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## ARCHAEOLOGICAL EXPLORATION OF A ROCK SHELTER IN BREWSTER COUNTY, TEXAS

BY

EDWIN F. COFFIN

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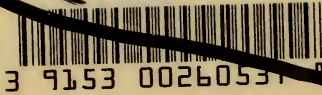
NEW YORK  
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EDWIN F. COFFIN





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*Frontispiece*

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## FOREWORD

The rock shelter to which this report refers was discovered on February 16, 1928, by Mr. M. R. Harrington who recorded it under the name "Eagle Cañon" rockshelter (Indian Notes, vol. v, no. 3, Museum of the American Indian, Heye Foundation, New York, July, 1928), although given on the map of the United States Geological Survey (Nine Point Mesa Quadrangle, Brewster County, Texas) as Bee Cave Canyon. Mr. Harrington, in a letter dated March 15, 1929, says, "I called the canyon Eagle Canyon in place of Bee Cave, as stated on the map, because Ray Miller of Marathon, an old timer in the district, told me that Eagle Canyon was the original name and that Bee Cave Canyon was given it on the spur of the moment by Government men." As it is now recorded on the Geological Survey maps as Bee Cave Canyon, it is so referred to in this publication.

After some work in the rock shelter, reference to which is made in the appendix, Mr. Harrington returned to New York, and shortly afterwards resigned from the staff of this Museum. The results thus far having been of great interest, it was deemed advisable to continue the archaeological investigations of the rock shelter, and in February, 1929, Mr.

Edwin F. Coffin, a member of the Museum's staff, commenced his work where Mr. Harrington left off, and worked on the site until the middle of June of that year.

GEORGE G. HEYE, *Director.*

## INTRODUCTION

The expedition, during which the research described in this publication was made, investigated primarily Bee Cave Canyon, and other caves and rock shelters in close proximity to it. Caves in the Hueco Mountains and pueblo sites in the vicinity of El Paso were also examined, as well as a rock shelter in Satan Canyon, a branch of Devil's Canyon, twenty-five to thirty miles northwest of Del Rio, in Valverde County, Texas. The work was carried on under the auspices of the Museum of the American Indian, Heye Foundation, of New York City, and the University Museum of Cambridge, England.

I want to take this opportunity to express my thanks to Mr. Lee Schuler and family, on whose property Bee Cave Canyon is located, for their great assistance and the many favors they have shown me. I wish to acknowledge my obligations to Mr. and Mrs. R. B. Alves, Mr. and Mrs. Fred Woodworth, Colonel M. L. Crimmins, and Mr. Victor J. Smith, for the many kindnesses shown, and the help given me while working in the vicinity of El Paso; Mr. Henry T. Fletcher and Mr. E. E. Townsend, while working near Alpine; Mr. C. A. Markward of Del Rio, for giving permission to excavate a cave on his property in Satan Canyon, Valverde County, and

Dr. John K. Small of the New York Botanical Garden, who identified many of the samples of vegetable substances found in the shelter and brought to New York from Texas.

E. F. C.



# LEGEND

- ..... Ditch
- Gross line
- Tree
- ▲ Entrance to cave
- Gravel pit
- ▭ Remains of houses
- Pit of water
- XX Camp

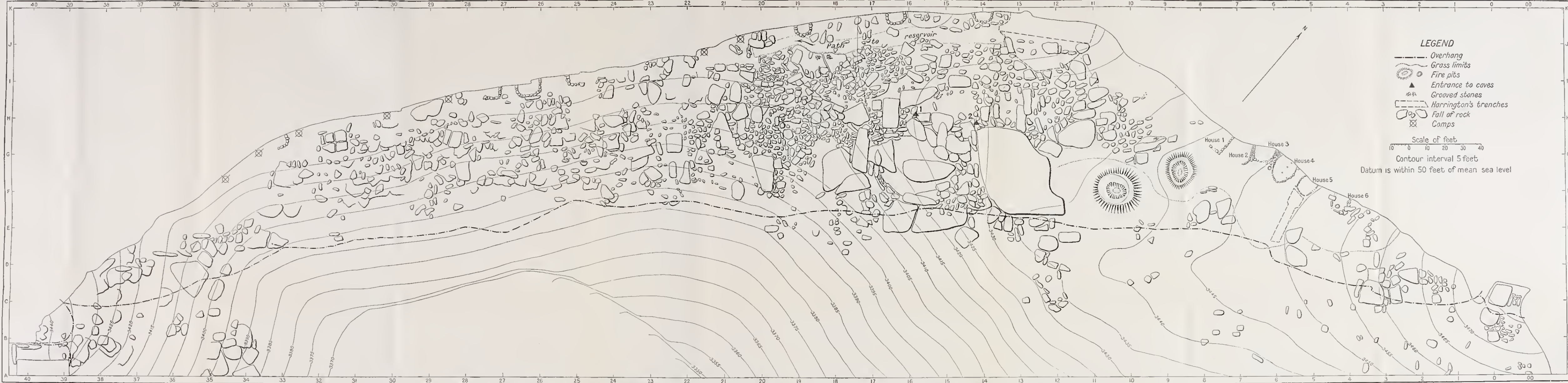
Scale of feet

0 10 20 30 40 50 60 70 80 90 100

(Contour interval 2 feet)

1 is within 50 feet of mean sea level





CONTOUR MAP OF FLOOR OF ROCK SHELTER AND SITES EXCAVATED, BEE CAVE CANYON, BREWSTER COUNTY, TEXAS

# ARCHAEOLOGICAL EXPLORATION OF A ROCK SHELTER IN BREWSTER COUNTY, TEXAS

BY EDWIN F. COFFIN

## BEE CAVE CANYON TOPOGRAPHY

THE rock shelter is located on the ranch of Mr. Lee Schuler, on the north side and at the mouth of Bee Cave Canyon, Brewster County, Texas, about nine miles southeast of Santiago Peak and about one and four tenths miles east, and a little south, of Black Peak.<sup>1</sup> Bee Cave Canyon is a box canyon, about 1500 feet deep and 400 feet wide at its mouth, and derives its name from the colonies of bees that nest in crevices of the wall of the rock shelter. The canyon opens into Chalk Draw, which at this point is very wide and drains toward the southeast. For over ten miles of its course, beginning a little more than half a mile northwest of Schuler's Ranch, its southern boundary is an almost continuous cliff of limestone, indented here and there with canyons and caves. Within the distance mentioned, there is but one horse trail leading from the

<sup>1</sup> See Nine Point Mesa Quadrangle, Brewster County, Texas, published by the United States Geological Survey, Washington, 1918.

draw to the top land. Wagons and automobiles must detour to reach the top.

The northern wall of the canyon at its mouth and at the rock shelter rises from 400 to 450 feet above the valley. The talus at its base extends up the wall about one third of this distance, and the outer edge of the sloping roof of the rock shelter is about midway between the upper edge of the talus and the top of the cliff. The northern wall juts from 200 to 300 feet beyond the southern one. This was advantageous to its inhabitants, as it allowed one standing at the eastern end of the rock shelter a wonderful view for miles to the east and southeast down the draw, and permitted any breeze coming up the draw in summer to enter the rock shelter, while in winter when the winds come down the draw, it prevented quite effectually their deflection into the canyon, a circumstance taken advantage of to-day by herders, who use the old shelter for a winter fold.

The rock shelter is well protected from rain, for the drainage above is toward the southwest and the water falls into the canyon at its western end, so that very little comes over the cliff. Occasionally, however, a small portion of the rainwater flowing over the edge of the opposite canyon wall is carried into the shelter by strong winds.

At the end of the canyon is an abundant water supply, stored in a natural stone reservoir, about thirty feet in diameter, formed by the fall of over





ROCK SHELTER AND TALUS AT MOUTH OF BEE CAVE CANYON



CHALK DRAW FROM EASTERN END OF ROCK SHELTER

one hundred feet of the waters of Upper Rotten Draw, which drains the southern slope of Black Peak and a large area of the upland. This reservoir has never been known to go dry, according to the present older inhabitants of the surrounding country.

### ROCK SHELTER

The rock shelter, measured by the overhang, is 768 feet long, and 106 to 110 feet wide in its central portion from overhang to back wall. A mass of rocks which has fallen from its roof near the center almost divides it into two portions.

It was occupied mostly at the easterly end, this part being better adapted to the purpose, as it was the widest and most level. Much filling and leveling had been done during the time of occupancy. Over a small area to the east the floor-covering was found to be on the undisturbed talus, while the further the work was carried to the west the deeper was the fill of ash, stone, grass and discarded material, especially against the rock shelter wall. Many pointed ends of large stones protruded through the lower layers of the flooring, but at the time of the abandonment almost all of these were covered by succeeding layers of similar floors, which were over four feet deep at some points. On the wall at the back were a number of pictographs in red oxide of iron, one of which probably represents a bird with wings spread, and two others human beings.

