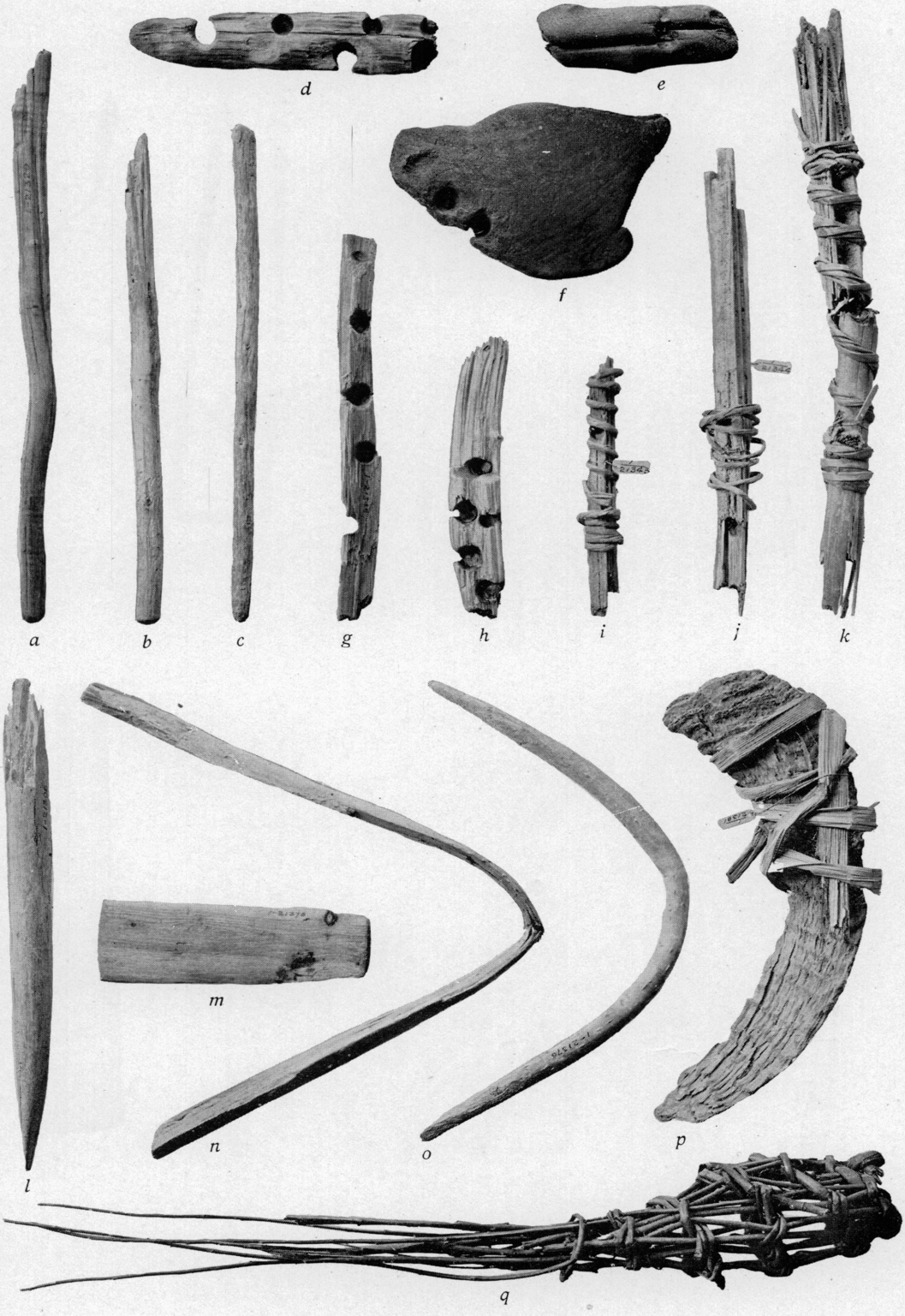
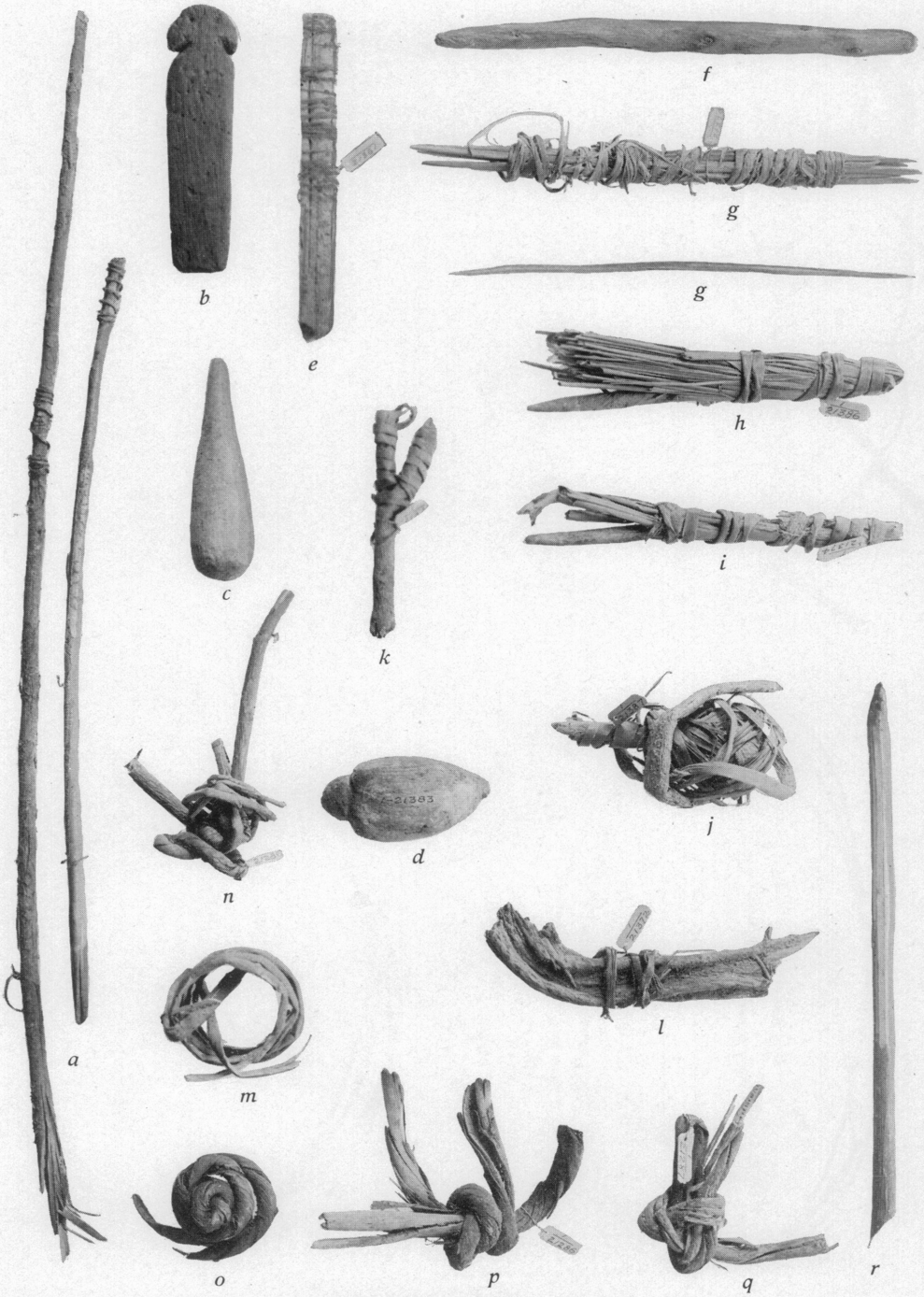
