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BASKET-MAKER CAVES
OF NORTHEASTERN ARIZONA

REPORT ON THE EXPLORATIONS, 1916-17

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*FORTY-FOUR PLATES AND SIXTEEN ILLUSTRATIONS
IN THE TEXT*

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INTRODUCTION

IN the summer of 1914 the Peabody Museum of Harvard University sent an expedition to northeastern Arizona under the joint leadership of the present authors for the purpose of studying the relations between the cliff-houses of that district and those of the north side of the San Juan River. In the course of this trip, evidence was found of the presence of the Basket-maker culture. This culture had hitherto only been reported from a single rather restricted area in southeastern Utah.¹ Furthermore, no Basket-maker remains had ever been taken out by trained investigators; so that the claims, put forward by the commercial collectors who discovered and named the culture, that it was a distinct one, antedating that of the Cliff-dwellers, had been received by archaeologists with more or less incredulity. We felt, therefore, that the opportunity for studying these little known remains in a region untouched by earlier diggers, was one which should not be neglected; all our subsequent work has accordingly been directed toward the finding and excavation of Basket-maker sites.

In 1915 the junior author regretfully gave up field work in this region to undertake other excavations, and the expeditions of that and the following years were conducted by Mr. Guernsey. The results of 1914 and 1915 have already been published,² the present report deals with the explorations of 1916 and 1917; at the close of the latter season field work was temporarily discontinued because of the war. In each year the expeditions were carried on under permits granted by the Secretary of the Interior.

The Museum wishes to make grateful acknowledgment to the following persons whose generous contributions, supplementing the Museum appropriation, served greatly to enlarge the scope of the work: Mrs. S. K. Lothrop, and Messrs. Bronson Cutting, Lawrence Grinnell, F. E. Guernsey, Augustus Hemenway, Henry Horn-

¹ Pepper, 1902. The existence of the Basket-makers was first pointed out in print by Dr. T. Mitchell Prudden in *An Elder Brother to the Cliff-dwellers* (Prudden, 1897).

² Kidder-Guernsey, 1919.

blower, J. M. Longyear, D. L. Pickman, and John E. Thayer. It wishes also to tender its thanks to Professor Byron Cummings of the University of Arizona, who unselfishly shared with it the field in which he was the pioneer; to Clayton Wetherill for his enthusiastic and faithful services as guide and interpreter; and to Mr. and Mrs. John Wetherill and Mr. Clyde Colville of Kayenta for their unfailing hospitality and constant helpfulness.

In the two seasons covered by this report, the party outfitted at Farmington, New Mexico, and proceeded by wagon and horseback to the trading post of Wetherill and Colville at Kayenta, the base from which further explorations were conducted. Kayenta, which may be found on the more recent Government maps, is reached from Farmington by a journey of four to five days, depending on the condition of the stock, and the abundance of grass and water. The caves and ruins described all lie in Arizona within a radius of one day's ride from Kayenta.

The country exerts a charm which the authors confess their inability to describe. Its physical aspect has already been noted by more competent writers;¹ it is sufficient for the purpose of this paper to say, that although essentially a semi-desert region, there is no difficulty now, nor was there ever, apparently, in earlier times, for the dweller here who understood the environment, to obtain sufficient sustenance for simple requirements. The wastes of the valleys and mesa tops that once supplied the wild game with which the early people supplemented the fruits of their agriculture, now furnish ample grazing grounds for the Navajo's flocks of sheep and goats; these Indians also succeed on selected sites in producing good crops of corn, under conditions that to a white farmer would seem quite impossible.

CAMBRIDGE, MASSACHUSETTS
March 5, 1921

¹ Prudden, 1903, pp. 282-285; and 1907; Gregory, 1916, pp. 45-67.

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BASKET-MAKER CAVES OF NORTH- EASTERN ARIZONA

REPORT ON THE EXPLORATIONS OF 1916-17

FIELD WORK, SEASON OF 1916

THE plans of the 1916 expedition included the investigation of a Cliff-dweller ruin discovered the previous year on the west bank of the Chinlee, one day's journey east of Kayenta.¹ A week was spent here. After reprovisioning at Kayenta, camp was made near the mouth of Yellow Head Canyon, about 10 miles to the west, where two days were occupied in examining a small cave and in studying cliff-dwellings that had been cleared by Professor Cummings in 1914. Sunflower Cave (see map, figure 1) a site left unfinished in 1915, was then visited with the object of further investigations.² The remainder of the season was occupied in exploring the South Comb and in excavating two caves some 5 miles north of Sunflower Cave.

THE SOUTH COMB³

The South Comb is a great sandstone monocline that extends from Marsh Pass in a generally northeastern direction as far as the San Juan River. About 16 miles from Marsh Pass its continuity is broken by a narrow valley which leads through it from Kayenta to the Agathla Rock. Our work was confined to that section lying between the break and Marsh Pass.

Hereabouts the course of the Comb is sinuous and its appearance constantly changing; some stretches are tilted steeply toward the sheer walls of Skeleton Mesa, whose top at those points rises higher than the jagged summit of the Comb itself, which is shown in plate 1, b. Other stretches show gentle inclines that seem to lead to the Mesa, but on reaching the crests the way is invariably blocked by deep intervening chasms. It is hard to imagine more

¹ To be described in a separate article.

² For the location of this and other sites, see map, figure 1.

