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INDIAN NOTES AND MONOGRAPHS

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A SERIES OF PUBLICA-
TIONS RELATING TO THE
AMERICAN ABORIGINES

A BASKET-MAKER CAVE IN KANE COUNTY, UTAH

BY

JESSE L. NUSBAUM

WITH NOTES ON THE ARTIFACTS BY

A. V. KIDDER AND S. J. GUERNSEY

NEW YORK

MUSEUM OF THE AMERICAN INDIAN

HEYE FOUNDATION

1922

THIS series of INDIAN NOTES AND MONOGRAPHS is devoted primarily to the publication of the results of studies by members of the staff of the Museum of the American Indian, Heye Foundation, and is uniform with HISPANIC NOTES AND MONOGRAPHS, published by the Hispanic Society of America, with which organization this Museum is in cordial coöperation.

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INDIAN NOTES AND MONOGRAPHS

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153

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Miscellaneous 29

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ACKNOWLEDGMENTS



THE discovery and exploration of the Basket-maker cave described in this paper is due to the generosity of General T. Coleman du Pont, by whose assistance the Museum of the American Indian, Heye Foundation, was enabled to send an expedition into the country of the Kaibab Paiute in the autumn of 1920. This expedition, under the leadership of Mr. Jesse L. Nusbaum, then a member of the Museum staff, had the two-fold object of collecting ethnological material from the surviving Paiute Indians in southwestern Utah and eastward, and of investigating such archeological sites as might be discovered during the reconnoissance. Mr. Nusbaum was fortunate enough to locate a cave eight miles northwest of the town of Kanab, in Kane county, Utah, that had previously been disturbed only to a very slight extent. The evidences of

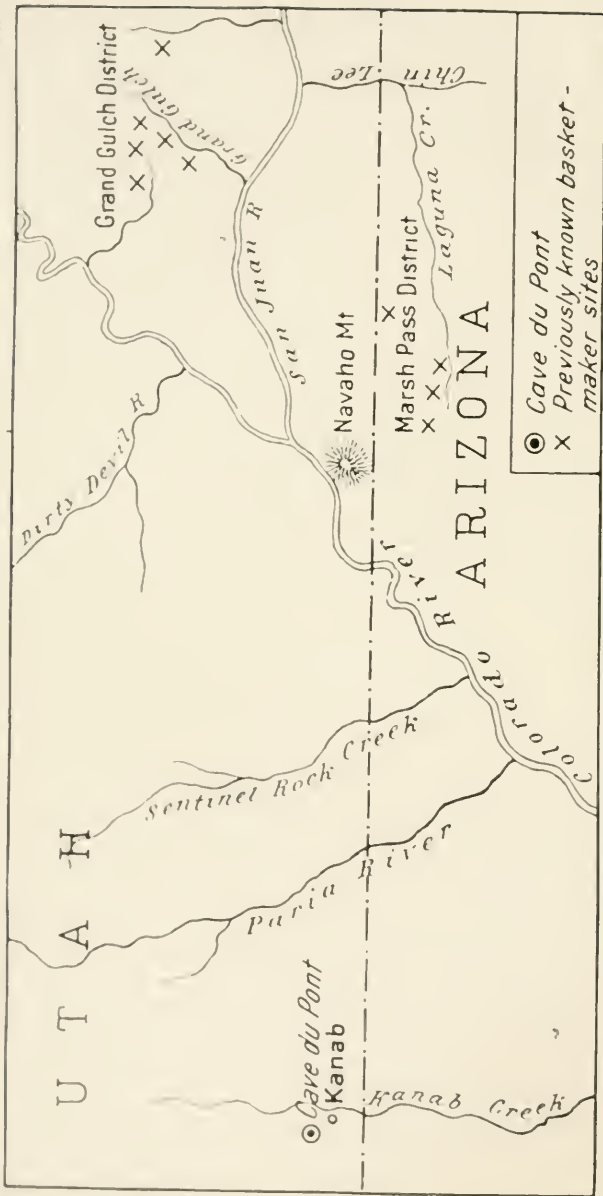
archeological remains here were so promising that he undertook and carried to completion the excavations whose results are herein recorded, and which proved to be of considerable importance in shedding additional light on the culture of the so-called Basket-makers. In recognition of the interest that General du Pont has taken in this work, the cave was named after him, and is now known locally as Cave du Pont. The thanks of the Museum are due also to General du Pont for making possible the present publication.

Dr. A. V. Kidder, of the Department of Archeology of Phillips Academy, Andover, Mass., and Mr. S. J. Guernsey, of the Peabody Museum of Harvard University, have devoted special attention to archeological problems in southern Utah and Colorado, and of northern Arizona, for several years, and it was therefore highly gratifying to the Museum of the American Indian, Heye Foundation, that Dr. Kidder and Mr. Guernsey accepted the task of preparing that part of the memoir which pertains to the artifacts recovered during the

course of the excavations. Appreciation of the contribution by these gentlemen, which adds materially to the value of the results, is hereby acknowledged. The photographs of the remains observed in the field are by Mr. Nusbaum, while those of the artifacts were made by Mr. E. F. Coffin of this Museum.

The thanks of the Museum are expressed also to Mr. Wilford Robinson, owner of Cave du Pont; to Dr. G. N. Collins, of the Bureau of Plant Industry, U. S. Department of Agriculture, for his study of and report on the maize found; and to Mr. Paul C. Standley, of the U. S. National Herbarium, for the identification of certain seeds.

GEORGE G. HEYE,
Director.




SKETCH MAP SHOWING LOCATION OF CAVE DU PONT

A BASKET-MAKER CAVE IN
KANE COUNTY, UTAH

PART I—EXCAVATION

BY JESSE L. NUSBAUM

LOCATION OF CAVE DU PONT

URING the summer of 1919 the writer made a trip through parts of southern Utah for the purpose of collecting ethnological specimens from the Ute and Paiute tribes. In the course of this journey information was received from Mormon farmers and cattlemen of Kane county to the effect that in the cañons of that district there were caves containing numerous signs of aboriginal occupancy. In the autumn of 1920 an expedition was undertaken to investigate these sites.

Kanab (see sketch-map, pl. 1), the county seat of Kane county, was reached after a trip of 140 miles by automobile stage from Marysvale, the terminus of a branch line of the Denver and Rio Grande Railroad. With Kanab as a base the country was explored on horseback, and a promising cave was located 8 miles northwest in Cave Lake cañon. The route from Kanab to the cave follows up Kanab creek for 5 miles along the Kanab-Mount Carmel mail-road, thence for 3 miles up Three Lakes cañon to its junction with Cave Lake cañon. Another mile up the barren lower reaches of the latter brings one to the "Meadows," a fertile widening of the valley in which Mormon pioneers, attracted by abundant water and fine natural pasturage, settled more than forty years ago.

Cave Lake cañon derives its name from two grottoes in its walls, both of which contain springs copious enough to spread out and form considerable pools under their overhanging roofs. The larger cave is 100 feet wide at the mouth and extends back about 300 feet into the red sandstone cliff;

the "lake" is not more than 7 or 8 feet deep, but it furnishes a never-failing water supply for the fields below. Besides these two caves there are, in the sides of the cañon at and near the "Meadows," a number of others, some at the level of the valley bottom and often more or less moist; some high up in the cliffs and, where protected from rain and snow, almost absolutely dry. Cave du Pont is one of the latter; it was discovered by the children of Mr. Wilford Robinson, a local ranchman; later Mr. and Mrs. Robinson did some digging in it and found several interesting specimens which were purchased and now form part of the collection.

The cave lies 300 yards below the Robinson ranch in a bay on the east side of the cañon. To reach it from the valley bottom one climbs 250 feet or so up a steep, rocky talus, heavily overgrown with scrub-oak and juniper. At the top of this there is a narrow sandstone bench, on which is a good seepage of water. Thirty feet above the bench and at the foot of the final cliff or rimrock, is situated the cave, at a total

of about 275 feet above the level of the "Meadows." In front of the cave the dampness that concentrates lower down to form the seepage on the bench is sufficient to support a very dense growth of oak and box-elder, screening the entrance effectively from the view of anyone in the valley below (pl. II).

The cave is high and relatively shallow; it measures 100 feet across the mouth, 60 feet deep from the line of shelter to the extreme rear, and is about 55 feet high at the front. The level, utilizable portion of the floor does not occupy the entire interior, but consists of a semilunar terrace or bench that hugs the back wall of the cave (pl. III).

At first sight the place did not seem an attractive one for excavation; the interior was completely devoid of buildings, and the roof and walls showed not the least trace of smoke. The sandy surface, filled with slabs of stone fallen from the roof, contained no débris of occupancy. At the rear, however, were a few almost obliterated pictographs, and at the west side there protruded the tops of a few slabs obviously set on edge



LOOKING OUT OF CAVE DU PONT



GENERAL VIEW OF CAVE BEFORE EXCAVATION
(The slabs of Cist 1 appear in the right foreground)

by human agency. These indications led the writer to explore. He was further influenced in choosing this particular site by the fact that the specimens recovered by Mr. Robinson appeared to belong to the Basket-maker culture. This culture is a very early one, antedates that of the Cliff-dweller-Pueblo people, and is in many ways strikingly simple and primitive.¹ Basket-maker remains had hitherto been found only in a rather restricted area in the southeastern corner of Utah and the northeastern corner of Arizona (see map, pl. 1). Kanab lies 125 miles in an air-line from the nearest previously reported Basket-maker site (Marsh Pass, Arizona), and is nearly 150 miles from the Basket-maker caves of Grand Gulch, Utah; furthermore the Kanab district is cut off from the above localities by the formidable barrier of the Colorado River cañon. Thus it appeared to be of great importance to determine whether the remains in Cave du Pont actually were Basket-maker or not. The excavations settled this question beyond a doubt, the finds agreeing in every particular with

those from other Basket-maker sites, and we now are enabled to extend the known range of this interesting people to well over twice its former extent. Although there are cliff-houses in Cave Lake cañon and in other nearby valleys,² no trace of Cliff-dweller artifacts was found in Cave du Pont.

EXCAVATION OF THE CAVE

A beginning was made by constructing a horse-trail up the steep talus in order that a team and pole-scraper might be employed to drag out the masses of sand that obviously had to be removed. An arbitrary bench was commenced well to the front of the cave and extending across its entire width. This cut was carried forward and inward by hoeing and raking at its base and allowing the loose fill to run down far enough to be carried over the dump by the scraper (pl. v). The dust resulting from such a method of excavation made breathing very difficult. Respirators could not be procured, and wet sponges tied over the nose gave little relief. Frequent halts were





BEGINNING OF EXCAVATION. CISTS 1 AND 2 CLEARED AND THE HEAVY LAYER OF DÉBRIS EXPOSED

necessary, not only for rest and fresh air, but also to allow the atmosphere to clear sufficiently for taking pictures. Photography, indeed, was much hampered because the all-pervading dust settled so

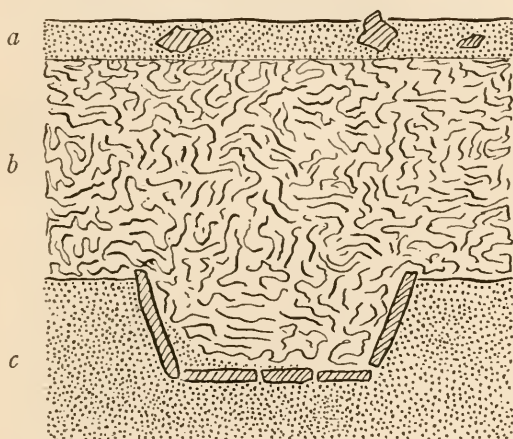


FIG. 1.—Diagrammatic section of cave deposit. (*a*, Surface sand with rocks from cave roof. *b*, Matted débris dipping more or less into cists. *c*, Cave sand undisturbed except by cists sunk into the upper measures.)

thickly that everything assumed a monotone, and the most thorough brushing had constantly to be done.

After two days' work in barren sand, the advancing face reached the front of the

culture stratum, a very uniform deposit lying across the entire width of the cave and extending clear to the back. From above downward the sequence of layers was as follows (see fig. 1):

(a) One foot to 18 inches of wind-blown sand containing here and there masses of rock fallen from the roof.

(b) A layer, 3 to 5 feet thick, of long grass, oak-leaves, juniper-bark, corn-husks, corn-stalks, corn-cobs, sticks, and yucca-leaves; with some pieces of twisted and braided yucca-fiber, and a certain amount of human and animal excrement. At the very bottom there was generally found a thin bed of apparently wind-blown oak-leaves. All this material was absolutely dry and perfectly preserved; it was tangled and matted together in a wadded mass that defied the shovel, and had to be pulled or raked out bit by bit (pl VI, VII). It is noteworthy that it held no charcoal or ash whatsoever, almost no animal-bones, and not a single sherd of pottery.

(c) Lastly, and extending to an unascertained depth, came the original soft, sandy



FIRST EXPOSURE OF THE MATTED DÉBRIS



CLOSE VIEW OF THE MATTED DÉBRIS OVER CIST 5

floor of the cave. Sunk into this floor were a number of cist-like structures made of flat sandstone slabs set on edge; they were overlaid by and often filled with the matted débris.

The cists, of which thirty-one were found, are all very much alike. Perhaps the best general idea of their structure and arrangement may be had from pl. VIII and IX, views taken after the completion of the excavations, and from the plan of the cave (pl. x).

It will be seen that the individual cists vary somewhat in size and in proportions, but that all tend to be round, with an average diameter of about 5 feet. They were made by digging in the sandy floor of the cave a hole of the desired size and then paving it with slabs of stone, the interstices between them often pointed up with adobe mortar. The sides or walls were constructed of a single course of large upright slabs, carefully selected for size and shape, but apparently unworked except for an occasional slight trimming. These wall-slabs were set in the sand around the edge of the

floor, leaning outward at an angle of about 15 degrees from perpendicular. If the slabs could be made to fit snugly side by side, there was no chinking; but if, as was often the case, a sand-tight joint could not be attained by juxtaposition or by a slight overlapping, it was filled with mud or with wads of grass and cedar-bark. The careful stopping of cracks, together with the fact that the walls have so pronounced an outward flare, makes it reasonably certain that the structures were sunk into rather than built upon the ancient surface of the cave. The tops of the wall-slabs were undoubtedly flush with or possibly a trifle below the level of the ground and did not protrude as shown in the photographs of the completed excavation (it was of course necessary for a thorough investigation to clear away the sand from the outsides of the walls).

Some of the cists were certainly roofed. In other cases there is doubt, for many of them appear to have been roughly torn open, the roofs thrown aside, and the interiors emptied of whatever they may have



GENERAL VIEW OF CISTS AFTER EXCAVATION. LOOKING SOUTHWEST

contained; whether this was done by their owners or by subsequent looters is uncertain.

DESCRIPTION OF THE CISTS AND BURIALS

CIST 1 lay toward the front of the cave on the western side. Water falling from the cliff above has cut a considerable gully which heads at this place and has washed away about half of the walls. Seven rough slabs remain, forming the rear and part of the sides; they indicate a squarish or rectangular enclosure. The construction, as shown in the photograph (pl. XI), is very poor, large unfilled spaces having been left between the slabs. Because the floor is unpaved, the original depth of the cist could not be ascertained; the complete side is 3 feet 6 inches long; one of the fragmentary walls is of the same length. No trace of roofing was found, nor were there any specimens in the mass of oak-leaves and sand which filled the chamber.

CIST 2 was covered to a depth of more than 2 feet with sand and rocks mixed with oak-leaves. When this had been cleared

away the cist proved to be irregularly diamond shaped and to measure 5 feet long, 3 feet wide, and 2 feet 8 inches deep. Its walls are composed of seven large slabs of selected sandstone, 1 to 4 inches thick, one of them very much longer than the others (see plan, pl. x; and photograph, pl. xii). The edges of the slabs roughly join or slightly overlap one another. On the inside the joints are filled and pointed up with sandy, iron-red, adobe mortar; on the outside they are backed with juniper-bark torn into long thin shreds or strips; and at the base of the walls on the outside these strips are held in place and the main slabs are steadied by smaller slabs. The floor of the cist is paved with large irregular slabs, the interstices filled with adobe mortar.

On excavating the interior it was found that at some time subsequent to its original construction a fireplace had been built in the cist. Two sides of this were made by utilizing the two original slabs of the south-east corner; the other two sides were made of small slabs set in the débris within the

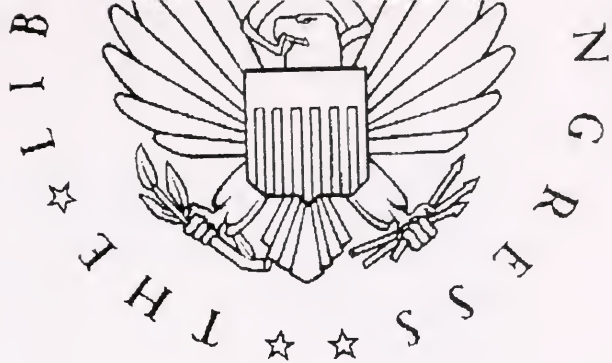


GENERAL VIEW OF CISTS AFTER EXCAVATION, LOOKING EAST

cist (pl. XII). The fireplace was almost square (2 feet by 2 feet 1 inch), was 1 foot 2 inches deep, and contained a bed of coarse charcoal a foot in depth.

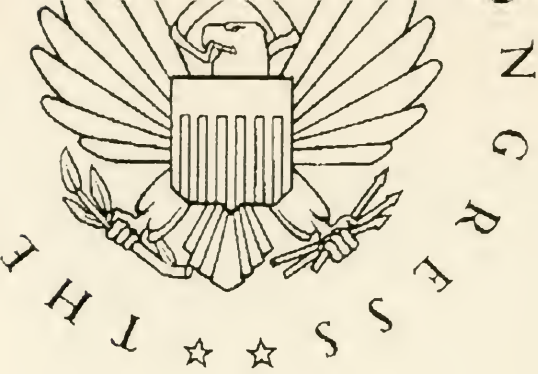
Just above the firepit in the loose débris was a small piece of very heavy, tanned deerskin. Underneath the firepit a tangled mass of shredded juniper-bark was found to cover the whole interior of the cist; below this were long, wide strips of the same material; and below these many small slabs of sandstone. There was next encountered a series of broken oak poles, $1\frac{1}{4}$ to 4 inches in diameter and about 3 feet long. These were undoubtedly the supporting members of a crushed-in roof, which had consisted of: (1) poles, (2) slabs, (3) juniper-bark strips, (4) shredded or matted juniper-bark. Many corn-cobs of a small irregular type and one ear with kernels were found in the sand and débris on the paved floor. There were also a nicely made planting-stick of buck-brush or mountain mahogany, and a small deposit of tiny, very black seeds (*Chenopodium* sp.).