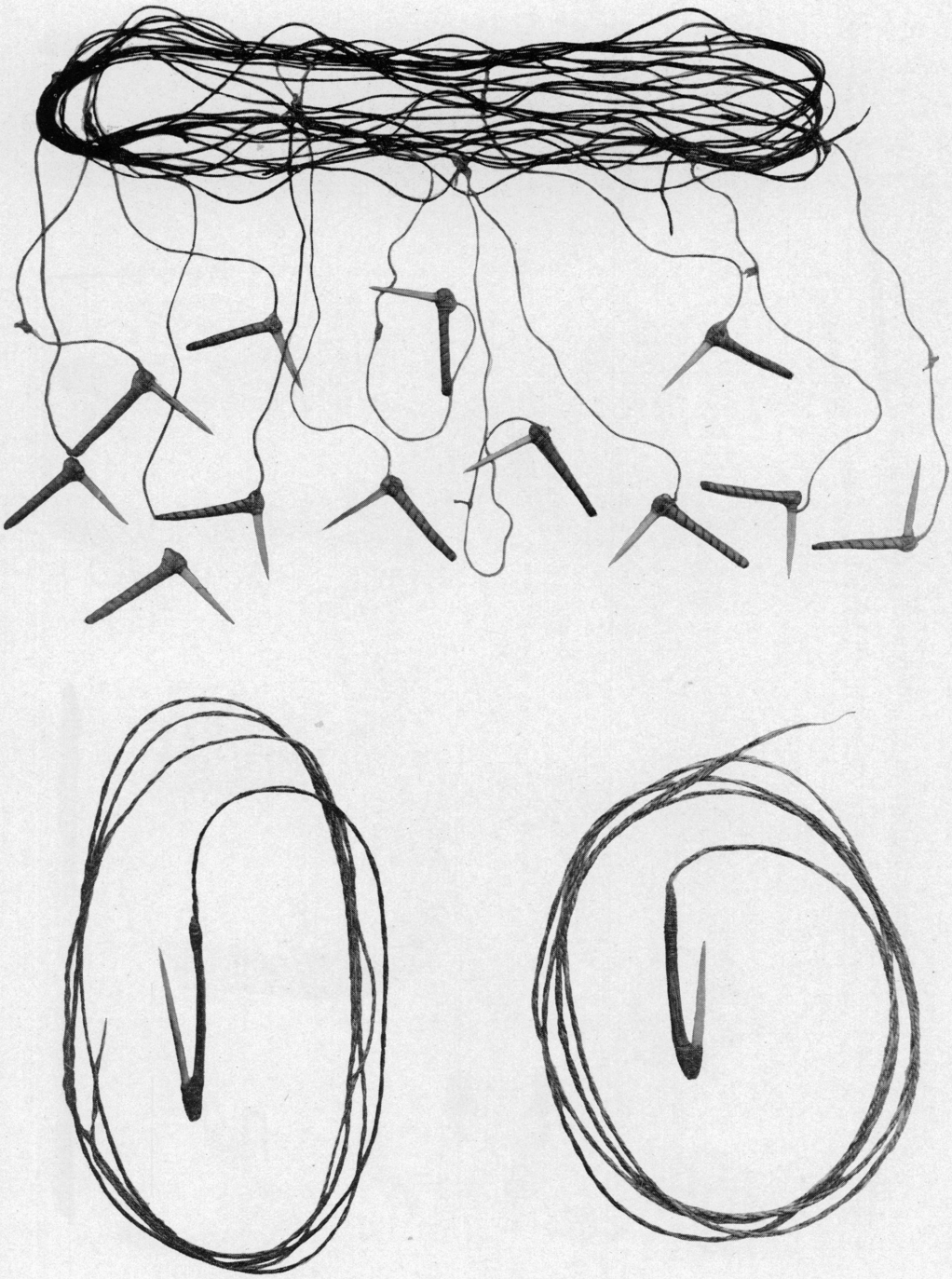
SNARES, WOODEN PENDANTS, ETC.



