

THE ARCHAEOLOGY OF HUMBOLDT CAVE CHURCHILL COUNTY, NEVADA

BY

ROBERT F. HEIZER AND ALEX D. KRIEGER

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INTRODUCTION

THIS WORK is a description of the cultural material disclosed by the excavation in the summer of 1936 of Humboldt Cave, in the western end of the Humboldt Range, Churchill County, Nevada. The materials are in the University of California Museum of Anthropology.

Through the courtesy of the late John M. Fulton, Director of the Mackay School of Mines at the University of Nevada in Reno, the senior author was introduced to Mr. and Mrs. Beverly A. Blackmer of Pyramid Lake, Nevada, and a plan was made, late in 1935, to proceed with work in the summer of 1936, using funds which they had given to the University of California for the purpose. The authors and the Department of Anthropology of the University take this opportunity to express their sincere thanks to Mr. and Mrs. Blackmer for their financial assistance in the summers of 1936 and 1937. Their aid at a critical time was the main stimulus for the renewed interest in the productive Nevada and Central California archaeological areas.

A tent camp was set up below the cave, and a portable Kohler generating plant (contributed by Mr. and Mrs. Blackmer) for lighting the cave was installed. For the loan of a pickup truck and other equipment, we express our appreciation to the Nevada-Massachusetts Mining Company.

The field crew were: Richard K. Beardsley, Robert F. Heizer, Alex D. Krieger, and Gerald Lance, all of the University of California; and William Wiard, of Sacramento Junior College. The cave was dug during late June and July, 1936.

The main description of the materials recovered was written by the end of 1937, but for a number of reasons the completed report has been delayed for more than eighteen years. In 1946, Krieger superintended the photographing of the artifacts and sketched the basket designs.

In 1950-1951, Krieger, then attached to the University of Texas, was in Berkeley, and the authors were able once more to work together on the report and bring it to practical completion. Of the purely descriptive sections of the report, each author wrote about half, Krieger concentrating on basketry and Heizer on objects of wood, stone, and bone.

In the years since the excavation was made a number of persons have assisted us in preparing the report, and for this help we acknowledge our appreciation to Martin Baumhoff, Albert Elsasser, Chérie Grégoire, Gordon Grosseup, and Francis Riddell.

Catalogue numbers used in this paper refer to specimens in the California collection (Catalogue 1) of the Museum of Anthropology at Berkeley. In all, 5,161 specimens were recovered from the cave.

PREVIOUS ANTHROPOLOGICAL INVESTIGATION OF THE AREA

The lower Humboldt Valley, as compared with Nevada as a whole, has come in for its due share of anthropological research. Julian Steward's recent works on Great Basin ethnographic cultures include information on the bands resident in the area (Steward, 1938, 1940). Omer C. Stewart's Culture Element Distribution survey of the northern Paiute (Paviotso) contains several element lists gathered locally (Stewart, 1941). Stewart was interested in checking ethnographic attribution of archaeological forms, and his report is of much value. Earlier ethnographic investigations had been carried out by R. H. Lowie (1924) and L. L. Loud (Loud and M. R. Harrington, 1929, pp. 152-164 and *passim*). Mention should also be made of Sarah Winnemucca's *Life Among the Piutes* (1883), which contains a great deal of useful information. This account should be used with caution, however, since it was edited by a person unfamiliar with the environment and the people themselves.

In this desert region are two types of archaeological sites: (1) caves and (2) lake-bottom-surface camps. Published reports on excavated caves and dry rock-shelter deposits are few. They may be listed as follows: Lovelock Cave (Loud and Harrington, 1929, pp. 1-123; Orchard, 1925; M. R. Harrington, 1941), Ocala Cave (Loud and Harrington, 1929, pp. 150-151), an atlatl-horizon rockshelter north of Lovelock Cave (Heizer, 1938; this site, since excavated, has been briefly reported on by Heizer, 1951*a*), and surface sites on the bed of Humboldt Lake (M. R. Harrington, 1927, 1933*b*; Loud and Harrington, 1929, pp. 124-150). Desiccated human remains from Lovelock Cave have been studied to determine blood grouping (Wyman and Boyd, 1937), and measurements of the available cranial specimens from the Humboldt Valley region were presented by Gifford (1926, pp. 248-249, 290-291, 382-383). Map 1 shows the location of a number of these sites (see also Loud and Harrington, 1929, pl. 1).

LOCATION OF THE SITE

Humboldt Cave was probably reported to, but not visited by, L. L. Loud, who worked in the lower Humboldt Valley for the University of California in 1912 and 1924. His site 15 (Loud and Harrington, 1929, p. 183, pl. 68) probably was this cave.

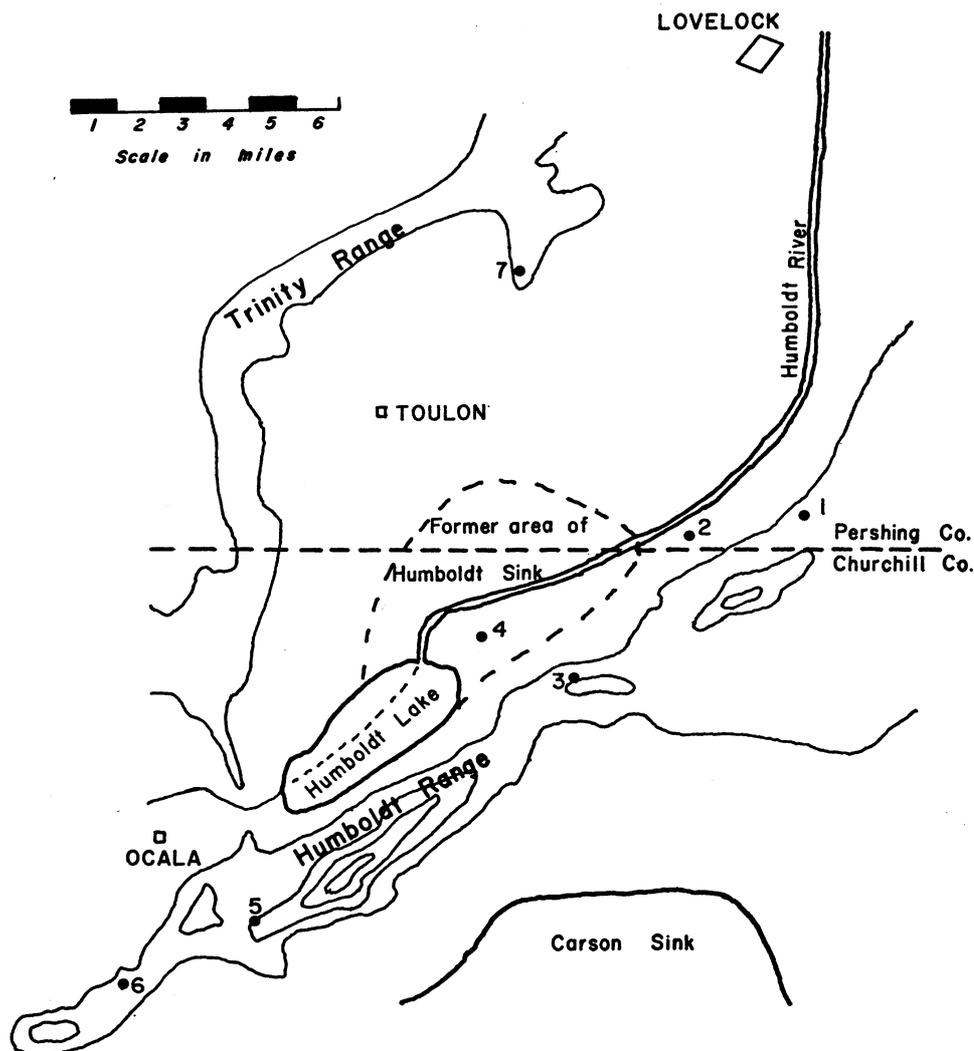
The site was known to a private collector, Mr. Arthur Green of Lovelock, who showed it to the senior author of this report about 1930. Some shallow potholes were then visible, but the amount of disturbance was negligible.

The cave lies almost at the western end of the Humboldt Range (pl. 3, *a*) and in the northern half of the northeastern quarter of Section 9, Township 23 North, Range 29 East. The Southern Pacific Railroad station Ocala bears north 17° west.

ENVIRONMENTAL BACKGROUND

The principal previous archaeological report on the immediate area has presented the general environmental features (Loud and Harrington, 1929, pp. 124-129). This earlier discussion should be supplemented by the excellent and full data in Steward's Basin-Plateau monograph (Steward, 1938, pp. 10-44, maps 3, 4).

The Humboldt Valley, an integral part of the basin and range physiographic province (Louderback, 1923), once contained at its lower (western) end old Humboldt Lake. For a description of the lake, see Russell (1885, pp. 66-68). The



Map 1. Lower Humboldt Valley showing location of excavated sites. Numbers refer to sites: 1, Leonard Rockshelter; 2, open site Pe-5; 3, Lovelock Cave; 4, open lake-bed site, Ch-15; 5, Ocala Cave; 6, Humboldt Cave; 7, Granite Point Cave.

Humboldt River, its waters now impounded and diverted for irrigation, no longer reaches the lake. A drainage canal across the old lake bottom, which cut the clay-flow layers, has caused the ground-water level to drop several feet. These influences on the inflow and maintenance of level have operated to dry up Humboldt Lake, and it is now only a wind-swept playa over the scoured surface of which sand dunes slowly migrate (pl. 1).¹

In aboriginal times the lake must have presented a quite different picture. The volume on Ornithology in the *U. S. Geological Exploration of the Fortieth Parallel*

¹ Since 1926 the Bureau of Reclamation reservoir at Derby has controlled the Humboldt River waters, and in 1952 the old basin of Humboldt Lake was filled nearly to its early historic shoreline level.

contains the following description of the marshes near Humboldt Sink in August, 1867 (Ridgway, 1877, p. 353).

The marshes were miles in extent and almost entirely covered by a dense growth of *tule*, except where the river meandered through, now and then expanding into a small lake. These marshes were surrounded by a bare plain, consisting in the winter season of mud, but at this time baked perfectly dry and hard by the heat of the sun, except in the more depressed portions which were covered by a deep deposit of snow-white "alkali." From these extensive flats, desert plains lead away to the barren mountains on either side, whose summits are bare and rugged eruptive rocks, of weird forms and strange colors. Upon the whole, the entire region was one of the most desolate and forbidding that could be imagined, and in these respects is probably not surpassed by any other portion of the land of "alkali" and the "everlasting sage-brush."

Wilkes' (1849, pp. 23-24) description of the Sink of Humboldt reads:

The "Sink" of Mary's River consists of pools of standing water, covered with a yellowish slime, and emitting a disagreeable odour; these, at times, have the appearance of a lake, some twenty miles in length by six miles in breadth, according to the season of the year. Around this lake or pool is the usual alluvial deposit, and upon this soil shoot up a short grass and reeds. It is important to take into consideration the season at which the accounts of the "Great Basin" have been written, though all describe it as barren and sterile. Yet it may be crossed at one season more advantageously than at another; and many persons have been able to pass it without much suffering to their animals or themselves, while others have entirely failed to reach their destination, or have been obliged to turn back after having endured every privation.

Edward M. Kern wrote in 1845: "On the 23rd of November, we arrived at the [Humboldt] sink or lake. This lake is about 8 miles long by 2 in width; it is marshy, overgrown with bulrushes, at the upper end." (Kern, 1876, p. 478.)

Another account, of 1849 (Potter, 1945, p. 189), reads:

This Sink extends over several miles and is generally grown up with rushes and grass. There is immense basins however on all sides, which, in high water, receive the back water. The road keeps in these basins, which extend over miles and miles without a vestige of vegetation, but so white and dazzling in the sun as scarcely to be looked at. We rolled by this, the water of which cannot be used by man or beast, [for] 4 miles, and came to some sulphur springs or rather wells. Here we encamped for the night.

The aboriginal occupation of this region must have depended chiefly on *tule*, fish, waterfowl, and to some extent on game such as rabbits and antelope and wild seeds.² Since so much of the Basin-Plateau area is without large bodies of water, we might expect that any culture resident on a lake would show elaborations or specializations directed toward the utilization of this feature of the environment. We shall see that this was so here as far as can be judged from the archaeological evidence. The hills surrounding the lake are dry and treeless (pl. 2, *a* and *b*).

Although this report is not primarily concerned with correlating the age of cultural strata in caves with the Pleistocene and post-Pleistocene lake fluctuations, the general problem of dating the time of earliest inhabitation of the area must not be ignored. Harrington proposes, on the basis of Kidder's predendrochronology estimate, a dating of about 1000 B.C. for the earliest occupation of Lovelock Cave. The period attributed to the Anasazi Basket Makers has become much shorter in recent years, and this revision materially affects Harrington's estimate. There is

² *Pinus monophylla* does not now grow on the western side of the Humboldt Range but stops short in the next range of mountains to the east (Stillwater Range). See Steward, 1938, fig. 4, for mapped distribution.

no substantial evidence of southwestern Nevada cultural connections specific enough to allow direct cross-dating.³

J. C. Jones (1925*a*, p. 4; 1925*b*, p. 296; 1929),⁴ who estimates the age of Lake Lahontan as approximately 2,400 years, differs from Russell (1885, p. 237) and concurs with Snyder (1914, pp. 299-300) in his opinion that Lake Lahontan has never gone entirely dry and that the present lakes (Humboldt, Pyramid, etc.) are remnants of Lake Lahontan (see also Hubbs and Miller, 1948). The demonstration of these facts has a certain bearing on Loud's discussion of prehistoric occupation, since some of the lakes have never been completely dry. Indeed, any computation of age based on the percentage of salinity by volume depends on several factors, any one of which may be extremely variable (Antevs, 1949, pp. 56-57). Thus, Harding (1935*a*, 1935*b*) and Antevs (1938, pp. 41-47) have shown that lake levels in the Great Basin area have undergone rather marked changes in the last three hundred years. The observable tendency in this region in that period seems to have been toward an increase in moisture.

From the nature of the Humboldt Cave deposits and the fact that the site lies four miles from water it would appear that the cave served mainly as a temporary retreat, possibly in times of extreme cold weather or war. A few fire pits and ash lenses were noted in the deposits. The numerous caches of personal possessions seem to argue against the probability of intensive and continuous occupation. Loud and Harrington (1929, p. 119) suggest that the occupation of Lovelock Cave was not continuous. The impression we got during the excavation of Humboldt Cave was that it served primarily as the equivalent of a safe-deposit vault and secondarily as a retreat in time of necessity. This is not to say that the cave was not lived in, but we consider that there is no evidence of continuous occupation over long periods of time.

SITES ON THE LAKE FLOOR

Surface evidence of aboriginal occupation of the dry bed of Humboldt Lake is abundant. Loud collected a number of specimens, which he has described in a separate section of the Lovelock Cave report (Loud and Harrington, 1929, pp. 29-110). Numerous collections, many of them comprising several thousand pieces, are in the hands of local townspeople. Unfortunately, most of the details of these will forever remain unknown. Over a period of years one of the authors of this paper has collected as representative a series of types of imperishable objects as possible; this collection is now in the University of California Museum of Anthropology and its description is the subject of a separate paper (Heizer and Grosscup, MS).

The whole matter of lake-bottom sites is most puzzling, for it appears that some sections of the lake bed were occupied. We are led to conclude that old Humboldt Lake must have at times dried up enough to permit habitation on parts of its bottom (Antevs, 1938, pp. 41-47).

Scattered around the edges of the lake floor are old Indian camp sites: great quantities of rocks and artifacts of all sorts indicate that people lived in these spots. These sites were systematically surveyed by Loud (Loud and Harrington, 1929, pl. 1, pp. 129-133), and this survey was extended in the summer of 1950 (records on file in University of California Archaeological Survey, Berkeley).

³ Zingg (1937) assumes that the Lovelock Cave deposits can be attributed culturally and temporally to archaic Basket Maker (Basket Maker I).

⁴ See criticism of Jones's view in Antevs (1944).

GEOLOGICAL SKETCH AND FIRST OCCUPATION OF THE CAVE

Humboldt Cave was formed by the ancient (Tertiary) vertical faulting of a breccia cliff. Subsequently the waters of Lake Lahontan rose, filled the cave, and deposited a tufa seal over the walls of the cave. This layer of tufa, about eight inches thick (pl. 2, *f*), prevented disintegration of the breccia and preserved the interior form. As the old Pleistocene lake subsided, a steep gravel talus was deposited on the hillside (pl. 2, *c*). Some of this gravel was laid down at the entrance of the cave, which faces north, and we excavated through nearly three feet of it in enlarging the entrance at the beginning of our work (pl. 2, *d* and *e*). Some gravel spilled into the front part of the cave but did not reach the back end. Here, instead, was deposited a layer of fine gray lacustrine silt about twelve inches thick.

The lake continued to subside and ultimately reached its present state, represented by the few surviving smaller lakes (Pyramid, Humboldt, and Walker).

When occupation of our cave first began we cannot say. Harrington (Loud and Harrington, 1929, p. 120) believes that Lovelock Cave was occupied soon after the subsidence of Lake Lahontan. If this is so, the surrounding terrain must have attained its present biotic characteristics at that time, since the earliest Lovelock Cave occupational remains indicate this. It would be valuable to know whether the present fauna and flora advanced at the same time the area was left exposed by the retreating lake. It is likely that some time elapsed between the lake retreat and the later establishment of existing floristic and faunistic patterns. Hence, Lovelock Cave was probably first occupied at a date much later than the time when it was first exposed by the final retreat of Lake Lahontan.⁵

This problem has an indirect bearing on the earliest occupation of Humboldt Cave, since this cave shows no evidence of the earliest culture of Lovelock Cave as described by Harrington. Steward (1940, pp. 464-466; 1939, p. 2) is of the opinion that the Basket Maker elements of Early Lovelock indicate either contemporaneity or a post-Basket-Maker dating for the material from western Nevada.⁶

GENERAL CHARACTER OF CAVE CULTURES

From the previous statements on the environmental background of the Humboldt Lake region, it is a natural conclusion that the aboriginal residents of that area must necessarily have depended primarily on the lake and its products. Since the several successive archaeological cultures, notwithstanding specific trait differences, were all specialized in the same direction, we may generalize in calling them desert-lake-shore or tule cultures.⁷ Throughout the archaeological continuum we find abundant evidence that fish, waterfowl, seeds, and water plants were the primary subsistence items. Some desert animals—mice, squirrels, antelope, deer, and mountain sheep—were obtained, but hunting seems to have been only an occasional pursuit. Rabbit hunting is a possible exception. Tule, rushes, willow, and greasewood were the main materials utilized for string, rope, baskets, clothing,

⁵ The radiocarbon dates for Leonard Rockshelter and Lovelock Cave (discussed below) show that the lake waters began their final lowering from a high stage about 11,000 years ago. Lovelock Cave should have been empty of water by 9,000 to 10,000 years ago.

⁶ The recent radiocarbon dates for Lovelock Cave show this hypothesis to be incorrect (see p. 76).

⁷ Barrett (1910) develops this approach in his study of the material culture of the Klamath Lake Indians. See also Cressman, 1942.

and household objects. Aside from stone metates, mortars, sinkers, chipped implements (points, knives, scrapers), a few ceremonial objects, and a limited use of bone, the material culture is predominantly based on perishable substances.

It is precisely because of the dry caves, which yield almost perfectly preserved perishable remains, that the archaeology of the Humboldt Lake region is so valuable. Here are unique prehistoric materials to illustrate the amazingly efficient human utilization of a meager and forbidding environment. In terms of achievement, the aboriginal peoples of the Great Basin must be given equal rank with the more advanced cultures.

METHOD OF EXCAVATION

Preliminary to actual excavation a passageway about three feet wide was cut out of the soft breccia with a hand sledge and hand drill, and a deposit of Lahontan gravel in the outer entranceway (pl. 2, *d*) was shoveled away. The cave opening thus was enlarged and made easy of access.

The interior of the cave (see maps 2 and 3) was long (49 ft. east-west) and narrow (8 ft. north-south). The wall surfaces were relatively flat, and both the footwall and the hanging wall dipped to the south at an angle of 70°-72°. The ceiling was irregular, but the floor—that is, the top of the refuse deposit—was nearly level except where it rose slightly toward the entrance. The interior of the cave therefore resembled a shoe box laid on edge. The cave roof at the beginning of excavation was nowhere less than 7 ft. or more than 11 ft. above the deposit surface.

Careful floor-plan and profile maps were made, and the original surface level was indicated along both walls by a line of white paint. During excavation each vertical depth measurement was calculated from the white-painted line that marked the original surface level of the deposit. All depth measurements contained in this report indicate plumb depths from the original surface. On the south wall a protruding point (see map 2) was selected and designated Datum A. All finds were located by right-angle triangulation with reference to this single datum. Thus, for example, an object might be located with reference to Datum A, using two cardinal directions, at 4 ft. 9 in. W / 6 ft. 3 in. N, depth 18 in.

Beginning at surface level at the rear (west) end of the cave, twelve "sections," each 3 ft. long and as wide as the cave, were laid off. Datum A fell in section 7. The division of the cave deposits into these 3-foot sections was for the sake of convenience, since miscellaneous basketry fragments, and so forth, which did not require separate and special locating, could be collected in paper sacks by depth level and section. Each section was dug in 6-inch "levels," the top level (0-6 in.) bearing the number 1, the second (6-12 in.) number 2, the fifth (24-30 in.) number 5, and so on.

Two pits next to the south wall in the rear of the cave were the only disturbed areas noted (pl. 3, *c*). They were shallow and could hardly have yielded important materials. After removing a number of fallen rocks lying upon the surface, we began excavation.

It was thought inadvisable to use exposed-flame lamps while digging, since so much guano dust was raised by the five trowelers that there was danger of a

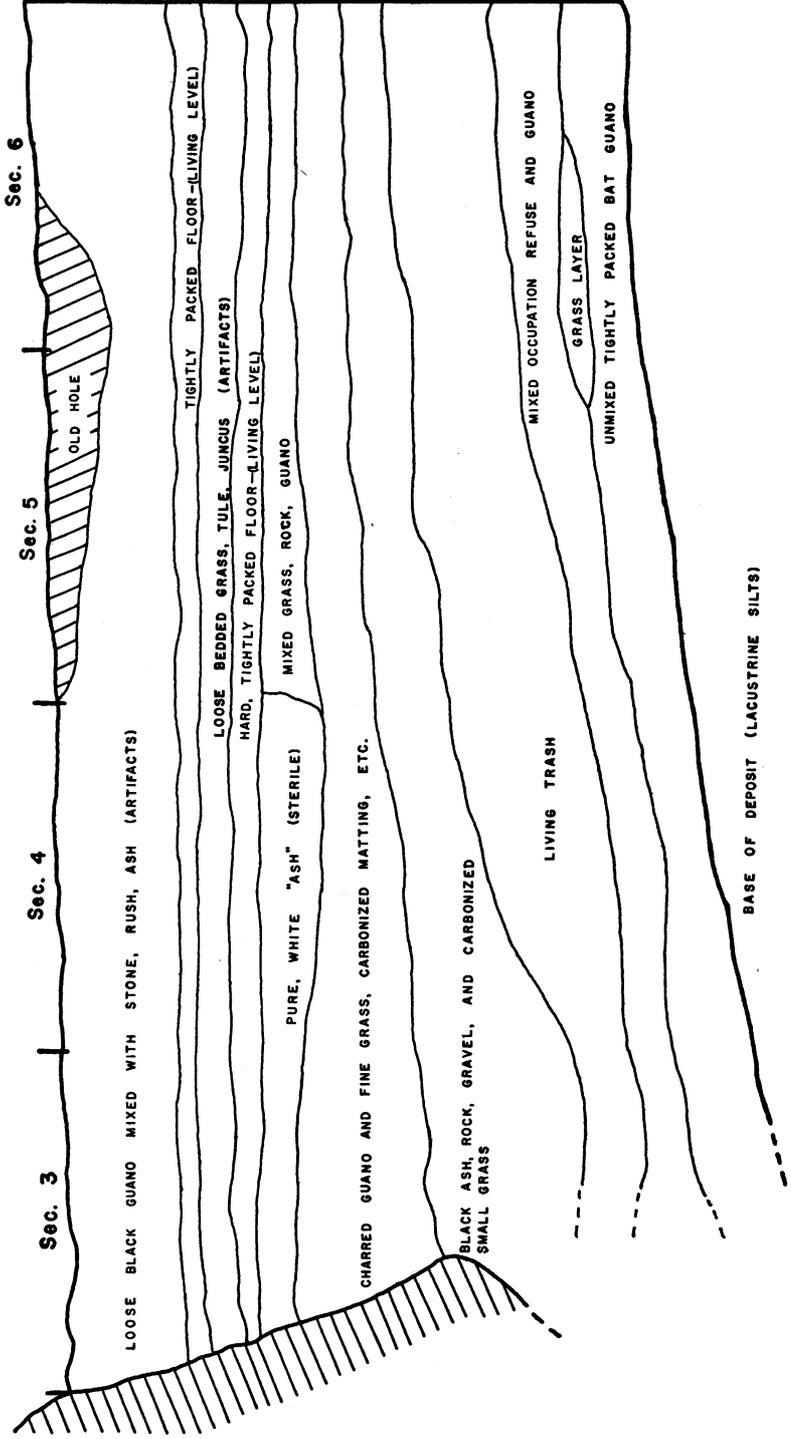


Fig. 1. Stratification in sections 3, 4, 5, and 6 in line parallel to north wall.

flash explosion. A portable Kohler generating plant which produced 1,200 watts was set up below the cave and gave excellent light for the work and for photography. Artifact recovery was high, since each man had his own 100-watt globe at the end of a long drop cord.

All back dirt was removed by means of a simple strap-iron-bound box with front and rear handles, which two men could handle easily (pl. 3, f).

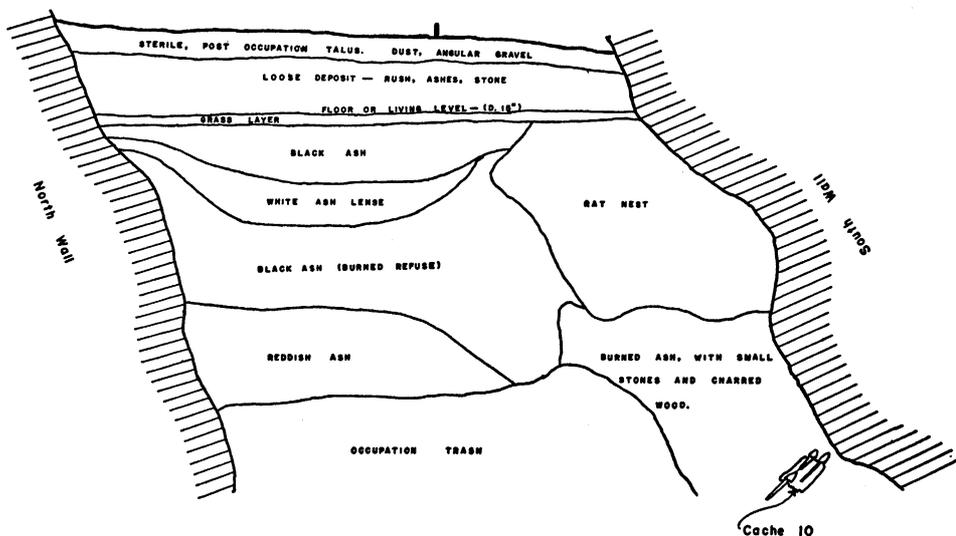


Fig. 2. Stratigraphy of Humboldt Cave deposits at datum point in section 7.

Our field camp was established a few hundred yards down the slope from the cave (pl. 3, b).

THE DEPOSITS

Refuse layers.—The deposits of Humboldt Cave were similar to those of Lovelock Cave (cf. Loud and Harrington, 1929, pp. 5 ff.), and consisted of elemental accumulation (wind-blown dust, fallen rocks) and organic remains (bat and rat guano, grass, rushes, etc.), all mixed with materials that must have been placed there by man, such as broken baskets and mats, fiber string, sticks, ash, animal and bird bones, and occasional implements of stone, wood, or bone.

The refuse deposits were completely dry except in certain damp areas near the entrance where rain water might occasionally seep in. Except for the fur or feather objects damaged by insects, and the wood, horn, or bone articles that had been gnawed by rodents, everything recovered was in a perfect state of preservation. The fine lacustrine sediment covering the floor of the rear of the cave was damp. The oldest materials found by us (Cache 30) were buried in this silt, and were also damp.

This dampness did not cause any physical deterioration of the coiled-basketry fragments in the cache. The observation is important, because this basketry was used for a radiocarbon date. We are both of the opinion that the presence of moisture in no way affected the accuracy of the radiocarbon date.

As shown in map 3, the deposits were thickest at the entrance, where they

reached a depth of 6 ft. Toward the back of the cave the deposits were about 4 ft. deep. The rock-filled slope below the entrance is shown in map 3 and plate 3, *d*.

The deposits were in general loosely laid and could be easily dug with a small pointer trowel. Where compacted layers of tule or grass were encountered, a small hand pick was needed to loosen them. An estimated 1,400 cu. ft. of deposit and rat-nest material was dug and removed from the cave.

There seemed to be no natural stratification, nor were there hard-packed floor areas of any appreciable extent, which might have indicated continuous occupation at one time. The cave seems to have been utilized intermittently over a very long period, but never intensively enough to produce appreciable occupation levels or strata. From analysis of artifacts recovered at different depths certain cultural differences can be shown, but these are neither profound nor particularly apparent at first sight. It would seem that Humboldt Cave was used only during a single cultural period, probably equivalent to that of the later or upper levels of Lovelock Cave (Loud and Harrington, 1929, pp. 18–28). At least, we found little or no evidence that the dwellers in Humboldt Cave ever had a culture corresponding to that of Lovelock Cave in the Early period, and we did find certain Transitional-period Lovelock Cave types of artifacts in Humboldt Cave. The Lovelock Cave deposits at the east end where Harrington dug his stratigraphic pit were 12 ft. deep (*ibid.*, p. 122). As will be discussed later, a radiocarbon date for the fifth level (*ibid.*, p. 26) is $3,172 \pm 260$ years. The oldest refuse of the lowest (sixth) level might be 3,700 to 4,000 years old. If we assume that 12 ft. of refuse accumulated in 4,000 years, and if the three periods of Lovelock Cave each comprise 4 ft. of deposit (*ibid.*, p. 122), each period lasted 1,300 years. On the basis of relative depth of accumulation, 72 in. in Humboldt Cave would correspond to the Upper Transitional and Late levels in Lovelock, and 48 in. (the over-all average) in Humboldt Cave would fall within limits of the Late period Lovelock Cave layers (*ibid.*, pp. 18–28, 121–122, fig. 5).

Rat nests.—After excavation had proceeded for about a week, the longitudinal south wall was found to be cutting in steeply, and during the second week of work we opened up a hitherto unsuspected “room,” which we called the south alcove. The south alcove (pl. 4, *a*) was 12 ft. long (north–south) and 14 ft. wide (east–west) and had an average height of 6 ft. It was solidly filled with ordinary rat-nest material, as well as basketry, bone awls, arrow-shaft fragments, etc., most of which were of a portable nature and had been carried in by the pack rats.

Pack rats had apparently lived in the cave throughout the time of human utilization,⁸ and whenever they found an object which could be carried off, they transported it into the south alcove and added it to their nest accumulation. In a general way, objects found at the bottom of the rat-nest deposit are probably older than those found on the surface, but this deposit was full of burrows and passageways which indicated the mixed and churned nature of the mass. To illustrate: a blue woolen sweater left overnight in the cave was shredded by the rats and carried off to the south alcove. Pieces of this sweater were found, as we excavated the rat nest, as far down as the very bottom of the mass. Under such conditions, observed stratigraphic position is a poor index to the age of an artifact, which one day

⁸ Pack rats continued to live in the cave during the month we were digging.

might be found on the surface of the rat nest and the next day at the very bottom.

Probably many of the objects recovered from the rat nest were pieces that had been taken by the pack rats at night from the temporary inhabitants of the cave. If so, these would be objects which would otherwise not have found their way into the deposits.

Caches, or storage pits.—In all, thirty-one definite cache pits with linings of grass or basketry fragments were noted. These were situated at random depths and positions throughout the deposits. Most of the contents of these cache or storage pits had been removed in antiquity by their owners (pls. 4-6, 8). A few had remained undisturbed until they were opened by us (pls. 7, *b*; 6, *f*); these few yielded most of the complete and unusual objects recovered from the cave. Caches from which the contents had been removed in antiquity were nevertheless of interest, since the lining materials were nearly always of basketry. It appears that the favorite materials for lining the interior walls or bottom of a storage pit were worn-out baskets, which might be occasionally available, or flat basketry fragments of variable size, which were available around the camp sites. When these could not be obtained, small grass was used. The people who made these caches seem to have felt that a storage pit must be lined, since we found few that were without any lining.

Each cache lot was saved and catalogued together (for details see App. I). Often the presence of separate types or styles of basketry in a single lot is revealing evidence of their contemporaneous use but not necessarily of their manufacture at the same point in time. This last possibility should be kept in mind; it is suggested by the fact that particular pieces of basketry could have been used over and over again by different individuals at different times and might therefore be found in association with a wide range of other basketry types. It must also be noted that the depth-from-surface measurement of a cache is not necessarily a true indication of its relative age. The normal operation of the rule of superposition is here upset by the fact that *all* cache pits are intrusive into the deposits. Relative stratum-age estimates of caches must rest upon one single depth measurement, that of the level of origin of the pit. We made every effort to determine the depth from which the cache pits were started; but we were not successful, since the cave deposit was a homogeneous, relatively unstratified mass of an accumulation of guano, rock, ash, artifacts, and refuse.

A summary of the information on location, size, and contents of the thirty-one caches from Humboldt Cave is given in Appendix I. The contents of one special cache are given below.

Cache 13: the "shaman's cache": The special characteristics of this cache indicate that it had belonged to a shaman. It consisted of six main parts: (1) a fragmentary twined rush mat, beneath which lay (2) a folded bird-skin robe; (3) grass lining on the floor of the cache pit, and small bunches of duck feathers tied with a *Juncus* culm (pl. 28, *e*) ensnared in the grass; (4) a pouch of very soft fawnskin (deer or antelope) containing various objects (pl. 6, *d*); (5) another pouch, of waterfowl (goose ?) skin from which all feathers had been removed except the white down, and which contained a number of objects (pl. 6, *d*); (6) a bleached bone tube made from the leg bone of a pelican or other large bird (pl. 30,

a), and a bunch of hawk feathers bound with a rush culm. The two skin pouches, the tube, and the bundle of hawk feathers lay on top of the grass lining and were themselves covered by the bird-skin robe, and this by the fragment of twined rush matting.

The fawnskin pouch was sewed together with a rush culm, but the goose (?) skin was merely folded into a sort of envelope. Both were bound round with stout cords of *Apocynum*. Their contents are described below.

The bird-skin robe consisted of warps made of narrow strips of duck (?) skin 12 to 15 in. long, their ends overlapping to attain the full width of the robe (estimated to have been about 60 by 40 in.), and wefts of stout *Apocynum* cords twisted back and forth over the warps as in the rush mats. When discovered, the robe was loosely folded and had fallen apart into three main pieces and several smaller pieces. The feathers had been eaten down to the quills by insects. However, it must originally have been a handsome object, tightly woven over the skin strips bearing their colorful feathers.

Between the folds of the robe, but unattached to it, was a canvasback duck head stuffed with grass. A quill had been tied round the lower part of the bill and knotted on the underside. Professor Gifford has suggested that this was done "with some notion of tying the duck's tongue down," to silence its spirit, as it were.

The fawnskin pouch was folded with the hair inside, the head forming a flap, and the body was folded over it from both sides. A locked stitch was then used to sew the sides together with an *Apocynum* cord. The left ear had been plugged with a strip of fur. The contents of this pouch, proceeding from top to bottom as it was emptied, were as follows:

1. Four thin, flat spatulate objects of stone (pl. 31, *b* and *c*).
2. A small cylindrical pouch of rabbitskin, open at the end, 7 in. deep and 1½ in. wide. Around this was some knotted netting twisted into a cord and used to bind the pouch. Inside this pouch were some vegetal material, caked and of gummy appearance, a small, roughly square flake of mineral material, and a fossilized mollusk shell.
3. A scrotum pouch (deer or mountain sheep) containing pitch.
4. A small pouch of soft skin containing pulverized red-ocher paint and tied round its neck with heavy *Apocynum* cord.
5. A small bundle of soft skin, bound about with *Apocynum* string.
6. Two acorns.
7. A small stone object of nondescript shape, one side slightly smoothed, which lay on the pouch bottom and also between items 3 and 4.

The second principal pouch, that of goose (?) skin folded into an envelope, contained the following objects, from right to left as one faced its open edge:

1. The skin of a small mammal, probably a weasel, its head stuffed with grass and with small red feathers gripped in the teeth.
2. A small skin bundle wrapped with sinew.
3. A small skin bundle wrapped with *Apocynum* string, to which was attached a small type 2 bone fishhook.
4. Two small skin bundles wrapped with *Apocynum* string.

The inside of this pouch and all the objects it contained had been stained a brick red by powdering or smearing them with pulverized ocher. The closed pouch was bound with an *Apocynum* string knotted into a slip noose.

ECONOMIC COMPLEX

TULE DECOYS

One decoy, complete except for the head, and four specimens of twisted tule, which are probably decoy fragments, were recovered from Humboldt Cave. The first specimen, 45229, is shown in top view in plate 28, *a*. It was constructed quite like the modern Paiute duck decoys shown by Loud and Harrington (1929, pls. 33, 59), being made of unusually large tule culms bound into bundles of twos and threes and bent to simulate very realistically the rounded body of a waterfowl. At the tail end the culms were clipped off short. The tule foundation of this specimen is not covered with a skin or painted, but on it the blue-black feathers of a mud hen are glued in their natural position, and a few white feathers are stuck into the clipped ends of the tule culms to form an upright tail. A sharp wooden peg is thrust vertically into the body toward the front, and a head of tule must once have been pushed down on this peg. A mooring string makes a turn round a large culm at the front, is brought up to the peg, round which it makes two turns, then leads out again. The decoy body is 23 cm. long, 11 cm. wide at the neck peg, 5 cm. wide at the tail, and 7.5 cm. high to the peg, which is 3.5 cm. high. The specimen was found just under the surface in section 11 at the front of the cave.

Four fragmentary objects, undoubtedly parts of such decoys, were found, all near the deposit surface. Two of these (45312 and 45316, both from a depth of 6–12 in. in section 12) seem to be heads (pl. 28, *b* and *c*). The other two, from the same position in the cave, may be tail parts. The evidence from this cave, though meager, indicates a relatively late trait in agreement with ethnographic data on the use of waterfowl decoys by the Paiute. Since the decoys and stuffed bird heads from Lovelock and Ocala caves (Loud and Harrington, 1929, pp. 114–115, 151, pls. 32–34) were also found at or near the surface, there seems to be a definite connection between the latest cave occupations and the Paiute.

A duck head stuffed with grass, probably a decoy head, was found loose in section 7, at a depth of 12 to 18 in., and another lay in the folds of a feather robe in Cache 13 (see "Feather Robes"). These also agree with the Late position of stuffed decoys at Lovelock and Ocala caves.

FEATHER BUNDLES

A peculiar object found in some abundance in Humboldt Cave is a small bundle of duck or goose feathers, the quills bound with a thin strip of rush (pl. 28, *e*). White and gray feathers are most common, but there are other colors also. Most of the bundles are 5 cm. to 10 cm. long.

The Lovelock Cave report (p. 48) mentions two small bundles of feathers tied with cord and found with "the child mummy." In these bundles the feathers were only an inch long and the cord was of the rare left-twist variety. Against 2 bundles for Lovelock, 43 were recovered in Humboldt, 17 of them from Cache 13, a fact which may have something to do with their use. This cache was dubbed the "shaman's cache," since it contained many objects that may have served as charms or "cures." Besides the 17 feather bunches there were stuffed weasel skins, a goose skin, a feather robe, intestine bags, red ocher, smooth stone spatulae, acorns,

and so forth. The feather bundles, however, were not inside the skins and intestine bags but were caught here and there in the grass which lined the bottom of the cache pit, under the twined mat. There were also many loose white feathers in the grass lining. The bundles could have been used as "cures" for ailments or pains. However, they may represent merely another method of feathering the decoys, for a probable fragment of tule decoy was found which has feather bundles stuck into punched holes. In one specimen (44149) there are two bundles bound with the same rush with the but held apart and approximately at right angles to each other. The distribution of feather bundles within the deposit was as follows.

<i>Catalogue No.</i>	<i>No. of bundles</i>	<i>Location</i>
42095.....	1	Near Cache 2, depth 42 in.
42851, 42852.....	17	Lining of Cache 13, depth 20 in.
43612, 43677.....	8	Dump and disturbed areas
43834, 43982.....	2	Front of rat nest, so. alcove
44076.....	1	Sec. 1, depth 12-18 in.
44149, 44150.....	3	Sec. 3, depth 5-12 in.
44161.....	1	Sec. 3, depth 12-18 in.
44241.....	1	Sec. 4, depth 24-30 in.
44360.....	1	Sec. 5, depth 36-42 in.
44455, 44462.....	4	Sec. 6, depth 0-6 in.
44476.....	1	Sec. 6, depth 24-30 in.
44839.....	1	Sec. 8, depth 0-6 in.
45061.....	1	Sec. 9, depth 24-30 in.
45288.....	1	Sec. 11, depth 36-42 in.

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This distribution clearly shows that the trait was confined to the upper third of the deposit. No feather bundle was found in the numerous ordinary caches, and the trait would seem to belong to a period later than the one in which these bulky caches were made. If these feather bundles are connected with decoy making, their distribution indicates a somewhat earlier presence of this trait than the decoy fragments alone, for these were all near the surface.

ARTIFACTS OF HORN

"Sickles" of mountain-sheep horn.—Six complete flat sickles and a fragmentary one came from the cave.

<i>Catalogue No.</i>	<i>Location</i>
42988.....	Cache 20, depth 87 in.
42989.....	Cache 20, depth 87 in.
42990.....	Cache 20, depth 87 in.
44058.....	So. alcove, E, depth 56 in.
42805.....	Cache 11, depth 12 in.
42806.....	Cache 11, depth 12 in.
45147.....	Sec. 10, depth 6-12 in.

These are clearly hand tools, but their use is problematical. It is a reasonable conjecture that they were used as sickles to cut grass or tules.

Specimen 42988 (pl. 9, *b*) is made of a flattened piece of mountain-sheep horn, is arc-shaped, and has a slight twist. It is rounded and thick at the outer edge,

with a bevel toward the sharp inner edge. The handle is smoothed from much use. The inner edge, or cutting arc, is moderately sharp and has been formed by beveling with a "file." It bears a high polish along the edge and on the flat underside.

No. 42989 (pl. 9, *c*) is similar to 42988 except that the twist is greater; this tool was used by a left-handed person, as shown by the blade's twist and polished edge. Toward the end of the inside arc are wide, shallow, polished notches (1–3 mm. deep), which correspond to the natural convolutions of the horn.

No. 42990 (pl. 9, *e*) is similar to the last two pieces except that it is more warped and bent. The cutting edge is more steeply beveled and has filed notches 1 mm. deep which run *with* the cutting motion (i.e., away from the handle). This is obviously not as efficient as it would be if the teeth were oppositely inclined; yet the piece was evidently used this way, for the backs of the teeth are polished and the point and front edges show no signs of wear.

No. 44058 (pl. 9, *d*) is made from the tip end of either a female horn or a juvenile male horn. It is somewhat thicker and rougher than the three specimens described above. The cutting edge was formed by splitting the thin hollow horn to produce a blade with a curved cross section. It is similar to the cutting edge in specimen 42989, with wide, uneven ridges formed by the surface convolutions of the horn.

No. 42806 is flat, arc-shaped, and has a marked torque. It is made from a larger horn than any of the others and, like 42989, was used by a left-handed person. It is somewhat weathered, since it has been subjected to moisture in the entryway deposits. The cutting edge bears wavy ridges and is polished from use.

No. 42805 is similar to 42806 except that it has very little longitudinal twist. It is also rather weathered, because of its position in damp deposit.

No. 45147 (pl. 9, *g*), a fragmentary piece, is unique in being narrower and better worked than any of the others. It is lenticular in cross section and was apparently cut and shaped from a large, solid piece of sheep horn. The cutting edge is ridged and polished.

These flat crescents are hand tools, as is clear from the handle on one end and the working blade on the other. The soft horn is polished where it has come into contact with some yielding material, and this polished work surface unfits it as a tool for working any material except skin, grass, or bark. It is difficult to visualize a hide fletcher of this sort held in one hand. The work surface of straight two-handed bone beamers known from Great Plains sites is along the leading edge, midway between the ends. Angled scrapers used with a pulling motion are hardly efficient tools. Under perfect conditions of preservation the horn crescents presumably would be permeated with animal fat if they were fleshing tools, but our specimens show no staining or impregnation by oil. All this, together with the fact that the working edge in all pieces is rounded and only moderately sharp, leads us to conclude that the horn crescents were not used for skin dressing.

We may now consider the horn tools as grass-cutting implements. Their shape, with an inside cutting curve, immediately suggests that they were sickles. Actual experiments with these tools as sickles demonstrate that they might have been so used. Dry grass with brittle stalks can be cut easily and in quantity with these horn crescents. Green or dried standing tule rushes are easily sheared off with

them. But not all the crescents could have been so used, since the cutting edge of some is too rounded and dull. It is suggested here that the horn sickles may have had multiple uses, which included grass cutting and cutting grain heads off into gathering baskets (Chamberlain, 1911, p. 341; Steward, 1938, p. 26). In the latter process the tool need not have a sharp-edged cutting blade, since the ripe grain will fall when tapped.

The true sickle shape may be partly determined fortuitously by the form of the horn itself, which is curved (cf. Loud and Harrington, 1929, fig. 9). Many of the earliest Old World sickles are straight; the curved form is supposed to have been derived from the mandible of a herbivorous animal (Petrie, 1917, pl. lv, figs. 7, 8; Swanton, 1943, pl. 16, fig. 1).

Our identification of the crescentic horn implements as sickles is supported by the abundance of grass and rushes in Humboldt Cave and by the great dependence of the local cultures on wild seeds for subsistence (Steward, 1938, pp. 32-33).

Horn arrow wrench.—Plate 9, *h*, shows this specimen (43554), found in Cache 26-A. It is made of sheep horn, the termini cut off square, the surface unworked and still showing the convolutions of the horn. Toward the smaller end is a perforation, 10 mm. in diameter, the edges of which are worn enough to suggest an ellipse. The piece is 80 mm. long, 48 mm. wide, and 25 mm. thick at the large end, 33 by 15 mm. at the perforated end. Tied through the perforation is a two-ply, two-strand left-twist *Juncus* (?) rope, the use of which is problematical—the rope would interfere with the use of this piece as an arrow straightener or shaft smoother.

ARTIFACTS OF BONE

Scapula "saws" or grass cutters.—Five of these interesting pieces came from the cave. They are all made from the scapula of artiodactylian species (deer or antelope). Their occurrence is shown below.

<i>Catalogue No.</i>	<i>Location</i>
42991.....	Cache 20, depth 87 in.
43407.....	Cache 31, depth 51 in.
43623.....	Unrecorded
43753.....	Rat nest, so. alcove
43877.....	E 10 ft.; S 10 ft. 8 in.; depth 41 in.

The largest specimen (42991, pl. 9, *a*) is 23.5 cm. long and 6 cm. wide. The medial ridge, or spine, which projects vertically from the flat blade of the scapula has been carefully chipped down, leaving only the flat blade. Both lateral edges are irregularly serrated, rounded, and highly polished. The flat blade is also very smooth and polished. Careful inspection of wear spots shows that the implement was held in the right hand with the scapular socket in the palm, the thumb and forefinger in opposable positions supplying the main controlling pressure. Specimen 43623, 19.8 cm. long and 3 cm. wide, is made like 42991. The irregularly serrated edge is well worn and polished from contact with soft material (grass ?). No. 43753 is 21 cm. long and 5 cm. wide. The spine is not completely removed, and one edge of the flat blade is polished from use. Specimens 43407 (length 20.2 cm., width 4 cm.) and 43877 (length 17.3 cm., width 4 cm.) still retain the vertical central ridge, and both edges of the flat blades are polished and slightly serrated.

All five of these specimens, though showing variation in the degree of workmanship and the amount of use, undoubtedly served the same utilitarian purpose, which may have been skin scraping, tule or bark shredding, grass cutting, or cutting off the ripe heads of seed-bearing wild grains. Identification of these scapula implements, as of many archaeological forms, is difficult, but majority opinion seems to agree that they are bark or tule shredders or hide fleshers. Schenck (1926, pp. 219–220) discusses their function, pointing out that they can hardly have served as saws for cutting hard materials, since the teeth are of variable size, often irregular, and are worn on the ridges and one side. He cites some unconvincing second-hand ethnographic data indicating that the “Nevada County Indians” (i.e., Maidu) of California formerly used these implements as fleshers for removing the adherent flesh and fat particles from the inner surface of animal skins. B. H. and H. A. Huscher (1943, p. 37) believe that these tools may have been hide scrapers. Harrington (1933, p. 31) suggests that they were used as bark shredders. Burgh and Scoggin (1948, p. 64) think that they may have served to process mammal tendons into sinew. Wormington (1955, p. 57, fig. 39) notes that Earl Morris experimented and found that these scapula tools “are wholly effective in freeing yucca fibers from the bark and pulp of the leaf and leaving them in condition to be twisted into cord.” They would also serve excellently to cut off ripe grain heads or dry grass stalks, a suggestion supported both by the presence on the polished cutting edge of some pieces of a thin siliceous coating and by the fact that the scapula tool was found in the same cache as the sheep-horn sickles, which were definitely used for grass cutting.

Bone awls.—Artiodactyl scapula: Five examples of this unusual type of bone awl were recovered; four are complete, one fragmentary. They are L-shaped, the flat handle being cut out of the scapula blade and the body of the awl formed from the median ridge of the scapula. The longest and best-finished example (43742), shown in plate 10, *b*, is 154 mm. long. The shaft is roughly cylindrical, with an average diameter of 10 mm. The flat handle is 4 mm. thick, 37 mm. long, and 14 mm. wide. Specimen 45204 (pl. 10, *c*), 116 mm. long, and 45224 (pl. 10, *d*), length 103 mm., exhibit similar technology. No. 45208 (pl. 10, *e*) is considerably shorter (67 mm.) and is decorated on the edges with no less than eight separate decorative elements, each composed of three short parallel incised lines. Figure 3 shows this decoration more clearly. One fragment (45296), 71 mm. long, completes the inventory of this type.

Cannon bone, proximal: Two awls of this type were found. Specimen 43747 is 82 mm. long. It has been broken and resharpened, and one surface and the edges are decorated by short, parallel, incised lines and a zigzag line. Figure 3 supplements the illustration on plate 10, *f*. No. 44412 is fragmentary and is 93 mm. long.

Cannon bone, distal: This was the most common awl type, 10 specimens being recovered. The butt ends of all have been ground off in varying degrees, presumably to fit more comfortably in the palm of the hand. The largest specimen (43621, pl. 10, *l*) is 153 mm. long. The rest are of similar technology and are of the following lengths: 43748, 106 mm.; 44060 (pl. 10, *j*), 120 mm.; 45333, 78 mm.; 44064, 60 mm.; 44980, 109 mm. No. 44060 has four sets of two parallel lines filled with diagonal hachuring (fig. 3); 44064, found in a fire pit in the west alcove, is

a glassy black; 44909, a fragmentary piece, has diagonally incised lines, now nearly effaced by wear, on the surface near the butt end.

Cannon bone, unfinished: Four awls in process of manufacture were found. They are merely unsharpened sections of bone formed by splitting the bone lengthwise by abrading a channel with a thin flint chip or similar implement. A piece of bone so cut is illustrated in plate 30, *j*.

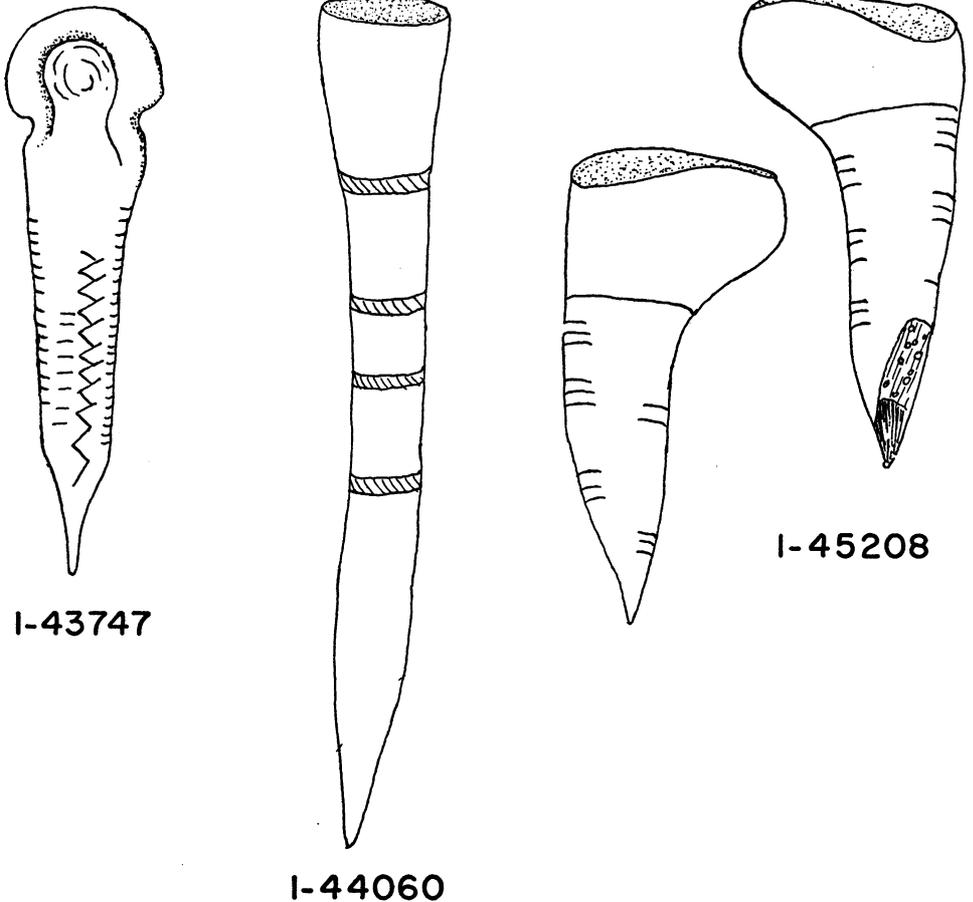


Fig. 3. Decorated bone awls.