³ For the geology of the region, see Gregory, 1916, p. 47.

BASKET-MAKER CAVES

rough rock formations than those to be found in this part of the Comb. Frequently, and with little strain on the imagination, one can make out along its crests weird forms in natural sculpture: the outlines of colossal animals, faces, solitary spires and minarets, whose silent grandeur at nightfall intensifies the brooding gloom of

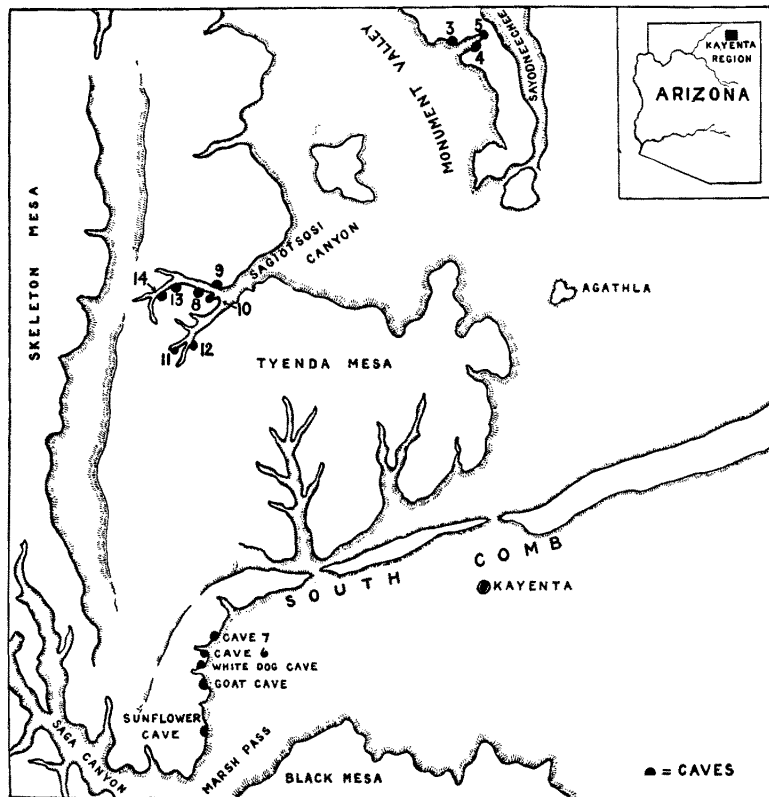


FIGURE 1
Sketch-map of the Kayenta Region.

the desert. In the walls of the tortuous gorges that wind up among the cliffs are countless caves, large and small, many of them so well hidden among the contorted rocks that they can be found only by working one's way on foot along the ledges.

Before exploring for new sites, the expedition occupied itself with two caves found in the Comb during the previous year.

Sunflower Cave Revisited. While work at this site was still in progress in 1915, a sudden flood in Laguna Creek cut off communication between the camp, which lay on the east bank, and the ruin. As time was very limited, it was thought best not to wait the several days that it would probably take for the water to subside; and the party moved on, leaving a section at the rear of the cave unexplored.

Sunflower Cave was occupied by a small cliff-house in which was found the remarkable cache of ceremonial objects that gave the place its name.¹ Of even greater interest, however, was the presence of certain remains which led us to suspect that in this cave might be found evidence as to the relative age of the Basket-maker and Cliff-dweller cultures. Cist 4, sunk into the hard-pan behind the cliff-house rooms, had given the most positive indications of this; it is described as follows in the previous report (p. 96):

The outlines of this cist could be traced by a disturbed area showing in the face of the trench. It had originally been a stone enclosure, though but two of the slabs were still in place. A few bones of a child were found in the upper part; near the bottom at the side nearest the back of the cave were two decorated bone tubes. Imprints of coiled basketry could be seen in hard lumps of the adobe filling, but nothing of the basket itself remained. The cist gave us the impression that it had been a Basket-maker burial chamber which had been pulled to pieces, partly emptied and then filled in with rubbish during the cliff-house period.

There was also found in the loose rubbish a typical Basket-maker sandal, the presence of which, in what was a purely cliff-house site to all outward appearance, required some explanation.

We were accordingly very anxious to examine the still undug portions at the rear of the cave. The results of the second visit amply repaid the effort, for we discovered unmistakable stratigraphic evidence of a sequence of occupation. The new excavations revealed Basket-maker burials, some of them entirely undisturbed, below a stratum of typical Cliff-dweller débris. The location of the finds is shown on the plan (figure 2); their relation to the Cliff-dweller remains is clearly brought out in the diagrammatic cross-section (figure 3).