FIRE DRILLS, HEARTHS, ETC.



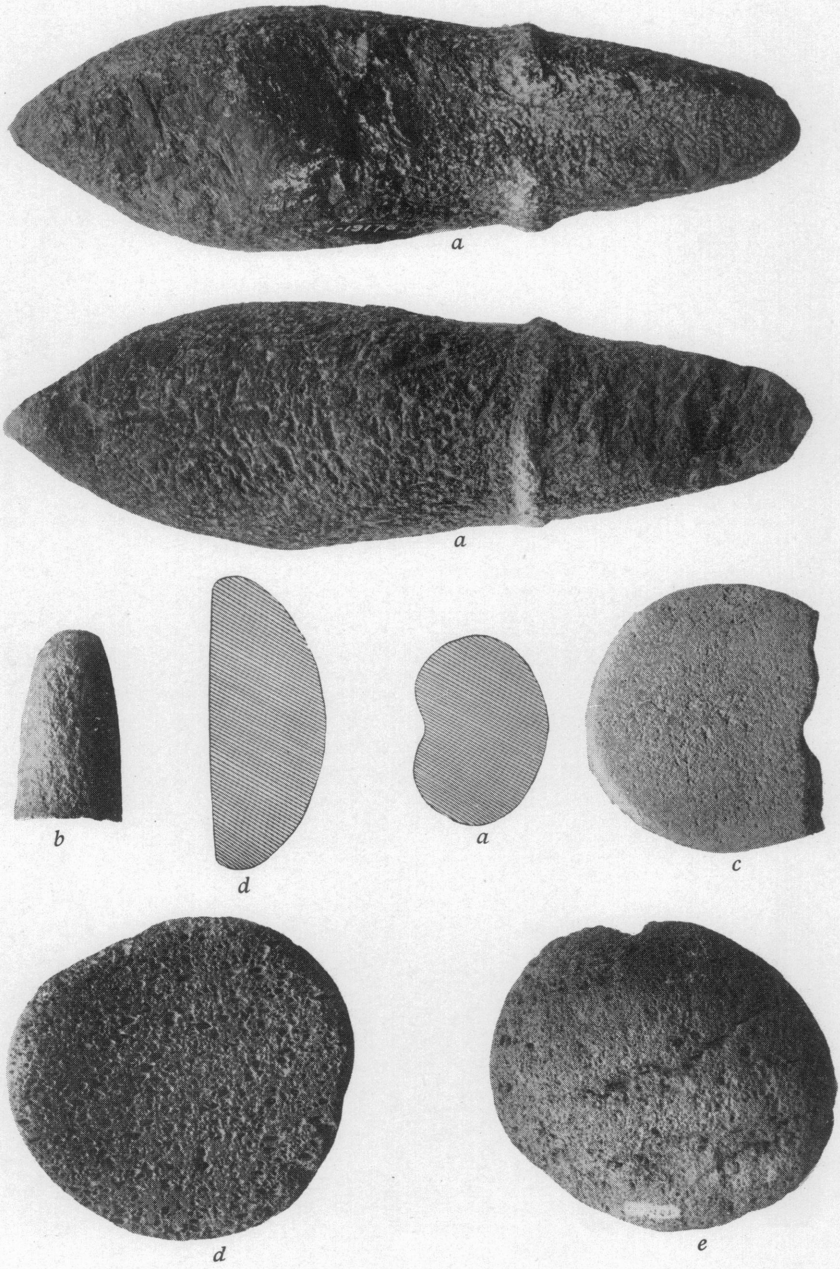
MISCELLANEOUS WOODEN OBJECTS



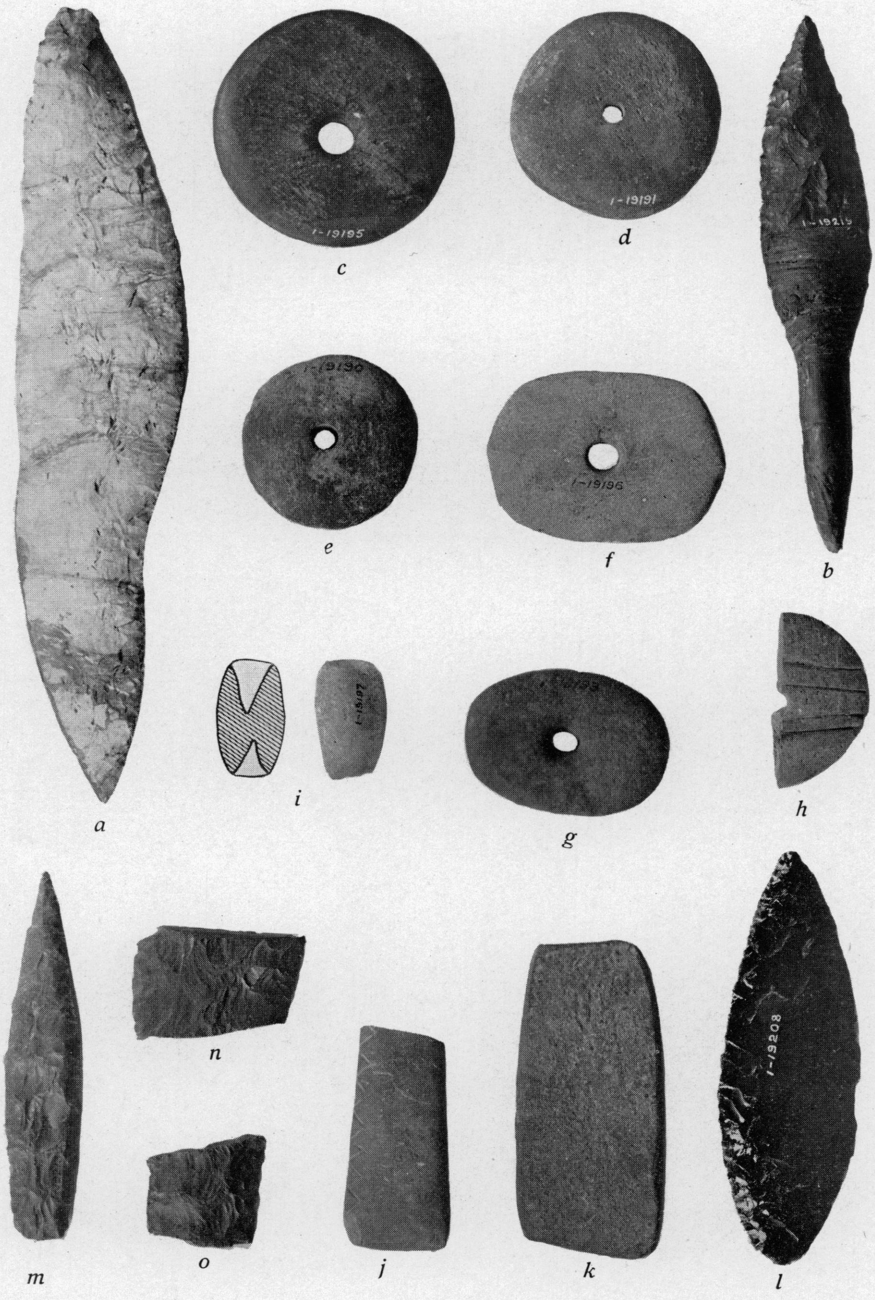
FISHHOOKS

PIPE, BALL, HEADBAND, FEATHERS, ETC.

SHELL AND CLAY OBJECTS



ICE PICK AND SHELLERS



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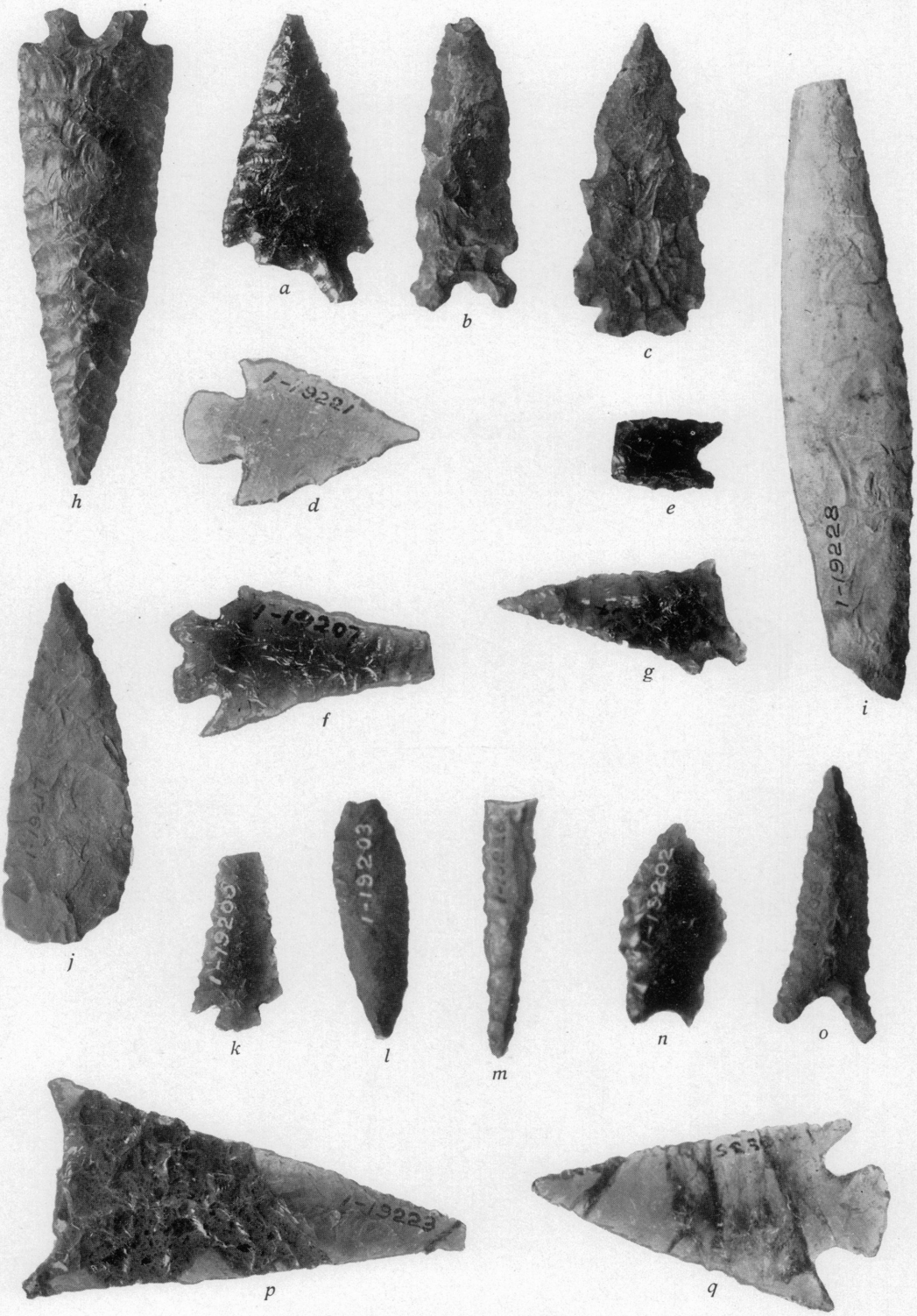
VARIOUS STONE OBJECTS