Artiodactyl radius: The awl shown in plate 10, *i* (43746), is the only one recovered of this type. It is 101 mm. long and is formed of the split half of the distal end of an artiodactyl radius.

Ulna, coyote: A coyote ulna (43749), formed into an excellent awl by knocking off the proximal hook and sharpening the distal end, is shown in plate 10, *k*. It is 150 mm. long.

Unidentified: Two fragments of awls of bone of unidentifiable species were found. One fortuitous bone splinter with a sharpened point serves the purpose of an awl very well.

Bird bone: A bird's leg bone with a beveled point is 261 mm. long and 8 mm. in diameter. It is fragmentary; the butt end shows a sharp break. It is shown in plate 10, *a* (43191). Specimen 45297 (pl. 10, *h*) is a split bird-bone awl with a beveled point. It is 99 mm. long.

Bone Awls

<i>Catalogue no.</i>	<i>Location</i>	<i>Depth</i>
43746.....	Rat nest, so. alcove	.....
43749.....	Rat nest, so. alcove	.....
45297.....	Sec. 11	36-42 in.
43742.....	Rat nest, so. alcove	.....
45204.....	Sec. 10	48 in.
45224.....	Sec. 10	66-72 in.
45208.....	Sec. 10	58 in.
45296.....	Sec. 11	36-42 in.
43747.....	Rat nest, so. alcove	.....
44412.....	Sec. 5	48-54 in.
43621.....	.....	.....
43748.....	Rat nest, so. alcove	.....
44060.....	Rat nest, so. alcove	38 in.
45333.....	Sec. 12	56 in.
44064.....	W. alcove	48-60 in.
44980.....	Sec. 8	42-48 in.

Thatch or matting needle.—Specimen 44242 (pl. 10, *g*) is a flat animal-bone implement (110 by 16 by 5 mm.) with a conically drilled hole at one end. The drilled end shows the evidence of a previous hole. Apparently the piece broke at the perforation and the second (present) hole was put through. The distal end is rounded. Use of the implement as a thatch or matting needle is a possibility.

Bunt point (?).—What may be a stunning point attached to the end of a projectile shaft is shown in plate 30, *m*. It is 6.3 cm. long. It has a smoothly cut end, and the interior cavity, 1.5 cm. in diameter, has been carefully scraped out as though to receive a shaft end. No vestige of binding or of wrapping can be seen, and the piece is otherwise unmodified.

It may have served as a blunt stunning point for an atlatl dart, though this identification is to be doubted in view of the lack of clear-cut evidence, in Humboldt Cave, of the use of the atlatl.

Similar bone specimens have been recovered from caves in the Reserve Area, New Mexico (Martin *et al.*, 1954, p. 148), from Anasazi Basket Maker sites (Pepper, 1902, pl. 3), from Cordova Cave (Martin *et al.*, 1952, p. 192, fig. 65), and from Napa Valley, California (Bennyhoff, 1953, pl. 38, *b-d*, p. 267).

Fishhooks.—Two caches yielded most of the fishhooks from the cave. Cache 22 included, among other objects, eight large composite bone and wood hooks with attached lines. The specific pattern of these varies so much that they will be discussed individually. Cache 1 contained, along with articles of Caucasian manufacture, a complete setline with 183 small composite hooks attached. When unwrapped, it measured 120 ft. (36.6 m.) in length. The two main kinds of fishhooks have been called types 1 and 2.

Type 1 fishhooks (large, composite, with 2 unilateral barbs): 43037 is consid-

ered the index specimen for this type. In simplest terms, the complete hook consists of a bone point (1.75 cm. long) with two unilateral barbs pointing inward toward the tapered cylindrical greasewood shank (1.85 cm. long), which has a beveled groove at the base for seating the bone point. The shank and point meet at the base in a 22° angle and are held together tightly in the groove with pitch and a neat seizing of string (diameter 0.5 mm.), both ends being attached at the end of the shank as described above. The leader is thus a loop; when both strings are held together and stretched tight it measures 125 cm. in length; it has two inward-pointed unilateral barbs. The tapered greasewood point is 82 mm. long, and 8 mm. wide (its maximum diameter) at the base. The seizing and the double leader, which measures 103 mm. in length when doubled, are like those in the type specimen.

No. 43034 (pl. 11, *d*) has several interesting features, yet it conforms closely to the type specimen (43037). The point is 77 mm. long, the shank 89 mm. The seizing is like that in 43037 except that the fine (diameter 1 mm.) line is not cut at the base but continues up the shank to begin the top wrapping for attaching the leader. The leader was apparently broken at the halfway mark (where, presumably, the line was attached) and a substitute half was put on. This repaired leader measures 117 mm. in length. Obviously, from this example, the double leader was the desired kind, though it is difficult to see its advantage.

No. 43038 (pl. 11, *e*) shows minor variations of the usual type. The point, 79 mm. long, has two unilateral barbs, but they are turned away from the shank; that is, outward. The shank is 87 mm. long; both seizings are like those of the preceding specimens. The leader, 2.5 mm. in diameter, is single (113 mm. long), with a looped end.

No. 43040 is an incomplete fishhook. The bone point with two inward-pointing barbs is 82 mm. long. The seizing which joins the point to the shank is characteristic. The greasewood point is 89 mm. long. It has not an attached leader, though cord impressions in the wood prove that it once had one and that the hook was formerly complete.

Associated with the five specimens just described, are three others (43035, 43039, 43041) from Cache 22, differing principally in the bone point which has two staggered or bilateral barbs (pl. 11, *c*) instead of two consecutive unilateral barbs. The distinction is perhaps not very important, because presumably one man made and owned the entire lot.

No. 43035 (pl. 11, *c*) is perhaps the finest single specimen of the eight recovered. The point is 85 mm. long. The extremely neat attachment of the point to the shank is similar to those in 43034 and 43035, in which the fine cord carries on up the shank and is used to attach the leader. The leader is doubled, but of small (1 mm.) cord, and measures 112 mm. in length.

No. 43039 is like the preceding specimen. The point is 78 mm. long, the shank 95 mm. long. The seizings are like that of the last specimen described and the leader is a single cord (diameter 2.5 mm.), which is 145 mm. long and knotted at the end.

No. 43041 is a lone bone point for this type fishhook. It is 75 mm. long.

Miscellaneous type 1 fishhook parts: A tapered, cylindrical wood shank (44411,

pl. 11, *a*), 58 mm. long with a maximum diameter of 5 mm., is a miniature of the specimens just described. The point is missing, but the groove for seating it and the seizing for attaching it are present. The seizing extends up to the center of the shank, takes three half hitches, and continues on to become the leader. As we shall see with reference to the type 2 pieces, the leader does not necessarily have to be a separate line. This hook part was found in section 5, at a depth of 50 in.

No. 44059 (pl. 11, *a*) is a bone point 3 mm. in diameter and 57 mm. long. It is cylindrical and has a slight taper; 19 mm. of its lower (i.e., larger) end is discolored, indicating that this was a point for a type 1 fishhook. It was found in the south alcove rat nest, at a depth of 42 in. In plate 11, *a*, two pieces (44411 and 44059) have been joined together.

Type 2 fishhooks (small, obtuse-angled): One complete line with hooks and leaders attached (42079) came from Cache 1. The other representative of this type of hook was tied on the outside of a small skin bundle, one of the components of Cache 13. This specimen (43832a) is a complete hook with leader.

No. 42079 (pl. 11, *b*) was found in Cache 1 in association with European cloth and metals and presumably is not more than a hundred years old, probably less. This fishline, complete and unbroken, was carefully wound on a small tule stalk and enclosed in a piece of flannel (42078). When found, it was a compact ball about 80 mm. in diameter. When unwrapped and stretched out, it was found to have a total length of 36.6 m. (120 ft.). Spaced at regular intervals of 20.2 cm. (8 in.) along the *Apocynum* line (diameter 0.75 mm.) were 183 fishhooks complete with leaders. The leaders are of light *Apocynum* string, 0.5 mm. in diameter, and have a uniform length of 65 mm. The hooks are remarkably alike in size, construction, and materials. The small point is ground from a thin bird-bone splinter and measures 12 mm. long and 1 mm. in diameter. The point is nicely ground and polished; the butt is broken off and unworked. We reproduce Loud's adequate description of identical specimens from Lovelock Cave.

"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. The cord then spirals about the two halves of the twig, securely binding them to the bone by several half hitches." It might be added that the length of the doubled twig shank is 17 mm., and that, after the final half hitch at the loop where the shank joins the point, the wrapping extends out in a line, at right angles to the shank and in line with the point, to become the leader, which is attached to the main line. This unusually complete and well-preserved piece of aboriginal fishing tackle was perhaps used as a setline in the river or along the lake margin.

No. 42832a is of similar construction to those just described. The fine cord wrapping is 0.5 mm. in diameter; the bone point is 18 mm. long; the shank is 2.5 mm. in diameter and 23 mm. long. It has been stained red from contact with pigment in Cache 13.

ARTIFACTS OF WOOD

Digging sticks.—Four specimens were recovered. Since they exhibit no special features, the essential data concerning them are summarized in the tabulation below. All specimens have rounded and polished points showing marks of fire, perhaps as a result of hardening the points (pl. 12, *a* and *b*). Adherent clay on the points also marks these as digging sticks. These seem rather short, yet two are complete specimens.

<i>Cat. No.</i>	<i>Location</i>	<i>Length (cm.)</i>	<i>Diameter (mm.)</i>	<i>Material</i>	<i>Remarks</i>
43771.....	Rat nest, so. alcove	53	21	Willow	Complete
42611.....	Cache 7	45	17	Cottonwood	Fragmentary
43081.....	Cache 25	49	17	Greasewood	Complete
43754.....	Rat nest, so. alcove	72	12	Greasewood	Fragmentary

Fire drill.—Only one specimen, and this fragmentary, was found (42526); it is not illustrated. It came from Cache 7. The material is cane (*Phragmites communis*). The specimen is 8 mm. in diameter; the end is scorched and ground down evenly. Packed in the end is a solid charred core covered with a wadding of finely shredded sagebrush bark. For another type of fire drill see the following section on fire hearths.

Fire hearths.—It is surprising to find so many hearths, with almost no fire drills. There are eleven hearths, made of various materials: cottonwood (5), willow (3), sagebrush (2), and split and bound cattail rush (1). Two types of drills were apparently used: a solid-wood type which formed a concave pit and a hollow-cane type like that described in the preceding section, which cut a vertical groove, leaving a central bore or column. Some hearths give evidence of both types of drills. Drill holes were started near the edge of the hearth, which had a vertical notch intersecting the drill pit. This notch permitted the spark to drop out on the tinder. The diameters of the drill pits for hollow-cane drills (pl. 12, *d*) range from 5 mm. to 12 mm.; of the solid-wood drills, 10 mm. to 13 mm. (pl. 12, *d, f*). Apparently the solid-wood drills were larger than the cane drills.

One specimen (42628) is composed of four halves of the top stalk of the cattail rush bound with a spiraled *Juncus* wrap tucked under at each end (pl. 12, *e*). There are four drill holes, 5 mm. in diameter and 9 mm. deep.

<i>Cat. No.</i>	<i>Location</i>	<i>Length (cm.)</i>	<i>Thickness (cm.)</i>	<i>Width (mm.)</i>	<i>Material</i>
45365....	Rat nest	21.5	2.3	12	Halved cottonwood branch
43983....	Rat nest, so. alcove	Fragment	1.8	15	Halved cottonwood branch
43028....	Cache 21	45.0	10.0	10	Flat worked cottonwood slab
43172....	Cache 26	55.0	10.5	9	Flat driftwood cottonwood slab
43339....	Cache 28	24.0	22.0	15	Willow branch
45350....	E rat nest	38.5	1.5	15	Willow branch
45037....	Sec. 9 (depth 18-24 in.)	23.0	2.6	10	Split cottonwood branch
43617....	.....	20.0	2.0	20	Sagebrush branch
43338....	Cache 28	15.5	1.5	25	Sagebrush fragment
42628....	Cache 7	18.5	0.8	15	Split and bound rush
43839....	Rat nest, so. alcove	Fragment	2.0	10	Flat willow-branch fragment

Arrows.—No recognizable bows or fragments of bows came to light in Humboldt Cave. Many fragmentary foreshafted cane arrows were found. With one or two very doubtful exceptions, no evidence of the atlatl was found.

Foreshafts of Greasewood

Complete	8
Shaft-end fragments	7
Point-end fragments	8
Center sections of shafts of foreshafts.....	12
Doubled foreshafts	1
Bunt (?) foreshaft	1
Cane shaftments with foreshaft inserted.....	2
Cane shaftments with proximal (foreshaft) end inserted.....	4
Cane shaftments with distal (nock) end inserted.....	3
Dart foreshaft (?) with stone point.....	1
Dart shaft (?), distal end fragment.....	1
Total	48

Complete foreshafts of greasewood (*Sarcobatus vermiculatus*): These are all unpainted and are made of straight greasewood branches from which the bark has been scraped off. They average 27.3 cm. in length and 9 mm. in diameter. The base or distal end (inserted into the cane shaft) is of smaller diameter than the body of the shaft and in most specimens is somewhat flattened. Foreshafts were, to judge from evidences of pitch and wrapping, joined to the cane arrow shaft by insertion, pitch, and binding. One piece (43924) has been decorated with four smoke-blackened (?) rings (15 mm. wide) spaced at 25 mm. intervals along the shaft. The following table summarizes the essential data concerning these.

<i>Catalogue No.</i>	<i>Length (cm.)</i>	<i>Diameter (mm.)</i>	<i>Location</i>
45366.....	26.0	6	Rat nest, entrance
45186.....	21.0	7	Sec. 10, depth 36-42 in.
43759.....	34.5	7	Rat nest, so. alcove
43923.....	24.5	6	Rat nest, so. alcove
43761.....	27.0	7	Rat nest, so. alcove
43760.....	32.0	9	Rat nest, so. alcove (pl. 13, j)
43766.....	24.0	7	Rat nest, so. alcove
43764.....	30.0	7	Rat nest, so. alcove
43923.....	30.0	8	Rat nest, so. alcove (pl. 13, i)

Shaft-end (proximal) foreshaft fragments: Seven proximal end fragments of greasewood foreshafts are similar to the complete examples cited above. No. 45325 has a spiraled *Apocynum* string 25 mm. from the end. The table below gives the measurements and locations.

<i>Catalogue No.</i>	<i>Diameter (mm.)</i>	<i>Location</i>
45318.....	7	Sec. 12, depth 12-18 in.
42603.....	7	Cache 7
43765.....	6	Rat nest, so. alcove
45063.....	5	Sec. 9, depth 24-30 in.
43758.....	7	Rat nest, so. alcove
43762.....	7	Rat nest, so. alcove
45325.....	7	Sec. 12, depth 21 in.

Point-end (distal) foreshaft fragments: These are represented by eight pieces made of greasewood. They show the same technology as described in the two preceding sections. The bark has been removed and twig scars have been rubbed down to produce a polished surface. Four specimens (see table below) seem rather large to have been parts of arrows; they are presumably foreshafts, but may be parts of darts thrown with the atlatl. There is no real evidence for the latter explanation, and it must be viewed as only a possibility.

Catalogue No.	Diameter (mm.)	Length (cm.)	Location
44092.....	8	16.5	Sec. 2, depth 0-6 in.
45367.....	6	21.7	Rat nest, entrance
44868.....	6	13.5	Sec. 8, depth 24 in.
43767.....	8	34.6	Rat nest, so. alcove
43768.....	10	37.5	Rat nest, so. alcove
43769.....	8	45.3	Rat nest, so. alcove
43803.....	9	43.1	Rat nest, so. alcove

Center sections of arrow shafts or foreshafts: Eleven central fragments of hardwood arrows or foreshafts were found. Specimen 44818 is painted red and has two slightly wavy incised lines along its longitudinal surface. These are perhaps to be identified with the so-called "blood grooves" (Spier, 1928, pp. 162-163, fig. 29).

Catalogue No.	Diameter (mm.)	Location
44818.....	5	Sec. 7, depth 66-72 in.
45116.....	7	Sec. 9, depth 36-42 in.
43732.....	8	.....
43872.....	5	Rat nest, so. alcove
44050.....	6	Sec. 9, depth 90 in.
43620.....	6	.....
43940.....	8	Rat nest, so. alcove
43787.....	5	Rat nest, so. alcove
43763.....	5	Rat nest, so. alcove
43874.....	7	Rat nest, so. alcove
43939.....	6	Rat nest, so. alcove
44062.....	6	West alcove

"Double foreshaft": This specimen (43757), shown in plate 13, *a*, is composed of two greasewood foreshafts 5 mm. in diameter, one 22 cm. long and the other 20 cm. long, tied together with a central wrapping of *Apocynum* string. The specimen is complete. The distal ends of both foreshafts show fresh pitch as though each had been inserted in a separate cane shaft. This piece may be part of a game set or a netting needle.

Bunt for shaft: A greasewood knot at one end forms the bunt. The other end, flattened for insertion into the cane shaft, has remnants of pitch and a wrapping of 1-mm. cord 40 mm. from the end. It is apparently a natural object which was used as a bunt because of its shape. It is 8 mm. in diameter and 11.2 cm. in length.

Foreshaft ends of cane arrows: Six of these ends were found. Two of them (44623, 44950, pl. 13, *e* and *f*) still have inserted fragments of the greasewood foreshafts. Specimen 44950 is a cane shaftment 10 mm. in diameter. Inserted in

it for 55 mm. is the fragmentary greasewood foreshaft, 5 mm. in diameter. The cane is neatly wrapped with a two-strand *Apocynum* string covered with pitch. No. 44623 is similar; the cane shaft is 9 mm. in diameter, the greasewood foreshaft is inserted for about 45 mm. A sinew wrapping keeps the cane from splitting.

<i>Catalogue No.</i>	<i>Diameter (mm.)</i>	<i>Location</i>
44926.....	10	Sec. 8, depth 36-42 in.
44950.....	10	Sec. 8, depth 36-42 in.
44295.....	8	Sec. 4, depth 54-60 in.
44623.....	9	Sec. 6, depth 60-66 in.
44048.....	8	Rat nest, so. alcove, depth 90 in.
43619.....	9	.....

Cane shaftments: A number of central sections of cane arrow shafts were recovered. Two are 8 mm. in diameter, 3 are 9 mm., and one is 10 mm.

<i>Catalogue No.</i>	<i>Location</i>
44329.....	Sec. 4, depth ?
44833.....	Sec. 7, depth 72-78 in.
44047.....	Sec. 10, depth 90 in.
43838.....	Rat nest, so. alcove
44047.....	Rat nest, so. alcove
43874.....	Rat nest, so. alcove

Cane arrow shaftments; nock ends: Three specimens were recovered. No. 44328 (pl. 13, *c*), 9 mm. diameter, has three halved (radial) feathers attached with a sinew wrapping. The surface of the cane shows much red paint. No. 44713 is a cane 8 mm. in diameter. Thirty mm. along the shaft are marks of the attachment of feathers; 70 mm. below these are other binding traces, marking the other attachment of the feathers. The piece is undecorated. No. 44114 (pl. 13, *b*) is a decorated cane shaftment 8 mm. in diameter, with the nock present but the feathering gone. There is a sinew wrapping immediately below the nock. The decoration is in green and red. There is a circular band of green, 2 mm. wide, and beneath this a red band which stains the whole surface of the shaft for 28 mm. and meets another green band. Below this there was originally a wide spiraled band; it is now mostly gone because the specimen is broken here.

<i>Catalogue No.</i>	<i>Location</i>
44328.....	Sec. 4, depth not recorded
44713.....	Sec. 7, depth 24-30 in.
44114.....	Sec. 2, depth 12-18 in.

Atlatl dart foreshaft (?).—This specimen, 45353 (pl. 15, *a*), was found in the south-alcove rat nest and therefore lacks stratigraphic significance. The point, of milky white chalcedony, is 50 mm. long and 20 mm. broad. Its base is inserted for 6 mm. into the cleft end of the willow foreshaft, which is 100 mm. in diameter and 126 mm. in length. Round the shaft near the base of the point is a tightly wrapped thin reed, placed there to prevent splitting. This wrap and the base of the point are thickly plastered with pitch. The wood shaft is of willow, perfectly cylindrical, and bears traces of red paint. The butt has been cut and flattened by pounding.

Dart shaft fragment (?).—A willow stick (44024), 9 mm. in diameter, with a cupped end suggests a dart shaft end which engaged the spur on the atlatl. The identification of this specimen is doubtful. It should be recalled here that certain foreshafts and fragments of foreshafts were suggested as being too large for arrow foreshafts but could conceivably have been dart foreshafts. Specimen 44024 was found in the south-alcove rat nest in the 24–40-in. layer.

Shallow cottonwood bowls or dishes.—Four fragmentary dishes of wood were found. The best specimen, 44272, is a slightly concave, dark-colored and highly polished plate with a serrated edge. There is a constriction at each end and a slight flare. This specimen is 24.5 cm. long and 2.5 cm. deep, and was originally 16 cm. wide. It is shown in plate 17, *d*. No. 45259 (pl. 17, *a*) was originally part of 44272. No. 44846 is a small fragment suggesting a form somewhat like 44272. A unique miniature bowl of cottonwood (43756) was found in the cave (pl. 17, *b*). It is dark brown and is highly polished. It is 50 mm. long, 40 mm. wide, and 38 mm. high. The hole dug out in it is 35 by 30 mm. in diameter and 30 mm. deep.

<i>Catalogue No.</i>	<i>Location</i>
44272.....	Sec. 4, depth 54 in.
45259.....	Sec. 11, depth 24–30 in.
44846.....	Sec. 8, depth 7 in.
43756.....	Rat nest, so. alcove

Flat cottonwood slabs, trowels.—Six specimens were recovered. No. 43028 (pl. 17, *e*) shows rasp marks, probably from stone tools, on the surface. The ends and edges have been cut and smoothed. No. 43172, a flat driftwood piece unworked except for two fire-drill pits on one edge, is described under “Fire hearths.” One surface is lightly smeared with pitch. A shallow pit in the surface is thickly coated with pitch. No. 43252 is similar to 43172 in form; it is 42 cm. long, 10 cm. wide, and 1.5 cm. thick. It is unworked and has clay adhering to the surface. No. 43871 (pl. 17, *c*) is a flat, worked piece of cottonwood, 15.5 cm. long, 6 cm. wide, and 1.8 cm. thick. It is rectangular except for one corner, which has been step-notched. The concave surface is somewhat smeared with pitch.

<i>Catalogue No.</i>	<i>Location</i>
43028.....	Cache 21
43172.....	Cache 26-B
43252.....	Cache 27
43871.....	Rat nest, so. alcove

Other flat slabs.—No. 44191 is a thin (3 mm.) piece of pine or cottonwood with one squared end and a straight edge; it is 18 cm. long and 6 cm. wide. A charred flat piece of pine wood with worked edges and flat surfaces is 13.5 cm. long, 6.2 cm. wide, and 5 mm. thick.

Knife handles.—Three of these wooden handles, described below under “Hafted stone knives,” were found in Cache 10 at a depth of 55 in. in the south alcove.

Another specimen (45142, pl. 15, *e*) was found in the south-alcove rat nest at a depth of 96 in. It is undoubtedly older than the three pieces mentioned above. It is 93 mm. long, 18 mm. in greatest diameter, and tapers cylindrically to the other end. The groove for the blade is 8 mm. wide and 20 mm. deep, and is coated

with black pitch inside. At the base of the cleft there is a narrow incised encircling groove where a binding was applied to keep the handle from splitting.

The last piece (44066, pl. 15, f) came from Cache 7. It is 91 mm. long and 11 mm. in diameter, tapering at one end to a blunted point. The V-shaped blade groove is 4 mm. wide and 10 mm. deep.

Miscellaneous wood artifacts.—These include sticks of various forms.

Forked sticks of greasewood: We consider this a definite class of wooden artifact because four specimens were found, each of which gives definite evidence of having been worked. No. 43773 (pl. 12, c) is a decorticated and well-smoothed greasewood stick. Its over-all length is 59 cm. The main shaft, 14 mm. in diameter, terminates in a rounded point. The other end is forked; each tine is 12.5 cm. long. At the base of the tines, at the juncture with the shaft, a heavy *Apocynum* string has been wrapped round it three times for strengthening.

A similar piece (43772) is 63 cm. long; the main shaft is 30 mm. in diameter, and the tines (one missing) are 22 cm. long. Except in size it is very similar to 43773.

No. 45220 is 20.6 cm. long, the tines 15 cm. long, the shaft 5.5 cm. in diameter. It is made of a slender branch 6 mm. in diameter.

<i>Catalogue No.</i>	<i>Location</i>
43773	Rat nest, so. alcove, depth 44 in.
43772	Rat nest, so. alcove, depth 40 in.
45220	Sec. 10, depth 66-72 in.

Crescentic sticks: The use of this class of wooden artifact is impossible to determine. Most of the pieces are worn and polished from handling. They were probably used for strengthening the edge of burden baskets (see pl. 12, g and h).

<i>Cat. No.</i>	<i>Length (cm.)</i>	<i>Diameter (mm.)</i>	<i>Location</i>	<i>Material</i>
45326	67	12	Sec. 12, depth 18-24 in.	Greasewood
45737	55	10	. . . . .	Greasewood
44214	32	10	Sec. 3, depth 51 in.	Greasewood
42631	28	9	Cache 7	Greasewood
43753	63	12	Rat nest, so. alcove	Willow
43102	48	14	Cache 26-A	Willow
43688	40	12	. . . . .	Willow

Short, straight sticks showing signs of use: Five pieces, all with cut and slightly rounded ends and somewhat smoothed shafts, were recovered. No particular function can be assigned to these.

Looped stick: One specimen (44847), perhaps identifiable with the implement commonly used for picking up hot rocks for stone boiling, was found in section 8, not more than 6 in. below the surface. It is made of willow, 25 cm. long and 11 mm. in diameter, broken just beyond the loop, which is 18 cm. long. A willow-bark tie joined the end of the stick to the shaft, thus forming the loop.

Split willow branches: Four flat, split willow branches, one surface convex, the other flat, represent this class. They may be sticks once bound to the rim of burden baskets to strengthen them.

Cat. No.	Length (cm.)	Diameter (mm.)	Location	Material
43178....	45.0	20	Cache 26-B	Peeled willow
44881....	25.0	19	Sec. 8, depth 24-30 in.	Peeled willow
43740....	31.0	25	Rat nest, so. alcove	Unpeeled willow
43184....	18.5	20	Cache 26-B	Unpeeled willow

Wrapped sticks: Two greasewood sticks with a wrapping were found. There is no indication of their use. No. 43566 is an unworked greasewood stick 8 mm. in diameter, with a natural loop. Near one end is tied a two-strand left-twist *Juncus* rope in a simple overhand knot. No. 45317 is a straight peeled greasewood stick 12 mm. in diameter and 26.5 cm. long, with a sixteen-strand *Juncus* binding knotted at the middle of the stick. Both ends are broken off and the piece shows no sign of wear.

Plate 12, *i*, shows specimen 42785, found in Cache 9. Two willow sticks 29 cm. long are bent into a slight arc and are wrapped tightly over their entire length with a six-strand two-ply left-twist rope of *Juncus*, 5 mm. in diameter. At one end is a wrapping of small cord made of twisted net. The sides of the specimen show signs of abrasion. The *Juncus* wrapping is worn and frayed. The use of the implement as a pounder is suggested, though it may simply be a heavy edge reinforcement for a broken burden basket.

The second piece of this type (45091) is composed of three willow twigs and a detached weft element of a wicker burden basket. This bundle, 24 cm. long, is wrapped at one end with an eight-strand, two-ply left-twist *Juncus* rope. At the other end, and extending to the middle of the piece, is a peeled willow wrapping.

Two small pieces—one (43678) a peeled willow twig 75 mm. long with a willow twig wrapped round it near one end, the other (43027) a short rush stalk with a knotted *Apocynum* string round the middle—complete the description of the wrapped sticks.

Problematical objects of worked wood: No. 43743 is a well-worked willow branch. It has been split, forming one concave and one flat surface. It is 46 cm. long, 24 mm. wide, and 12 mm. thick. It is slightly bowed and has been carefully peeled and smoothed. The concave surface shows binding stains. These and the notched ends of the wooden object first suggested a bowstave, yet the specimen is too short to be that. Location: rat nest, south alcove.

No. 42612 is a straight, peeled and smoothed willow piece, 51 cm. long and 17 mm. in diameter. One end has been broken off; the other end is cut square and has a squared groove across the diameter. Location: Cache 7.

No. 42820 is a well-worked but badly splintered fragment of juniper (?) or pine (?). Its surface texture and material suggest the end of a bow, yet the fragment is so small that we hesitate to so classify it. Location: Cache 12.

Five additional sticks showing minor alteration are listed below.

Cat. No.	Length (cm.)	Width (mm.)	Location	Material
42854....	29.3	11	Cache 13	Peeled cottonwood
43898....	21.0	13	Sec. 9, depth 24-36 in.	Willow
43837....	28.2	11	Rat nest, so. alcove	Peeled greasewood
43802....	19.2	10	Rat nest, so. alcove	Peeled greasewood
44027....	30.0	16	Sec. 10, depth 24-40 in.	Peeled greasewood

ARTIFACTS OF STONE

Flint and obsidian arrowpoints.—There are 13 specimens of this class, of types SCb2, NAb1, NBb1, SCb3, and NAb3.^o Table 1 gives the essential information regarding these. They are illustrated in plates 14, *a-k, m, n*; 15, *h*.

Dart point (?).—Specimen 45225 (pl. 14, *l*) has been placed under the classification of type NAb3. The concave base and the medial flare that makes the center the widest part are noteworthy features. In size (53 by 22 by 17 mm.) and weight it suggests a dart point.

TABLE 1
DISTRIBUTION AND DESCRIPTION OF FLAKED IMPLEMENTS

Type and catalogue no.	Location	Measurement (mm.)	Material
NAb1			
42793-97.....	Cache 10	92-116 × 30-41 × 5-7	Gray, brown flint
43630.....	.....	Fragmentary	Gray flint
NBb1			
42080.....	Cache 1	84 × 32 × 5	Brown chalcedony
44237.....	Sec. 4, depth 12-18 in.	69 × 28 × 8	Brown flint
SCb2			
42798.....	Cache 10	60 × 20 × 3	Light-brown flint
42799.....	Cache 10	56 × 24 × 3	Light-brown flint
42800.....	Cache 10	37 × 21 × 3	Gray flint
42805.....	Cache 11	38 × 22 × 3	Gray flint
43825.....	Rat nest, so. alcove	55 × 19 × 4	Brown flint
44687.....	Sec. 7, depth 6-12 in.	36 × 9 × 3	White chalcedony
44169.....	Sec. 3, depth 18-24 in.	25 × 16 × 3	Red flint
44356.....	Sec. 5, depth 30-36 in.	39 × 19 × 3	Obsidian
44864.....	Sec. 8, depth 12-18 in.	27 × 20 × 5	Obsidian
44344.....	Sec. 5, depth 24-30 in.	35 × 15 × 5	Obsidian
45291.....	Sec. 11, depth 36-42 in.	37 × 15 × 4	Obsidian
44097.....	Cache 2	32 × 15 × 4	Obsidian
NAb3			
45225.....	Sec. 10, depth 71 in.	53 × 22 × 7	Obsidian
SCb3			
44452.....	Sec. 6, depth 0-6 in.	38 × 25 × 4	Obsidian

Obsidian chipped knife.—A nicely flaked obsidian knife (44468) is shown on plate 14, *o*. It is roughly leaf-shaped (NAb1) and measures 57 by 37 by 7 mm.

Flint "flake knives."—A not uncommon artifact type from the cave was the flint flake with a cutting edge, sometimes slightly retouched, but often left with its natural sharp flake edge. Artifacts of this type must have been in general use in aboriginal times, not only here but wherever they were available (cf. Martin *et al.*, 1954, p. 128). There is no reason to believe that man always used a beauti-

^o Typology after Strong, 1935. Use of the Strong typology is Heizer's choice. Krieger, quite properly, feels that such groupings have no real meaning. For convenience, this section is left as written in 1937.

fully chipped knife for cutting. Indeed, he probably used a flake knife of this sort for rough work, since the loss if he broke it or nicked the edge would be negligible. For this reason we believe that these flakes deserve mention. Two specimens, 44144, 44688 (pl. 16, *e*), are broad, thin, flat flakes of brownish flint. They respectively measure 39 by 34 by 3 mm. and 45 by 36 by 6 mm. Each has been slightly retouched, and the few small flake scars show polish from use. A second class of flake knife is represented by four specimens (43686, 43897, 44262, 45004) which may be classed as long core flakes with unretouched edges. They measure respectively 60 by 25 by 4 mm., 65 by 20 by 6 mm., 55 by 22 by 5 mm., and 66 by 20 by 9 mm. The remaining three pieces are miscellaneous flint flakes which show a careless retouching of the natural edges. Typical specimens of flake knives are shown in plate 16, *b-d*.

Hafted stone knives.—Cache 10 yielded five chipped-flint knives, three of which were hafted. Plate 15, *c*, shows the longest knife (42793), 224 mm. The gray flint blade (type NAb1) is 92 mm. long, 30 mm. wide, and 6 mm. thick. The circular wood handle is 147 mm. long and tapers toward the end. It is made of some softwood, probably willow. A cleft 17 mm. long fits over the base of the blade, which is firmly attached with pitch. On the handle, below the blade, is a seizing of twisted sinew to keep the wood from splitting. The blade is not held by wrappings and at best must have been rather weakly seated. Plate 15, *d*, is the second knife of Cache 10 (42794). The blade (type NAb1) is leaf-shaped, and measures 95 by 38 by 6 mm. The handle is 143 mm. long and 17 mm. in diameter. The cleft is 22 mm. long, the blade is affixed with pitch exactly like that of 42793, and the handle is bound to prevent splitting. Plate 15, *b*, shows the third hafted knife of Cache 10 (42795). The blade (type NAb1) is leaf-shaped and measures 87 by 36 by 5 mm. The handle is tapered; its maximum diameter is 15 mm., and it is 126 mm. long. The handle of this specimen is polished over its entire length, whereas the handles of nos. 42793 and 42794 for 100 mm. on the tapered end have roughened surfaces like those made by a rasp file. This piece also has a resinous gum (piñon ?) on it and a sinew seizing to prevent splitting of the handle (not to attach the blade).

Flint knife blades.—Two unhafted blades were found in Cache 10, along with the three-handled ones described above. Plate 15, *g*, illustrates a light-brownish flint blade (42796) measuring 106 by 41 by 7 mm. The other (42797) is of pinkish flint and measures 116 by 43 by 7 mm. Both are type NAb1.

Unhafted rough stone knives.—Plate 16, *j*, shows a flat slate "fish knife" (44865). It is broken straight across and measures, in its fragmentary condition, 10 by 5 by 5 cm. No. 45408 is similar, though much thicker. It is 110 mm. long and has two chipped edges. No. 43625 is a "flake knife" made from a thin boulder chip with a retouched convex cutting edge. It is 84 mm. long and is made of a dense basaltic rock. Plate 16, *f* (44998), is very similar to 43625 and is 90 mm. long. Plate 16, *i, k* (44243, 44348), illustrates crude knives of basalt with a slight retouching of the edge of the natural beveled edge. No. 45068 is a thin natural flake of basalt which had been used in its unmodified form except that a few small flakes had been removed to resharpen the natural edge. This slight alteration is the only evidence of technology. The cultural value of the artifact is its illustration of the fact that the Indian used what was available—a stick, a sharp stone for cutting,

or a stray cobble for pounding. Two large flint flakes (44233, 44244) have re-touched edges and were probably crude, makeshift knives. The first (pl. 16, *a*) is 80 by 70 by 20 mm.; the second (pl. 16, *g*) is roughly rectangular, 90 by 25 mm.

<i>Catalogue No.</i>	<i>Location</i>	<i>Depth</i>
44865.....	Sec. 8	12-18 in.
45408.....	.....	.....
43625.....	Cache 26	.....
44998.....	Sec. 8	48-54 in.
44243.....	Sec. 4	24-30 in.
44348.....	Sec. 5	24-30 in.
45068.....	Sec. 9	24-30 in.
44233.....	Sec. 4	6-12 in.
44244.....	Sec. 4	24-30 in.

Hammerstones.—Specimen 44472 is a flat pebble with much-battered ends and edges. Its use as a hammerstone is obvious. It is 85 mm. long, 65 mm. wide, and 15 mm. thick. No. 45293 is nearly identical in size and shape, but shows battering only on one end. Other specimens found are listed below.

<i>Catalogue No.</i>	<i>Location</i>	<i>Depth</i>
43626.....	Cache 26	.....
44882.....	Sec. 8	24-30 in.
44197.....	Sec. 3	42-48 in.
42845.....	Cache 13	29 in.
43687.....	Cache 26	.....
44472.....	Sec. 6	18-24 in.
45293.....	Sec. 11	36-42 in.

Miscellaneous stone objects.—Specimen 43626 is a long (50 mm.) black limestone pebble with rounded ends. It is 18 mm. in diameter, though not quite cylindrical. It shows no signs of use but was undoubtedly brought to the cave by man. No. 44882 (pl. 16, *n*) is a flattened oval diorite pebble with a smoothed surface. It was perhaps a talisman or charm. No. 44197 (pl. 16, *m*) is a natural object showing ribbed striations. It was probably picked up and carried to the cave and regarded as of talismanic value. No. 42845 is a fragment of fossil shell found in Cache 13 enclosed in the "fetish bag."

Small stones with grinding faces.—Plate 16, *o*, shows a black basalt pebble (44179) which once had an ovoid cross section. Two longitudinal grinding surfaces have given it a pear-shaped cross section. It is 65 mm. long, 45 mm. wide, and 33 mm. at its greatest thickness. Its rounded ends give no evidence of wear, and its use is problematical. No. 44735 is a tufa-covered pebble, roughly circular, with one side rounded and the other flattened from grinding. The irregularities on the grinding surface are tightly packed with red ocher. The specimen is 80 mm. in diameter and 35 mm. thick. It was probably used as a paint grinder. No. 42850 is a small (35 mm. long, 22 mm. thick) slaty pebble such as might be picked up anywhere in the nearby hills or along the lakeshore. It is smoothed from much handling and has two small grinding facets. It was found in Cache 13 in what we have concluded was a fetish bag and therefore deserves description.

The stone shown in plate 16, *l*, may be a smoothing stone or a makeshift mano for grinding seeds.

IRON ARROWPOINT

Included in the contents of Cache 1 was a long, slender arrowpoint (42082) made of thin metal, probably a barrel hoop. It is shown in figure 4.

POUCHES OF ANIMAL INTESTINE

Three lengths of intestine (43042, 43043, 43044) of some large animal (deer or mountain sheep ?), about 7 cm. in diameter and 13, 14, and 33 cm. long, respectively, came from Cache 22 (pl. 29, *a*). One end of each is gathered and closed by an *Apocynum* string, the other end is open. One pouch contained the set of fish-hooks shown in plate 11. The other two were empty.

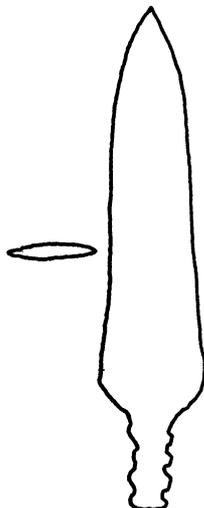


Fig. 4. Iron arrowpoint.

FISH REMAINS

Humboldt River and Humboldt Lake contained a rich fish fauna, which was exploited by the native peoples. Loud and Harrington (1929, pp. 129, 156-157) and Steward (1938, p. 41) list the fishes recognized and used by the Northern Paiute of Humboldt Lake.

A selection of the desiccated fish remains from Humboldt Cave was submitted to Dr. Carl L. Hubbs for identification. The resulting report (Hubbs and Miller, 1948, pp. 41-42) reads as follows:

Glimpses of the Postpluvial history of the Lahontan fishes have recently been seen in a preliminary examination of dried fish remains from Humboldt Cave, kindly made available to us by Dr. E. W. Gifford of the University of California. This dry cave, with evidence of an Indian culture similar to that elaborately described for Lovelock Cave by Loud and Harrington (1929), yielded many fish remains in a remarkably fine state of preservation. These, we may assume, represent the ancient fish fauna of the region, presumably that of Humboldt Lake or lower Humboldt River. The antiquity is to be dated by centuries and perhaps by millenia. The remains include the posterior part of a large sucker, presumably the lacustrine *Chamistes cujus* (now

confined to Pyramid Lake) and many chubs (*Siphateles*). The chubs include hybrids (intergrades) between the lacustrine *S. obesus pectinifer* and the fluviatile *S. o. obesus*, whereas at the present time only *S. o. obesus* occurs in this part of the Humboldt River system. We are thus led to conclude that at the ancient time of the occupancy of Humboldt Cave, Humboldt Lake was a relatively large and perennially fresh lake. Rather sharp annuli on the scales indicate that there were marked seasonal differences in temperature. The long period of time during which the two types of *Siphateles* have been hybridizing is of special interest to students of speciation, because it shows that such hybridization, although producing what we have good reason to regard as fertile offspring, may continue almost indefinitely without leading to a fusion of the two interbreeding types. Through the further study of such fish remains from Indian deposits, along with research on the living and fossil fishes, we may eventually be able to reconstruct in considerable detail the changing fish faunas of the alternately watery and arid Lahontan basin and to make plausible inferences in regard to the past hydrography and the past climate of the region.

FOOD REMAINS

No analysis of food remains has been attempted beyond identification of animal bones (App. III). It may be presumed that the foods eaten were similar to those listed by Steward (1938) and by Loud (in Loud and Harrington, 1929).

A number of human feces from Humboldt and Lovelock caves have been analyzed by Norman L. Roust, but he has not yet prepared a report on the results of the study. Wakefield and Dellinger (1936) showed how productive such analysis can be, and Jennings (1953) indicates the value of such a study in Danger Cave, Utah.

HANDICRAFT PATTERN: BASKETRY AND TEXTILES

Specimens of basketry constitute about half the total collection from Humboldt Cave. Of the 2,056 specimens classified below, only four may be considered complete. These four are all circular coiled trays; three came from caches, the fourth was found in scattered pieces.

On the whole, Humboldt Cave basketry greatly resembles that found at Lovelock Cave in techniques used, in variety, and in appearance; but some of the Humboldt Cave basketry, of types common to both caves, can be described more effectively than the Lovelock material. Moreover, for Humboldt Cave we have the advantages of a depth and frequency record from a completed excavation, which, when added to results of the Lovelock work, leads to somewhat more substantial historical interpretations than can be gained from Lovelock Cave alone; and the Lovelock paper contains a few minor errors which we here point out.

In order to avoid expensive and unnecessary duplication of illustrations, we frequently make cross reference to the Lovelock plates when the techniques represented are considered identical. In a few instances, when the Lovelock description seems inadequate, we give an independent account. Although not in general use, Loud's method of measuring fineness of weave by the number of courses per 10 cm. is convenient and is employed here. When a fragment is less than 10 cm. across, the number of courses per 10 cm. has been estimated.

In determining the relative frequency of occurrence of different basketry techniques, Krieger worked out a system of matching fragments found in the cave in order to calculate the number of actual baskets representing each technique. The usual method is simply to count the number of pieces recovered and to present this "straight count" as a record of the relative frequency of occurrence of specimen types. However, as is pointed out below, the system of matching basketry fragments to determine fairly accurately the number of complete specimens gives results differing markedly from those of a straight count. The simple straight count is likely to suggest relative frequencies rather far removed from the true ones because of differences in the size of the various baskets, which may break or tear into a number of pieces. Table 2 compares the results of the matching process in the present study with those of the straight count. The straight count of specimens from Humboldt Cave is given first, with the percentage of the total that these fragments represent. Then the figures for the number of actual baskets are presented, first as calculated by the matching process and then a revised estimate. Finally, we give the totals already published for Lovelock Cave, where no matching of fragments was attempted. Table 3 recapitulates the totals from table 2.

To illustrate the difference in the results of the two methods, a comparison of the relative frequencies of wickerware and coiling in Humboldt and in Lovelock shows the straight count for the two caves in remarkable agreement: in each there were nearly four times as many wicker fragments as coiled. The matching process, however, indicates that the true proportion of wicker to coiling is actually much closer to 4:3 than 4:1. This can be readily explained by the fact that the wickerware consisted entirely of very large conical burden baskets, whereas the coiled specimens were either trays or small bowls. The large burden baskets had been broken and torn into small fragments, whereas most of the coiled pieces had worn

TABLE 3
SUMMARY OF BASKETRY TYPES AT HUMBOLDT CAVE AND LOVELOCK CAVE

Type	Humboldt Cave						Lovellock Cave	
	Pieces recovered (“straight count”)		Calculation by matching process	Number of baskets		Percentage	Pieces recovered	
	Number	Percentage		Percentage	Estimated true number		Number	Percentage
Wicker burden baskets.....	1,566	76.0	240	57.7	200	55.7	1,115	73.0
Coiled (all forms).....	488	21.3	154	37.0	142	39.5	309	20.2
Twined (all forms).....	54	2.6	22	5.3	17	4.7	104	6.8
Total.....	2,058	99.9	416	100.0	359	99.9	1,528	100.0

through at the bottom and had then been discarded. Actually, the ratio may have been even closer to 1:1 than the table indicates, for the coiled specimens are on the whole more distinctive than the wicker and may thus be more accurately matched by means of texture and stitching. The revised estimate of the number of wicker burden baskets, 200, therefore may be too high; the total for the coiled, 142, is probably more nearly accurate.

The matching process serves one other use. Pieces from the same basket may come from different parts of the deposit; caches as far apart as ten feet horizontally and three feet vertically yielded fragments that matched. This circumstance lends support to our belief that the cultural material from the cache levels of the cave (that is, from the deposit below 20 in.) has an essential unity. It is interesting that Humboldt Cave, though but a fraction of the size of Lovelock Cave, yielded about one and one-quarter times as much basketry as the scientifically excavated parts of Lovelock.

WICKER BASKETRY

BURDEN BASKETS

In general, the Lovelock Cave report of Loud and Harrington (1929, pp. 60-64) describes this type of basketry satisfactorily, and the Humboldt Cave wickerwork appears to be identical. These two caves are the only important sites which have yielded specimens of this unique and localized technique. The principle of a conical burden basket is, of course, very widespread in the western states, yet the people who lived in these particular caves appear to have hit upon a special technique for the construction of this kind of basket. There is as yet no suggestion that it may have been borrowed from any outside source. The following account of the burden baskets of Humboldt Cave will supplement the Lovelock description.

Size.—To judge from a few Humboldt fragments that extend from rim to apex, the average burden basket was probably about 70 to 75 cm. (28 to 30 in.) high (measured from rim to apex) and about 60 cm. (24 in.) across the mouth. The rim was usually made with a selvage construction (described below) and was somewhat more rigid than the body. Not more than 5 per cent of the rims are bound about by sticks to make them rigid. The entire basket is fairly pliant—much more so than the California burden baskets, which are constructed of stiff, twined twigs. The wicker basket from the Nevada cave is also unique in being so closely woven that it will retain small seeds and yet stout enough to carry heavy loads of wood. A few fragments of heavy, coarse twining with peeled twigs (see "Twined Basketry") were also found in both caves, indicating that the idea of the typical northern California burden basket was known, although the type was unimportant quantitatively.

Technique.—Warp: The warps are made of light willow twigs, 60 to 80 cm. in length. When peeled, they range from 2 to 6 mm. in diameter in the same basket, since the warps are grouped radially, with the heavy ends at the apex, where strength is needed, and the lighter ends at the rim, where they can be easily woven into selvage patterns.

Weft: This invariably consists of two remarkably thin, uniform willow splints, or ribbons. Loud observes that these vary in width, the average being about 3 mm.

wide, and that the thickness of ten of them superimposed is only 4 mm. The Humboldt Cave splints average somewhat broader and thicker, but the difference is unimportant. In weaving, the two ribbons usually overlapped, but occasionally they were laid side by side or were completely superimposed. All variations may occur in the same basket.

Weave: Mechanically, the weaving of wicker is a form of plaiting. In plain plaiting, the warps and wefts are indistinguishable and both are active. In wickerwork the warps are stiff and passive, the wefts pliant and active. All the wicker specimens from the cave are woven one over and one under, and are advanced one on the next course. Where there are splices, the weft may cross two warps, but this does not alter the pattern.

To begin, the warps were set radially in a conical frame. The butts were not quite joined together, but a small round hole was left in the center; this was usually webbed over with heavy *Apocynum* cords or skin thongs, but occasionally it was covered with a piece of hide.¹⁰ The weave began nearly always, if not always, with five or six courses of heavy twining round a pair of thick, unpeeled willow splints twisted down to the right, which provided a tight, strong binding for the basket bottom.¹¹ The wicker splints were then introduced and were plaited across the warps in a continuous spiral until the zone of rim selvage was approached. At this point one or two heavy twined courses like those at the basket bottom were introduced, which bound the framework tightly before the rim selvage was made. Some 5 per cent of the larger fragments show that courses of similar twining were sometimes placed in zones within the basket body. One may therefore suppose that the twined work in the wicker burden baskets served two purposes: (1) it provided a tighter binding element than wicker at the pointed bottom and the top edge, and (2) it served as a decorative relief in the basket body. In one basket fragment there is more twine than wicker, but here it is the regular wicker warp elements that are twisted as a variation from the usual flat plaiting of the weft ribbons.

Wherever there is twining in the wicker baskets, the weft consists of split, unpeeled lengths of willow twig, highly suggestive of northern California burden baskets, which are completely woven with such elements. Loud treated all twining in Lovelock Cave as a distinct technique, under a different head from wickerware, thus missing the significance, both technological and numerical, of this interesting combination. The texture of the wicker baskets varies considerably, but the whole range of variation may occur in the same specimen. The gradation from very coarse at the apex to fine at the rim is so masterfully controlled that the change is hardly perceptible in a small piece. Weft courses range from 32 per 10 cm. in a coarse weave to 70 or even 80 in an exceptionally fine one (Loud and Harrington, 1929, pls. 27 and 28).

Because of the lack of complete baskets, it is difficult to determine the direction of work. A guess is that the basket was held with the apex toward the worker and that the work proceeded clockwise.

Selvage: Loud has adequately described the peculiar technique of finishing the burden basket by turning the stiff warp ends back toward the body of the basket

¹⁰ As in the Owens Valley burden baskets illustrated by Steward, 1933, pl. 10, *b* and *c*.

¹¹ See Loud and Harrington, 1929, pl. 28, bottom end of fragment.

and weaving them over and under one another in an open mesh. After the body was woven, 8 to 15 centimeters of the warps were left projecting. In the final body course the warps were bound into pairs at this point with coarse willow-splint twine, and the paired warp ends were then bent obliquely back toward the body and were there seized with another course of twining, which bound them tightly, completing the basket. Loud says that "in two or three specimens of border weave the woof rods are impacted so as to appear like a very close twining weave"; but it should be pointed out that in these specimens the weave *is* twining—because of their stiffness, the warp rods are only slightly twisted. All these variations appear identically in the collections from the two caves.¹²

Repairing.—The extensive amount of repair work on both Lovelock and Humboldt Cave baskets is significant, being much greater than is generally seen in the western states on either historic or prehistoric material. The sewing up of tears in coiled ware is not uncommon, but the wickerwork of these caves has innumerable patches, for which small pieces of wickerware and rabbitskin are used. Rim selvages were sometimes patched with body pieces, and vice versa. A patch was fastened on by simply basting round it once; the thread was a thin willow-splint weft element. In repairing tears a clinching stitch was used. First, the edges were brought together by a spiral sewing. Next, the splint ribbon was brought across these stitches, making a complete turn over each former stitch, back to the start. A repair of this sort was neatly done, and a pitchy substance was sometimes used to help bind the edges of the tear. (See pls. 21 and 22.)

Decoration.—Although an occasional burden-basket fragment has a smear of red ocher or a purplish coloring, in none does the smear assume any recognizable form. As in the Lovelock material, formal decorations depend on the contrast between weft splints with their bark still on and peeled splints. These designs are wholly geometric, based on the checkered nature of the weave, and none suggests human or zoöomorphic motifs. The Lovelock description will serve nicely for Humboldt Cave wicker as well (Loud and Harrington, 1929, pp. 62–64):

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 [i.e., weft] 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. . . .

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 California 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

¹² See Loud and Harrington, 1929, pl. 27, *a-c*, and pl. 61. Our impression of the method of constructing the burden baskets is the opposite of that described by Loud, who writes of the "final courses" in connection with the apex. It would seem difficult, if not impossible, to weave the selvage first and then the body, tapering it to the apex.

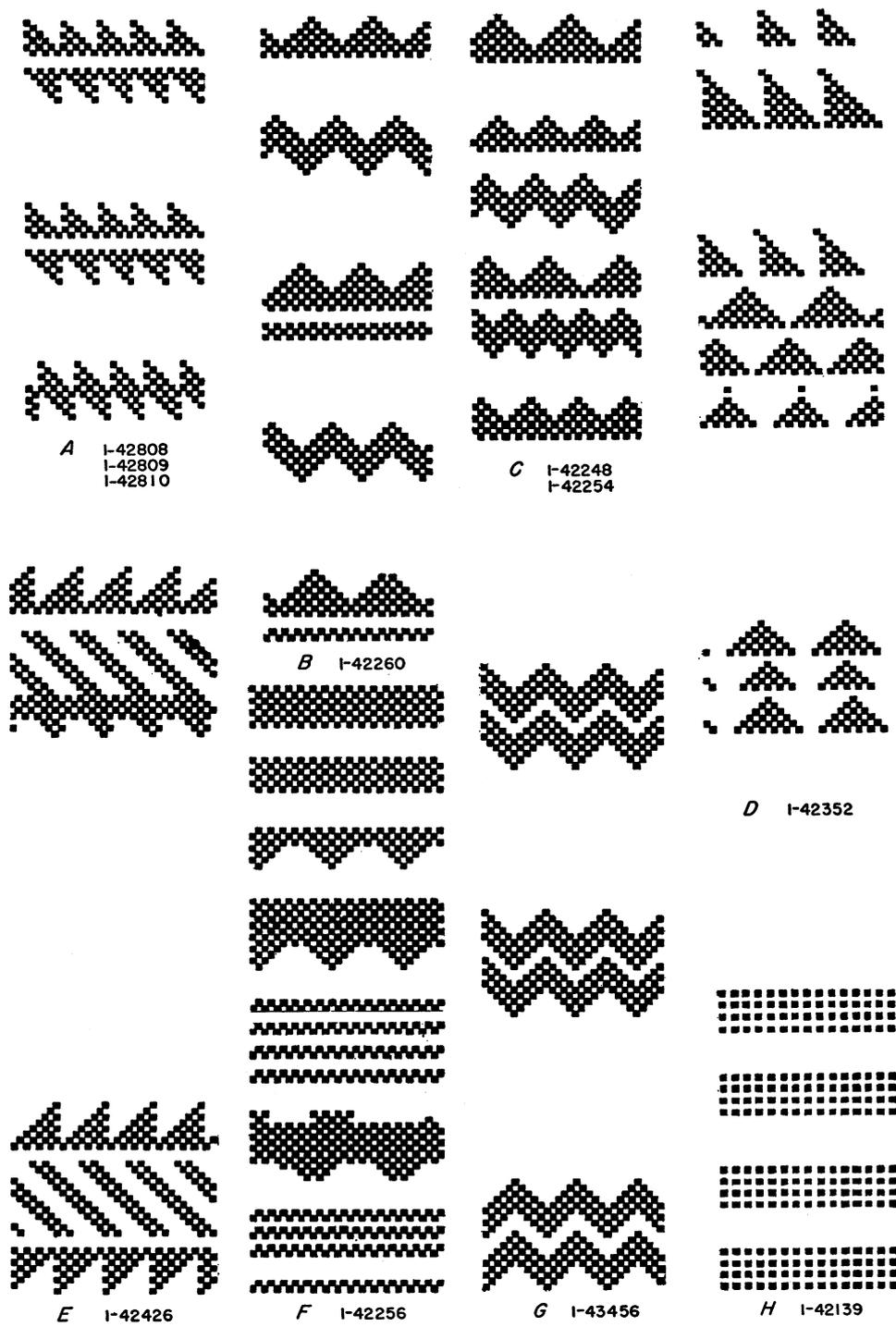


Fig. 5. Wicker-basketry design elements.