## HOUSE-SITES

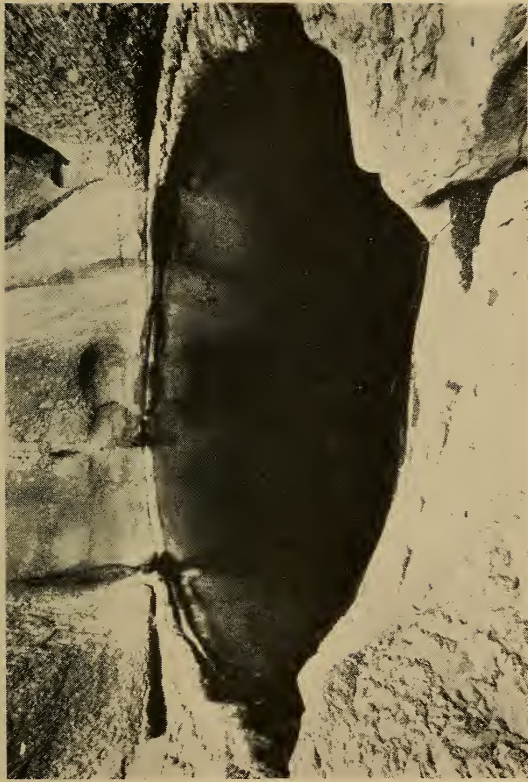
These sites have been called house-sites for want of a better name. The walls, judging by the amount of loose stone in close proximity, were probably not much higher than when found. No roof beams or posts were found except in house-site 4, where charred ends of posts were driven into the floor, but there is no evidence that these supported a roof. Perhaps enclosures would have been a better term.

The ruins of six "houses" were found, the foundations of which were all laid on the lower floor levels. These, for convenience of reference, will be denoted by number, in the order of excavation.

The walls of house 1 were partly demolished, and the site completely covered by the later floor layers. The east wall was 15 inches thick and measured 11 feet in inside length; it was 21 inches high at its southern end, and 17 inches at its northern end where it abutted on the rock shelter wall, and it bowed 6 inches in the center, toward the east. The northern end of the wall was 4 feet 3 inches long, and was constructed of small stones quite well laid, and chinked with a mixture of adobe and ash. The southern end was made of heavier stones with the inside corner thickly plastered with the same material, and the center part, 3 feet 5 inches long, was poorly constructed, one stone 12 inches wide by  $2\frac{1}{2}$  inches thick having been placed on end.

Six feet of the southern wall of this house were traceable, it being 17 inches thick at its western end.





NATURAL STONE RESERVOIR AT END OF BEE CAVE CANYON

COFFIN—ROCK SHELTER

PL. IV



HOUSE-SITE 3, LOOKING EAST

The second course of stone was laid in adobe, with the base heavily plastered, and showed the fingerprints of the builder. The western wall was missing. Near the eastern wall and outside the house-site were two small stakes driven into the ground, not far from the rock shelter wall.

Little remained of house-site 2, except a part of its eastern wall which curved at its southern end and was 2 feet high. The foundation stones were all quite large and were set on end. For a distance of 9 feet this wall was parallel with the west wall of house 3, forming a wall 2 feet thick.

Near this wall, but inside of the site and six inches below the surface, was uncovered a sherd of a cooking pot. In a row, about six inches apart and at the same distance from the house wall and on the same level, were three fragments of unbaked pottery figurines and a fragment of coiled basketry.

House-site 3 was immediately east of that of house 2. The west wall of this house was built against the east wall of house 2, as before mentioned. Both the east and the west walls were of large stones set on edge; the southern one of smaller stones, laid up. All the walls stood 2 feet high. The floor plan was irregular. Its northern side along the rock shelter wall was 11 feet 8 inches long. The average dimensions of the house were 6 feet 6 inches, by 9 feet 8 inches. No definitely defined floor was found, but the level of a bed of ashes found six inches below the surface and in the center of the room probably

had been one that caught fire and burned downward until it reached the stone fill beneath (pl. iv).

Outside of the burned area, in the first foot below the surface and mixed with grass, were fragments of matting, skin, skin twisted on strings, wood showing marks of tools, arrow foreshafts, a hearth for fire-making, a quantity of chews or quids and fragments of crowns of sotol (*Dasylirion* sp.), cactus leaves (*Opuntia*), pieces of gourd, corn-cobs and husks, cactus seed-pods, piñon nuts, animal bones, stone chips, a broken stone arrowpoint, a small grinding-stone, a pitted hammerstone, and a small stone painted with a black design.

In the second foot level, which exposed the bottom of the west wall, the fragmentary material was similar to that of the first with the addition of two worn sandals and two fragments of the carapace of a turtle. In the northwest corner, 14 inches below the surface, was a bundle of loose grass which covered a fragment of a blanket-like object made of fine fiber and strings. The fragment was folded and laid upon a checker-weave mat, which in turn was placed upon a piece of leather of about the same size. The grass floor-coverings, which were laid before this house was built, ended a few inches below the west wall.

Below the house just described and between the rock shelter wall and a large rock, were three fragments of an object that may possibly have been a baby-carrier, made of grass, tie-twined together with yucca leaves. One of the fragments was charred by the fire before mentioned.

Just east of these fragments and along the rock shelter wall was a bed of grass, 5 feet by 5 feet 4 inches in size. Below the grass was a framework of buckeye branches tied together at different points with strands of fiber. A bent piece of cedar laid on this framework, with the concave side toward the wall, caused a ridge under the grass and may have acted as a partition to divide off the space next to the wall, to be used as a bed for a very small child (pl. v).

Under the second cross-bar, formed by a branch, toward the eastern end, was a small mass of soft grass which, upon being removed, disclosed a digging stick lying parallel to and under the cross-bar, and a net bag.

Eight inches below the bed just described was another one made of grass on a framework of branches. In removing the grass, which was well worn, a small child's sandal was found. The bed was in a depression and rested on the undisturbed talus (which at this point was of very fine stones), except in the center where there was a hole 15 inches in diameter and 5 inches deep which had been filled in with stone and ash. It was of the same length as the upper bed but narrower by about one foot. Scattered between the branches under the lower bed were quantities of small seeds, nuts, animal bones, sotol and cactus leaves, a burned fragment of antler, an arrow-point, pieces of matting, and a worn sandal. The two beds and the baby-carrier were quite separate from the débris of house-site 3 above them.

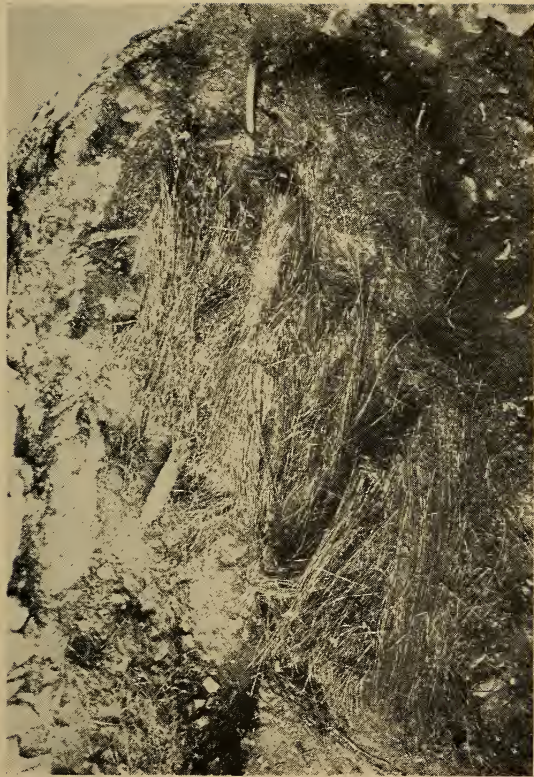
On the wall of the rock shelter, about midway between the remains of the east and west walls of house 3, were five impressions made by hands smeared with red oxide of iron, four of which, placed in pairs, one above the other, faced directly into the room. The thumbs of the upper pair were placed opposite each other, while the thumbs of the lower pair faced outward. The lower left impression was  $6\frac{3}{4}$  inches long and was 3 feet above the surface of the room before excavating began. The fifth impression was that of a left hand placed on a fractured surface facing southwest and a few inches to the west of the four above described. The imprint of the fingers was elongated, as though the person had drawn his hand down with the fingers touching the wall for a short distance before pressing the palm upon it. The bottom of this imprint was about in line with the top of the highest of the other four. About six inches below the imprint last described there was a smear on the wall, as though the hand had been wiped on it after making the impression.

There were traces of smoke blackening on the wall at the eastern end of the house.