CIST 3 is a roughly circular chamber with one side somewhat flattened. Its dimensions are: 5 feet 6 inches long, 5 feet wide, 2 feet 6 inches deep. The walls are composed of 14 more or less rectangular slabs set, leaning slightly outward, in the sand; the majority of them are butted together; a few overlap at the joints. No chinking or mud was used, either in the irregularly paved floor or in the interstices of the walls. A single stout box-elder stake is set upright in the floor on the north side, tight against one of the wall slabs (to be seen at left of photograph, pl. XIII); it stands 3 feet above the floor, and near the top it is wrapped by a double loop of yucca-leaves neatly knotted. On the opposite side of the cist an unpeeled, forked branch of box-elder is set firmly in the floor; it measures 1 foot 8 inches to the crotch and 3 feet 4 inches to the tops of the limbs (the farther one of the two forked holes in pl. XIII). The crotch shows much rubbing or wear, as though it had been used to support a cross-pole. Beside it was found a juniper log, also forked, 4 inches through the butt



Fold-out Placeholder

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Fold-out placeholder

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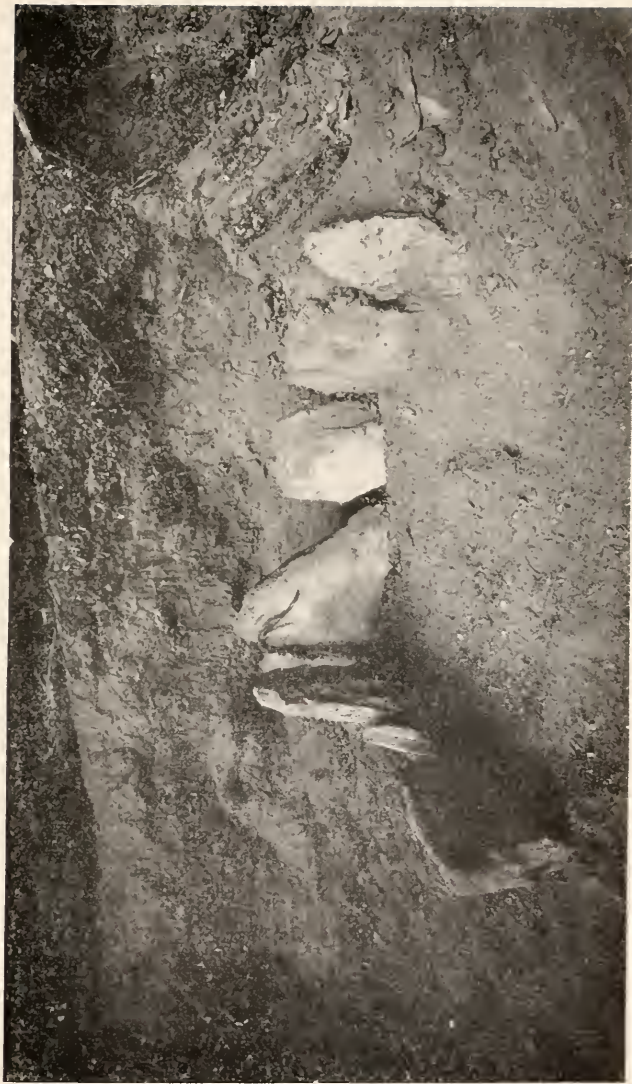
and 8 feet 6 inches long. It was not planted in the floor, but leaned against the wall as shown in the photograph (pl. XIII). The first forked stick and the looped stake probably represent roof supports, and the juniper log was presumably one of the cross-members; the others, however, have all disappeared, either thrown out by prehistoric looters or removed by the original tenants of the cave for use in some other structure. Nothing else was found in the filling except matted juniper-bark and trash such as covered the whole cist area.

CIST 4 lies close to Cist 3 and is of about the same size and shape; it exhibits, however, much more careful workmanship, the joints in the wall and between the large slabs of the floor being carefully filled and pointed up with adobe mud. A boulder *in situ* was utilized for part of one side. While the débris within was of the usual type, very densely tangled and most difficult to excavate, there were found scattered through it the following specimens: a two-strand necklace of polished seeds and serpentine beads (pl. XL, *a*); several sections of

a string of seed beads (pl. XL, *b*); a piece of juniper-bark matting; two large balls of red paint; a lump of white paint; a small bundle of feathers (fig. 5); a worked stick; a small round stone; a bit of flint; a squash stem; two pieces of squash rind; and eighteen small ears of corn.

CIST 5 is of particular interest because it was put to secondary use as a burial chamber. It is a larger example than is usual in the cave, is approximately circular, and measures 8 feet north and south, 6 feet 8 inches east and west, and 2 feet 9½ inches deep. Above the walls lay 3 feet of compact débris topped by 15 inches of wind-blown sand. When all this superficial material had been removed, and the sides cleared sufficiently to expose the wall-slabs all around, it became evident that the interior had been subdivided into two bin-like structures of slabs built against opposite sides of the main cist (see pl. XIV, a photograph taken at a later stage of the clearing).

Burial A, the first uncovered, occupied the better made of the two bins. In constructing it the slabs of the cist-wall were



CIST 1



CIST 2. SHOWING LATE FIREPLACE BUILT ON ORIGINAL FILLING OF THE CIST

utilized at one end only, the rest having been built of slabs set on the floor (pl. xv). No covering was in place, but two slabs large enough to have served that purpose were found on edge beside the grave; and three poles lay near the foot (pl. xiv). As the second burial in this cist was covered with both poles and slabs, it is possible that in the present case a similar protection was originally provided, but was pulled off and pushed aside by looters; the body, however, did not appear to have been disturbed. The burial bin was so small (2 feet 9 inches long, 1 foot 1½ inches wide) that the individual, an adult, occupied an extremely cramped position, lying on the back, the head south and bent forward nearly at right angles to the body; the left hand was at the pelvis, the right arm extended along the side, the knees were drawn up and rested against the wall of the bin (pl. xvi). The body was placed directly on the original paved floor of the cist. Over the head was inverted a fine coiled basket (pl. xlv). Although the corpse itself was desiccated, and where the

tissues had not been eaten by rats and insects was in fairly good preservation, such mortuary wrappings as may have been used were entirely destroyed by decay. The hair was brownish-black streaked with gray, and showed a reddish tinge in the sunlight. This reddish tinge, often seen in the hair of ancient "mummies" from the Southwest, is probably due to some chemical action.

Burial B, as was said above, occupied a second bin on the opposite side of the main cist from Burial A (pl. XIV). Directly below the mass of matted débris which overlaid the entire top of the cist, were a number of flat slabs lying on their sides, together with a piece of rush matting (pl. XVII, right-hand side); carefully removing these, grass and juniper-bark were found underneath, covering three juniper poles, 5 to 7 feet long and 7 inches or so thick at the butts (pl. XVIII, right-hand side). The north ends of the poles did not reach the wall slabs at that side of the cist, and only two of the south ends extended over the south wall. Five smaller sticks of shorter



CIST 3



CIST 5 PARTLY CLEARED, BURIAL A IN FOREGROUND, BURIAL B BEHIND

lengths, placed more or less at random, completed the timbering, under which was the rather crudely built bin containing the body (pl. XIX). Its west side was formed of a single slab, 1 foot 10 inches long; the east by two slabs (11 inches, and 1 foot 10 inches long respectively) butted together at a slight angle; the head of the grave was provided by one of the slabs of the original cist wall; the lower end was open. The dimensions of the bin were: width at feet, 10 inches; at the middle, 1 foot 3 inches; total length, 3 feet 8 inches. Sand and débris had sifted in, covering all but the erect knees of the body. The individual was an adult. It lay on the back, the head 20 degrees south of east; the arms were folded across the abdominal region, the knees drawn up to the perpendicular (pl. XIX); the head was tilted well forward as the result of cramping it against the end of the grave. Over the head was inverted a small coiled basket (see pl. XV, XVI, upper right-hand corners; the basket is illustrated in pl. XLVI). On the left shoulder lay a pair of very fine, square-toed, yucca-fiber

sandals with elaborate human-hair tie-strings (pl. xxxviii); under the heel of these was part of a skin pouch. At about 5 inches from the left elbow there had been placed a long, sickle-shaped implement of mountain-sheep horn (pl. lxi, *b*). Over the chest were two small pieces of grass matting, possibly part of the mortuary wrappings, but more probably fallen from among the logs which had covered the grave. Of other wrappings nothing was preserved; decay, indeed, had taken considerably greater effect upon this interment than was the case with Burial A, for the fleshy parts had almost entirely disappeared, and where present were completely honey-combed with tiny worm-holes. The liquids of decomposition had so permeated and caked the sand in the grave that a knife-blade pierced it with difficulty, and the task of clearing the body and its accompanying objects was an arduous one. Kidder and Guernsey (op. cit., p. 81, fig. 31) found Basket-maker burials apparently encased in prepared adobe mud. This was not the case in the present instance, where the



CIST 5, BURIAL A AS FOUND



CIST 5, BURIAL A WITH BASKET REMOVED FROM HEAD

caking was surely due to the decomposition of the body.

When the two burials and their enclosing bins had been removed, the cist was cleared out (pl. xx). As the photograph shows, it is a structure of the ordinary type, the encircling wall and the paved floor made of fitted slabs, the interstices between them chinked and smoothed over with red mud. Two short stakes, one of which appears in pl. xx, are driven into the floor to help support the wall slabs. The three timbers that are seen leaning against the wall are the ones referred to above as having possibly been part of the pushed-aside covering of Burial A; it is also possible that they were timbers used in roofing the cist before it was converted into a mortuary chamber. In the latter case they probably extended clear across the cist and were reduced to their present length by some accidental fire in it, for two of them are burned at the ends, and a deposit of ashes and charcoal was found at about the position where it would be expected had such a fire taken place. Under the ashes was an empty

umbilical-pad cover; aside from this, a few ears of corn, and some loose bits of cordage, the rubbish in the cist was barren.

CIST 6 is the largest in point of diameter of any structure in the cave; it measures 8 feet 9 inches from northeast to southwest, and 7 feet 8 inches in the opposite direction. From the top of its wall-slabs to the paved floor the average distance is 2 feet 8 inches, a depth slightly exceeded by several other cists. Eleven slabs, several of unusually large size, form the walls. There is a gap at the northeast side (see plan, pl. x, and pl. XXI), probably attributable to the removal, for some reason or other, of a single slab, rather than to the former presence of an entryway at this point. Ten stakes, $1\frac{1}{4}$ to 2 inches in diameter, some reaching half-way up the wall, others extending its full height, are so driven into the floor, against the inside of the wall at the butted or lapped joints between the slabs, that they effectually support the whole structure and keep it from being caved inward by the pressure of the sand outside (pl. XXI). The



CIST 5, BURIAL B, SHOWING SLAB TOP-COVERING OF THE GRAVE.
BURIAL A (CLEARED) AT THE LEFT



CIST 5. BURIAL B, SLABS REMOVED TO SHOW LOG SUPPORTS

stakes are all either burned off or broken off at the ends; these were the only methods ever used, apparently, for reducing the length of small stakes.

As may be seen in the plan and photograph (pl. x, XXI), the cist contains a small quadrant-shaped inner chamber, each side of which is constructed of two very irregular slabs. In this compartment, as in most of the rest of the main cist, nothing was found except the usual matted rubbish. On the paving slabs at the southeast side, however, where the tip of an underlying boulder protrudes through the floor, there was uncovered a skin "medicine pouch" (pl. LXVI and fig. 36), about two pounds of yellowish-brown gummy substance, a fragment of yucca matting, and several pieces of yucca cord. These specimens are described in the second part of the report.

CIST 7, a small hexagonal affair about 3 feet in diameter, has five sides made of thin slabs; the sixth is provided by the largest slab used in any wall construction in the cave. It had evidently scaled off

from the roof of the cave and been set on edge just where it fell, for no attempt was made to lower it level with the rest, or to conform with them in height. It is 5 feet in length, 8 inches thick, and protrudes 2 feet 9 inches above the unpaved sand floor of the cist; only 2 feet 5 inches of its length were used in the wall (see pl. x).

This cist was found in its original condition, as left by its owners. It lay beneath 3 feet of débris and 1 foot of surface sand. Under this and over the top of the slab walls was a matted layer of grass and shredded juniper-bark, on which had been placed a single very large woven moccasin, three bundles of corn-husks (pl. LIV), and a piece of yucca cord knotted at each end. Under the matted grass and juniper-bark was a thin layer of clean, stripped juniper-bark; next below a two- to six-inch bed of macerated and twisted bunch-grass. All this material covered and protected from sand the three to three and a half bushels of corn on the cob which were stored in the bottom of the cist (pl. XXII). The cobs had been stripped nearly bare by insects



CIST 5, BURIAL B, BODY EXPOSED, BASKET REMOVED FROM HEAD



CISTS 5. AFTER REMOVAL OF BODIES AND BURIAL ENCLOSURES

and borers, but many of the partly-eaten kernels were found loose in the deposit. The ears were small and slender, many of them imperfectly formed or immature.

CIST 8 is a five-sided structure of very large, regular slabs; its diameter is a little greater than that of Cist 7, but it is shallower, measuring only 1 foot 3 inches to the slab floor. No mud was used in chinking the slabs, and nothing of interest was found within.

CIST 9, whose average diameter is 4 feet and whose depth is 2 feet 2 inches, has a well-paved floor. Its chief interest lies in the method that was employed to provide its wall with a smooth and even top. Only a small portion of this arrangement is preserved, but there is enough to illustrate the process very clearly. The main wall-slabs, although carefully selected to fit snugly against one another near their bases, leave nevertheless open gaps at their tops; the tops also are not all on exactly the same level (see, for example, pl. xv). In the present cist the gaps were closed with mud and the sand outside was filled in

against the wall to the top of the slabs. Then smaller slabs, resting flat on the sand outside, were laid in mud, their inner edges flush with the inner face of the wall, thus bridging the low places and gaps, and coping, so to speak, the entire edge of the cist (fig. 2). Kidder and Guernsey (op. cit., p. 87 and fig. 33) found a similar

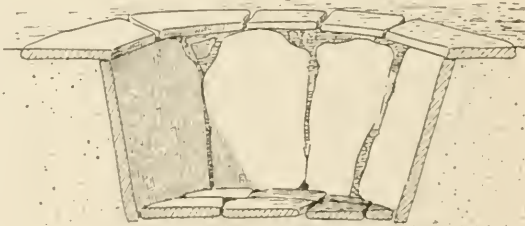


FIG. 2.—Diagrammatic section of Cist 9.

cist (No. 12, Cave II) in Marsh Pass, Arizona, which was provided with a rim or coping of adobe and small stones. A roof rested on the coping.

As was stated above, only a small part of this coping was preserved, nor was any similar arrangement found intact in other cists; it was probably, however, fairly



CIST 6, SHOWING INTERIOR PARTITION AND STAKES AT JOINTS BETWEEN WALL-SLABS



CIST 7, SHOWING CORN, AND COVERING OF GRASS ROLLED
BACK

common throughout the cave, as numbers of small slabs similar to the ones used here were found about the outside of other chambers. The fact that the coping lay flat on the outer sand and was entirely supported by it, proves that this cist, at least, was subterranean.

CIST 10 is six-sided, and 2 feet 3 inches deep to the single large slab which floors it. An unusual feature is provided by an upright juniper post, 8 inches in diameter, incorporated in the wall at the south corner, with the adjacent wall-slabs butted against it on each side. A single roofing pole of pine, 7 inches in diameter by 4 feet long, was found in place along the slabs forming the west wall.

CIST 11, diameter 4 feet, depth 2 feet 2 inches, is built of the roughest and crudest slabs seen in any structure in the cave; they vary in size from 1 foot long and 1½ inches thick, to 3 feet 6 inches long and 1 foot thick. The floor is very well laid, the component stones being neatly fitted together and the joints carefully mudded up. Three juniper roof-poles lay along the

side walls; they measure respectively 4 and 6 feet long, and are from 5 to 10 inches in diameter.

CIST 12 is 4 to 4 feet 6 inches in diameter and of the usual somewhat irregular shape. Its depth is 1 foot 7 inches. The north half is built on and floored by the top of a great buried fragment of rock fallen from the cave roof; the remainder of the bottom is of sand. A little grass was used to plug the chinks between the wall slabs.

CIST 13, 5 feet long, 3 feet 6 inches wide, closely adjoins No. 11 on the north. Its sides are made of ten slabs, $1\frac{1}{2}$ inches in thickness, rising 2 feet 7 inches above the paved floor. The crevices between the abutting wall-slabs, as well as the jagged gaps between their tops, were stopped up with series of bunches of corn-husks tied together with yucca-leaves (pl. LIV). Some of the series contained as many as seven bunches; the average, however, was four. This is one of two instances in the cave of the use of corn-husks as a protection against sand

CIST 14, a very small, squarish bin, lies



CIST 15, SHOWING STAKES AND PARTS OF THE ROOFING



CIST 18 A WITHIN CIST 18; THE FILLING OF THE LATTER HAS BEEN
ONLY PARTIALLY REMOVED

to the south of and a little deeper than Cist 13. It is made of five slabs, with a single large one at the bottom. There is no chinking. Depth, 1 foot 5 inches; greatest width, 3 feet.

CIST 15 is more or less round, and is 6 feet in diameter. The nine slabs that form its walls are very large, and many of them are approximately rectangular. Upright stakes about 2 inches in diameter are in place at six of the joints between slabs (pl. XXIII). The floor is of well-fitted slabs pointed up with adobe. Three short, heavy, juniper logs were found resting on the top of the wall. From the débris which, as usual, filled this chamber, there were taken: a section of matting made from long grass plants (pl. L), a crude wooden dipper (pl. LIX, *e*), and a single ear of corn.

CIST 16. This is one of the smaller type of structures, its greatest length being 3 feet 6 inches. It is 1 foot 9 inches deep. The wall is made of seven slabs, placed on end in more or less of a circle. The floor is paved and mudded up, and has a pronounced

sag in the center, approximately 6 inches below the general level.

CIST 17 has a diameter of 6 feet and measures 3 feet from the top of the wall-slabs to the floor, a depth equaled by only one other cist in the cave (No. 29). The largest wall-slab is 3 feet 9 inches long, about 4 feet high, and 2 inches thick; the rest are long, thin, rectangular pieces set up with great care and with their edges in all but one case abutting. The floor is composed mainly of two large slabs, smaller ones being used to complete the paving.

CIST 18. After removing the 4 feet of débris which overlaid this cist, there came to light a very small bin built upon the filling within it (labeled 18 A on the plan, pl. x; see also pl. xxiv). The small bin was made of six slabs, was unfloored, and contained nothing but sand. Its top was nearly 4 feet and its bottom about 2 feet 9 inches above the floor of Cist 18. It was 2 feet 8 inches long by 1 foot 9 inches wide.

When the above little structure had been removed, the main cist was excavated. It proved to be one of the finest in the cave,



CISTS 20 (LEFT), 29 (RIGHT), AND 30 (BEHIND)



CISTS 23 (FOREGROUND), 22 (BEHIND 23), AND 21 (BEHIND 22)

6 feet 6 inches in one direction, 7 feet in the other, and 2 feet 4 inches deep. The large selected slabs of its sides are very neatly laid up, the joints between them being so close that no mud or other chinking was necessary to keep out the sand. Five juniper poles were found roughly paralleling the slab walls or covering slight sections of the cist itself. These were of varying lengths and ranged from $2\frac{1}{2}$ to 8 inches in diameter.

CIST 19, formed by the walls of Nos. 17, 20, 30, and two slabs set on edge between nos. 17 and 20, was not at first considered a cist, but the appearance of the débris within the area and the care with which the two slabs had been placed to close the gap all pointed to its use at one time as a very irregularly shaped chamber, which depended largely on those surrounding it for walls and for roof support. Nothing of importance was found within. It was shallower than its neighbors and was unpaved.

CIST 20 averages 4 feet in diameter and 2 feet deep. It is well built. The seven slabs of nearly uniform size which go to make up the wall are reinforced at all but

one joint by stakes reaching to an average height of a foot. The floor is of medium-sized slabs pointed up with mud mortar. Before the paving was laid a thin bed of oak-leaves had been spread over the prepared hole in order to prevent the sand from working up through the joints. Grass was used for this purpose under the floors of some other cists. Three short, heavy, juniper logs lay along the wall on the north side (pl. xxv).

The débris filling and covering Cist 20 was such a tangle of grass, corn-husks, corn-stalks, and sandstone slabs, that a shovel could not be forced into it. In the rubbish from the cist proper there was a considerable amount of prepared yucca-fiber; the fleshy parts of the leaves had been beaten out, but the fiber was still uncarded.

CIST 21, roughly hexagonal, is 4 feet wide east and west by 4 feet 8 inches north and south; it is 2 feet 2 inches deep. The wall slabs are so neatly butted together that there was no necessity for mud or juniper-bark chinking between them. (See pl. xxvi.)

CISTS 22 AND 23, each about 4 feet 6 inches in diameter, are described together, because they form, in their present condition, a single dumb-bell shaped chamber (pl. x, XXVI). Floor conditions, however, indicate that a slab once separated them, though it could not be found on excavation. Both cists are roughly paved. The depth of No. 22 is 1 foot 10 inches; of No. 23, 2 feet 7 inches. The wall slabs of 22 are very small and narrow, whereas those of 23 are mostly large, one being 4 feet in length. The workmanship is poor in both, and the joints, though not tight, had never been chinked.