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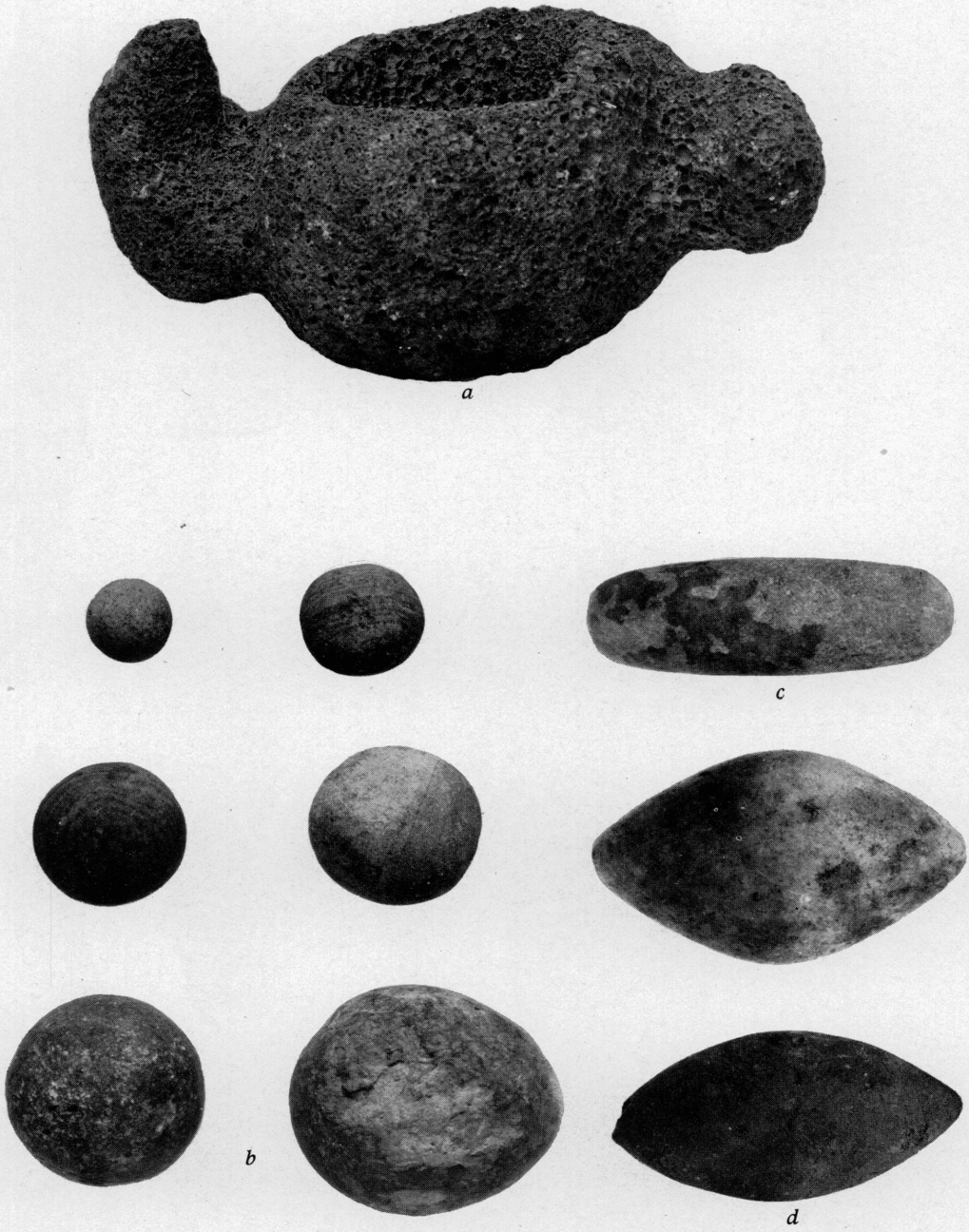
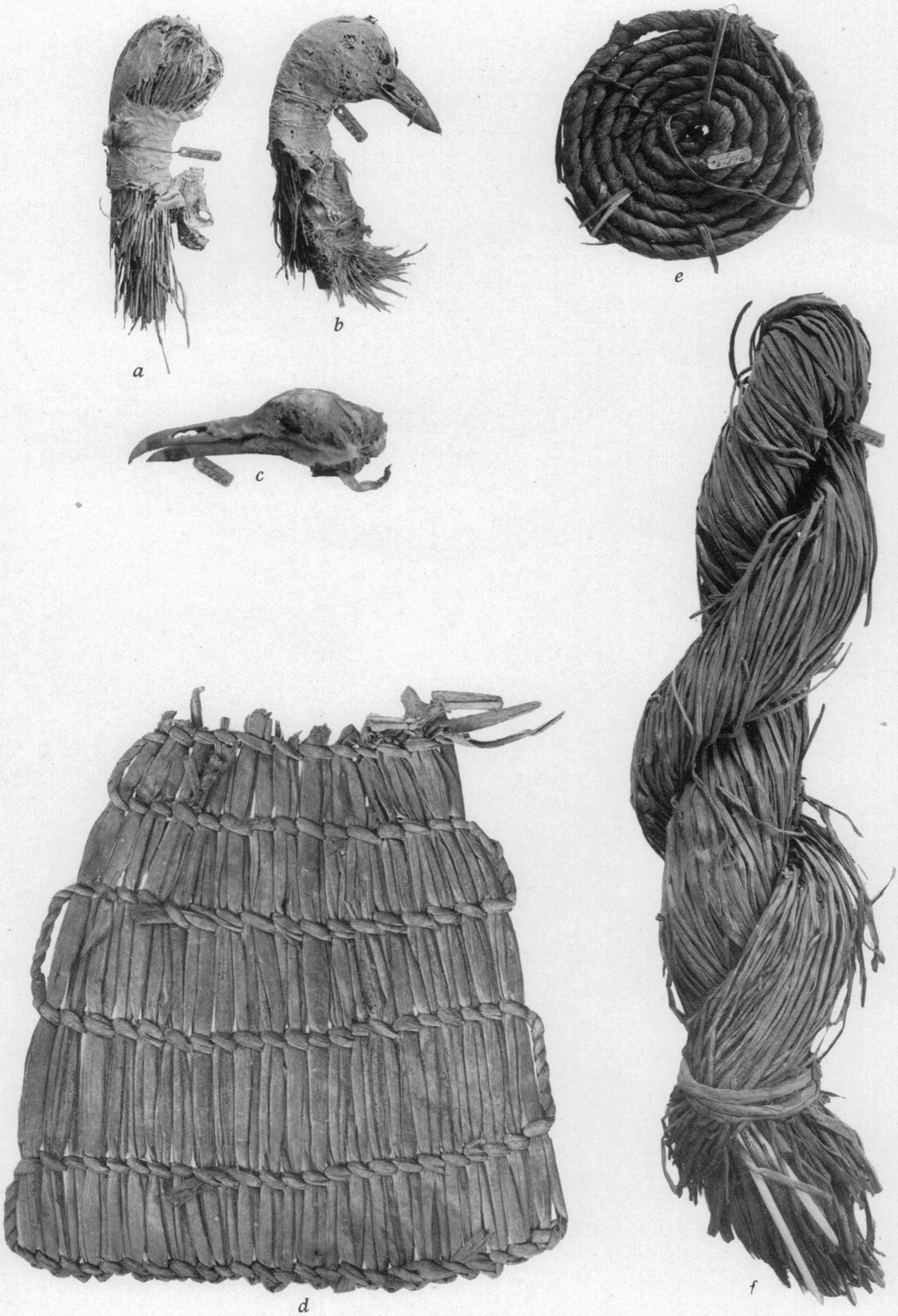
CHIPPED STONE IMPLEMENTS



SCORIA RING AND BALLS



OBJECTS FROM OCALA CAVE

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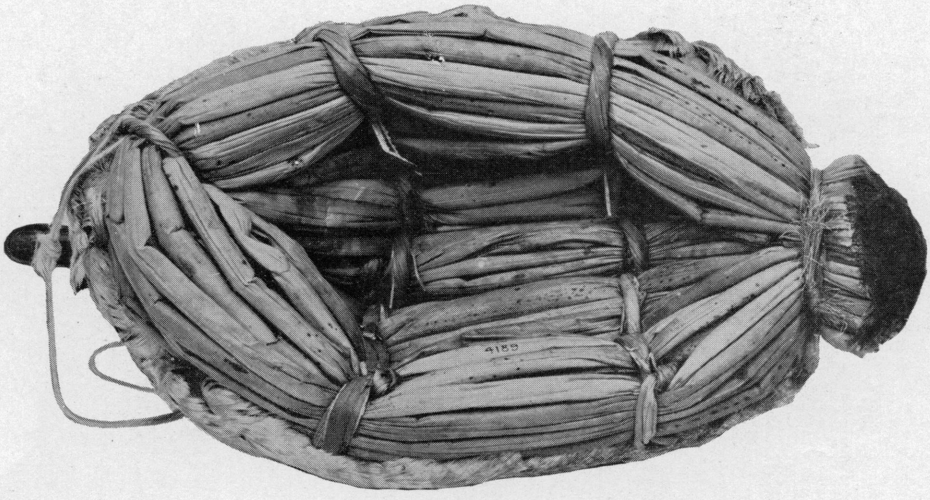