Cist 5 (cists 1 to 4 opened in 1915) was a shallow bowl-shaped hole dug in the hard-pan. In it were parts of the skeletons of a young

¹ For a general description of this cave and of the finds made there in 1915, see Kidder-Guernsey, 1919, pp. 92-96.

child and an adult, while scattered through the loose dirt about the top were portions of the skeleton of a second child, which had probably originally been deposited with the other remains. The bones

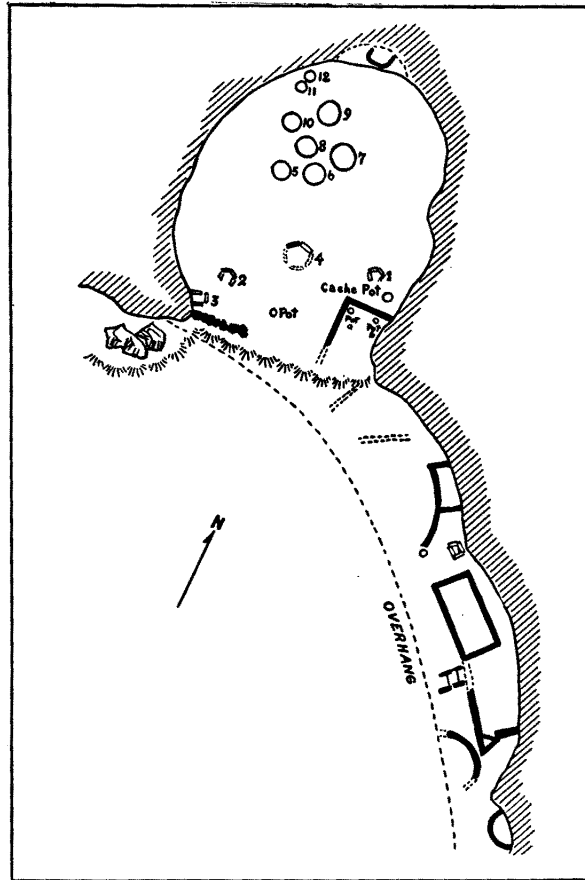


FIGURE 2
Plan of Sunflower Cave, South Comb.

of the adult had been carefully disposed at the bottom of the hole, in a manner to make the most of the limited space. They consisted of an undeformed skull in good preservation, the long bones of the arms, the scapulae, and a few ribs and vertebrae. The arm bones were placed on either side of the skull, the other bones

being packed close about it. Lying across the arm bones was a section of a femur which showed a long splintered post-mortem break. The lower jaw was found in the loose rubbish some fifteen inches from the edge of the cist.

It had probably been dragged out by rats, a thing we found to be not uncommon in caves. A small white chipped point lay among the bones. Above these remains was the disarranged skeleton of the young child. The second child's skeleton as before stated, was scattered through the loose earth about the cist. We

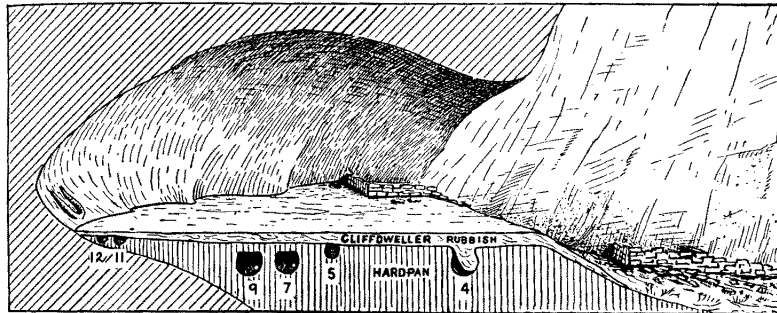


FIGURE 3
Sunflower Cave, Cross-section.

are at a loss to account for the neat arrangement of the adult bones. It is clearly a case of secondary burial, but we have never found any instance of this practice in undisturbed Basket-maker sites, and the people who looted Basket-maker graves did not, as far as we are aware, ever trouble themselves to restore anything to place.

Cist 6 was 2 feet 6 inches in diameter and was cut 3 feet deep into the hard-pan. It lay 4 feet east of *Cist 5*, and contained only a quantity of loose cedar bark and shredded grass piled in the bottom. It is possible that the bones found in *Cist 5* came from here, though no positive evidence remained that it had been used for burial.

Cist 7 was an untouched Basket-maker grave; the original filling passed unbroken above it, and was in turn overlaid by Cliff-dweller rubbish (figure 3). It was 4 feet in diameter, 3 feet deep, and held the well-preserved skeletons of two adults with undeformed crania. They lay flexed on their left sides, hands between the lower thighs (plate 10, c); over the head of each was inverted a small coiled basket, one of which can be seen in the photograph. The