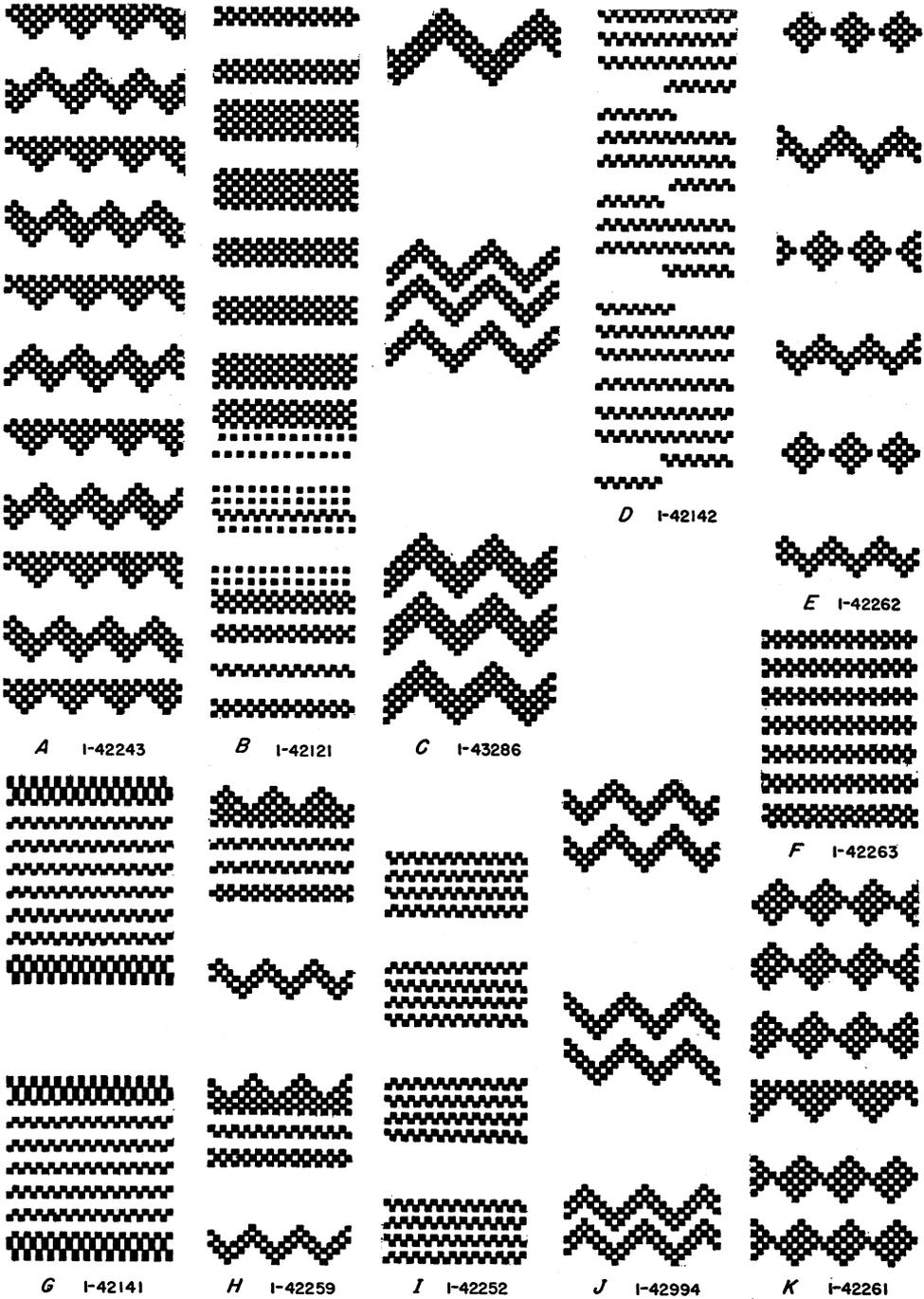


Fig. 6. Wicker-basketry design elements.

numerous. A pleasing effect is produced by the spacing of the bands and by the combination of the narrower and the wider bands . . .

Next to bands the zigzag or W-design . . . is most common. . . .

The designs with right-angle triangles . . . are about half as numerous as the W-designs. . . . 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.

If there is any marked difference between the designs found in the two caves, it is that triangular motifs are more frequent in Humboldt, but this could result merely from the personal preference of the weavers. A few designs from Humboldt Cave wicker fragments are illustrated in figures 5 and 6.

Tumpline attachments.—Four or five large fragments, all from Caches 5 and 7, have heavy willow sticks tied with *Apocynum* cord against the inner side near the bottom. One fragment has two of these stays. In others, there are pairs of small holes in the finished weave through which stout cords and thongs are looped. These must once have held sticks which acted as stays against the inner surface. Thus, the baskets appear to have been supplied with tumplines, shoulder straps, or wooden frames to facilitate carrying heavy loads (pls. 21, 22). No frames or tumplines were found in position. The Lovelock Cave report does not mention such stays or loops, but they probably were used at Lovelock also.

Distribution in the cave.—There was a clear difference in the mode of occurrence of wicker fragments: the largest pieces came from caches, the smaller ones (ranging from about 1 to 10 sq. in.) were found loose in the main deposit. The greatest number of pieces in a cache was 181—from Cache 7. This was the largest cache in all respects; everything in it, however, was badly worn and torn, seemingly beyond any hope of repair. The 181 pieces assembled by fitting torn pieces and matching others apparently represent between 20 and 25 actual burden baskets. Cache 5, contained 132 wicker fragments, considerably larger than most wicker pieces found. Twenty-eight are more than 1 sq. ft. in area; the largest is about 3 sq. ft., or nearly half a basket. The upper or "false" part of Cache 5 contained 60 small pieces of wicker, most of them neatly hacked into squares; the lower half contained the remaining 72, all large pieces. The 72 pieces may be accurately said to represent 20 baskets, for distinctive decorations make the matching easy. Despite the care taken in caching, including the arrangement of a false upper cache presumably to foil potential looters, all this basketry seems perfectly useless in its mangled state. This was also true in many of the large caches. In Cache 5, some of the small squares in the upper part had been hacked out of the large pieces buried in the lower part!

A similar matching of fragments was made in other caches. Caches 26 and 27 likewise had "false" upper parts and contained 75 and 53 pieces of wicker, respectively, which represent 25 and 9 baskets. Thus Caches 5, 7, 26, and 27 yielded pieces representing a total of at least 100 baskets, a remarkable amount of property for a simple Great Basin group living where raw material must have been hard to obtain. As table 4 shows, 23 of the 31 caches contained some 766 wicker fragments, which represent an estimated 213 separate burden baskets, a figure probably somewhat too high. Allowing for incomplete matching, the true figure must nevertheless be about 200 baskets.

The distribution of this material within the deposit (excluding the caches) is

given in table 5. The vertical columns of the table give the data for the main room, the columns from left to right listing occurrence in the numbered excavation sections 1 to 12, which run from the rear to the front of the cave. Following table 5 (p. 44) are listed the fragments recovered from different alcoves, those of which the locality records have been lost, and those recovered from the dump. The material

TABLE 4
WICKER BURDEN BASKETS IN CACHES

Cache	Number of pieces	Estimated number of baskets
2.....	6	3
3.....	13	7
4.....	31	11
5 (top).....	60	27
5 (main).....	72	20
6.....	18	5
7.....	181	20*
8.....	23	15
9.....	52	14
12.....	5	3
14.....	21	6
15.....	14	1
16.....	8	?
17.....	22	5
18.....	5	3
21.....	27	7
23.....	1	1
24.....	2	2
25.....	15	6
26 (top).....	14	6
26 (middle).....	38	11
26 (bottom).....	23	8
27 (top).....	30	7
27 (main).....	23	2
28.....	41	12
30.....	5	2
31.....	16	9
	766	213

* Possibly as many as 25.

from the south alcove may be regarded as broadly equivalent temporally to that from lower parts of the main room, for the alcove was filled with debris and caches before the main room was more than half full. The figures entered for the excavation sections and levels are straight counts of individual pieces recovered.

Almost exactly half the wicker fragments came from caches, and half from the rest of the deposit (766 and 779 pieces, respectively). Except for a few very tiny bits, there was no wickerware in the top eighteen inches. There were not many artifacts of any kind near bedrock, for the floor was littered with fallen roof rocks, between which lay only small pockets of refuse. Other gaps, like those in section columns 4, 9, 10, and 12, indicate the presence of very large rocks in the refuse.

The number of wicker baskets in the caches is estimated in table 4. *It is thought that the estimate of actual baskets from the caches gives the approximate total for the entire cave*, for the many small fragments found loose in the main-room deposit seem to have been mere odds and ends that were kicked about and almost pulverized during the occupation of the cave. Many of these loose bits match the cached fragments closely, and the entire lot would not add materially to the estimate of baskets for the caches alone.

TABLE 5
DISTRIBUTION OF FRAGMENTS OF WICKER BURDEN BASKETS IN HUMBOLDT CAVE

Depth (inches)	Main-room sections												Total	
	1	2	3	4	5	6	7	8	9	10	11	12		
0-6.....	1	1	..	..	..	..	..	2
6-12.....	1	..	..	..	1
12-18.....	6	1	1	..	..	..	..	1	..	9	..	..	..	18
18-24.....	..	1	1	..	..	..	..	1	15	..	1	1	..	20
24-30.....	..	1	..	2	1	2	2	4	..	9	1	..	..	22
30-36.....	..	1	2	..	2	2	2	5	10	5	7	1	..	37
36-42.....	..	5	3	8	2	4	20	18	12	10	10	..	..	92
42-48.....	1	..	10	20	3	5	8	9	—	..	..	56
48-54.....	..	—	10	1	24	35	10	6	3	..	..	—	..	89
54-60.....	1	5	10	11	2	3	..	..	..	..	..	32
60-66.....	4	6	31	..	..	..	..	..	..	..	41
66-72.....	15	3	4	10	..	1	3	..	..	..	36
72-78.....	2	6	13	..	..	..	..	..	..	21
78-84.....	3	..	..	..	..	..	..	..	3
84-90.....	1	..	1	..	..	..	..	..	..	2
90-96.....	0
Total.....	6	8	20	33	62	117	64	42	53	37	27	3	..	472

Rule at bottom of column indicates depth of bedrock bottom.

Main room	472
Alcoves and other locations.....	307
Caches	766

Total.....1,545

It is clear enough that the distinctive Lovelock-Humboldt wicker burden basket was made in large quantities from the beginning of the occupation of Humboldt Cave, and that it was not made or used while the final eighteen or twenty inches of deposit was accumulating.

COILED BASKETRY

A total of 438 specimens of coiled basketry was recovered from the cave. As mentioned above, the total number of individual pieces of coiled basketry is about one-quarter that of wicker, but the actual number of baskets represented (a figure obtained by matching fragments) is 154 coiled as compared with approximately 200 wicker, or about three-fourths as many coiled baskets as wicker. Where wicker was used for a single form of basket, the burden basket, coiling was employed for

five or six kinds. The treatment of coiled work in the Lovelock Cave report is confusing; the "types" are defined on the basis of foundation structure and method of stitching, but no specific relation is made to kinds of baskets. For this reason the following description is independent of the Lovelock Cave discussion, the two caves being compared only in summary.

CIRCULAR FLAT ROASTING TRAYS

Of the 154 coiled baskets recovered, 136 are identified as circular trays used for parching vegetal foods. This agrees well with the Lovelock Cave report, in which Loud observes that nine-tenths of the multiple-rod, split-stitch specimens were shelling and roasting trays.

Size.—The largest tray in the collection (incomplete) measures 74 cm. across (nearly 30 in.). A hole shows where a disk 46 cm. in diameter was cut from its center or dropped out where the tray was worn along one of the circuits. This ring is heavily smeared with red ocher. The three complete trays are somewhat smaller. Specimen 43065 (pl. 18, *b*), from Cache 25, is of medium weave, having 25 coils and 29 stitches per 10 cm., slightly concave, and 53 cm. in diameter. The stitches are split on the convex (bottom) side but not on the concave side, which is charred, pitched with resin, and also has small dabs of red-ocher paint. Specimen 42146, from Cache 4, is of fine weave, having 31 coils and 32 stitches per 10 cm., the stitches split on both sides. It is 50 cm. in diameter, though the final courses seem to be missing, and is only 4 mm. thick. It is slightly concave, and the coil runs clockwise when one looks at the bottom, which was probably the side from which the weaver worked. The upper, concave side is badly scorched, and the bottom is somewhat worn. The concave side has smears of red paint. Specimen 42147 (pl. 18, *a*), also from Cache 4, has 22 coils and 26 stitches per 10 cm., the stitches split on both sides. It is 52 cm. in diameter and 6 mm. thick. It is coiled clockwise from what appears to be the convex or bottom side, although the tray is virtually flat. Dabs of red paint show on the under (?) side. Another tray, about three-quarters complete, was found in three parts: 42275 in the lower part of Cache 5; 44281 in section 4, at a depth of 54–60 in.; and 44507 in section 6, at a depth of 54–60 in. It is 66 cm. across and of medium texture, with stitches split on both sides, and is so badly worn that it is impossible to determine the work surface.

Technique.—Foundation: Willow appears to be the sole material used in these trays. The foundation is conveniently termed "rod-bundle" and has many variations. Loud's observation (Loud and Harrington, 1929, p. 65) that the most common tray foundation consists of two or three rods (whole peeled twigs) set side by side, with a slat—a split rectangular section of a twig—above them, holds equally well for Humboldt. However, close examination of this ware in both caves reveals whole, half, and quarter twigs, barlike slats, small strips of bark, and pieces of slat split into smaller units, all used in the foundation in every possible combination. Figure 7 illustrates some of these variations; many such arrangements are found within the same basket. Clearly, although the ideal may have been to use a foundation composed of two (or three) rods and slats, the weaver's chief concern was to keep a uniform diameter in each circuit. This was achieved by adding whatever elements were at hand. At the same time, as the work proceeded,

the diameter of each succeeding circuit was slightly reduced. Most trays thus show a skillfully controlled, gradual reduction in the size of the coils from center to perimeter.

Stitching and texture: The sewing element was invariably a willow splint, or ribbon, 2 to 3 mm. wide, thin, pliant, and sturdy. The trays were started by making a tiny ring, 2 to 3 cm. across (outside measure), round which the splint was tightly

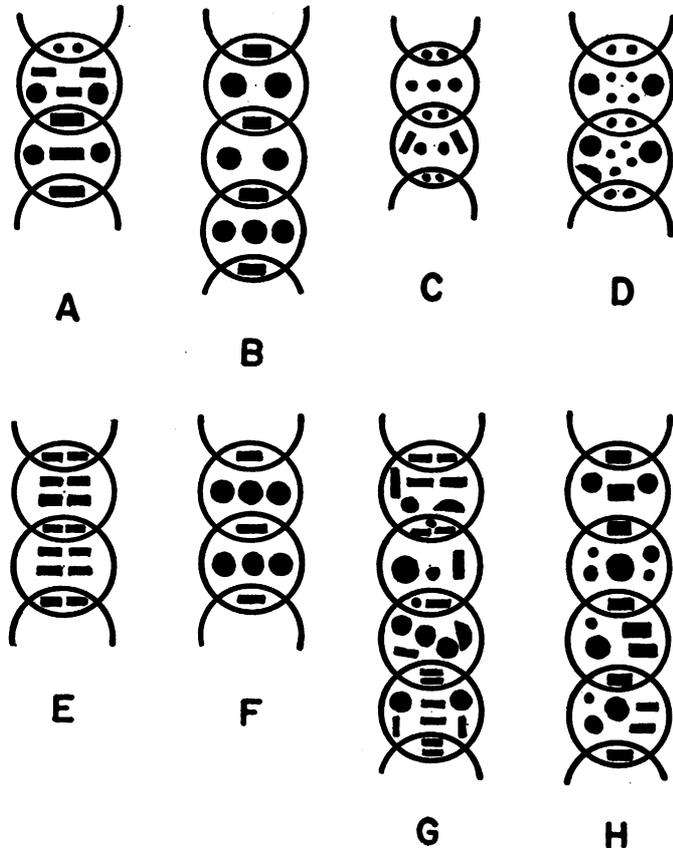
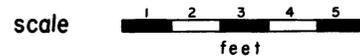
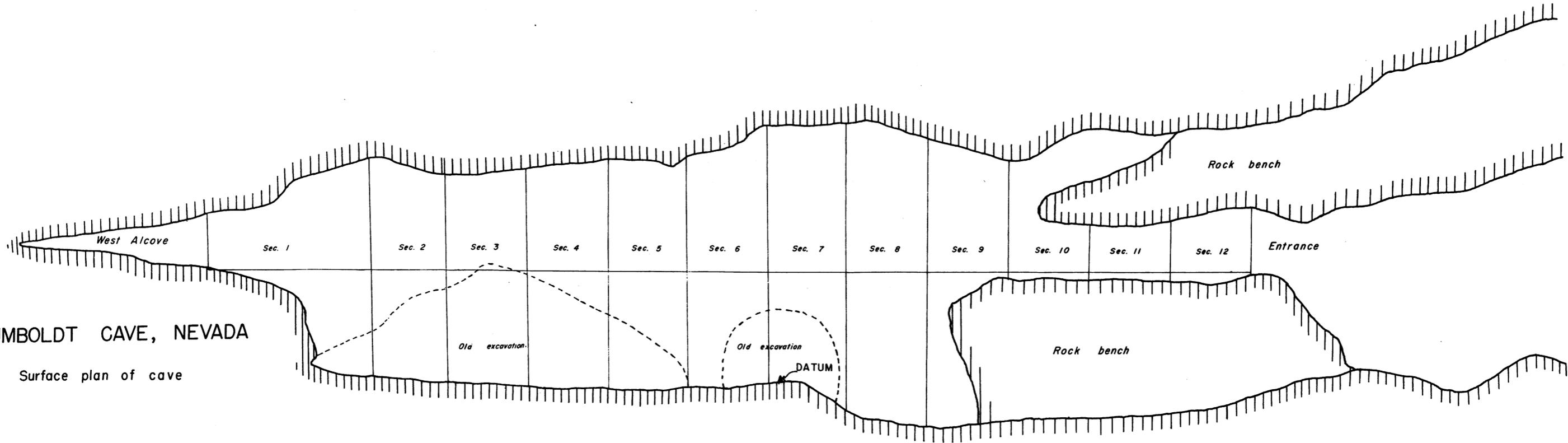


Fig. 7. Coiled-ware basketry foundations. Single-rod foundation not included. Note variety of peeled rods, slats, and grass stems (smallest dots) used to maintain uniform diameter of coil, several combinations often appearing in same basket. Uniform combinations such as E and F were relatively rare.

spiraled. The first coil course was started against this ring and was seized with the pliant splint. The final course was simply sewed on in the same manner as the others; no special clinch was used. The "herringbone" rim finish on some Lovelock trays was not noted in the Humboldt material. At Lovelock the plain and "herringbone" finishes are said to have been about equally numerous.

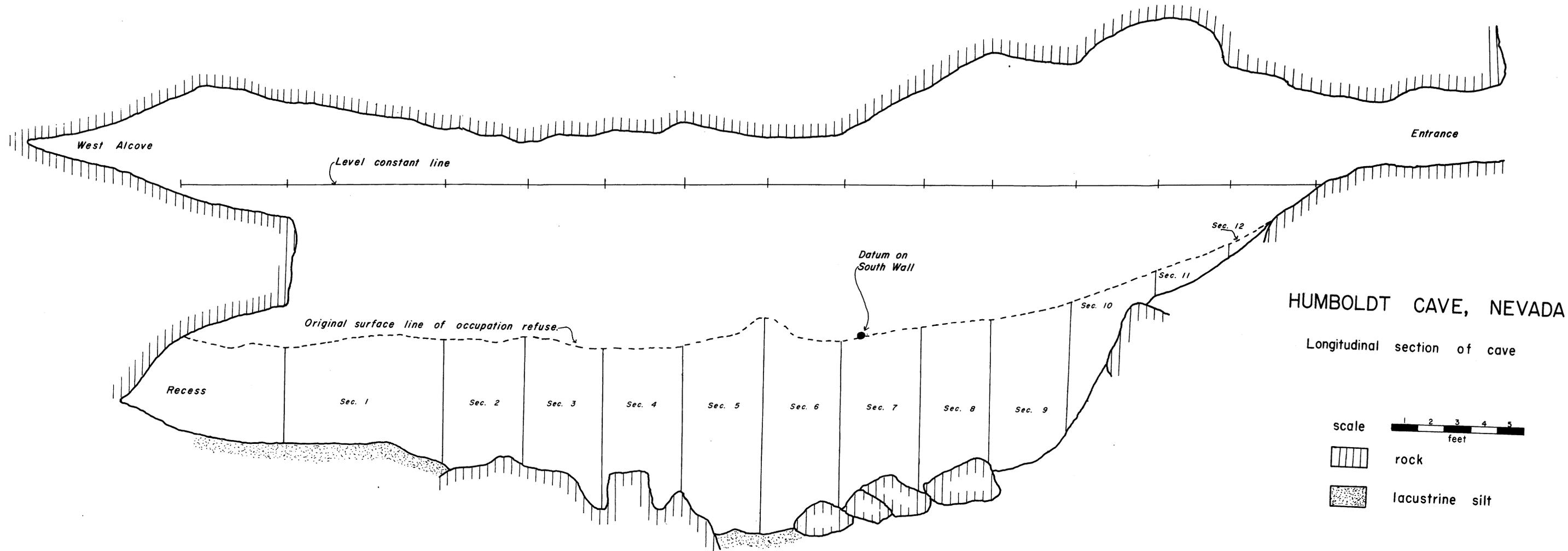
In stitching, the worker has five alternatives: (1) he can pass each stitch round all or part of the underlying coil without passing it under any preceding stitch (noninterlocking style); (2) he can pass the ribbon round all or part of the preceding coil, at the same time passing it obliquely under each preceding stitch (interlocking style); (3) he can pass the ribbon through a slit made in the

HUMBOLDT CAVE, NEVADA
 Surface plan of cave



To accompany R. F. Heizer and A. D. Krieger, "The Archaeology of Humboldt Cave, Churchill County, Nevada," Univ. Calif. Publ. Am. Arch. and Ethn.

Map 2. Surface plan of cave.



HUMBOLDT CAVE, NEVADA

Longitudinal section of cave

scale 1 2 3 4 5 feet

-  rock
-  lacustrine silt

Map 3. Longitudinal section of cave.

To accompany R. F. Heizer and A. D. Krieger, "The Archaeology of Humboldt Cave, Churchill County, Nevada," Univ. Calif. Publ. Am. Arch. and Ethn.

preceding stitch in the visible or work surface and bring it out between stitches on the back; (4) he can insert the ribbon between stitches on the work side but split them in bringing it through on the back side; or (5) he can split the preceding stitches on both work surface and back. None of these fragments, representing some 136 trays, is in exclusively interlocking or noninterlocking style. Twelve trays were sewed with stitches split consistently on one side only, the other 124 have stitches split on both sides. This probably agrees closely with the method used in Lovelock Cave.¹³

The coarsest tray with stitches split on both sides (42669, Cache 8) has 15 or 16 coils and about 20 stitches per 10 cm. The finest weaves of this group have 31 coils and 32 stitches per 10 cm. (42146, Cache 4), and 28 coils with 35 stitches per 10 cm. (42272, Cache 5). Most of them have 22 to 27 coils and 25 to 29 stitches per 10 cm. The trays are 4 to 8 mm. thick, most of them between 6 and 7 mm. All pieces with stitches split on one side only fall within these ranges, for the unsplit stitches are merely farther apart than those spread by splitting.

Direction of work: In making a flat or shallow tray the worker could hold either side toward him. Where there are designs, as on the inside of many Southwestern coiled trays, the "good" or work side is easy to determine, for the design will be clear on one side and rough or imperfect on the other. Few of the parching trays of Lovelock and Humboldt caves, however, are in sufficiently good condition for us to determine which side had the sharper, neater construction. In most, the decoration has been destroyed—on the upper side, charred by the hot rocks placed on it; on the bottom, by general wear and tear. Thus, it is very difficult to recognize the decorated or "good" work side. Loud's suggestion that the direction of work is shown by the way stitches lean forward, as in handwriting, is also unsatisfactory, since this direction is reversed on the two sides of the basket. Again, the side on which stitches are split may have been the work side, the splitting itself, when done evenly, having a certain aesthetic value. There is no reason to assume, as Loud does, that the Indians would not decorate the upper side of a parching tray with a design which would be charred when the tray was used. It is rather certain that some parching trays were decorated.

Twenty Humboldt Cave specimens include the starting core and enough body for us to judge which was the better surface. It appears that both clockwise and counterclockwise directions were followed. Among the charred fragments, the face, or bottom, which is not parched, is more regularly stitched and neater than the other. Thus (with the bottom held toward the worker) 13 are coiled clockwise, 3 are coiled counterclockwise, and in 2 the direction of coiling is indeterminate. The two others have stitches split on the inside only, and the outside is better made; one has a clockwise coil, the other counterclockwise. One further point to consider is the flexibility of these trays; if one side were worn or burned excessively, the tray could be turned inside out.

Decoration.—Like the wicker, these coiled pieces have smears of red-ocher paint on them, as well as formal designs made by substituting for the usual peeled, or "white," weft elements splints with a covering of dark bark. On the trays, a bark-covered ribbon was inserted for whatever number of stitches the pattern required on

¹³ "Considering all types of coiled weave from the cave, 91 per cent of the pieces . . . are with split stitches on either one or both sides" (Loud and Harrington, 1929, p. 65).

each course. Designs of this kind are discernible on about 10 per cent of the specimens, though of course they may have been visible on many more pieces before these were charred or worn. As on the wicker, there is here no suggestion of human or other zöomorphic motifs; rather, the designs run to oblique series of triangles and horizontal bands, the band designs being the more common. A tray without its center—represented by specimens 42406, 43241, and 43283, from Caches 7, 27-A, and 27-B, respectively—shows three series of triangles running obliquely from the edge of the hole toward the rim. All the other known tray designs are horizontal plain bands—one to three courses in width, sometimes alternating between narrow and wide bands—and zigzag bands running horizontally. These designs show best in the interior; the exterior is always badly worn. Specimens 42433 (pl. 19, *b*) and 42453 from Cache 7 together form half a tray, from which the center is missing; they are decorated with a solid-triangle design. Specimens 42879 (pl. 19, *c*), 42881, and 42884 from Cache 14 show a continuous, horizontal zigzag band.

Loud mentions two designs on unscorched trays (Loud and Harrington, 1929, fig. 14, *e, h*), neither of which was found on Humboldt trays. The design shown in figure 14, *e*, of the Lovelock Cave report is a staggered white band between black areas; the one shown in figure 14, *h*, is made up of 17 bands of alternate black and white bars radiating out from the edge of a plain center. The basket bearing the design shown in figure 14, *h*, is reproduced entirely in plate 30, *a*, of the Lovelock Cave report. The design with radiating elements has at least one possible counterpart from Humboldt Cave—the decoration of the tray mentioned in the preceding paragraph and shown here in plate 19, *b*. This design consists of three series of solid triangles radiating toward the rim.

In summary, it appears certain that the circular roasting trays of both Lovelock and Humboldt caves were sometimes decorated with unpeeled splints. The principle of radiating units as a design element is represented by at least one tray from each cave. A design of horizontal bands—solid, zigzag, or composed of triangles—is seen in fragments of at least five Humboldt trays but is not reported from Lovelock.

Trays without center.—Eight trays, fairly complete or reconstructed from fragments, have a large round hole in the center (pl. 19, *d*). The outside diameters of these pieces (in some not the original rim) are as follows: 66 cm., 71 cm., 62 cm., 60 cm., 57 cm., 60 cm., 65 cm., and 74 cm. The diameters of the central hole are: 21 cm., 42 cm., 30 cm., 27 cm., 32 cm., 20 cm., 38 cm., and 46 cm. Nine disks or central cores from such trays were found in caches and the main deposit. These nine range from 4 to 22 cm. in diameter but none of them fits the hole in any of the trays from which the center is missing. Three explanations may be considered: (1) When a tray became worn, the fabric began to crack around one or more courses and a disk eventually dropped out (many trays had been sewed around broken courses to prevent this); (2) these parching trays had been “killed” by breaking out the center; (3) the centers had been purposely cut out to make hopper baskets like those commonly used by northern California Indians. None of the inner edges of the rings is finished as though the basket had originally been a hopper, and no hopper mortars were found in the cave, but neither fact completely rules out the use of the trays as hoppers. The theory of “killing” would be strengthened if a

central core were found still attached to the ring (i.e., not completely removed), or if such baskets were found in graves. On the whole, however, the first explanation, the loss of the center disks through wear, seems best.

Distribution in the cave.—Table 6 gives the occurrence of coiled-tray fragments in the caches, concentrations, cuts, and so forth. Somewhat more than half, 218, came from caches, but the main deposit also yielded several fairly large pieces. Apparently these ragged and worn larger pieces were not cached as carefully as the wicker burden baskets. Nevertheless, the distribution of these two

TABLE 6
DISTRIBUTION OF COILED ROASTING TRAY FRAGMENTS IN HUMBOLDT CAVE

Depth (inches)	Main-room Sections												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
0-6.....	..	..	..	..	..	..	..	..	..	..	..	..	0
6-12.....	..	..	..	..	..	..	..	..	..	1	..	..	1
12-18.....	<u>3</u>	..	..	..	..	..	..	..	..	..	..	..	3
18-24.....	..	..	..	..	..	..	..	..	..	..	1	1	2
24-30.....	..	1	..	..	..	..	3	4	..	..	..	..	8
30-36.....	..	..	..	..	2	1	..	1	2	..	..	..	6
36-42.....	..	..	..	1	..	..	4	1	..	2	..	..	8
42-48.....	1	1	..	2	2	..	3	1	1	—	..	..	11
48-54.....	<u>1</u>	1	..	2	1	..	1	..	..	..	..	—	6
54-60.....	..	—	1	..	2	..	—	..	..	..	..	..	3
60-66.....	..	..	..	..	3	..	..	..	..	..	..	..	3
66-72.....	..	..	2	..	3	2	..	—	..	..	..	..	7
72-78.....	..	..	..	..	..	..	..	..	..	—	..	..	0
78-84.....	..	..	..	..	..	..	..	..	..	..	..	..	0
84-90.....	..	..	..	..	..	..	..	..	..	..	..	..	0
90-96.....	..	..	..	..	—	..	—	..	..	..	..	..	0
Total.....	3	2	3	3	5	13	3	11	7	4	3	1	58

Rule at bottom of column indicates depth of bedrock bottom.

main forms of basketry in the depth of the cave was nearly identical; like the wicker, the only coiled-tray fragments in the top twenty inches are minute scraps.

Coiled trays and wicker must have been used by the first occupants of the caves. At Lovelock Cave (Loud and Harrington, 1929, p. 9 and fig. 2) the earliest occupation by human beings is represented by a cache pit dug into lacustrine clays, but in this cave "a thin layer" of bat guano collected over the lacustrine floor before any human refuse—of tule, grass, ash, and so forth—began to accumulate.¹⁴

COILED BOWLS

The coiled basketry from Humboldt Cave, aside from the circular roasting trays, may be classified in various ways. All types apparently have one feature in common: all are bowl-like in shape. No bottle-shaped baskets like those found at Lovelock were recognized here. For convenience, we shall mention plain, or undecorated, bowl fragments first, dividing them into "coarse" and "fine"; then discuss the

¹⁴ Some samples of this pre-occupation bat guano have been age-dated by the radiocarbon method. See Heizer, 1956b, 1956; Cressman, 1956.

decorated bowls, "coarse" and "fine"; and finally treat the single-rod coiled vessels as a separate group. The one example of feather-decorated coiling is described under "Decorated bowls, fine."

The feathered bowl, the bowl with vertical black bars and diagonal checkered lines, and the single-rod fragment with black line decoration all appear to have been spared household use. The first two evidently were deliberately hacked to pieces. All others either have pitch on the outside or remains of gruel on the inside. Unlike the circular roasting trays, no bowl specimens show any attempt at repair.

Plain bowls, coarse.—Only four fragments of this kind of bowl can be definitely recognized, three of which probably belong to the same basket. The fourth and largest piece, 43816 (pl. 20, *f*), was found at the entrance to the south alcove. The bowl of which this is a fragment is estimated to have been 16 to 18 cm. in diameter at the mouth and 12 cm. across at the point where it begins to flatten at the base. The foundation is regularly three rods placed side by side and a slat under which the stitches pass (fig. 7, *f*). It has 26 coils and 30 to 32 stitches per 10 cm., the stitches split on both sides. The remains of a mush or gruel can be seen on the interior. This basketry closely resembles coiled roasting trays in all particulars except shape and is believed to represent a variety of the same ware. The three small fragments—42148, 42452, and 43131, from caches 4, 7, and 26—are of similar construction and curvature, and probably come from one basket.

Plain bowls, fine.—Eight specimens in this group represent five or six baskets. The foundation is similar to that of the trays and bowls described above; it consists of multiple elements and varies considerably, but the weave is much finer and the stitches interlock. The finest weave has 28 to 30 coils and 62 stitches per 10 cm.; the stitches are perfectly straight up and down, and so compact that the foundation is invisible (Loud and Harrington, 1929, pl. 29, *g* and *h*, "type *a*, narrow stitch"). This bowl came from the small rat nest at the east end. Four other pieces from one or two baskets of comparable fineness were found in the same rat nest. From the small entrance alcove came specimen 45354, with 28 coils and 58 interlocking stitches per 10 cm. A bit from the surface has 4 coils and 5 stitches per cm. and is only 3 mm. thick.

The provenience of this group is uncertain, since all the specimens were found in rat nests or on the surface. None came from the main-room deposit or the south alcove; hence a late trait is indicated. Some pieces are lightly smeared with a pitchy substance, perhaps pine resin used for plugging holes. Willow was used for all the bowls.

Decorated bowls, coarse.—Under this heading are 12 fragments, all from a single basket. Like the trays and the "coarse plain bowls" it has a multiple foundation, regularly three-rod-and-slat, with stitches split on both sides. There are 30 to 32 coils and 40 stitches per 10 cm., which is rather fine for a coiled tray but coarser than the group with interlocked stitches. This specimen has a rather clear and brightly contrasting decoration, which is seen in approximately the original pattern when the pieces are placed together, as in plate 20, *a-e*. For the most part, the edges fit well, and the pieces are excellently preserved; hence it is evident that the basket was deliberately hacked apart. It was about 17 cm. from center to rim measured along the side, and 28 cm. across the mouth. The thickness is 4 mm.

Apparently the outside was the better side originally, but staining and burning have almost obliterated the design, which is clear only on the inside. The coil is counterclockwise, with the bottom held toward the worker. The central part, from starting point to the eighteenth circuit, is plain. The decorated zone is 30 courses wide, and the final course is plain. The design was made with willow splints from which the dark inner bark had not been removed, as in the coiled trays and wicker. Solid vertical bars, each three stitches wide, ran from the plain central disk to the rim, probably in groups spaced about the basket. In the spaces between the groups of vertical bars are climbing diagonal lines, as seen in plate 20, *a-e*; there were three of these bands, two made up of double lines, the upper one triple. The checkered effect was achieved by turning the bark side out for three stitches, then in for three stitches, and so on.

The distribution of the twelve pieces is interesting:

<i>Cat. No.</i>	<i>Location</i>	<i>Cat. No.</i>	<i>Location</i>
42150.....	Cache 4	43585.....	Disturbed area
43317.....	Cache 28	43643.....	Dump
43463.....	Concentration 3	43886.....	Rat nest, so. alcove
43508.....	Concentration 6	44315.....	Sec. 4, depth 66-72 in.
43561.....	Cache 26, middle	44394.....	Sec. 5, depth 48-54 in.
43584.....	Disturbed area	44810.....	Sec. 7, depth 66-72 in.

We may conclude that this basket was associated with the large caches in the main period of occupation, and that it was a well-decorated bowl of essentially the same weave as the coiled trays. A tray from Lovelock Cave (Loud and Harrington, 1929, p. 68 and pl. 30, *a*) somewhat resembles it; the Lovelock tray has 17 ladderlike elements extending vertically from the edge of a plain center to the rim, the stitches split regularly on the exterior.

Considering the two caves together, it appears that the same split-stitch coiling on multiple foundation was used primarily for circular roasting trays, which were occasionally decorated, and now and then for a bowl, also occasionally decorated. The decorations on most of the trays were concentric bands, but at least one Lovelock tray has bands radiating from a plain center. Of bowls we know little. One from Humboldt Cave has bands radiating from a plain center, and fragments of two others are plain.

Decorated bowls, fine.—There are 12 fragments from one basket with feather decoration, and one fragment of interlocked coiling. The 12 pieces make up only one-third of the feathered basket, but 3 show the technique from center to rim (pl. 20, *l-n*). Since the torn edges fit and the piece is very well preserved, the basket must have been deliberately hacked to pieces. It was about 27 cm. across the mouth, 10 cm. deep, and 4 mm. thick. There are 40 coils and 40 stitches per 10 cm., the stitches split regularly on both sides. The foundation varies: three-rod triangular, rod over three rods, rod over two slats over two rods, and so on. The exterior is the best-made part and the coil is counterclockwise, with the bottom held toward the worker. The first 13 courses are plain, the tiny feathers being on the fourteenth. Each feather is caught under two stitches; thus the feathers emerge from every other stitch from the fourteenth to the fifty-fifth, but only on alternate courses. The last three courses are plain. Before the feathers were chewed

by insects, they may have been large enough to cover the surface, even though they were used only on alternate courses. Green, brown, and gray may still be seen, and the basket must have rivaled the better recent Pomo work.

Parts of this feathered basket were found in Cache 5, other parts in the center of the room at depths of 42–54 in., and still others in rat nests. It is certainly contemporaneous with the period of large caches and must have belonged to a time about midway in the cave's history. It is thus prehistoric by some centuries, a matter of interest in connection with the famed Pomo development of this technique. Nine feathered pieces came from Lovelock Cave, but Loud gives no detailed description of them; he says only that they came from the deepest levels, that the "feathers were inserted in baskets only at wide intervals," and that the feathers were greenish, "possibly those of either the merganser or mallard."

One fragment, an example of "fine" decorated coiling with an interlocking stitch (45339, pl. 20, *i*), has a foundation of three rods surmounted by a slat. The stitching is very fine, nearly 80 stitches per 10 cm. The materials have not been determined, but the sewing element is hard, glossy, and a bright yellow-orange except for the design, where it is a deep reddish brown. The fragment shows a double chevron at the left edge, and a single line zigzagging to the right.¹⁵ It comes from the east-alcove rat nest.

Single-rod coiling.—Twelve pieces belonging to five or six baskets were found. The foundation of most is a single fairly large peeled willow twig, but some are reinforced with very small rods round the main one, which presumably were put in when the tapering twig became too small. Specimen 42475 is a bottom piece found in or near Cache 7; it has 5 coils and 5 split stitches per cm. and is 3 mm. thick. The exterior is the better side, and the coil is clockwise as one looks at the bottom.

Two other pieces are much alike and probably belong to one basket. They have 30 coils and 46 stitches per 10 cm., the stitches split on the exterior only. The final course is three-rod triangular, heavier than the rest. The exterior is easily the better side, and the direction is counterclockwise as one looks at the bottom. Both pieces show traces of decoration effected by a narrow, black, waxy thread of maidenhair fern. One, 44043 (pl. 20, *h*), was found in damp, rotting rat-nest material in the bottom of the south alcove, the deepest point in the cave. The other, 45355, came from the entrance alcove, which contained much new nest material, including small items of our equipment. The two pieces were thus found as far apart in the cave as was physically possible; if not from the same basket, they are nevertheless of identical technique.

The other single-rod specimens are somewhat coarser. Plate 20, *g*, shows specimen 45135, from section 9, at a depth of 60–66 in.; specimen 44888, from section 8, 30–36 in., is probably from the same basket. These fragments are from a bowl about 18 cm. across, with pitch on the outside and gruel on the inside. The stitches are split neatly and with great regularity, although the work is better on the outside; the direction of work is indeterminate. Six pieces of a small bowl or tray, found in section 12, at a depth of 36–42 in., also have pitch on the outside; they too may belong to the last-mentioned basket. One of the six shows a counter-

¹⁵ More than any other piece from the cave, this one suggests the beautiful Washo coiled basketry in fineness of weave and rich color (Mason, 1904, pp. 466–467 and pls. 179–182).

clockwise direction as one looks at the bottom. One small piece of single-rod coiling was recovered from the dump.

No single-rod basketry was found definitely with a cache, but specimens of it were found at the same depths as the caches. The technique was probably a minor one, contemporaneous with the many pieces of wickerwork and multiple-rod coiled basketry. We found no definite examples of roasting trays in single-rod technique, and no bowls with noninterlocking stitches, both of which are reported from Lovelock Cave.¹⁸

CACHE OF SEWING SPLINTS

Plate 3, *e*, shows a large coiled mass of willow sewing splints of the kind commonly used for coiled basketry. This mass (43343) was recorded as from Cache 29, where it lay on top of a very large piece of wicker burden basket. Specimen 44896 was a bundle of peeled willow twigs about 60 cm. long, bound round the butts with a tule culm. It was found in section 8, at a depth of 30–36 in. The material was all in excellent condition, and once cached was apparently never disturbed.

COILED RINGS, OR STANDS

Two very crudely coiled rings, shaped like truncated cones and suggesting pot stands, were found. Pottery, however, has never been found in this area. Possibly these rings are parts of water bottles, but the inner edge of one (45245, pl. 20, *j*) is a finished selvage. Specimen 43727 (pl. 20, *k*) is 13 cm. across the larger opening and 6 or 7 cm. across the smaller one, and is 3 cm. high; it has black pitch on the outside. It was found on the dump. Specimen 45245 (pl. 20, *j*) is complete but is broken across at one point. The greater diameter is 11 cm., the smaller 7 cm., and the height 3 cm. It came from section 11, at a depth of 24–30 in. It shows wear around the base, or wider opening; the smaller opening is finished with a stick foundation instead of the rod bundle otherwise used on both specimens. Stitches are split on both sides of both rings.

TWINED BASKETRY

Except for the twining variation on wicker basketry described above, all other twined baskets fall readily into two classes: (1) stiff twined and (2) flexible twined.

STIFF TWINED BASKETS

These are of two kinds: (1) pieces in which both the warps and the wefts are spaced some distance apart; and (2) pieces in which the wefts are spaced at 8 mm. to 1 cm. apart, but the warps lie close together. In both, the warps are peeled willow twigs; the wefts are usually smaller, unpeeled twigs. Twisting the wefts often broke the thin bark, giving the work a ragged appearance.

Of 26 pieces in which the warps are well spaced, 3 have simple two-strand wefts (pl. 23, *c*), 1 has 4 strands in 2 pairs; the other 22 are made in three-strand twine. The warps are 1 to 3 cm. apart, 2 cm. being the most usual interval. Weft intervals are 1 to 8 cm., 3 to 5 cm. being usual. The 26 pieces represent not more than 12 baskets, probably fewer. Two distinct uses are indicated. The burden basket is sug-

¹⁸ Loud did not use the terms "interlocking" or "noninterlocking," but his description (Loud and Harrington, 1929, p. 67, 2d par.) and pl. 30, *e*, seem to refer to noninterlocking.

gested by 44173 from section 3 (depth 24–30 in.), and by 42332 from Cache 6. The first fragment is regular openwork fastened to a stick rim by wrapping each warp end two or three times round the stick, then tucking it under the next warp, where that warp is seized by the top row of twine (pl. 23, *a*). The second piece, instead of a stick rim, has a bundle of small twigs laid against the basket selvage and held with a looping willow splint. This selvage was formed by pairing the warps with the last twine course, then carrying the warp pair out and across the adjacent pair, and finally tucking it under the twine of the next pair.

Willow openwork was also used for smaller receptacles, as shown by basket 43745 from the south-alcove rat nest. This basket is nearly complete; shaped like a wasp nest, it is 24 cm. long and 13 cm. wide (its maximum diameter) at the middle, contracting at the mouth to an oval 8 by 4 cm. (pl. 23, *b*). The same number of warps was used from top to bottom; the size of the vessel was increased by increasing the weft interval with each circuit until it reached 4 cm. at the middle of the basket. The interval was then gradually decreased until the mouth was reached, where the interval is only 1 cm. The mouth was constricted by taking with the weft 2 warps at a time on the next to the last circuit, and 3 warps on the last, which also cinched the bent-over warp stubs in groups of three. The weft spirals clockwise, as one looks at the basket from the bottom.

A type of small conical burden basket in willow openwork is suggested by the fragment 45046, found in section 9 at a depth of 24–30 in. (pl. 23, *c*). Though the apex is missing, the warps radiate from a central point, additional warps having been inserted to increase the basket diameter, a method differing from that of the basket just mentioned. Weft intervals are uniform at 18 to 20 mm. diameter, warps at 5 mm. The section is 22 cm. long along the warps. Smaller pieces from Cache 28 may belong to it.

Pieces of this stiff open twining came from as deep as 78 in. in section 6, virtually at the bottom of the deposit; the shallowest came from a depth of 24 in. in both front and back sections. Caches 7 and 28 yielded three small fragments apiece; Caches 5, 6, and 9, one each; and the main cave, 13 fragments besides the four baskets described above.

In the second form of stiff twining, the warps were pulled tightly together (our pl. 23, *d*, and Loud and Harrington, 1929, pl. 31, *g*). The weft interval is consistently 8 to 10 mm. in all fourteen fragments found. Probably all are from one or two baskets. Three pieces from Caches 26 (lower) and 28 and concentration 4, fit into a segment 42 cm. high along the warps. The radiating position of the warps suggests a conical burden basket. Still other pieces came from Caches 5 and 7, concentration 3, the south-alcove rat nest, section 4 (depth 60–66 in.), section 10 (depth 24–30 in.), and two were found in disturbed dirt. A long smear of black paint is visible on several fragments, and the largest (44215, pl. 23, *d*) from section 3 (depth 54–60 in.), has black smears in a series of roughly l-shaped elements.

Most of the stiff open-twined specimens are probably from conical burden baskets used contemporaneously with the overwhelmingly prevalent wicker type. Similar open twining was used for at least one barrel-shaped container (pl. 23, *b*) of the same form as the twined rush bags (pl. 27). The use of a crudely made little conical object of unpeeled twigs (pl. 23, *e*) is unknown, but the piece suggests a child's

attempt to make a miniature burden basket (43323, Cache 28). It is 12 cm. long and 10 cm. across the mouth; the warp ends are bunched and bound with a twig.

FLEXIBLE CLOSE-TWINED: "CATLOW TWINED"

Sixteen specimens from Humboldt Cave appear to agree precisely with the type which Cressman calls "Catlow Twine" (which might better be termed "Catlow Twined") reported by Cressman from several caves in southeastern Oregon (Cressman, 1942, pp. 33-45; figs. 12, 14-19, and 80-85). The principal identifying characters of this interesting basketry are its close weave, flexibility, the use of small two-ply twisted warps of split tule culm, the usual if not invariable pitch of the weft down to the right, and the use of overlay decoration on one or both sides. The type has been very fully described and illustrated and its probable affiliations with soft bags and baskets of the Plateau and Southwest have been discussed (*ibid.*, pp. 43-45). It suffices here to state that in our opinion the Humboldt specimens belong to the specific type Catlow Twined, and are made of the same materials.

The sixteen specimens under consideration apparently belong to five baskets, two of which have overlay decoration. It is possible that the others were decorated; some of the baskets from the Oregon caves have large plain areas between the decorated zones. The only visible motif on the Humboldt fragments is a series of right triangles above a solid band (pl. 25, *b*), a motif also found in Oregon. Table 7, in the "Remarks" column, gives the data on fineness of weave, decoration, and distribution of the fragments.

The small circular plaque shown in plate 25, *a*, is the most nearly complete of the Catlow Twined specimens. This piece, 44373, is flat and is 8.5 cm. in diameter, although the rim is ragged and either unfinished or damaged. The direction of the weft is clockwise as one looks at the better side, and the twist is down to the right in all but one circuit, in which it is up to the right.¹⁷ An interesting technique was used to insert new warps as the size increased. The usual two-ply twisted warps were used in a group extending from center to rim. However, each new warp was begun at the rim and was extended toward the center until it was wedged between the initial ones; it was then allowed to dangle as a loose loop before being returned to the rim as an added warp farther round the plaque. Warps were added in this manner about seven times. These loops appear on the under side in seven more or less concentric rings; each loop crosses one to four warps before reëntering the fabric. The initial warps were doubled at the center but did not pass through the center either singly or in bundles. In this feature the Humboldt Cave specimens also resembled Catlow Twined; and like it, these centers differ from the starting cores of Basket Maker and Plateau soft baskets (sometimes erroneously called "bags").¹⁸

The fragments of Catlow Twined, like those in the Oregon caves, seem to belong to large, shallow baskets or trays, some of them possibly to burden baskets, and not to such articles as cylindrical containers or the hemispherical caps worn by modern Klamath and Modoc Indians.

Fragmentary specimens of Catlow Twined were also recovered from Lovelock Cave, although it is difficult to determine the number. Krieger's count of this

¹⁷ Cressman, 1942, fig. 82, *f* and *g*, presents an excellent photograph of this specimen.

¹⁸ *Ibid.*, figs. 12, 83, and 84.

material in 1938, after it had been brought to Berkeley, mentions 36 specimens, 17 of which had overlay on one or both sides; this did not include, however, the Harrington collection from Lovelock Cave, which was taken to the Museum of the American Indian in New York City and has never been described. The count of 36 includes only such specimens as can be regarded as almost certainly of the specific type Catlow Twined and not the semiflexible specimens which Loud and Harrington refer to as "of the same type but different material as that made by the Klamath,

TABLE 7
CATLOW TWINED BASKETRY IN HUMBOLDT CAVE

	Catalogue No.	Location	Remarks
Basket A	43591	Disturbed surface	Overlay decoration on both sides; very fine texture, about 40 warps and 60 wefts per 10 cm.
	43652a	Dump	
	43652b	Dump	
	43782	Rat nest, east wall	
	43913*	Rat nest, east wall	
	43914*	Rat nest, so. alcove	
	44967	Sec. 8, 42-48 in.	
	45030	Sec. 9, 18-24 in.	
	45031	Sec. 9, 18-24 in.	
Basket B	43137	Cache 26 or rat nest	No overlay; weave fairly coarse, 22 warps and 36 wefts per 10 cm.
	44210	Sec. 3, 48-54 in.	
Basket C	43888*	So. alcove, 24-30 in.	Very soft and flexible; overlay on one side.
	44019	So. alcove, 0-6 in.	
Basket D	44239	Sec. 4, 24-30 in.	Small circular plaque (see text); no overlay; 40 warps and 50 wefts per 10 cm.
	44373*	Sec. 5, 48 in. (from datum 11 ft. 6 in. W and 1 ft. S)	
Basket E	45177	Sec. 10, 36-42 in.	Very flexible, partly because of decay; no overlay

* Illustrated, plate 25.

Modoc, and Pit River Indians today." This semiflexible basketry came from the deeper levels of Lovelock Cave (see "fourth level," p. 22 of Loud and Harrington, 1929) and does not specifically resemble the Catlow Cave and modern Klamath-Modoc twinework, except for a degree of flexibility. The warps are single rather than twisted; the direction of work, pitch of the twine, and so forth, are different; and there is no overlay decoration. No such basketry was found in Humboldt Cave.

Catlow Twined basketry was found only in the upper half of the Humboldt Cave deposit, at a maximum depth of 54 in. (see table 7), whereas all pieces definitely of this type in the Lovelock Cave material examined by Krieger came from surface lots and cache pits near the surface of that cave. None of the 16 Humboldt Cave examples positively came from a cache, although one piece was either from Cache 28 or the rat nest between it and the wall. The available data on this interesting and easily recognized basketry point to a relatively late trait in the west-central Nevada caves, rather than an early one, as Cressman has argued

(Cressman, 1942, pp. 137-140). Or, stated differently, the type was probably adopted in the Lovelock-Humboldt area only in the centuries preceding historic contacts, but whether it was considerably earlier in southeastern Oregon is a point which depends on many factors.¹⁹ Whatever the date to be assigned to this type of basketry, it appears very likely that the type spread from Oregon southward to the Lovelock area; it has not as yet been found farther south or east.

TWINED MATTING, BAGS, AND WALLETS

After basketry, twined rush matting and bag fragments are the most numerous objects found in the cave. Mats are of small diagnostic value here, for a simple twined mat of some sort must have been nearly universal in western North America. In the Great Basin and adjoining regions the techniques were remarkably uniform and simple, and various rushes and sagebrush bark provided abundant material. Two specialized developments of the matting technique were found in both Lovelock and Humboldt caves and are described below.