House-site 4 was east of that of 3, and the space between the walls of the two houses was filled with stone, making a wall varying from 3 feet 6 inches to 4 feet in thickness. The floor plan was oval in shape, with one end truncated.

The east and west walls were built of both large stones on end, and small stones laid up, while the





UPPER BED AT ONE-FOOT LEVEL BENEATH HOUSE-SITE 3



HOUSE-SITE 4, LOOKING EAST, WITH WESTERN AND PART OF SOUTHERN  
WALLS REMOVED



southern section was composed of large stones on end. The bases of the east and west walls were 32 inches below the surface, and the base of the southern portion was slightly higher. Two fragments of crude metates were incorporated in the walls, one in the east (pl. VI) and one in the west. The east wall was smoke blackened.

While cleaning out the house to the level of the low spot next to the rock shelter wall, an almost complete sifting basket was uncovered, set on edge against the west wall. Six inches below this level was a remnant of a grass floor, the center of which was covered with ash and small burned stones. Between the eastern edge of this area and the east wall of the house, and on the floor, was about a bushel of pieces of leaves which had been stripped from the outside of roasted crowns of sotol, and in the northwest corner was about half this amount of the same material.

Scattered through the débris encircling the room were numerous bones of animals and birds (many of which were burned and split), an arrow foreshaft, two paint-sticks, six reed pipes, a fragment of a shell pendant, an arrowpoint, fragments of matting and leather, wood showing marks of tools, a hearth for fire-making, gourds, seed-pods, seeds, stone flakes, pieces of antler, a grinding-stone, and the sotol leaves already mentioned. Finding such a quantity of roasted sotol fragments and animal bones surrounding the burned area in the center of the room sug-

gests that the house, after falling into disuse as a habitation, was employed as a pit for cooking.

The east and west walls extended about two inches below this floor. Slightly below the floor were the charred ends of three posts which stood in a row about one foot east of the center of the room. Their lower ends had been hacked and broken off, as though a stone tool had been used, and they had been driven into the stones of the talus below.

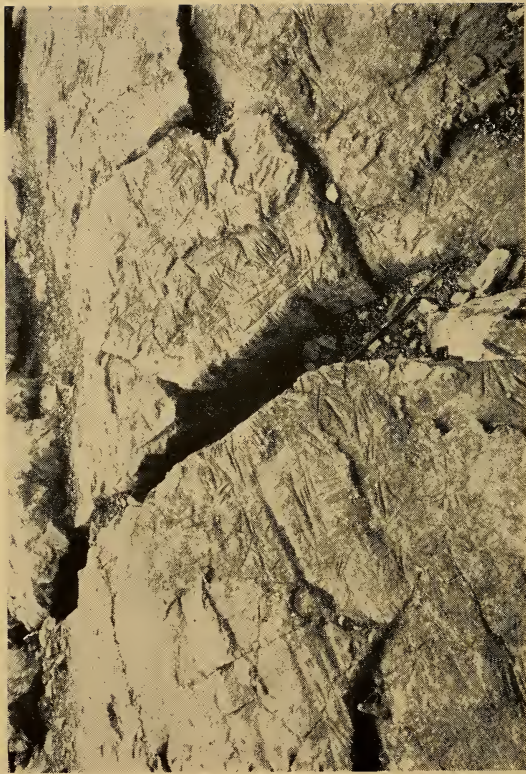
The grass floor-coverings extended under and down 9 inches below the walls of house 4, and the fill of rock and débris another 15 inches. The grass was badly burned, and with it everything that it might have contained.

Between the rocks of the fill below were several fragments of sandals and checker-weave matting, a short piece of fiber string with two seed and three reed beads threaded on it, three arrowpoints, animal and bird bones, several grinding-stones and pitted hammerstones, a fragment of a wooden fire-tongs, a painted stone, a notched rhythm stick, a fragment of an unbaked pottery figurine, a quantity of small seeds, several Mexican walnuts, a stick of wood charred at one end and having two strips of leather attached with sinew to the other.

On the wall of the rock shelter, about midway between the east and west walls of house 4, was limned an outline of a left hand and wrist. Inside the outline, which was dark red, the surface was clean with the exception of a trace of lighter red on



OUTLINE OF HAND AND WRIST, HOUSE-SITE 4  
Length of hand, 8.5 inches



GROOVED ROCK SURFACE, POSSIBLY ABRADED FOR SHAPING AND  
SHARPENING IMPLEMENTS

the two center fingers and across the knuckles. Outside there were smudges of smoke blackening on the left side of the wrist and between the thumb, first, second and third fingers. The left outline of the third finger was missing and the tips of thumb and fingers were not completed. The total length of this outline was  $13\frac{1}{2}$  inches (pl. VII).

To the south, adjacent to the combined east and west wall of house-sites 3 and 4, and on the surface, was a fireplace or pit 26 inches in diameter by 7 inches deep, which was filled with ash. It was well defined, having no doubt been cleaned out many times. The grass floorings around and below the pit were charred, but remained firm.

House-site 5 was excavated by Mr. M. R. Harrington in 1928. Its inside northwest corner was 7 feet 9 inches from the inside northeast corner of house-site 4. The west wall stood on a grass floor-covering 15 inches thick, in which a pendant of steatite was found. Between this flooring and the stone fill, 12 to 15 inches below and under the western part of the house, three wooden plugs and a piece of coiled basketry were recovered. The removal of a large stone from the center of the south wall exposed a pouch made from a small checker-weave mat, containing a quantity of corn and squash seeds.

When house 6 was built, three large stones which lay on the surface were incorporated with other stones on edge to form the wall. The floor, which was immediately below the surface, was of well worn

grass. A fireplace, in the shape of a rounded pit, was midway of the room, not far from the southern wall. It was filled with ashes to the depth of  $7\frac{1}{2}$  inches, and the grass adjoining was charred. The layers of the grass floor-coverings under the house were 9 inches thick and lay on the talus. There was no rock or other fill below.

Between the grass floor-coverings and next to the large stone at the eastern side of the house were found the left half of the lower jaw and part of the frontal bone of a human skeleton, two fragments of metates colored red on one side and black on the other, and a rubbing stone. Near by was a fragment of a sandal and a short length of reed inserted into what appears to be a piece of dried vegetable substance.

Along the rock shelter wall, to the west of the house-sites above described, were three groups of stones which were flat on the surface. Their position suggests that at one time they formed low walls which have been knocked down by the sheep and goats that today occupy the rock shelter during the winter months. While it was impossible to measure these enclosures accurately, they are in such a position as to indicate rooms about 8 by 9 feet in size. If assembled, the stones would have made a wall two tiers, or about 9 inches high.

Remnants of seven similar structures were located along the wall in the western part of the rock shelter. They were built of loose stones on the talus and the



floors covered with grass mixed with which strings and fibers were found. There were also eight spots along this section of wall which had been lightly covered with grass and had probably been used for camping. One of these, in a depression, was covered a little more thickly than the others, and was littered with twigs, leaves, animal bones, fiber strings and corn-cobs.

### CAVES

The mass of stones previously mentioned, which had fallen from the middle of the arch of the rock shelter roof, formed several small caves, two of which showed signs of human habitation. The larger, cave 1, was 37 feet 9 inches in extreme length, and about 9 feet wide. The smaller was approximately 9 feet square. Cave 1 had been occupied at its northeastern end. Back of a retaining wall four to five inches high, formed of three stones placed end to end between a large rock and the southerly wall, was a bed of grass, leaves, twigs and litter. In front of the retaining wall was a patch of grass flooring one to two inches thick. A fireplace 18 inches deep was close to the edge of the flooring and 6 inches from the northerly wall. It was filled with ashes and the wall was smoke blackened.

Behind a stone, against the southerly wall and at the edge of the grass flooring, were a pair of worn fiber sandals, and scattered through the grass of the bed were a corn-cob, fragments of checker-weave

matting, coiled-weave basketry, reeds, pieces of wood bearing marks of tools, fiber, strings, gourds, a hearth for fire-making, a notched end of an arrowshaft, a bowed twig, and a fragment of a curved grooved stick, 8 inches long, such as is used for rabbit hunting by some of the living tribes of the southwestern United States today. Upon removal of the retaining wall before mentioned, the grass flooring was found to run under the wall and bed.

On the northerly face of a large rock at 9-G, 10-G, and on the upper face and edge of a large split rock, 18-J, 19-J (see map), were numerous grooves which may have been used to help shape and sharpen bone and other implements (pl. VIII).

#### FIRE-PITS

To the east of the rock pile at the center of the shelter were two depressions, the larger without, and the smaller within the area covered with grass. Both these depressions proved to have been fire-pits. The greater one was bare, but the smaller was surrounded with pieces of roasted sotol crowns and other refuse.