CIST 24. This cist had been crushed flat by a fall of heavy rocks from the cave roof, and the five slabs forming its walls had been forced outward. When they were replaced in what was undoubtedly their original position, they formed a little squarish bin, 18 inches long, 15 inches wide, and 1 foot deep. No indications of chinking were found, nor was there a floor slab

CIST 25. This cist and the two next to be described lie at the extreme west end of

the cave, where they are somewhat protected by the low overhang of its roof; for this reason they were not so deeply covered by wind-blown sand as were those in the middle and eastern parts of the cave. No trace of roofing remains in any of them. Cist 25 is roughly circular; its wall is made of nine more or less uniform slabs, and it has the customary paved floor with mudded joints, its center depressed somewhat more than is usual. The average diameter is 4 feet 8 inches, the depth 2 feet.

CIST 26 is slightly smaller than No. 25. It is carelessly built, hexagonal in shape, 2 feet deep, and has a floor composed of one large and one small stone slab with no mud between them.

CIST 27 is made of five fairly regular slabs, and accordingly is pentagonal. The average width is 3 feet 6 inches. The construction is poor and the wall shaky. A single slab, considerably tilted, forms the floor; no doubt this is the upper surface of a mass of rock from the cave roof, but this could not be determined absolutely without destroying the cist. In the southeast corner there is a



CIST 28 (WITH SLAB COVER); CISTS 20 (LEFT) AND 29 (RIGHT) IN THE BACKGROUND



ROOF OF CIST 28 WITH SLAB COVER IN PLACE

small space between the rock floor and one of the wall-slabs. In brushing this out there was found a little pocket sunk below the level of the floor, which contained two fine stone pipes (figs. 26-29).

CIST 28. The area enclosed by Cists 4, 5, 6, 16, 17, 20, and 29 was covered, underneath the surface sand and the layer of matter *débris*, by a jumbled mass of rocks, probably formed by the scaling off of a large section of the roof prior to the first occupancy of the cave by man. Because the floor was so cumbered with rocks, no cists had been built in this section. The rocks do not show in the general photographs (pl. VIII, IX), because the upper ones were removed during excavation and the lower ones were covered up again with sand to level the floor and facilitate moving about in the cave. When the south end of this rocky area was reached, work was begun on the exterior of Cist 29 at its western side. After digging through the usual wind-blown sand and the general *débris* to the stratum of oak-leaves which generally marked the bottom limit

of finds, the protruding butt of an oak pole and some strips of juniper-bark led to deeper excavation. After going down a little farther there was uncovered the roof of a very deeply sunk structure. The first thing encountered was an oval worked slab

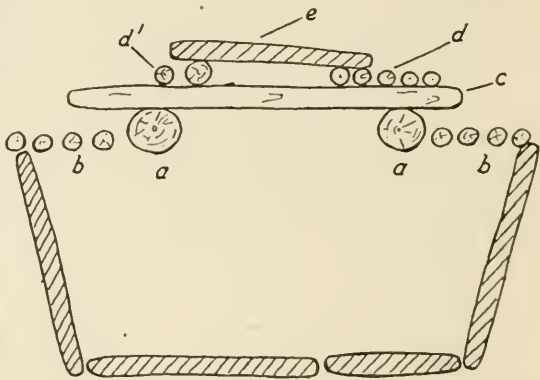


FIG. 3.—Diagrammatic section of Cist 28.

of sandstone, 26 inches long, 23 inches wide, and $1\frac{1}{2}$ inches thick. Removing this a sort of hatchway apparently opening through a roof was found underneath. The stone was replaced and the area cleared so that the whole structure could be exposed and photographed (pl. xxvii). The rotted condition of the timbers, the constantly



ROOF OF CIST 28 WITH SLAB COVER REMOVED



CIST 28 WITH ROOFING REMOVED

sifting sand, and the cramped space that had to be worked in, made this a difficult task.

The structure proved to be a roof, the main supports of which were two logs (fig. 3, *a, a*) laid north and south across the slab walls of an underlying cist. The western of these two timbers (its smaller end runs into the middle background of the photographs, pl. XXVIII, XXIX) was about one-third of a large box-elder riven lengthwise and measuring 11 inches across the split face (the original log was probably 14 or 15 inches in diameter). The eastern main timber (running into the foreground of pl. XXVIII, XXIX) was an unsplit box-elder 6 inches through the butt. Outside the two large logs and parallel with them were small twisted and forked scrub-oak poles and branches averaging 2 inches in diameter (fig. 3, *b, b*); these were laid close together on the slab walls, thereby completing the roofing over the ends of the cist. Using the two heavy timbers as a support, four oak poles (*c*) 2 to 2½ inches in diameter, were laid on each side of the

hatchway, at right angles to the main members. Five small poles and forked branches (*d*), paralleling the main members and resting on and at right angles to the oak poles (*c*), served to limit the western side of the hatch opening. One large crooked stick of oak and one small one (*d'*), laid in the same manner, formed the eastern side of the hatchway, an irregular opening, 22 inches long north and south, by 13 inches wide at the broadest part (pl. xxviii). The slab (*e*) lay over this opening, its north edge held up by a small oak stick, $1\frac{1}{4}$ inches in diameter, which may be seen in pl. xxviii and xxix. The framework of the roof was thatched with long strips of juniper-bark and oak-leaves, making a thick, matted, sand-proof covering.

When the roof was removed, the cist itself (pl. xxx) was examined. Its lower parts proved to be so damp that whatever may have been in it had long since rotted away. The wall is made of seven slabs set at an angle of 15 degrees outward from the perpendicular. No mud was used in the joints, nor between the slabs

which paved the floor. The bottom dimensions are: length 3 feet 6 inches, width 2 feet, depth 2 feet 3 inches. Why a cist so small should have required so heavy a roof is hard to understand, unless it was designed to be buried under many feet of sand. The latter supposition is not improbable, for this cist occupies by far the deepest situation of any structure found in the cave. From its floor to the surface before excavation was 9 feet 3 inches. Its probable depth from the original living surface of the cave may be calculated: Cist 29, which adjoins it on the east, is 3 feet deep; the hatchway slab of Cist 28 is 6 to 8 inches lower than the floor of Cist 29; the roofing material is about 10 inches thick, and the depth of the cist itself is 2 feet 3 inches. As the wall top of Cist 29 was almost certainly not higher than the ground level, we get a total depth to the floor of Cist 28 of about 6 feet 8 inches.

Whether Cist 28 is the only very deep example, or whether there are others, could not be determined, as the owner of the cave desired to preserve the excavated cists

intact, and deep digging in the loose sand about them would certainly have resulted in undermining and bringing down their walls.

CIST 29 is situated very close to the rear wall of the cave. Its depth of 3 feet is equaled only in one other cist (No. 17). It is one of the most regular and best constructed examples, and closely approaches a true circle (longest diameter 7 feet, shortest 6 feet). Thirteen rectangular slabs, varying in width from 1 foot 4 inches to 2 feet 3 inches, and tilting slightly outward, compose its wall. Ten of the joints between slabs are overlapped, the rest are butted together (pl. x); at three of the joints are supporting stakes. The floor is of large, well-laid slabs, pointed up, as are the interstices of the wall, with adobe. In spite of the fact that the sand in the lower parts of this cist was somewhat damp, there were recovered: a grass bag, a piece of red paint wrapped in yucca fiber, and part of the rim of a large, flat, coiled basket. The last specimen was far gone in decay and was saved only by the use of paraffin.





BURIAL E, THE BUNCHED BONES COVERED BY FRAGMENTS OF BASKET

CIST 30 (pl. xxxi; fig. 4) is 4 feet 6 inches long, 3 feet 4 inches wide, and 1 foot 10 inches deep. Its wall is made of seven slabs without chinking material between them; the floor is of small slabs, also unchinked. This much of the cist is of normal type, but about its top, and set back from 6 to 10 inches from the outside of the main wall, is a second wall of small slabs 10 inches high. On the narrow bench thus produced around the lip of the cist there were found five small juniper poles resting on the slabs of the lower wall and following its outline closely (fig. 4). If more poles were laid upon the ones still in place in such a way as to cut across the angles produced by them; and if other poles were in turn laid upon this hypothetical second series in a similar manner, there would be produced a cribbed roof, in principle much like the roofs of the cliff-house and pueblo kivas of the northern San Juan district.³ The writer believes that such overlapping or cribbing was actually carried out in the present cist, and that the missing upper members were later removed, either by the

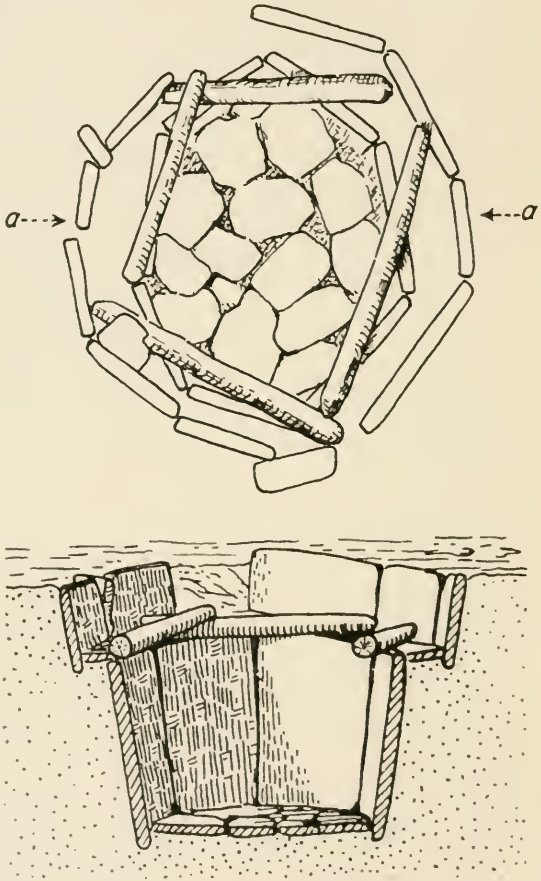


FIG. 4.—Diagrammatic plan and section of Cist 30.

owners who wished to use them elsewhere, or by looters. Traces of this supposed system of roofing in the form of logs lying close along the wall tops were found in Cists 10, 11, 15, 18, and 20, all medium to large chambers. The smaller bins were perhaps provided with movable slab covers or were roofed after the manner of Cist 28.

From this cist was taken a yucca-leaf bag (pl. XXXIV), containing a quantity of corn on the cob.

CIST 31. At the extreme eastern end of the cave a deep notch in the wall forms a small inner recess. Here, under nearly 4 feet of débris and oak-leaves, was a cist 2 feet 2 inches deep, but less than 2 feet in diameter. The seven slabs forming its sides are tilted outward about 15 degrees from perpendicular. The joints between them, although not mudded, are flush and even on the inside. The floor consists of a single slab.

BURIALS NOT IN CISTS

Four burials, aside from the two in Cist 5 (A and B), were found. Three of these

were taken from near the west wall of the cave; the fourth from the rocky area within the main house group.

Burials C and D. The same watercourse that had undermined and carried away the front of Cist 1 was responsible for the disturbed condition of these interments. Burial C, an infant, the bones badly disarranged, appeared to have been placed head south at the left side of the hips of the adult, Burial D. The latter, of which the pelvis and lower limbs alone remained, seemed to have been extended on the back with the head south. The upper part of the body and whatever offerings may have accompanied it had been washed away. The depth of these two burials was 2 feet, measured from the pelvis of D.

Burial E. Two feet from the cave wall, and about midway between Cists 26 and 27, there was found at a depth of 1 foot a bunched or secondary burial, consisting of the femora, pelvic bones, ribs, arm-bones, scapulæ, and some of the vertebræ of an adult. All these were piled together with the femora crossed over the pelvic bones.



and the whole was covered with a fragment of a large, finely coiled basket (pl. xxxii). By the side of one of the humeri lay a pointed wooden stick, badly rotted. Near the bottom of the pile of bones was a small round stick, 9 inches long, a little less than three-eighths of an inch in diameter, with flattened ends; it was too far gone in decay to be saved. Some 20 inches east, in drier sand, was a double bundle of squaw-bush sticks wrapped with juniper-bark (see pl. xxxii and page 144). A lone slab standing at the rear of the burial, and some scattered ones in the immediate vicinity, may possibly indicate the former presence of a cist; the evidence, however, is inconclusive.

Burial F (pl. xxxiii) was found 5 feet north of the intersection of Cists 19 and 20. It was an adult. Whether or not the interment had originally been made in a cist was again uncertain, since but one slab was found, fallen over against the skull. The grave was very badly disturbed, only the skull, lower jaw, upper vertebræ, and a few ribs being in place; the rest of the skeleton was scattered through the surrounding

débris for a distance of 20 feet. The head was pointed south. The remains lay at a depth of 3 feet below the surface, and at approximately the same level as the top of the slab wall of Cist 20. At the former position of the left shoulder was a single square-toed sandal, probably the remaining one of a pair (cf. Burial B, Cist 5). A ball of loosely twisted yucca cord and a bundle of prepared basketry splints were found close to the sandal.

SUMMARY

The cave is situated high up in the cliff and is difficult to reach; it is sunless at all seasons of the year; it contained a very heavy deposit of tangled grass, juniper-bark, corn-husks, and other vegetable materials which had in it very few animal bones, almost no charcoal, and extremely few bone awls, flint chips, worn-out sandals, or other objects which are usually so common in the refuse of dwelling-sites; finally, there lay below the mass of débris a number of slab-walled and slab-floored cists, sunk into the original sandy surface of the cave and giv-

ing good evidence that they had formerly been provided with flat or, in some cases, cribbed roofs. The cists were small, averaging about 5 feet in diameter, and were so shallow that even allowing for the arch of a cribbed roof, the deepest of them could not have had more than 3 feet 6 inches or 4 feet of headroom.

The lack of débris of occupancy indicates plainly enough that Cave du Pont could not have been used to any great extent as a permanent habitation, and the cists are certainly too small to be considered houses. The place, however, was admirably suited, by reason of its inaccessibility and dryness, to the storage of crops, and it may well have served as a shelter for the people themselves in times of danger or during periods of unusually severe weather. The cists were doubtless used as granaries for harvested corn and as caches for other property, and served a secondary purpose for the burial of the dead. The presence of the great amount of matted débris is easily accounted for. The larger cists were undoubtedly provided with roofs of small timbers and

poles, rendered sandtight by spreading over them layers of grass and juniper-bark (cf. Cist 2); the smaller cists were not roofed, but their contents were also protected from sand by layers of bark and grass (cf. Cist 7). The periodical opening up of the caches for the removal of corn or other belongings would naturally have resulted in the scattering about of quantities of this material and the gradual forming of the matted mass that was found on the floor of the cave. The roof-beams have for the greater part disappeared; they were probably removed when the place was abandoned, for timbers are hard to cut with primitive tools, and the labor of carrying them to a new site was probably much less than that of felling and trimming others.

There is some evidence of ancient looting in Cave du Pont, witness the disturbed condition of Burial F and the presence of certain objects of value scattered through the débris about the cists. No such systematic spoliation took place, however, as is usually found on Basket-maker sites, presumably because few interments were made there.

S U M M A R Y

63

That there were once more bodies in the cave than were found on excavation is unlikely, for the old looters of Basket-maker cemeteries habitually scattered the bones of the dead in all directions, and no parts of skeletons were recovered which could not be referred to the five graves recorded.

A N D M O N O G R A P H S

PART II.—NOTES ON THE ARTI-
FACTS AND ON FOODS

BY A. V. KIDDER AND S. J. GUERNSEY



CAVE DU PONT is the only important Basket-maker site so far discovered that has yielded no trace of material referable to any later culture. The place was certainly never occupied by Cliffhouse people; and there are no indications, aside from the possible looting of cists, to show that it had ever even been visited by human beings subsequent to its abandonment by the Basket-makers. This, as has just been said, is an unusual state of affairs, for the upper layer of most caves of this type which have been thoroughly explored, have furnished more or less evidence of reoccupancy by later comers. Such conditions have, of course, been of the greatest value in providing stratigraphic data, and have

enabled us to prove that the Basket-makers antedated the Cliffhouse-Pueblo people.

Relative age once established, however, it becomes most desirable to obtain collections of Basket-maker specimens which we can be certain are entirely unmixed with material from any succeeding culture in order that we may have a firm basis for comparative studies. The collection from Cave du Pont is just such a lot; it is large and well-preserved, excellently recorded in the field, and, most important of all, seems to be perfectly free from extraneous material; hence it is a great privilege to be able to examine and report upon it. The writers have been particularly impressed by the remarkable similarity, even in apparently unimportant details, between many of these specimens and corresponding Basket-maker objects which they have recovered in northern Arizona. It is obvious that at Cave du Pont we are dealing with an integral part of the regular Basket-maker culture, and the inference is strong that the Cave du Pont people were approximately if not exactly contemporaneous with

the Basket-makers of Marsh Pass and Grand Gulch. Further exploration in this newly-opened field is most desirable, not only for the purpose of tracing the exact limits of this interesting culture, but also to find out whether, and if so to what degree, it changes as it goes westward and northward toward those Californian and Great Basin cultures which in some ways it so much resembles.

We must apologize for the constant references in the descriptions which follow, to our own publications; nothing else of a detailed nature, however, has appeared on Basket-maker technology.

FOOD

VEGETAL FOOD

MAIZE.—The common use of maize by the ancient inhabitants of Cave du Font is proved by the great quantities of leaves and husks that were found in the débris. It is probable, indeed, that the primary purpose of the structures in the cave was for the storage of harvested crops of corn. Cist 7, the only unemptied and undisturbed

granary found, held three and a half bushels of corn on the cob, while 18 ears were taken from the disturbed filling of Cist 4 A cache, apparently of seed-corn, for the ears were all fine, fully developed ones, was discovered in Cist 30; it consisted of 16 ears enclosed in a crude bag of crushed yucca-leaves (pl. xxxiv).

Dr. G. N. Collins, of the Bureau of Plant Industry, United States Department of Agriculture, has examined the entire collection of corn and has kindly contributed the following notes:⁴

It is a most interesting collection. The larger specimens, one of which is 19 cm. long and 4 cm. in diameter, are the finest prehistoric ears I have seen.

Number of rows.

The numbers of rows of seeds vary from 10 to 18. The absence of 8-rowed ears is worthy of note. Increase in the number of rows is supposed to be one of the results of selection. Eight-rowed varieties are common among the types grown by the present-day Indians, and one would naturally expect 8-rowed ears to be characteristic of primitive forms. The present-day distribution of 8-rowed varieties is fairly definite. In North America they are practically confined to the North. The New England flints and the soft varieties of the

western Indians are characteristically 8-rowed. I know of no 8-rowed types in Central America or Mexico, but the character reappears in South America in connection with the large-seeded Cuzco varieties.

Endosperm texture.

Eighteen of the 33 ears were classed as having horny or corneous endosperms, the remaining 15 had starchy or amalaceous endosperms.

In none of those classed as horny were the horny portions of the seed as extensive as in typical flint or pop varieties, and all fall into the seed type we have called tropical flint. The distinction between the horny ears and those classed as soft is not sharp and is somewhat arbitrary.

Endosperm color.

With the exception of one or two ears, the endosperm was some shade of yellow. Since the yellow color of the endosperm is always confined to the horny portion, it is difficult to be certain of the color in the soft seeds. There is however one undoubted instance of white endosperm.

Aleurone color.

Twenty-five of the specimens appeared to have colorless aleurone and in none of the ears did all the seeds have colored aleurone. In several ears some of the seeds had an aleurone layer that is yellowish brown, probably a color to which blue aleurone disintegrates with time.

Pericarp color.

Twenty-five of the ears apparently had colorless pericarp. In five the pericarp was red and in one it was variegated. This is the first



CACHE OF SEED CORN IN YUCCA BAG. FROM CIST 30
(Length of bag, 14 in.)



EARS OF CORN FROM THE CAVE
(The longest ear is $7\frac{3}{4}$ in.)

instance I recall of variegated pericarp in prehistoric specimens.

Color of cob.

In all instances where the color of the cob could be observed, it appeared to agree with the pericarp color. That is, a red cob was associated with red pericarp and a white cob with colorless pericarp.

The arrangement of the seeds in straight rows is as perfect as in modern varieties having a corresponding number of rows. The ears are rounded at the butt and unusually well filled. This character, together with the small ear stalk, is usually considered a mark of good breeding in maize, although both characters are not infrequent in varieties grown by primitive peoples.