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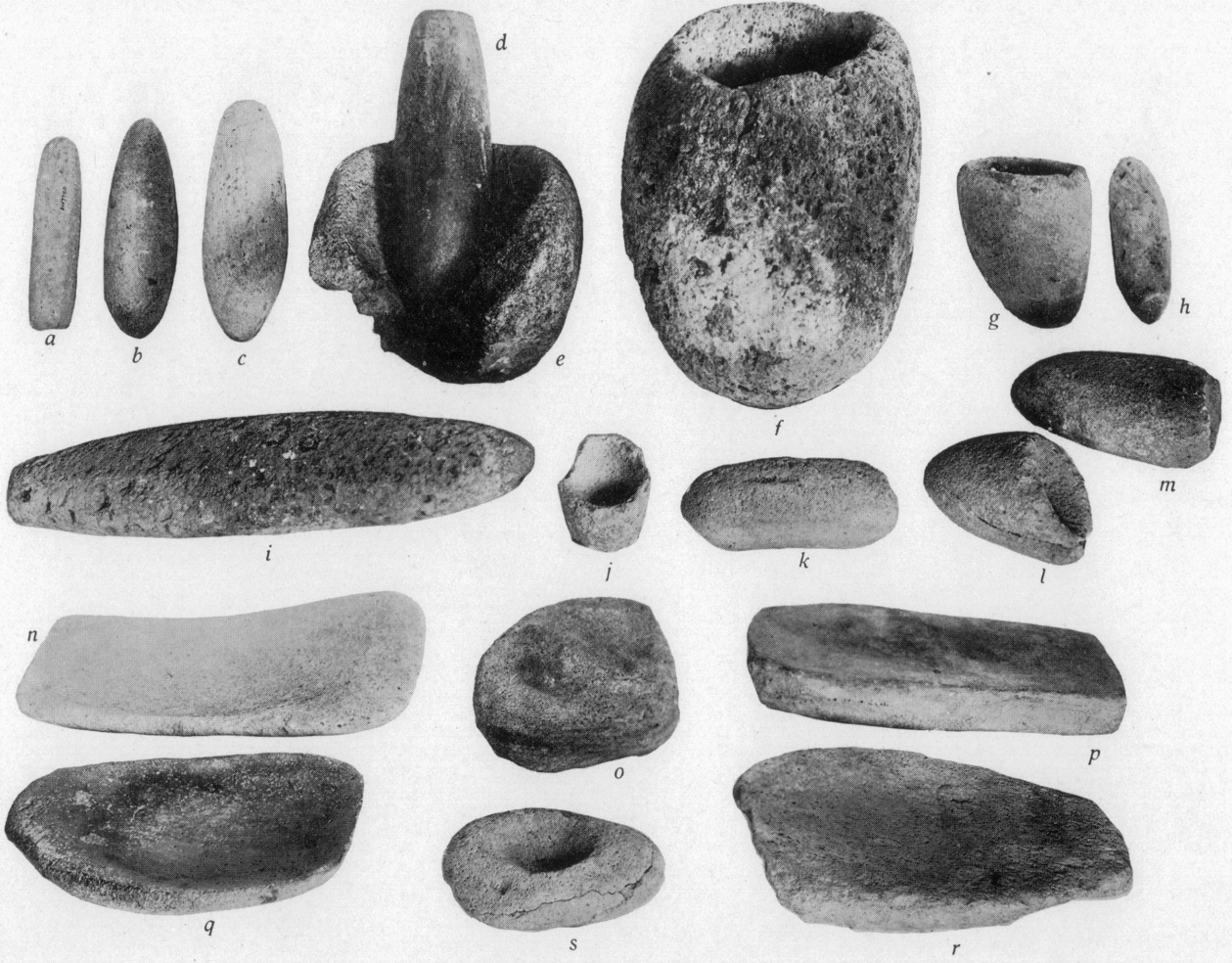
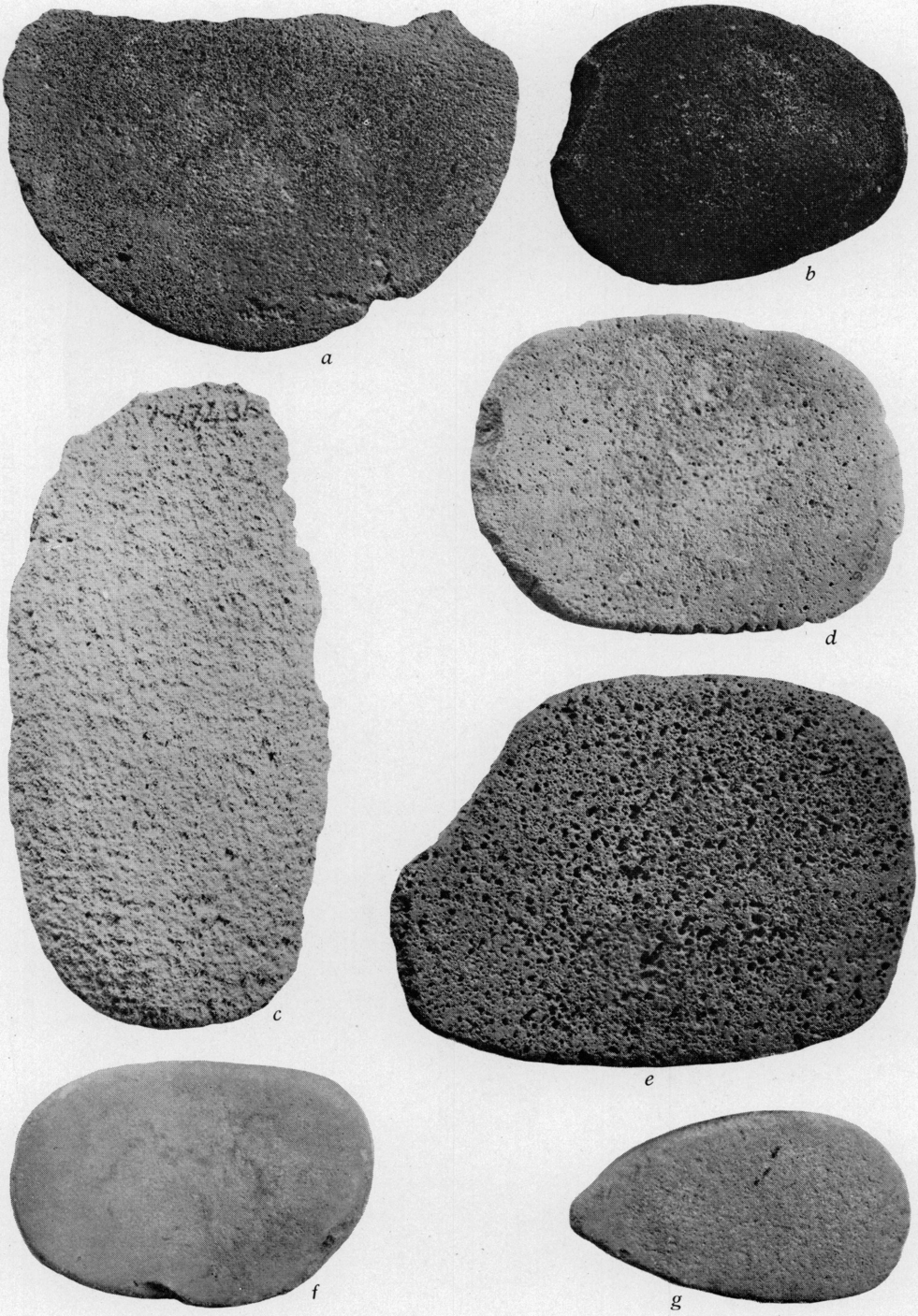
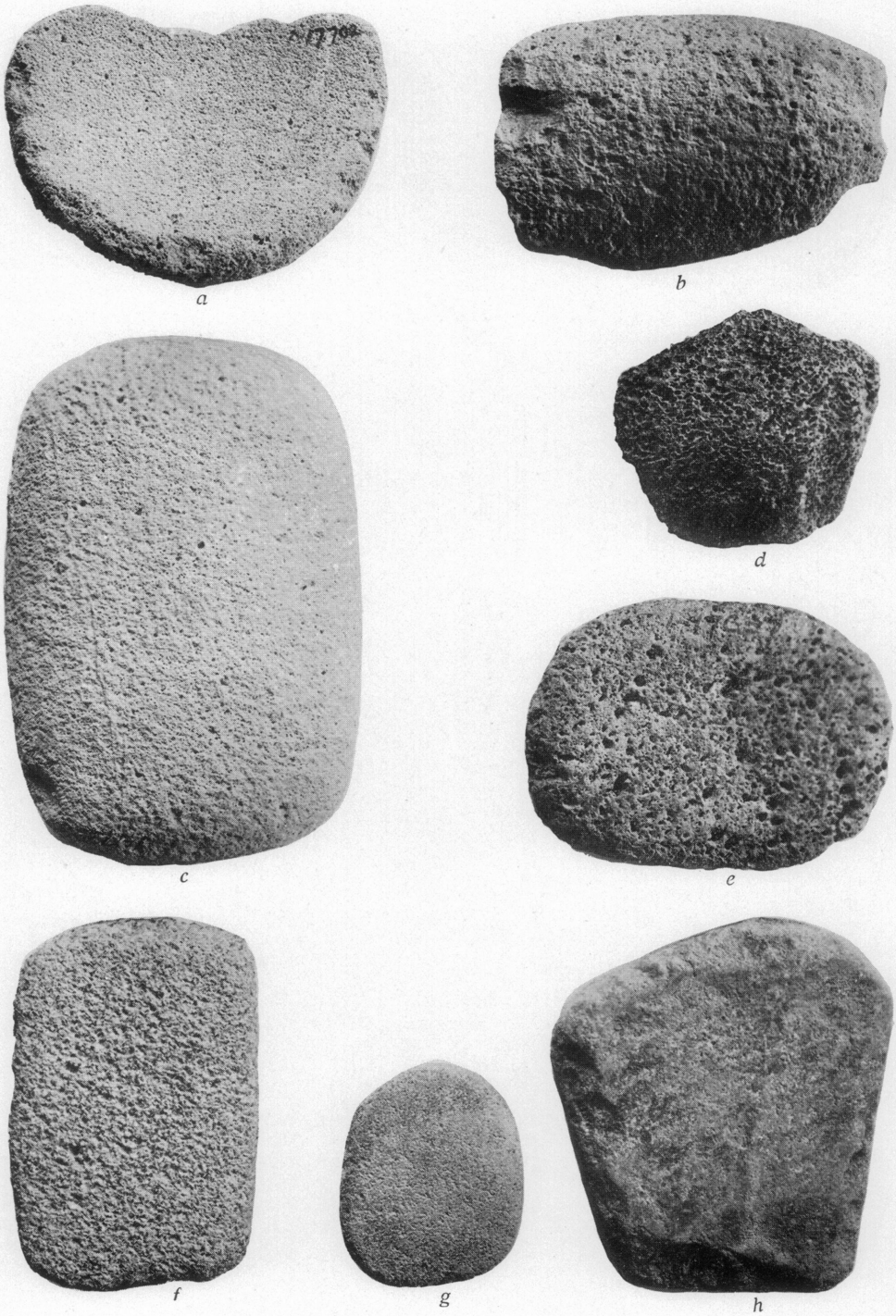
MODERN NORTHERN PAIUTE DUCK DECOY