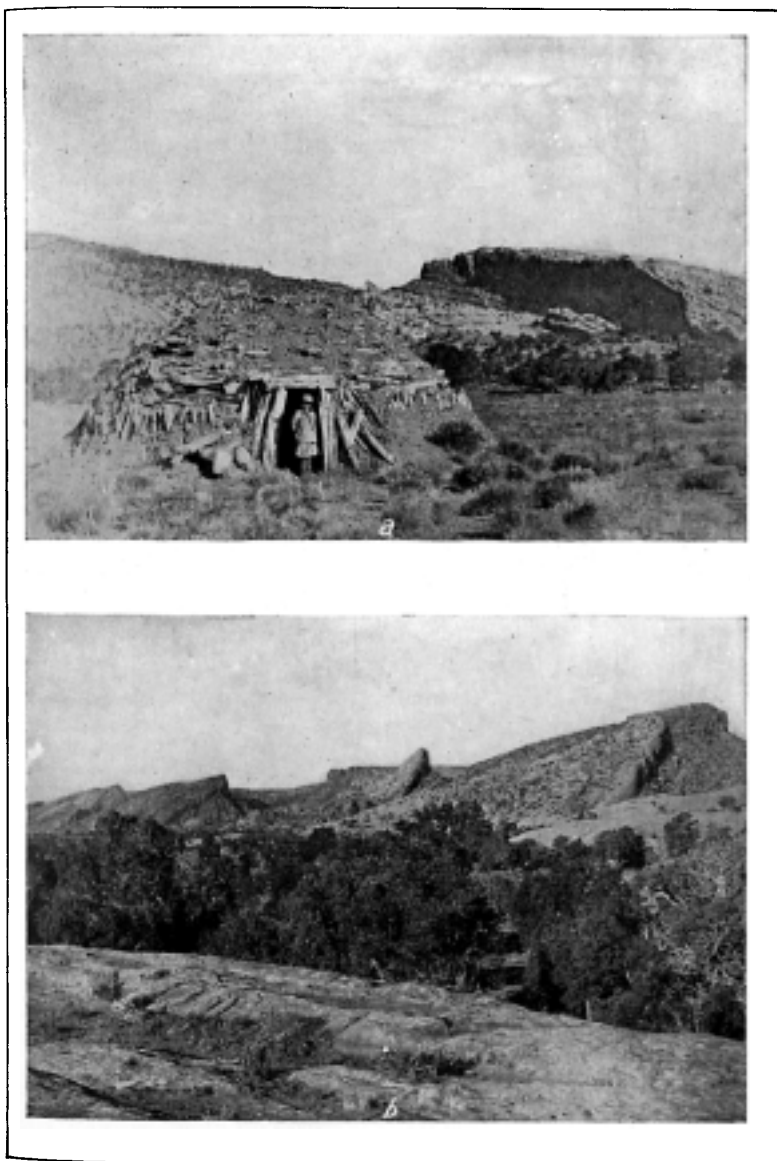
earth about the skeletons showed traces of decayed organic matter, probably from fur-string robes and other wrappings; rotted cedar bark was found at the bottom. The only object besides the decomposed baskets was a small strip of bark with one end neatly trimmed off.

Cists 8, 9 and 10 had all been plundered in early times and contained only fragmentary skeletons; a number of cylindrical seed beads accompanied the remains of a child in *Cist 10*.

Cists 11 and 12 were within 3 feet of the rear wall of the cave. Although very close under the surface they had not been molested. *Cist 11* was a shallow bowl-shaped scoop in the hard-pan, and held two infants. One of these had been wrapped in a fur-string blanket and lay on what seemed to be a twined-woven cedar-bark mat, beneath which was a reed-backed cradle too badly rotted to preserve. *Infant 2* was also wrapped in a fur-string blanket and lay on a decayed reed-backed cradle; near the head were remains of a coiled basket inverted over traces of a substance resembling meal. Both cradles were of the rigid type shown in plate 20. Accompanying the bodies were two bark objects covered with prairie-dog skin, which we have since been able to identify as umbilical pads. *Cist 12* was a small hole in the hard-pan. In it was an infant wrapped in a fur-string robe and encased in a twined-woven bag. The robe had been destroyed by insects, but the bag was in a fair state of preservation.

All the above Basket-maker cists lay below a layer of cliff-house rubbish from 6 to 8 inches deep, made up of ashes, turkey droppings, bits of straw and many potsherds of the same wares as those found on other cliff-house sites in this region. Beneath this rubbish, the surface of the hard-pan above the cists gave no indication of their presence, being as compact and of the same appearance as the surrounding hard-pan. If, therefore, we had followed the 1915 method of clearing and examining the Cliff-dweller rubbish down to the hard-pan, and not cutting into it except where the tops of cists were encountered or other surface indications excited interest, these burials would have escaped notice altogether.

Fortunately, however, the trench was run much deeper than usual and entered *Cist 7* from the side. The section thus exposed showed the top to be filled to a depth of 1 foot with a compactly tamped mass exactly like the hard-pan in which the cist itself was



SOUTH COMB

a, White Dog Cliff and Navajo Hogan; b, South Comb, near White Dog Cave.

excavated (figure 3). That the infant burials in Cists 11 and 12 remained undiscovered through the period of Cliff-dweller occupancy is remarkable, since they were covered by hardly more than 3 inches of the cave earth; the Cliff-dweller rubbish here was also very thin. A possible explanation may be that this part of the cave was used by the Cliff-dwellers for storage or for sleeping places, and was thus in a measure protected from the random digging to which the more open portions were exposed.

Had the Cliff-dwellers, the final tenants of the cave, been more persistent in their search, there would have remained no trace of the Basket-maker period except the cists, empty or refilled with Cliff-dweller rubbish. Attention is called to this for the sake of emphasis, as further on in this report, caves are described where all evidence of Basket-maker occupancy other than the empty cists has been effaced.

Goat Cave. This site was located by the expedition of 1915. It lies about two miles north of Sunflower Cave at the foot of a steep incline leading to the top of the Comb (see figure 1). The approach is through a narrow ravine choked with great rocks, among which a thick growth of large old cedars has found root. These trees screen the place from view except at a few points in the ravine. The cave is a deep shelter at the west end of which is an even deeper recess. As shown in the plan (figure 4) there are two levels: a front or lower one, extending the entire length of the cave; and a higher rear level, consisting of the whole floor of the inner recess and of a narrow gallery running all along the back of the more open part of the cave. The whole upper level is formed of the original hard-pan fill; along the gallery or terrace this breaks away in a vertical bank. The walls and roof of the cave are much blackened by smoke. At one point in the rear of the cave the floor is covered by a thick layer of ashes and charcoal. In the recess and on the end of the gallery next to it, are a number of partly fallen walls (plate 2, a, b).