There are a few examples of what we have termed split seeds where the pericarp has burst, exposing the soft starch of the interior. This is a character only recently brought to the attention of geneticists working with maize, and it is of interest that this supposedly new character should appear in this old material. There is also in several cases a wrinkling of the pericarp that closely simulates another recently-discovered character, the inheritance of which has not been worked out.

There is some evidence that the ears have been attacked by the corn ear worm (*Chloridea obsoleta* Fab). The apparently complete absence of damage by weevils is worthy of note. Some of the seeds in the lot numbered 10/3881 may have been eaten by weevils, but most of the damage seems to have been done by rodents.

Later Dr. Collins requested Dr. William W. Diehl, mycologist in the Bureau of Plant Industry, to examine the material for evidences of fungus or bacterial parasites, with the result that Dr. Diehl found the fungus *Cladosporium herbarum* (P.) Lk., a common saprophytic species, at the base of corn ears submitted to him. Dr. Diehl could not say positively that certain smut-like spores observed are those of *Ustilago zeae* (Beckm.) Ung., but he strongly suspected them to be. Miss Nellie A. Brown, of the same Bureau, also examined the material at first thought to be bacteria, but because these lack the usual staining properties, she was not willing to express a definite opinion upon them, although she stated that they do suggest bacteria.

SQUASH.—In Cist 4 were found the stem and pieces of the rind of a large squash. The rind is light grayish-green streaked with irregular markings of dark brownish-green.

ACORNS were picked up here and there

in the débris, but whether or not they served as food is unknown; scrub-oak is common all about the slopes below the cave, and the rubbish contains a great quantity of oak-leaves, so that the presence of the few acorns recovered might well be accidental.

SEEDS.—The few specimens recovered have kindly been identified by Mr. P. C. Standley, of the U. S. National Herbarium. These are: a perennial sunflower (*Helianthus* sp.); a grass, probably *Chenopodium fremonti*, Wats.; and seeds of a species of *Ephedra*.

YUCCA-POD.—A single dry and shriveled specimen was found. Yucca fruits are eaten by the modern Pueblo Indians.

CAKES OF PREPARED FOOD.—There are in the collection six round, flat cakes of vegetal substances; they are 2 to 3½ inches in diameter and half an inch thick. Their color is dark-brown, and age has so hardened and shriveled them that their exact nature cannot be determined; it is certain, however, that they are not lumps of resin, and

it is probable that they were some sort of food, prepared, kneaded to shape, and dried for future use.

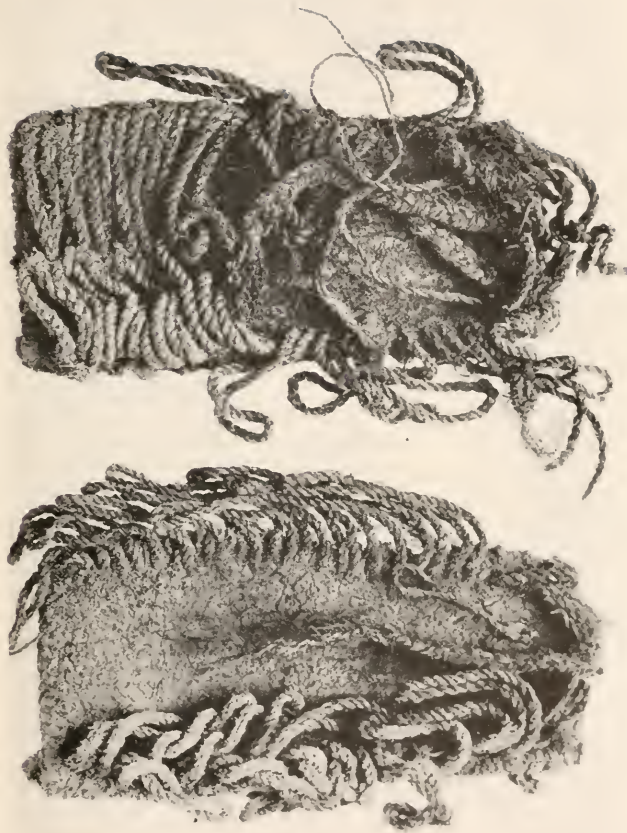
ANIMAL FOOD

The data on this subject are mostly inferential, for animal bones were extremely rare in the débris of the cave; only a handful altogether was collected; the animals represented are: deer, jack-rabbit, cottontail rabbit, beaver, and an unidentified small mammal. That the Basket-makers were good hunters, however, may be inferred from the presence in the cave of many bits of deer and mountain-sheep hide, of feathers of several species of birds, and by the finding of two different sorts of game snares (see pp. 144-147).

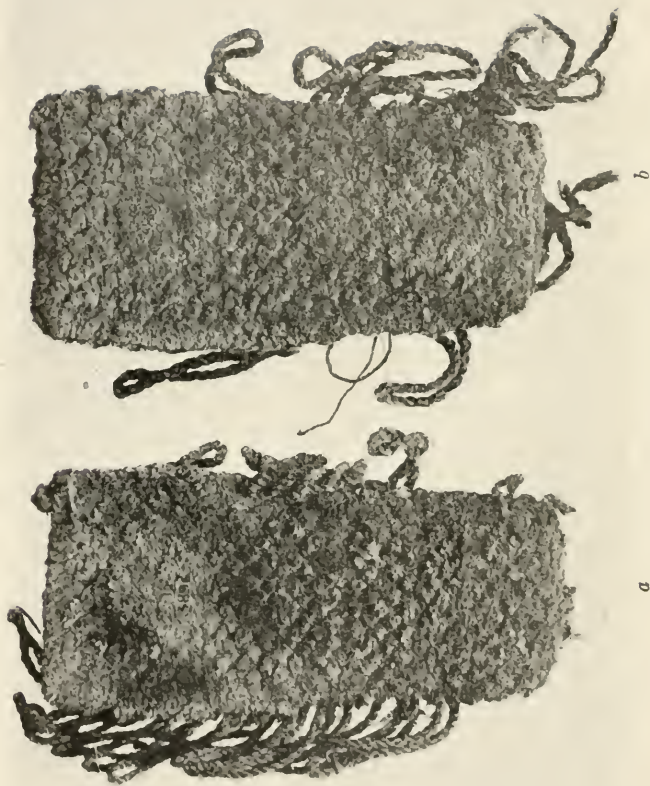
CLOTHING

BODY CLOTHING

Nothing much in the way of body clothing has ever been discovered in Basket-maker sites, and Cave du Pont proved no exception to the rule. There are only a



a b
PAIR OF SANDALS, UPPER SIDE
(Length of a, 10 $\frac{1}{8}$ in.)



a PAIR OF SANDALS, SOLES
(Length of a, 10½ in.)

few small pieces of fur-cloth robes, and certain rags of dressed leather which may have formed parts of shirt-like garments.

SANDALS

The material consists of two pairs and five odd sandals; these are such interesting specimens that it seems worth while to describe them in detail.

Pl. XXXVI shows the upper surface and pl. XXXVII the soles of a pair of sandals found lying together in the rubbish. They are $10\frac{1}{8}$ inches long, square-toed and square-heeled, and without toe-fringes. The basis of the weave consists of 16 parallel warps of stiff, heavy, yucca cord. The weft is of much finer string (either soft yucca or *Apocynum*) twined-woven in such a way as to produce a rep effect on the upper surface, and a pattern of round raised lumps covering the entire sole. The details of the web and of the method of attaching the warps at heel and toe cannot be studied without damaging the specimens, which are stiff and somewhat brittle with age. The most striking feature of these sandals

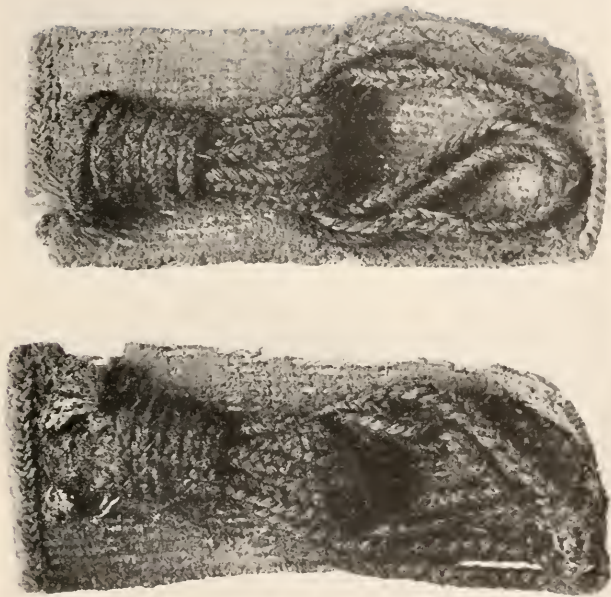
is the elaborate system of loops and tie-strings with which they are provided. As the illustration (pl. xxxvi) shows, there is attached to each edge of each sandal a series of loops of heavy three-strand yucca cord. There are fifteen such loops to a side, the one nearest the toe being $2\frac{1}{2}$ inches long. Counting back from this first one, the loops become gradually longer, until the third from the heel is 4 inches long. The last two loops are much shorter. At the square heel are two thick tie-strings 7 inches long, made by collecting and braiding together groups of protruding warp-ends. At the very corners of the heel are two other tie-strings, $8\frac{1}{2}$ inches long; these are much lighter, each being made of a single two-strand yucca cord. The method of attachment is clear. The foot was placed on the sandal, and a cord was tied to one of the loops of the front pair; thence it was laced backward along the top of the foot through the succeeding loops to the instep (part of this lacing is still in place on the sandal shown in pl. xxxvi, *b*). The same string doubtless passed around the

ankle, taking in the longer loops toward the heel of the sandal, first on one side and then on the other, bringing them snugly up about the foot; it was probably tied back to itself on the instep. The two short loops on either side at the heel are bent strongly backward, showing that they were not included in the general lacing but were fastened close about the heel of the wearer. The sets of long tie-strings, mentioned above as having been made from warp ends, were presumably made fast around the ankle to hold the heel of the sandal well up against the foot.

A single sandal of the same type was taken from the grave of Burial F. It is somewhat larger, measuring 11 inches long, 5 inches wide at the toe, and $3\frac{3}{4}$ inches at the heel. It is of similar weave with lumpy knot reinforcements on the sole, but has 20 instead of 16 warps and was also provided with a toe-fringe of yucca fiber. The side loops, though badly worn and frayed, appear to have been the same in number and arrangement, but the tie-strings have disappeared.

The system of attachment illustrated by these specimens differs from the side-loop tie of Cliff-dweller sandals in that the latter have short loops which are not pulled up to meet over the instep and about the ankle, but merely serve to hold a long lacing cord which crosses back and forth from one side to the other.⁵ No example of the present style has yet been found in the Basket-maker caves of the Marsh Pass district of northern Arizona, but the so-called "Princess," a Basket-maker mummy from Butler wash, San Juan county, Utah, now in this Museum, has on its feet an apparently almost identical pair. This type therefore is not restricted to the Kanab region.

A second pair of sandals (pl. xxxviii), also chiefly remarkable for their elaborate attachment devices, were found over the left shoulder of Skeleton B, Cist 5 (see pl. xix). When discovered they were heavily caked with adobe, and are very stiff and brittle; the soles show long use, but are not worn through. In length they measure $9\frac{1}{2}$ inches; across the unfringed



PAIR OF SANDALS WITH HAIR-STRING TIES
(Length 9½ in.)



SANDAL WITH BARK TIE-STRING
(Length 10 in.)

square toe they are $4\frac{1}{2}$ inches wide, at the heel $3\frac{1}{4}$ inches. There are 24 warps, the attachment of which at both toe and heel produces tightly woven and very strong selvages. The weave is close twined-work, making a plain rep effect above; the entire sole was apparently covered by a raised pattern. On the upper surface at the front there is a small transverse loop, made of several strands of human-hair string; this was for the insertion of the second and third toes; at the rear is a similar though broader loop designed to slip up over the heel (these loops do not appear in the photograph, pl. xxxviii). This is the normal equipment for the attachment of Southwestern sandals, both Basket-maker and Cliff-dweller, and is completed by a tie-string which passes through the toe-loop, runs up the foot, through the heel-loop on one side, over the instep to the heel-loop on the opposite side, returns to the instep, and is there made fast.⁶ In the present case the principle is the same, but the tie-string is more elaborate, both in structure and in manipulation. It is a

three-strand flat braid, each strand made up of 10 to 12 fine two-ply cords of human hair. The braided string is at least 10 feet long, and is twice carried backward and forward between toe-loop and heel-loop, then it is wrapped round and round on itself over the instep, as shown in the photograph, and is finally knotted near the toe-loop. As each tie-string is 10 or more feet long, is three-strand, and each strand is made of at least ten small two-strand cords, we get the surprising total of not less than $2 \times 10 \times 3 \times 10 \times 2 = 1200$ feet of fine hair string used for the attachment of this one pair of sandals. The above figures represent a bare minimum; the twist in the strings and the "take-up" in braiding probably required the use of 20 to 30 per cent more material than is recognized in the calculation.

In pl. xxxix is illustrated a coarsely made sandal 10 inches long. There are 12 warps, and the weft is as usual in twined weaving with raised knots on the sole. Toe- and heel-loops are of heavy yucca cords doubled, and the tie-string is of twisted juniper-bark.

An interesting point about the tie-string is that it is fastened to the toe-loop in a single bowknot, the only case of the use of this knot which we have ever observed among Basket-maker remains.

Two other single sandals present no unusual features; they are square-toed and square-heeled, rather coarsely twined woven over 15 and 16 yucca warps respectively; they have raised patterns on the soles, and the characteristic Basket-maker multiple-strand heel-loops. One is of child's size, 6 inches long.

From the general digging came a much rotted fragment of a sandal of the sort typical of the Marsh Pass and Grand Gulch Basket-maker caves. It has a colored design, and its sole is covered by a layer of close-set piling in minute loops.⁷ The fabric is double-woven with secondary warps and secondary wefts lying below (on the sole side of) the main warps and wefts. The details of this complex weave have never been worked out because sufficient materials for dissection have not yet been recovered. Of the pres-

ent specimen only the heel remains, so that it cannot be determined whether or not the customary toe-fringe of deerskin strips had been present. There are 26 yucca warps, and the wefts are of fine *Apocynum* (?) cord. Across the heel the warp-ends are held by a twining of human hair string.

ORNAMENTS

NECKLACES.—From Cist 30 were taken the only two necklaces recovered. One of them (pl. XL, *a*), which is complete and still on its original cords, is perhaps the finest specimen of its kind, in perfection of workmanship and in harmony of color, that has yet been collected from a Basket-maker site. It consists of two strings, each 26 inches long, of brown beads, made by cutting off the ends of *Ephedra* seeds and working down their sides to an even cylindrical shape. The two strings are knotted to each other at the ends and are held together at regular intervals by stringing on them six large discoidal beads of a very handsome green stone. The seed-beads average three-sixteenths of an inch

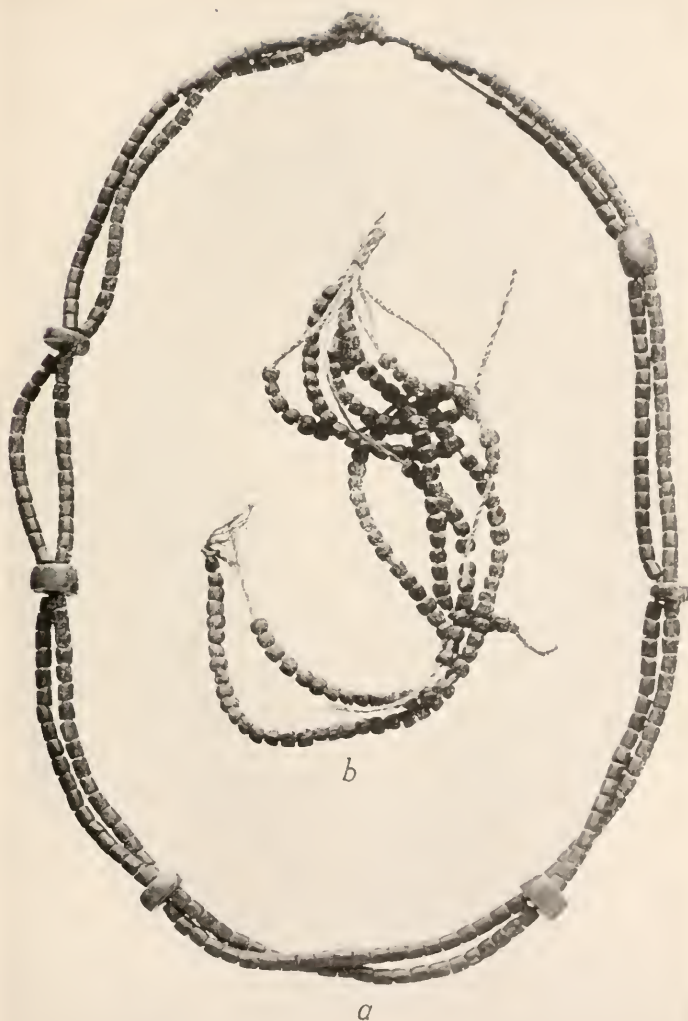
long by slightly less than three-sixteenths of an inch in diameter, and their bore is about one thirty-second of an inch. There are 243 of them in the necklace. At one point there are introduced two black beads of similar shape; whether these are also seeds which have been smoked and greased or whether they are of albatite, as are some Basket-maker cylindrical beads collected by the authors at Sayodneechee, Arizona, we could not tell without unduly injuring them.

Of the second necklace there were found only fragments (pl. XL, *b*), consisting of bits of fine yucca cord with numerous brown seed beads strung on them. They all appear to have formed part of a single ornament and, as the aggregate length of the various bits is 55 inches, it must have been an unusually long one. The individual seeds are of the same species as those used in the perfect specimen just described, but they average smaller, and have been less carefully worked down, so that the corrugations of their original surfaces are not entirely obliterated.

BEADS.—Of loose beads only two were found in the cave; one is the shell of a land snail, the spire of which has been broken away and the resultant hole carried through the shell in order to make an aperture for stringing; the second is a very small saucer-shaped bead made presumably from the side wall of a large *Olivella*. The latter type of bead is particularly characteristic of the Basket-maker culture.

FEATHER ORNAMENTS.—Although the specimens about to be described may perhaps have formed parts of ceremonial contrivances, they almost certainly had no utilitarian purpose; and as we know that the Basket-makers made a variety of feather decorations, it seems probable that the following once belonged to something of the kind.

There is a bunch of eight bright-colored tail-feathers of the red-shafted flicker, the butts tightly bound together with a strip of yucca-leaf (fig. 5). Another bunch (fig. 6) consists of six white tail-feathers of some small bird; these are lashed to the end of a thin stick with many turns of yucca



NECKLACE OF SEED BEADS AND PARTS OF ANOTHER



FIG. 6.—Feather ornament.



FIG. 7.—Wrapped plume.

bound against the lower side of the quill, the sinew seizing which holds it being brought neatly round and round the quill through the separated pile. The cord extends somewhat beyond the tip of the feather and is wrapped closely with sinew.⁸

CRADLES AND ACCESSORIES

No whole or even fragmentary cradles of the rigid, reed- or twig-backed variety typical of the Basket-makers were discovered, but certain pieces of grass and juniper-bark matting, found in and about the cists, may possibly be parts of such flexible cradles or baby-beds as those found in Cave 2, Kinboko, Marsh Pass, and described by us in a former publication.⁹ There was also recovered a crescent shaped roll of juniper-bark (pl. XII) that without much question served as the foot-support at the base of a rigid cradle.¹⁰

TOY CRADLE (?)

A peculiar little object from the refuse may perhaps be identified as a toy cradle

(pl. XLII). It is 15 inches long and consists of a single peeled twig bent double. The two tips of the bow are tied together with the pliable slivers of its larger end, reinforced by a yucca-string binding. Across this frame is stretched an irregular network of long-twist yucca cord, and on the upper surface is a torn arrangement of strings. In general appearance this object resembles a miniature snowshoe, and the string arrangement just referred to bears out the likeness by its similarity to a foot-harness. There is also a series of string loops down one side and traces of the same on the other; the loops, however, run back to the pointed end of the specimen and would seem to be poorly adapted for attachment to the foot; they are, on the other hand, identical to the side-loops always placed along the edges of rigid cradles to hold the lashing cord that bound the baby in place.