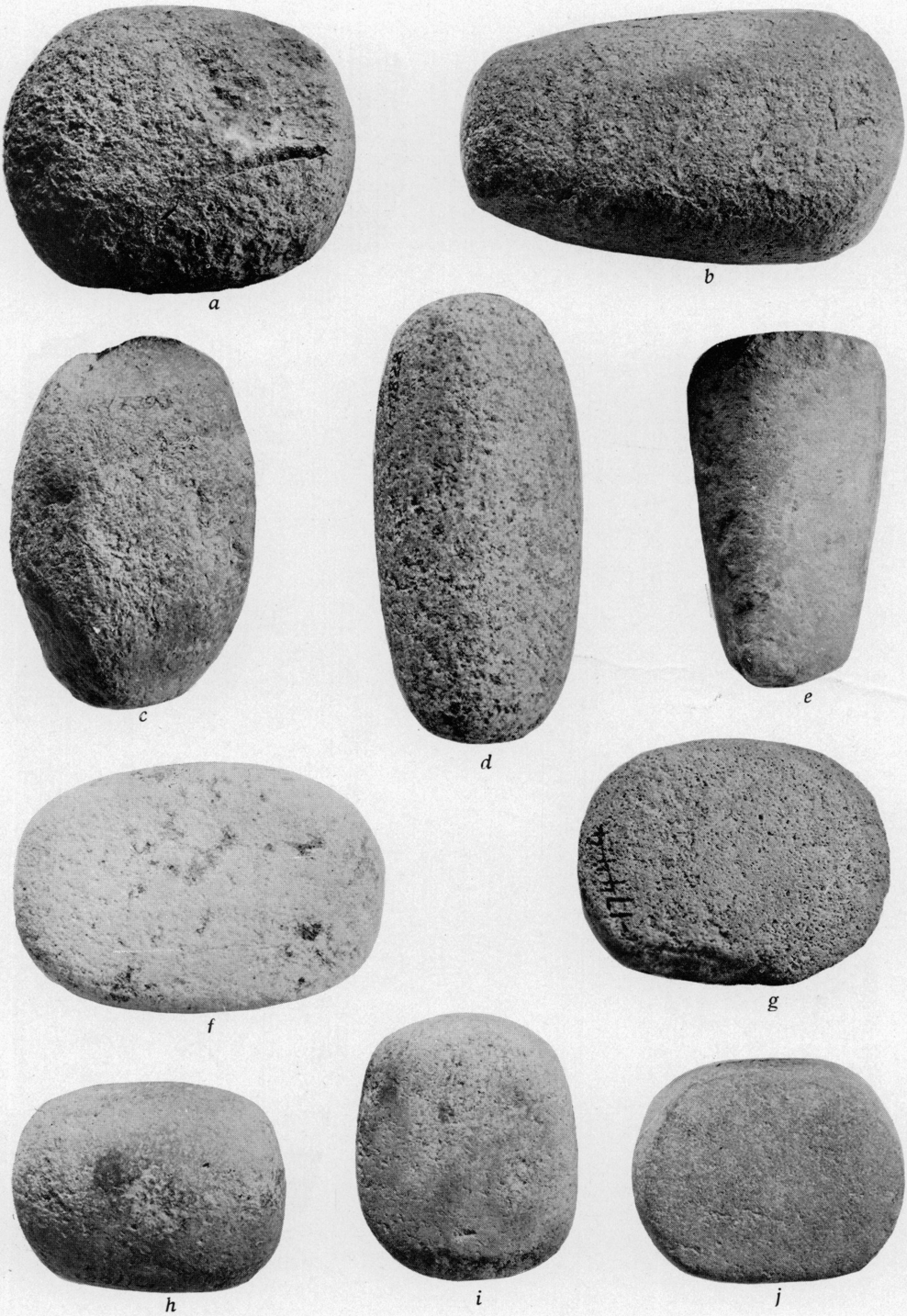
HUMBOLDT VALLEY MORTARS AND METATES



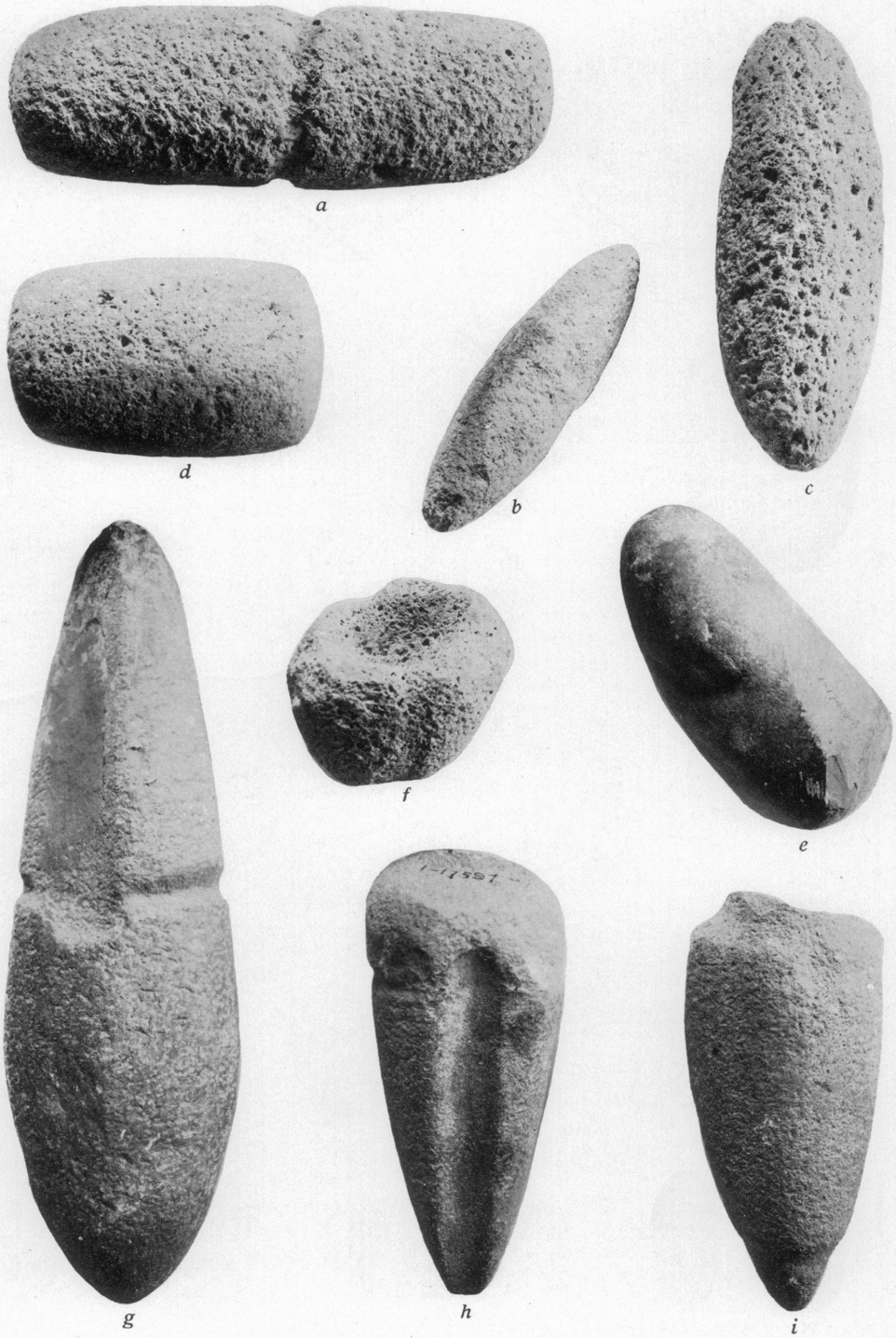
HUMBOLDT VALLEY HULLERS



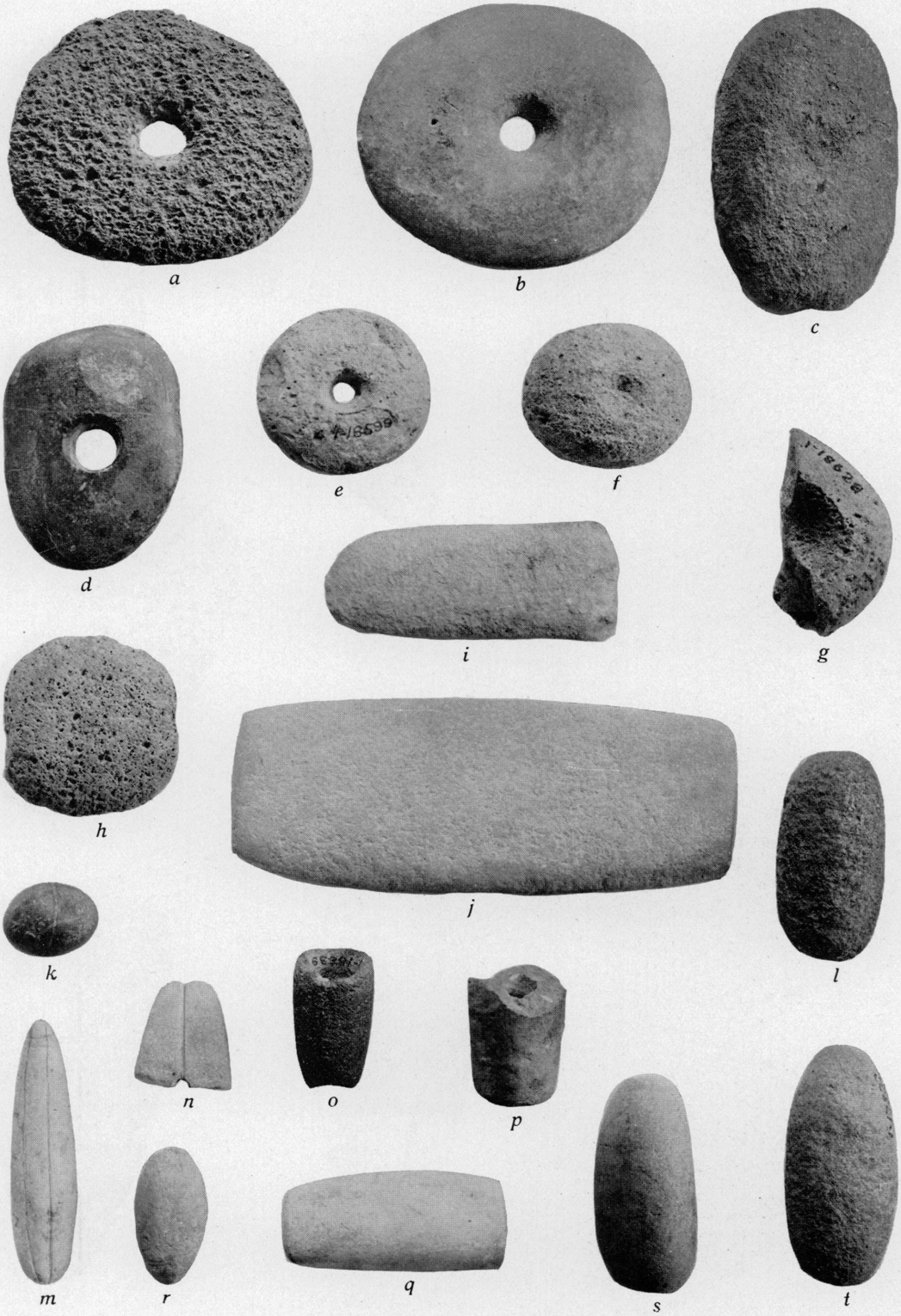