#### OBJECTS RECOVERED FROM THE EXCAVATIONS

##### STONE ARTIFACTS

Many grinding-stones, few of which are over 6 inches in length, a size convenient to operate with



one hand, were found. The coarser and harder ones are neatly pecked to shape, but some of the finer grained and softer are ordinary brook stones. The worn surfaces are of interest as they show the motion used while grinding. Some are worn flat by steady pressure, some are convex from rocking, and others, especially the softer, finer grained type, are worn to a sharp edge on one side. A few are pitted on one or both sides, showing a secondary use as hammers.

Beside the two crude metates used in construction of house 4, and one found under the surface, only a few fragments of others were recovered.

Pitted hammerstones were abundant, and about a dozen roughly chipped spherical stones, which probably were used as hammerstones, were also found.

Many chipped or flaked stone implements occurred, such as arrowpoints, scrapers, saws, knives and spear-points. The largest of the scrapers is  $5\frac{1}{2}$  inches long.

A fragment of a grooved axe or maul, and a fragment of what appears to have been a bowl made from a nodule with the rim rounded by grinding and the outside pecked were found in the fill under the floor-covering, near the wall about in the center of the shelter.

Other finds within the shelter were:

Several fragments of flat, fire-blackened stones, which may have been used as griddles or baking stones.

Two rough stones with fiber cords attached.

Two fragments of tubular smoking pipes, or "cloud blowers," made of limestone.

Four small unworked stones wrapped with grass. The ends of the wrapping on one of these are twisted together, while the ends of the grass on two of the others are held in place by cactus spines. Protruding from under the wrappings are what appear to be thin pieces of some vegetable substance. It is possible that these objects were used as charms (fig. 1).

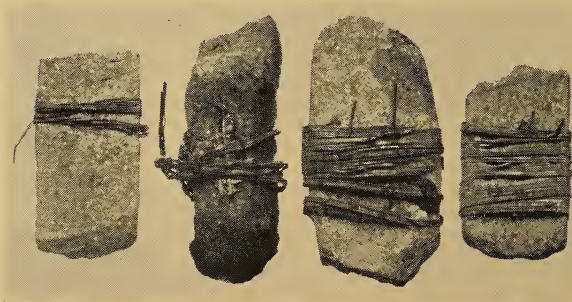
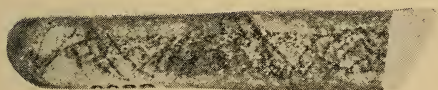
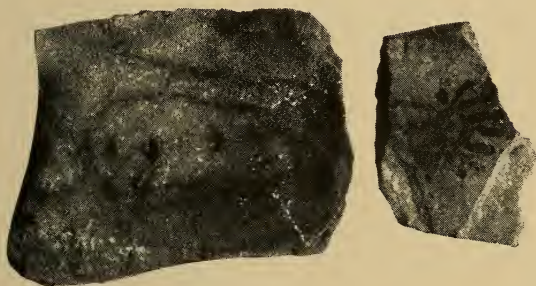
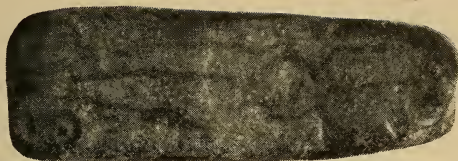


FIG. 1.—Stones wrapped with grass. Maximum length, 2.6 in.  
(16/8706-08)

A number of brook stones and flakes from the shelter wall were decorated with painted designs, two with red, the others with black. The designs, for the most part, although quite clearly defined, are not suggestive of interpretation (pl. ix).



STONES DECORATED WITH DESIGNS IN BLACK OR RED  
Maximum length, 3.5 in. (16/8589, 8594, 8596, 8599, 8600)



STICKS OF WOOD WITH TENON-LIKE ENDS  
Length of *b*, 7.4 in. (16/8619)

## PAINTS

Black, red, and yellow paints were employed by the dwellers in the rock shelter. On some of the painted stones charcoal appears to have been the basis of black paint, on others vegetable juices were the chief ingredient. Oxide of iron was used for red, and ochre for yellow. The beveled ends of thin pieces of stone served to apply the colors, and a number of these were found with the paint adhering to them.

## WOODEN IMPLEMENTS

A number of round sticks cut at each end, possibly gaming sticks, and two short triangular ones which may have been dice were found.

Among objects of unknown use are five lengths of wood, round, and with one end cut like a tenon. The opposite ends of two are tool marked (pl. x, *c*, *d*). The one marked *e* is splintered, and the remaining two are charred.

A similar object,  $9\frac{1}{8}$  inches long and  $\frac{9}{16}$  of an inch in diameter, was found back of a cave at the mouth of Rotten Draw, about two and three quarters of a mile south by east of the shelter. This specimen had a tenon at each end, one at an angle of about forty-five degrees in relation to the other.

An entire rhythm stick,  $11\frac{1}{2}$  inches long, with twenty-nine notches, and several fragments of others, some of which are very crude, were recovered.

Many fragments of fire-making drills and hearths

remained. Only one of the drills was complete. It measured  $25\frac{5}{8}$  inches in length, and had a rough point at the upper end, proving that it was of the type manipulated by twirling between the hands.

Small bows, about a foot in length, made from a branch or twig, and bent with a string of fiber, were the only bows recovered. These were probably toys, for although they are strong enough to rotate a fire-drill, it is doubtful if they were used as such, for no parts of the fire-drills found show evidence of having been used in that manner.

Four fragments of atlatls, or throwing-sticks, all from the end in which the nock of the arrow or spear rests, lay in the same levels as notched arrows. The upper sides of three of them are flat, while the upper surface of the fourth slopes slightly toward the center. The grooves are round. The under sides are all convex. Two of these specimens had been severed from the rest of the implement, probably after accidental damage to the prongs, by cutting or sawing part way through from either side and breaking the remaining fibers.

Three fragments of curved sticks (rabbit sticks), grooved along the sides, were recovered, but no entire specimen.

Tapered plugs, saw-grooved, and broken off at one end and battered at the other, may have been used as stoppers for gourd bottles. One of these has been cut off and made smaller at one end, the tool marks showing where this operation ceased. In both ends

of this specimen are what appear to be wedges (although these may be the projections of one piece running all the way through, as they are in line) of a material, in its present state, as soft as, and resembling, the edge of a piece of gourd.

A number of battered and hacked pieces of wood which may have been used as stakes to drive in the ground, or as wedges, were found.

Many broken and cut fragments are probably remains of tool handles and implements. One of these is probably the partly sawed and broken off handle of a rabbit stick, roughened to afford a grip.

A thin stick  $4\frac{1}{8}$  inches long, flattened on two sides, is pointed and charred at one end. On the



FIG. 2.—Pointed stick with leather straps. Length of stick, 4.1 in. (16/8685)



other end are bound two pieces of leather which apparently originally formed loops, one on each flat side. One of the loops is broken, and part of the other is missing (fig. 2). The object suggests an implement held between two fingers passed through the loops, possibly a corn sheller.

An object  $\frac{7}{16}$  of an inch in diameter and 3 inches long is wrapped on one end with sinew. A hole  $\frac{5}{16}$  of an inch in diameter and 1 inch deep is drilled in one end. The other end is cut off, and judging by the surface this object was used after the cutting took place, as it is more or less smoothed and rounded. Other similar sticks ranging up to 8 inches in length were also found, with drillings in one or both ends, though some do not show usage on the cut end.

Other sticks have depressions in the upper ends from  $\frac{3}{32}$  to  $\frac{3}{16}$  of an inch deep. The lower ends are partly cut, then broken off. These objects fit well when laid in the groove of the fragment of the throwing-stick before described, with the depressions engaged with the spur of it. They may have been ends of light projectiles.

Other wooden implements were:

Several pointed digging sticks, varying from 20 to  $42\frac{3}{8}$  inches long, and ranging from  $\frac{5}{8}$  to 1 inch in diameter.

A number of sides of wooden tongs used for trimming the fire, and for other purposes. These had been flattened on one side and grooved at one end, so that when a pair of them is bound together, the



flat surfaces face to face, a very efficient tool for handling embers is obtained. They had all been used, as shown by the charring of the unbound ends.

Two finely finished wooden implements, pointed at one end and grooved at the other, probably used as paint-sticks.

Two twigs bound at both ends with fiber strings, probably parts of snares.

A flat piece of wood  $\frac{5}{8}$  of an inch wide by  $2\frac{1}{2}$  inches long, decorated with three black painted designs, one of which appears to represent a dragon-fly, another possibly a butterfly, while the last is a rectangular oblong outline.

Notched foreshafts of wood, for projectiles used with throwing-sticks.