UMBILICAL-PAD COVERS (?)

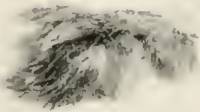
There are in the collection three furry bags which at first sight appear to be merely



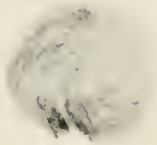
TOY CRADLE
(Length 15 in.)



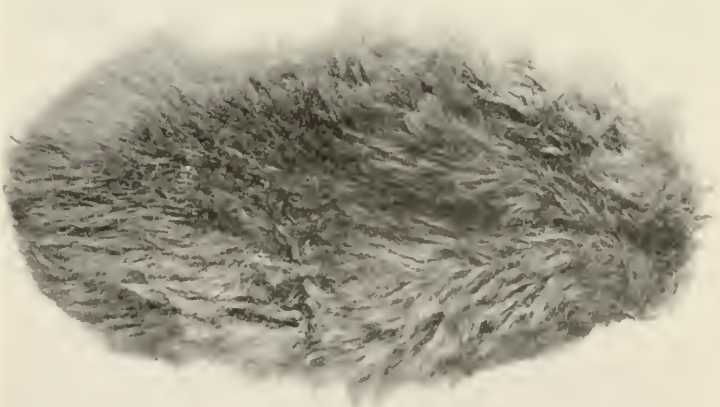
a



b



c



d

UMBILICAL-PAD COVER AND CONTENTS
(Length of *d*, 3 $\frac{3}{4}$ in.)

skin pouches or containers; two of them, indeed, served as such, but closer inspection shows that they must have been originally made and used for another purpose.

Part of the regular equipment of the Basket-maker baby was a firm, flattish, oval pad, made by wrapping a solid core of stone, bark, or corncobs with juniper-bark, and enclosing the whole in the soft skin of some small animal with the fur side outward. Such a pad was held in place over the navel of the newborn infant by means of a long string and served as do our modern "binders" to prevent umbilical rupture. The fur "pouches" found in Cave du Pont are of exactly the correct size and shape for the covers of similar pads, and on examining them carefully it can be seen that they were not made like ordinary bags, with an open mouth at one end, but were in each case originally completely sewed up, with all but the last bit of seam turned inward, thus leaving no aperture at all, and were later reopened by tearing a hole in the skin itself along one of the sewed seams.

One of the three "covers" was found empty, the other two were reused as containers. Of the latter, one held an assortment of oddments typical of Basket-maker "medicine pouches." It is described in another section (p. 147); as is there pointed out a shriveled object among the contents may possibly be a dried umbilical cord. The third "cover" (pl. XLIII, *d*) held two small bunches of rabbit fur (*b*, *c*) and the most beautifully made tie-cord that we have ever seen (*a*). It consists of a loose, apparently two-stranded, twist of long, soft, white hair (presumably dog-wool) three-sixteenths of an inch in diameter. overwrapped with narrow strips of the fine, furry, pure-white skin from the bellies of cottontail rabbits, thus making a wonderfully silky, pliable rope half an inch in diameter and 44 inches long. To one end of the rope is seized with sinew a yucca string 7 inches long, with knotted end; at the other is a similar cord 4 inches long (fig. 8), the end of which is tied around, and lashed with sinew to, the butt of what

Dr. N. L. Britton, of the New York Botanical Gardens, identifies as a cactus spine from some member of the *Echinocactus* group, evidently from a locality as far south as southern Arizona.

The use of the above contrivance is unknown, but in view of its having been found in what is without much doubt an umbilical-pad cover, and because of its beautifully soft texture, we think it likely that it was used as a lash-cord to attach a baby to its cradle. The sharp cactus-spine pin at one end would have been handy for threading the cord through the loops which are always present along the sides of Basket-maker cradles, and which serve to hold the lashing.¹¹

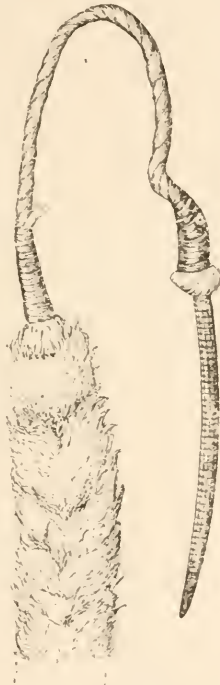


FIG. 8.—End of tie-string.

BASKETRY

Nearly thirty specimens of basketry were recovered, mostly fragmentary. All of these are coiled ware, and all but four are of perfectly normal weave for the culture to which they belong. The foundation (fig. 9) is of two slim, peeled, willow or cottonwood twigs placed side by side, and above each

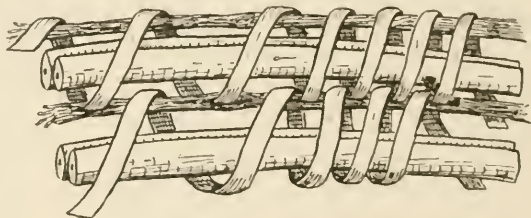


FIG. 9.—Weave of normal coiled basketry.

pair of twigs lies a bundle of yucca fiber. The sewing elements are wooden splints one sixteenth to three thirty-seconds of an inch wide (two packets, one of light-colored splints, one of dark, were found in the digging; see pl. XLIV). The sewing element, in attaching each added coil to the one below it, encloses the two twigs and the bundle above them, and passes downward



a



b

BUNDLES OF SPLINTS FOR COILED BASKETRY



COILED BASKET FROM BURIAL A
(Diameter 18 in.)

and *through* the bundle of the coil below. The stitches do not interlock with the stitches of the coil below, but pass between them. In the diagrammatic drawing (fig. 9) the weave is shown opened out; in the original specimens it is of course pulled tight so that the bundles fit close down upon the sets of paired twigs; the successive turns of the sewing element also lie snugly against each other, so that very little of the foundation material can be seen between them. In this particular most of the Cave du Pont basketry is superior to Basket-maker ware from other sites, in which the stitches are usually set relatively wide apart and reveal a considerable amount of the foundation. In fineness of weave there is very little variation between the different Cave du Pont specimens; the best made piece has 5 coils and 11 stitches to the inch, the coarsest $4\frac{1}{2}$ coils and 8 stitches.

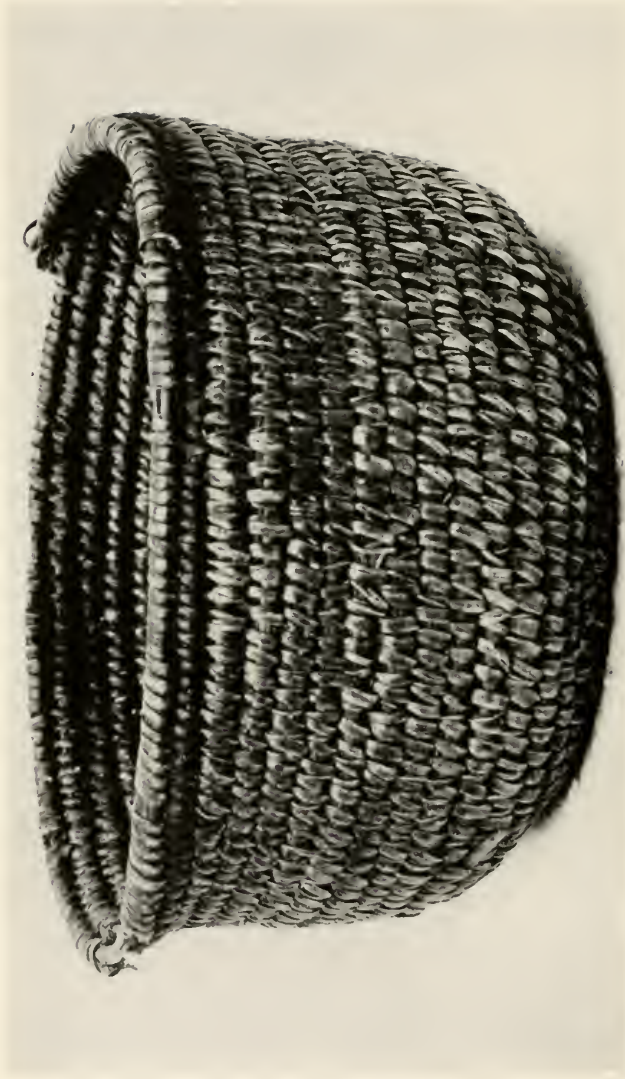
Three whole baskets were recovered. The largest (from Burial A, Cist 5) is bowl-shaped with flat base and widely-flaring sides (pl. XLV). It is 18 inches in diameter by 4 inches deep. The decoration con-

sists of two black coils near the bottom; and a single black coil just below the rim, from which extend downward at equal distances from each other four small stepped units. The design is visible only on the exterior, the inside being colored dark wine-red; this may be paint or possibly an effect of decomposition (we have noticed a dark-red stain on several semi-decayed specimens from other Basket-maker caves). The last or rim-coil is somewhat more tightly and evenly wrapped than are the coils in the body of the piece; the last inch is finished off and bound down with "false braid." An interesting feature is the apparent "killing" of this basket by partly breaking in from the outside the bottom three or four coils. The evidence of "killing" is even clearer in the specimen next to be described.

Over the head of Skeleton B, Cist 5, lay a bowl-shaped basket, $9\frac{1}{4}$ inches in diameter, 4 inches deep, with flat base and steeply rising sides (pl. XLVI). It is so discolored that no decoration is observable. The rim is badly rotted, but the bottom is



COILED BASKET FROM BURIAL B
(Diameter $9\frac{1}{4}$ in.)



SMALL COILED BASKET
(Diameter $4\frac{1}{2}$ in.)

firm and strong. The first three coils at the base have been broken inward; this was obviously done before burial, as the broken disc, still attached by a few strands of the sewing splint, is bent over and has stiffened and hardened into place in a way which would be impossible if the breaking had taken place in recent times. A coiled basket of this type is so strong and solid that great pressure must have been necessary to push in the bottom of it; hence the observed mutilation can hardly have been accidental and is probably due to intentional "killing." The above two mortuary baskets are well woven; each of them has 5 coils and 11 stitches per inch.

The small cup-like basket shown in pl. XLVII is from the general digging. It is $4\frac{1}{2}$ inches in diameter and 3 inches deep. The coil next below the rim is black, otherwise there is no decoration. The workmanship is coarse; there are only 7 stitches to the inch of coil, and the foundation material shows between them. There are an unusual number of split stitches, but they are for the greater part split at the sides of

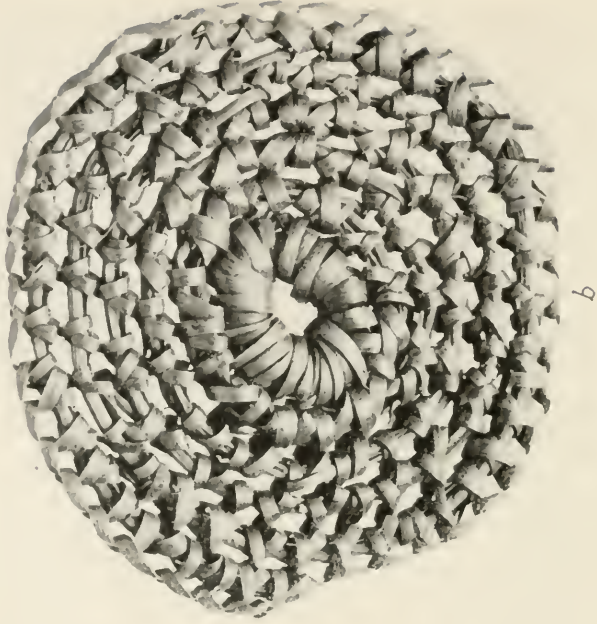
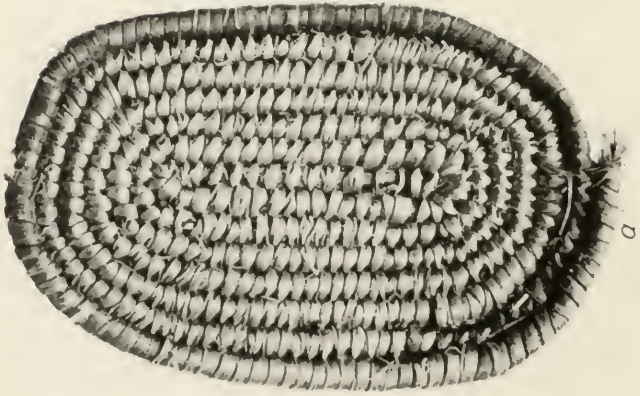
the splints, not squarely in the middle as in true split-stitch weaving.

Among the numerous fragments of normal coiled ware recovered, the majority are from bowl or tray-shaped baskets; there is one strong, thick piece (pl. XLVIII, *b*), however, which appears to be part of the flaring top of a large pannier or carrying basket. There was also found the unfinished base of a narrow-bottomed basket, possibly a pannier, but because of the fineness of the weave more probably a water-basket.¹² As may be seen in the photograph (pl. XLIX, *a*), the oval shape of the base is produced by laying the first few coils parallel to each other. The last turn of the coil is sewed with red splint.

Only four examples of unusual weave were found, all fragmentary. The first of these (pl. XLVIII, *c*) is a piece from the upper side of a large coarse basket. The foundation is normal, two-twign-and-bundle, but the sewing elements are whole yucca-leaves instead of wooden splints. Each turn of the sewing element splits a stitch in the coil below and then passes through



FRAGMENTS OF COILED BASKETRY
(Length of *b*, 13 $\frac{7}{8}$ in.)



BOTTOMS OF UNFINISHED BASKETS
(Length of *a*, $4\frac{1}{2}$ in.)

the fibrous bundle before rising for another revolution (fig. 10). When one of the leaf sewing elements has been nearly all woven in, it is carried downward on the outside of the basket across two coils, passed through the fabric, and trimmed off flush with the

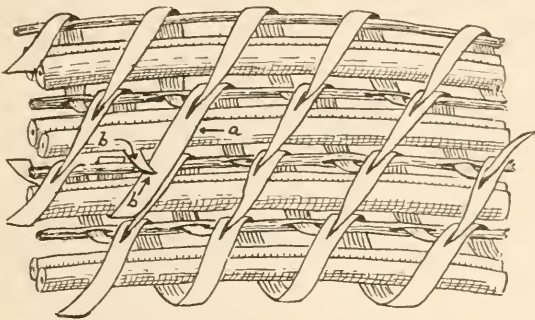


FIG. 10.—Diagrammatic drawing of weave shown in pl. XLVIII, *c*.

inner surface. A new leaf is then introduced, as shown at *b*, fig. 10. This carrying down over two coils of the sewing elements as they terminate, results in the appearance on the outside of the basket of a number of double-length stitches (*a*, fig. 10). As the leaves used are all of approximately the same length, these double-length stitches occur at more or less regular intervals.

and produce a variation in the otherwise monotonous texture of the fabric (see pl. XLVIII, *c*).

The second unusual specimen is a very small piece. The foundation of the coil consists of a single twig completely encased in a padding of yucca fiber (fig. 11). The sewing splints are caught through the

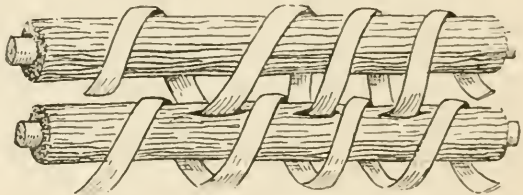


FIG. 11.—Diagrammatic drawing of single-rod weave.

padding and so hold the coils together. The weave is coarse: 4 coils and 7 stitches per inch.

Both the above are merely variants from the normal coiled basketry of the cave; the two remaining pieces represent an entirely different technique. They are unfinished bottoms of apparently shallow, bowl-like baskets. The construction in each case was started by rolling up a single splint

on itself like a watch-spring and then wrapping it with a splint to make a ring-like base about an inch in diameter (pl. XLIX, *b*). The same splint was then passed around the periphery of the base, being sewed through it and leaving standing loops for the en-

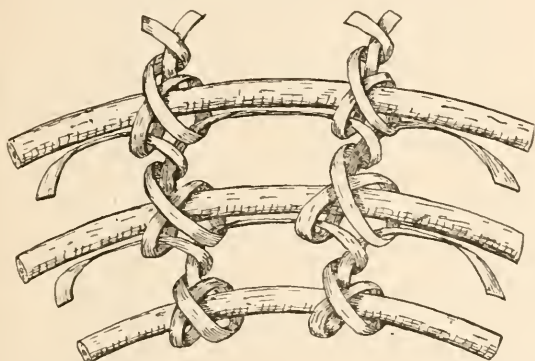


FIG. 12.—Diagrammatic drawing of weave of sifter basket.

gagement of the binder of the first coil. The foundation of the coil is a single slim osier and the fabric is held together by the binding splint as shown in fig. 12. This results in a very open but very firm and stiff weave, and it is probable that baskets so made were used as sifters.

MATTING

Among the rubbish in the cave there occurred many pieces of worn-out and discarded mats quite unlike the neatly plaited twilled rush mats of the cliff-houses. They

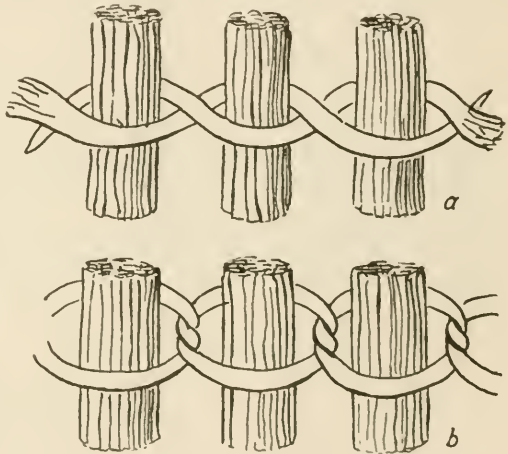


FIG. 13.—Diagrams of plain and tied twining in mat-making.

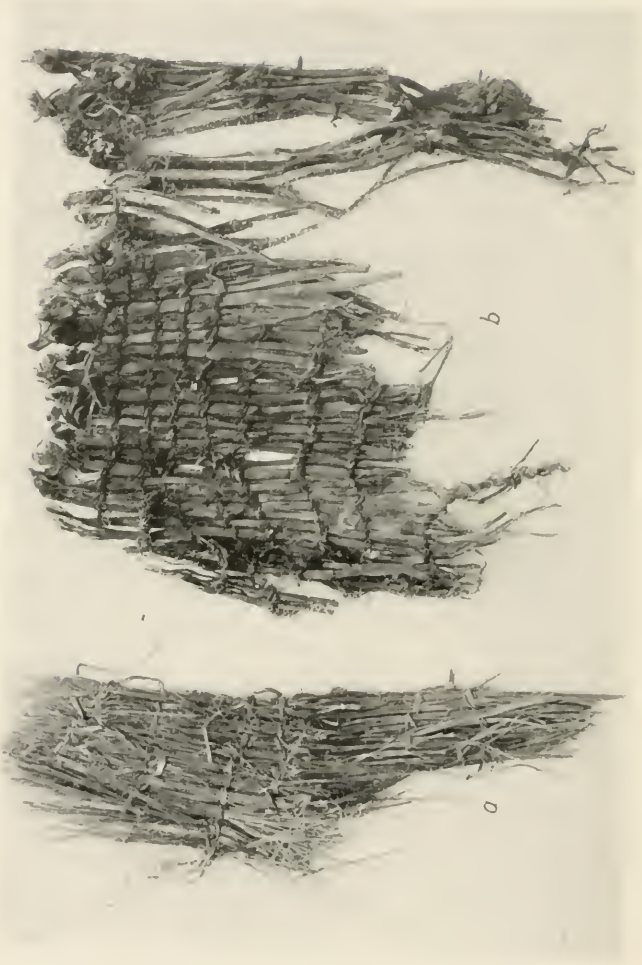
are all made of thin bundles of soft vegetable substances. The bundles are laid close together side by side and held in that position by rows of yucca-leaves or string, widely spaced and inserted in twined weaving (pl. L, LI). The material for the bundles



MAT MADE OF WHOLE GRASS PLANTS

BASKET-MAKER CAVE

PL. LI



GRASS AND YUCCA LEAF MATTING

is most commonly the long grass called by the Mormons "wild hay"; this was sometimes used in the form of whole plants pulled up by the roots (pl. L), sometimes in bunches of the stems (pl. LI, *a*), sometimes pounded and shredded. Juniper-bark in strips or shredded; mashed yucca-leaves (pl. LI, *b*); and cattail rushes were also much used. The rows of twined weaving that hold the bundles together are set from 3 to 5 inches apart. Plain twining (fig. 13, *a*) and tied twining (*b*) are about equally well represented, the latter method having been employed as a rule when the materials in the bundle were more or less flimsy. The usual way of carrying the twining-strands down the edge of the fabric for a new crossing is shown in fig. 14; the selvage thus produced is strong and serviceable.