HUMBOLDT VALLEY HEAVY HULLERS



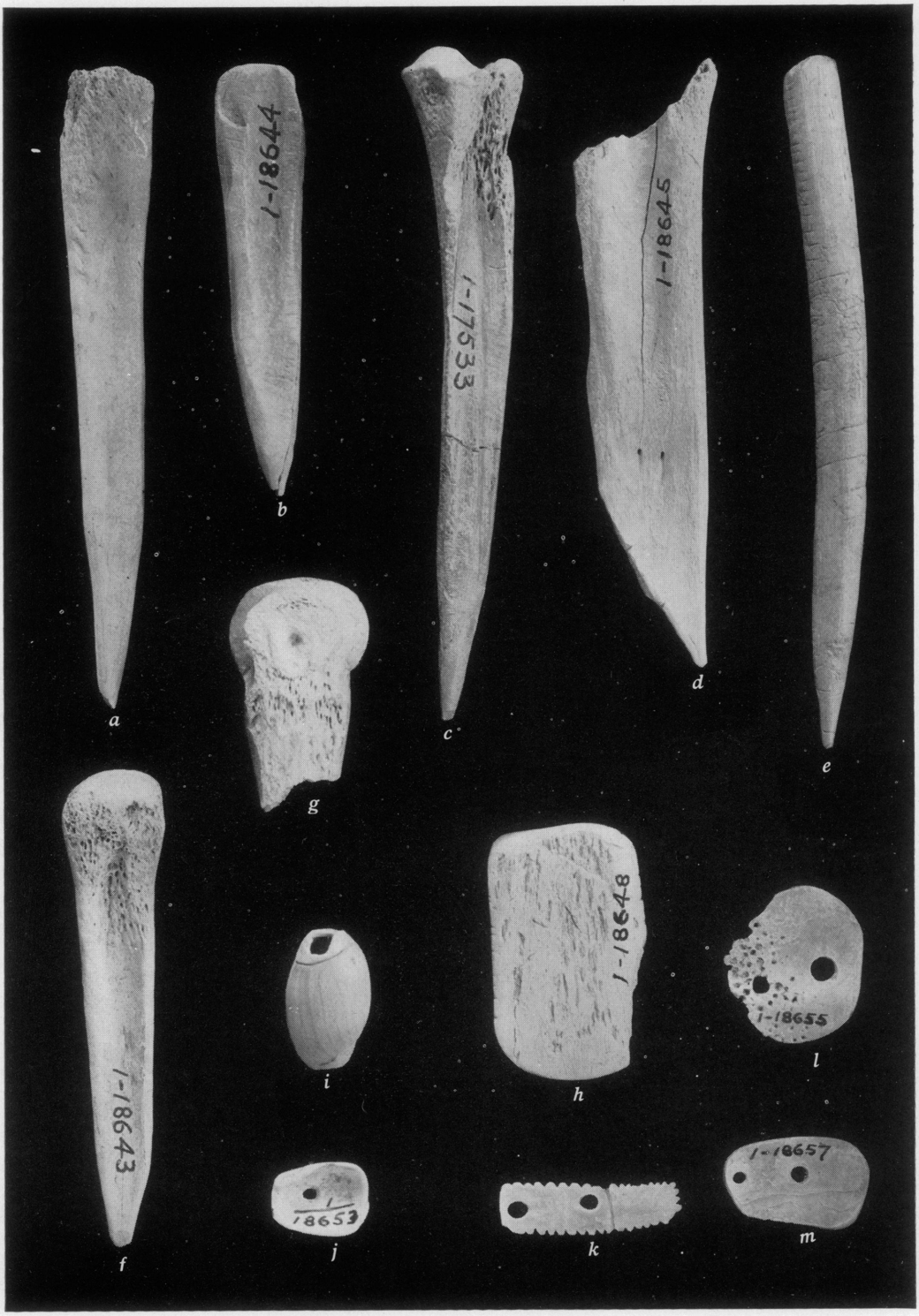
HUMBOLDT VALLEY SEED GRINDERS



HUMBOLDT VALLEY SINKERS, ICE PICKS, ETC.

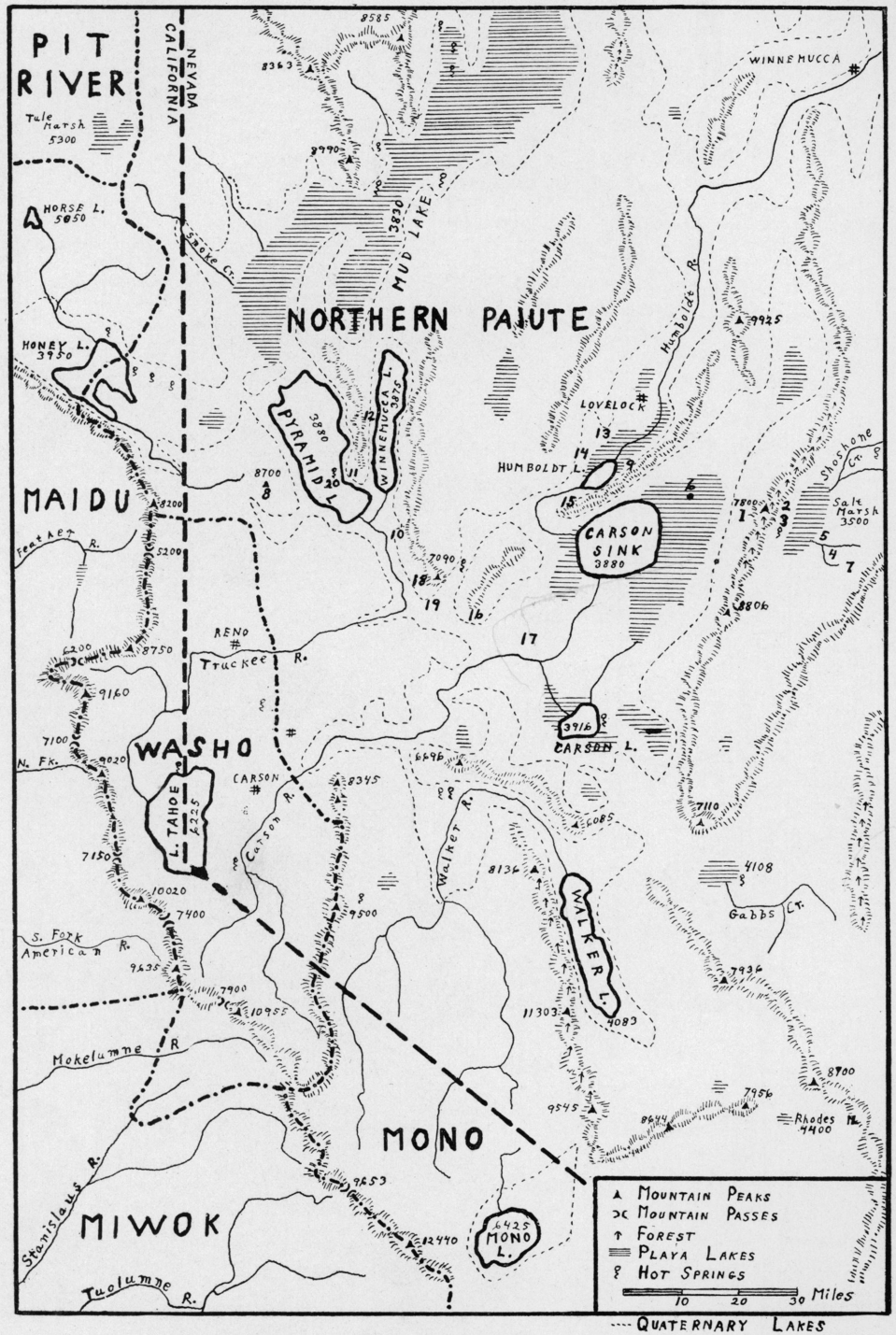


HUMBOLDT VALLEY PERFORATED STONES, PIPES, FLINT CRACKERS, ETC.



HUMBOLDT VALLEY BONE AND SHELL OBJECTS

COILED BASKET FROM LOVELOCK CAVE



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