MATTING

About 304 pieces which are of use in this study were recovered. This does not include some hundreds of torn bits of warp and weft elements, selvage braids, weft loops, knots, and so forth, which must all have once belonged to twined rush mats. Such scraps have not been analyzed or tabulated and are not illustrated here, but their nature may be judged from the Lovelock Cave report (Loud and Harrington, 1929, pls. 35-37). The most nearly complete flat mats from Humboldt Cave are shown in our plate 26 and may be compared with those from Lovelock Cave (*ibid.*, pls. 24-25). Probably the original dimensions and total area of mats varied greatly. The largest fragments measure 125 by 30 cm., 110 by 60 cm., 130 by 40 cm., 95 by 68 cm., 90 by 70 cm., 90 by 25 cm., 80 by 70 cm., and 60 by 45 cm. Cache 5 (lower part) had far more large mat fragments than any other cache. Matting, like coiled and wicker basketry, had been carefully placed in the caches, even though badly mangled.

The uniform character of flat mats in Humboldt and Lovelock caves is shown by the frequency of edging or selvage techniques. Eight treatments of edges were noted at Lovelock (Loud and Harrington, 1929, fig. 12), six of which were found also, with nearly the same frequency, among the Humboldt Cave specimens. Table 8 shows the number of mat fragments of Lovelock selvage types *a* to *h* found in the caches, concentrations, and main deposit of Humboldt Cave; only fragments having two or more weft courses were counted. For the reader's convenience, the totals from Lovelock Cave are given in the last row of the table.

It appears unlikely that there were any temporal distinctions in selvage treatments, to judge from table 8. Cache 7, for example, had selvage types *a*, *c*, *d*, *e*,

¹⁹ Krieger, 1944. The technical similarities between Catlow Twined and modern Klamath-Modoc twined basketry are so close that it is difficult to believe that they are very far apart in time; such minor differences as may appear in the method and in rim finish may be regarded as locally significant.

Two radiocarbon runs for Catlow Cave (sample C-430) gave the following age: 1118 ± 190 years and 798 ± 230 years (average 959 ± 150 yrs.). The Humboldt Cave Catlow Twined was found in the upper half of the cave deposits, which are probably about 1,000 years old, since the total deposit is 1,950 years old (age based on radiocarbon dating, sample C-587).

TABLE 8
FLAT TWINED MAT FRAGMENTS IN HUMBOLDT AND LOVELOCK CAVES

Cache	Selvage type								No selvage	Total no. of fragments
	a	b	c	d	e	f	g	h		
2.....	..	..	1	..	..	..	..	..	2	3
3.....	..	..	1	..	..	..	..	..	5	6
4.....	3	..	..	..	1	..	..	..	21	25
5.....	10	..	..	..	..	..	..	..	30	40
6.....	1	..	..	..	..	..	..	..	2	3
7.....	11	..	5	5	2	1	..	..	68	92
8.....	1	..	..	..	..	..	..	..	7	8
9.....	1	..	..	2	..	..	..	..	8	11
12.....	1	..	..	..	..	..	..	..	7	8
13.....	..	..	..	1	..	..	..	..	1	2
14.....	..	..	..	..	..	..	..	..	3	3
15.....	..	..	..	..	..	..	..	..	6	6
16.....	..	..	1	..	..	..	..	..	5	6
17.....	1	..	..	..	..	..	..	..	7	8
18.....	2	..	..	..	..	..	..	..	2	4
19.....	..	..	..	..	..	..	..	..	6	6
21.....	..	..	..	..	..	..	..	..	4	4
22.....	1	..	..	..	..	..	..	..	1	2
24.....	..	..	..	..	..	..	..	..	1	1
25.....	1	..	..	..	..	..	..	..	3	4
26.....	2	..	3	..	..	..	..	..	12	17
27.....	..	..	..	..	..	..	..	..	6	6
28.....	1	..	..	..	..	..	..	..	2	3
31.....	1	..	..	..	..	..	..	..	13	14
Concentrations 1-6.....	..	..	..	..	1	..	..	..	15	16
Sec. 7, 66-72 in.....	..	..	..	..	..	1	..	..	..	1
Sec. 9, 18-24 in.....	1	..	..	..	..	..	1	..	..	1
Sec. 10, 12-18 in.....	..	..	..	..	..	..	1	..	..	1
Sec. 10, 36-42 in.....	..	..	..	..	..	..	..	..	1	1
Sec. 10, 60-66 in.....	..	..	..	..	1	..	..	..	..	1
Sec. 10, 66-72 in.....	..	..	..	..	..	..	..	..	1	1
Total in Humboldt Cave.....	38	0	11	8	5	1	2	0	239	304
Total in Lovelock Cave.....	38	1	20	2	8	2	1	1	211	284

and *f*. Body weaves were also identical in the two caves except that no three-strand twining was seen at Humboldt and the Lovelock paper reports 14 occurrences. Otherwise, all the twining was simple, with wefts composed of two, three, four, and occasionally more culms. Weft intervals range from 3 to 12 cm., 6 to 10 cm. being most common. In not more than 2 per cent of the Humboldt specimens the technique is a loose diagonal twining. There were no examples of "sewed" matting, made by threading the weft through the warps by means of an awl.

Materials of similar variety were used in both caves. Some mats are loose, very coarsely twined masses of grass or cattail leaves; others are rather nicely made,

compact affairs of small, flat *Juncus* culms. Tule was by far the preferred material, as at Lovelock Cave, with the triangular-stemmed *Scirpus nevadensis* far less common than the round-stemmed *S. lacustris*. *Juncus* was the next most popular material; it was followed by cattail, spike rush, and *Phragmites* cane, in that order. Sagebrush bark, though undoubtedly available in unlimited quantities, was scarcely used at all, only two mat fragments employing it as weft material over *Juncus*-bundle warps. One specimen (43327 from Cache 28) has strips of weasel fur in the selvage.

There is some suggestion that the mats were not always used flat but sometimes were gathered into a cylindrical roll by running a rope back and forth through the weft loops at the edges (see pl. 26, *b*). They could thus have been used as scuttles for carrying wood, roots, and so forth, or—as once suggested to us by Dr. Isabel Kelly—as leggings in cold weather, perhaps for snow travel. The mat of “peculiar oval shape” from Lovelock Cave (Loud and Harrington, 1929, pl. 24, *d*, p. 57) suggests similar uses.

An easily recognized and apparently special form of matting is that shown in plate 25, *e*, and the Lovelock Cave report (Loud and Harrington, 1929, pl. 25, *k* and *l*). The warps are rolled cattail culms (*Typha latifolia*), and the wefts fine *Apocynum* string. Most of the weft intervals are about 1.5 cm. The weft strings are about 1 mm. thick, and were rolled clockwise and twisted counterclockwise, or down to the right, in twining. The finest weave employs 34 warps per 10 cm., and the coarsest 19 warps per 10 cm., with a weft interval of 3.5 cm. This coarsest piece has a three-strand braid of cattail culms all along its edge; it is also the largest fragment, 56 by 41 cm. Another piece is completely smeared with black paint on both sides.

Significantly, all nine specimens of this matting type came from the top twelve inches of the deposit, indicating a definitely late trait here.

BAGS

At least three kinds of containers were made of tule and *Juncus* in a technique similar to that of plain matting, except that a different starting method was necessary. The first of these is a more or less cylindrical bag with conical bottom, the second a pouch open at the side and closed at both ends, and the third a long cylindrical sack with a special weave at the bottom which suggests a cradle.

A similar starting method was used in all. A small ring about 3 cm. across was made by twisting a tule culm. The warp culms, each twice the length of the intended bag, were doubled over this ring and splayed out to form a cone, as in basketmaking. However, to increase the diameter new warps were not added; instead, the weft interval was gradually increased. The weft was a continuation of the ring, or a separate culm doubled over it, continuously twisted over the warps in a spiral, as in any twined receptacle.

Cylindrical.—In these, the intervals between the spiraling wefts increased until the middle and upper part of the bag was reached, then decreased to constrict it somewhat at the mouth. The smallest bag, 42476, has three- and four-strand warp and weft of *Juncus*, a length of 30 cm., a maximum diameter of 15 cm., and a mouth diameter of 12 cm. Another, 43071 (pl. 27, *d*), was made of orange-colored *Juncus*

throughout and is 46 cm. long; the weft, when finished with its circuits, was tied across the mouth to form a convenient handle. Two other bags, 44889 and 44941, 47 and 54 cm. long, respectively, were very loosely twined of flattened tule culms. Specimen 42285 (pl. 27, *b*), 40 cm. long, is the best illustration of the form of these bags. No. 43997 (pl. 27, *c*) is a very stiff open cone of *Juncus*, which probably comes from the bottom of a similar bag. The six specimens come from the middle of the deposit in the cave; three are from caches and three from the main deposit, as follows:

<i>Cat. No.</i>	<i>Location</i>	<i>Cat. No.</i>	<i>Location</i>
42285.....	Cache 5 (lower)	43997.....	Rat nest, so. alcove
42476.....	Cache 7	44889.....	Sec. 8, depth 30-36 in.
43071.....	Cache 25	44941.....	Sec. 8, depth 36-42 in.

With side opening.—The second form of container is a twined tule pouch open at the side. There is only one fairly complete specimen, 42505, from Cache 7 (pl. 27, *e*). It is 55 cm. long; the pocket is 20 cm. deep at the middle. To bind the side opening, the weft was not, of course, twisted in a spiral but, after it had made one circuit, was passed back and forth, leaving a loop at the open edge each time this was reached. Finally, the weft was bound about the loose warps at the other end, securing them. There was still a good length of weft left, and this was then passed back through the loops along the open edges, drawing them up into a closed receptacle. A pouch of this sort would have been convenient for carrying any material which would not fall through the loosely woven culms.

Specimen 42760 from Cache 9 looks like part of a pouch of this kind. Five other fragmentary specimens show the conical end of a receptacle, but it is unknown whether these were open-ended (i.e., cylindrical) or open-sided. Two came from a depth of 36 to 42 in. in sections 3 and 11, two from Cache 7, and one from Cache 5 (lower); all were about in the middle of the cave accumulation.

The Lovelock Cave report (Loud and Harrington, 1929, p. 71) lists 27 "carrying cases" of tule and five of *Juncus*. Four examples of the open-end or cylindrical form are shown by Loud and Harrington (*ibid.*, pl. 26, *c-f*) and one example of the open-side (pl. 26, *g*).

RUSH WALLETS

A complete, tightly twined wallet, the "fisherman's bundle," was found in Cache 22 near the deposit surface. This wallet, 43032 (pl. 24, *j*), contained a mass of fishing tackle, part of which is shown in plate 11. Plate 7, *b*, shows the wallet²⁰ and tackle just as they were first opened in the cave.

The wallet is constructed of cattail rush (*Typha latifolia*) in both warp and weft, except for the substitution of tule for one and a half weft courses, possibly as decorative relief. The warps were probably laid out in concentric parabolas in a flat plane, as were sandal warps (see "Sandals"). The bottom of the U-shaped area thus formed was lifted to form a pucket, or "heel," and the weft was started by doubling over the top warp just to the side of the center line of the heel, then up the opposite side to the top warp. Each subsequent weft circuit was then twined tightly against the preceding one, back and forth across the heel to the ends of the

²⁰ An excellent photograph of this specimen is shown in Cressman, 1942, fig. 82, *e*.

warps, until the whole fabric was drawn into a pocket, open on two edges. The open edges were strengthened with final courses of *Apocynum* cord. There are 33 warps, each a split length of cattail culm, and 51 courses of weft from rim to rim. The length is 21 cm., the greatest width is 15 cm., and the width at the smaller end is 5 cm.

The wallet is unique in Humboldt Cave in being of "V" twining; that is, each course of the weft was twisted in the direction opposite that of the preceding course. At Lovelock Cave (Loud and Harrington, 1929, pl. 22, *b, b', d*) "V" twining appeared on "fine" sandals. No wallets were reported there.

A fragmentary, somewhat similar wallet (45083) came from section 9, at a depth of 30-36 in. It differs from the one described above in that each weft starts from the same edge, going down one side and up the other, then returning. Some of these circuits are "V" twined, but not all. This specimen is rectangular; it lies flat and is open along one edge only. It is somewhat decayed and has been chewed by rats, but it is composed entirely of tule. It is 14 cm. long, 9 cm. wide, and when it is laid out flat it is 12 to 15 cm. thick.

MISCELLANEOUS TEXTILES

TULE CRADLE (?)

The large twined object shown in plate 27, *a* (42495, from Cache 7), has a conical bottom like the cylindrical bags, and a special panel of *Juncus* woven into the side near the bottom. Because of its torn condition the exact original form cannot be ascertained. The warps of the *Juncus* panel were extended upward and twisted into a heavy rope across the top of the panel, then again extended upward, as seen on the right side of the photograph. Since the opposite side is missing, we cannot determine whether this rope edging was carried round an open "window" in the front of the bag, but this seems probable. Use of the object as a cradle with a large opening in the front is indicated, the *Juncus* panel below it serving, presumably, as decoration. The total length is 85 cm., or about 34 in. Another fragment from Cache 7, specimen 42558, has a similar panel of *Juncus*. Neither had any grass padding in the bottom, but the general idea of a cradle of this form is similar to that reported by Kidder and Guernsey (1919, pp. 164-166, pls. 72, 73, *b*) from a Basket Maker cave of northeastern Arizona. Some of the loosely twined cradles found there were made of grass and yucca fiber, others of cedar bark; some had grass and cedar-bark padding in the bottom. One example is 33 in. long by 21 in. wide.

PARTS OF STICK CRADLES (?)

The long, straight stick shown in plate 12, *j*, is grooved round both ends and is probably a cross stick from a rigid cradle. There are 9 such sticks from Humboldt Cave. All are of willow, most of them peeled or scraped. They are uniformly 41.5 cm. long and 10 mm. in diameter, with a groove 6 to 8 mm. wide and 1 to 2 mm. deep about 5 mm. from each end. These may represent prepared slats formed before the actual manufacture of the cradle. Specimens were found in the following localities: section 8, at a depth of 24-30 in. (1); Cache 7 (2), Cache 27 (2), south-alcove rat nest, 24-40 in. (1); section 9, 36-42 in. (1); no location (2).

Kidder and Guernsey (1919, pp. 107-108, pl. 42) and Martin *et al.* (1952, fig. 123) illustrate such cradles, and the Lovelock Cave report (Loud and Harrington, 1929, pl. 47, *t*) shows a series of grooved sticks which could also have come from such a cradle. The stick in plate 12, *j* (43730), came from disturbed deposit. The sharply curved stick shown above it (pl. 12, *g*) might also have been part of the semi-circular curved frame at the head of a cradle like that shown by Kidder and Guernsey. This specimen, 44214, came from section 3, at a depth of 48-54 in.

ROPES, BRAIDS, CORDAGE, KNOTS, AND NETS

No attempt is made in this paper to analyze the several hundred specimens which may be variously termed ropes, braids, cords, and so on, both plain and knotted. It is enough to say here that their nature and variety is analogous to those of Lovelock Cave (Loud and Harrington, 1929, pp. 72-87, pls. 35-40). It appears to us that a careful study and depth tabulation of these objects (aside from knots) is a waste of time unless their functional association can be determined. Thus, in Humboldt Cave, there were about four hundred pieces of twisted and braided rush of one kind or another, which are merely fragments of wefts from baskets, mats, bags, and the like and can offer nothing new in the way of information. Many more specimens are pieces of string which came from mat wefts, bird-skin robes, netting, fishline, and so forth. The braids discussed in the Lovelock paper are obviously torn selvages from baskets and mats, as well as tie strings and edge loops from mats and sandals. As far as string or knots of tule and other rush culms are concerned, Humboldt Cave has produced nothing to add to the Lovelock study. The largest piece of netting recovered is shown in plate 25, *f*. The two rush specimens shown in plate 28, *g* and *h*, apparently once were attached to a round object like a stick, but their purpose cannot now be identified.

APOCYNUM FABRIC

A finger-woven textile (pl. 24, *i*) from Humboldt Cave (43774) has been separately described and illustrated (O'Neale, 1947). It is tentatively identified as a sling pocket, an identification made somewhat more probable in view of the sling pocket of similar construction recovered by Loud from Lovelock Cave (Heizer and Johnson, 1952). Another sling pocket from Humboldt Cave is described here in Appendix II (illustrated in pl. 24, *k*).

AESTHETIC COMPLEX

DRESS AND ORNAMENT

Sandals.—Four fairly complete sandals and eight fragments were found. All are of tule except two fragments (from the same sandal?) that are made of *Juncus* bundles. All are similar in material and technique to what Loud called the “coarser and heavier type” of Lovelock Cave. The V-twined, or “finer type,” from Lovelock (Loud and Harrington, 1929, pls. 22, *b, d*; 23, *a*) was not seen here. No sandals of sagebrush bark were found.

The construction of sole and toe flap is the same in all four complete sandals, and apparently so in all fragments. The tie loops and seizing show variations, which will be mentioned.

The warps generally consist of two, three, or four large, mature, and tough tule culms twisted rope-fashion to hold them together. In making the sandal, warps were used which were about three times the length of the completed sandal. They were doubled and placed in a series of concentric parabolas, or U-shaped area, so that the arms of the U were about one and a half times the sandal length. A single warp was placed down the middle of this arrangement; hence the number of warps counting across the sole is always odd. In the Humboldt sandals, it ranges from 9 to 13 (i.e., 4 to 6 actual warp lengths, each doubled, with one down the middle).²¹

Weft elements differ in thickness. Sandal 42314 (pl. 28, *j*) is made from 4 light culms twisted in pairs; 42561 from 6 culms twisted in 3's, forming a very stout and tough weave (pl. 28, *i*).

In twining the sole, the U-shaped area formed by the warps was bent upward at the bottom to form a heel pucket. The pucket reaches forward to about the middle of the sole, the front half of which is flat. First, the weft was doubled over the top warp of the pucket, just to the side of the middle line of the sandal; then it was brought downward to the sole at the bottom of the pucket and up the pucket on the other side of the middle line to a point near where it started. The twist was always counterclockwise, or down to the right. The weft was then turned back across the warps of the pucket to the sole at the bottom and back to the rim, crowded closely against the first course. The twining proceeded back and forth across the warps in this manner, first round the heel pucket and then across the flat sole, until the sole was completed. At irregular intervals the weft was left to dangle in a loose loop at the edge before going back into the sole, precisely in the way mats and bags were made. The technique could easily have been V-twining if the sandal had been turned end to end for each crossing, but, as we have said, there are no examples of this.

The sole complete, the weft was knotted at a front corner to cinch the weave. The warp culms, which had been carried in small bundles down the sole, were now separated, and all were bent back over the foot to form a toe flap. The weft, after being knotted, was now carried back and forth across the toe flap, twisted over each

²¹ Use of this element in the middle provides the only technical point of difference between these sandals and those of the “multiple-warp type” from the Catlow Valley caves of southeastern Oregon (Cressman, 1942, p. 58 and fig. 91, *f-k*). The warps of the Oregon sandals number 8 to 14; i.e., 4 to 7 doubled-back warps in parabolic arrangement without an odd one in the middle. We have not had an opportunity to check this feature in the Lovelock sandals of “fine” and “coarse” weave.

culm separately. The resultant finer weave can be seen in plate 28, *i* and *j*. The toe flap was then trimmed on three sides, but there was no attempt to bind down its edges; rather, it was held down on the foot by a rope of tule knotted to a front corner of the sole and passed back and forth through the loops (pl. 28, *i* and *j*) along the sole edges. The four nearly complete sandals are further equipped with a stiff braid of tule which, attached only at the front corner under the toe flap, runs along the side of the sandal. The purpose of this braid (clearly visible in the middle of specimen 42314, pl. 28, *j*) is unknown. It may have been brought up between the toes as an additional means of holding the sandal tight, but in three fragments it runs along close to the edge. In three sandals it is tied to the right front corner; in the fourth, to the left front corner (42561).

There are some variations in the method of making loops at the edges. In most of the pieces, the weft was left dangling out at intervals, but sandal 43470 has a separate rope tied into the sole on one edge. Sandal 42561 (pl. 28, *i*) has separate tule ropes along its edges, which are caught under the weft at intervals.

The distribution of sandals and sandal fragments is given below.

Catalogue No.	Location	Remarks
42314.....	Cache 5, lower	30 × 15 cm.; worn through at heel and toes (pl. 28, <i>j</i>)
42561.....	Cache 7	28 × 14 cm.; worn through at heel
43080.....	Cache 25	28 × 14 cm.; worn and caked
43470.....	Concentration 3	28 × 15 cm.; badly worn
42092.....	Cache 2	Sole fragment, all <i>Juncus</i>
42562, 42563.....	Cache 7	Sole fragments
42564.....	Cache 7	Sole with warps of <i>Juncus</i> bundle; wefts 5- and 6-strand <i>Juncus</i> in pairs
43144.....	Cache 26, lower	Sole fragment
43484.....	Cache 4	Sole fragment
43976.....	Rat nest, so. alcove	Sole fragment
45179.....	Sec. 10, depth 36-42 in.	Sole fragment

From this tabulation it is clear that this sandal type, equivalent to the Lovelock "coarse type" and the Catlow Valley caves "multiple-warp type," was a trait of the cache-making occupants of Humboldt Cave. The chief characteristics of the type are: the parabolic arrangement of the warps; the beginning of the weft at the upper warp of the heel pucker and its passage down the heel and then up the opposite side before going back and forth across the sole proper; the turning of the warp ends back over the foot after the sole is complete and twining the weft-fibers across them without fastening them to the sole; and the method of tying by passing a rope back through loops in the sandal edges. The practical identity of this sandal form in the Nevada and southeastern Oregon caves is doubtless evidence of historical connection between the two areas.

Two fragments which may be sandal soles are woven in a sort of openwork that switches inconsistently between regular and diagonal twining (see Loud and Harrington, 1929, pl. 22, *a*). Specimen 43793 was found in the south-alcove rat nest, and 44117 in section 2, at a depth of 24-30 in.; hence neither offers any clue to relative position.

For warmth or to soften the interior, sandal soles and toe flaps were commonly lined with cattail fuzz, grass, shredded sagebrush bark, or the soft inner bark of cottonwood. Masses and sweat-caked wads of such material, especially of cattail fuzz (pl. 28, *k*), were found in many caches and concentrations, as well as in layer cuts in the upper half of the deposit.

Moccasin fragment.—A worn and twice-repaired piece of sole from a hide moccasin (44044) was recovered from the deep pocket of decomposed rat-nest material at the back of the south alcove, 90 in. below datum. This was the deepest point excavated. It should be remembered, however, that two identical fragments of single-rod basket, very like modern Washo and almost without doubt from the same basket, came from two rat nests: one on the surface at the entrance; the other, the deep remote pocket that held the moccasin sole. The agility of pack rats is not to be underestimated!

The moccasin fragment in question is probably deerskin or mountain-sheep skin, with the hair removed. When the original moccasin sole was worn through, a new piece of hide was fastened over it by punching holes in both pieces and passing thongs through both thicknesses and then knotting the thongs tightly. They were knotted twice, once on each side of the original sole (pl. 28, *l*). The one hide moccasin fragment from Lovelock Cave (Loud and Harrington, 1929, p. 47) had been mended in this fashion no less than eight times.

Apron.—One object was found which may be a small apron for a woman or girl. It consists of warp bundles of shredded sagebrush bark held together with a course of twining about 2 in. below the first course; below the second course, the shredded material hangs in a loose mass. The "apron" is only 5 in. wide at the top and 6 or 7 in. long. This specimen, 45360 (pl. 24, *l*), came from the rat nest by the cave entrance and is one of the very rare objects of sagebrush bark from this cave. Otherwise, it does not differ from the three mentioned in the Lovelock Cave report (Loud and Harrington, 1929, pp. 53-54, pl. 19, *a-c*).

Feather robes.—Two bird-skin robes were found, both fragmentary but complete enough for us to judge the size and method of manufacture. Scattered strips of twisted rabbit fur indicate that robes of this material were also made. Lovelock Cave yielded 198 "specimens" of fur and feather "blankets" (Loud and Harrington, 1929, pp. 50-53), but these included many tiny bits. That cave did, however, yield several beautiful robes of mole, muskrat, and meadow-mouse fur, as well as those of rabbitskin and bird skin.

The "shaman's cache" (Cache 13) just below the surface of Humboldt Cave contained the better of the two robes we found. Except for having fallen apart in places, it is well preserved. This specimen (42823) is not illustrated here, for Lovelock Cave examples (Loud and Harrington, 1929, pls. 17, *a*; 18, *a*) suffice to show the general appearance. If the loose parts are placed in their probable position, the robe is approximately 150 by 100 cm., or 60 by 40 in. The warps are strips of duck (?) skin cut in a continuous spiral so as to get the longest possible strip. These strips are some 2 m. in length and only 1 to 2 cm. wide; in drying they curled somewhat but were apparently not twisted. To make a continuous warp the strips were not tied together but were placed so as to overlap slightly end to end; they were held together by the curling as the skins dried, or by the weft. The warp

was thus continuous from the starting corner to the opposite one, running back and forth the length of the robe. This suggests that it may have been woven on a frame of two upright poles, on which the warp passed back and forth from pole to pole in a vertical plane, and the weft was carried up and down from one end to the other. There is, however, no direct evidence of this.

The weft of this specimen looks like the hoard of a prehistoric string saver. It, too, was continuous and was made up of every variety of *Apocynum* fiber cord to be found in the cave—small and large, short and long, single and double—with innumerable knots. The weft passes back and forth across the robe exactly as in matting, the strands being twisted over the warps; in this piece, however, the weft does not hang out in loops at the edges. The weft elements were often twisted two or three times or were knotted between the warps to hold the fabric more tightly. The twist is consistently counterclockwise, or down to the right.

The head of a canvasback duck (44697), stuffed with grass, lay between the folds of this duck (?) skin robe. The mandible is tied to the bill with a small quill passed through the nostrils. Loud (in Loud and Harrington, 1929, p. 49) suggests that this was to keep the mandible from falling off, but Professor E. W. Gifford suggests that it could have been a magical device, that is, a device to keep the duck's spirit silenced. The head may once have been tied to the robe as an ornament or amulet, it may have been an item in the shaman's paraphernalia, or it may merely be part of a decoy.

Another bird-skin robe, 42315, came from Cache 5, lower part. It is now an unsightly mass of string and feathers chewed down to the bare shafts by insects. Unlike the preceding specimen, the skin strips of this robe were rolled and twisted together with many small cords into a continuous strip. Through five warps a sandy-brown rabbitskin was substituted for bird skin. The weft cords are light, only 1 mm. to 2 mm. thick, and for two courses a fine netting of small mesh was rolled up and used for one element. This robe is more torn than the other, but warp and weft appear to be likewise continuous. The dimensions were no less than 60 by 50 cm. (24 by 20 in.), and may have been more.

The second specimen shows that at least the twisted form of bird-skin robe was made in the period of bulky cache making. The historical significance of the appearance of the other, nontwisted, form in the "shaman's cache" near the surface cannot be determined with so few specimens. Loud describes a blanket of twisted bird skin from Lovelock Cave (Loud and Harrington, 1929, p. 52, pl. 18, *b*) but does not give exact proportions of twisted and nontwisted skin warps nor any data on their stratigraphic positions.

Hairbrush.—No. 43397 (pl. 28, *d*) is a round brush made by wrapping an *Apocynum* string round the middle of a bundle of short lengths of some small, stiff, segmented grass. It is 12 cm. long and 2 cm. in diameter. A number of human hairs caught in the bundle identify it as a brush for the hair.

Pine-nut beads.—One hundred and seventy-five beads made from the hard seed of *Pinus sabiniana* (pl. 28, *f*) were recovered from Humboldt Cave. They are all of the same type and are of uniform size (average 18 mm. long). One end is rubbed off, and a second hole is punched cleanly, or drilled, in the wall of the shell near the holed end.

Pinus sabiniana does not grow in the Humboldt region but far to the west in the Sierra. The presence of the beads at depths of 66–72 in. in section 9 and of 54–60 in. in section 10 suggests that the beads were being used at the time the bulky caches in these sections were deposited. Most of the beads found *in situ* were at shallow depths; by far the largest number are from rat nests. The shiny nuts were probably attractive to the pack rats. It would appear from both the horizontal and the vertical distribution that these beads were known and used mainly during the later part of the cave's occupancy. Farther west and north these beads have been found in what appear to be very late prehistoric deposits (Heizer, 1942, p. 126). The beads are small and might easily become scattered and sifted through the loose deposits to various depths, and it might be argued that the 175 beads recovered represent a single uniform-type trade lot. This assumption is, however, partly nullified by the observation that the nut beads vary widely in color, degree of polish, and amount of wear, for this variation indicates a series of separate introductions.

Shell beads.—Two shell beads were recovered, both *Olivella biplicata*, a Pacific species. Both were at shallow depths, suggesting a late trait. No. 44099 (sec. 2, depth 6–12 in.) is a whole shell with the spire ground down to expose a hole through which a string was passed. The other, 44163 (sec. 3, depth 12–18 in.), was cut from the side of an *Olivella*. It was cut from the broad back opposite the orifice and thus forms a shallow basin. The edges are untrimmed, and the perforation is crudely punched. This, too, is a common bead type in California.

Flat perforated horn "pendant."—No. 43775 (pl. 9, f) is a horn plate only 2 mm. thick. One end is rounded, the other squared. It is 120 mm. long and 45 mm. wide and has 90 holes, 5 mm. in diameter, drilled through it. It is very delicate and could be of little utilitarian value. It is perhaps a pendant used as a decoration (cf. Loud and Harrington, 1929, pl. 14).

No. 45371 is a flat, worked section of sheephorn. The surfaces and edges are smoothed, the ends roughly worked down and rounded off. It measures 113 by 57 by 9 mm. It is perhaps a horn implement or ornament that was never completed.

Pigments.—Thirteen lumps of earth or clay presumably used as pigment were found.

Hand-molded, unfired white clay lumps.....	2
White paint lumps	2
Red paint lumps	8
Yellow paint lumps	1
	—
Total.....	13

No. 43774 is a molded lump of finely ground white earth which feels like talc. It is 130 mm. long, 85 mm. in diameter, and weighs 721 gr. It is comprised of three parts: the gray-and-white center is surrounded by a light-brown earth on one side and pinkish earth on the other. Apparently about one-third of the original lump is missing. The colors suggest that this was a mass of paint pigments, sections of which could be broken off and used as needed. A similar object (42617, pl. 31, g) is a molded cylinder of white earth, 86 mm. long, 40 mm. in diameter, and weighing 132 gr. When it is rubbed, a white powder is formed. No. 45233 is similar to 42617,

though it is less carefully molded. It is of white earth and is roughly rectangular, 55 by 30 mm. No. 45148 is a small flat lump of diatomaceous earth with a scraped surface. Nos. 44929, 44930, 42619-21, 43624, 45404, and 44413 are all red-ocher lumps, aggregating 99.3 gr.; on an average they are the size of a man's thumb. No. 43687 is a flat section (50 by 45 by 6 mm.) of very fine, yellow sandstone. One surface shows scratch marks. When it is rubbed with the finger, a yellow powder comes off.

<i>Catalogue No.</i>	<i>Location</i>	<i>Depth</i>
43744.....	Cache 26	.....
42619-21.....	Cache 7	.....
42617.....	Cache 7	.....
43624.....	Cache 26	.....
45233.....	Sec. 11	12-18 in.
45148.....	Sec. 10	6-12 in.
44929.....	Sec. 8	30-40 in.
44930.....	Sec. 8	30-40 in.
45404.....	Sec. 5	54-60 in.
44413.....	Sec. 5	54-60 in.
43687.....	.....	.....

Galena.—A chunk of galena 55 by 45 by 20 mm. was found in Cache 5-B. One face is smoothed, as if it had been ground off. The bright particles thus removed may have been used for personal decoration.

Paint palette.—In the collection of Arthur Green of Lovelock, Nevada, is a flattish pine slab, which he dug from Humboldt Cave in 1930. Seven cup-shaped depressions in the surface, each about 7 cm. in diameter and 0.5 cm. deep, show traces of colored pigments, which include white, red, green, and black. This slab obviously served the purpose of a palette for mixing pigments, which were probably used for painting the face and body. The slab is about 60 cm. long, 24 cm. wide, and 6 cm. thick.

Hoofs for rattle (?).—Five deer hoofs or dewclaws (43683, 44326, 43682, 45067, 43800) were found. In each the top has been knocked or ground off, leaving a hole where a string might be run through. One piece (43682) has such a piece of string, broken at the perforation and knotted inside to keep it from pulling through the hole. Such dewclaws were probably used as pendants on dresses or as parts of the widely used deer-hoof rattle.

<i>Catalogue No.</i>	<i>Location</i>
43683.....	.....
44326.....	Sec. 4, depth unknown
43682.....	.....
45067.....	Sec. 9, 24-30 in.
43800.....	Rat nest, so. alcove

Wrapped seed heads.—From Cache 22 came two spirally wrapped cylinders of sagebrush (*Artemesia*) seed heads (pl. 29, *b*). One (43048), which is 1.5 cm. in diameter and 69 cm. long, forms a continuous band (pl. 29, *b*, right). Mixed in with the tightly compressed seed heads are bits of bird down, and a few human hairs are caught in the spiral rush wrapping. The second piece (43047) is like the first in construction but is 44 cm. long and has free ends and a loose length of rush

wrapping (pl. 29, *b*, left). Here, as in the first specimen, there is down mixed with the seeds, and an occasional human hair is caught in the wrapping.

It is almost certain that both pieces were headbands. They may have been used as a part of ceremonial dress by a shaman engaged in some food-increase rite, or they may have been used by a pubescent girl. The fact that they occurred in the "shaman's cache" constitutes a priori grounds for assuming that their function was ceremonial.

Flat, spatulate slate or stone objects.—Four of these unusual objects (shown in pl. 31, *a-c*) were found wrapped in a skin pouch in Cache 13; they are almost certainly of ritual or ceremonial function. They are all made of thin slate slabs. No. 42837 (pl. 31, *b*) is 77 mm. long, 26 mm. wide, and 5 mm. thick. It is nicely polished, and one surface has a faintly incised line along the edge. No. 42838 (not illustrated) is 113 mm. long, 38 mm. wide, and 5 mm. thick. The edges are nicely rounded and the flat surfaces much smoothed. No. 42839 (pl. 31, *c*) is 130 mm. long, 32 mm. wide, and 5 mm. thick. No. 42840 (pl. 31, *a*), unlike the others, is of brown slate. In shape it is similar to 42837, but it is larger: 127 mm. long, 24 mm. wide, and 5 mm. thick. Similar to this specimen is 44071, which is 93 mm. long, 46 mm. wide, and 9 mm. thick. The surface shows scratch marks and the edges are nicely worked. No. 45155, of white altered sandstone, is 135 by 43 by 5 mm. No. 45373 is a fragmentary specimen, 75 mm. long, 45 mm. wide, and 10 mm. thick. The surfaces show definite lateral scratch marks. Three other pieces—43628, 44470, 44698—are smoothed by much handling and bear traces of red paint stain. They are natural flat slate pieces.

<i>Catalogue No.</i>	<i>Location</i>	<i>Depth</i>
44179.....	Sec. 3	24-30 in.
44735.....	Sec. 7	30 in.
42850.....	Cache 13	29 in.
44109.....	Sec. 2	23 in.
44345.....	Sec. 4	27 in.
45095.....	Sec. 9	32 in.
43629.....	.....	.....
42837-40.....	Cache 13	29 in.
44071.....	Sec. 1	6-12 in.
45155.....	.....	.....
45373.....	Rat nest	.....
43628.....	Cache 26	.....
44470.....	Sec. 6	12-18 in.
44698.....	Sec. 7	12-18 in.

BONE WHISTLES AND TUBES

Bird-bone whistles.—Two complete and one broken whistle were recovered. No. 43752 (pl. 30, *k*) is of polished bird bone with nicely rounded ends. It is 133 mm. long and 9 mm. in diameter. The hole is deeply cut, quite large, and noticeably long. No. 45370 (pl. 30, *l*) is similar and measures 134 mm. in length and 9 mm. in diameter. The hole is of the same kind but is much nearer the end than in the preceding specimen. The stops are gone, but it may be presumed that these two produced different tones. No. 45381 is very fragmentary and is mentioned only to record an additional occurrence of a whistle in the cave. All specimens came from rat-nest deposits.

Bone tubes.—A cache of four tubes (45015a-d) was found in section 9, at a depth of 12-18 in. Three are made of coyote humeri, the fourth (45015a) of coyote femur. The ends of each have been cut off but remain unpolished, and the surfaces still show some remnants of attached tendons, and so forth. Their measurements are as follows: 45015a, length 121 mm., diameter 11 mm.; 45015b, 106 by 14 mm.; 45015c, 108 by 13 mm.; 45015d, 80 by 11 mm. They are shown in plate 30, *c-f*.

Two identical bird ulnae with cut and polished ends were found in different parts of the cave: 45290 came from section 11, at a depth of 36-42 in.; 43751 was found in the south-alcove rat nest. They are 113 mm. long and 6 mm. in diameter. Perhaps they were originally a matched pair, which later got separated and found resting places in different parts of the deposits.

A bone tube (42828, pl. 30, *a*) of pelican (?) ulna came from Cache 13. It is 177 mm. long and 12 mm. in diameter and is highly polished, although the ends are somewhat rough. It is possibly a drinking tube.

Two tubes (43741, 44061) differing in size but both of the same kind of bone were found in the south-alcove rat nest and section 11 (depth 32 in.), respectively. The bone is possibly a large pelican humerus. No. 43741 (pl. 30, *g*) is 55 mm. long and slightly elliptical, the least diameter being 15 mm. No. 44061 (pl. 30, *b*) is 111 mm. long and 17 mm. in diameter.

Miscellaneous bone objects.—No. 44355 is a fragment of a bird-bone tube. It was found in an ashpit in section 5, at a depth of 30-36 in., and is carbonized. Nos. 45299 and 42792 are tubes of bird bone, from which the ends have been broken off. Their classification as artifacts is doubtful. No. 44074 (pl. 30, *j*) is a bird bone 100 mm. long and 12 mm. in diameter, with roughly broken ends. Two opposite longitudinal cut grooves show that this bone was in the process of being split.

No. 43879 (pl. 30, *h*) is a small bone, 48 mm. long and 5 mm. in diameter, with five deep encircling grooves. This is perhaps a bone from which beads were being made. If these were to be beads, they would be 8 mm. long and 5 mm. in diameter. No. 45369 (pl. 30, *i*) is similar to 43879. It is 48 mm. long and 8 mm. in diameter and shows six grooves. Beads cut from this bone would be 7 mm. long and 8 mm. in diameter.

A piece (44072) similar to the thatch needle shown in plate 10, *g*, has a shovel-shaped point, but the other end is missing. No. 44841 (pl. 10, *m*), 77 by 11 by 5 mm., is made of animal bone. The ends are somewhat rounded. No use is suggested. Two small leg bones, probably rabbit fibulae (44242), 115 mm. long, have been tied together at one end with a single-strand wrap of small rush.

<i>Catalogue No.</i>	<i>Location</i>	<i>Depth</i>
45299.....	Sec. 11	36-42 in.
42792.....	Cache 9	59 in.
44074.....	Sec. 1	12-18 in.
43879.....	Rat nest, so. alcove	.....
45369.....	Rat nest, entrance	.....
44072.....	Sec. 1	6-12 in.
44841.....	Sec. 8	0-6 in.
45223.....	Sec. 10	66-72 in.
44242.....	Sec. 4	27 in.

TUBULAR STONE PIPES

Plate 31, *f*, illustrates a complete pipe (44109) made of black fine-grained scoria. Its small size is remarkable: length 25 mm., outside bowl diameter 24 mm., outside stem diameter 15 mm. The bowl is 12 mm. deep and has a thin adherent hard "cake." The stem is missing, but a coating (pitch ?) at the stem end suggests that one was formerly present and was attached by an adhesive and fine binding. An incised ring encircles the bowl just below the edge, and the outer walls are incised in a herringbone pattern. Plate 31, *e* (44345), shows the other complete pipe found in the cave. It is made of a dense, fine-grained, red volcanic rock. It is also rather small: length 37 mm., outside bowl diameter 18 mm., outside stem-end diameter 8 mm. The bowl is 12 mm. deep and shows a thin "cake." There is no indication of a stem, and the exterior is undecorated. This, like the preceding specimen, is biconically drilled. Plate 31, *d*, shows an incomplete pipe (45095) made of pink volcanic tuff. It is cylindrical: length 74 mm., bowl diameter 42 mm., and stem diameter 34 mm. Drilling had just begun—in the center of the bowl end is a conical pit 9 mm. in diameter and 7 mm. in depth. The exterior has a tendency to exfoliate, and some saline deposit has leached out and formed on the surface. Perhaps the aboriginal manufacturer noticed that the material was unsuitable and gave up the attempt. The second uncompleted pipe (43629) is a cylinder, 21 mm. in diameter and 28 mm. long, with a badly directed perforation, 9 mm. in diameter and 17 mm. deep. It is made of a white, soft, earthlike material (limestone ?).

GAME DARTS

Six specimens which resemble double-ended foreshafts (pl. 13, *d*, *g*, *h*) were recovered (see "Distribution of Aesthetic-Complex Traits," below). They show uniformly the same technology, and all are of greasewood. A thick length of greasewood has been drawn to a point on each end, leaving in the center a cylindrical, unworked section. Specimens are illustrated in plate 13.

<i>Catalogue No.</i>	<i>Length (mm.)</i>	<i>Diameter (mm.)</i>	<i>Location</i>
43253.....	92	12	Cache 27
42609.....	210	10	Cache 7
42804.....	...	10	Cache 10
45093.....	150	14	Sec. 9, 34 in.
43680.....	85	10	Rat nest, so. alcove
43770.....	170	13	.....

DISTRIBUTION OF TRAITS

It is important to call attention to similarities between the prehistoric cultures of the lower Humboldt Valley, Nevada, and the surrounding regions. To the north lies the southern Oregon region, which we are beginning to know from the work of Cressman and his associates. Eastward across the Nevada line in Utah, around the borders of Salt Lake—and separated from the Humboldt Valley by a gap several hundred miles wide in which no archaeological work has been done—are the northern Utah caves excavated by J. H. Steward, E. R. Smith, and J. D. Jennings. To the west, on the other side of the Sierra Nevada, lies central California, the archaeological past of which is only now being outlined by workers at the University of California. Far to the south is the Southwest, with its full archaeological record. It will thus be seen that west-central Nevada is so situated strategically that cultural influences could have been received from all sides, and indeed this appears actually to have happened.

In the ethnographical and archaeological literature a number of opinions have already been expressed about the position of the west-central Nevada region within the larger framework of western North America. Thus, on the basis of analysis of crisis rites and certain aspects of social organization, Lowie (1923, p. 156) concluded: "The Plateau Shoshoneans reveal far-reaching relations to the Californian peoples. A wider survey suggests that both these groups, together with other Far Western tribes, may perhaps be conveniently united as representing a single basic ultramontane culture area or stratum. . . ." Kroeber (1939, p. 50) echoes this when he says that

the relation of California to the Basin, which cannot be denied, is best viewed as resting on an early kinship of Californian and primitive Basin-Southwest cultures. In part, influences flower from the latter into California, resulting in growths like that of Yokuts-Mono pottery. In part, perhaps, reciprocal influences flowed from California into the Basin, as specific Pueblo influences retracted there. In the main, however, the California and Basin cultures are alike because they have not risen very far above their early, closely related forms.

Somewhat earlier, Kroeber (1925, pp. 915–917) tied Central California and the Great Basin area together as regions which had a low-level cultural unity, and between which mutual influences had diffused. In the editorial preface to the Lovelock Cave report (Loud and Harrington, 1929, p. vii), Kroeber stated: "It was obvious on casual inspection that the ancient culture represented had strong relations with the native culture of California in historic times," and went on to add: "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 . . . of affiliations in another direction. . . ."

W. Z. Park (1938, p. 157), in his monograph on shamanism, observes:

The affiliations in western North America cut across the conventional boundaries of culture areas. Moreover, it must be recognized that although many of the similarities upon which this conclusion is based are referable to a common basic stock of generalized culture content, important interrelationships of localized blocks of cultures have resulted in far-reaching alterations of and additions to the widely occurring simple elements. . . .

For additional analysis, see Park (1941).

The Southwestern affiliations of the Lovelock Cave culture were immediately apparent to Harrington (Loud and Harrington, 1929, pp. 110-123), who proposed (p. 121):

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". . .

Kroeber (1939, p. 50) cautions that "significant affinities must not be stretched into identification. The Lovelock culture is *not* classical Arizona-New Mexico Basket-Maker culture."

Steward (1940, pp. 464-466) in his admirable synthesis of the historical development and differentiation of the culture of the intermontane (Great Basin) area has offered us a reconstruction of the sequential history of Lovelock Cave with specific reference to the Southwest (Basket Maker and Pueblo) culture continuum content:

The most important site in this Western Nevada region is Lovelock Cave which lies in an ancient shore terrace of Lake Lahontan (Loud and Harrington, 1929). This cave, according to the stratigraphy established by Harrington, seems to provide the crucial links between Basket Maker and recent Shoshonean culture.

Although the deepest Lovelock artifacts occur close to Lahontan clays, there is nothing about them to suggest great antiquity. To the contrary, Harrington's chronology shows three periods, the earliest of which is sufficiently similar to Southwestern Basket Maker to leave no doubt of historical connection and approximate contemporaneity (Harrington, *in* Loud and Harrington, 1929, pp. 1-28).

The early period culture [of Lovelock] is directly related to Basket Maker in the subsistence complex (lacking mainly horticulture) and in several other features. It shares with Basket Maker the atlatl, darts with bone and bunt points, double-curved wooden clubs, rabbit nets, 3- and 4-rod coiled baskets, with conical, tray, bowl-shaped, and jug-shaped forms, storage and burial cists, mountain sheep horn "sickles," and woven fur cloth. As several of these elements may have reached the Basket Maker from Mexico—clubs, nets, and weaving—and as they have not yet been found in sites demonstrably earlier than Basket Maker, it is possible that diffusion was predominantly from the Southwest to western Nevada rather than the reverse. New evidence may, of course, require reversal of judgment of the history of any of these elements.

Because of the many Basket Maker traits of Lovelock Cave, it has been suggested by several writers that the early period be called Basket Maker I. This view is untenable for several reasons: First, the distinctive Basket Maker skeletal type does not occur at Lovelock; second, if Lovelock acquired its Basket Maker traits from the Southwest, it must be later than, or marginal to, it; third, it lacked horticulture, the Basket Maker style metate, and finely woven bags and sandals; and fourth, it possessed such non-Basket Maker traits as fish (?) nets, possibly fishhooks, feather ornamentation on coiled basketry, soft twined baskets, L-shaped awls, and probably others that cannot at present be placed in the chronological scheme. In short, it was a local adaptation of some Basket Maker and some central California and probably other features. Although with reference to the Southwest it was, as Harrington suggested, "sub-Basket Maker" (Harrington, *in* Loud and Harrington, 1929, p. 121), it was definitely not Basket Maker I in the sense of ancestral Basket Maker and should not, in the writer's opinion, be called Basket Maker of any kind.

During the period of Developmental Pueblo in the Southwest, Anasazi traits were spread throughout a wide territory. Transitional Lovelock seems to correspond to this period. Snares, cloth of both bird skin and bird feathers wrapped on cords, and tubular pipes were probably derived from the Southwest. Stone balls perhaps came from the Northern Periphery, which, by

this time, had an Anasazi culture with this element. The bow and arrow was introduced, perhaps from the north, and used in addition to the atlatl. Fur cloth, rabbit nets, and coiled baskets continued, but stiff twining, which was later the predominant weave of the Shoshonean utility baskets, made its first appearance. Duck decoys, which were recently used by Nevada Northern Paiute, were also introduced. Twined bags, curved clubs, and sheep-horn "sickles" were abandoned.

The Lovelock late period, whether representing the culture of the Pit River Indians, as some have supposed, or of the Northern Paiute, is not radically different either from the culture of the latter or of the transitional period. It contains the main elements which modern Shoshoneans share with the Basket Makers. The atlatl is abandoned, but the bow and arrow continue in use. There are snares, rabbit nets, coiled baskets, fur cloth, and bird-skin cloth. Sandals, which were no doubt derived from the Southwest, are added. Duck decoys, fishhooks, and fish nets are retained. The main losses are flexible twined baskets, stone balls, and the atlatl.

Cressman (1942, p. 140) has a somewhat different interpretation of the cultural position of Lovelock Cave within the Great Basin. He says:

The fact that the Basket Maker horizon and the Lovelock and Oregon Caves share certain features indicates either a chronological sequence or at least a contemporaneity. In view of the stratigraphic evidence from Oregon we are inclined toward the sequence theory which would make the Basket Maker II horizon somewhat later than that represented by the L-shaped awls of Lovelock, Oregon and Washington. Lovelock Cave in its early phase and the Oregon Caves throughout most of their history would antedate Basket Maker II at least for those deposits containing L-shaped awls and associated complexes. In this sense Oregon Cave materials and Early Lovelock seem to provide the pre-Basket Maker culture.

Although we shall not attempt a detailed historical reconstruction, on the basis of trait distributions in western North America, of the culture complex exhibited in the Humboldt Cave collection, it will nevertheless be of value to trace the general area in which, anciently, these or closely similar forms were used. In so placing the Humboldt Cave culture in a distributional context we will gain some hints about the nature of the aggregate or compound and perhaps of the general areas from which culture influences have come.

First, a note concerning time relations. In the Lovelock region or lower Humboldt Valley we are fortunate in having a number of radiocarbon dates for the prehistoric cultures. These have been presented elsewhere (Heizer, 1951*a*, fig. 43) and are again shown here, in slightly modified form, in figure 8. The older cultures—named Granite Point, Humboldt, and Leonard (see Heizer, 1951*a*)—do not concern us here.²² Examples of the latest culture, named Lovelock, are commonly found in surface sites in the valley and in numerous shelters and caves. The Lovelock culture alone is represented, so far as present knowledge goes, in Lovelock Cave.²³ A radiocarbon analysis of dry vegetal materials (including fragments of coiled and wicker basketry) collected in 1950 from the trash layer resting immediately upon the preoccupation bat-guano deposit gave the date as 532 B.C.

²² These cultures are not yet described in detail, and at best are confined to small quantities of a limited range of materials. Jennings (1953, pp. 207–208) disagrees with the identification of such materials as comprising cultures. His position is further elaborated in an important paper (Jennings and Norbeck, 1955). See also Heizer (1956).

²³ The outer rockshelter formed by the limestone cliff at this site quite probably contains more ancient culture remains. It is pretty clear that the earliest occupants of the lower Humboldt Valley (bearers of the Humboldt and Granite Point cultures) specifically avoided living in closed caves, preferring open stations and only occasionally visiting open shelters such as Leonard Rockshelter. Lovelock, Ocala, and Humboldt caves have yielded no culture materials as old as those from the deeper levels of the Leonard Rockshelter.

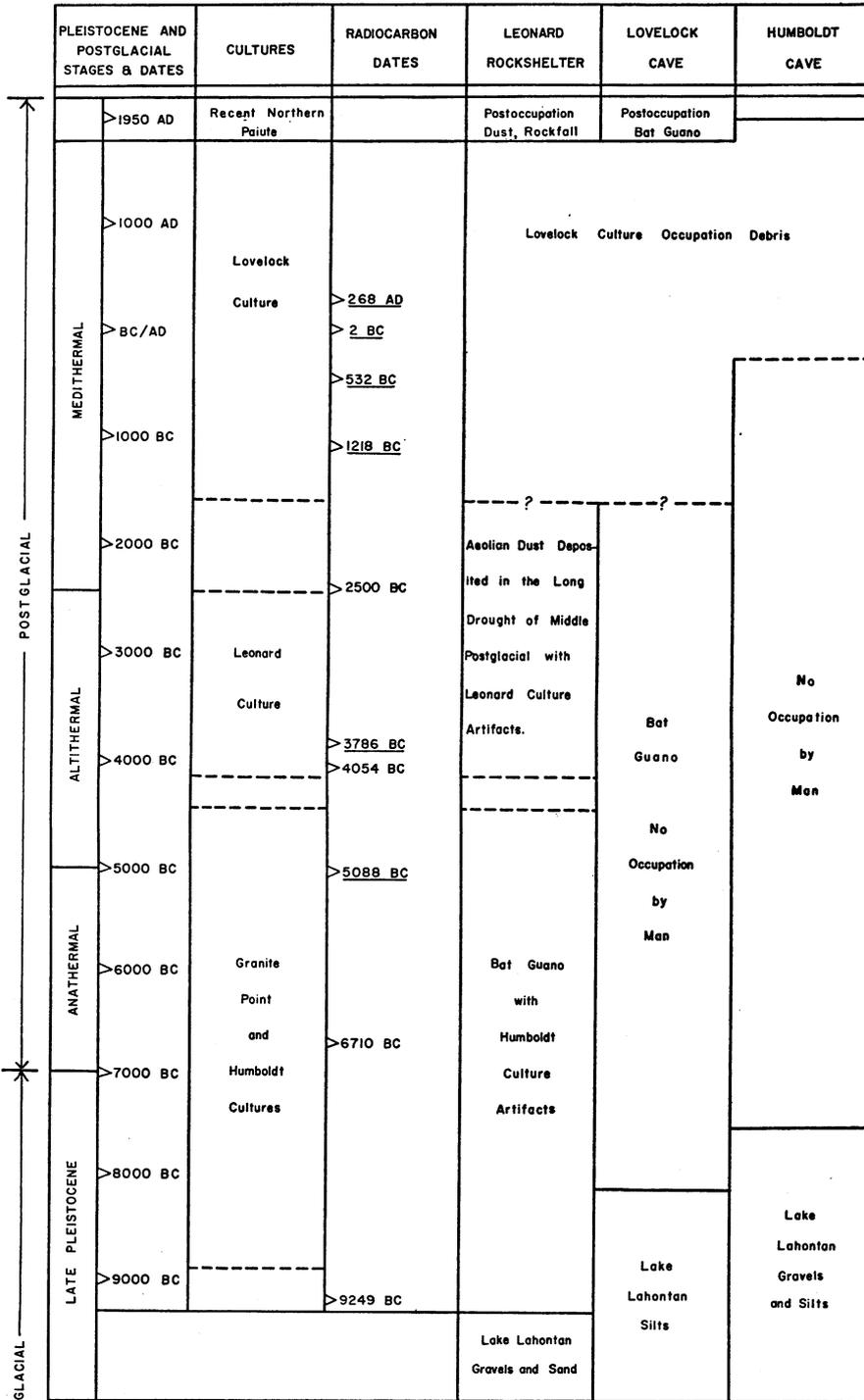


Fig. 8. Stratigraphic chart.

Since the same climatic situation (called Medithermal by Antevs, 1948) as prevails in modern times was instituted about 2000 or 2500 B.C., the Lovelock culture could be that ancient, and clear evidence has now been noted of its presence as early as 1218 B.C.²⁴ Lovelock Cave apparently was abandoned in late prehistoric times, for although the site was known to the Northern Paiute in the historic period, they attributed its use to an earlier population (for detail see Loud and Harrington, 1929, pp. 165-169); about 4 feet of sterile bat guano overlay the occupation strata (*ibid.*, pp. 1, 2, 34, 168), signifying that last occupation of the cave was several hundred years ago.