Some complete, and many fragments of wooden foreshafts for arrows. A few of these were pointed at one end and notched at the other, for the purpose of mounting points therein. The majority of these foreshafts, however, were pointed at each end. One of the latter type was found inserted in and attached to a fragment of reed arrowshaft. Two fragments of notched foreshafts were found with fragments of arrowpoints in place, held there by sinew wrapping.

#### REEDS

Of this material there were:

Fragments of the tapered head ends of arrowshafts.

A cut and tapered piece of reed inserted into another section of reed cut for the purpose.

Fragments of the nock end of reed arrowshafts with wrappings and shreds of feathers in place; two specimens showing that they had been cut from the shaft. All of the nock ends when wrapped had been reinforced by driving pieces of reed or wood into them.

Small reeds which had had feathers attached to one end, parts of the bindings and feathers being still in place.

A short piece of reed inserted into what appears to be a dried vegetable substance.

Pipes were found made from two sections of the stem of a reed. One end is cut off close to, and the other at a distance from the joint; the dividing partition between the sections is punctured. The short ends served as mouth-pieces while the longer ends served as bowls, these being in many cases badly charred and shortened through use. A few of the bowls still contained the dottle, one of which was of cedar sprays.

Tubular containers were made of reed; three of these were found between two clumps of grass, under the edge of a large stone, near the bottom of the trench and below the grass floor-covering. They were filled with what appear to be seeds of *Amaranthus paniculatus*,<sup>2</sup> and were stoppered with grass plugs. The tubes were cut similar to the reed pipes, but were longer, and the partitions between the sections were not punctured.

<sup>2</sup> Identified by the Bureau of Plant Industry, Washington, D. C.

## ANTLER PESTLES AND TOOLS

The following specimens were found:

Several pieces of antler, cut and rubbed smooth at the ends, that may have been used as pestles.

The basal segment of an antler, hollowed out  $\frac{9}{16}$  of an inch in diameter and  $\frac{5}{8}$  of an inch deep, on one end, the inside of which is charred.

A fragment of an antler implement, possibly a flaking tool.

An implement, the inner surface of which is concave, and the ends of which are beveled. It was probably used as a skin scraper.

Pieces of split antler, the cut surface and edges finished smooth as by rubbing.

## BONE IMPLEMENTS

Bone implements, awl, chisel and gouge shaped, were quite plentiful, and well polished from use. They do not differ in type from those found so abundantly in Arizona and New Mexico. Two fragments of bone have as designs scorings of parallel straight lines. One bone fragment is decorated by a series of black paint dots running lengthwise, and another shows traces of having been smeared with red paint and striped with black.

Three implements made of scapulae, probably those of deer, were broken away so as to retain the spine and one fossa. The edges of the implements are worn quite smooth and thin at the point, and

one has what appears to be some vegetable substance adhering to it. For use as scoops these implements are sturdy and fit well in the hand.

#### GOURD VESSELS

Fragments of gourd vessels, many of which have been mended by placing a caulking of soft fiber over the crack before lacing together with fiber strings, were recovered. A few fragments appear to have been perforated with a friction drill, and one has many indentations, apparently made with a hot, pointed instrument.

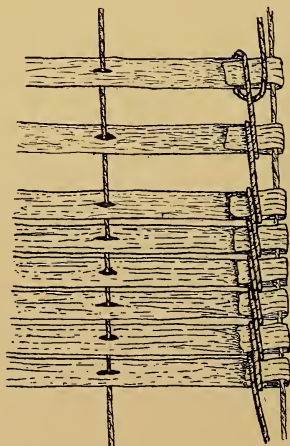


FIG. 3.—Detail of wrap-woven edge and warp strand of mat shown in pl. XI



FRAGMENT OF GRASS MAT  
Length, 6.3 in. (16/8688)

## MATTING

Many fragments of matting of yucca leaves were found, both of the checker type, and of the over-two under-two twilled-weave technique, also three small mats, two of which are of checker-weave, and one of twilled, and a small checker-weave object with several strands allowed to extend out from one side.

There were also fragments of a mat made of unidentified grass, the edge wrap-woven with a two-strand twisted fiber string. Three inches from the edge the matting was held together by piercing and stringing the grass leaves on a two-strand twisted fiber cord (pl. XI and fig. 3). Fragments of a similar mat were found under the remains of a child in cave 3, around the corner and a little to the north of the shelter.

## BASKETRY

A pouch about four and one-half inches square, made by folding a small checker-weave mat in the middle and stitching the ends and one edge together, was found buried a few inches below the surface and next to the outer side of a stone, forming part of the south wall of house 5. It was filled with about an equal quantity of corn and squash seeds. Part of the matting at the opening of the pouch had been broken away. It was closed by stuffing in a small quantity of soft grass and stitching with a narrow yucca leaf; a fiber cord was tied both ways around the pouch (fig. 4).

A cylindrical checker-weave basket four inches high, containing a piece of hematite, five small pieces of sinew, and a quantity of fine fiber, may be part



FIG. 4.—Pouch containing corn and squash seeds. Length, 5 in.  
(16/8690)

of a fire-making outfit. They were found while scraping off the floor of the shelter preparatory to

excavation. The only fire-making tools found below the surface were drills and hearths.

Two sifting-baskets of the tray type were made of yucca leaves, with the strands separated  $\frac{1}{16}$  to  $\frac{1}{8}$  of an inch. Attached to each of these is a fragment of a rim or binding, made of several yucca leaves one laid on another and bound to the edge of the basket with an open-coil stitch. Many fragments of basketry with similar binding were found.

Of several fragments of coiled basketry, all in a very poor state of preservation, three are open-coiled, and nine split-coiled. The foundation of most is splints; one of the open-coiled fragments has a foundation of the small stems of some plant. A fragment of a base of another specimen was repaired by stitching with yucca fiber.

A piece of coiled basketry, about two inches in diameter, had both the foundation and the coils of yucca leaves. Two narrow leaves on edge form the foundation and split leaves form simple interlocking coils.

Many small fragments showed a weaving technique similar to the sandals found in the shelter, to be described later (pp. 43-49).

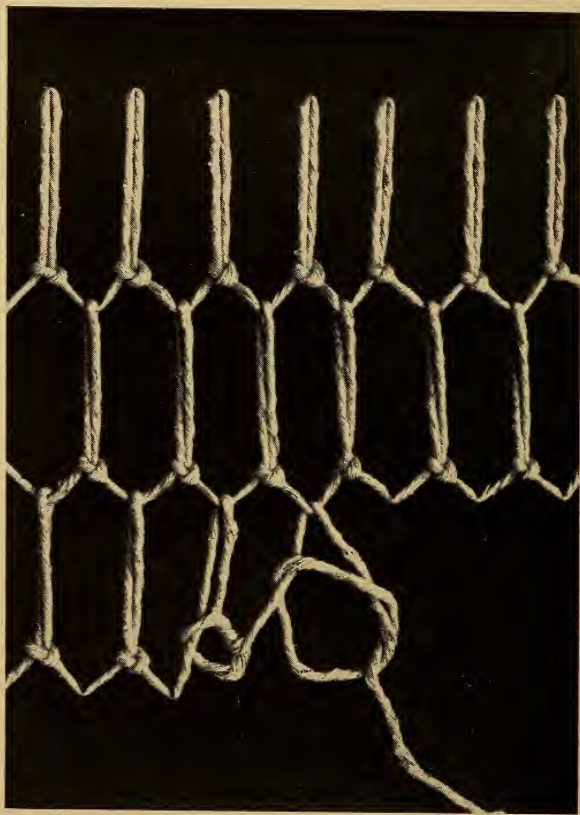
#### NETTING

Two fragments of netting were made of fiber strings, tied with a netting knot, the meshes approximately  $1\frac{3}{4}$  and  $2\frac{1}{2}$  inches respectively.





NETWORK BAG  
Length, 12 in. (16/8719)



DETAIL OF NETTING TECHNIQUE OF NETWORK FRAGMENT

A network bag 12 inches long, of fiber string, has a mesh averaging  $\frac{3}{4}$  of an inch. A draw string runs through the upper or last mesh; a twisted cord 9 inches long with a knot at its end is attached to the center of the bottom (pl. XII).

The meshes of two other fragments of netted bags measure  $\frac{5}{8}$  and  $2\frac{1}{2}$  inches approximately.

Other fragments of netting were made of split yucca leaves. The intersections are not tied, and they are attached to sticks of wood. The net apparently was made on a frame, the sticks forming part of it, and the strands of yucca were stretched across, first in one direction and then in the other. Where a strand crossed another it was wrapped one turn around the one already in place.

A fragment of network, in bad condition, made of split yucca leaves, shows an irregular sized mesh consisting of a series of loops, tied with slip knots, interlaced with other like series. Plate XIII depicts a cotton string netted to illustrate this technique.