Room 1, five feet in diameter, the walls 2 feet 4 inches high, is built of upright slabs of stone.

Room 2, from the foundations that remain, appears to have been oval in shape. From front to back it measured 8 feet, its length could not be determined as the end wall had disappeared. The foundation is of thick stone slabs of uniform size set on end, on

these small stones were laid flat (plate 2, *a*), but little of the upper course remained in place. Joints between the foundation slabs were closed with adobe mortar. The upper courses appear to have been chinked with the same material. Back of this room are remains of two curved walls built of coursed masonry in the usual Cliff-dweller manner. Stone apparently from these walls was used to construct a small cairn on the opposite side of the recess. It

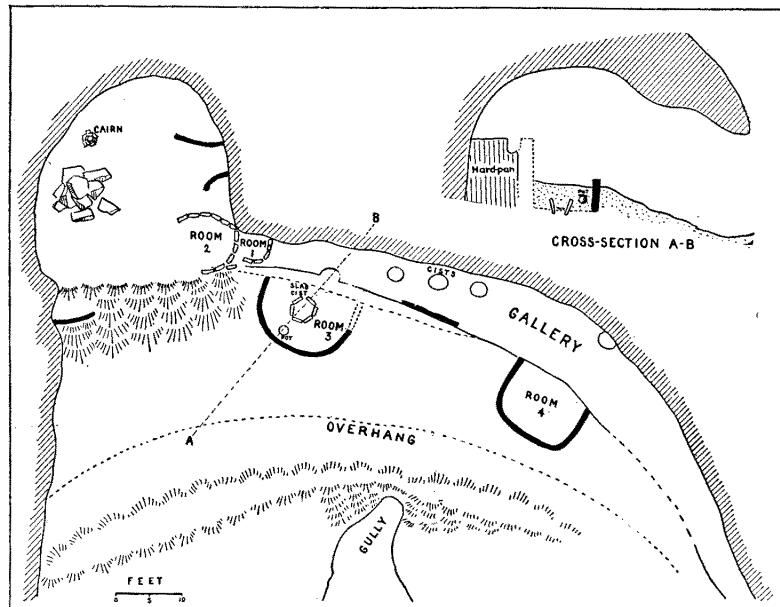
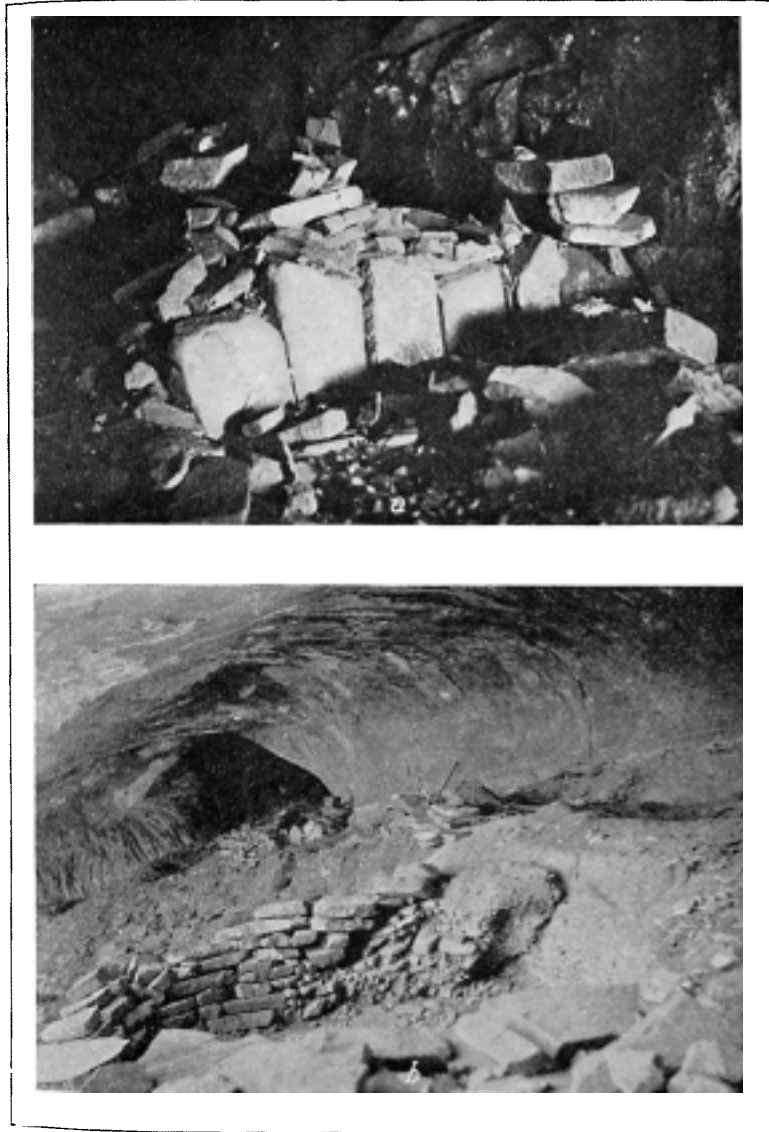


FIGURE 4
Plan and Cross-section of Goat Cave, South Comb.

resembles monuments built by the Navajo to mark water or trails; nothing was found beneath it. Directly in front of the cairn is a heap of rocks fallen from the roof of the cave.