The uppermost levels at Leonard Rockshelter produced a limited amount of cultural materials, mostly basketry, identical to and no doubt contemporaneous with the Lovelock culture. No radiocarbon date for this culture level was obtained at Leonard Rockshelter.

The entire Humboldt Cave archaeological collection is clearly assignable to the Lovelock culture. Several pieces of coiled basketry from Cache 30, which was apparently the earliest cache deposit in the cave, were subjected to radiocarbon analysis by W. F. Libby, Institute for Nuclear Studies, University of Chicago, who in 1951 determined their antiquity as 1953 ± 175 years—that is, they were made sometime between 177 B.C. and A.D. 173 (Libby, 1951, p. 294, sample C-587).²⁵ This date falls some twelve hundred years later than the oldest cultural material thus far (October, 1954) dated from Lovelock Cave. Humboldt Cave was, therefore, occupied materially later than Lovelock Cave, which is larger and much nearer to the shores of Humboldt Lake. The more favorable lakeside situation of Lovelock Cave probably accounts for its earlier use by Indians.

DISTRIBUTION OF ECONOMIC-COMPLEX TRAITS

Duck decoys.—Duck decoys are reported from the Humboldt Valley area in Lovelock Cave and Ocala Cave (Loud and Harrington, 1929; M. R. Harrington, 1941). These, plus the Humboldt Cave examples, appear to be the only prehistoric decoys from Nevada. The recent Northern Paiute and Washo made and used stuffed decoys for hunting ducks (Stewart, 1941, elements 180 and 181a, p. 424; Lowie, 1924, p. 197, fig. 1; Ridgway, 1877; Simpson, 1876, pp. 85, 480). What are probably the same sort of decoys, though described as "grass-stuffed geese," are reported for the Costanoans on San Pablo Creek on San Francisco Bay in 1776 by Palóu (Bolton, 1926, 2:341), and for general Costanoan territory by Fages (1911). Kroeber (1932, p. 390) and Bartlett (1854) describe decoys of stuffed geese and ducks for the River Patwin. J. H. Steward's Culture Element Distribution studies of the Nevada Shoshoni and the Northern and Gosiute Shoshoni show this trait to be unknown or doubtfully present to the east, in part owing to the lack of suitable bodies of water where ducks congregated in numbers. The trait, therefore, is a special western Great Basin element with closest parallels to central California.

²⁴ The organic materials dated came from Harrington's "stratigraphic pit" dug in 1924. Details and interpretation have recently been supplied by Cressman (1956); it suffices to note here that the oldest radiocarbon date for Lovelock Cave is now (October, 1954) 3172 ± 260 years (Libby, 1954, p. 31, sample C-735). In 1950 Heizer collected an organic sample from Lovelock Cave from what he believed represented the oldest occupation level of the site. This assumption now proves to be wrong in the light of the age of sample C-735. For further discussion see Heizer (1956).

²⁵ The sample consisted of four pieces of coiled basketry, UCMA nos. 43351-52 and 43354-55.

Scapula "saws" or grass cutters.—These are very widely distributed in North America. They were probably known throughout the whole span of occupation of Humboldt Cave. Several examples were recovered from Lovelock Cave (Loud and Harrington, 1929, p. 40, pl. 13, *j*), and they are found in nearby open sites on the shores or bed of Humboldt Lake (Heizer and Grosscup, MS).

Outside the lower Humboldt Valley these dentate-edged tools are reported from Hawikuh (Hodge, 1920, pl. 25, fig. 3); Jemez Cave, New Mexico (Alexander and Reiter, 1935, p. 36, fig. 7, pl. 10, *k* and *l*); Brewster County, Texas (Coffin, 1932, p. 33); Gypsum Cave and Moapa Valley, southern Nevada (M. R. Harrington, 1933*a*, pp. 31, 137–138, fig. 12); Deadman Cave, Utah (E. R. Smith, 1941, pl. 8, fig. 1); Promontory Point, Utah (Steward, 1937, p. 28, specimen 10473); Castle Park, Colorado (Burgh and Scoggin, 1948, pl. 21, *a*, pp. 64–65); Tabegauche Cave, Colorado (Hurst, 1942, p. 15, pl. 3, fig. 10); Turner-Look site, east-central Utah (Wormington, 1955, pl. 57, fig. 29); a Basket Maker II cave near Durango, Colorado (Morris, 1939, p. 122). To the north this type is not reported from the south-central Oregon caves, but occurs in the Thompson River region (H. Smith, 1900, fig. 356); and far to the north an example made by the Point Barrow Eskimo is on record (Murdock, 1892, p. 175, fig. 147). To the west, in California, this implement is known from the intermediate and later prehistoric cultures of central California (Nelson, 1910, p. 393, pl. 46, fig. 6; Moorehead, 1900, p. 236, fig. 363; Schenck, 1926, pp. 219–220, pl. 40; Uhle, 1907, pp. 76–78, pl. 9, fig. 17). A careful distribution study of this type of scapula tool for central California has been made by J. A. Bennyhoff (1953). From southern California one archaeological example comes from the Twentynine Palms area (Campbell, 1931, pl. 41, *a*), and Boscana noted for the Juaneno "little saws which they made from shoulderblades of deer" and used for making bows and arrows (J. P. Harrington, 1934, p. 29).

Even farther afield the tooth-edged scapula implement is known from New York and Massachusetts (Schenck, 1926, p. 220).

Apparently we are dealing with a very old implement and one that is common to the Great Basin-California-Southwest area. It cannot be allocated to a particular time level and is therefore not very useful in tracing specific cultural influences. This may be a tool belonging to the basic cultural substratum of the western North American hunting-gathering basket-making peoples.

Fishhooks.—Fishhooks from Humboldt Cave are of two types. Only type 2 (small) hooks were found in Lovelock Cave, although two hooks, each attached to single lines, approach our large (type 1) hooks (Loud and Harrington, 1929, pl. 51, lower). In Humboldt Cave both types were found together in Cache 13, and we can assume their local contemporaneous use.

Rau (1885, p. 301) quotes Stephen Powers' description of the Pyramid Lake Paviotso hooks as "made by lashing a sharp piece of bone to a shaft of greasewood at a nearly right angle. . . ." The hook turns crossways in the throat. A number of them are fastened by snoods at regular intervals, to a line with a sinker at the end, which is thrown out into the water, while the other end is tied to some object ashore, constituting what is known in the western states as a "throw-line" or a "trot-line."

Goddard (1903, p. 25) describes large-angled fishhooks with bone barb and wood shank from the Hupa of northwestern California, and the Klamath Indians of Oregon make similar hooks (UCMA specimen 1-12476).

In summary, type 2 fishhooks (small, obtuse-angled) are both prehistoric and historic and so far are reported from only Lovelock and Humboldt caves. Type 1 fishhooks (large, acute-angled) were not remembered by O. C. Stewart's Paviotso informants but are used ethnographically to the northwest among the Klamath and Hupa. Since the type 1 hooks from Humboldt Cave were found all together in a single cache, there is a possibility that they represent a single batch of hooks secured by trade from outside the Humboldt area, to the west.

Sickles.—Sickles made of flat curved sections of the horn of mountain sheep have been recovered from Basket Maker caves in Utah and Arizona (Heizer, 1951c, pp. 249–250, figs. 81 and 82). The archaeological distribution of this grass-cutting tool does not extend north of the lower Humboldt Valley in Nevada.

Arrow wrench.—The perforated arrow wrench made of mountain-sheep horn was found in Lovelock Cave (Loud and Harrington, 1929, p. 42, pl. 15, *j* and *k*); DuPont Cave in southern Utah (Nusbaum, 1922, pl. LXI, *a*); a Basket Maker cave in northeastern Arizona (Kidder and Guernsey, 1919, pl. 46A, *e*); Cordova Cave (Martin *et al.*, 1952, p. 118); and Mantle's Cave, Colorado (Burgh and Scoggin, 1948, p. 82). An antler arrow wrench comes from Jemez Cave, New Mexico (Alexander and Reiter, 1935, p. 38, pl. 10, *v*, fig. 9), and elk-antler examples are fairly common in Late Horizon sites of central California (Lillard and Purves, 1936, pl. 14). Ethnographically this implement is known from Walpi pueblo (Stevenson, 1883, p. 396, fig. 576). Made of horn or bone, the arrow wrench is known from the recent Navajo, Ute, Cheyenne, Havasupai, and Hopi (Spier, 1928, p. 161), Mandan (Brower, 1904, pls. on pp. xxii, xxv), Yurok and Modoc (Kroeber, 1925, pp. 90, 332, pl. 16), and Maidu (Gifford, 1940, type LL, p. 183, ethnol. fig. 7). A sketch from life of a Shoshoni using such a wrench is printed on page 92 of the *Handbook of American Indians North of Mexico* (Bull. 30, Bureau of American Ethnology).

Digging sticks.—These were universally used in western North America. They have been found in most dry caves (Martin *et al.*, 1952, pp. 343–344) and are known to have been used by all recent groups.

Fire drills.—In western North America, fire drills are common archaeological finds in dry caves. The compound fire drill known ethnographically (for partial distribution see Stewart, 1941, element 785; Spier, 1928, p. 158; Spier, 1930, p. 172) for the Hopi, Navaho, Northern Paiute, Wind River Shoshone, Crow, Washo, Modoc, Klamath, Takelma, Snohomish, and Snoqualmie is not represented in either Lovelock Cave or Humboldt Cave. The composite fire drill has been found in dry caves of northeastern Utah, southern Colorado, the Salt Lake area, and south-central Oregon (Kidder and Guernsey, 1919, p. 121; Steward, 1937, fig. 3, *a*; Cressman, 1942, p. 71). Its absence from prehistoric deposits of the lower Humboldt Valley implies that it is a recent acquisition by the Northern Paiute.

The solid-shaft fire drill rotated between the palms is so commonly known, both prehistorically and ethnographically, that it is unnecessary to list the places where it has been found. Use of the hollow-shaft palm drill by the recent Northern Paiute has been reported (Lowie, 1924, pp. 222–223, fig. 11; Stewart, 1941, element 786), and fire hearths with drill pits giving evidence of the use of the hollow-cane drill were found in Lovelock Cave. Elsewhere the hollow-cane fire drill is reported from

the La Plata district of southwestern Colorado and from northwestern New Mexico (Morris, 1939, pl. 128). From farther afield, the hollow drill is known to the Bororo Indians of Brazil (Lane, 1938). One may suppose that use of the hollow-cane fire drill was more widespread than has been reported, and that another inspection of archaeological hearths from western North America would bring to light additional evidence of the trait.

Fire hearths.—Hearths of wood show nothing distinctive. Spier (1928, p. 158) has outlined the ethnographic distribution, and Martin *et al.* (1952, pp. 345–346) the archaeological occurrence of fire hearths. The hearth composed of a bundle of rushes is known also from Lovelock Cave (Loud and Harrington, 1929, pp. 96–97, pl. 49, *k*); elsewhere, so far as has been determined, only by the Guiana Indians of South America (Roth, 1929, fig. 1).

Arrows.—Arrows are of the widespread composite form with a hardwood foreshaft and softwood or cane main shaft (for their distribution see Martin *et al.*, 1952, pp. 340–343). Humboldt Cave yielded only a few bits of doubtful evidence of the atlatl and nothing to indicate when this weapon was supplanted by the bow. In the Mogollon and Hohokam areas to the south the bow began to be used about A.D. 1 (Martin *et al.*, 1954, p. 188). The earliest occupants of Humboldt Cave may have used either the atlatl or the bow, but we do not know for certain which weapon was being used at the beginning of the Christian era.

From Leonard Rockshelter came a compound atlatl dart and some hardwood foreshafts which, by radiocarbon age measurement, are 7038 ± 350 years old (Heizer, 1951*b*, p. 24). The lower levels of Lovelock Cave yielded both spear-throwers (atlatls) and the darts propelled by them. The abundance of arrow shafts from Humboldt Cave may mean that by the beginning of the Christian era the bow was in use in the Humboldt Cave area. The best way to determine when the bow succeeded the atlatl in this area would be simply to subject a series of the atlatl shafts and arrow shafts from the stratigraphic pit in Lovelock Cave (Loud and Harrington, 1929, pp. 18–28) to radiocarbon dating.

Two hardwood arrow foreshafts, tied together, showed evidence of having been inserted separately into parallel cane shafts. Their function has not been identified. A similar piece was recovered by Kidder and Guernsey (1919, pl. 84, fig. 13) from a Basket Maker cave in Arizona. The Coast Yuki used this same sort of implement as a netting needle (Gifford, 1939, fig. 13).

Cottonwood bowls.—These bowls from Humboldt Cave are rather nondescript but are of interest since they attest to the idea of fashioning wooden containers. There are no closely similar pieces from other archaeological sites in the western Nevada region, and these are best looked upon as fumbling efforts in wood carving. The closest archaeological parallel is the juniper-wood ladle from the Basket Maker II site in Tsegi Canyon called Woodchuck Cave (Lockett and Hargrave, 1953, fig. 17). In recent times the California Indians probably manufactured this sort of implement more extensively than the Shoshoneans of the Great Basin, and it may be that the source of the trait was in the trans-Sierran area to the west.

Flat cottonwood slab trowels.—These implements from Humboldt Cave are paralleled by Southwestern finds from Tularosa and Cordova caves, New Mexico (Martin *et al.*, 1952, pp. 392–393, figs. 142–143), DuPont Cave (Nusbaum, 1922,

pp. 115–117), northeastern Arizona Basket Maker caves (Kidder and Guernsey, 1919, p. 187, fig. 91; Haury, 1945, p. 51; Guernsey and Kidder, 1921, pp. 90–91; Jemez Cave (Alexander and Reiter, 1935, p. 43). Other occurrences are cited by Martin *et al.* (1952, p. 344; 1954, p. 190).

This trowel is a simple instrument, usually of the same flat form. It was used as a digging stick—probably not to dig roots or bulbs but to dig holes in soft earth or sand. These slab trowels from Humboldt Cave, which are shared specifically with the Southwestern cave-dwelling peoples of antiquity, quite possibly represent a definite and specific item of material culture and a technique of digging which may be taken as additional evidence of the cultural connection between the two areas. Presumably the southern region, where this implement is more widespread, is the source from which the Humboldt Cave people derived the trait.

Wooden knife handles.—The handles from Humboldt Cave and Lovelock Cave (Loud and Harrington, 1929, pp. 100, 108, 117, pls. 55, *b*, 45, *b*, 47, *n*) are round in cross section. Utah Cave examples are shown by Steward (1937, fig. 32; note secondary use of handle as fire-drill hearth) and Morss (1931, p. 62, pl. 37, *f*, *h*). There are also examples from Anasazi Basket Maker caves (Nusbaum, 1922, p. 127, fig. 123). Elsewhere in the Southwest the round knife handle has been found in Winchester Cave (Fulton, 1941, p. 34), Tularosa Cave (Hough, 1914, p. 62), Cordova Cave (Martin *et al.*, 1952, fig. 146, *c*), southern Nevada (Amsden, 1939), and various unnamed sites (Willoughby, 1902; Nordenskiöld, 1893, p. 97, fig. 59). Two recent Kaibab Ute round-handled knives are illustrated by Hoffman (1896, figs. 52 and 53).

Flat wooden knife handles are reported from Aztec Ruin (Morris, 1919*b*, p. 33, figs. 17–18), White Dog Cave, Arizona (Guernsey and Kidder, 1921, p. 87, pl. 35, *l*), and Grand Gulch caves (Martin *et al.*, 1952, p. 345). The recent Hupa and Paiute hafted knives shown by Wilson (1899, pp. 947–948, pl. 41, *p*) also have flat and broad rather than cylindrical handles.

Horn or antler knife handles like those found in the Oregon caves (Cressman, 1942, figs. 92, *g*, 65, *g*) have been found in Middle Horizon sites in central California (unpublished specimens in UCMA) but not in the lower Humboldt Valley.

Apparently the wooden-handled knife is old in western North America and is common to both the central-western and central-eastern Great Basin cultures (Salt Lake caves, Lovelock and Humboldt caves) and the Anasazi-Mogollon Southwest. It is thus far unreported for the northwestern Great Basin (Oregon caves) and can hardly be derived from this source.

A more careful review of the published data on handled stone knives and also an inventory of unpublished museum specimens, paying attention to the shape of the blade and manner of its attachment and the shape of handle, might yield valuable conclusions on cultural relationships in western North America.

DISTRIBUTION OF HANDICRAFT-PATTERN TRAITS

Basketry.—Two controls were used in reconstructing the occurrence of various techniques through the history of the cave. The contents of caches and “concentrations” were taken as one control, the successive six-inch cuts in the different sections as the other. They appear to agree on the following points.

1. Beginning with the first occupation of the cave by human beings, or not long thereafter, and continuing until the deposit reached to within about twenty inches of the modern surface, caches were made from time to time; most of these contained nothing of obvious value but consisted of many broken and worn objects made of vegetal materials. The caches were commonly lined with grass, on which were laid varying amounts of coiled, wicker, and twined basketry, twined rush matting, rush bags, sandals, sticks, and the like. The baskets were either worn to the point of coming apart or, strangely, were in good condition except that they apparently had been deliberately chopped into pieces a few inches square before they were cached. Some of the cached material, however, was intact and in good condition. The pouch of knives and projectile points (Cache 10, pl. 6, *b*) is an example, the one with the sheep-horn sickles (Cache 20, pl. 5, *e*) another.

2. The matching of fragments from the same basket showed that as many as seven different caches might contain pieces from the same container; it was not unusual for the fragments to be scattered in two or three caches. Similarly, chopped out pieces of the same basket were found both in the caches and in the main deposit. One carefully prepared cache, however, contained six small pieces of wickerware in good condition, each apparently from a separate burden basket. Such pieces were perhaps intended to be used someday as patches (pls. 21 and 22).

3. The common baskets of the main deposit, namely, the coiled roasting trays, wicker burden baskets, and stiff twined openwork (also burden baskets ?) were represented in the top twenty inches of deposit by only a few scattered bits. It is probable that these bits were merely kicked up during the latest occupation. Since the coiled trays and the wicker technique in general are unknown to the historic Paiute, their absence from the upper twenty inches or so permits us to assign the last occupation to the Paiute. The Paiute, however, had both roasting trays and conical burden baskets made by an entirely different technique (pl. 24). The modern Paviotso trays are somewhat like a rounded triangle, woven in a close diagonal twine and strengthened with a stick bound round the rim (Steward, 1933, pl. 10, *d* and *e*). The burden baskets are in the same technique but are in both close and open work. The close-weave baskets are suitable for collecting small seeds and nuts, the open weave for roots, tules, firewood, and so forth (Steward, 1933, pl. 10, *a-c*).

4. No "junk" caches of wornout goods were found in the upper twenty inches; instead there were two caches with specialized artifacts in excellent condition. These were the "shaman's cache" (Cache 13) and the "fisherman's cache" (Cache 22). In addition, there was the surface cache (Cache 1) in the back of the cave, containing cloth trousers, an eagle-feather bundle, gunny bags, fishline, and so forth.

5. A few specimens of fine, flexible, close-twined basketry with overlay decoration, similar or identical to modern Klamath-Modoc ware as well as to the pre-European Catlow Twined basketry from caves in southeastern Oregon (Cressman, 1942, pp. 34-49, figs. 80-87), were found in the upper half of Humboldt Cave and on the surface of the south alcove, but not in caches. This same basketry was also found by Loud at Lovelock Cave in "lots" that represent the topmost deposits of that cave.²⁰ This particular combination of techniques is highly specific and can be

²⁰ Reëxamination of Lovelock basketry and catalogue data by the authors of this paper.

easily recognized. It is most common in the northeastern corner of California and adjacent southern Oregon, where the modern Modoc and Klamath continue to make a basketry which is presumably of considerable antiquity in that region. It would be premature to state whether this fine flexible basketry was first made in Oregon, northern California, or some other area, but its relatively late position in both Lovelock and Humboldt caves and its scarcity as compared with other techniques in western Nevada suggest that it diffused southward from the Klamath-Modoc area, or perhaps from one of the valleys to the east.

6. Twined-rush mats and sandals were used so extensively in the western United States—and probably at one time in the eastern states as well²⁷—that they are of little value for purposes of comparison.

The distinctive basketry called "Lovelock wicker" by Weltfish (1930, p. 491) is now known from Lovelock and Humboldt caves and numerous rockshelter or small-cave deposits in lower Humboldt Valley. It has been found in caves around Pyramid and Winnemucca lakes some fifty miles or so to the west of Lovelock Cave. A few specimens have been recovered from sites about thirty miles due south on the southern margin of Carson Sink (Grosscup, 1956, p. 61). Beyond this the double ribbon-weft Lovelock Wicker is to date unknown archaeologically.

It is difficult to derive Lovelock Wicker typologically from any of the other rare archaeological occurrences of wicker noted at Cheylon Ruin, Arizona; Bear Creek on Blue River, Arizona; Sitkyatki, Arizona (Weltfish, 1932, pp. 27, 28, 34, 42), or Roaring Springs Cave, Oregon (Cressman, 1942, p. 13, fig. 86, *c* and *d*); nor are the ethnographic occurrences of wicker among the Hopi, Zuni, Modoc, Pomo, and eastern Algonquians sufficiently similar in technology or near enough in time to be probable survivals of Lovelock Wicker. This is a locally distinctive basketry which may well have been invented in this area. The organic sample from Lovelock Cave which yielded the radiocarbon date 532 B.C. included several fragments of Lovelock Wicker. Loud and Harrington (1929, p. 26) believed that Lovelock Wicker was not deposited in the cave until the period represented by the fourth level (depth 72–96 in. in the stratigraphic cut).²⁸

The cylindrical, openwork rush bags from Humboldt Cave were a standard local type, as shown by their presence also in Lovelock Cave. Elsewhere they have been found in Hidden Cave on the southern shore of Carson Sink and near Pyramid and Winnemucca lakes (Grosscup and Roust, MS). Rather similar bags are reported from Southwestern caves (e.g., Guernsey, 1931, pl. 11; Cosgrove, 1947, pp. 112–113, fig. 102, *a*). We know too little about this form of container to reach conclusions concerning the genetic relationship of the scattered occurrences thus far reported.

²⁷ Although archaeologists tend to make comparisons with Basket Maker artifacts for chronological clues, they overlook the larger aspects of the problem. The Southwest is outstanding for the preservation of perishable artifacts, but under favorable conditions such objects have been preserved in other spots as well. For example, the Ozark Bluff-dweller artifacts (M. R. Harrington, 1924) compare very favorably with those of both the Southwest and the Great Basin; and even the Kentucky caves yield twined-rush sandals, mats, and bags that differ only in detail from those in Humboldt Cave (Orchard, 1920).

²⁸ The next lowest (fifth) level in the stratigraphic trench at Lovelock Cave (96–120-in. level) is dated by the radiocarbon method as 3172 ± 260 years old (Libby, 1954, p. 31). The fifth level in the stratigraphic cut did not yield any wicker basketry. This suggests that wicker may be as old as 2,500 years. The beginning of wicker basketry in Lovelock Cave may therefore be placed somewhere between 1218 B.C. and 532 B.C.

The object from Humboldt Cave which we call a flexible tule cradle has not definitely been identified as such, but similar pieces from Basket Maker caves in Arizona have been so labeled (Cummings, 1910, pp. 14, 34; Kidder and Guernsey, 1919, pls. 72, 73, *b*), as well as those from Steamboat Cave, New Mexico (Cosgrove, 1947, fig. 110). The Southwestern archaeological distribution of this type of cradle is given by Martin *et al.* (1952, p. 253, fig. 122). Stewart (1941, element 1245) notes wide use among Northern Paiute bands of a "simple temporary basketry cradle," which is replaced about once a week when soiled (*ibid.*, p. 435). The rigid carrying cradle is not used until the infant is about a month old.

Bone artifacts.—Bone awls are numerous and rather varied. Most of them are of types which are found in many parts of western North America. A few are decorated with short incised lines in a technique reminiscent of the bone incising of central California. Similarly decorated artifacts have been found in Lovelock Cave and in surface sites around Humboldt Lake (Loud and Harrington, 1929, pls. 12, 66; Heizer and Grosscup, MS).

L-shaped awls of scapulae have a wide though scattering distribution in western North America. At least ten were recovered from Lovelock Cave, and there are two from site Ch-15 on the bed of Humboldt Lake. This type of distinctively shaped awl has been discussed by Cressman (1942, pp. 63–65), who has made a careful study of its distribution, ranging from Arizona to Salt Lake, the Lovelock area, southern Oregon, and the Columbia River. To Cressman's distribution we add Tabeguache Cave, Colorado (Hurst, 1942, pl. 2), Danger Cave, Utah (Jennings, 1953, p. 201), and Woodchuck Cave in Tsegi Canyon (Lockett and Hargrave, 1953, fig. 10, *f*). In the Southwest the L-shaped scapula awl is most abundant in Basket Maker sites. It is early and transitional in Lovelock Cave, and late in Roaring Springs Cave, Oregon. We would agree with Cressman's conclusion that the occurrences of the distinctive L-shaped awl were probably not due to successive local independent inventions but were historically connected, and that the type extended over the intermontane area from Oregon through Utah and Nevada to Oregon and Washington. Whether this type is oldest in the Oregon or Nevada or Utah or Arizona caves we cannot tell at present, but the Oregon examples appear to be later than the others. The Humboldt Cave specimens were deposited within the span of the Christian Era, and those from levels III and IV of Danger Cave are older than 3,800 years (Jennings, 1953, fig. 2). If one looks for a particular type of basketry which has a functional connection with the L-shaped awl, split-stitch coiling may be suggested on the grounds that the angled base of the scapula awl offers a firm grip to enable the worker to withdraw the point from the split weft element.

Another type of scapula awl, found in Lovelock Cave (Loud and Harrington, 1929, pl. 13, figs. *k* and *l*) but not in Humboldt Cave, is straight; it may be linked with the L-shaped form. These straight awls have been found in the Salt Lake Caves (Steward, 1937, fig. 9, *f*; E. R. Smith, 1941, p. 35); in open sites on the Upper Columbia River (Collier, Hudson, and Ford, 1942, p. 80, pl. 8, *y* and *z*); at Hawikuh in somewhat aberrant form (Hodge, 1920, fig. 9, *b*); Fremont River area, Utah (Morss, 1931, pl. 35, *a*, *z*); Jemez Cave (Alexander and Reiter, 1935, pl. 10, *f*); Tabeguache Cave, Colorado (Burgh and Scoggin, 1948, pl. 21, *e*); and Tularosa

Cave, New Mexico (Martin *et al.*, 1952, fig. 62, *f*). This type of awl is thus far unreported from California.

DISTRIBUTION OF AESTHETIC-COMPLEX TRAITS

Rush sandals, as pointed out by Cressman (1942, pp. 59–61), have been found in many sites of arid western North America. As indicated in the descriptive part of this paper, the Humboldt Cave sandals are very much like those from the southern Oregon caves. The Lovelock Cave and Humboldt Cave sandals are apparently similar, according to Krieger, who compared pieces from the two collections. Krieger did not inspect the Heye Foundation collection from Lovelock Cave made by Harrington in 1924.

Bark aprons, probably used by girls, have also been found in Lovelock Cave (Loud and Harrington, 1929, pp. 53–54, pl. 19, *a-c*). They have counterparts in the string aprons of the Southwest (Cosgrove, 1947, p. 68). Martin *et al.* (1952, p. 255) give the distribution of these, concluding that they are “a common type of clothing in the Southwest, Texas and the Basin. They occur at about the same time all over the area.”

The round hairbrush has been reported from Painted Cave, Arizona (Haury, 1945, pl. 25, *c*), Mesa Verde (Fewkes, 1909, fig. 30; 1916, fig. 12), and Pecos (Kidder, 1932, fig. 249) and is used by the modern Hopi (Hough, 1918, pl. 28). The type is apparently most abundant in the Anasazi area, and its presence in Nevada may be evidence of the northward diffusion of the form.

Pine-nut beads made from the seed of the digger pine (*Pinus sabiniana*), a tree which does not grow in the Humboldt region, must have been introduced by trade. The distribution of these beads has earlier been traced by Heizer (1942, p. 126, fig. 71). With the exception of the Humboldt Cave occurrence, this kind of bead is thus far limited to northern California and southern Oregon, and in those regions it is used today and has been found in late prehistoric sites as well. To the distribution referred to, add McCloud River sites (Smith and Weymouth, 1952, p. 22), Tommy Tucker Cave (Fenenga and Riddell, 1949, pp. 205–206), and Redbank (Treganza, 1954, p. 18). Although Stewart's Küpa informants from Lovelock denied using these beads (Stewart, 1941, element 1333), the Paviotso bands of the Carson Sink area claimed that they knew them and said they were obtained from California. The Achomawi got them from peoples farther west (Shasta or Karok ?). Two types of pine-nut beads were used by the Yana (Sapir and Spier, 1943, pp. 252–253). We thus have in Humboldt Cave a recent form of seed bead obtained by trade from the west or north.

Bird-bone whistles have been found both in Lovelock Cave and in open sites around Humboldt Lake. Here again we are dealing with a simple trait which is practically universal in western North America. The only unusual feature in our specimens is the rather long, rectangular hole, and this may prove to be locally distinctive.

Bone tubes of simple form with squarely cut ends are known from many parts of western North America. They were found in Lovelock Cave (Loud and Harrington, 1929, pls. 12, 13), are common in Southwestern Basket Maker and Puebloan sites (Guernsey and Kidder, 1921, pls. 41, 42; Hodge, 1920, pp. 121–126,

pls. 29–31), and have been found in many parts of California (Gifford, 1940, pp. 179–181).

Game darts, with a cylindrical central part and with a tapering point at each end, are also reported from Catlow Cave, Oregon (Cressman, 1942, pp. 70–71, fig. 93, *b*), Massacre Lake Cave, Nevada (Cressman, 1942, fig. 100), and the Sierra Ancha region, Arizona (Haury, 1934, pl. LXVIII, *g*). Our identification of this form as the dart used in the ring-and-dart game is derived from Teit (1900, fig. 261), who shows such an object from the Thompson Indians. Haury identifies the Sierra Ancha specimen as a “ginning tool.” If we are correct, these ancient occurrences attest a wider distribution of this particular form of the ring-and-dart game than can be inferred from the ethnographic record.

Deer hoofs used as rattles are represented by five specimens in the Humboldt Cave collection. Driver and Riesenbergs (1950, pp. 11–12) have listed the places where perforated hoofs were used for rattles, as follows: Basket Maker caves of northeastern Arizona, Pueblo Bonito, Aztec Ruin, Gypsum Cave, Lovelock Cave, and Tommy Tucker Cave. To this list we add Promontory Cave No. 1 (Steward, 1937, fig. 15, *c*). Since, as Driver and Riesenbergs show, the distribution of this form of rattle is intercontinental, we can hardly base any conclusions on these few occurrences.

Tubular stone pipes like those from Humboldt Cave were found in Lovelock Cave (Loud and Harrington, 1929, pl. 52) and in surface sites on the bed and margins of Humboldt Lake (Loud and Harrington, 1929, pl. 65). The short stone pipe, often made of scoria, has been found also in many Southwestern sites (cf. Martin *et al.*, 1952, fig. 44, pp. 112–113), but it is not at all the typical form of California culture complex. From this we may suppose that the use of the tubular stone pipe in the Great Basin was derived from the south, probably from the Anasazi area.

The “shaman’s cache” (Cache 13) in Humboldt Cave has been interpreted as comprising equipment used by a shaman. Such equipment must have been of high value, in the owner’s eyes, and this may partly account for the many cave caches of shamans’ apparatus.

In the published literature “medicine pouches” or “medicine bags” have been recorded from archaeological sites in the American Southwest (mostly Basket Maker) by the following authors: Cummings, 1910, pp. 13–14, figs. on pp. 14, 15; Morris, 1939, p. 143; Kidder and Guernsey, 1919, pp. 30, 148 ff., fig. 68, pl. 62; Guernsey and Kidder, 1921, pp. 108–109; Guernsey, 1931, pl. 52; Nusbaum, 1922, pp. 147–150, pl. 66; Martin *et al.*, 1952, p. 452, pl. 68; Morris, 1939, p. 143; Cosgrove, 1932, pl. 77. The contents of some of these Anasazi kits are remarkably similar to those of the one from Humboldt Cave.

Actual objects which occur in archaeological deposits and whose source lies outside the area can be very revealing in culture-historical terms, for the place of origin may often be positively assigned, as well as the dating of the particular form in its homeland. From such data important facts can be derived concerning both the direction and time of extraterritorial influences registered in the receiving culture.

We have already suggested that the beads made of the shell of the nut of the

digger pine (*Pinus sabiniana*) and the large acute-angled composite fishhooks represent lots of trade material from the general northeastern California area.²⁹ Two acorns, doubtless from west of the crest of the Sierra Nevada, were found in Cache 13.

Beads made of clam (*Saxidomus* and *Tivela*), olive (*Olivella*), abalone (*Haliotis*), or dentalium (*Dentalium*) shells have been found in several cave and open sites in the lower Humboldt Valley.³⁰ Some of the *Olivella* beads can be identified as having been made in central California in the Middle Horizon culture period (estimated range from 1000 B.C. to A.D. 500. The clamshell-disk beads were also from central California in the Late Horizon, and probably were made after A.D. 1500. The local Nevada method of stringing such shell beads is detailed by Orchard (1929, pp. 23-24, figs. 8-11).

The probable routes of transmission lay from the Sacramento-San Joaquin Valley across the several mountain passes into the Great Basin. Some of these trails and the items carried over them have been described by Sample (1950). That such trade has been carried on since very ancient days is shown by the presence of beads of whole *Olivella* shell in the lower levels at Leonard Rockshelter with a radio-carbon age of 6,000 to 7,000 years (Heizer, 1951a).

The several fragments of distinctively manufactured coiled baskets from Humboldt Cave (pl. 16), some of which bear feather decorations, are not at all of the types common in the local caves. They are best explained as actual trade pieces from the nearby Washo, or from the Maidu and Miwok who live over the crest of the Sierra in California. If this explanation is correct, it tells us something of the antiquity of California Indian basketry techniques.

No items of actual Anasazi origin have been found, and there is no hint of trade connections to the east with Utah. What trade there was seems to have been with the California area to the west. Trade with that area is known to have been carried on six to seven thousand years ago.

The custom of caching objects and materials in caves was widespread through the American Southwest and the Great Basin, as reference to the publications of Cressman (1942), Nusbaum (1922), and Morss (1931) will attest. Examples of the trait also have been found in some of the occupation caves of central California (Heizer and Treganza, MS; Meighan, 1955).

²⁹ The local Humboldt Valley Northern Paiute band named Küpa-dökadö did not recognize the cave specimens (Stewart, 1941, element 281a and note).

³⁰ See Stewart (1941, elements 1323-1326) for ethnographic data on shell beads.

CONCLUSIONS

Humboldt Cave was a rich depository of prehistoric materials left there by the former residents of the lower Humboldt Valley. The identity of the people is a mystery. As discussed in the preceding section, some students (e.g., Steward) identify the authors of the late cave culture, named "Lovelock Culture" by Heizer (1951*b*, p. 94), as Shoshoneans.³¹ It is generally agreed that the peoples of the prehistoric Basket Maker and Pueblo cultures were the ancestors of the modern Hopi, who are Shoshonean-speaking; it is likewise probable that the ancient Nevada cave dwellers spoke Shoshonean. The major problem here is whether or not we can connect the historic Northern Paiute with the later prehistoric archaeological levels of the lower Humboldt Valley cave sites. We believe that it cannot be now conclusively demonstrated that the topmost levels of either Lovelock or Humboldt caves were the result of occupation by the Northern Paiute, but that this probably can be assumed. Our inability to prove the late archaeological-Northern Paiute equation is due to the fact that a number of late archaeological types are not known to the recent Northern Paiute and, conversely, that some important Northern Paiute culture elements are unrepresented in the upper (i.e., later) cave strata.

Thus, the characteristic Lovelock Wicker, made in the area from perhaps 500 B.C. on, is not made or recognized by recent Northern Paiute (Stewart, 1941, element 386). Heizer has shown examples of this basketry to a number of Northern Paiute, both men and women, and has found that they are completely unfamiliar with the technique. The large, round, flat coiled trays which are common in both Lovelock and Humboldt caves are not made by the Northern Paiute, nor, so far as is known, is basketry of the Catlow Twined type, which is of the late prehistoric period in the Nevada caves. The shallow, subovoid, twined winnowing trays, sagebrush-bark sandals, heavy openwork twined pack baskets and small-mouth twined and pitch-covered water bottles of the recent Northern Paiute have not been found in either Lovelock or Humboldt caves.³² Curved grass-cutting sickles of mountain-sheep horn, L-shaped scapula awls, and cottonwood bowls are not, so far as any ethnographic record known to us attests, part of the cultural equipment of the Northern Paiute. Their archaeological occurrence, however, seems to be late enough to make it not at all improbable that they were known to the Northern Paiute.

On the affirmative side—that is, tending to support the view that the latest cave deposits were laid down by the lineal ancestors of the Northern Paiute—we may refer to feather-covered duck decoys made of tule, type 2 fishhooks, and tubular stone smoking pipes, which are late archaeologically and are also known to the recent Northern Paiute. Although more of these comparisons could be made, the problem of explaining the nonoccurrence of late prehistoric forms in recent Northern Paiute culture would still remain. What may have happened is that in late prehistoric times there was some deeply persuasive acculturation that led the Northern Paiute to abandon wicker basketry and flat coiled trays and to substitute

³¹ Steward denies this once (1937, p. 86, no. 46) but affirms it later (1940, pp. 464-466).

³² A single archaeological occurrence of the typical recent Northern Paiute twined winnowing-tray is noted by Loud, who collected the piece at a site which probably, but not certainly, was Leonard Rockshelter. This specimen is being reported on by Gordon Grosseup, MS.

for them twined basketry of different forms. If so, the impulse may have come from a southwesterly direction, perhaps out of southern California via Owens Valley. Caves were used by the Northern Paiute when they were seen by explorers of the middle nineteenth century (cf. Frémont, 1845, p. 216; Delano, 1857, pp. 170-171). We believe that the upper twenty inches of refuse deposit in Humboldt Cave were in all probability left by the Northern Paiute, though we have no definite proof of this. Whether the deeper layers were left by them or by a different people we do not know. It is less certain that Lovelock Cave was occupied by the Northern Paiute. They were aware of the existence of the cave and tell a story,

TABLE 9
RELATIVE AGE OF HUMBOLDT CAVE MATERIALS

Trait	Early (+ 20 in.)	Late (0-20 in.)	Early and Late
Hafted stone knives	+
Scapula saws	+
Lovelock wicker basketry	+
Coiled flat trays	+
Soft twined openwork bags	+
Shell beads	+	..
Tule duck decoys	+	..
Type 2 fishhooks	+	..
Catlow Twined basketry	+	..
Fine matting, <i>Apocynum</i> weft	+	..
Tubular stone pipes	+	..
Type 1 fishhooks	+	..
Mountain-sheep-horn sickles	+
L-shaped scapula awls	+
Bow and arrow	+
Crude wooden bowls	+
Feather bundles	+
Pine-nut beads	+
Flat spatulate objects	+

which may have some historical basis, of a battle there with a people whom they call Saidukah ("tule eaters").⁸⁸ We know that Lovelock Cave must have been abandoned sometime, perhaps several centuries, before the opening of the historic period, since there was a layer of postoccupation bat guano, 3 to 6 feet deep, covering the occupation deposits (Loud and Harrington, 1929, pp. 1-3, 34, 168). Because of this layer and the derangement of the deposits in the process of guano mining, and also because of Loud's method of collecting and recording data, we do not know very much about the stratigraphic seriation of the artifact materials in the upper levels in Lovelock Cave. In brief, we know that Lovelock Cave could not have been occupied at the opening of the historic period (say, 1830-1840), and there is no record to tell us whether something culturally or chronologically equivalent to the upper twenty inches of Humboldt Cave may have been present in Lovelock Cave.

⁸⁸ See Loud and Harrington (1929, pp. 167-168); Hopkins (1883, pp. 73-75); and Steward (1938, p. 178).

There was no natural stratification in the Humboldt Cave refuse deposits, and stratigraphic analysis of the cultural materials has failed to yield clear-cut evidence of a sequence of forms. Table 9 presents the best generalization that can be made of the relative age of the materials found in various strata of the Humboldt Cave deposits. We take the 20-inch depth (or the 18-24-in. level) as probably marking the time of the appearance of the Northern Paiute, and call materials in this upper level "Late" and those in deeper levels "Early."

The nature of the culture represented by the Humboldt Cave collection could have been analyzed by what Taylor (1948) calls the "conjunctive approach"; that is, by reconstructing the ethnography of the past. We chose not to do this, first because the descriptive report was written some ten years before Taylor's work was published; and second, because a better study of this sort could be made by using all the local cave materials so far recovered, for it would be of advantage to have as many data to manipulate as possible.³⁴

There is not much point in summarizing the rather compact section of this report entitled "Distribution of Traits." It suffices to point out that the Humboldt Cave culture is apparently contemporaneous with the late and transitional periods of Lovelock Cave, and also with some of the Oregon caves like Catlow No. 1 (cf. radiocarbon sample C430, with a date of 959 ± 150 years, for the approximate mid-point level of the Catlow deposits³⁵). The Basket Maker caves of the Four Corners region do not have tree-ring dates older than the radiocarbon date (sample C587) from Humboldt Cave, and the oldest date now known for the Lovelock Cave deposits (sample C735) far exceeds that of any Basket Maker site. It may yet turn out that Lovelock Cave is Basket Maker I in the literal sense, if this horizon continues to evade discovery in the Anasazi area.³⁶ Our trait distributions indicate two main areas of culture connections, one with the Southwest and the other with California to the west of the Sierra Nevada. Duck decoys, type 1 fishhooks, flat coiled basketry trays, crude shallow wooden bowls, pine-nut beads, technique of incised decorative designs on bone artifacts, feather-decorated fine coiled basketry, and beads of marine mollusk shells all have specific connections with California, indicating either a direct west-to-east trade or an ancient shared cultural community. With the Southwest (Basket Maker and Pueblo archaeological cultures or recent Pueblo cultures) there are some specific parallels. These include the tubular stone pipe (with affixed bird-bone stem), curved grass-cutting sickles of mountain-sheep horn, hollow-cane fire drill, flat wooden slab trowels, cylindrical openwork twined-rush bags, flexible tule cradle, bark apron, and round hair brush. With southern Oregon, Humboldt Cave shares the distinctive Catlow Twined basketry and tule sandals. Certain Humboldt Cave forms are restricted to the local area and probably represent provincial inventions—these include type 2 fishhooks and the distinctive Lovelock Wicker basketry.³⁷ A series of widespread traits which

³⁴ Harrington's 1924 collection from Lovelock Cave is in the Museum of the American Indian, Heye Foundation. It has never been described. The analysis in Laura Thompson's study of the Hopi strikes a note decidedly reminiscent, in some ways, of the ancient Nevada desert lake dwellers. An attempt to write the "ethnography" of the prehistoric cave dwellers would, we think, be aided by reference to Thompson's work (Thompson, 1950a, 1950b).

³⁵ Cf. Cressman, 1942, p. 140. Further discussion in Cressman, 1951, p. 308.

³⁶ Cf. Martin *et al.*, 1952, p. 503.

³⁷ This list could be considerably expanded if we included the materials from Lovelock Cave and other surface and cave or shelter sites in the lower Humboldt Valley region.

form part of the generic substratum of far western North American cultures include the deer-hoof rattle, medicine bags or pouches, twined tule matting, scapula grass cutter, perforated horn or antler arrow wrench, bird-bone whistle, compound (cane-hardwood) arrow, wooden-handled flint-bladed knives, L-shaped scapula awls, straight scapula awl, digging stick, solid-shaft fire drill, wooden fire hearth, game darts, and the use of caves for shelter and for caching valuables, food, and so forth.

The rather meager list presented by Kirchoff of elements comprising the "hypothetical basic culture" of the Great Basin (Kirchoff, 1954, p. 543) might be materially added to by a careful comparative and distributional analysis of archaeological materials and the Culture Element Survey data of the University of California. The nature or content of the basic culture was touched upon earlier by Beals (1932; 1943, p. 195), Kroeber (1925, p. 583), Underhill (1954, pp. 645-646), and Zingg (1937).

The complex represented by the main body of Humboldt Cave remains, therefore, is composed of certain generic western culture forms, a strong element, shared with—but not necessarily derived from—the Southwest culture province, a somewhat lesser connection with trans-Sierran California, and a definite, though weaker, connection with southern Oregon.

The recent book by Weltfish (1953), *The Origins of Art*, contains a chapter on Lovelock Cave. This passage is full of outright inaccuracies, among which is the statement that Lovelock Cave was occupied between A.D. 700 and 1400 and that within this span of seven centuries "the cave looked out on a large lake, almost the size of Lake Erie, which has since dried up to a small pond" (*ibid.*, pp. 156, 187). It would be pointless to enumerate the errors presented by Dr. Weltfish as authoritative facts, and it will suffice to point out her reconstruction of events in which the cave was successively inhabited by various tribal groups who are actually identified as "Pit Rivers" (Achomawi ?), Klamath-Modoc, Maidu, and Pomo. When she says (*ibid.*, p. 161), "[that] we have been able to reconstruct the history of seed-gathering peoples over a period of seven centuries is a rather remarkable achievement of science," it is obvious that she is unable to distinguish between her own clairvoyant abilities and archaeological facts.

The concern of the University of California in the prehistory of Nevada began with the salvage work of L. L. Loud in 1912; it was continued by him in 1924, revived in 1936 with the excavation of Humboldt Cave, continued in 1937 with the testing of Leonard Rockshelter, and resumed in 1950 and 1951. The present report, though long overdue, completes one phase of this program of work. Reports on the 1950 and 1951 summers are in preparation or ready for the press.⁸⁸

We hope that this report will be useful to the students of the Great Basin who are for the first time beginning to study that culture area seriously, as illustrated by the initiation of the Great Basin Archaeological Conference in 1954 under the able leadership of Jesse Jennings, and by the August, 1954, number of the *American Anthropologist*, which deals wholly with the Greater Southwest.

⁸⁸ For a recent statement on activities of the University of California in the Nevada area see the annual report for 1953-1954 of the University of California Archaeological Survey (mimeo., Berkeley, 1954) and UCAS-R33.

APPENDIX I: SUMMARY OF DATA ON CACHES

Cache 1. Specimens 42067-42085; undisturbed surface; depth 4 in.; rear of cave. (Pls. 6, a, 7, a.)

- 3 burlap sacks (2 close weave, 1 loose weave)
- 2 pairs trousers (1 military, 1 black pair split open)
- 1 canvas ore sack
- 5 strips of cloth or cloth fragments
- 1 *Apocynum* cord
- 1 fishline with bone hooks
- 1 chert blade
- 1 steel arrowpoint
- 1 bundle of eagle feathers

Cache 2. Specimens 42086-42099; in sec. 3, next to S wall; depth 42 in., W 16 ft. 4 in., S 2 ft. 6 in. (center); diameter of round cache pit 26 in.; pit grass-lined.

- 6 wicker-basketry fragments
- 1 coiled-basketry fragment
- 2 tule mat fragments
- 1 sandal fragment, tule
- 1 stone object
- 1 bone awl
- 1 bound bundle of feathers
- 1 piece of desiccated fish remains
- 1 willow-wickerwork fragment
- Apocynum* string fragments

Cache 3. Specimens 42100-42120; depth 46-54 in., W 16 ft. 4 in., N 4 ft. 3 in. (center); W 15 ft. 6 in. to 17 ft. 3 in., N 3 ft. 9 in. to 5 ft. 4 in., from against N wall out into trench. No apparent order to specimens, but mat was against N wall and basketry under it. Also, a long tule rope ran through center of cache in direction of main axis of cave.

- 13 wicker-basketry fragments
- 4 coiled-basketry fragments
- 4 tule mat fragments
- 2 tule rope fragments
- 1 *Apocynum* string fragment
- 1 piece of cottonwood inner bark

Cache 4. Specimens 42121-42169; depth 50-63 in., W 17 ft. 6 in., N 1 ft. 6 in. (center). (Pl. 4, f.)

Cache 39 in. in diameter, in two parts, upper and lower, in bottom of rock recess in back of cave. Large mats were superimposed; ropes round rim of cache; 2 in. grass lining between two parts and under whole cache; large rock found dropped (?) in center of cache.

- 25 wicker-basketry fragments
- 2 complete coiled-basketry trays
- 3 coiled-basketry fragments
- 5 tule matting fragments
- 1 legging (?) of *Juncus* bundles
- Rope fragments
- 1 rope
- 3 samples of grass and tule from cache lining
- 1 flat stone object
- Mass of lake scum (?)
- Sample of *Artemisia* sticks
- 4 sticks of *Sarcobatus*
- 2 animal feces
- 1 strip of buckskin
- 1 wooden arrowpoint fragment

Cache 5-A (upper). Specimens 42170-42233; depth 60-66 in., W 11 ft., S 4 ft. 6 in. Cache 5 upper apparently a "false cache" over Cache 5 lower. Extent, 36 in. E-W by 30 in. N-S, near S wall in a small alcove. Pit was grass-lined. (Pl. 5, c.)

- 22 wicker-basketry fragments
- 18 wicker-basketry fragments, light
- 11 wicker-basketry fragments, medium
- 1 wicker-basketry fragment, 2 doubled warps
- 1 wicker-basketry fragment, checkered (?) patchwork
- 1 twined-basketry fragment, double warp
- 2 wicker-borderwork fragments, double rigid elements
- 1 wicker-borderwork fragment, double rigid elements, twined courses marginal to wicker body
- 3 wicker-basketry borderwork fragments, marginal twine courses
- 1 twined-basketry fragment, 2-rod warp
- 6 coiled-basketry tray fragments
- 1 coiled-basketry fragment, close weave
- 2 coiled-basketry fragments
- 8 tule matting fragments
- 4 tule matting weft elements
- 2 *Juncus* or rush matting weft elements
- 1 rope fragment, *Juncus*
- 1 knotted rope, *Juncus*
- 1 loop-knotted rope of tule
- 3 knotted grass strands
- 1 open twinwork fragment, rigid elements, triple weft
- 2 strips animal skin twisted as for cordage
- 3 *Apocynum* string fragments
- 1 *Sarcobatus* stick, worked
- 1 awl (?) of wood, somewhat charred; length 108 mm.
- 1 pointed bone object; length 85 mm.

Cache 5-B (lower). Specimens 42234-42320; depth 72 in., W 10 ft., S 5 ft. 6 in. (center); extent, 49 in. N-S by 62 in. E-W. (Pl. 5, d.)

- 32 wicker-burden-basket fragments, large
- 45 wicker-basketry fragments
- 1 wicker-basketry fragment, double weft laid side by side
- 1 coiled-basketry tray fragment, red paint on one side
- 12 coiled-basketry tray fragments
- 4 fine, feathered coiled-basketry fragments
- 1 soft woven bag of *S. lacustris*
- 22 tule matting fragments (two with bordered loops, and one with border loop and braid)
- 1 matting fragment of *Juncus* rush
- 1 open willow-wickerwork fragment
- 1 rope of tule, 2-ply
- 2 knotted willow shoots
- 1 sandal, woven tule
- 1 woven bird-skin garment fragment
- 1 blue limestone slab
- 1 piece of galena (PbS)
- 1 sample of *S. lacustris* "fuzz"

Cache 6. Specimens 42321-42346; depth 45 in., W 6 ft. 8 in., S 2 ft. 8 in. (center); pit grass-lined. (Pl. 5, b.)

- 13 wicker-basketry fragments
- 1 wicker-borderwork fragment; 2-rod foundation, single marginal twine course
- 1 wicker-borderwork fragment, 2 marginal twine courses
- 1 wicker-borderwork fragment

- 2 open twine fragments, rigid elements, both single and doubled (i.e., 3- and 4-strand weft)
- 1 twining fragment, double elements with multiple-rod backing sewed on
- 1 coiled-basketry tray fragment, multiple-foundation
- 1 coiled-basketry fragment, 4-rod
- 1 coiled-basketry fragment, with sewed reinforcement
- 1 coiled-basketry fragment, 3-rod
- 2 coiled-basketry fragments
- 1 matting weft element, tule
- 1 piece tule matting, border loops; size 7 × 15 in.
- 1 knotted *Juncus* strand
- 1 braided rope fragment of tule
- 4 knotted *Apocynum* strings

100 pieces of desiccated fish remains, many practically whole fish

Cache 7. Specimens 42347-42643; depth 48-88 in., E 2 ft. 6 in., W 5 ft., S 6 in. to 5 ft. (Pl. 4, c and d.) Cache 7 largest in cave, containing nearly 600 catalogue specimens, which were piled more or less at random against S wall, under a considerable overhang and along a ledge leading into the S alcove. The cache was ± 40 in. top to bottom, extended 7 ft. 6 in. along S wall from alcove around into main cave, and had an average width of 2 ft. 6 in. Mats were somewhat orderly in E end, but very disorderly in W end. A pit probably bounded the cave side of the cache, i.e., faced the S wall in a parallel curve ± 2 ft. 6 in. away from it.