Open-coiled work without foundation, made of fiber strings, was exemplified in a number of fragments. One specimen, when held in its proper position, forms what may have been a cap. Near the edge there are ten coils and six loops to the square inch and near the center seven coils and five loops. Another fragment is of interest because of the extra twist used in making coils.

## STRING

Examination of the large number of pieces of string show that a variety of fibrous vegetable material was used in making them. The majority appear to be made of the fibers of the leaves of different species of yucca which grow in the neighborhood.

Many pieces of string of a softer fiber were colored red and yellow; a few are made of grass and some of a material as soft as cotton.

Many times, split yucca leaves and untwisted fiber strands were used as binders or tie strings. Most of the string found was twisted, varying from  $\frac{1}{32}$  to  $\frac{3}{8}$  of an inch in diameter, and of one, two, three, four, and five twisted strands. A few four-strand strings were made by twisting together two two-strand strings.

Sometimes in making string of a leaf, the point was left intact, thus keeping the end from fraying, and forming a lacer-like tip. A few fragments of sandals have tie-strings of this type attached to them.

Fringe-like fragments made of one- and two-strand cords of twisted fiber, the units of the fringe hanging down, were probably formed by tightly twisting and looping sections of the main cord. One fragment has two complete units  $15\frac{1}{2}$  inches long.

Many pieces of twisted cord have tapering ends. In one case two such pieces are tied together with a square knot, forming a cord almost eight feet long, with the tapered ends free. A twisted fiber cord,

complete in itself, one end tapered and the other end formed in a loop, was found in a small coil. Several tie-twined bits of fiber string were also collected.

### KNOTS

The square or reef-knot was generally used. Out of over one hundred knots examined, only three were granny, and two square bow-knots. Half-hitches and slip-knots were also used, the former probably in tying to an object, the latter in snaring.

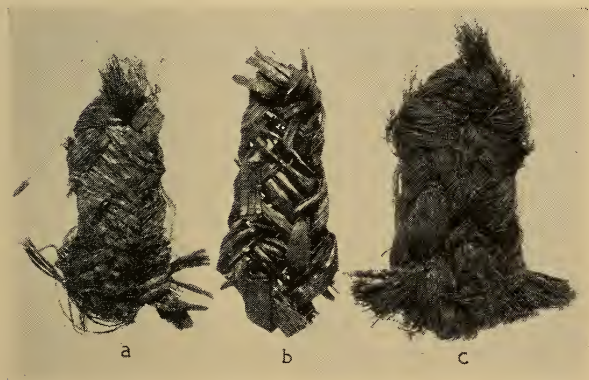


FIG. 5.—Sandals of yucca, braided, with ends woven in. Maximum length, 6.5 in. (16/8814, 8817)

### SANDALS

A great many sandals made of yucca were found, but unfortunately, almost all of them are badly worn and have but few tie-strings still attached.

The sandals may be said to have been braided in two ways: First, several strands braided together; second, one or more strands braided with two opposed elements. The plaiting of the former is irregular, the ends of the strands are woven back through the braid and it is impossible to trace the whole braid without destroying the specimens (fig. 5). Thickness and strength were added to the larger sandals

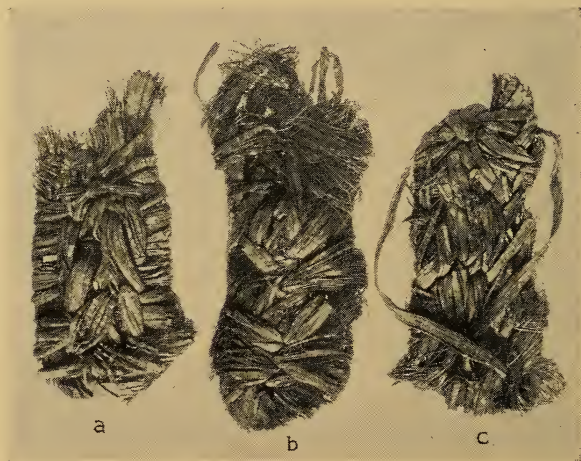


FIG. 6.—Sandals of yucca, reinforced. Maximum length, 8.5 in.  
(16/8812, 8817)

of this type by weaving in extra strands after the braiding had been completed. The two specimens, *b* and *c*, fig. 6, are braided, the latter having been

reinforced with strands woven in lengthwise, while the former appears to have been reinforced at the ends with an overcast stitch that pierces the center, and coils around the sides of the sandal. The coils have been worn off on the under side.

The braiding with two opposed elements varies but little (figs. 7-9). In fig. 7 the strand is kept flat

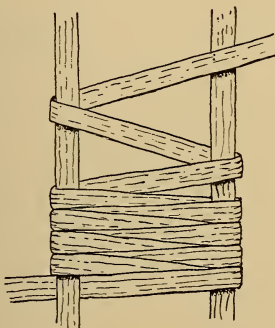


FIG. 7.—Detail of braiding technique with opposed elements, strands kept flat.

while braiding. In fig. 8 the technique is the same as in fig. 7, except that the strand is turned over each time it is passed between the opposed elements. Figure 9 and fig. 7 show the same technique except that in the latter two strands are braided instead of one.

When necessary, new strands were added to carry on the work. Loose ends were allowed to project



from the under side of the sandal. For opposed elements, broad leaves, narrow leaves, shredded fiber, and two-strand twisted fiber strings were used.

The sandal *c*, fig. 10, is made of broad leaves and is constructed in reverse of the technique of fig. 9. *B* of the same plate is made of narrow leaves and is constructed according to the technique of fig. 9, with

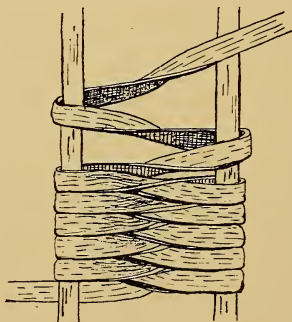


FIG. 8.—Detail of braiding technique with opposed elements, strands turned.

extra strands woven in lengthwise. *A*, fig. 10, is made according to the technique of fig. 8, one large leaf forming the two opposing elements.

The three sandals depicted in fig. 11 are woven in the technique of fig. 7. The opposing elements of *a* are of yucca which has been shredded, except at the ends which are tied together at the top. This sandal appears to have been made from the bottom



up, and the shredded yucca strand used to form the opposed elements was wrapped several times spirally around a small bundle of fiber at the start, to help keep the elements apart. The sandal *b* is made of short narrow leaves, three or four of them being used for each opposing element; a single narrow leaf is

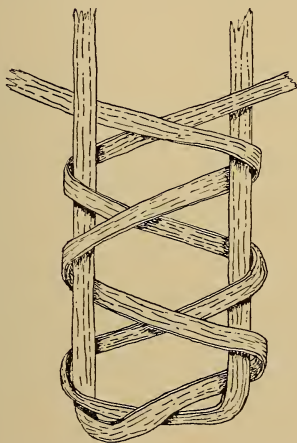


FIG. 9.—Detail of braiding technique with opposed elements, two flat strands.

braided for about five rows from the bottom, after which two or more leaves are woven in at a time.

#### TIE-STRINGS

Judging by the tie-strings found attached to other sandals and fragments of sandals, the tie-strings of

the sandals shown in figs. 5, 6 and 10 were of yucca leaf or fiber, and were attached as shown in fig. 12.

Six sandals similar to the one illustrated in *b*, fig. 11, were found. All of them are small, ranging from 4 to  $5\frac{1}{2}$  inches in length, and were probably worn by children. They appear to have been held to the foot

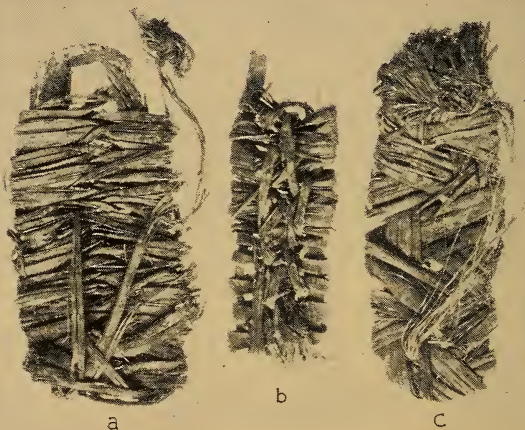


FIG. 10.—Sandals of yucca, braided with two opposed elements. Maximum length, 7.8 in. (16/8812-13)

with a toe loop, and two side strings, which are attached to the edges of the sandal half to three quarters the distance from the toe end to the heel, passed over the instep, and then tied to the toe loop.

The opposing elements, or framework, and the tie-strings of the child's sandal (fig. 11, *c*) were two-strand twisted fiber cords. One long cord was used to form the framework and the front tie-strings, as shown in fig. 13.