Although for convenience we call the above specimens mats, we have really no data as to their former size or as to the uses to which they were put. As a matter of fact they were probably general-utility affairs, serving spread out for mats, or with the edges turned up and caught together

for flimsy carrying bags or cradles; and, when partly worn out, as covering material on the roofs and over the hatchway-openings of storage cists.

More carefully made mat-like fabrics are shown in pl. LII, LIII. The former is a

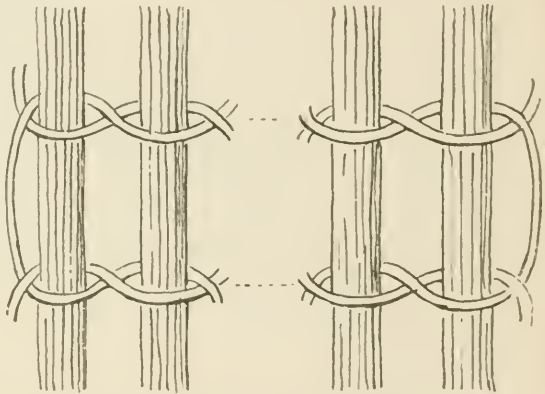
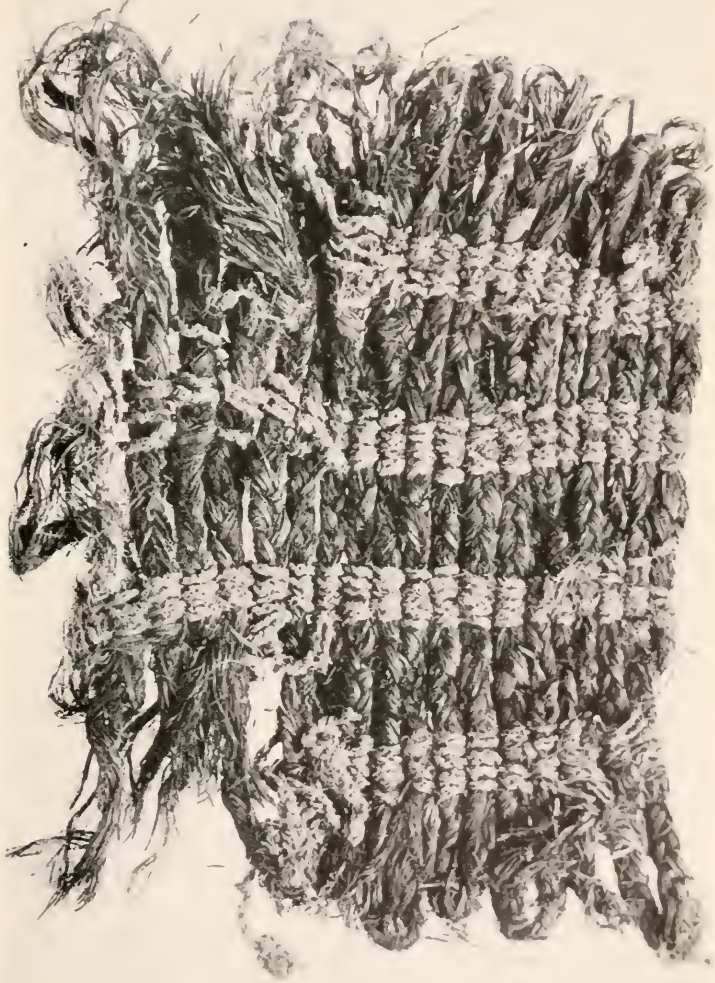
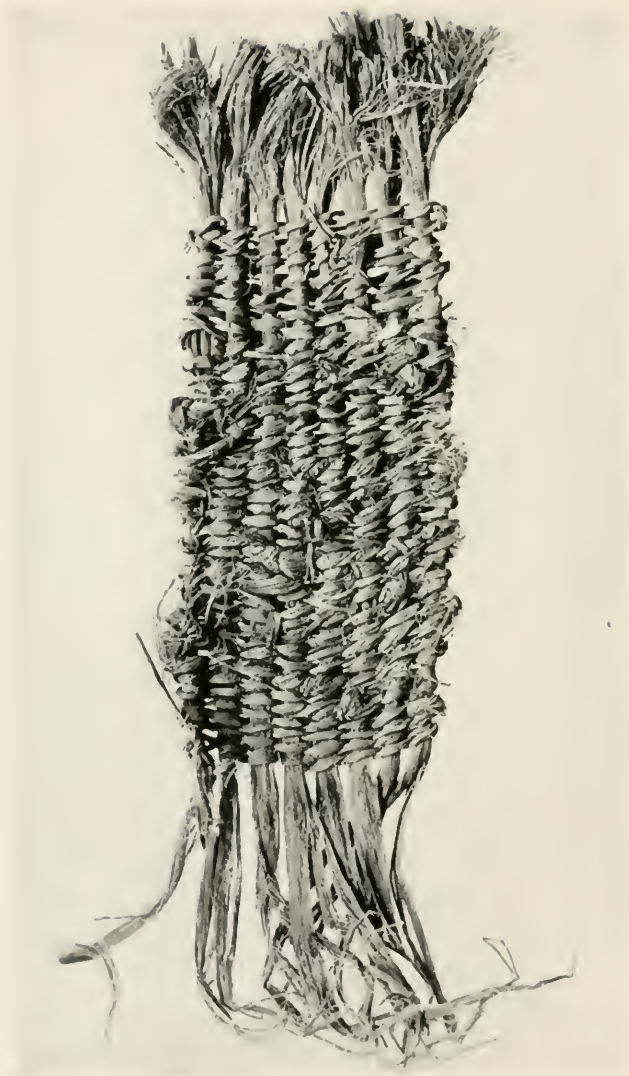


FIG. 14.—Normal selvage of matting.

small, rectangular piece, 7 by 10 inches, consisting of a single three-strand braid of juniper-bark looped back and forth on itself and firmly held by four rows of twined yucca strings, each row having from four to six crossings. The method in which the binding strings are brought down the edge



SMALL MAT OF BRAIDED JUNIPER-BARK AND STRING
(Length 10 in.)



FABRIC OF YUCCA-LEAVES
(Length $15\frac{1}{2}$ in.)

is shown in the diagrammatic drawing (fig. 15) The second specimen (pl. LIII) has a framework or warp of 8 pairs of yucca-leaves, across which other yucca-leaves are closely twined-woven to make a narrow fabric about $15\frac{1}{2}$ inches long. The warps

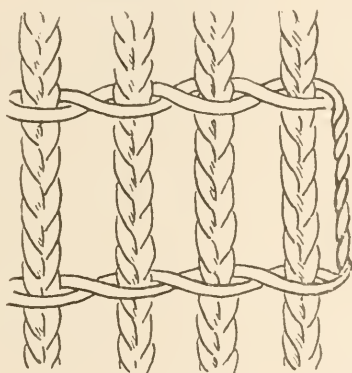


FIG. 15.—Diagram of selvage of small mat.

protrude at each end, and the piece has a sandal-like appearance, but the wear which is present on one side is general, rather than localized (as is the case with sandals) in certain spots, and there is no trace of any arrangement for attaching the object to the foot.

Although not mats, strictly speaking, a

number of corn-husk pads used for preventing sand from sifting through the joints of cists, may be mentioned here, as they are put together in the same way as the fabrics just described. They are made of the complete empty husks, including the stems, of large ears of corn. Four to six or seven of these are laid side by side and held together by single rows of tied twining (pl. LIV).

STRINGS AND CORDS

Among the American Indians the spinner's art is doubtless a very ancient one, far antedating agriculture or the manufacture of pottery. This has, of course, long been known to anthropologists, but it is strongly emphasized by the quantity and excellence of the cordage found among the relics of the Basket-makers, a people who had no true pottery, and who were only on the threshold of an agricultural life. The rubbish in Cave du Pont yielded a remarkably fine collection of raw materials; of



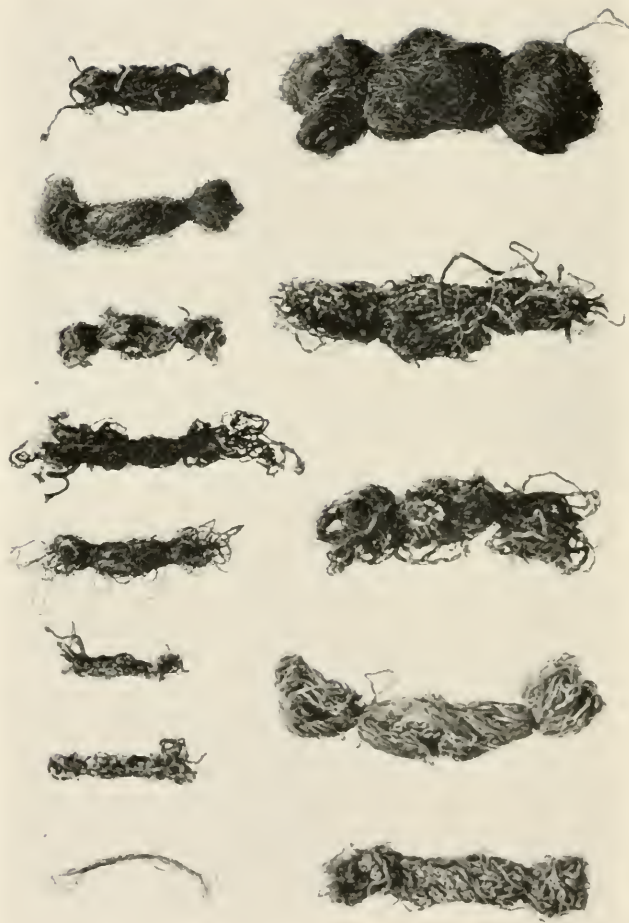
CORN-HUSK PAD USED FOR CHINKING CISTS
(Width 12 in.)

per-bark, box-elder bark, animal wool, and human hair; the range in diameter is from less than one thirty-second of an inch to a trifle over one quarter of an inch. In twist almost every piece is anti-clockwise, though the component plies of multiple-stranded strings are sometimes spun clockwise. Two-ply twist is the usual type; three strands are often used for heavier cordage; and some bits of four-, five-, and six-ply twist occur. Three-strand braids of yucca strings are common and seem to have served where an extra strong ligature was needed. Bits of fur string and feather string for blankets were recovered: the former were made by twisting narrow strips of hide about heavy yucca cords; the latter by using similar strips of the skins of small birds. No example of turkey-feather string was found.

Of interest as showing the variety of the spinner's art are the contents of a "work-bag" recovered from the rubbish (pl. LVI). In addition to nearly a quart of wild sunflower seeds, it held thirteen loose hanks made up as follows (see pl. LVII):



WORK-BAG CONTAINING ASSORTMENT OF STRINGS AND THREADS
(Length $9\frac{1}{2}$ in.)



BUNDLES OF TEXTILE MATERIALS FROM WORK-BAG
(Length of longest, 5½ in.)

(1) Very fine two-strand yucca threads.

(2) Extra-fine two-strand yucca threads, diameter less than one thirty-second of an inch. These are the sort of threads commonly employed in sewing leather.

(3) Bunch of work-ends and clippings of all sorts of strings, heavy and light, harsh and soft, some of yucca, some of *Apocynum*. Among them is a single piece of very hard and wiry three-stranded yucca string, diameter three thirty-seconds of an inch; this is the type of string used for the warps of high-grade sandals.

(4) Skein of very kinky, two-strand *Apocynum* (?) string; this is apparently weft material for sandals.

(5) Larger bundle of the same.

(6) Skein of four-strand string, soft and pliable.

(7) Skein of "contrast-twist," i.e. string made of strands of different colors. This example has two strands died black and one of natural (grayish-white) color. Diameter three thirty-seconds of an inch.

(8) Skein of similar "contrast-twist," three-strand, one red, two natural.

(9) Skein of "contrast-twist," two-strand, one brown, one black. With this skein are a few strings of human hair.

(10) Hank of two-stranded string dyed bright-red.

(11) Bunch of coarse, uncombed yucca fiber.

(12) Bunch of finer fiber.

(13) Strings partly twisted, ends still in the fiber.

The container of the above-listed materials is the only example of the typical Basket-maker twined bag in the collection;¹³ it is also the only piece of cloth-like textile found in Cave du Pont. It is a small specimen, considerably frayed and worn, and lacking the upper part or neck; this edge has been whipped with stout yucca cord to prevent raveling. The body of the bag is decorated with alternate narrow stripes of red and black. The weave is fine, there being 9 to 11 warps and 18 to 20 weft-pairs per inch.

OBJECTS OF WOOD

ATLATL DARTS

One of the few characteristic Basket-maker implements which is lacking from the Cave du Pont collection is the spear-thrower or atlatl. There is no doubt, however, that this contrivance was in common use, for there were recovered a number of pieces of the typical light spears or, more properly speaking, darts, that were always used with it. These darts were a little more than 50 inches long. At their butt-ends the shafts were cupped to engage the spur of the throwing-stick; a feathering of three plumes was set about two inches from the cupped end. At the tip the darts were deeply socketed for the reception of short wooden foreshafts. The foreshafts were usually provided with tanged points of stone.

SHAFTS.—The best-preserved specimen in the present collection is a section, 3 feet 6 inches long, broken from the distal end of a dart of this sort. The material is a box-elder branch five-sixteenths of an



FIG. 16.—Tip-end of dart showing socket for reception of fore-shaft.

inch in diameter at the tip, straightened and peeled but not otherwise worked down (fig. 16 shows the end of this piece). The foreshaft is missing, but the end of the shaft is socketed for its reception and was strengthened and kept from splitting by a seizing of sinew $1\frac{3}{8}$ inches wide; this has disappeared, but its former width is indicated by deep scorings made in the wood to give it a firm seat. Such scoring has not previously been noted at this part of a shaft. At $3\frac{1}{2}$ and $4\frac{3}{4}$ inches respectively from the socket end are broad sinew bindings (see fig. 16). Up to the second binding the shaft is painted red; at 13 inches from the broken end the red color begins again. There is a battered fragment from the same part of another shaft.

Although the socket is broken, the wood about it shows scorings for reinforcing liga-

tures. The only piece from the butt, or proximal end, of a shaft is three-eighths of an inch in diameter; it has the typical shallow cup at the end for the reception of the spur of the spear-thrower.

An interesting find consists of a bundle of five sticks tightly bound together with yucca-leaves. They are straight shoots of some light but tough wood; the bark has been peeled and the twigs trimmed off. The ends were severed by hacking and breaking. The longest stick measures 75 inches, the shortest 70; the large ends average three-quarters of an inch in diameter, the small ends seven-sixteenths of an inch. Three complete atlatl darts in the Peabody Museum collection average about 55 inches long, one half inch thick at the proximal end and three-sixteenths of an inch at the distal. If the present sticks were cut so that their ends had diameters corresponding to the above, they would have a length of almost exactly 55 inches; hence it seems probable that they were designed for use as dart-shafts.

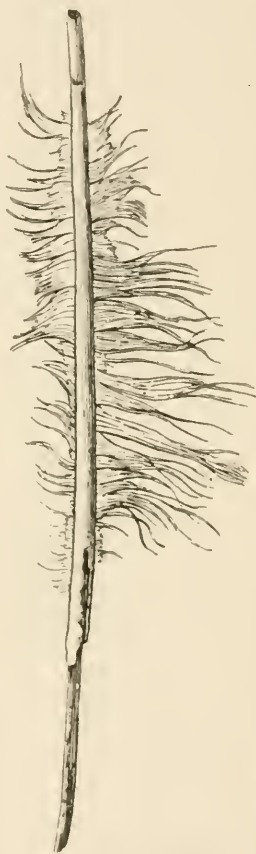


FIG. 17.—Feather
with butt plugged.

The only other specimen that once formed part of a main-shaft is a very large white feather, badly eaten by insects. The butt has been cut off and the hollow quill plugged for an inch or so with a bit of split willow (fig. 17). This plugging of the quill is characteristic of the feathers used for winging Basket-maker darts; it was probably done to render the end solid enough to be bound firmly in its correct position on the shaft.

FORESHAFTS. — Of the foreshafts that were used at the ends of the main-shafts there are several ex-

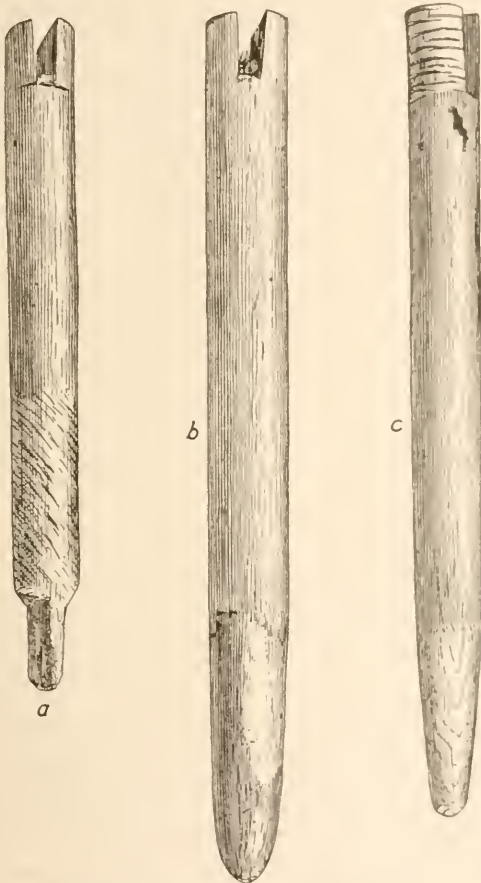


FIG. 18.—Foreshafts for atlatl darts.

amples. The base of each one has been tapered to fit into the socketed end of the main-shaft of the dart; at the opposite

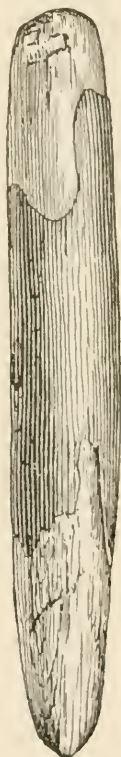


FIG. 19.—Bunt foreshaft (?).

extremity of each there has been neatly cut a deep, narrow notch to hold a stone point. In doing this care was evidently exercised not to split the stick. Two of the specimens (fig. 18, *a*, *b*) were obviously never put in service, for the notches show no trace of use; the third, however, once had a point mounted in it, as is proved by grooves cut about the end to give a grip to the seizings, and by the wear in the bottom and sides of the notch itself. The shortest of these foreshafts measures $3\frac{3}{4}$ inches in length, the longest $4\frac{7}{8}$ inches.

Another specimen (fig. 19) may perhaps be part of a bunt-headed foreshaft. The butt is tapered as if to fit in a socket; the forward end is rounded off

and bears scratches such as might have been made by fitting the hollow part of a blunted bone down over it. Complete examples of this sort of foreshaft, with their bone tips in place, are figured by Pepper;¹⁴ the wooden parts of these devices are, as in the present case, considerably shorter than the sticks of stone-tipped foreshafts.