- 12 wicker-basketry fragments, large
- 55 wicker-basketry fragments
 - 1 wicker-basketry borderwork, marginal twine courses, willow-stick reinforcement
 - 1 willow stick bound to wicker fragment with netting cord
- Small wicker-basketry fragments
 - 1 wicker-basketry fragment, double warp
 - 1 wicker-basketry fragment, willow-bark twining marginal
 - 1 wicker-basketry fragment, triple weft
 - 1 wicker-basketry fragment, from rim
 - 5 wicker-basketry fragments, borderwork
 - 1 wicker-basketry fragment, large; reinforced with willow stick
 - 1 twined willow-basketry fragment, plain
 - 1 diagonal-twined basketry fragment
 - 2 twined willow burden-basket fragments, plain
 - 1 detached weft course of twined burden basket
- 30 coiled-basketry tray fragments
- 55 coiled-basketry fragments
 - 1 open twined basket of *Juncus*
- 84 matting fragments of various materials and of various parts of mat
 - 1 large twined bag of tule, with section of closer weaving of *Juncus*
 - 3 twined sandal fragments
 - Masses of *Typha latifolia* "fuzz" for sandal lining and padding
- 10 tule matting weft courses, detached
 - 1 *Juncus* matting weft course, detached
 - 1 grass rope, left-twist, multiple grass foundation, 2-strand
 - 1 braided grass rope, 3-strand
 - 1 braided grass rope, 4-strand
 - 7 rope fragments, grass, left twist
 - 1 rope fragment, *Juncus*, left twist, 2-strand
 - 1 rope fragment, 3-strand
 - 2 knotted tule strands
 - 2 rope fragments, grass, 2-strand
 - 5 rope fragments, tule, 2-strand
- 10 rope fragments, tule and small grass
 - 5 knots of grass and tule
 - 1 roll of flattened tule

- 6 *Apocynum* strings
 - 34 *Apocynum* string fragments
 - 1 outworn fish net, wrapped on buckskin base
 - 17 bird-skin strips (feathers gone)
 - 1 long buckskin thong
 - 1 buckskin fragment
 - 1 forked plant stalk
 - 1 arrow foreshaft, *Sarcobatus*
 - Cane samples, *Phragmites communis*
 - 1 wood sample, willow (*Salix*)
 - 1 *Sarcobatus* game dart
 - 1 cradle rung of willow (*Salix*), encircling groove both ends
 - 1 digging stick of softwood; length 18 in.
 - 1 stick with notched end; softwood
 - 1 animal bone
 - 3 unworked stones
 - 1 molded cylinder of white clay
 - 1 shale object, partly smoothed
 - 3 lumps of ocher paint
 - 1 obsidian flake
 - 1 flat, rounded pebble, unworked
 - 1 mano fragment
 - 1 willow stick, unworked
 - 1 sample of dogbane (*Apocynum*)
 - 1 cradle rung, willow
 - 1 fire-drill hearth of 4 pieces of rush aligned vertically and bound with tule
 - 1 strip of fur, from animal tail
 - 8 desiccated fish remains
 - 3 animal feces
 - 2 pieces of open twinework of willow splints
- Cache 8.* Specimens 42644-42688; depth 63 in., W 6 ft. 3 in., N 6 in. (center); diameter of cache 18 in.
- 1 wicker-basketry borderwork fragment
 - 22 wicker-basketry fragments
 - 5 coiled-basketry tray fragments
 - 5 coiled-basketry fragments
 - 2 matting fragments, tule
 - 1 matting fragment, border loops, tule
 - 2 matting fragments, *Juncus*
 - 2 matting weft-course fragments, *Juncus*
 - 1 rope fragment, *Juncus*
 - 1 large knot of grass, doubled and tied back round itself
 - 1 loose knot of rush or grass
 - 1 piece of bird skin, white feathers adhering
 - 1 flint flake, triangular
- Cache 9.* Specimens 42689-42792; depth 59 in., W 11 ft. 9 in., N 3 ft. (center); extent of cache 48 in. N-S by 55 in. E-W, bounded by N wall and extending to about center line of cave; depth range 54-63 in.
- 53 wicker-basketry fragments
 - 1 coiled-basketry tray fragment
 - 37 coiled-basketry fragments
 - 1 twined-basketry fragment
 - 1 detached weft of open twinework of willow elements
 - 7 matting fragments, tule
 - 1 matting fragment, *Juncus*

- 1 matting fragment, grass
 - 7 detached matting weft courses, tule
 - 3 rope fragments, *Juncus* (left twist)
 - 5 rope fragments, tule
 - 1 rope fragment, grass
 - 5 rope fragments, grass and tule
 - 1 rope fragment, twisted grass
 - 1 rope fragment, *Juncus*, knotted, with open spliced loop
 - 1 piece of knotted grass
 - 1 knotted grass bundle
 - 1 spliced willow stick, bound with grass rope and fish net
 - 3 pieces of *Typha latifolia* "fuzz," used as sandal lining (?)
 - 1 flat stone, unsmoothed
 - 1 bird bone; both ends broken off
- Cache 10.* Specimens 42793-42804; depth 55 in., S 4 ft. 4 in. (Pl. 6, b.) Cache 10 may possibly be a component of Cache 7, for it lay within the same bounds but was set off by a burned area from the Cache 7 specimens. It appeared to have been made separately.
- 3 hafted stone knives or spear foreshafts
 - 2 spear or knife blades
 - 3 arrowpoints, chert
 - 1 mass of pitch wrapped with tule strands
 - 1 buckskin wrapping, tied with string
 - 1 *Apocynum* string
 - 1 wooden bunt; length 11 cm.
- Cache 11.* Specimens 42805-42807; depth 12 in., E 9 ft. 6 in., N 1 ft. 3 in.
- 2 implements of mountain-sheep horn
 - Fragments of mountain-sheep horn implements
- Cache 12.* Specimens 42808-42821; depth 78 in., W 5 ft. 6 in., S 6 in. (center); extent, 29 in. E-W by 18 in. N-S, in pit 9 in. deep dug through deposit into sterile bottom of lake deposit, to W of Cache 17, near rock wall in center of cave; centered 2 ft. W of Cache 17, 18 in. deeper.
- 5 wicker-basketry fragments
 - 1 matting fragment, *Juncus*, very loosely woven (possibly a reject)
 - 1 matting fragment, tule
 - 4 matting pieces, tule, border loops
 - 1 matting piece, tule, diagonal twine; large
 - 1 fragment of round-pointed, smoothed wooden implement; length 3¼ in.
- Cache 13.* Specimens 42822-42857; depth 29 in., E 1 ft. 6 in., N 1 ft. (center). (Pl. 6, c and d.) Extent, 26 in. E-W by 26 in. N-S, depth 24-33 in., circular, with neat grass lining. Because of unity and specific nature, this was termed a "shaman's cache."
- 1 matting fragment, tule (lay on top of cache as protection to robe)
 - 5 feather robes of duck-skin strips
 - 1 duck head, stuffed with grass, lower bill tied with quill
 - 6 *Apocynum* strings, from feather robe
 - 1 bundle of hawk feathers, tied with tule strand
 - 1 bone tube of large bird leg, ends unfinished; length 17.5 cm.
 - 1 bird skin used as wrapping, down adhering
 - 1 weasel skin, head stuffed with grass, red feathers between teeth
 - 1 small skin bundle, wrapped with sinew
 - 1 small skin bundle, wrapped with *Apocynum* string; a bone fishhook attached
 - 2 small skin bundles, wrapped with *Apocynum* string
 - 1 *Apocynum* cord, slip noose
 - 1 sewed fawnskin pouch, hair inside
 - 4 slate spatulate objects; thin, flat
 - 1 *Apocynum* cord, knotted, for binding pouch
 - 1 rabbitskin pouch, narrow and deep

- 1 knotted netting used as cord for binding pouch listed above
- Vegetal material, from inside rabbitskin pouch listed above
- 1 flake of mineral, roughly square, from inside rabbitskin pouch
- 1 scrotum pouch containing pitch
- 1 soft skin bag with powdered paint
- 1 heavy *Apocynum* cord, binding above skin bag
- 1 small skin bundle, wrapped with *Apocynum* string
- 2 acorns from bottom of sewed fawnskin pouch (listed above)
- 1 small stone object; of indefinite shape, one side somewhat smoothed
- 7 bound feather bunches, *Juncus* binding, from within cache and its lining
- 5 bound feather bunches, as above
- 1 grass lining of cache, with bound feather bunches entwined
- Cache 14.* Specimens 42858-42892; depth 60 in., W 5 ft. 6 in., N 2 ft. 3 in. (center); extent, 40 in. E-W by 21 in. N-S, depth 56-66 in.; lay S of the large rock in center of cave in sec. 6.
- 22 wicker-basketry fragments
- 3 coiled-basketry fragments, tray
- 8 coiled-basketry fragments
- 1 coiled-basketry fragment, 5-rod foundation
- Wood shavings
- 6 matting weft courses, tule (2), *Juncus* (4)
- 1 matting fragment, *Juncus*; some parts are diagonal twined; some wefts doubled
- 2 matting fragments, tule
- Cache 15.* Specimens 42893-42918. Burned layer, sec. 7, depth 60 in., W 4 in., N 2 ft. 6 in. (center). Cache lay in a triangular recess in the central rocks. Extent, 22 in. E-W by 15 in. N-S, depth 53-67 in. Recess was lined with grass on bottom and sides, with matting next to the lining. Coiled fragments on edge against back rock. Apparently rifled previously.
- 13 wicker-basketry fragments
- 2 coiled-basketry fragments, trays
- 9 coiled-basketry fragments
- 3 matting fragments, tule
- 1 matting fragment, *Juncus*
- 1 matting border fragment, tule
- 1 fragment of matting with border loop, tule
- Matting weft course fragments, tule
- 1 strip of bird skin fastened with pitch (?) to *Apocynum* string
- Cache 16.* Specimens 42919-42938; depth 63 in., W 1 ft. 9 in., N 1 ft. 4 in. (center); extent, 26 in. E-W by 34 in. N-S, depth 57-63 in., bounded on E by overhanging rock, on N by rock wall (?), on W by Cache 17.
- 2 wicker-basketry fragments
- 3 wicker-basketry fragments, with zonal weft twist
- 1 wicker-basketry borderwork, double warp, triple weft
- 1 wicker-basketry fragment, from border; triple warp, double weft
- 2 coiled-basketry center fragments
- 1 coiled-basketry tray fragment
- 2 coiled-basketry fragments
- 1 large complete mat, diagonal twine; weft spanning as much as 5 warps; warps 6-ply; *Juncus* throughout
- 1 matting fragment, tule
- 1 matting fragment, *Juncus*
- 1 matting fragment, *Juncus*, border loop
- 1 matting weft course, *Juncus*
- 1 braided rope, multiple-ply *Juncus* spliced to 3-ply tule
- 1 knotted-string netting fragment

Cache 17. Specimens 42938-42965; depth 60 in., W 3 ft. 6 in., N 6 in. (center); extent, 26 in. E-W by 36 in. N-S, depth 58-62 in.; bounded on E by Cache 16 (centered 30 in. to E), on W by Cache 12 (centered 24 in. to W and 18 in. lower); center of Cache 17, 51 in. from S wall.

- 1 wicker-basketry fragment, with borderwork showing series of twisted double wefts
- 1 wicker-basketry fragment, with borderwork
- 16 wicker-basketry fragments
- 4 wicker-basketry fragments, with borderwork
- 1 coiled-basketry fragment
- 1 matting fragment, grass-bundle foundation, weft of multiple-strand *Juncus*
- 3 matting fragments, *Juncus*
- 1 matting fragment, *Juncus* weft, grass warp
- 5 matting weft course fragments, *Juncus*
- 2 knotted *Juncus* strands
- Clumps of "salt grass"
- 1 knotted *Apocynum* string

Cache 18. Specimens 42966-42977; location data lost.

- 1 wicker-burden-basket rim piece, with patch sewed to stick
- 1 wicker-basketry borderwork fragment
- 3 wicker-basketry fragments
- 1 coiled-basketry fragment
- 1 matting fragment, tule
- 2 matting fragments, tule, border loops
- 2 knotted *Apocynum* strings
- 1 sample of grass lining of cache

Cache 19. Specimens 42978-42987; depth 81 in., W 3 ft. 6 in., S 3 ft. (center). (Pl. 6, e.) Extent, 36 in. N-S by 36 in. E-W, depth 81 in. Cache was lined with brush instead of the usual grass.

- 1 matting fragment, grass-bundle foundation, *Juncus* weft (double)
- 2 matting fragments, all *Juncus*, warp and weft both doubled and tripled; border loops
- 1 knotted *Juncus* strand
- 1 worked stick of *Sarcobatus*; length 21½ in.

Cache 20. Specimens 42988-42993; depth 87 in., W 3 ft. 3 in., datum (center). (Pl. 6, f.) Extent, 13 in. N-S by 16 in. E-W, depth 78-84 in. In shallow pit dug into loose sterile bottom material. Lined with grass and tule "fuzz." Lay NW of Cache 21, SE of Cache 18, and S of large central rock.

- 3 sickles of mountain-sheep horn
- 1 grass cutter of mountain-sheep or deer scapula
- 1 wad of *Scirpus* "fuzz"

Cache 21. Specimens 42994-43029; depth 85 in., W 2 ft., S 1 ft. (center). (Pl. 5, e.) Extent, 30 in. N-S by 33 in. E-W, depth 85-91 in. Bounded on S by rat nest and Cache 7, on N by large rock, on E by Caches 20 and 19. Apparently a shallow pit dug into bottom gravel.

- 17 wicker-basketry fragments
- 2 wicker-basketry fragments, warp doubled
- 4 wicker-basketry fragments, with borderwork
- 1 wicker-basketry fragment, weft twist
- 1 coiled-basketry fragment, tray
- 1 coiled-basketry fragment
- 2 matting fragments, tule
- 1 matting fragment, *Juncus*
- 2 matting weft courses, tule
- 1 knotted *Apocynum* string
- 1 splinter of wood
- 1 piece of willow stick with knotted string
- 1 paddle-shaped object ("trowel") of cottonwood, with fire-drill pit

Cache 22. Specimens 43030-43048; depth 21 in., E 3 ft. 3 in., N 6 ft. 4 in. (center). (Pls. 5, f; 7, b; 8, a.) Extent, 32 in. N-S by 15 in. E-W, depth 18-24 in. from actual surface. Apparently a fisherman's cache. Cache lay just below an ash layer 15 in. from surface.

- 1 large mat, diagonal twine, all *Juncus* (?), some wefts double; one side encrusted with salt
- 1 bundle of cane, some with heads
- 1 envelope-like pouch of V-twinning; two decorative weft courses round middle, terminal cord
- 1 strip of bird skin, feathers adhering
- 4 barbed bone fishhooks, bound to wooden shaft; 2 cords
- 2 barbed bone fishhooks, bound to wooden shaft; 1 cord
- 1 barbed bone fishhook, bound to wooden shaft, no cord
- 1 barbed bone fishhook, without shaft or cord
- 2 intestine pouches, cord binding one end, folded
- 1 intestine pouch, cord binding one end, not folded
- 1 swan- or goose skin, used as pouch; down side in
- 1 strip of *Juncus* used to bind above pouch
- 1 hoop made of grass heads, bound with rush, buckled to fit in pouch
- 1 hoop made of grass heads, bound with rush, buckled to fit in pouch, and bound again to hold it in buckled position

Cache 23. Specimen 43049; depth 70 in., E 5 ft., S 1 ft. 9 in. (center).

- 1 wicker-basketry fragment, with zonal weft twist

Cache 24. Specimens 43050-43051; depth 44 in., E 8 ft., N 9 in. (center). Cache directly on sterile gravel, below thin human-occupation level under rat nest. Bounded on N by rock.

- 1 matting of cane warp and tule weft

Cache 25. Specimens 43052-43083; location data lost. Cache lined with grass and *Juncus*. (Pl. 8, b and c.)

- 11 wicker-basketry fragments
 - 1 wicker-basketry borderwork fragment, 2-, 3-, and 4-rod wefts
 - 2 wicker-basketry borderwork fragments
 - 1 wicker-basketry fragment, with patchwork
 - 1 wicker-basketry fragment, with marginal twining
 - 1 wicker-basketry fragment, with marginal twining, double foundation
 - 1 coiled-basketry tray, complete
 - 5 coiled-basketry fragments
 - 1 twined carrying bag, *Juncus*, multiple-foundation; length 47.5 cm.
 - 1 piece of matting, multiple-foundation of *Juncus*, tule weft
 - 3 matting fragments, tule
 - 1 matting fragment, grass weft and grass foundation
 - 1 matting fragment, both elements grass (and *Juncus* ?)
 - 1 matting weft element, tule
 - 1 matting weft element, tule, willow splints
 - 1 twined sandal, tule body, *Juncus* toe
 - 1 *Sarcobatus* stick; 1.50 cm.; both ends pointed; (a digging stick ?)

Cache 26-A (upper). Specimens 43084-43102; location data lost. The 3 levels of this cache were superimposed and lay directly under the dome of S alcove, the top cache level (A) being 40 in. below dome of alcove. The large pieces of matting topped the cache; most of the basketry lay to the extreme S.

- 1 wicker-basketry borderwork fragment
- 6 wicker-basketry fragments
- 2 wicker-basketry fragments, with patch of basketry
- 1 wicker-basketry fragment, with borderwork
- 2 coiled-basketry tray fragments
- 1 matting fragment, part plain and part diagonal twining, round tule
- 1 matting fragment, *Juncus*-bundle foundation, *Apocynum*-string weft
- 1 strip of matting, 40 × 5½ in. long; all *Juncus*

- 1 large piece of matting, all *Juncus* multiple-foundation, partly in diagonal twining
- 1 matting fragment, multiple-foundation; all *Juncus*
- 1 curved willow stick, (piece from burden-basket rim ?)

Cache 26-B (middle). Specimens 43103-43192. See Cache 26-A. (Pls. 5, a; 8, d.)

- 28 wicker-basketry fragments
 - 1 wicker-basketry fragment, with borderwork and patch
 - 1 wicker-basketry fragment, with marginal twining
 - 2 wicker-basketry borderwork fragments, with patching
 - 1 coiled-basketry tray fragment
- 12 coiled-basketry fragments
 - 1 coiled-basketry fragment, with patchwork
 - 1 twined-basketry fragment
 - 1 piece of matting, grass-bundle foundation, *Juncus* weft
 - 1 large mat, of grass and *Juncus*
 - 1 piece of matting, of grass and *Juncus*
 - 3 matting fragments, tule
 - 1 matting fragment, tule (part of sandal ?)
 - 3 matting fragments, *Juncus*
 - 6 matting weft courses, *Juncus*
 - 7 rope fragments, *Juncus*
 - 3 braided rope fragments, *Juncus*
 - 1 fragment of open willow twinework
 - 1 buckled grass bundle
 - 1 coiled rush strand
 - 1 knotted tule stalk
 - 1 coil of willow splint, as used in basketry patchwork
 - 1 mass of knotted *Apocynum* string and twisted bird-skin strips
 - 1 *Apocynum* (?) rope, 4-strand, wrapped with quills and bird-skin strips
 - 1 fine, knotted netting, wrapped with bird-skin strips
 - 1 *Apocynum* cord, wrapped with strips of bird skin
 - 1 *Apocynum* cord wrapped with quills
 - 7 twisted strips of skin, bird and weasel
 - 2 knotted *Apocynum* cords
 - 5 *Apocynum* cord fragments
 - 1 knotted rope; length 16 in.
 - 1 pine-nut bead
 - 3 waterfowl bills
 - 1 small mammalian mandible
 - 5 pieces of desiccated fish remains
 - 1 paddle-like object of cottonwood (trowel ?), used as a fire hearth
 - 1 cradle stick (?) of willow
 - 1 pointed stick
 - 2 split sticks
 - 1 stick
 - 1 cut stick
 - 1 piece of *Sarcobatus* root
 - 1 bird-bone awl; length 26.5 cm.
 - 1 unworked cobble

Cache 26-C (lower). Specimens 43193-43216. See Cache 26-A.

- 14 wicker-basketry fragments
 - 4 coiled-basketry fragments
 - 1 wicker-basketry fragment with adjoining twinework and zonal weft twist
 - 1 twill-twined matting of rigid willow materials
 - 1 braided rope fragment, tule or partially decomposed rush

- 1 piece of matting, multiple-weft courses, *Juncus*
 1 matting fragment, tule or partially decomposed rush
 2 *Apocynum* strings
- Cache 27-A (upper)*. Specimens 43217-43258; depth 51 in., E 5 ft. 9 in., S 4 ft. 9 in. (center); extent, 40 in. E-W by 54 in. N-S, depth 46-56 in. Several pieces of unworked cane lay on top of cache. Cache roughly bowl-shaped, 10 in. deep.
- 20 wicker-basketry fragments
 4 wicker-basketry fragments, zonal weft twist
 1 wicker-basketry fragment, with split stitching of splint patching
 1 wicker-basketry fragment, patch of basketry on both sides
 1 wicker-basketry fragment, decorative two-color wefts
 1 wicker-basketry fragment, borderwork, with double warp elements twisted in a ropelike fashion before they reënter as wefts
 1 wicker-basketry fragment, borderwork, hung to wooden rim piece by wrapping method
 1 wicker-basketry fragment, double wefts run side by side
 2 coiled-basketry fragments
 2 coiled-basketry fragments, trays
 4 matting fragments, tule
 1 matting fragment, tule, paired warps—one thick, one thin
 1 matting weft course, tule
 1 cut stick, one end notched around; length 15¼ in.
 1 curved stick, probably a piece of burden-basket rim; length 17½ in.
 1 worked wooden slab, 17 × 4 in., ends roughly pointed; one side concave
 1 bipointed wooden object, cylindrical midsection; length 3⅝ in.
- Cache 27-B (lower)*. Specimens 43259-43285; depth 56 in., E 6 ft., S 4 ft. (center). The second or lower level of Cache 27 was a concentration of basketry, mostly wicker, directly beneath and slightly to the NE of the top layer.
- 1 large shattered piece of wicker basketry with borderwork
 2 large pieces of wicker basketry with borderwork and zonal weft twist
 11 wicker-basketry fragments
 1 wicker-basketry fragment, with *Apocynum* string attached
 5 wicker-basketry fragments, zonal weft twist
 1 wicker-basketry fragment, zonal weft twist and borderwork
 5 wicker-basketry fragments, borderwork
 1 wicker-basketry fragment, borderwork, with zonal twisting of double semirigid wefts
 1 coiled-basketry tray fragment
 1 matting fragment, grass and rush elements
 1 peeled, forked stick of *Sarcobatus*
- Cache 28*. Specimens 43286-43342; depth 46 in., E 9 ft. 6 in., S 5 ft. (center).
- 1 large triangular section of wicker burden basket, design zones geometric; weft twist
 32 wicker-basketry fragments
 5 wicker-basketry fragments, with borderwork
 3 wicker-basketry fragments, with zonal weft twist
 5 coiled-basketry fragments
 1 coiled-basketry fragment, rod-and-splint foundation
 1 open-twill-twined basketry fragment, stick warp, semiflexible wefts
 1 open-twined basket (?), inflexible elements, selvage
 2 open-twined willow latticework fragments
 1 open-twined willow latticework fragment, stouter
 15 flexible, close-twined mats of tule, with animal fur woven into border fragments
 1 flexible, close-twined mat of tule, but several weft courses of opposite twist (i.e., V-twined)
 1 flexible, close-twined mat of tule, with V-twined courses
 1 piece of open matting of rush
 1 matting fragment of tule
 1 bundle of grass heads twined with *Juncus* strands

- 1 knotted tule strand
- 1 knotted rush strand
- 5 knotted *Apocynum* cords
- 3 twisted bird-skin strips
- 2 fire-drill hearths, *Sarcobatus*
- 1 cut stick, sagebrush

Cache 29. Specimen 43343; depth 64 in., E 9 ft. 8 in., S 7 ft. 4 in. (Pl. 3, e.) This single coil appears to be a cache, in human-occupation levels below rat nest and below southerly parts of Cache 28.

- 1 coil of ribbon-like willow splints, probably for basketry

Cache 30. Specimens 43344-43364; depth 48 in., E 10 ft., S 1 ft. 3 in. (center); extent, circular, diameter 18 in. Lay directly upon clean, sterile sand-and-gravel bed sloping into cave from entrance. There was some evidence of a pit in the gravel for the cache.

- 5 wicker-basketry fragments
- 20 coiled-basketry fragments
- 1 rough stone thickly encrusted with niter salts

Cache 31. Specimens 43365-43407; depth 51 in., secs. 8 and 9, N wall. (Pl. 8, f.) Extent, 62 in. E-W by 32 in. N-S. Cache lay in rocky bottom of recess between large central rocks and N wall.

- 15 wicker-basketry fragments
- 1 wicker-basketry fragment, with basketry patch
- 1 wicker-basketry fragment, borderwork
- 1 coiled-basketry fragment, smeared with red paint
- 8 coiled-basketry fragments
- 1 large twined mat, 37 × 34 in., bundle warps of cane, rush, and grass, wefts of rush; border loops 2 sides
- 4 matting fragments, tule
- 3 matting fragments, rush
- 3 matting weft courses, fragments, rush
- 1 open-twined willow latticework fragment
- 2 knotted rush strands
- 1 rope fragment, tule (?)
- 1 spliced rope with running noose, *Juncus*
- 1 rope of *Juncus*, knotted and spliced, 2 strings attached
- 1 coiled tule stalk (3 turns)
- 1 bundle of stiff grass stalks, tied with *Apocynum* cord
- 1 animal fur wrapped with *Apocynum* cord
- 3 strips of bird skin
- 1 sling pocket
- 3 *Apocynum* cords
- 1 fine knotted string netting wrapped with strip of small animal skin
- 1 fine knotted string netting fragment
- 1 fine knotted string
- 1 piece of desiccated fish
- 1 animal scapula, with very rough serrated edge showing wear

APPENDIX II: *APOCYNUM* SLING

BY

Chérie Grégoire

The world-wide distribution of slings for hunting, toys, and occasionally for warfare has been noted by Heizer and Johnson (1952). Included in that paper (pp. 139-142) is a list of published sources for the sling in the Americas, which will not be repeated here.

The sling is known ethnographically among all groups in the Great Basin. Steward (1941, p. 291) claims that it was used only as a toy among the Northern Paiute. This assertion is further substantiated by the association of a sling with a child's burial in Lovelock Cave.

Most commonly, aboriginal slings consisted of a small rectangular or diamond-shaped piece of buckskin with long strings attached. These strings were tied in a manner which caused the skin to form a little pocket or cup to hold slingstones. Strings were made either of sinew or of plant fiber, the latter being most common. A number of variations of this general pattern have been recorded. Among the Pomo the pocket was made of tules (Barrett, 1952, 1:145). An interesting pocket woven of *Apocynum* cordage was recovered from Lovelock Cave (Heizer and Johnson, 1952), and another similar fragment (pl. 24, i) came from Humboldt Cave (O'Neale, 1947).

The construction of the present sling pocket from Humboldt Cave (43400) does not resemble any of the known techniques of manufacture mentioned above, nor does it parallel any recorded method of tumpline construction. The piece is a unique specimen; none like it has been described from any other site in North America. All in all, the type appears to be a local invention. As there is only one example, it is within the realm of possibility that someone made it in his leisure time and for various reasons neither he nor anyone else continued to make this type.

Although its construction is unusual, in other respects the sling is very ordinary. The cordage is two-ply S-twist composed of *Apocynum* fibers. *Apocynum*, sometimes known as Indian hemp, is a common cordage material in western North America.

In general appearance this sling resembles a small netted hammock with patterned chains of meshes. A pattern of two chains of small meshes alternating with one chain of long meshes is repeated three times. There is no evidence of wrapping or binding at either end except for a hitch, which gathers together the beginning and terminal loops. The specimen is illustrated in plate 24, k; note that construction apparently began at right.

Yarn analysis.—The material used in the construction of this specimen is a bast fiber, *Apocynum cannabinum*. The fiber color is reddish gold, falling well within the gray-to-red range of *Apocynum*. Individual fibers are long and silky, but form a strong reliable cord when twisted together. Throughout, the cordage in this sling shows uniform color, twist, and ply, which indicates that all strings came from a single batch of prepared materials. Within the sling, body yarns are consistently two-ply S-twist. Each yarn ply was itself originally twisted in a Z direction. The end string (one is missing) is three-ply Z-twist. In turn, each ply of yarn is composed of a two-ply S-twist string.

Dimensions.—All measurements given below are taken at the maximum unless otherwise stated: length of specimen is 17 cm. (6.5 in.); width of specimen 6.7 cm. (2.6 in.); diameter of body yarns 0.1-0.2 cm., averaging 5 twists per 1 cm.; diameter of end yarns 0.25 cm., averaging 3 twists per 1 cm. Small meshes average 1.3 cm.; long meshes average 2.4 cm.; beginning and terminal loops average 3.5 and 2.5 cm., respectively. Stretched mesh measurements were made because the long meshes are composed of two long and two short sides. All tag ends are clipped so short that they can scarcely be detected (see pl. 24, k).

Construction.—The sling was started with three loops of string over a rod or similar removable instrument (fig. 3). (See fig. 2 for all reference points mentioned below and for mode of construction.) These loops were laid on in a right-to-left direction. All following course numbers refer to rows of mesh knots shown in the figure. In manufacture, work proceeded consistently from left to right. When an even-numbered course was completed, the piece was turned over to make the uneven-numbered course and was then reversed. Meshes are somewhat irregular in size, indicating that a mesh gauge was not used.

All knots used for the construction of this sling are sheet bends (fig. 1), except three simple overhands used in the expansion technique described below.

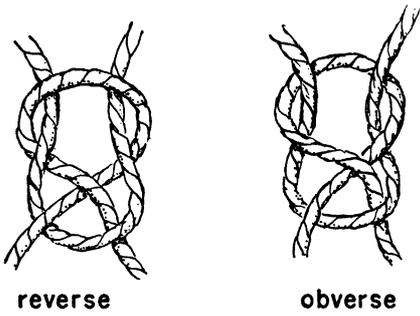


Fig. 1. Sheet-bend knot.

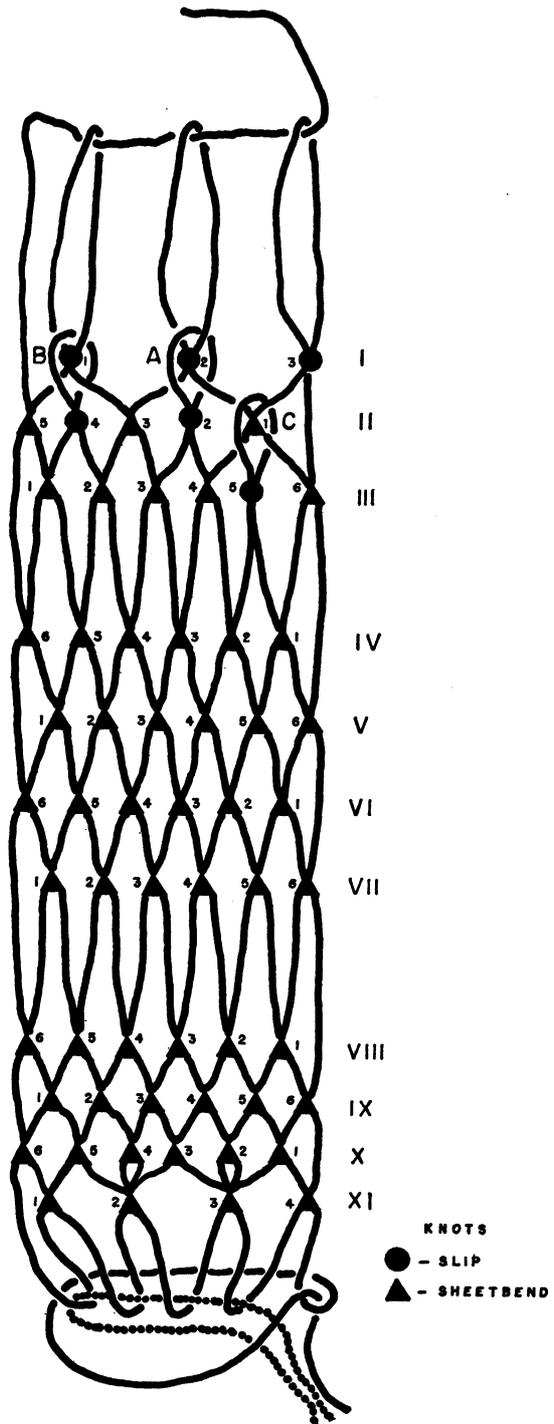


Fig. 2. Sling pocket of *Apocynum cord* (43400). A, B, C, loops used to widen pockets; roman numbers indicate courses of knots; arabic numbers indicate knots in order of construction; triangle, sheet-bend knot; circle, over-hand knot. Scale: $1\frac{1}{4}$ natural size.

Course I: Composed of three knots which complete the beginning loops.

Course II: Forming the first chain of small meshes. The first mesh was made in the usual way (fig. 3); then a loop (A) was thrown over knot 2 of course I, the cord being brought back and knotted on itself with a simple overhand. A regular mesh follows and a repeat of the loop construction (B) thrown over knot 1 of course I; the chain ends with a regular mesh. This course is,

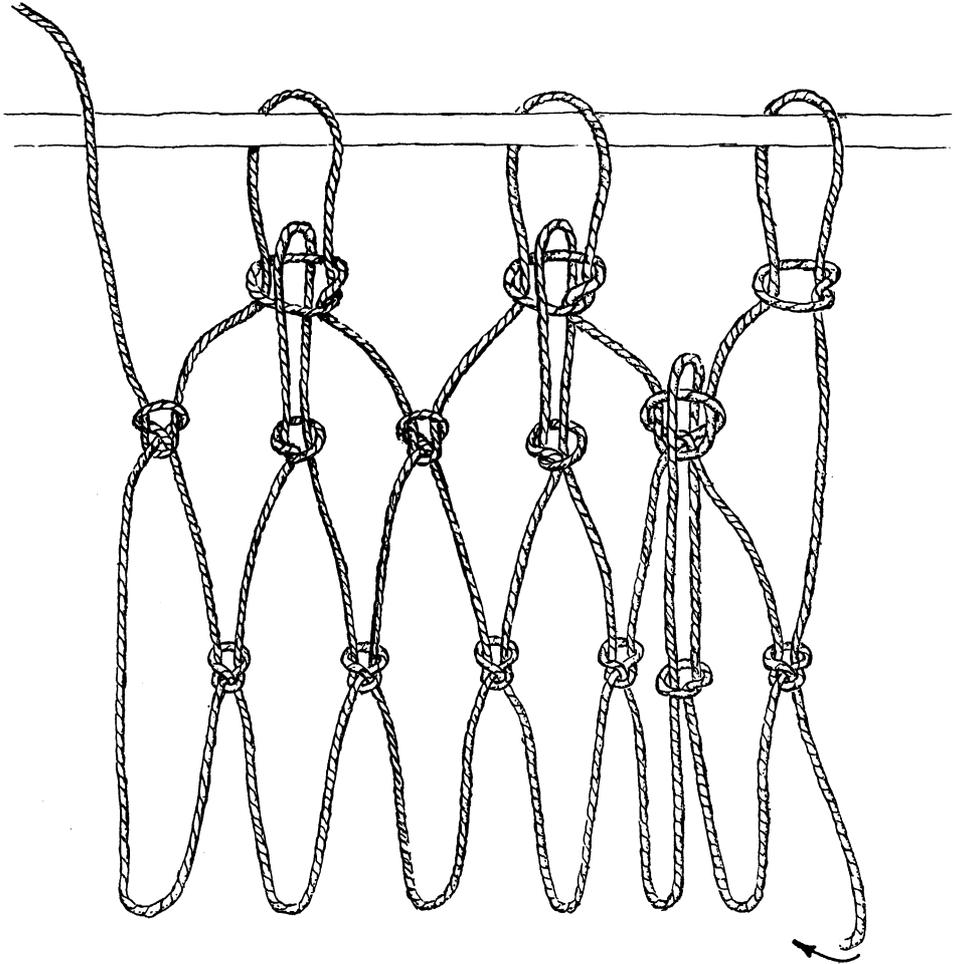


Fig. 3. Section of figure 2 showing construction technique. Scale: $3 \times$ natural size; thickness of cord, $\frac{1}{2}$ natural size.

then, composed of three regular meshes and two secondary loops (A-B). These secondary loops make the pocket wide enough to hold slingstones.

Course III: Composed of five regular meshes and a single secondary-loop construction (C) thrown over knot 1, course II. It completes a second chain of small meshes. At this point the desired width was reached.

Course IV: Forms the first chain of long meshes and has six knots. Knot 5 is actually two sheet bends tied closely together.

Course V-VII: Form two chains of small meshes. Each course is composed of six knots.

Course VIII: Completes a chain of long meshes with six knots. Knot 1 is two sheet bends tied closely together.

Course IX-X: Are like those described for V-VII.

Course XI: Completes the last chain of small meshes with only four knots. Knots 2 and 4 are tied around two meshes (each) of course X, in order to decrease width. Terminal long loops are gathered together by a hitch. After the sling was completed, the end string was made from the tag end and cordage used for the hitch.

Apparently a new length of cordage was joined to the body of the specimen at knot 5, course IV, and knot 1, course VIII.

Finishing: The construction completed, a second piece of cordage was threaded through the terminal (end B) loops to gather them together, and the free yarn end was brought around and tied in a half hitch (fig. 2). The three resulting yarns were then twisted together to form a sling string. At end A the free yarn end was threaded through the loops and brought around in a half hitch. The remainder of this yarn formed a sling string.

APPENDIX III: FAUNAL REMAINS

BY

Richard H. Brooks

Identification of the mammal and bird bones from Humboldt Cave, Churchill County, Nevada, enlarges the archaeological picture of the site by suggesting the former ecological background. In the preparation of this report, two major sources were consulted: *Mammals of Nevada*, by Raymond Hall (1946), and *The Birds of Nevada*, by Jean M. Linsdale (1936). Any distributions of mammals or birds mentioned in this paper can be further studied in these monographs. The taxonomy in this paper follows Linsdale (1936) for avifauna and Hall (1946) for mammals. I am indebted to Dr. Seth B. Benson, who gave me permission to use the comparative specimens in the University of California Museum of Vertebrate Zoölogy and frequently aided me in identifications. I should like also to thank Dr. Frank Pitelka for his permission to utilize the skeletal avifauna material in the University of California Museum of Vertebrate Zoölogy. The range of both these collections is highly suitable for comparative purposes.

AVIFAUNA

Bird remains identified consisted solely of skeletal elements.¹ Seven orders are represented: Colymbiformes, Pelecaniformes, Ciconiiformes, Anseriformes, Falconiformes, Gruiformes, and Passeriformes. Skeletal elements in all these orders, except the last, were identified as belonging to eighteen genera and sixteen species (table A). In the last order listed above, a tentative identification of American raven was carried only to the family Corvidae. Among the Anseriformes there are other tentative identifications, based on only one or two bones, *Anser albifrons* and *Anas* sp.²

In table A, "Taxonomic List of Birds," the method used for obtaining the figures in the column "Estimated individuals" was to total all the bones for each species to obtain the maximum figure. The minimum figure tallied is based on the data for right or left side, adult or juvenile, and relative sizes of bones. Minimum figures are considered to represent individuals; many of these are based on nearly whole skulls or single complete bones.

According to Linsdale's classification, 50 per cent of the genera and species represented are permanent residents: Canada goose, *Anas* sp., common mallard, merganser, red-tailed hawk, Swainson hawk, prairie hawk, cormorant, and raven. Twenty-seven per cent are transitory summer residents: grebe, pelican, heron, teal, and American coot, or mud hen. Twenty-two per cent are winter visitors or residents: whistling swan, snow goose, white-fronted goose, black brant, and canvasback. Of the species named above, the pelican, Canada goose, cormorant, merganser, and American coot nest in Nevada.

The total of seventy-eight bird bones weighed 414.5 gm. Thirteen bones—six of them artifacts and seven long bones—could not be identified, because of their modified or fragmentary condition. Bones made into artifacts total 14.1 per cent, nonartifact bones 85.9 per cent. Whole and fragmentary bones are divided evenly, 50 per cent for each. Cranial and postcranial elements each account for about half of the total of eighty bird bones. At least fifty-five individual birds are represented, and possibly twenty-three more, making a maximum of seventy-eight (table A).

MAMMALIAN FAUNA

Mammalian skeletal remains were identified as belonging to four orders: Carnivora, Rodentia, Lagomorpha, and Artiodactyla; or eleven families and seventeen genera and species. All species

¹ Stuffed birds' heads, feathers, and so forth, were among the identified material from Lovelock Cave (Loud and Harrington, 1929, p. 35).

² Both were represented in Lovelock Cave. Other Anseriformes in Lovelock but not in Humboldt Cave include the sprig, *Dasfla acuta*; widgeon, *Mareca americana*; and the ring-necked duck, *Marela (Nyroca ?) collaris*. Other genera and species found in Lovelock Cave but not in Humboldt Cave include the great blue heron, *Ardea herodias*; California gull, *Larus californicus*; great horned owl, *Bubo virginianus*; crow, *Corvus brachyrhynchus*; and western blue bird, *Sialia mexicana*. All avifauna in both caves are listed by Linsdale, with one exception, *Anser albifrons*.

TABLE A
TAXONOMIC LIST OF BIRDS

Specific name	Common name	Bone frequencies	Estimated individuals
Colymbiformes			
<i>Colymbus auritus</i>	Horned Grebe.....	1	1
Pelecaniformes			
<i>Pelecanus cf. erythrorhynchos</i>	White Pelican.....	8	5- 8
<i>Phalacrocorax auritus</i>	Farallon Cormorant.....	2	1- 2
Ciconiiformes			
<i>Nycticorax nycticorax</i>	Black-crowned Night Heron..	1	1
Anseriformes			
<i>Cygnus columbianus</i>	Whistling Swan.....	8	4- 8
<i>Chen hyperborea</i>	Lesser Snow Goose.....	5	4- 5
<i>Branta nigrans</i>	Black Brant.....	2	2
<i>Branta canadensis</i>	Canada Goose.....	2	2
<i>Anser albifrons</i>	White-fronted Goose.....	1	1
<i>Anas</i> sp.....	Duck.....	1	1
<i>Querquedula cyanoptera</i>	Cinnamon Teal.....	1	1
<i>Nyroca cf. valisineria</i>	Canvas Back.....	17	11-17
<i>Mergus merganser</i>	American Merganser.....	1	1
Unidentifiable.....	.....	6	5- 6
Falconiformes			
<i>Buteo borealis</i>	Western Red-tailed Hawk....	1	1
<i>Buteo swainsoni</i>	Swainson Hawk.....	2	2
<i>Buteo</i> sp.....	.....	1	1
<i>Falco mexicanus</i>	Prairie Hawk.....	1	1
Gruiformes			
<i>Fulica americana</i>	American Coot (Mud Hen)...	2	2
Passeriformes			
Corvidae.....	American Raven (?).....	2	1- 2
Unidentifiable.....	.....	13	7-13
Total.....	.....	78	55-78

identified were found to be within their present range and habitat.³ At least one species, the yellow-bellied marmot, previously had a greater distribution. Hall (1946, p. 282) reports that "in past centuries, probably later than Pleistocene time, this species, as indicated by remains in kitchen middens from northern Arizona and remains in a cave in the Providence Mountains of California, occurred further south than it does today. Because the species formerly occurred due south of Nevada, the species at this earlier time probably occurred further south in Nevada itself than it does now." All mammals considered in this series are discussed in Hall's monograph, and their distribution, habitat, and so forth, are fully described.

³ See table B. Species found in Lovelock Cave (Loud and Harrington, 1929, p. 32) but not in Humboldt Cave include mole, *Scapanus latimanus*; weasel, *Mustela*, sp.; mink, *Mustela vison*; skunk, *Spilogale gracilis*; wolf, *Canis (lupus ?) gigas*; beaver, *Castor canadensis*; cottontail, *Sylvilagus nuttalli*; and antelope, *Antilocapra americana*.

TABLE B
TAXONOMIC LIST OF MAMMALS

Specific name	Common name	Bone frequencies	Estimated individuals
Carnivora			
Mustelidae			
<i>Taxidea taxus</i>	American Badger	1	1
Canidae			
<i>Vulpes fulva</i>	Red Fox	2	1- 2
<i>Vulpes macrotis</i>	Kit Fox	2	2
<i>Canis latrans</i>	Coyote	8	3- 8
Felidae			
<i>Lynx rufus</i>	Bobcat	3	3
Rodentia			
Sciuridae			
<i>Marmota flaviventer</i>	Yellow-bellied Marmot	6	1- 2
Heteromyidae			
<i>Dipodomys</i> sp.	Kangaroo Rat	1	1
Geomyidae			
<i>Thomomys</i> cf. <i>bottae</i>	Pocket Gopher	10	8-10
Muridae			
<i>Neotoma lepida</i>	Wood Rat	1	1
<i>Microtis montanus</i>	Montane Meadow Mouse	4	4
<i>Microtis longicaudus</i>	Long-tailed Meadow Mouse	5	5
<i>Ondatra zibethica</i>	Muskrat	1	1
Lagomorpha			
Leporidae			
<i>Lepus</i> cf. <i>californicus</i>	Jack Rabbit	36	7-36
Artiodactyla			
Suidae			
<i>Sus scrofa</i>	Domestic Pig	1	1
Cervidae			
<i>Odocoileus hemionus</i>	Black-tailed Mule Deer	5	1- 5
Bovidae			
<i>Ovis canadensis</i>	Mountain Sheep	20	5-20
<i>Bos taurus</i>	Domestic Cow	1	1
Unidentifiable		24	.....
Unidentifiable mammals		15	.....
Total		146	45-102

The four orders of mammals (table B) in frequency of occurrence and percentage of the total follow this sequence: Artiodactyla, Lagomorpha, Rodentia, and Carnivora. Of the identifiable Artiodactyla, the mountain sheep is most numerous, and next in order come the deer, domestic pig, and cow. The Lagomorpha are represented by a single species of jack rabbit. Of Rodentia, the pocket gopher is most numerous, and next in order are the marmot, long-tailed meadow mouse, montane meadow mouse, kangaroo rat, wood rat, and muskrat. Most specimens of this order were represented by skulls or parts of skulls. Of the order Carnivora, the coyote is most abundant, and after that the bobcat, red fox, kit fox, and badger.

The entire series consists of 146 catalogued bones, weighing 2,089 gm. (table C). Of these, 15 long bones were unidentifiable because of their modification into bone tools. Judged by their size, these bones possibly represent long bones of one or other of the Carnivora, though some of the artifacts—for instance, those used for the fishhooks—could be from artiodactyl long bones. artifacts total 57 bones, or 39 per cent of the total of 146 bones; nonartifact, 89 bones, or 61 per cent. None of the rodent or rabbit bones examined appears to have been modified for use as an artifact. If we subtract these rodent bones—which make up 19.1 per cent of the total—from the nonartifact material, the amount of bone used for artifacts more than equals that not used for artifacts.

Bone is classified as adult or juvenile on the basis of epiphyses-diaphyses fusion. Adult bone, comprising 82.9 per cent of the total, greatly exceeds juvenile, which is 17.1 per cent. The largest amounts of juvenile bone are found in the following species: jack rabbit 6.85 per cent, marmot 3.41 per cent, and deer 2.05 per cent.

Whole and fragmentary bones of mammals are divided into their separate categories on the basis of the completeness of the bone, or the lack of proximal or distal end or both ends in the long bones, and of the fragmentary nature of the cranial elements. Artifacts are thus regarded as fragmentary, but are not considered on the same basis as bones which, like the bird bones, have definitely broken ends. Unlike bird bones, practically every mammal bone considered fragmentary is an artifact; the remaining fragments are rodent or rabbit skulls and long bones. No mammal bones identified, except those classified as artifacts, show any indication of having been burned or cut (as for dressing meat). Specimens 43621, 43622, 44064, 44072, 44094, 44116, 44342, all in the order Artiodactyla, were the only burned bones.

Table C presents the occurrence of mammalian skeletal elements. The postcranial elements constitute 73.5 per cent, the cranial elements 26.5 per cent of the total.

The minimum number of individuals estimated for all mammalian species present is 45, and the probable maximum figure is 102 individuals for the site (see table B). The small number of deer bones in the site may represent a similarity of aboriginal and present-day conditions. Hall (1946, p. 625) lists deer reported taken between the years 1929 and 1940 in Churchill, Lyon, Mineral, and Pershing counties as usually less than ten deer in a year for all these counties.

CONCLUSIONS

A partial understanding of the ecological background of the aboriginal inhabitants of Humboldt Cave results from this analysis. Although a good many birds may have been present during some parts of the year, the aboriginal inhabitants no doubt had wider use for mammals. Birds, as represented by some 55 to 78 individuals, were apparently used the year round, when the species were available; Anseriformes seem to have been preferred. The amount of mammal bone, represented in our collection by some 45 to 102 individuals, seems to show that the inhabitants preferred or found available mountain sheep and, to a lesser degree, jack rabbit, coyote, and deer. The large amount of rodent material may indicate the use of rodents such as marmot and muskrat for food, and the various species of rats and mice probably lived in the cave from time to time during and after human occupation. Compared with the amount of bone observed in coastal archaeological sites in California the Humboldt Cave collection is markedly small.

The difference in the use made of bird bone and mammal bone is noteworthy. Eleven bird bones, especially the larger pelican long bones, were modified into artifacts, whereas 57 mammal bones were thus used, mainly bones of mountain sheep, deer, and coyote.

There are no significant differences in the depths at which food bones were found. They were scattered throughout the refuse layers and were concentrated in the rat-nest deposits where they had been taken by the pack rats.

The significance of the different skeletal elements of bird and mammal bones found in Humboldt Cave is not clear; it seems doubtful that a butchering technique can be discerned in the small sample of bone remains that was found. It is hoped that comparative material of this type can eventually be compiled to establish a fuller report in this area for such techniques.

Although it is true that no unmodified bone showed any evidence of cutting, it is equally true

TABLE C
DISTRIBUTION FREQUENCIES OF MAMMALS

Bone elements*	American Badger	Red Fox	Kit Fox	Coyote	Bobcat	Yellow-bellied Marmot	Kangaroo Rat	Pocket Gopher	Wood Rat	Montane Meadow Mouse	Long-tailed Meadow Mouse	Muskrat	Jack Rabbit	Domestic Pig	Black-tailed Mule Deer	Mountain Sheep	Domestic Cow	Unidentifiable Artiodactyl	Unidentifiable Mammal	Total	Percentages of total
Total number.....	1	2	2	8	3	6	1	10	1	4	5	1	36	1	5	20	1	24	15	146	.....
Total weight (gm.).....	3	23	15	83	8	19	0.5	14	0.5	2.5	2.5	2	149	6	84.5	1,354	32	268	23	2,089	.....
Artifact.....	..	..	..	5	..	..	..	..	..	..	..	..	..	..	2	15	..	21	14	57	39.0
Nonartifact.....	1	2	2	3	3	6	1	10	1	4	5	1	36	1	3	5	1	3	15	89	61.0
Adult.....	1	2	2	8	1	1	1	10	1	4	5	1	26	..	2	19	1	21	1	121	82.9
Juvenile.....	..	..	..	..	2	5	..	..	..	..	..	..	10	1	3	1	..	3	..	25	17.1
Whole bone.....	1	..	..	2	3	5	1	3	..	1	..	1	30	..	3	1	1	1	..	53	36.3
Bone fragment.....	..	2	2	6	..	1	..	7	1	3	5	..	6	1	2	19	..	23	15	93	63.7
Horn sheath.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	..	..	..	5	3.21
Horn core.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	2	1.29
Calvarium.....	..	1	1	..	..	1	..	3	1	4	5	..	..	..	..	..	..	..	..	17	10.9
Maxillae.....	..	..	..	1	..	..	..	5	..	..	..	..	2	1	..	..	..	..	..	9	5.8
Mandible	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Right.....	..	1	..	..	..	1	..	2	..	..	..	..	1	..	..	..	..	..	..	4	2.58
Left.....	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	4	2.58
Scapula.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	4	..	..	..	5	3.21
Right.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	2	1.29
Left.....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	3	1.94

that these same bones showed no signs of chewing or gnawing. This negative evidence seems to indicate that the subsurface bone material recovered was not dragged into the cave by carnivores, as has been suggested for much of the material recovered from Lovelock Cave (Loud and Harrington, 1929, p. 33), but was left there by human beings. Pack rats concentrated in their nest areas much of the portable bone leavings. The pig maxilla and cow metapodial are sun-bleached and must have been carried into the cave by rats after these bones had lain exposed outside for a time.

Ecologically, the mammal and bird remains found in Humboldt Cave illustrate the varied pattern of mammal and bird life in Nevada today.

Occurrence of Mammal and Bird Bone

<i>Depth (in.) or location</i>	<i>Mammal</i>	<i>Bird</i>	<i>Total</i>
0-6	3	..	3
6-12	2	..	2
12-18	4	1	5
18-24	8		8
24-30	4	4	8
30-36	2	1	3
36-42	5	5	10
42-48	1	1	2
48-54	2	..	2
54-60	5	..	5
60-66	2	..	2
66-72	7	..	7
72-78	0	..	0
78-84	1	..	1
84-90	1	..	1
90-96	2	..	2
Rat nest	29	21	50
No location	64	41	105
Surface	4	4	8
	—	—	—
Total	146	78	224

APPENDIX IV

MERRIAM'S PHOTOGRAPHS OF NORTHERN PAIUTE HOUSES

In July, 1903, C. Hart Merriam visited the Northern Paiute at Pyramid Lake, Nevada, and there photographed some native houses and basketry. His photographs are shown here in plates 32-34. They are part of the large collection of ethnogeographic and photographic records deposited by his heirs at the University of California (Berkeley).

The photographs are of particular interest in showing houses of aboriginal type and construction. It is probable that identical types were used by the Paviotso band that lived around Humboldt Lake. The pictures are useful in giving us some visual impression of the probable appearance of the former open village sites on the borders of Humboldt Lake, the inhabitants of which also knew and used Humboldt and Lovelock caves as cache spots and retreat positions.

The baskets illustrated in plates 32-34 may be compared with those shown in plate 24. The photographs in plate 24 are not so good as Dr. Merriam's, but it will be seen that the baskets are identical. They illustrate the range of forms commonly used in collecting and preparing food and for carrying water.

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ABBREVIATIONS

AA	American Anthropologist, Menasha, Wis.
AAA-M	American Anthropological Association, Memoirs, Menasha, Wis.
A Ant	American Antiquity, Salt Lake City, Utah
AFP	Amerind Foundation Papers, Dragoon, Ariz.
AMNH	American Museum of Natural History, New York
-AP	Anthropological Papers
-M	Memoirs
BAE	Bureau of American Ethnology, Washington
-AR	Annual Report
-B	Bulletin
CNHM	Chicago Natural History Museum, Chicago
-F	Fieldiana
CIW	Carnegie Institution of Washington, Washington
IU	Indiana University Publications, Bloomington, Ind.
-PAL	Anthropology and Linguistics
MAIHF	Museum of the American Indian, Heye Foundation, New York
-C	Contributions
-INM	Indian Notes and Monographs
-MP	Miscellaneous Publications
MNA	Museum of Northern Arizona, Flagstaff, Ariz.
-B	Bulletin
PMH	Peabody Museum, Harvard University, Cambridge, Mass.
-P	Papers
SAA	Society for American Archaeology, Salt Lake City, Utah.
-M	Memoirs
SI	Smithsonian Institution, Washington
-CK	Contributions to Knowledge
-MC	Miscellaneous Collections
SJA	Southwestern Journal of Anthropology, Albuquerque, N.M.
SM	Southwest Museum, Los Angeles
-P	Papers
UCAS	University of California Archaeological Survey, Berkeley
-R	Reports
UC	University of California Publications, Berkeley and Los Angeles
-AR	Anthropological Records
-PAAE	American Archaeology and Ethnology
-P Geol	Geology
-IA	Ibero-Americana
UNM	University of New Mexico, Albuquerque, N.M.
-B	Bulletin
USGS	United States Geological Survey, Washington
-M	Monographs
USNM	United States National Museum, Washington
-AR	Annual Report
-B	Bulletin
-P	Proceedings
UU	University of Utah, Salt Lake City
-B	Bulletin
UW	University of Washington Publications, Seattle
-PA	Anthropology

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PLATES

PLATE 1

Airplane photograph (December, 1947) of western end of Humboldt Lake, western end of Humboldt Range, and northern rim of Carson Sink. Highway U.S. 40 in extreme upper left; Southern Pacific Railroad is dark line in left middle. Humboldt Cave shown by white dot marked "H"; Ocala Cave shown by white dot marked "O." Scale: 1 in. = 4 mi. (1 : 250,000). Photograph by courtesy of Roger Morrison, U. S. Geological Survey.