On the lower level in front of the gallery are two roughly circular rooms which we at first wrongly thought to be Cliff-dweller kivas, but they were found to contain none of the special features of ceremonial rooms. Both were built against the steep bank of the terrace which had been cut away to form their rear walls.

Room 3, the less well-preserved of the two, measured 15 feet across its greatest diameter; the wall stood 4 feet at its highest



GOAT CAVE

a, Slab foundation of Room 2; b, General view, Room 3 in foreground.

point. The masonry is interesting and unusual; medium-sized flat stones are laid up without any mortar in such a way as to produce an even surface on the interior (plate 2, b), the exterior being left irregular and rough. So carefully are the stones placed that in spite of the absence of mortar the construction is firm and solid. In clearing this room a slab cist was uncovered, measuring 4 feet in diameter at the top, 3 feet at the bottom, and 2 feet deep; in the bottom was a 2-inch layer of ashes and charcoal and over this 2 inches of cedar bark. It was very similar to Basket-maker slab cists found in Cave 1, 1915.¹ The original floor of Room 3 was so ill-defined that we could not determine exactly the relation of the cist to the floor, but as near as could be judged the upright slabs had been sunk into it a depth of about 8 inches.

Cached in the loose filling of the room, at the point indicated in the plan (figure 4; note also its position in the cross-section) was a black corrugated olla. It was covered with a thin flat stone, but contained only drift sand.

Room 4. The general shape of this room is shown in the plan. Its greatest diameter, measured inside, is fourteen feet, from back to front eleven feet. The highest point in the wall, five feet, is probably the original height, as no loose building stones were noticed here. No trace of roofing remains. The masonry wall has no sharp corners. The back wall is cut in the face of the gallery and has a slight bend or angle. The stones are laid to produce a smooth face on the inside as in Room 3, and with considerable skill, since they are still firmly in place though there is no trace of adobe mortar in the joints. In excavating the room we found quantities of charcoal and scattered bundles of cedar bark, but no artifacts. Two rude cists lined with cedar bark were also opened. As in Room 3 the floor was not well-defined.

In the floor of the gallery were several jar-shaped cists dug in the hard-pan (see figure 4). These were exactly like the burial cists found in the Sayodneechee burial cave, 1914.² At a point back of Room 3 where the terrace wall had caved off carrying with it one half a cist (see section in figure 4) the exposed cross-section showed plainly the marks of digging sticks in the side of the cist thus brought to view. Two of the cists contained a few human bones;

¹ Kidder-Guernsey, 1919, p. 77 and plate 27.

² *Ibid.*, p. 28 and figure 8.

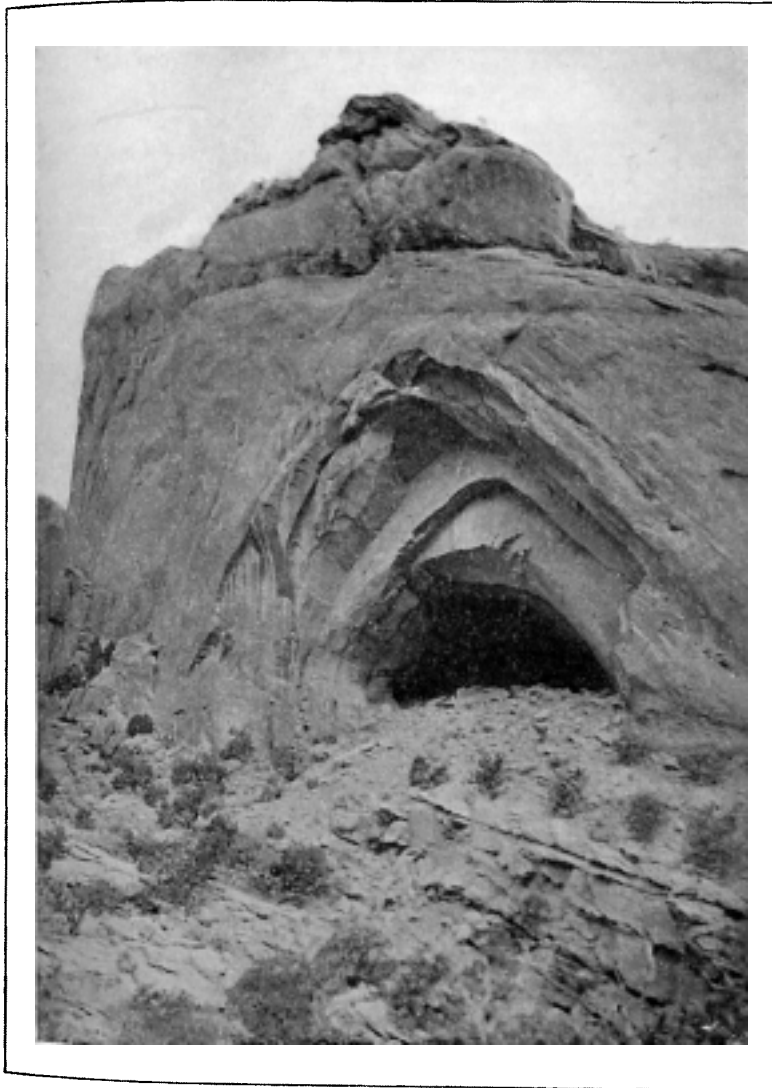
while other portions of skeletons, some bleached by long exposure, were found in the loose sand covering the floor of the terrace. These were, no doubt, plundered Basket-maker burials.