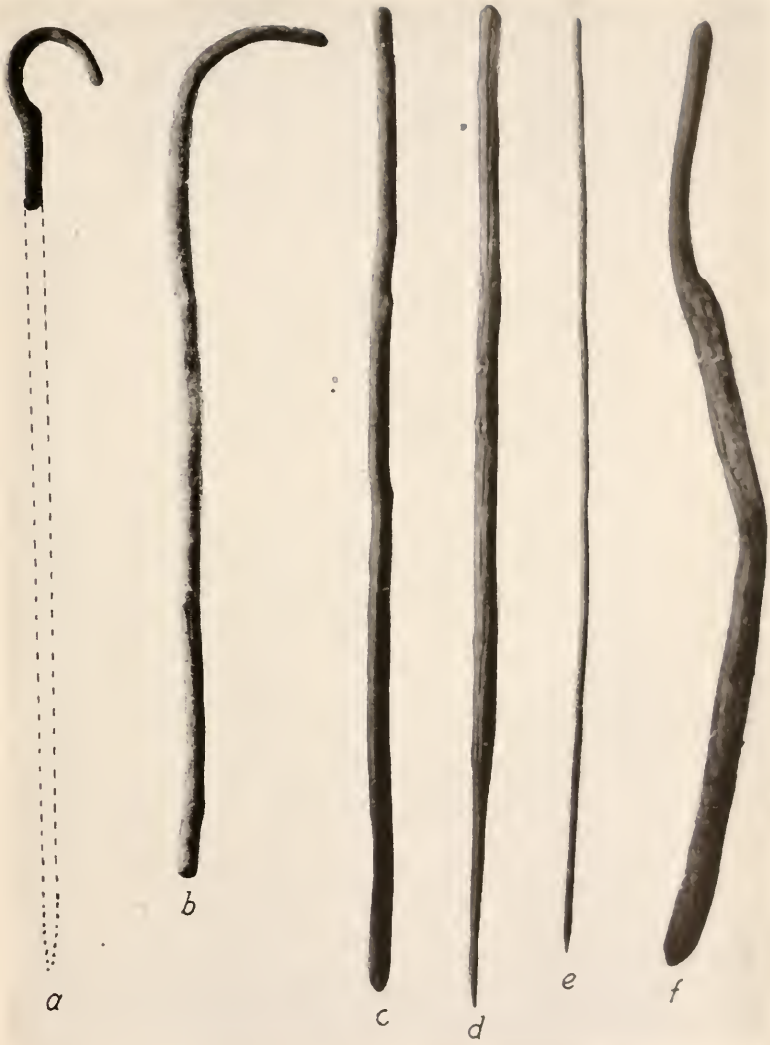
DIGGING-STICKS

Pl. LVIII illustrates certain long, sharp-pointed or thin-bladed objects of wood that were found in the matted débris. These were without much doubt used for work in the ground, such as planting and cultivating corn and also for excavating storage cists in the hardpan of caves.¹⁵ Although the crook-end specimens (pl. LVIII, *a*, *b*) are neither of them complete, they are so much like digging-sticks from other Basket-maker caves that we do not hesitate to identify them as such.¹⁶ The short piece (pl. LVIII, *a*) is made from a peeled limb; the crook is artificial; the longer one (*b*) is 31 inches in length, the crook in this case was produced by cutting away

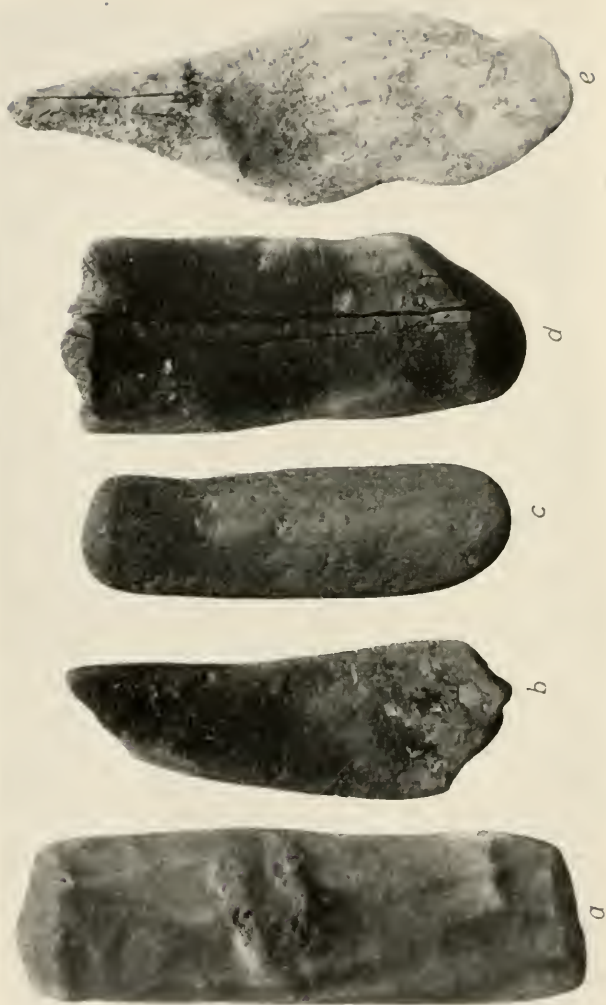
nearly half the diameter of the stick for a space of 9 inches and then bending this thinned portion over with the flat surface underneath; the lower end of the specimen is now blunt, but there are indications that it was once tapered to a point.

The two straight specimens (pl. LVIII, *c*, *d*, the latter photographed in side-view to show the thinning of the blade) are 3 feet 1 inch and 3 feet 2 inches long respectively; each is approximately an inch in diameter. Both are made of hardwood branches with the bark removed and the knots rubbed smooth. The butts are rounded off and the tips are worked into thin blades about 9 inches long. The blades are smoothed as if by long use in the soil. Sticks of this sort have been found in other Basket-maker caves, but are not peculiar to the Basket-maker culture, as similar ones occur in the cliff-houses, and are, indeed, still in use for agricultural work among the Hopi and the Navaho.

The very slender rod (pl. LVIII, *e*), length 34 inches, has one end sharply pointed and much worn. The object is so frail that



AGRICULTURAL IMPLEMENTS
(Length of *d*, 36½ in.)



SCOOP-LIKE OBJECTS OF WOOD
(Length of *a*, 11 in.)

it could hardly have been of service for heavy work in the earth, but it might have been used as a planting-stick.

Pl. LVIII, *f*, is a very characteristic Basket-maker digging tool. It is 35 inches long. The material is the gnarled root, apparently, of a hardwood tree, with the irregularities partly rubbed down. The lower or working end is fashioned into a thin blade $10\frac{1}{2}$ inches long by $1\frac{1}{2}$ inches wide; the handle has a slight natural bend. We have found several sticks in Basket-maker caves of the Marsh Pass region of Arizona, which are closely similar to this one, in material, general shape, and size of blade. They are all quite different from the cliff-house digging-sticks, which are characterized by lightness, careful shaping of the whole shaft, and by the presence at the upper ends of neat round knobs for handles.¹⁷

WOODEN SCOOPS

In every Basket-maker cave that we have excavated, and in Cave du Pont as well, there have turned up in the sand or rub-



FIG. 20.—Feather (?) box.

bish about the cists a certain number of scoop-like objects of wood. They range in length from 5 to 18 inches and consist of thin sections from the outer parts of logs of wood; their outer surfaces are unworked and retain the natural convex form of the log (pl. LIX, *a, c*), their inner surfaces have been made concave by charring and scraping (pl. LIX, *b, d, e*); their edges and ends are always much worn. Aside from these general characteristics the specimens do not lend themselves to description, for they vary infinitely in the details of size and shape. Experiment has shown that they are excellent tools for scraping out

loose sand (as in digging a cist); they would also have served admirably, if used in pairs, for transporting embers or for handling hot stones in basket cookery.¹⁸

FEATHER (?) BOX

This neat little object (fig. 20) was made by cutting a section 10 inches long from a cottonwood limb 2 inches in diameter. The bark was peeled off and the ends rubbed smooth. A cavity 8 inches long by 1¼ inch in depth was dug out on the upper surface. At one end, as shown in the figure, are traces of a fret design in black paint. The specimen was doubtless a container of some sort, and, provided with a leather flap would have made a very satisfactory receptacle for feathers or other fragile articles. Similarly shaped, though usually smaller, receptacles were used as trinket-boxes by many Pacific Coast tribes.

OBJECTS OF BONE

As in the case of stone implements, so little is known of the tools of bone produced by the Basket-makers that it seems best

to record all of the few examples which were found in the refuse of Cave du Pont.

AWLS

The material consists of three complete and two fragmentary specimens. The longest (pl. LX, *c*) measures $6\frac{3}{4}$ inches over all; it is made from a long-bone, presumably of deer, split lengthwise; the cut edges are well worked and the point is keen; the proximal end is rounded but not chisel-edged. Figs. *a* and *b* of the same plate show awls $3\frac{1}{8}$ and $3\frac{3}{4}$ inches long respectively. The latter is made from the tibia of a large species of *Lepus*, probably *Lepus californicus deserticola*, which ranges over nearly all of Utah. The head of the bone is unaltered and still retains the dried ends of the tendons; the only work has been to cut the shaft obliquely across and to point the end by grinding. The metapodial of an immature deer served for the raw material of the second short awl (pl. LX, *a*). The bone was split and the end brought to a short but keen point.

The two fragmentary awls have both lost their tips. One of them, made from a split deer metapodial, with the head of the bone nearly worked away, has a length of $4\frac{3}{4}$ inches; it was probably once about 7 inches long. The other is part of a similar awl; after the tip was broken off the implement was used for some rough work, possibly flaking, which has battered and rounded the broken end.

KNIFE-LIKE TOOL

This is a splinter from the side of a large long-bone (fig. 21). One end has been ground to a sharp-edged triangular point. The rest of the bone is unaltered except for the original splitting, but the raw surfaces have been worn and smoothed down by long



FIG. 21.—Knife-like bone tool.

handling. This tool would have been a very handy one for separating the hide from the flesh during skinning; or it might have been used as a bark-stripper.

SCRAPERS

There are but two bone scrapers from Cave du Pont. One (pl. LX, *d*) consists of the lower end of a deer tibia from which the head has been neatly removed by grooving and breaking. The remaining piece of bone is $9\frac{3}{4}$ inches long. The anterior surface of the shaft has been cut away, along with part of the same surface of the lower joint. The resultant edges of the exposed cavity are well worn, particularly at the upper end. The specimen was perhaps a beamer for scraping hides, although the wear is not localized at the middle as is the case with the beamers of the Plains and Mississippi Valley tribes. In spite of the obviously long use to which this specimen has been subjected, the bone has a fresh, almost greasy look, and the roots of tendons are still attached to the joint.



BONE AWLS AND SCRAPING TOOL
(Length of *d*, 9 $\frac{1}{4}$ in.)



WRENCH AND SICKLE-SHAPED OBJECT OF MOUNTAIN-SHEEP HORN
(Length of *a*, $6\frac{3}{4}$ in.)

The second scraping tool is a piece of deer or mountain-sheep scapula 3 inches long by $2\frac{1}{4}$ inches wide. The edges are worked thin and the surfaces show many fine, straight scratches running in all directions.

PROBLEMATICAL BONE OBJECTS

In fig. 22 is illustrated a piece of deer-rib, 8 inches long. The sternal end is worked round, the vertebral end broken away. On the sharp edge of the rib near the broken end is a series of grooves worn in the bone. These are deepest at the middle of the series, where they have penetrated to the hollow interior, and become shallower at the two ends. Though these grooves are very smooth, the sides of the bone are not at all polished. To what purpose

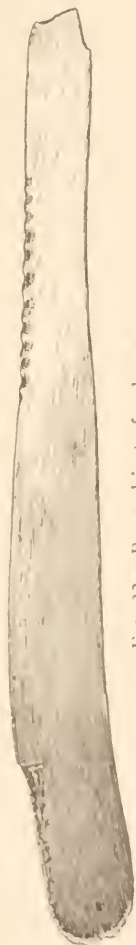


FIG. 22.—Bone object of unknown use.

this tool could have been put is unknown; the grooves look as if they had been made by the play of strings over the edge of the bone, but the unworn sides show that it could not have served as any kind of batten for textile work.

The second piece is a two-inch fragment from a similar specimen. It is badly mouse-gnawed, but still retains on one edge a row of deeply-worn grooves.

OBJECTS OF MOUNTAIN-SHEEP HORN

SICKLE-SHAPED IMPLEMENT

This tool (pl. LXI, *b*) was found with Burial B, Cist 5 (see pl. XIX). It is made from a thin section split from a large horn. The dimensions are: length across the curve, $12\frac{1}{2}$ inches; maximum width, 2 inches; average thickness, three-eighths of an inch. The object was probably steamed and flattened, but how much of its present curved shape is natural and how much due to artificial warping cannot be determined. The original corrugations of the horn.

though they have been almost obliterated by scraping and rubbing, appear faintly on one of the flat surfaces of the specimen (see pl. LXI); the other or split side has been worked smooth. The convex edge is round and unworn; the concave edge has either been sharpened intentionally or has been worn sharp, and the sides of the tool are more or less polished to a depth of about one quarter of an inch from this edge, the higher polish being on the corrugated side. The smaller, or what appears to have been the handle end, of the specimen is noticeably rougher than the rest of it, but gives no definite evidence of hafting.

The use of this nicely-made tool is problematical. If held by the small end it would have made an excellent sickle for cutting weeds or soft grass; or grasped in both hands and pulled toward the body it would have served well as a beamer for working hides.

WRENCH

This is a very heavy, thick piece about $6\frac{3}{4}$ inches long from near the tip of a large

horn (pl. LXI, *a*). The big end was crudely hacked off, but subsequent wear in service has smoothed this roughness down. A single hole nine-sixteenths of an inch in diameter has been bored through the piece. There are evident signs that hard objects, such as sticks, have been passed through this hole and pried up and down in the process, for its orifices are worn smooth and slightly funneled. There is little doubt that the contrivance served as a wrench for truing up green or perhaps steamed sticks; it might also have been useful as a sizer or gage if it was desired to select a number of sticks of the same diameter.

OBJECTS OF STONE

We know less about the stone implements of the Basket-makers than we do about any other phase of their material culture. The reason for this is that no long-inhabited dwelling-site whose rubbish might be expected to be rich in lost or discarded stone specimens has yet been discovered. That these people were expert

workers both in flaking and in grinding stone is amply proved by specimens already published, and by some of the examples about to be described from Cave du Pont; but the present collection, like all other lots of Basket-maker material, is very poor, numerically speaking, in such artifacts, and still leaves us in doubt as to whether or not many important categories of objects were represented at all in the culture. For example, axes, celts, scrapers, and drills, all more or less common in the cliff-houses of this general region, are entirely lacking from authentic Basket-maker collections.

HAMMERSTONES

The following are the first objects of their kind which have been taken from a Basket-maker site. There are three complete and three fragmentary specimens, most of them waterworn pebbles of impure quartz, about the size of one's fist. Their surfaces show both battering and rubbing as if they had been used indifferently as hammerstones and as smoothers. The

three complete specimens also served as paint grinders, for two still have adhering to them fine particles of bright red paint, and the other bears at one end traces of a brilliant yellow pigment.

GROOVED STONE

This is a rough lump of soft, gritty sandstone (pl. LXII). On each side of it are three deep grooves made by long use, probably in sharpening bone implements or in working down the shafts of small wooden tools. Some of the grooves have smooth, round bottoms, as if they had served as slots for rubbing strings of beads to uniform size.

HAFTED KNIVES

Stone implements in their original hafts are of particular interest, because the nature of the hafting usually allows us to judge of the service to which the tool was put and so helps to throw light on the use of the many stone "points," "heads," etc., found throughout the country, about the purpose of which there exists so much doubt.

The first specimen to be described (fig. 23) would, if discovered without its haft, have probably been identified as an unfinished or rejected spearhead. It is a crudely chipped blade of coarse flint, $1\frac{3}{4}$ inches long; at the base it measures seven-eighths of an inch wide and three-sixteenths of an inch thick. Whether or not it is tanged cannot be ascertained, as its attachment to the short, round, wooden haft is entirely obscured by a bulky lashing, itself hidden by a thick coating of pitch. The point of the blade is blunt and the edges are dull and slightly beveled from opposite sides. This implement was undoubtedly a knife. It

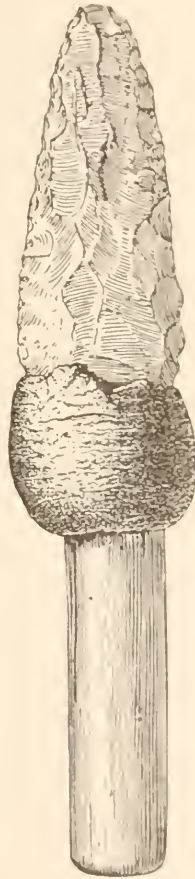


FIG. 23.—Hafted knife.

was probably designed for coarse work, as much better shaped and keener blades are to be found in other Basket-maker collections; it might possibly have been used for excavating the bowls of such pipes as the ones taken from Cist 27. At all events the edge as it is at present could have been of little value, and if it had been retained in service would doubtless have been sharpened by rechipping. Successive dullings and resharpenings would have cut down its length and width, and would ultimately have reduced it to the size of the implement next to be described.

This specimen (fig. 24, length 3 inches) consists of a short, round, wooden haft to which is attached by a heavy seizing a stone blade which has been chipped or worn down to a mere crescent-shaped stub. The edge of the blade is very blunt and somewhat polished as if by long rubbing; it would be of no service as a knife or even as a drill. It is very likely that this implement was originally a knife similar to the foregoing one, which, after accidental



STONE GROOVED BY TOOL SHARPENING
(Length $6\frac{1}{2}$ in.)



X-RAY PHOTOGRAPH SHOWING BORE OF PIPE
(Photograph by Dr. Elsie Fox)

breakage or many resharpenings, was finally used as a scraping or beaming tool.

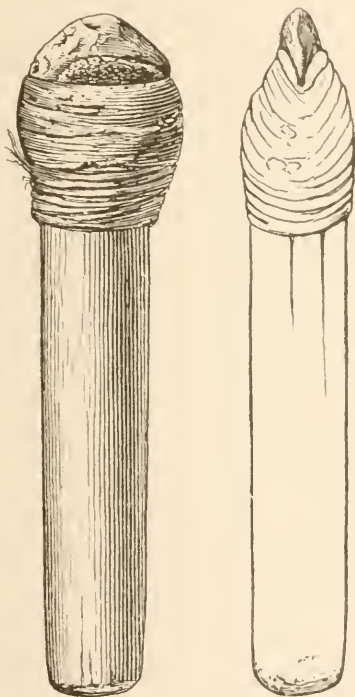


FIG. 24.—Blunt hafted implement.

A knife-handle lacking the blade (fig. 25) is described here for comparison with the

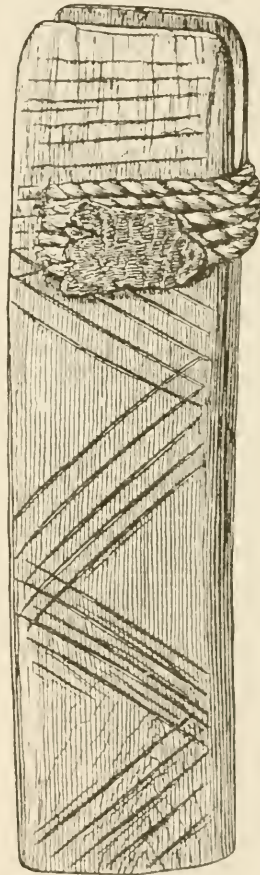


FIG. 25.—Haft for stone knife.

above. Its length is $3\frac{3}{4}$ inches, width 1 inch. It is cut from some tough, close-grained wood. The slot for the missing blade is three-quarters of an inch deep, and the sides of the haft about it are scored to provide a firmer grip for the lashings that held the blade in place; a few turns of pitch-coated yucca string still remain. On both sides the handle is decorated with scratched zigzag patterns. The zigzag, it may be noted, is a favorite Basket-maker motive for the ornamentation of all sorts of small objects.

DART-POINTS

Only one point was found; it is described and illustrated with the other objects of the cache in which it occurred (p. 149 and pl. LXVI, *e*).