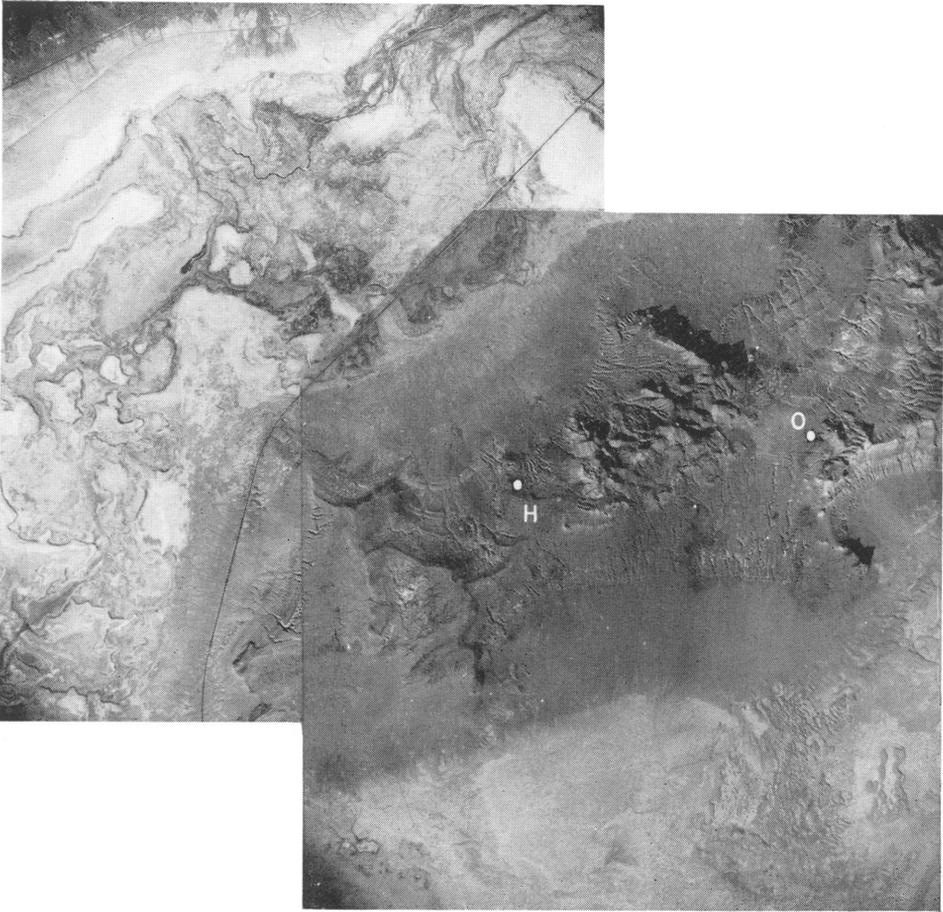


PLATE 2

Lower Humboldt Valley and Humboldt Cave. *a.* Looking north-east across alluvial slopes of northern exposure of Humboldt Range across Humboldt Sink. *b.* Like *a* but facing nearly due east to show gullying and dissection of alluvial fans. *c.* Entrance to Humboldt Cave; man at left stands in opening. Exposed rock is Lahontan tufa. *d.* Old Lahontan gravels in outer entrance to Humboldt Cave. This gravel stood at level of bar and light in *f* before its removal to permit easy access to cave. *e.* Entrance to Humboldt Cave. R. K. Beardsley holding photoflood lamp. *f.* Looking out of Humboldt Cave. Note tufa seal on walls and roof and angle of foot wall and hanging wall.

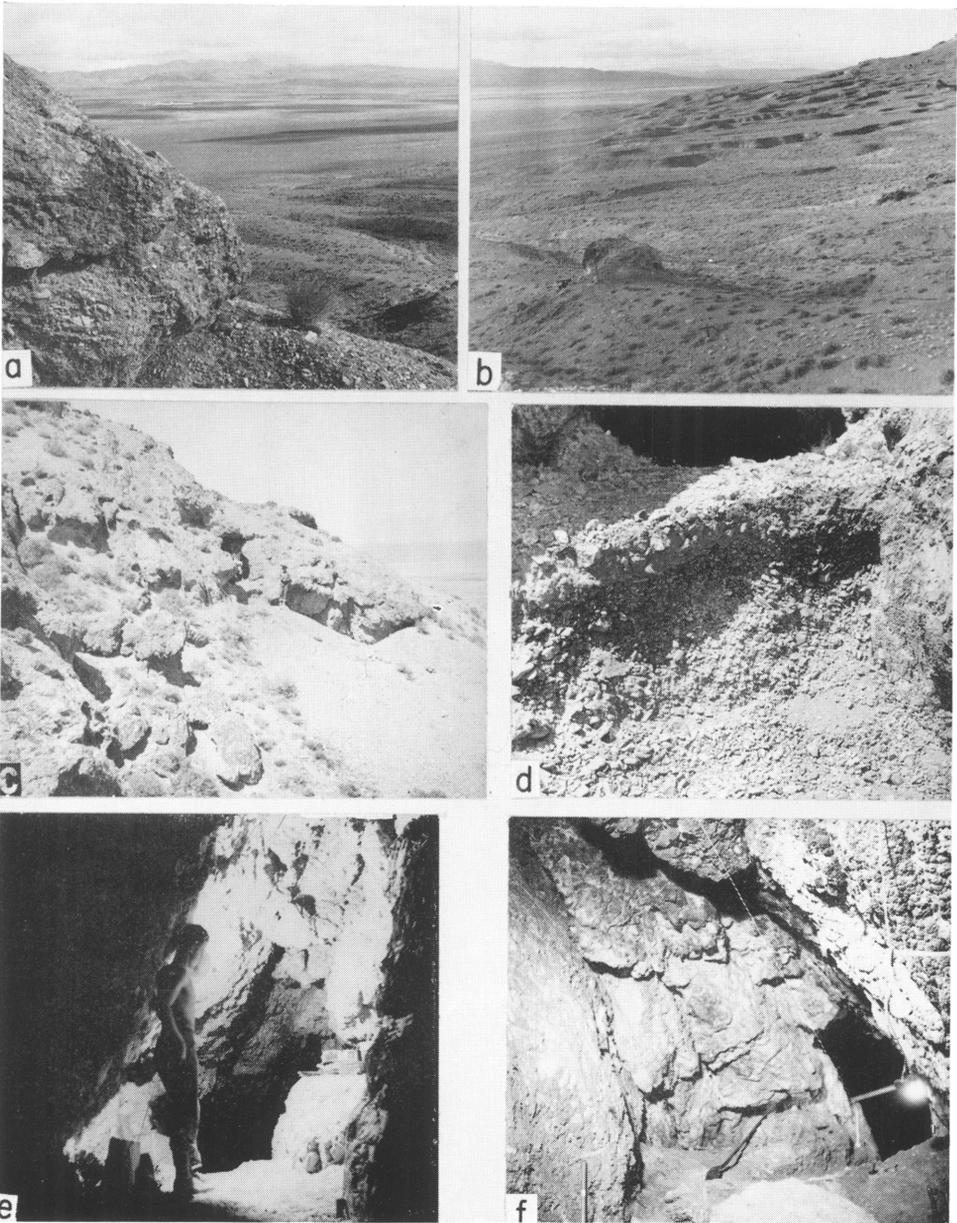


PLATE 3

Humboldt Cave. *a.* Looking south to end of Humboldt Range. Location of Humboldt Cave shown by white dot marked "H"; Ocala Cave marked "O." *b.* Field camp, July, 1936. *c.* Interior of Humboldt Cave before our excavation; note relie hunter's pit against left (south) wall. *d.* Looking out of cave; note large fallen rocks on slope just inside entrance. *e.* Cache 29. *f.* Carrying boxes for back-dirt removal; note dust masks used in cave.

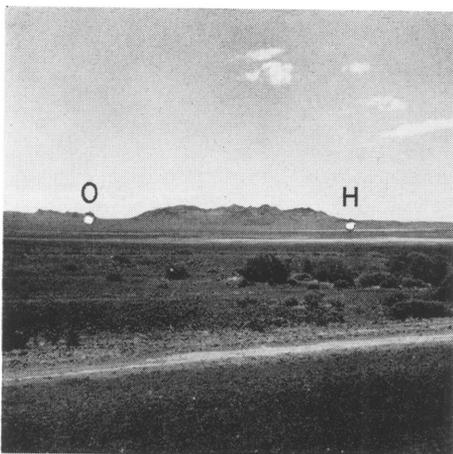
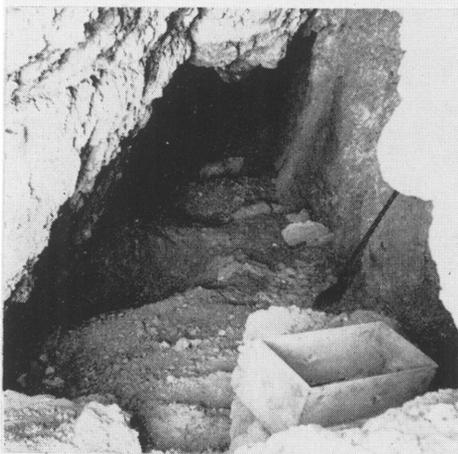
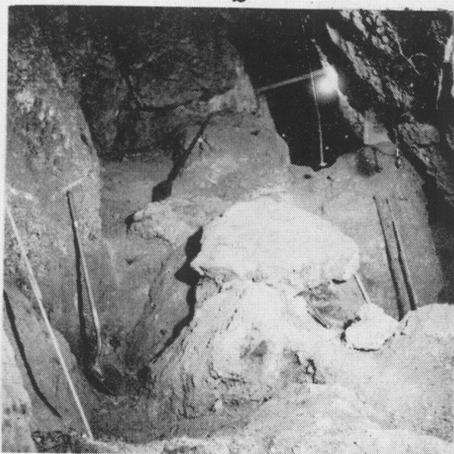
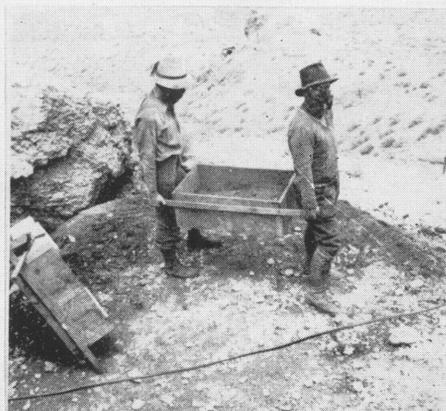
**a****b****c****d****e****f**

PLATE 4

Interior of Humboldt Cave. *a.* Looking into south alcove after removal of rat-nest fill. *b.* Burned area in section 6; note white ash layer and carbonized layer beneath it. *c.* Cache 7, upper materials. *d.* Cache 7, lower materials. *e.* Cache 3, lower level, note basin-shaped arrangement of scrap basketry. *f.* Cache 4.

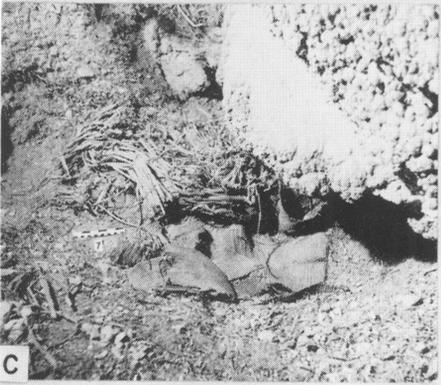
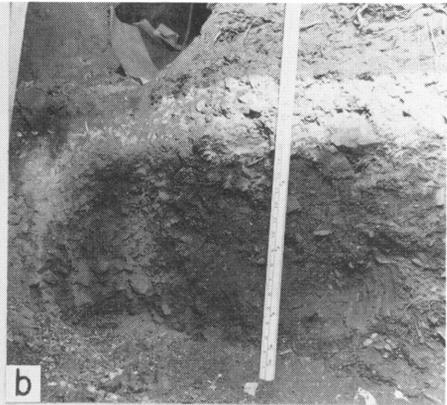
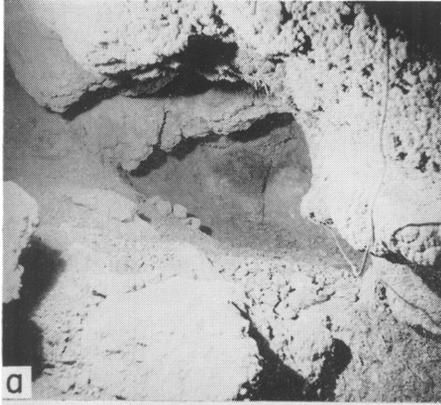


PLATE 5

Caches. *a.* Cache 26. *b.* Cache 6; note heavy grass layers above. *c.* Cache 5 before exposure. *d.* Cache 5 after exposure. *e.* Caches 19, 20, 21. *f.* Cache 22; note bundle of seeding *Phragmites* stalks.

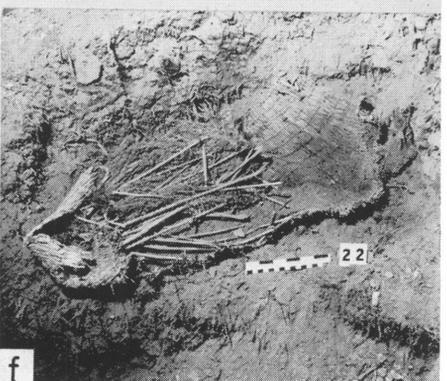
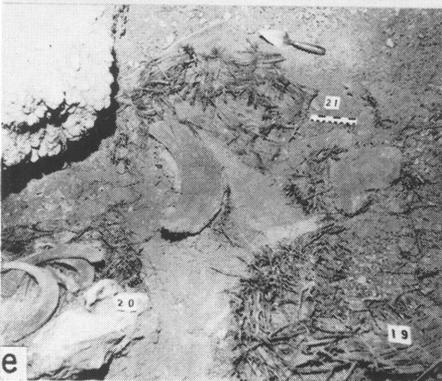
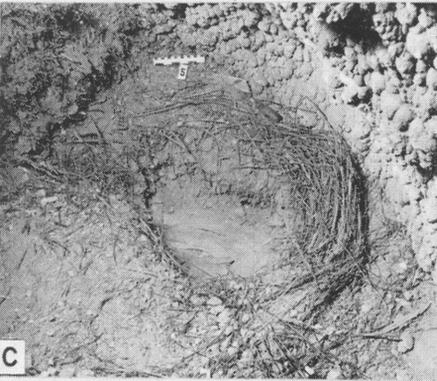
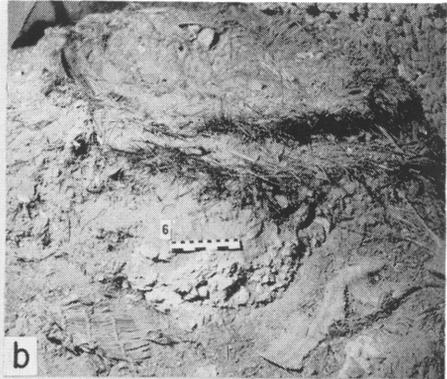
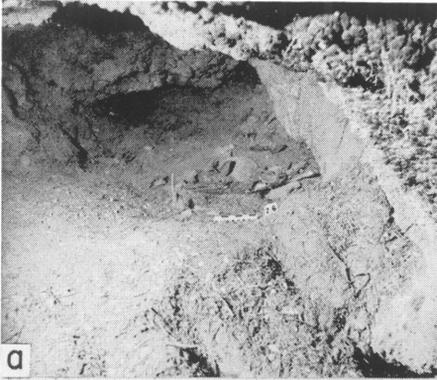


PLATE 6

Caches. *a.* Cache 1 *in situ*. *b.* Contents of Cache 10 immediately after removal. Note wrapped skin cover of hafted knives and tule-wrapped and string-bound ball of piñon pitch. *c.* Cache 13. *d.* Cache 13 contents immediately after removal and before unwrapping. *e.* Cache 19. *f.* Cache 20.

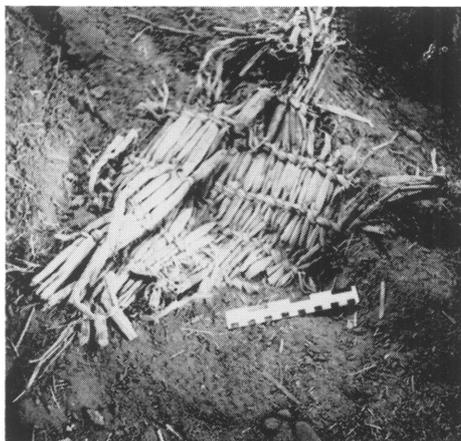
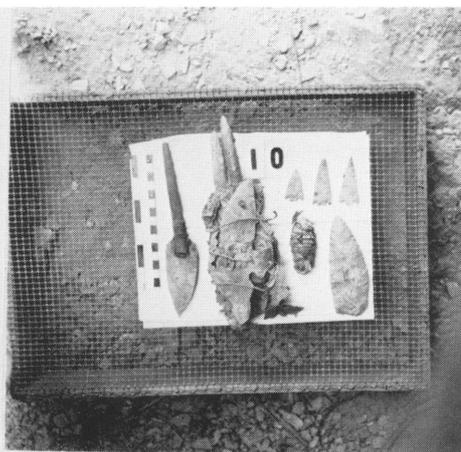
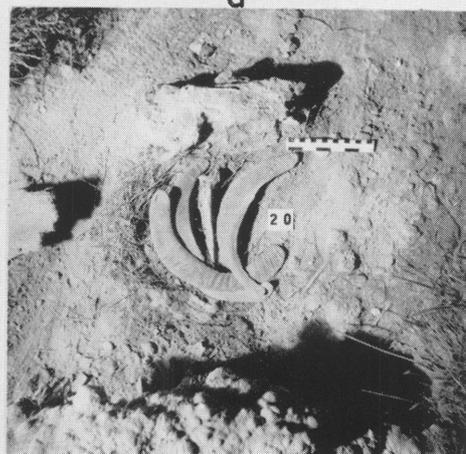
**a****b****c****d****e****f**

PLATE 7

Caches. *a*. Some of the contents of Cache 1 immediately after removal. Left to right: cloth strip; iron arrowpoint with red-flannel wrapping; fishing line wrapped in cloth and bound with cloth strips; flint blade; bundle of eagle feathers. *b*. Cache 22 showing two bundles after removal of cane (cf. pl. 5, *f*).

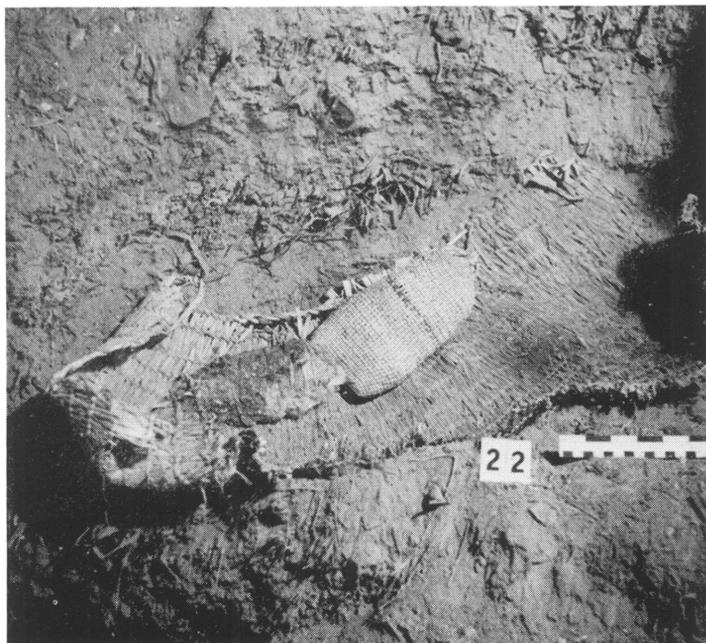
**a****b**

PLATE 8

Caches. *a.* Bird-skin pouch (cf. pl. 7, *b*), opened, showing contents (wrapped seed heads, intestine pouches). *b.* Cache 25, uppermost materials. *c.* Cache 25, lower materials. *d.* Cache 26. *e.* Cache 30. *f.* Cache 31.

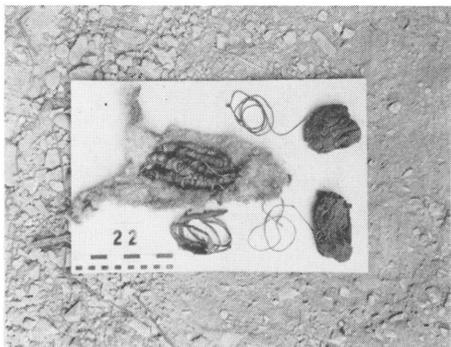
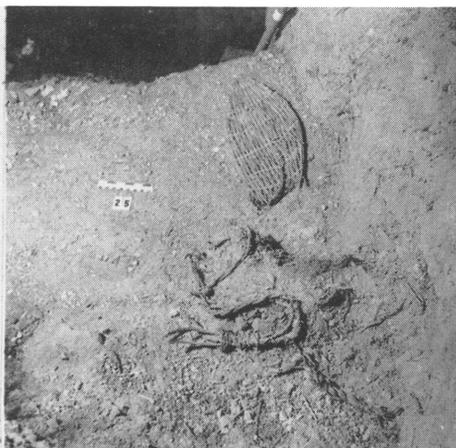
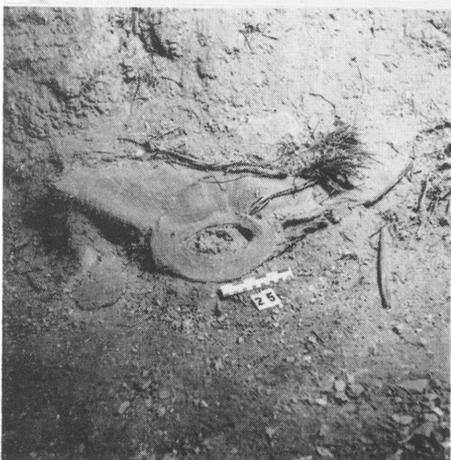
**a****b****c****d****e****f**

PLATE 9

Mountain-sheep horn and bone artifacts. *a.* Scapula grass cutter (42991), length 9.25 in. (23.5 cm.). *b.* Mountain-sheep-horn sickle (42988). *c.* Like *b* (42989). *d.* Like *b* (44058). *e.* Like *b* (42990). *f.* Thin piece of mountain-sheep horn with drilled holes (43775). *g.* Fragment of sheep-horn sickle (45147). *h.* Hollow section of mountain-sheep horn with drilled hole and rush string (43554).

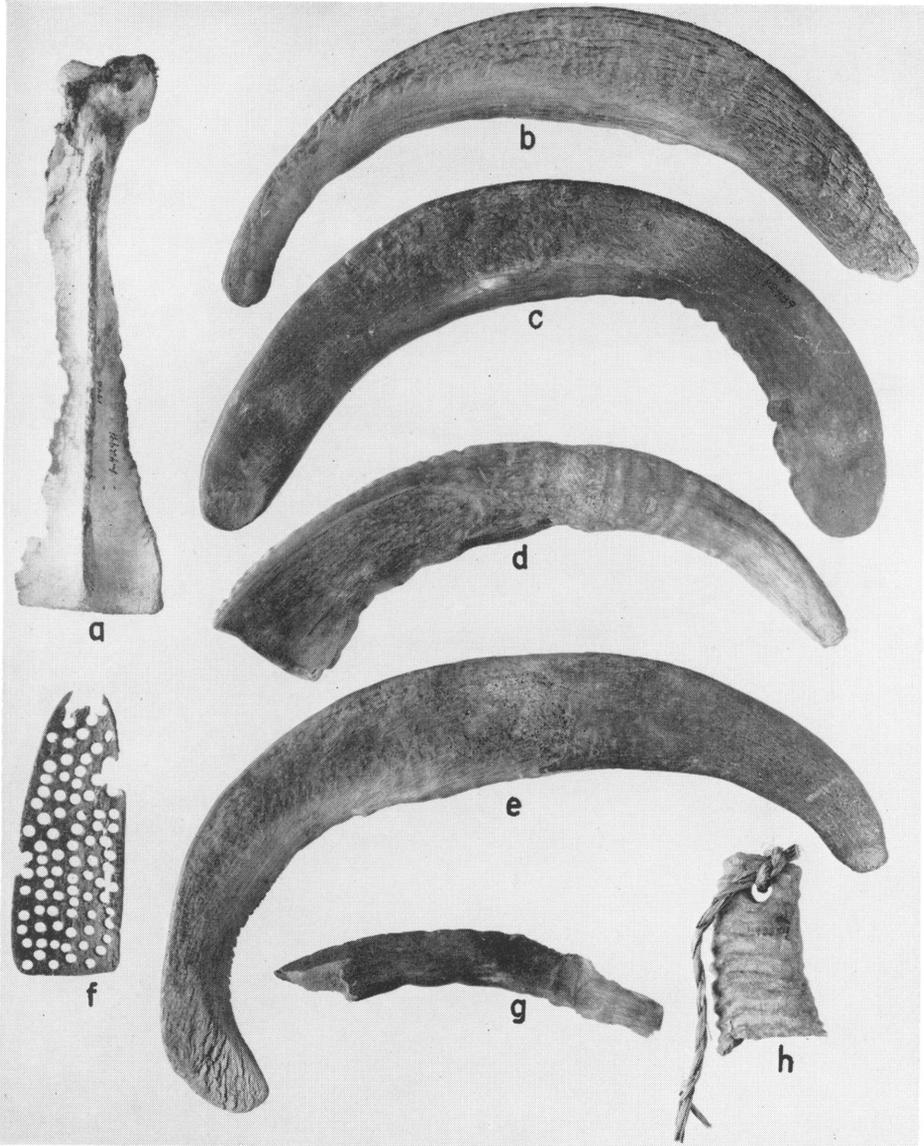


PLATE 10

Bone implements. *a.* Bird bone with beveled point (43191), length 10.25 in. (26 cm.). *b.* L-shaped scapula awl (43742). *c.* Like *b* (45204). *d.* Like *b* (45224). *e.* Like *b*; note incised decoration and stubby form (45208). *f.* Cannon-bone awl with incised decorations (43747). *g.* Matting or thatch needle (?) with terminal perforation (44242). *h.* Awl (45297). *i.* Awl (43746). *j.* Awl with incised decorations (44060). *k.* Awl (43749). *l.* Awl (43621), length 6.25 in. (16 cm.). *m.* Worked bone (44841).

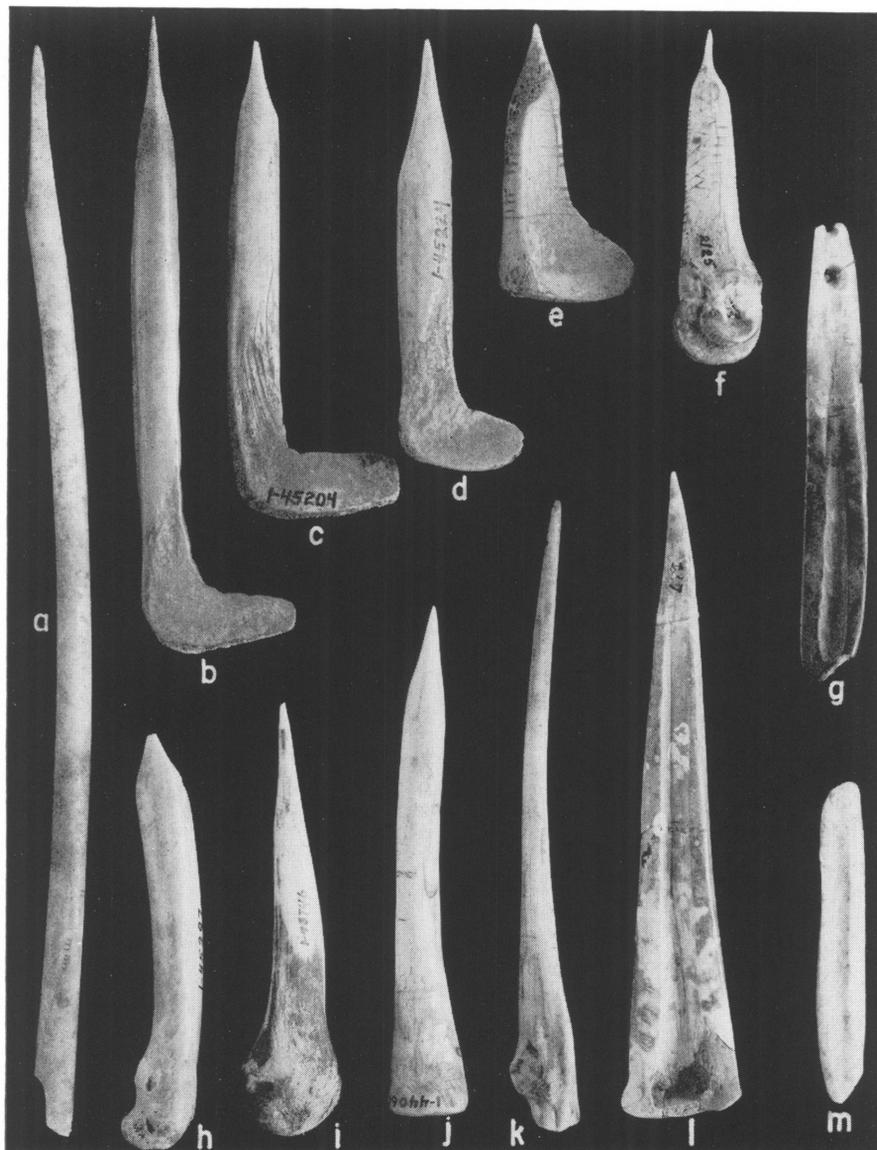


PLATE 11

Fishing gear. *a*. Fishhook with bone point and wooden shank (44059 and 44411). *b*. Fishing line of type 2 hooks (42079). *c-e*. Type 1 hooks with attached lines (43035, 43034, 43038).

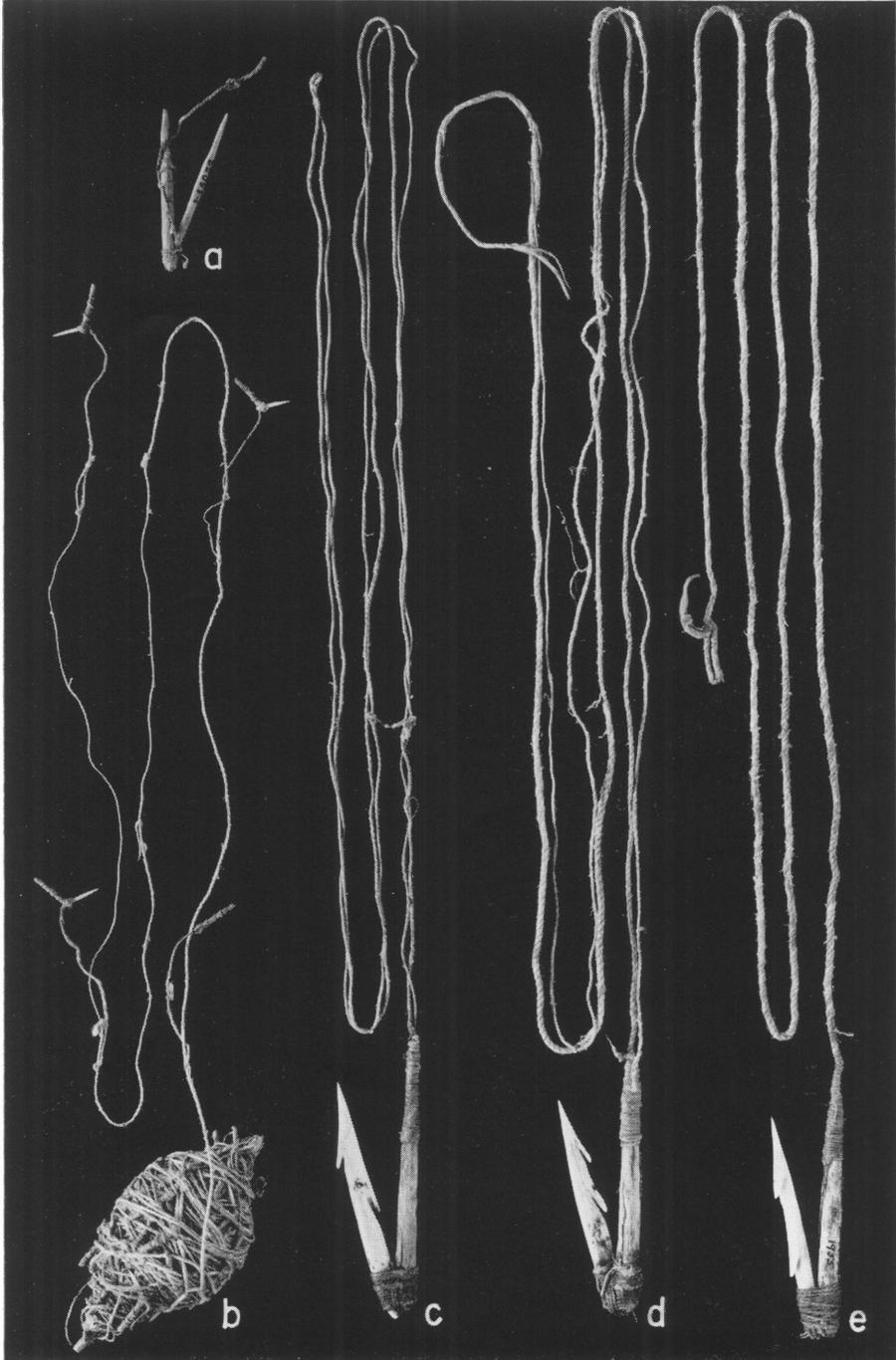


PLATE 12

Digging sticks, fire hearths, miscellaneous wooden objects. *a.* Digging stick (43771), length 21 in. (53 cm.). *b.* Digging stick (43081). *c.* Digging stick with forked handle end (43773). *d.* Drill hearth; note hole left by hollow-cane drill on right edge (45037). *e.* Compound wrapped-rush hearth (42628). *f.* Fire hearth (45365). *g.* Bow-shaped stick, possibly used for strengthening rim of burden basket (43753). *h.* Like *g* (44214). *i.* Rope-wrapped stick with fragment of net attached to lower end (42785). *j.* Cradle slat (?) (43730).

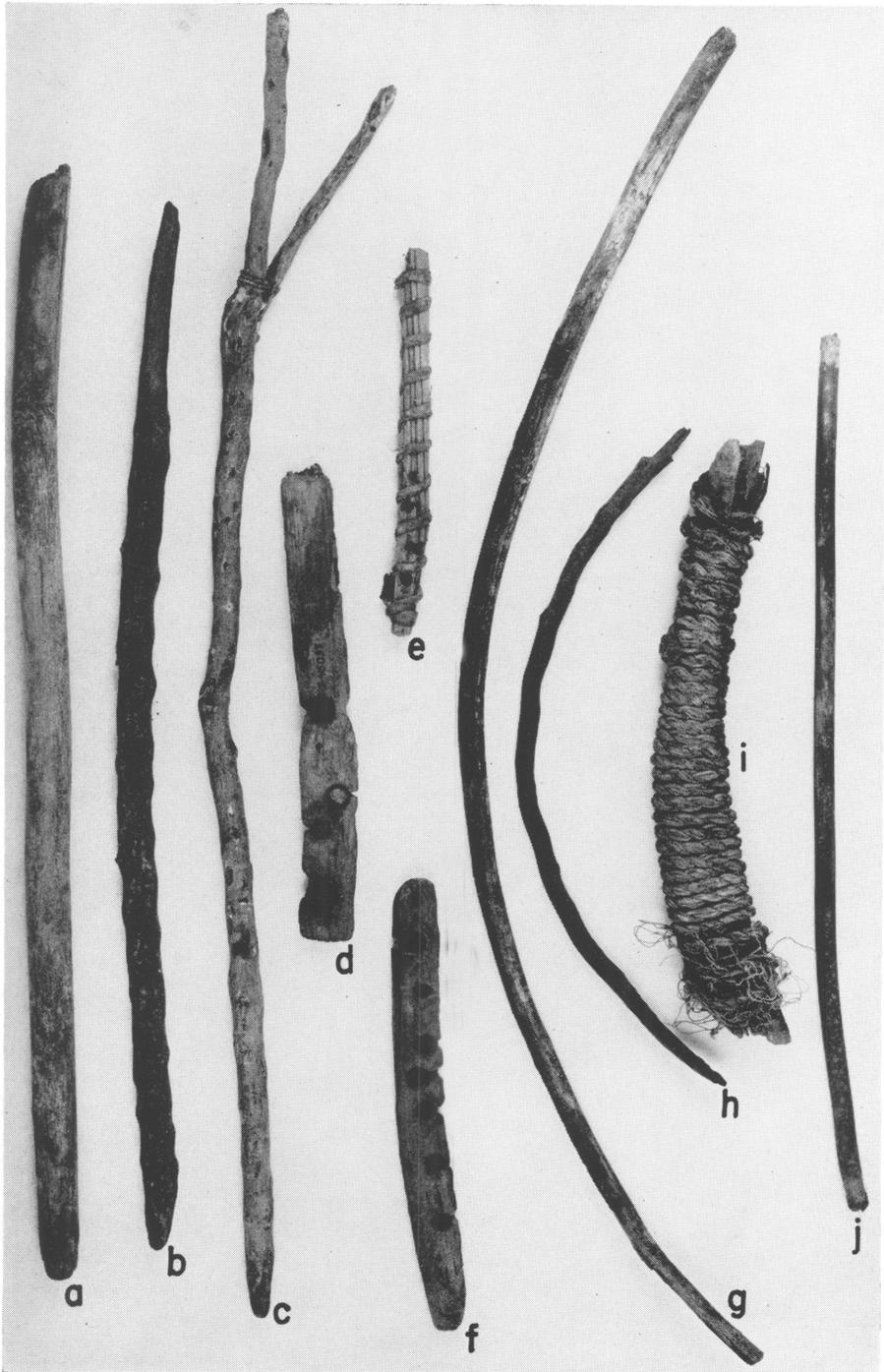


PLATE 13

Arrows and game pieces. *a*. Double foreshafts tied together at middle (43757), length 8.62 in. (22 cm.). *b*. Nock end of cane arrow shaft (44114). *c*. Arrow-shaft fragment showing remnant of three radial feathers (44328). *d*. Piece for ring-and-pin game (43253). *e*. Arrow fragment with cane shaft and impact-shattered foreshaft (44623). *f*. Broken arrow with foreshaft inserted in end of cane mainshaft (44950). *g, h*. Like *d* (42609, 45093). *i*. Greasewood arrow foreshaft with simple tip (43923). *j*. Heavy greasewood foreshaft with simple tip (43760), length 12.5 in. (32 cm.).

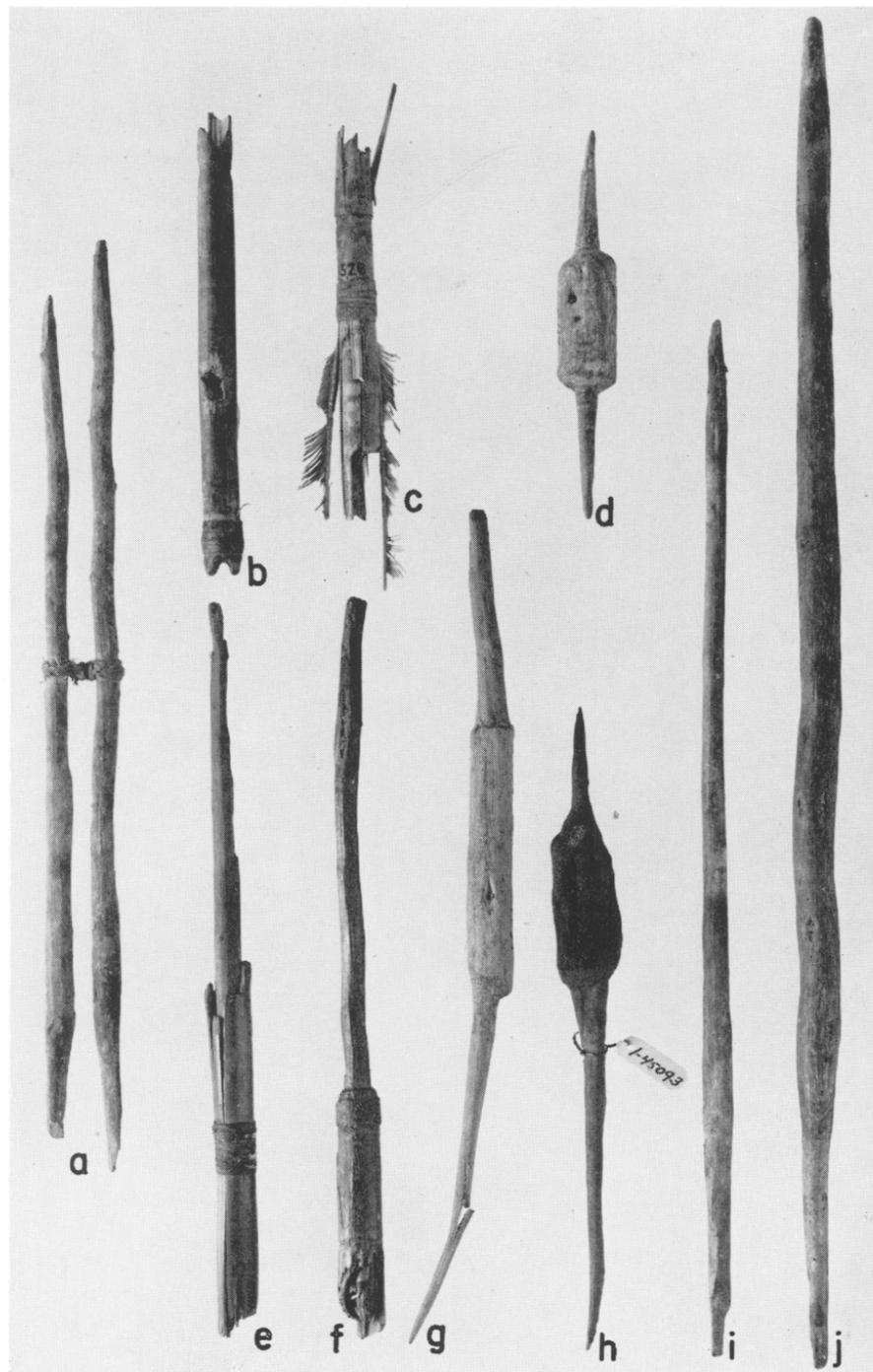


PLATE 14

Flaked stone implements. *a.* Type SCb2 (44169). *b.* Type SCb2 (45291). *c.* Type SCb2 (44687). *d.* Type SCb2 (44864). *e.* Type SCb2 (44097). *f.* Type SCb2 (44356). *g.* Type SCb3 (44452). *h.* Type SCb2 (42798). *i.* Type SCb2 (42799). *j.* Type SCb2 (42805). *k.* Type SCb2 (42800). *l.* Type NAb3 (45225). *m.* Type NAb1 (43630). *n.* Type NBb1 (44237). *o.* Type NAb1 (44468).

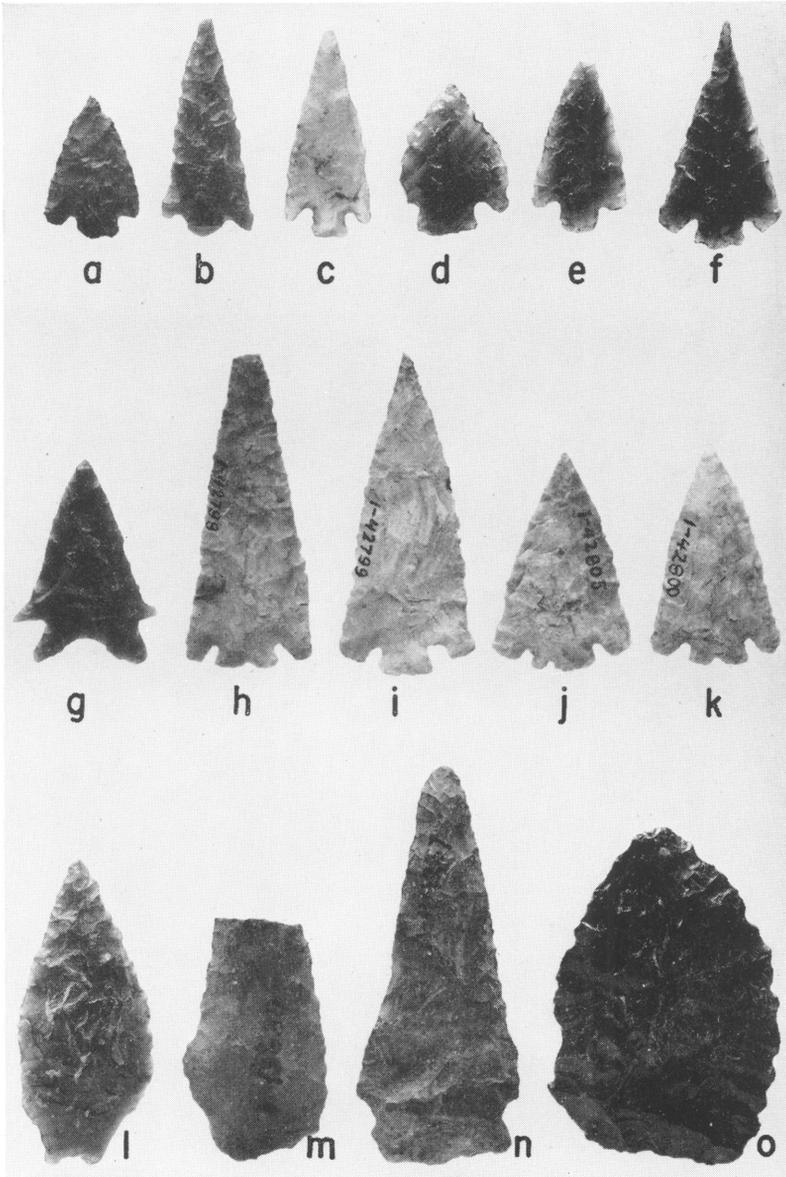


PLATE 15

Knives. *a.* Atlatl dart (?) (45353). *b-d.* From Cache 10 (42795, 42793, 42794); length of *e*, 8.7 in. (22.4 cm.). *e.* Knife handle (45142). *f.* Knife handle (44066). *g.* Knife blade (42796), length 4.12 in. (10.5 cm.). *h.* Knife blade (42080).

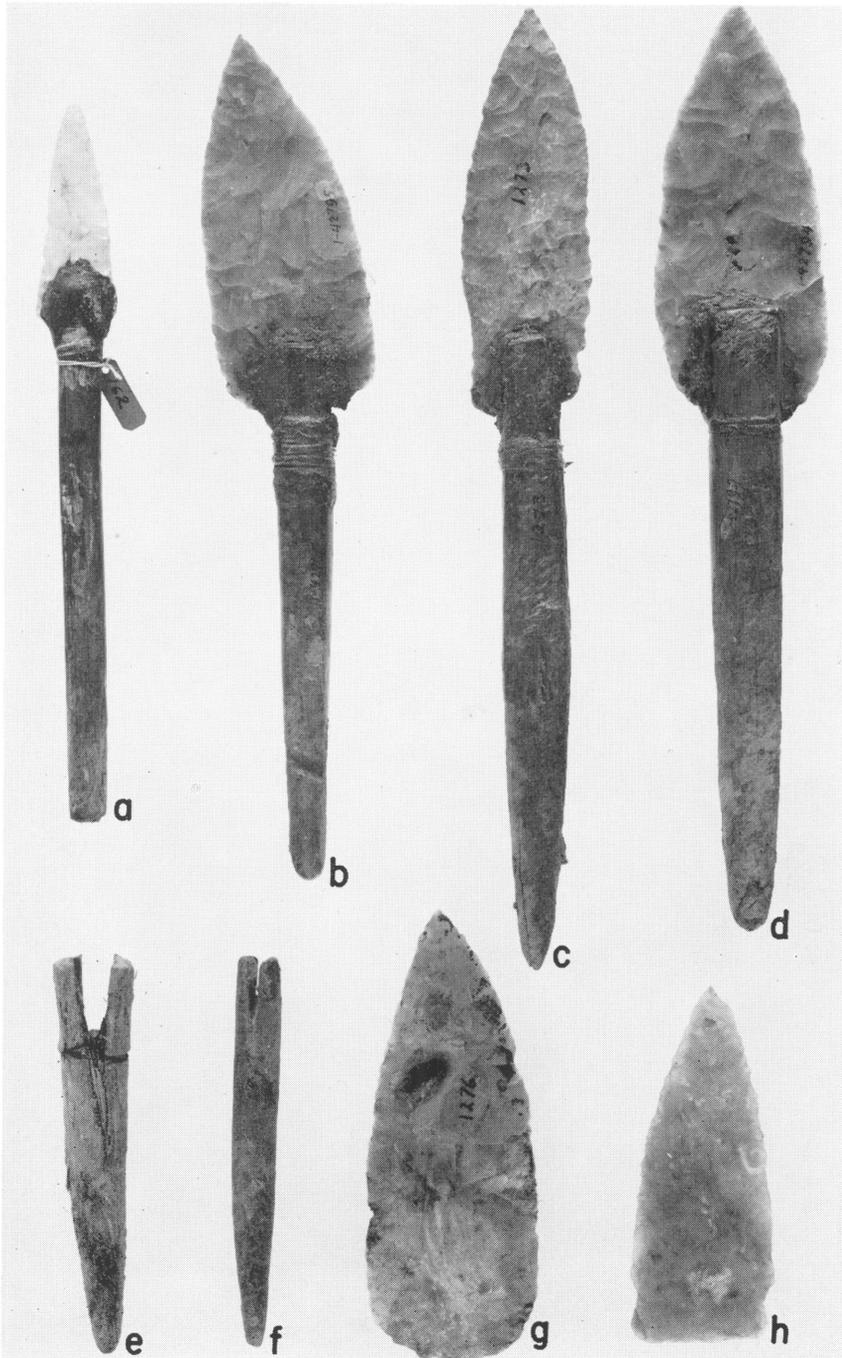


PLATE 16

Chipped and pecked stone tools. *a*. Crude scraper or knife (44233). *b-d*. Flake knives with unretouched edges (45004, 44262, 43897). *e*. Flake knife or scraper (44688). *f*. Stone knife or scraper (44998). *g*. Jasper core or crude scraping tool (44244). *h*. Scraper (44144). *i-k*. Slate knives or scrapers (44243, 44865, 44348); length of *j*, 4 in. (10 cm.). *l*. Polishing stone or crude mano (44774). *m*. Layered concretion apparently unmodified (44197). *n*. Polished pebble (44882). *o*. Basalt pebble with flattened grinding surfaces (44179).

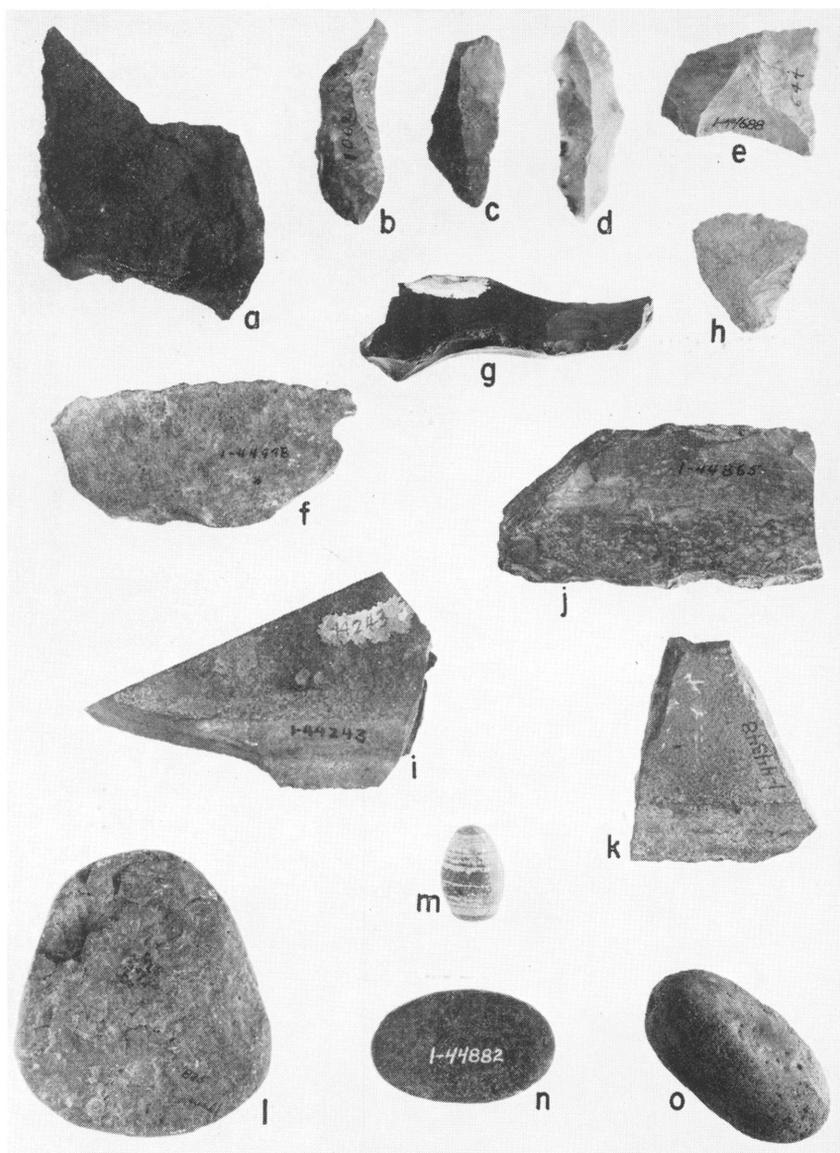


PLATE 17

Objects of wood. *a*. Fragment of shallow bowl used secondarily as fire-drill hearth (45259). *b*. Small cup with incised line decoration on rim (43756). *c*. Flat worked section of wood with one serrated margin (43871). *d*. Shallow carved disk with notched margin (44272). *e*. Wooden slab trowel (43028), length 6 in. (66 cm.).