The authors wish to call particular attention to the rooms uncovered in this cave. Their masonry, with the exception of the single wall in the recess, is quite different from that of the cliff-dwellings.

White Dog Cave. This was by far the most prolific site discovered by the Museum's expeditions to northeastern Arizona. Its position is most inconspicuous and the first view of it was obtained during a climb high up among the rocks of the Comb, the only place in fact, from which it could be seen from any distance. It might easily have escaped notice altogether, for a rider passing along the valley below would not be tempted to explore the narrow ravine leading up to it, particularly as the cliff in which it is located is apparently in full view and seems to be entirely unbroken (see plate 1, a). One short section of the cliff is, however, out of sight from the flat land, and just there is tucked away the cave. The above conditions are described thus at length in order to show the absolute necessity of a careful search *on foot* among all the little side canyons of this broken country.

The approach is up a tortuous ravine. Arriving below it the visitor is astonished that so great a cavern should be so effectively hidden. It occupies a commanding position in the rounded front of a buttress-like swell of the cliff. The huge portal, 120 feet across the base and at least 125 feet high, seems carved by nature to conform to the dome-shaped top of the cliff above it. The accompanying photograph (plate 3), aside from having in it no familiar objects by which relative proportions may be judged, shows so clearly the process of formation and general aspect that further description is unnecessary.

Reaching the cave after a stiff climb of 100 feet up a steep talus, one enters a spacious chamber measuring approximately 70 feet from back wall to line of shelter and 120 feet across the opening. The ceiling is high and arched, the floor rises at an easy grade from front to back. Somewhat more than half the floor space is covered by large rocks fallen from the roof, one of which measures 20 feet in length, 12 feet in width and 10 feet thick (figure 5 and plate 11, a). This and other rocks near it we found later had fallen since the



WHITE DOG CAVE.

cave was occupied. The unencumbered portion of the floor was composed of clean sand and small broken stones. Although we subsequently unearthed considerable accumulations of ashes and charcoal in different parts of the cave, the walls and ceilings showed not a trace of soot, having been scoured clean by wind-blown sand. A demonstration of this process was furnished one day when a high wind from the proper quarter created a veritable

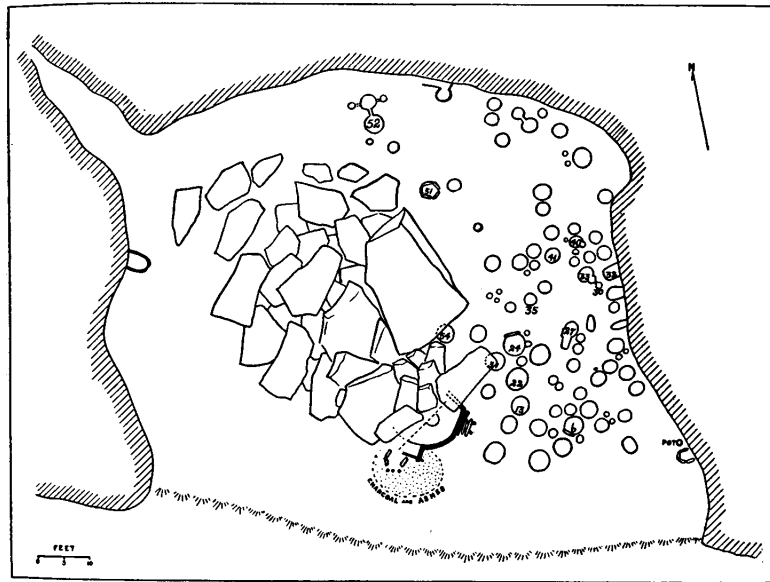


FIGURE 5
Plan of White Dog Cave, South Comb.

whirlwind in the cave, gathering up the surface sand and swirling it about in such quantities that we were forced to abandon work while it continued. A piece of paper released at the back would sometimes make as many as three complete circuits of the cave clinging close to the wall except as it passed across the front. On mentioning this to Mrs. Wetherill we were told by her that the place was known to the Navajo as the Cave of Winds.

The first examination of the cave for traces of occupation showed at the back against the wall the tops of several sand-filled cists, dug in the hard-pan. Searching the surface, a few bleached