WORKSHOP REFUSE

The rubbish in Cave du Pont was unusually barren of chips, flakes, and broken implements. There were recovered: a single 6-inch boulder of banded yellow and black jasper from which a few flakes had been struck; part of a red jasper reject in the "turtleback" stage; and fifteen or twenty chips of jasper and quartz. A few of the latter have blunted edges, showing that they were used for whittling until dull and then thrown aside.

FLINT-WORKER'S "PALM" (?)

This specimen is a piece of dressed hide, probably from the neck of a large deer, as it is very thick. It has been cut roughly to the shape of an isosceles triangle 5 inches long by $3\frac{1}{2}$ inches across the base. One surface is much scarred and worn. These

marks, together with the fact that it fits nicely in the hand, make it seem probable that this tough piece of leather was used as a "palm" to protect the hand of the flint worker.¹⁹

PIPES

The two pipes found cached together in a little pocket by the wall of Cist 27 are certainly the finest specimens of stonework yet taken from a Basket-maker cave. Both were evidently cut from the same lump of stone, a hard and very close-grained slate, light gray in color, banded with streaks of varying shades of purple. These pipes obviously formed a pair, for they are closely similar in size, shape, and workmanship.

One of them (fig. 26) is $4\frac{5}{8}$ inches long, has a diameter at the large or bowl end of $1\frac{3}{8}$ inches, and at the mouth end of half an inch. The diameter of the bowl itself is $1\frac{3}{16}$ inches; that of the bore at the stem, seven thirty-seconds of an inch. The size and depth of the bowl could not be ascertained by a superficial examination, because it is so heavily caked with the crust

of long-continued smoking that only a very small orifice remains (fig. 27). The X-ray photograph, however (pl. LXIII), enables



FIG. 26.—Pipe of banded slate.

one to make out very clearly the original contour of both bowl and bore. It will be seen that the bowl proper occupies about half the length of the pipe. It has a shallow, flaring orifice, and an almost cylindrical lower part which tapers gradually from three-quarters of an inch in diameter at the beginning of the flare to five-eighths of an inch at the place where the narrower smoke-passage commences. The latter is



FIG. 27.—End view of fig. 26.

also gradually tapered until near the mouth-end it has a width of one-quarter of an inch. From the fact that the taper is



FIG. 28.—Pipe of banded slate.

all from the bowl-end, it is obvious that the finishing of the bore must have been

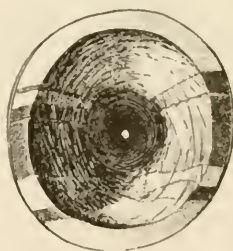


FIG. 29.—End view of
fig. 28.

done entirely from that direction; it is probable, indeed, that the whole drilling was carried out from the bowl-end. Both bowl-end and mouth-end (in the latter there is no trace of a detachable stem) are ground off flat, and the sides have an even and very regular, slightly convex curve.

The surface is perfectly smooth, but is not polished.

The second pipe (fig. 28) is $4\frac{3}{4}$ inches long, has a diameter at the large end of $2\frac{1}{16}$ inches, and at the mouth end of five-eighths of an inch. The diameter of the bowl is $1\frac{1}{2}$ inches; that of the bore at the stem seven-sixteenths of an inch. This pipe had split lengthwise in two while still in use, and was evidently mended and continued in service, for a broad shallow groove has been roughly scored into the surface around the middle to hold a ligature which has now rotted away. As the "cake" has disappeared, the bore of the pipe can be investigated; it is trumpet-shaped (see diagrammatic drawing, fig. 30), and the flaring part at the large end has deep scratches running obliquely toward the orifice as if that part had been worked to its present form by whittling with a stone knife (fig. 29). The lower bore running from the flaring bowl nearly to the stem, bears the typical concentric circular striations of a drilling tool (these appear deep down in the bowl in fig. 29). It is probable

that a large hole was first drilled into the bowl-end as far as *a* (fig. 30); from that point the work was continued with a somewhat smaller drill, so that a slight offset or shoulder is left at *a* (purposely exaggerated a little in the drawing). At *b* drilling from the large end was discontinued, and a hole to complete the passage was bored in

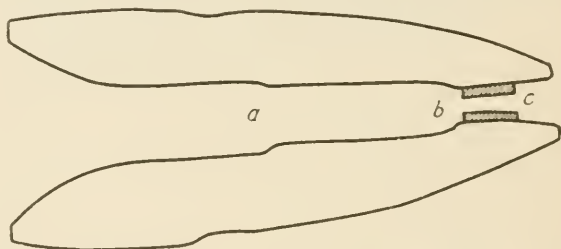


FIG. 30.—Section of pipe to show successive drillings of the bore.

from the smaller end; this hole is not quite in line with the first one. Lastly, the flaring part of the bowl was produced by scraping and whittling. In the drawing there is shown at *c* a coating of a reddish gummy substance, quite different in appearance from the “cake” in the other pipe. This reduces the size of the bore to about one-eighth of an inch; whether it is a cement

which once held a stem of wood or of bird-bone, or whether it merely served to constrict the rather large aperture, is conjectural.

DECORATED STONE

On one of the typical small Basket-maker mealing stones, or *manos*, there is painted the crude face shown in fig. 31. The stone itself is $4\frac{1}{4}$ inches long, but has lost a small portion of one end; it has been used since the break occurred, as that surface is somewhat worn. The lines of the decoration look at first sight as if they had



FIG. 31.—Decorated stone.

been penciled with a bit of charcoal, but examination under a lens shows that the pigment was brushed on in liquid form and has settled into the minute interstices of the stone in a way that charcoal never does. The delineation of

the face is unlike anything yet recorded in Basket-maker pictography.

PAINTS

There were found several specimens of yellow and red ochres of varying degrees of brightness, and a few of pure white gypsum; these were evidently used as paints. The materials had been ground to powder, mixed with water, and then molded in the hands into cakes of various sizes and shapes, oval, cylindrical, or round. One lot of yellow paint in small lumps, aggregating about one pound in weight, appears to have been mixed with some gummy substance for a "binder."

PSEUDO-POTTERY

It is probable that the fragmentary little specimens about to be described represent early attempts of the Basket-makers at the manufacture of pottery. The objects are parts of three vessels roughly molded of red clay and showing distinctly the finger-marks of their makers. That

none of them were fired is proved by the fact that small bits of their substance, crumbled and moistened, can readily be kneaded back into a plastic condition. The clay

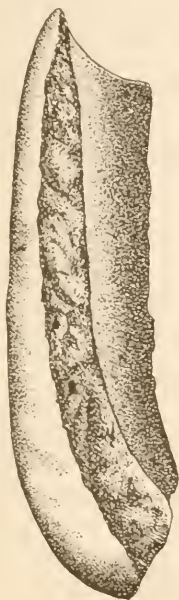


FIG. 32.—Fragment of unfired clay vessel.



FIG. 33.—Fragment of unfired clay vessel.

is a light brick-red color; it shows no trace of intentionally added tempering material, but contains a few tiny water-worn pebbles.

The first specimen (fig. 32) is part of a small conical vessel. Although the actual base is missing, there is little doubt that it was of tapering form, and that the piece was about 5 inches high and 3 inches wide at the mouth. The rim is rounded and, by the standards of later Southwestern pottery, very heavy; toward the base the ware is not less than three-quarters of an inch in thickness. The surface, both within and without, is uneven and was obviously modeled with the fingers.

The second fragment (fig. 33) is from a closely similar, though probably not the same, vessel. On one broken edge are the sides of two holes which pierce the wall of the pot 2 inches below the rim; they are one eighth of an inch in diameter, and appear to have been made by pushing a small round stick through the clay while it was still moist.

Lastly there are four sherds which fit together to make about one quarter of a bowl nearly 7 inches in diameter (fig. 34). As the base is lacking, it is hard to approximate the depth, but it was probably in the

neighborhood of 4 inches. The rim is rounded and slightly wavy, and the walls are lightly finger-marked. The most interesting feature of this bowl is the crude attempt at the decoration of its inner surface. There is a roughly-drawn, horizon-

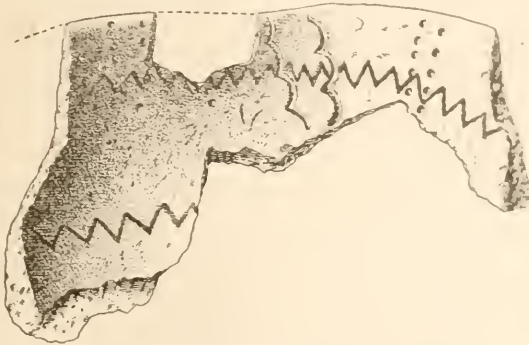


FIG. 34.—Fragment of unfired clay vessel.

tal zigzag in black paint set three-quarters of an inch below the rim, and another near the bottom. Two scalloped incised lines run downward from the rim, and there are also lines of shallow punctate marks as shown in the drawing.

The above specimens, which being unfired are not really pottery, naturally bring up the question of the presence or absence

of true fired pottery in the Basket-maker culture. The only such pieces that have ever been attributed to the Basket-makers are some vessels in a collection from Grand Gulch procured by McLoyd and Graham and sold by them to the Hyde Exploring Expedition. In McLoyd and Graham's catalogue it was stated: "The third kind of pottery is very valuable, less than fifty pieces having been found up to date. . . . It is a very crude unglazed ware, some of the bowls showing the imprint of the baskets, in which they were formed."²⁰ These pieces are now in the Museum of the American Indian, Heye Foundation, where we have had an opportunity to examine them. They are a peculiar heavy, slate-gray ware, with well-smoothed but rather uneven surfaces; in form they are unlike any other Southwestern pottery with which we are familiar; they are small, bowl-like, dipper-like, and crucible-like vessels, the latter provided with lugs and spouts. Several of them are crudely decorated with broad lines and large dots of dull-red paint. While it is not feasible to describe this

pottery adequately in the present publication, we may say that to anyone who has worked much with Southwestern ceramics it is quite distinctive, and once seen could be identified at a glance, even in small sherds. We do not believe it to be of Basket-maker origin, because no similar ware was ever discovered by the Wetherill brothers in the large number of Basket-maker caves dug by them, nor have we ever found any of it in our own explorations in northeastern Arizona and southeastern Utah. On the other hand, it is certainly not characteristic of any known later phase of Southwestern culture. There is, then, no well-authenticated instance of true fired pottery of Basket-maker origin, and it seems hardly possible that if these people had possessed pottery some vessel would not have turned up in the many graves well-stocked with offerings that have been found by the Wetherills and ourselves, or some fragment among the quantities of rubbish so carefully gone through in Cave du Pont. This gives the little unfired specimens found by Mr. Nusbaum a partic-

ular interest, for, as was said above, they may represent the very first attempts of the Basket-makers at the manufacture of pottery.

SNARES

BIRD SNARES

With the bunched bones of Burial E (pl. XXXII) there was found a large double bundle. This proved to be made up of two packages, one containing 120, the other 17, slim, straight, squawbush twigs averaging 25 inches in length and three-sixteenths of an inch in diameter at their larger ends. The majority of them are peeled; the ends show clean breaks, but no pointing or other finish. At from 15 to 17 inches from the larger end (or 8 to 10 inches from the tip) each twig has a tight wrapping of twisted fiber under which is a short end of fine, human-hair string. These strings are all broken off short; the longest piece that remains measures only 3 inches.

The identification as bird snares rests on a large bunch of similar twigs from Grand Gulch, now in the American Museum of

Natural History (H-13834); the latter specimens have the same ligatures and the same human-hair strings which, however, are unbroken, are 4 to 5 inches long, and terminate in small free-running slip-nooses. The strings are so fine that they could hardly have held anything stronger than a small bird. How these little devices were set up and how sprung is problematical.

NET-SNARE

When found this specimen appeared to be merely a small stick loosely wrapped with cordage, but on opening it out and unwinding the strings, it proved to be a very cleverly made and efficient snare for the capture of rabbits, birds, or other small game. The device consists of a loop of heavy fiber-string which, laid in a circle, encloses a space about 3 feet 6 inches in diameter; this space is filled by a net of finer string (see pl. LXIV, the net is there only partly spread). The heavy looped cord is strung along the marginal meshes of the filling net; its two ends pass through a 2¼ inch wooden ring, which is tied to the net at the throat

of the loop, and finally are fastened to a short, sharp-pointed stake.

The snare was obviously used as follows: The pin was driven solidly into the ground and the net spread to its full extent, across a runway, over a hole, or in some other likely situation (fig. 35, *a*); when the animal

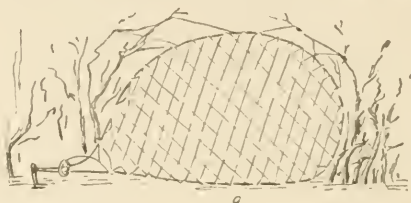


FIG. 35.—Probable use of net-snare.

or bird encountered the light meshes it would attempt to push through them, would become entangled, and its struggles would cause the net to gather and run up on the edge cord and pucker about the victim. As the net pursed, the little ring attached to it would be pulled up along the edge cord and effectually close the mouth of the



NET SNARE
(Length of wooden peg, 7 m.)



RE-USED UMBILICAL-PAD COVER AND PART OF CONTENTS
(Length, of *d*, 7½ in.)

bag into which the quarry had run itself (fig. 35, *b*).

This snare is beautifully made and is still strong and serviceable. The edge-cord is a hard, three-strand *Apocynum* string about five thirty-seconds of an inch in diameter. The net is of much finer two-strand string, a little more than one-sixteenth of an inch in diameter; the meshes, though not exactly true to gage, averages 3 inches. The puckering-ring is a hoop made by tying together with sinew the two ends of a small peeled twig; this same binding holds under it the end of mesh-cord which attaches the hoop to the net. The anchor-peg is $7\frac{3}{4}$ inches long.

“MEDICINE OUTFIT”

The container of this interesting little collection of oddments is an old umbilical-pad cover made of a very soft, woolly pelt, probably dog-skin (pl. LXV, *d*). It was originally carefully sewed up with all but a short section of the seam turned in; on removal from the umbilical pad it was torn

open without unsewing the seam. In it were placed: a deerskin thong (pl. LXV, *c*); a pair of small skin containers (pl. LXV, *a, b*); and a little bag of dressed hide (pl. LXVI, *a*). The thong is 16 inches long by one quarter of an inch wide; its edges show the straight, clean cuts of a very sharp knife, presumably a keen-edged spall of flint. The small containers are irregularly shaped pieces of deerskin with the hair on, puckered up into little bags; one is tied with a bit of dressed deerskin, the other with a wisp of fine string; both are empty, but stains on the inside of one of them show that it had formerly held red paint.

The bag of dressed deerskin (pl. LXVI, *a*) is 7 inches deep and about $2\frac{1}{4}$ inches wide at the bottom. It is made of two pieces: a round one for the base; and a long one rolled into a cylinder, sewed to the base and up the side to within 3 inches of the top, thus leaving a roomy aperture. The seams are turned in and the thread is a fine *Apocynum* string. The mouth was tied up by many turns of a narrow, soft deerskin thong $20\frac{1}{2}$ inches long, one end of



"MEDICINE POUCH" AND CONTENTS
(Length of *a*, 7 in.)

which is knotted and rove through a hole in the neck of the bag. Within were the following objects:

(1) A bobbin-shaped object (pl. LXVI, *d*; and fig. 36) not quite $1\frac{3}{4}$ inches long, cut from the shaft of some heavy bone; the ends bear traces of the facets produced in grinding it to shape, the other surfaces are carefully smoothed. It is very much like some of the "weights" or "charms" which are found attached to the shafts of spear-throwers.



(2) Two minute flakes of quartz (pl. LXVI, *b*, *c*).

(3) A small ball of resinous, gummy substance (pl. LXVI, *g*).

FIG. 36.—Bone object from "medicine pouch."

(4) A tanged point of red jasper, well-chipped, $1\frac{7}{8}$ inches long (pl. LXVI, *e*). This is surely a head for a dart foreshaft.

(5) A shriveled bit of organic tissue (pl. LXVI, *f*) which appears to have been tubular and looks very much like a dried umbilical cord; it is wrapped in a piece of

soft fur and overwrapped with shredded fiber and string.

The term "medicine outfit," which we have applied to this queerly assorted collection of little objects, is of course guess-work, but we can think of no practical end which could have been served by it.

NOTES

1. Practically all the published information in regard to the Basket-makers is to be found in the following articles:

Prudden, T. Mitchell. An Elder Brother to the Cliff-dweller, *Harpers Monthly Magazine* for June, 1897, pp. 56-63, New York, 1897.

Pepper, George H. The Ancient Basket Makers of Southeastern Utah, *American Museum Journal*, vol. II, no. 4, suppl., New York, 1902. Also, The Throwing-stick of a Pre-historic People of the Southwest, *International Congress of Americanists, 13th Session, New York, 1902*, pp. 107-130, Easton, Pa., 1905.

Kidder, A. V., and Guernsey, S. J. Archeological explorations in Northeastern Arizona, *Bulletin 65 Bureau of American Ethnology*, Washington, 1919.

Guernsey, S. J., and Kidder, A. V. Basket-maker Caves of Northeastern Arizona, *Papers of the Peabody Museum of American Archaeology and Ethnology*, vol. VIII, no. 2, Cambridge, 1921.

2. See Judd, N. M., in *American Anthropologist*, N. S., vol. 19, 1917, p. 38.

AND MONOGRAPHS

3. See Fewkes, J. W., Ventilators in Ceremonial Rooms of Prehistoric Cliff-dwellings. *American Anthropologist*, N. S., vol. 10, 1908, p. 387.
4. For notes by Dr. Collins on other specimens of Basket-maker corn, see Guernsey and Kidder, op. cit., pp. 41-42.
5. Kidder and Guernsey, op. cit., pl. 41, *a*.
6. Cf. idem, pl. 69.
7. Idem, pl. 68, *c*.
8. Guernsey and Kidder, op. cit., pl. 40, *e*.
9. Kidder and Guernsey, op. cit., pl. 72.
10. Guernsey and Kidder, op. cit., pl. 20, *a*; and p. 56.
11. Idem, pl. 4, *g, i*; pl. 21, *c*; and p. 54.
12. Kidder and Guernsey, op. cit., pl. 78.
13. See Guernsey and Kidder, op. cit., p. 65, for details of the weave and decoration of these bags; the extra warps in the present specimen are introduced by the "second" method (op. cit., p. 68, and pl. 27, *a*).
14. Pepper, The Throwing Stick, pl. III.
15. The marks of such tools are often seen on the sides of cists in hardpan. See Kidder and Guernsey, op. cit., pl. 8, *b*, left-hand cist.
16. Compare Guernsey and Kidder, op. cit., pl. 37, *a, c*; the present plate (LVIII) is arranged to bring out the great similarity between the Cave du Pont digging-sticks and those from Marsh Pass, Arizona; compare *b* of pl. 37, Guernsey and Kidder, with *c* and *d*, of pl. LVIII, *d* with *e*, and *g* with *f*.

17. See Kidder and Guernsey, op. cit., pl. 47, *d, e*. The specimens figured at *b* and *c* came from a disturbed grave which we have since identified as Basket-maker; they should be compared with pl. LVIII, *a, f*, of this report.
18. See Guernsey and Kidder, op. cit., p. 90, and pl. 38, *g, h, i*.
19. See W. H. Holmes, Handbook of Aboriginal American Antiquities, Part 1, *Bull. 60, Bureau of American Ethnology*, pp. 310, 314, and fig. 179.
20. Catalogue and Description of a very large Collection of Prehistoric Relics, Obtained in the Cliff Houses and Caves of South-eastern Utah, 1894, pp. [10-11]. A vessel from Sunflower cave, Marsh Pass, Arizona, described by us as being possibly of Basket-maker origin (Kidder and Guernsey, op. cit., pp. 96, 208, and pl. 59, *a*), has since been surely identified as a later product. The two crude and badly fired clay pipes found by us at Marsh Pass and Sayod-nechee, Arizona (op. cit., p. 188, fig. 94, *d*), can hardly be classed as pottery, for the semi-firing observed in them might well be due to the heat engendered in smoking.

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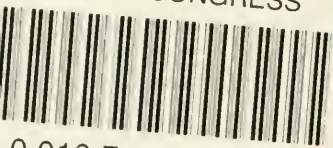
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