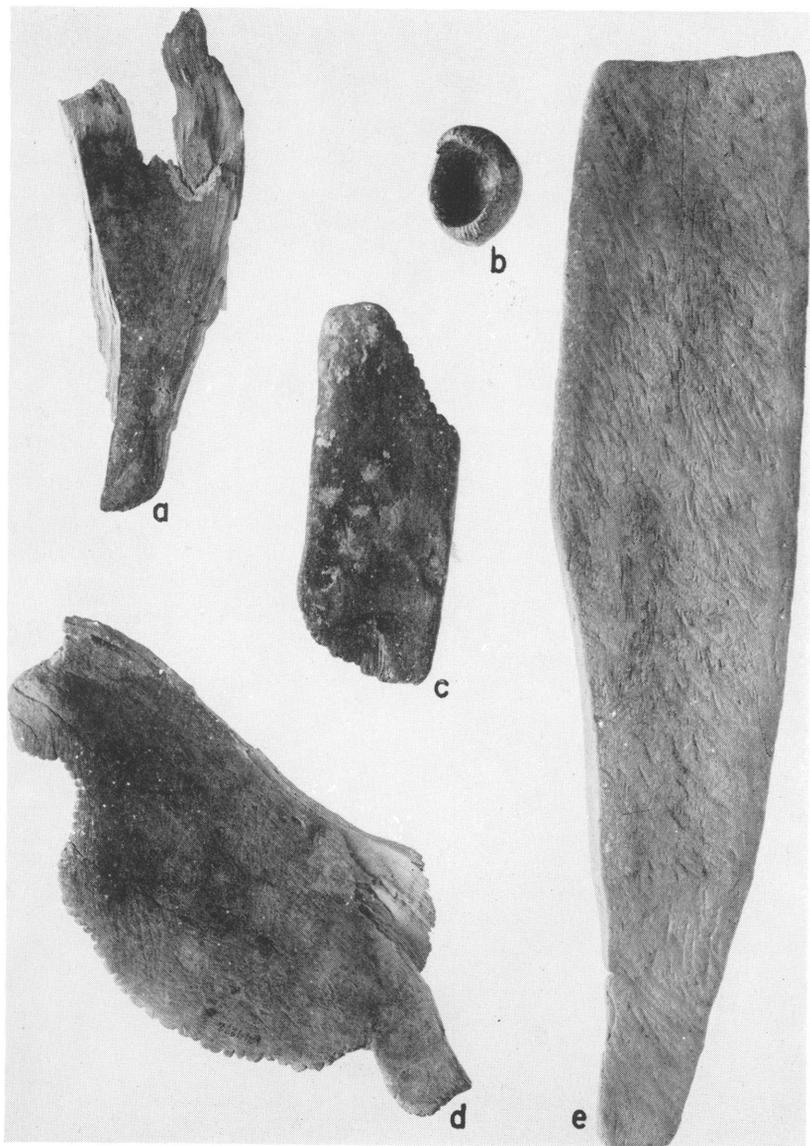


PLATE 18

Flat coiled-basketry trays. *a.* (42147), diameter 20 in. (52 cm.). *b.* (43065).

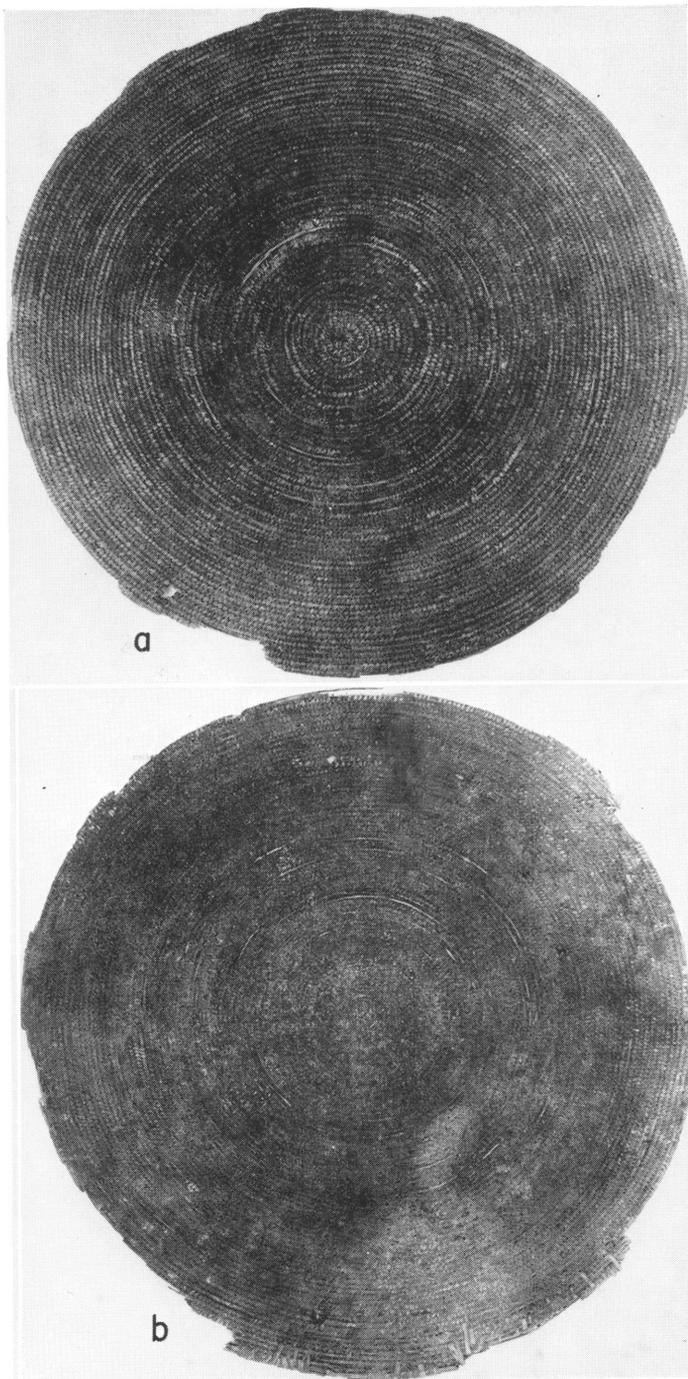
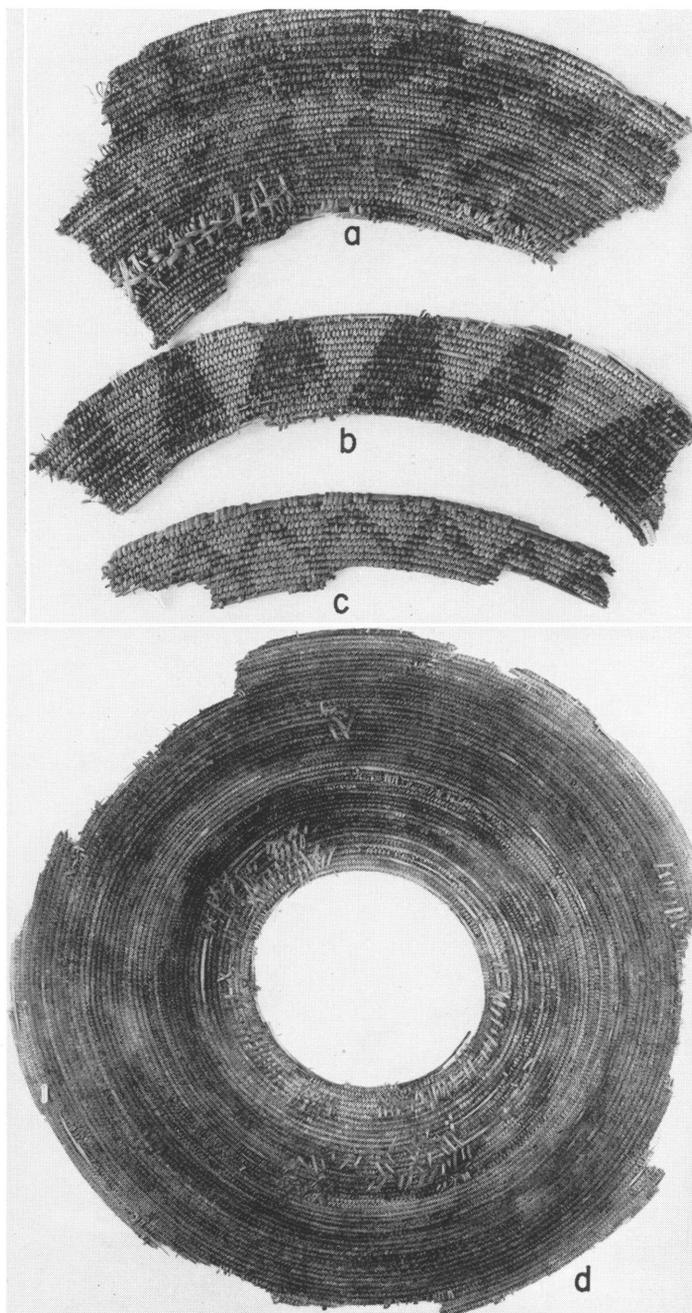


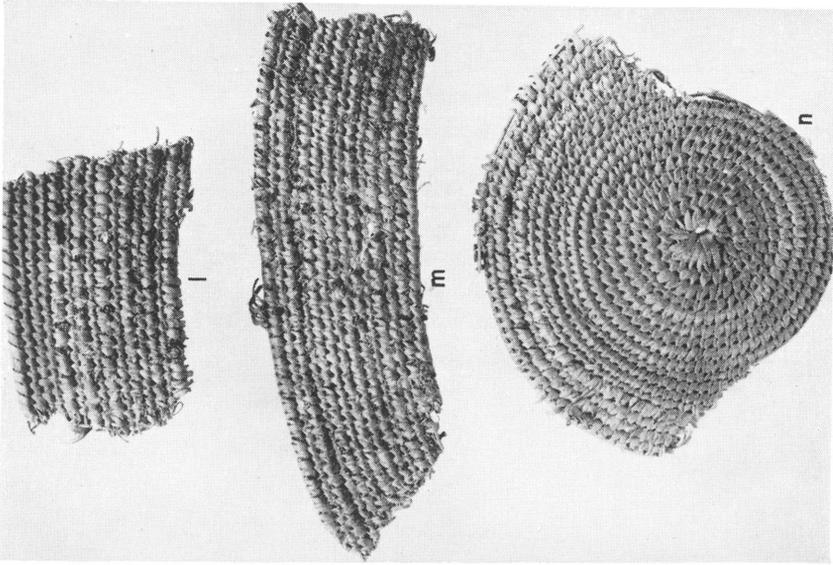
PLATE 19

Flat coiled-basketry trays, *a-c*. Fragments of decorated trays with split-stitch coiling (42273, 42433, 42879). *d*. Coiled tray from which the center has fallen out (42276), diameter 26 in. (66 cm.).



Coiled basketry. *a-e*. Pieces of a single finely made, decorated coiled basket found in different parts of the cave (43585, 43317, 43886, 43584, 43463). *f*. Feather-decorated coiled-basketry fragment (43816). *g*. Like *f* (45135). *h*. Like *f* (44043). *i*. Finely made, decorated coiled-basket fragment (45339). *j*. Annular basket fragment, perhaps an orifice (45245). *k*. Coarse coiled-basket fragment like *j*, with pitch adhering (43727). *l-n*. Coarse, feather-decorated coiled-basket fragments (42283, 43464, 42284); length of *m* 4.6 in. (11.7 cm.).

[HEIZER-KRIEGER] PLATE 20



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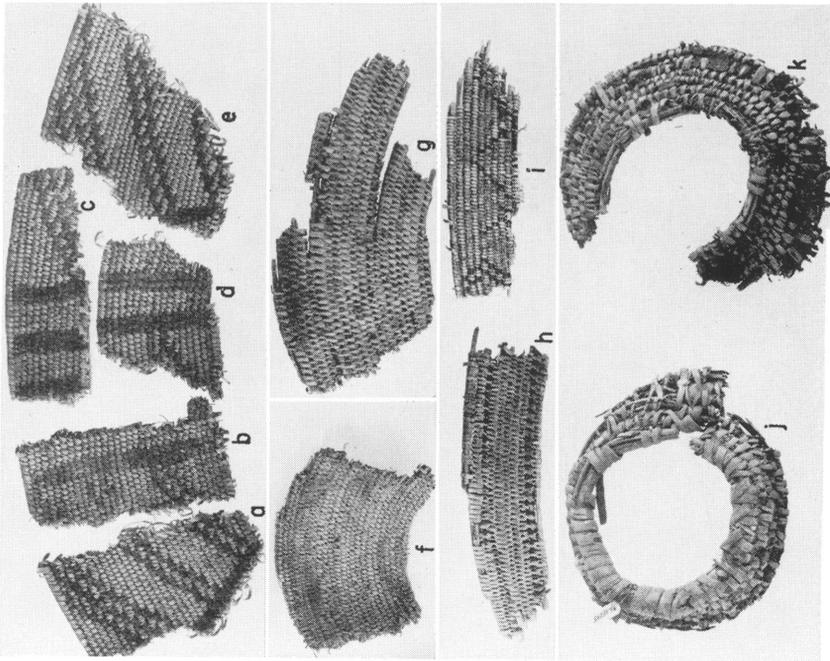


PLATE 21

Lovelock Wicker. *a.* Flat wicker fragment; note selvage, patches, decoration (42142). *b.* Selvage of wicker basket with rim-strengthening repair attached (42966). *c.* Like *b* (42381), length 14.5 in. (37 cm.). *d.* Wicker piece with stick-stiffener repair attached (42426).

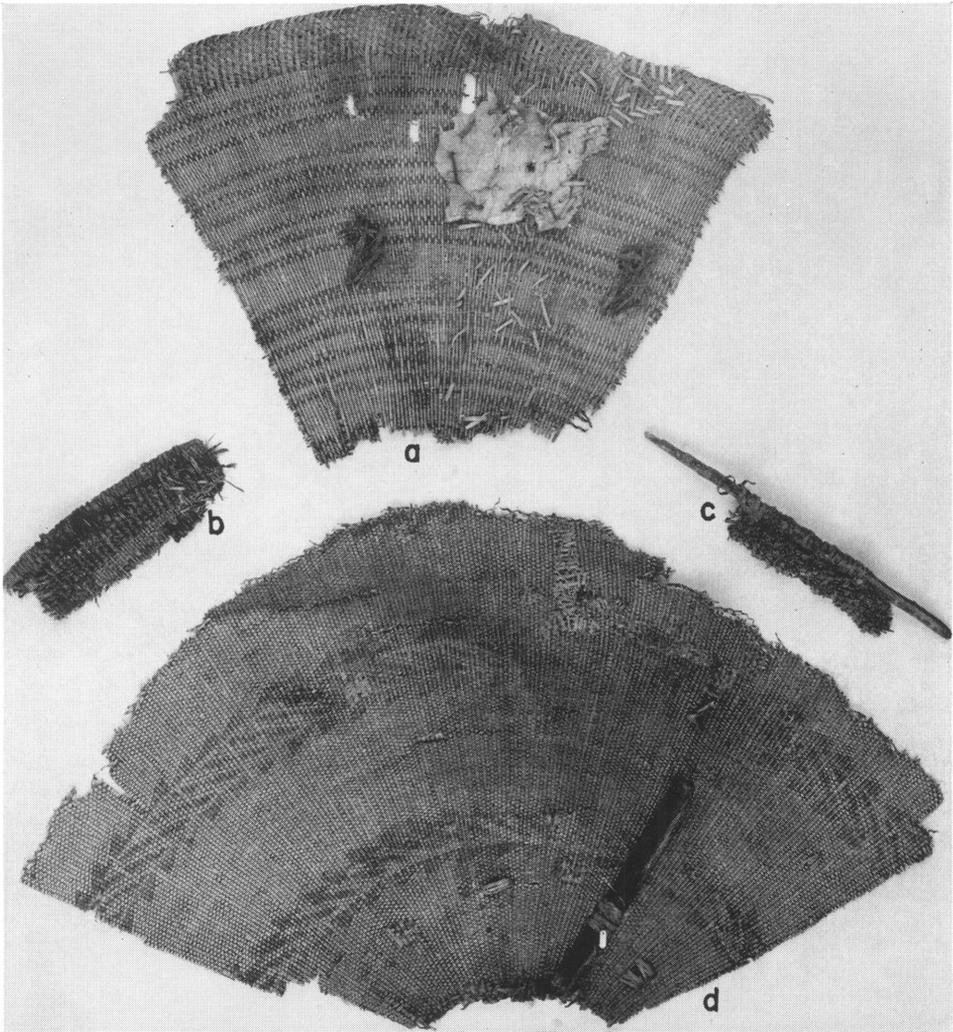


PLATE 22

Lovelock Wicker. *a-d*. The reverse side of the specimens shown
in plate 21, *a-d*.

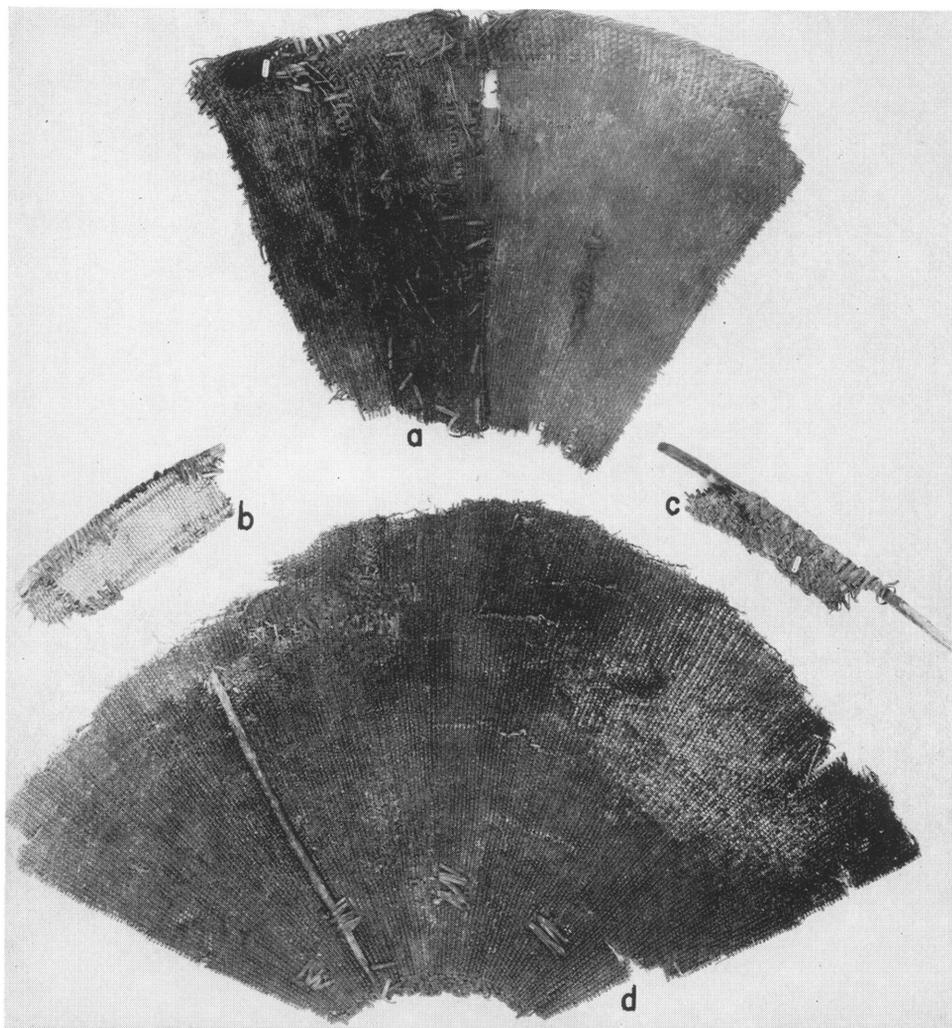


PLATE 23

Coarse twined basketry. *a.* Selvage fragment of openwork twined carrying basket (44173). *b.* Nearly complete openwork twined basket; note rim and base details (43745). *c.* Heavy twined carrying-basket fragment (45046). *d.* Heavy, closely twined pack-basket fragment (44215). *e.* Rim fragment of heavy openwork twined carrying basket (43323), length 4.5 in. (12 cm.).

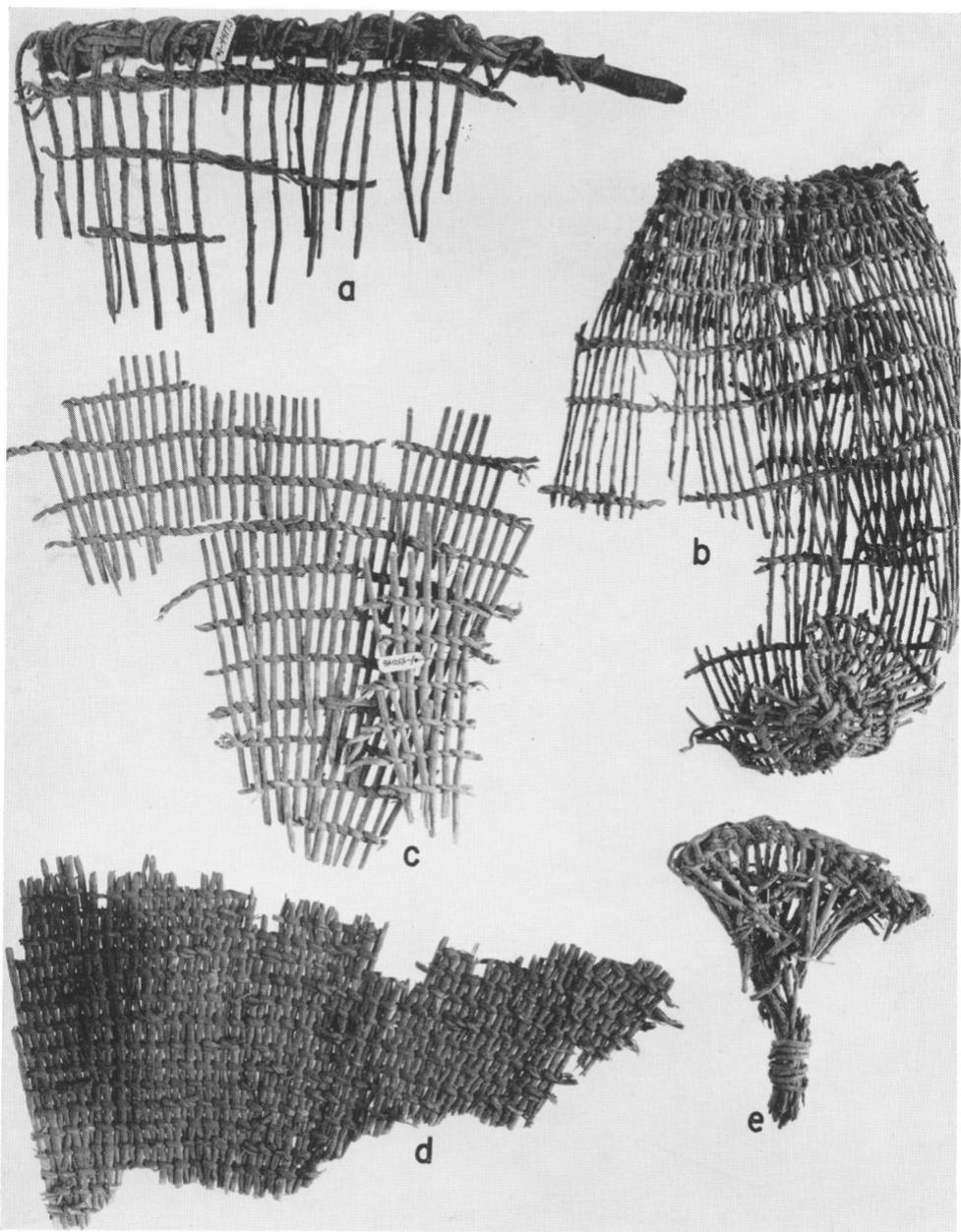


PLATE 24

Modern Paviotso baskets and Humboldt Cave textiles. *a-h*. Twined baskets of recent Paviotso manufacture. Identified as, consecutively, water containers (3), conical carrying basket (1), coarse openwork twined concave tray (1), close-twined shallow tray winnowing baskets (2). From collection of J. T. Reid, Lovelock, Nevada. *i*. Finger-woven *Apocynum* fabric, probably a sling pocket (43774). *j*. Wallet with chevron-design wefts (43032). *k*. Sling pocket of knotted *Apocynum* (43400) (see App. II). *l*. Bark apron (45360).

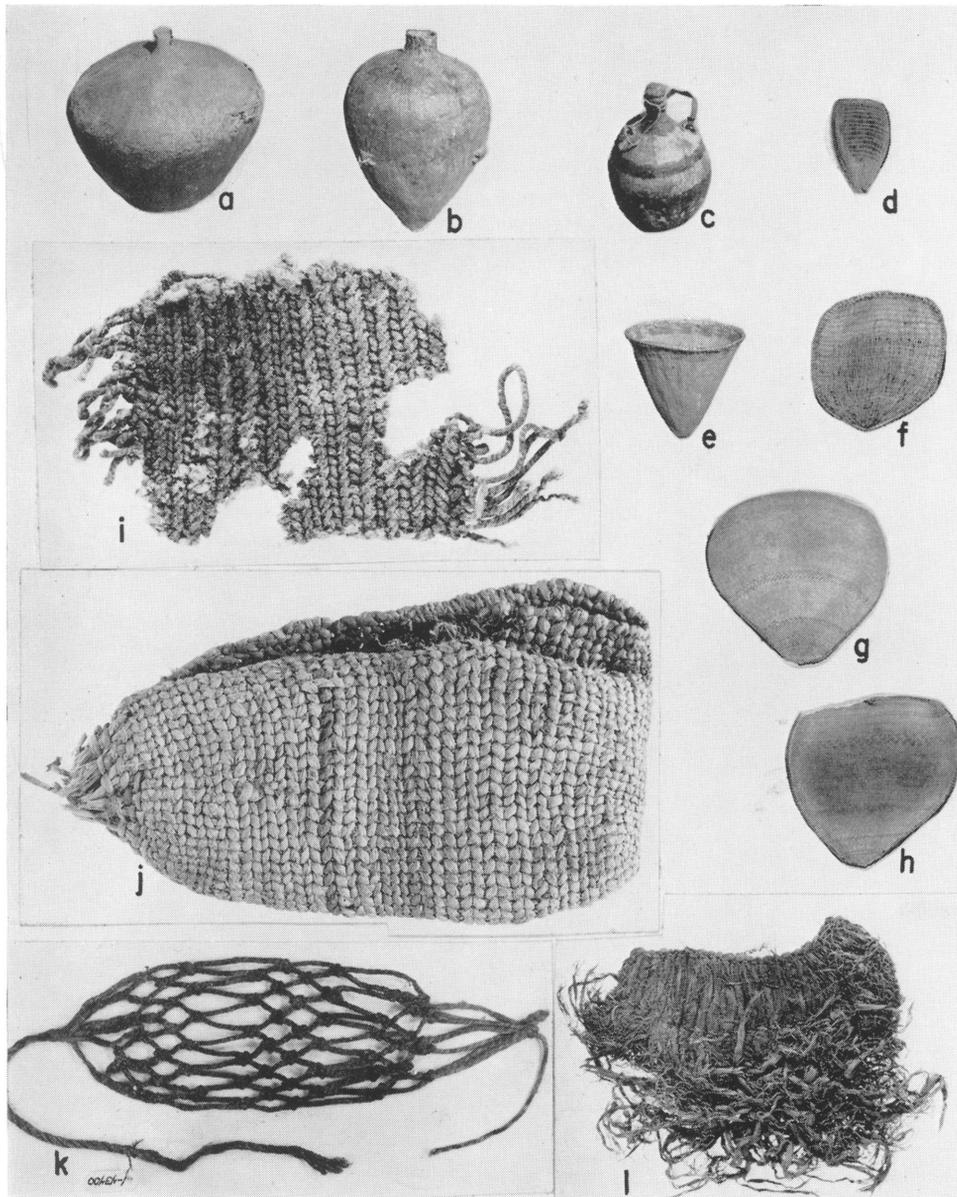


PLATE 25

Twined basketry and matting; netting. *a.* Flat twined circular plaque, Catlow Twined technique (44373). *b.* Catlow Twined with overlay decoration (43913). *c.* Catlow Twined fragment (43914). *d.* Catlow Twined fragment (43888). *e.* Matting with string wefts (44093). *f.* *Apocynum* netting (45295).

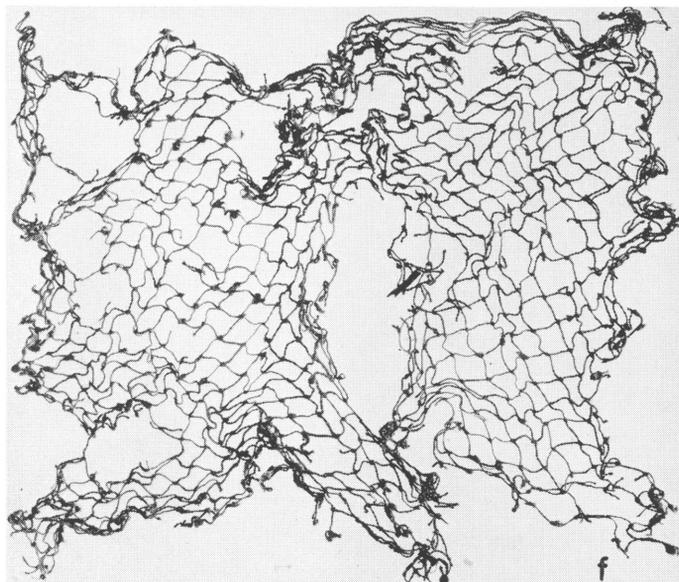
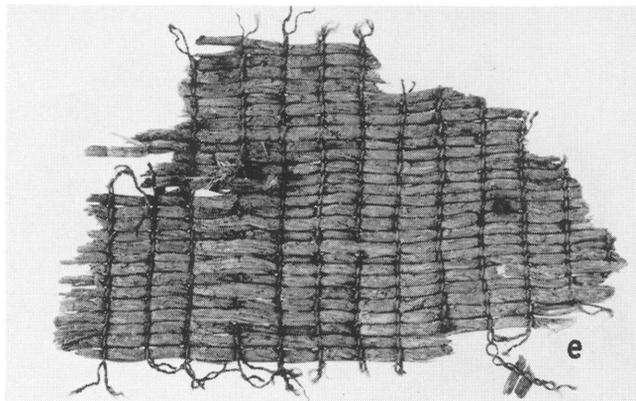
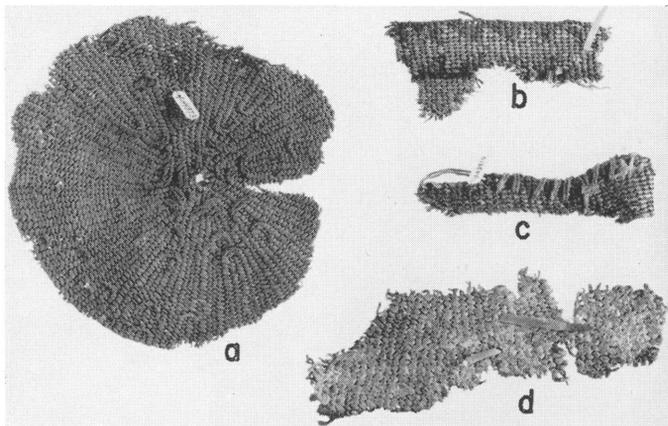


PLATE 26

Coarse twined matting. *a.* Twined rush carrying case; note side loops (42156). *b.* Twined tule mat with side loops (42296). *c.* Heavy, coarse twined tule matting (42294).

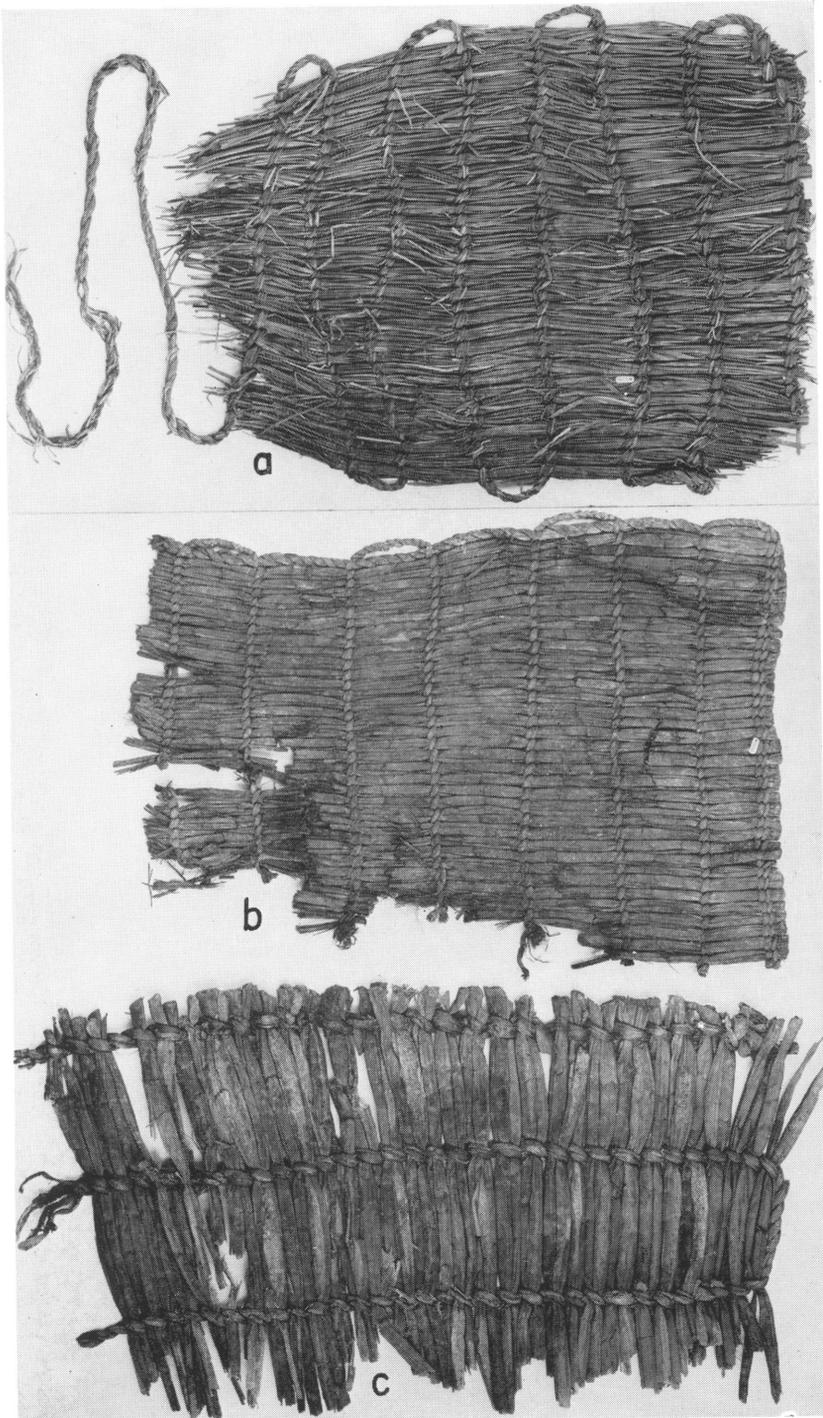


PLATE 27

Flexible cradle and rush bags. *a.* Tule flexible cradle (42495). *b.* Cylindrical rush bag (42285). *c.* Stiff base or apex of cylindrical *Juncus* bag (43997). *d.* Semiflexible cylindrical *Juncus* bag (43071). *e.* Side-opening tulle pouch or bag (42505).

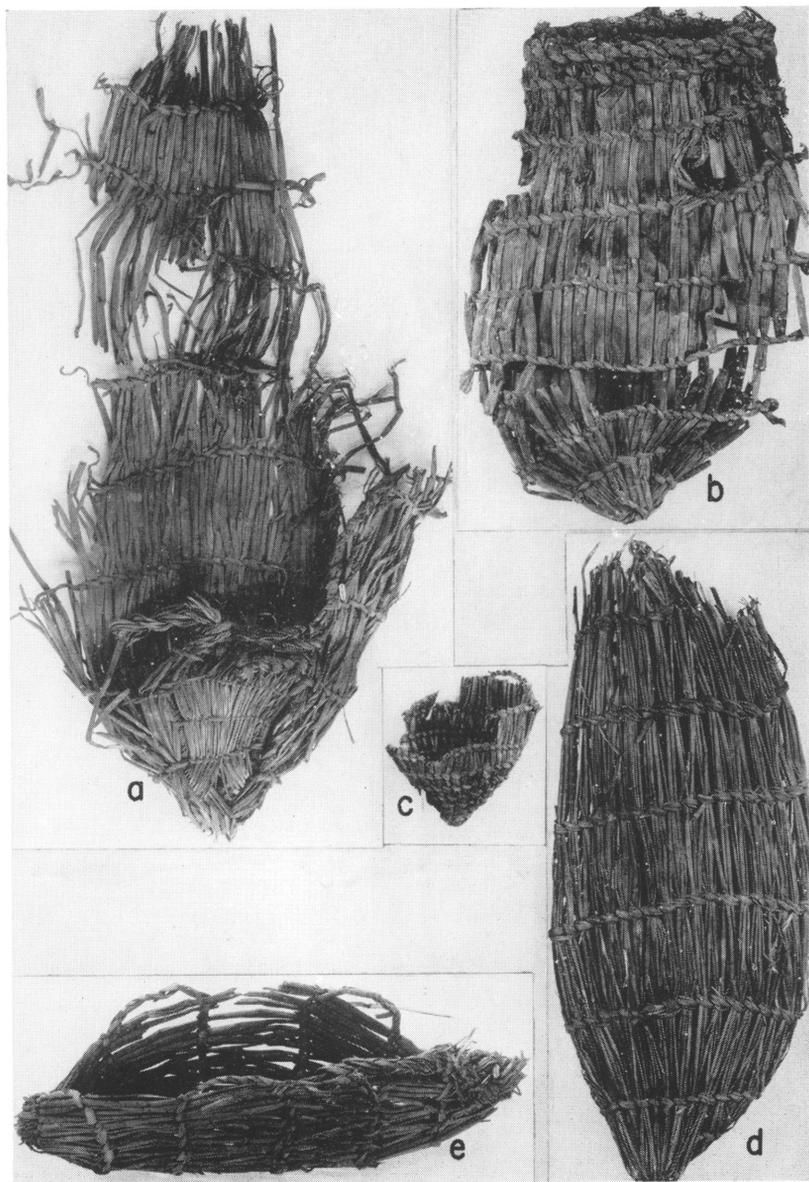


PLATE 28

Duck decoys and sandals. *a*. Duck decoy lacking head (45229). *b* and *c*. Bound tule bundles, probably foundation for decoy heads (45312, 45316). *d*. Hairbrush (43397). *e*. Feather bundles (42852). *f*. Beads of nutshells of digger pine (44001). *g*. Small rush loop (44087). *h*. Like *g* (45401). *i* and *j*. Tule sandals (42561, 42314); length of *i*, 11 in. (28 cm.). *k*. Sandal lining (43849). *l*. Fragment of repaired moccasin sole (44044).

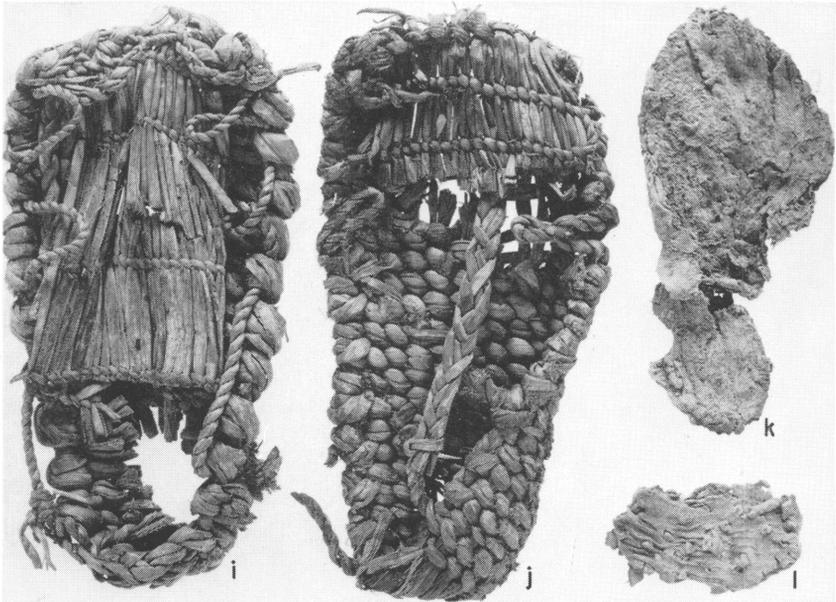
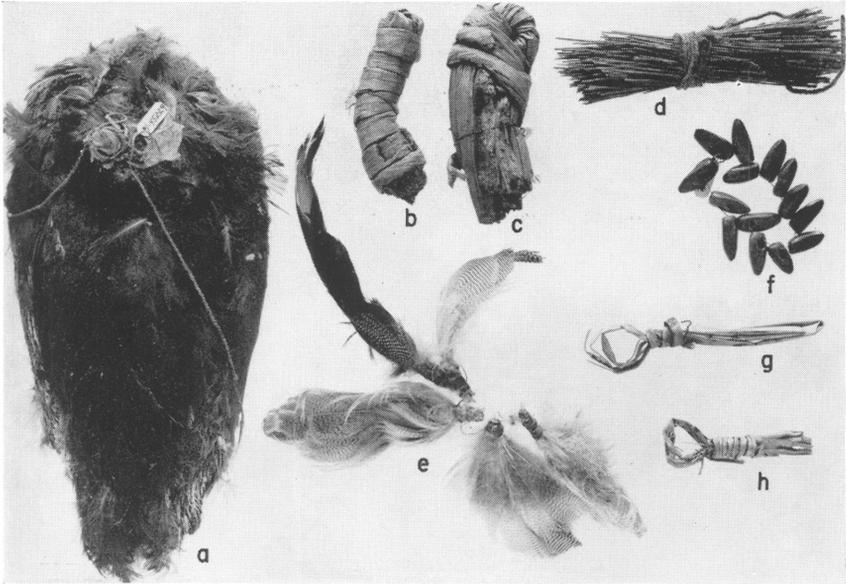


PLATE 29

Intestine bags and wrapped seed heads. *a.* Animal intestine bags (43042, 43043, 43044). *b.* Wrapped sagebrush seed heads (43048, 43047).

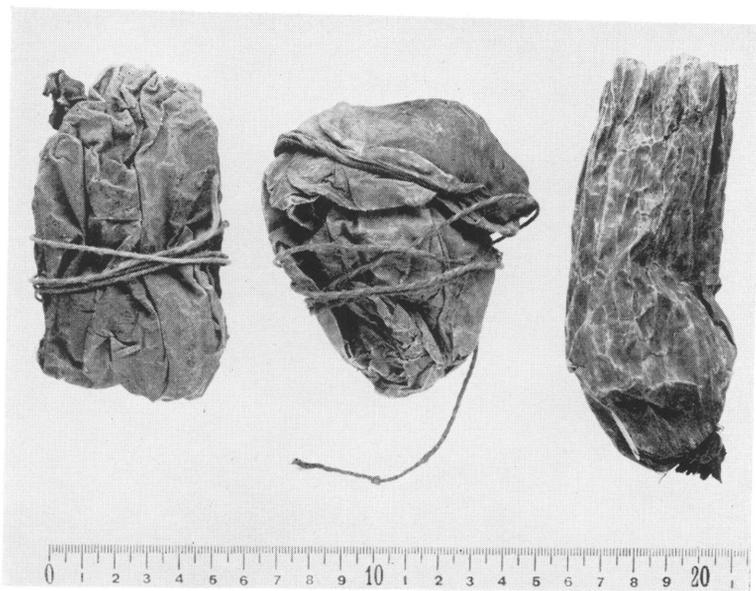
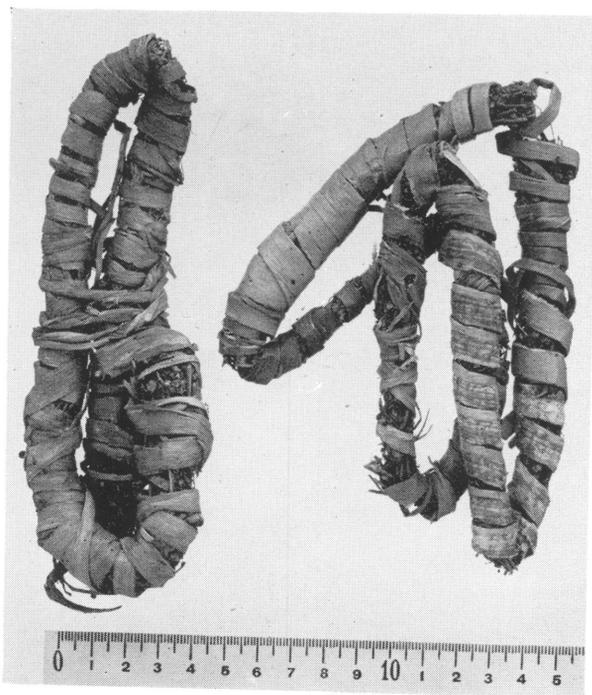
**a****b**

PLATE 30

Bone implements. *a*. Sucking tube (42828), length 7 in. (18 cm.). *b*. Pelican-bone tube (44061). *c-f*. Unfinished animal-bone tubes with cut ends (45015a-d). *g*. Short bone tube (43741). *h* and *i*. Scored bones in process of bead manufacture (43879, 45369). *j*. Bone showing cut groove (44074). *k* and *l*. Bird-bone whistles (43752, 45370). *m*. Distal end of artiodactyl tibia with polished cut end, possibly a bunt point (45223).



PLATE 31

Spatulate objects, pipes and clay ball. *a-c*. Thin spatulate objects apparently for ceremonial use (42840, 42837, 42839); length of *a* 5 in. (12.6 cm.). *d*. Unfinished stone pipe, with drilled hole started in top (45095). *e*. Tubular stone pipe (44345). *f*. Tubular stone pipe with incised ring and diagonal incised lines (44109). *g*. Hand-molded lump of white clay, probably used as body paint (42617).

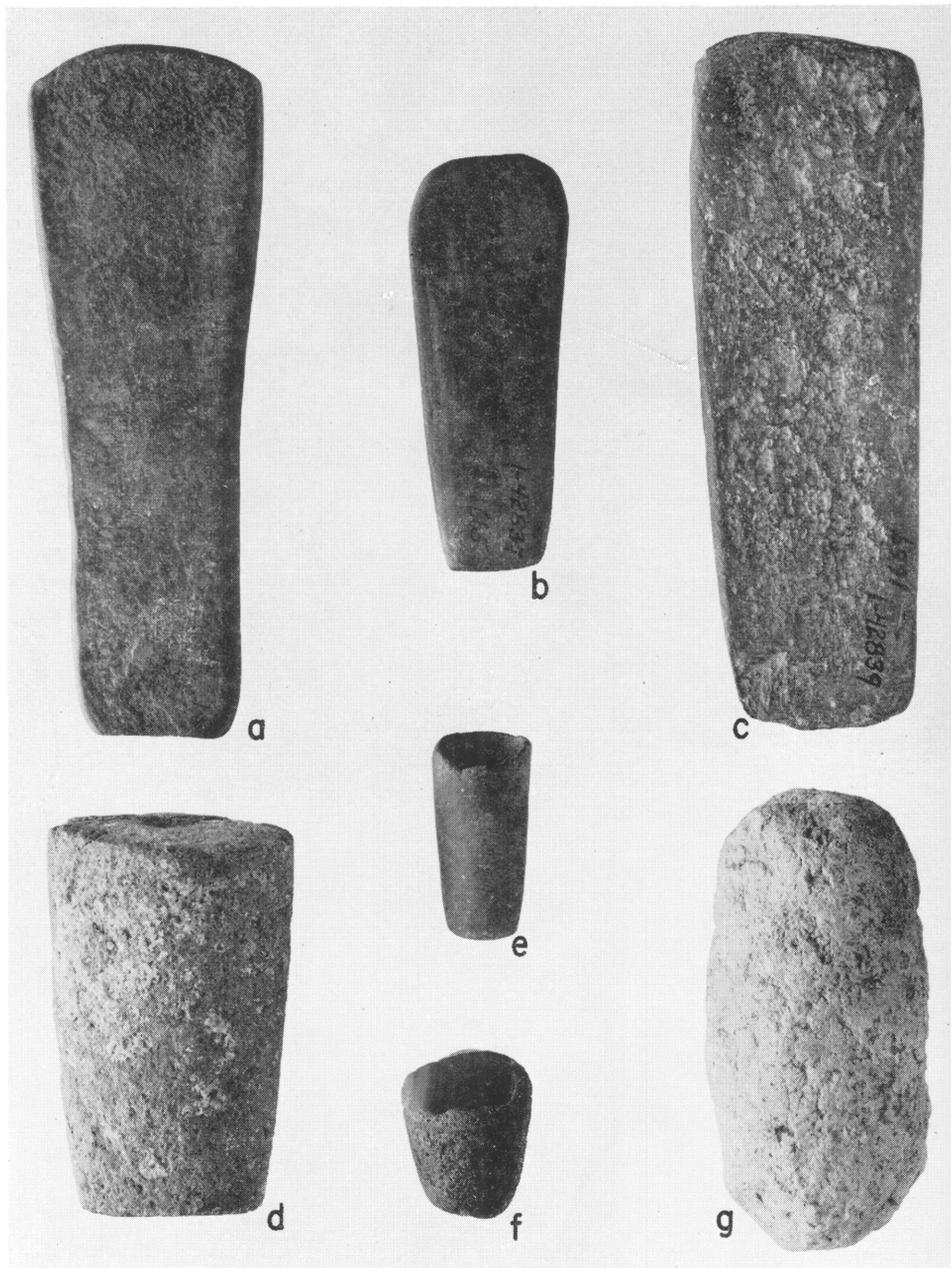


PLATE 32

a and *b*. Northern Paiute of Pyramid Lake, Nevada. Photographs by C. Hart Merriam, July, 1903. Note brush houses, rabbitskin robe, coarse twined burden baskets.

**a****b**

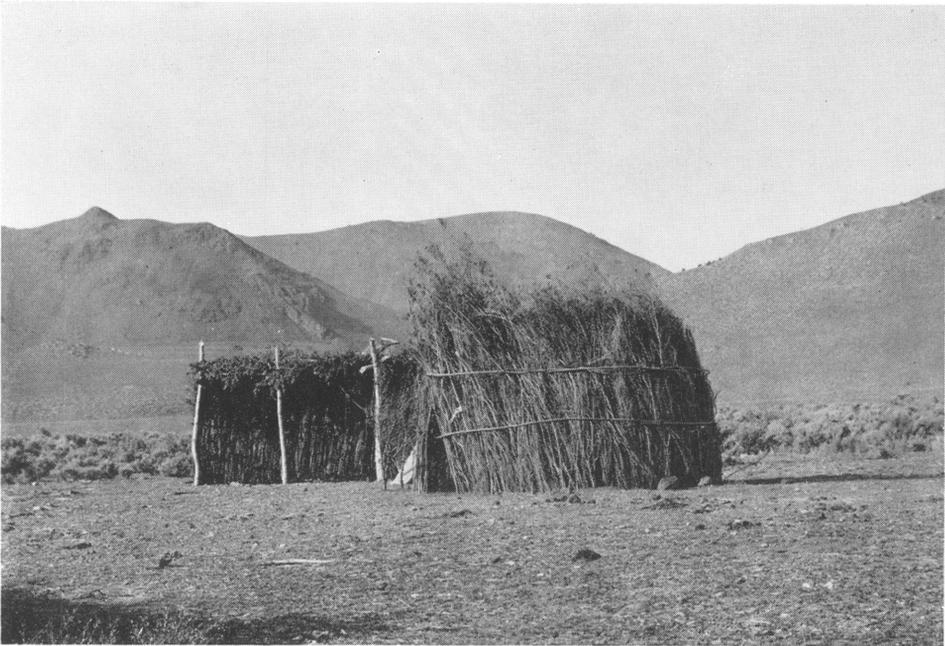
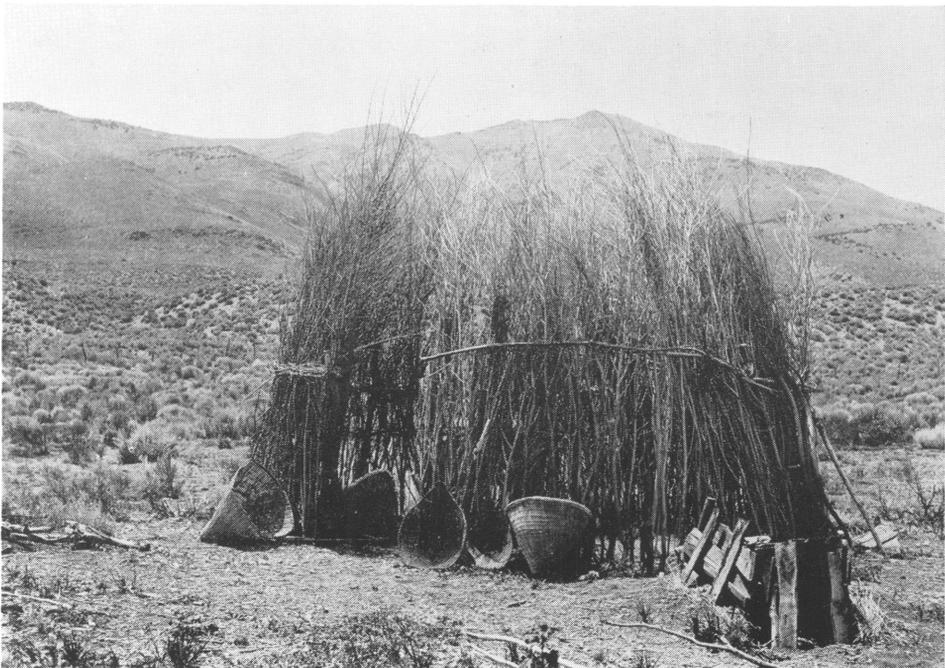
PLATE 33

a and *b*. Northern Paiute of Pyramid Lake, Nevada. Photographs by C. Hart Merriam, July, 1903. *a*. Tule-thatched house in flood plain of Truckee River; note various forms of baskets. *b*. Pole framing of dwelling; entrance is between the two persons.

**a****b**

PLATE 34

a and *b*. Northern Paiute of Pyramid Lake, Nevada. Photographs by C. Hart Merriam, July, 1903. *a*. Unroofed brush house and open-sided sun shelter. *b*. Roofless brush (willow ?) house; note twined burden baskets and winnowing trays.

**a****b**