FIG. 11.—Sandals of yucca, braided with two opposed elements, *a* with shredded strands and *c* with fiber string. Maximum length, 7 in. (16/8813-14)

A fragment of what may have been a sandal is of checker-weave, with two strings attached to it, and shows wear on one side.

## FABRICS

A fragment of woven material of blanket-like appearance, about 14 by 15 inches, is made of coarse twisted strands of fine fiber, held together at intervals by twined similar strands, and small tightly twisted two-strand fiber strings (pl. XIV).

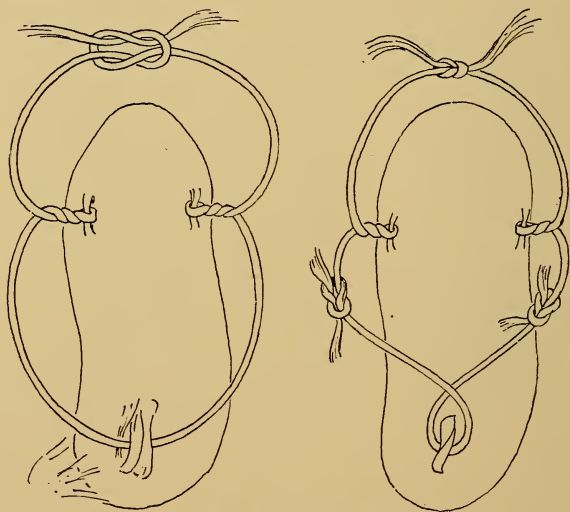


FIG. 12.—Technique of tie-strings of sandals.

Another specimen is a small corner piece of fabric in which the warp strands, or two-strand twisted strings about  $\frac{1}{8}$  of an inch in diameter, are twined tightly together at  $1\frac{1}{2}$  inch intervals by smaller strings. The edges are turned, and the twining is

similar to that of the previous specimen described, and in both specimens the technique resembles that used in making rabbit-skin blankets.

Many twisted strips of skin such as are used for making skin blankets were also found. Most of them are wrapped spirally around fiber cords; a few have bits of fur or hair still in place.

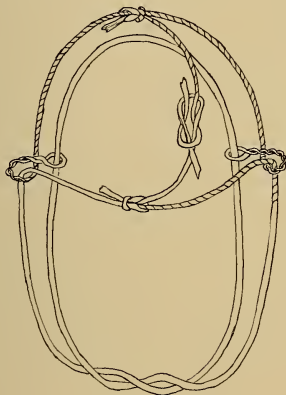
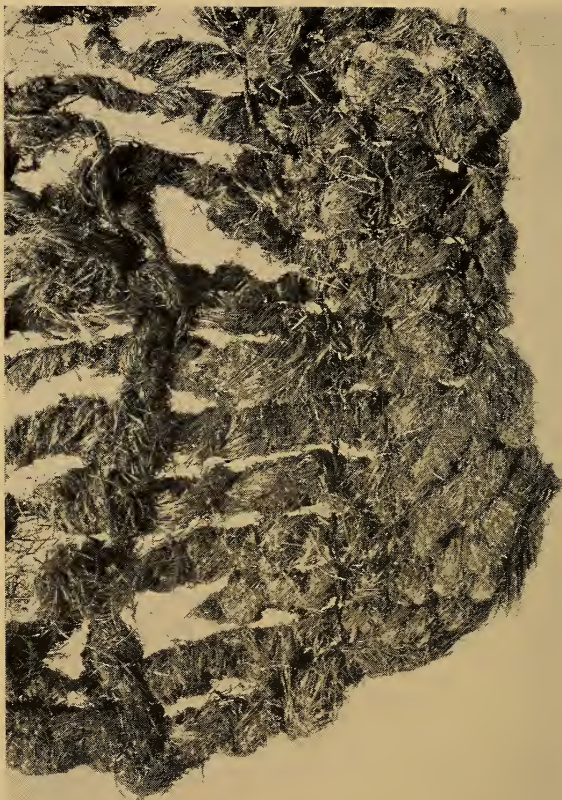


FIG. 13.—Technique of framework and tie-strings of child's sandal *c*,  
fig. 11.

Of materials prepared for use in weaving there were:

Quite a number of small bundles of shredded fiber; leaves of sotol (*Dasylirion* sp.), yucca and other plants, sorted or split to a size; grass, etc. Most of the bundles are loosely wrapped near the center with a tie-string of the same material as that in the bundle.



BLANKET-LIKE FABRIC OF SOFT FIBER  
(16/8729)

## FIBER BRUSHES

A brush was made by folding a number of strands of fiber so that the ends met, and then wrapping them around with other strands of fiber.

An object made of fiber strands folded over a loosely twisted fiber string and tie-twined below the string was in a roll when found and had the appearance of being a brush. \*

## CACTUS THORNS

Several cactus thorns were bound together with a fiber string.

## BINDINGS

Numerous rings, from less than two inches to over six inches in diameter, made of yucca leaves and other fibrous plants, were discovered. They probably were used as bindings in transporting grass and other material to the shelter. They were made either by wrapping a single leaf, or leaves tied together, end to end, with a square knot; or by running fiber strands around the bundle of material several times and then repeatedly passing the loose ends under and around the loop thus formed. Several rings made of narrow leaves have the appearance of having been twisted together before binding, but the ends finish in a wrap and not in the knot which would be necessary if the strands had been twisted



before binding. All these rings are quite flat, probably made so by being trampled upon after having been discarded on the shelter floor.

Many plain bindings and wrappings were found, and they were almost invariably tied with one or more square knots.

#### GRASSES AND LEAVES OTHERWISE EMPLOYED

Grasses were put to other uses than those already mentioned. Among articles of this material found were:

Rings of grass wrapped with yucca leaves, or other fibrous vegetable substances.

Fragments of pads of matted grass with parts of tie-strings attached.

Fragments of an object made by tie-twining together strands of grass with strips of yucca leaves. The grass stems used in making the strands do not exceed 9 inches in length, so the strands were made continuous by overlapping small bundles of stems as the work proceeded. Some of the strands are loosely wrapped with narrow strips of yucca leaves. The widest fragment has seven strands and is  $5\frac{3}{4}$  inches wide. Judging by the fragments found, the bottom of the object was a crude network of yucca strips tied to the lower ends of the tie-twined strips. The rim was finished, after the final tie-twining knot of the upper coil, by tying the ends of the tie-twining strips in pairs with a square knot. The work probably was carried on from left to right as all the loose

ends of the knots to the left are free, while the ends to the right are caught under the following knot. The tie-twining is separated by intervals ranging from  $1\frac{1}{2}$  to 4 inches. The fragile construction of this object must have made it unfit for heavy duty, and the finding of the fragments just west of the beds under house 3 suggests that they may have been pieces of a cradle or baby-carrier which was discarded when the lower bed was abandoned and the upper bed made.<sup>3</sup>

Fragments of an object made of sotol leaves twined together to form a bag-like container, the bottom part of which is missing. A large fragment of a similar object, with a worn sandal tied across the opening, was found in a cave at the mouth of Lower Rotten Draw.

Fragments of a hammock-like specimen made of sotol leaves twined together at intervals with split leaves found in a fill 4 feet 2 inches below the surface. This object, when found, was 35 inches long by 18 inches wide near the center, and was broken in two by a worked stone which had been thrown in on top of it. One of the ends, a ball of knotted leaves, was broken off and lay a couple of inches away. Scattered over the object were some light twigs and leaves, and toward one end was a handful of grass held together with a leaf.

<sup>3</sup> Kidder and Guernsey in *Archeological Explorations in Northeastern Arizona*, *Bulletin* 65, Bureau of American Ethnology, Washington, 1919, illustrate, pl. 72, cedar-bark cradles the sides of which are twined together.

## LEATHER REMNANTS

Many fragments of different sorts of leather besides the strips previously mentioned (p. 30) were found. The majority seem to be scraps, with the

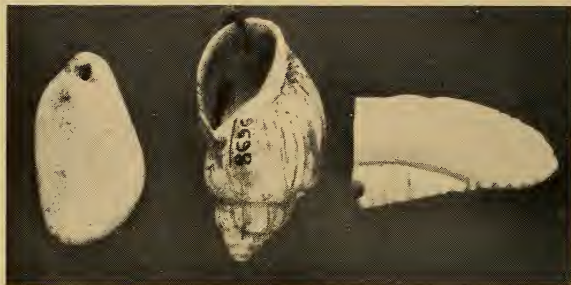


FIG. 14.—Pendants of stone and shell. Length of mussel shell, 1.6 in. (16/8682, 8683, 8696)

holes made in stretching still at the edge, and cuttings left after making garments or other articles. Some of the pieces have been scored with series of lines which form irregular squares. Four fragments appear to have been parts of objects made for some definite use, but there is not enough left fully to determine what purpose they might have served.

## ORNAMENTS

Few objects of personal adornment were found. These were:

Two flat pendants of stone, one of which has had two perforations broken out, but in place of which a third one had been drilled. A fragment of a pendant made of the shell of a fresh-water mussel. A pendant made of a land-snail shell, with a piece of a fiber cord attached for suspension (figs. 14-15).

Two short strands of beads made from seeds, and a short strand of beads of cut sections of reed, threaded on fiber strings (fig. 16).



FIG. 15.—Pendant of stone. Length, 1.2 in. (16/8684)

#### CLAY FIGURINES

Two complete and twenty-four fragments of small grotesque human figures made of untempered and unfired clay seem to have been the only fictile objects possessed by the ancient inhabitants. The figures



FIG. 16.—Seeds and sections of reed strung like beads. Maximum length, 4.6 in. (16/8704)

consist of the head and torso; the noses are long and sharp; the mouths are small round punctations; the

eyes are part of the black paint decoration which covers the upper parts of the figures. One fragment has sharp pointed breasts, evidently representing a female. Another has traces of red, yellow and black painted decoration. The lower parts of the torsos



FIG. 17.—Figurines of unfired clay. Maximum height, 2.9 in.  
(16/8675, 8678, 17/8705)

are round. The backs are incurved and some have the natural indented line down the buttocks. One figure, with head missing, was wrapped around its center with grass (fig. 17). These figurines are probably of the same class as others more or less like them still found among many of the present day tribes, and are a symbolism of fertility.

## VEGETABLE FOODS

Among the vegetable substances, most of which could be used for food, were:

Quantities of prickly pear (*Opuntia* sp.) and other small seeds, corn, mesquite beans (*Prosopis glandulosa*), acorns (*Quercus*), Mexican walnuts (*Juglans*), Mexican buckeye or soap-berries (*Sapinus*), piñon nuts (*Pinus edulis*), desert-willow pods (*Chilopsis linearis*), pumpkin seeds (*Cucurbita pepo*), small gourds (*Cucurbita foetidissima*), squash seeds, seeds and pods of yucca, roots, some of which were no doubt used as amoles are today, and strings of dried cactus fruit of which some were tie-twined together. Cacti of different species, many devil's heads (*Homolacephala texensis*) were split in two horizontally to get at the inside. Great care must have been taken to rid them of the upper spiniferous halves, as none were found. Small cacti (*Echinocercus* sp.) were dried as were star cacti (*Astrocarpus fissuratus*). The latter is said to be used by Mexicans in the same manner as the peyote button. *Opuntia* leaves were all of a large size; one leaf was cut and filled with ash in such a manner as to resemble a quarter-cut of pie,  $2\frac{1}{4}$  inches thick and  $4\frac{1}{2}$  inches long on the straight sides. A sharpened piece of wood had been thrust through the center.

Large quantities of corn-cobs were found, and fragments of sotol crowns (*Dasyllirion* sp.). Innumerable quids or "cuds" of fiber, which are no

doubt remnants of the latter discarded after chewing, were scattered through the débris.

#### ANIMAL BONES

While quite a variety of animal and bird bones were found, they were not numerous, considering the size of the shelter and the quantity of vegetable refuse it contained. Whether this points to dry seasons and poor hunting during part of the summer is a question. Most of the bones were broken in order to obtain the marrow. Among the bones that it was possible to identify are those of deer, rabbit, badger, coyote and rat; while the fragments of a large jaw and a tibia are probably those of a bison. Fragments of the carapace of a turtle were also found.

#### CONCLUSIONS

The rock shelter in Bee Cave Canyon seems to have been occupied at different intervals and for no long time at any period; for the artificial deposits, which varied from almost nothing at the edge, to about four feet at the rear of the shelter, were separated from one another by layers of grass only a couple of inches apart, as if the occupants had successively inhabited and abandoned the site many times, leveling and improving the floor with grass each time they or others returned to reoccupy it. In excavating the successive floorings, each layer of deposits was removed, and within them were found



many artifacts and other objects; but there was no indication of any cultural difference in the layers, regardless of their depth.

Although many fragments of notched arrowshafts were found, there was no trace of a bow. The occurrence of the atlatl and the notched arrow, in deposits indicating no great range of time, would seem to suggest that the throwing-stick and the bow had been used contemporaneously.

A notable feature is the scarcity of pottery, the only trace of it being some unbaked figurines, and three small fragments of vessels, one of which (part of a bowl) is of thin brown ware with black painted decoration. These potsherds were found on or near the surface, and are doubtless intrusive.

The only small fireplaces found in the area covered by grass were the one south of the combined east and west wall of house-sites 3 and 4, and the one in house-site 6. These were undoubtedly made by sheep-herders who use the shelter in the cold months as a fold. The litter of cardboard boxes, pieces of leather and other rubbish on the surface south of house-site 6, and the finding of a small tin box containing beans, and burned wood from boxes, on the surface in the house-site, confirm this opinion.

Leaving these two fireplaces out of consideration, the only fireplaces left are the two large pits east of the rock pile at the center of the shelter, and house-site 4, which had been used as a fire-pit after falling into disuse as a dwelling.

Bearing in mind what has been said as to the floor-coverings and fire-pits, the evidence points to the supposition that the rock shelter was occupied only as a summer camp. The inflammable material used as floor-coverings prevented building fires for warmth in the houses in the winter time. Cooking or roasting in large pits suggests a communal mode of living. Probably only one pit at a time was used. The larger one outside of the covered area, judging by the fact that it was bare of refuse, appears to have been in use prior to the one within (see p. 22).

The finding of such large quantities of pieces of sotol crowns and of corn-cobs suggests that corn was raised in the valley, and that sotol was the main food supply while waiting for the corn to ripen.

Other circumstances pointing to the theory that the camp was used only in the summer time are that, while numbers of hammerstones and manos were transported into the shelter, but few metates, which are heavy, were found. Also, the finding of so many pieces of leather, all of which, with the exception of four, appear to be discarded cuttings, suggests that the people left the lowlands in the spring, traveling light, and that such skins as were secured during the summer were made up into garments or other objects and taken away with them in the fall.

No whole gourd vessels were found, and most of the fragments had been carefully mended—facts which might indicate either that the gourds also were brought in by the seasonal immigrants, or at least that gourds were scarce.

The only human remains discovered in the shelter in 1929, besides the piece of a frontal and the left half of a lower jaw-bone found in house-site 6, were: three more left halves of lower jaw-bones found eight inches below the surface in a triangle within two feet of one another and about midway and seven feet south of 9 I and 10 I (see map); a few charred fragments of what appear to have been a tibia in cave 2; and a tibia and a fragment of a skull in the rear of cave 1.

It would be interesting to know if there is any significance to be attached to the fact that four left halves of lower jaws were found.

It would be impossible to say how many people occupied the shelter at one time, but if the houses both in the east and the west halves of the shelter and the camp sites along the wall were all inhabited contemporaneously, sixty souls could easily have been accommodated.

The heavy grass floor-covering ended somewhere behind the large rock pile, but a grass walk was laid from there, between the loose stones on the surface, to a point beyond, leading past some of the westerly houses, in the direction of others and of the water supply; and this is naturally the first step in building up the floor of the western part of the shelter in a manner similar to that of the east.

## APPENDIX

In a short account of his work done in Bee Cave Canyon rock shelter in 1928, Mr. M. R. Harrington refers to a burial he uncovered.<sup>4</sup> As this was the only one encountered during the work done in this shelter, and as some of the accompaniments are different from those found during the later exploration, a quotation from the above mentioned report is pertinent. Mr. Harrington writes:

Beginning another trench between the pile of fallen stones and the cliff, and continuing it eastward along the rear of the shelter, we found almost immediately the remains of a flexed skeleton, minus the skull, with which appeared a bowl-shape coiled basket, part of a twined openwork cigar-shape basket, fragments of a bag made of fiber cord, many small beads made of cane, and part of a necklace made of sections of the legs of some large iridescent green beetle neatly strung on a fine fiber cord. Among the vertebrae was a wicked-looking flint spear-head, and near the pelvis lay a deposit consisting of three red paint-stones and two flint knives.

Notes on the Ethnobotany of Bee Cave Canyon, by Henry T. Fletcher, *Bulletin* 33, no. 3, West Texas Historical and Scientific Society, Sul Ross State Teachers College, Alpine, Texas, 1930, is also of interest, Mr. Fletcher having devoted much time to research and study in that region.

<sup>4</sup> Indian Notes, vol. v, no. 3, Museum of the American Indian, Heye Foundation, New York, July, 1928.

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