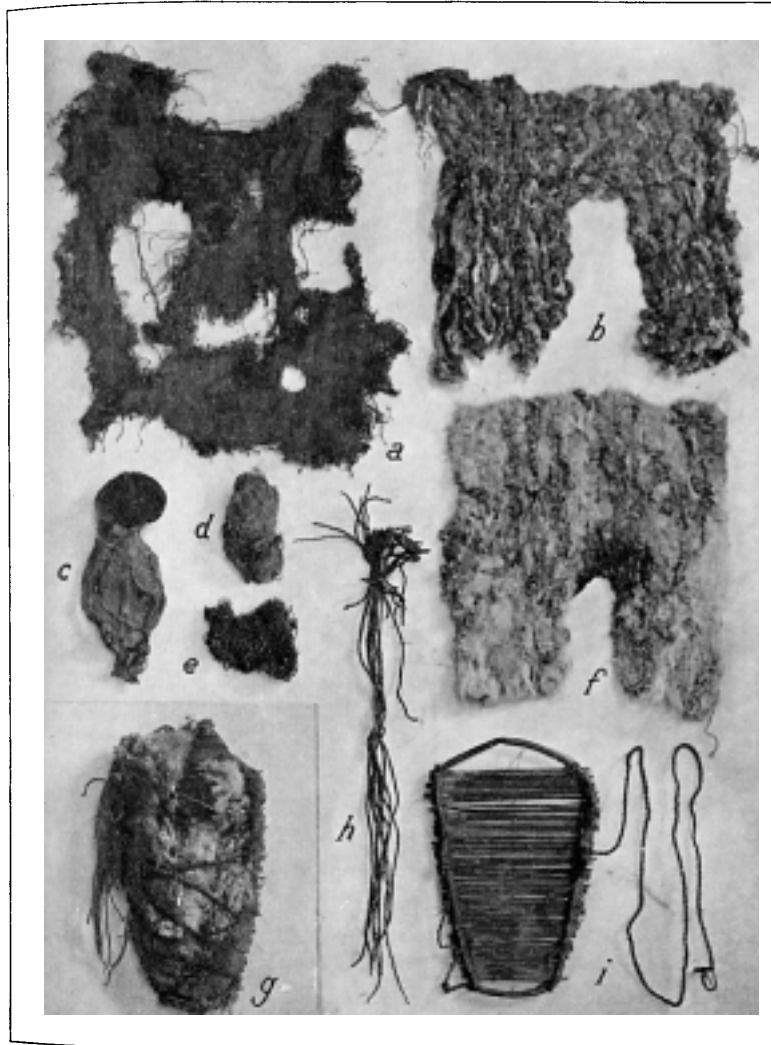
human bones were seen and a small handful of Cliff-dweller potsherds was picked up. Digging at random with a trowel, a few fragments of basketry and some bone beads were found. Near the center of the cave the ends of two upright stakes were noticed, projecting from 2 to 3 inches above the surface. Not until our second and more thorough examination did we discover on the west side a low foundation wall mudded on to the sloping rock floor of the cave. This was apparently the beginning of a small Cliff-dweller storage room or bin. As a "prospect" the cave fulfilled every requirement. Its exploration yielded a collection which fully represents most phases of the material culture of the Basket-makers.

Across the front of the cave where work was commenced there was found a natural ridge of coarse débris, back of which the sand fill had accumulated above the hard-pan floor to a depth of from 5 to 7 feet. Toward the back this deposit grew shallower until along the rear wall the hard-pan cropped to the surface.

The fill carried no refuse pockets or well-defined rubbish layers such as are found marking floor levels in Cliff-dweller caves. In general it was made up of a surface layer 6 inches to 1 foot deep of drift sand, below which it was composed of sand and bits of stone mixed with straw, pieces of bark, and particles of charcoal.

Occasionally there appeared thin strata of coarse charcoal and in certain areas there were encountered quite extensive accumulations of ashes and charcoal. In the general digging a number of specimens were found at various depths. They consisted mainly of basket sherds, fragments of fur-string blankets and tattered bits of woven bags; a mummified foot and other fragments of human remains were also recovered. All other objects were taken from cists.

In the plan, figure 5, are indicated a large number of cists grouped along the east wall; there were no cists on the west and north sides. The majority of these were jar-shaped excavations in the hard-pan ranging in size from small pot-holes 1 foot in diameter and of about the same depth, to examples 5 feet deep and 4 feet 6 inches in diameter. Some burials were found in this type of cist but for the most part they were empty, save for sand or sometimes cedar bark and grass at the bottom. Most of the burials were in the front half of the cist area. A few, as was just stated, were in



WHITE DOG CAVE

g. Cradle bundle as found. The other figures show cradle and contents unwrapped.
a, Woven cloth; **b, f,** Fur cloth blankets; **c,** Mummy of child; **d,** Umbilical pad;
e, Absorbent bark; **i,** Cradle. (About 1/12.)

cists completely excavated in the hard-pan, others were in shallow excavations in the hard-pan with one or two stone slabs so placed as to hold back the loose sand, and a single burial was in a cist (51) of the stone slab type described in the previous report.¹ Some of the burials had been previously disturbed,² but a number were found intact, the remains and mortuary offerings in a remarkably fine state of preservation.

In the account of the excavations which follows, certain cists and burials are described in detail. The intention is to present the salient features of the more typical ones, hence many small objects found in the cists or concealed among the wrappings of the mummies are not enumerated. They are, however, described in detail in another section.

Cist 6 (figure 6, a). The first burial cist to be encountered measured 3 feet in diameter, 2 feet in depth and was 4 feet below the surface. It represents a type that was evidently constructed primarily for sepulchre. At one side was an upright stone slab. Although the cist had been relieved of a good portion of its contents by ancient diggers we obtained from it a collection which required 51 catalogue numbers to record. In the upper part were the scattered bones of three infants; at the bottom a few bones from the skeleton of an adult. In the loose fill were several bunches of human hair (plate 32, c, d). A quantity of human hair evidently from the head of a mummy³ that had been pulled from the cist was also found in the loose fill. One small strand was wrapped about with a leather thong. Later we found in another cist a mummy with coiffure intact, having a queue-like strand wrapped in the same manner. These were practically all the human remains that were left. At the bottom against one side were a quantity of piñon nuts, the rotted remains of woven bags, loose beads, basket sherds, pieces of woven bags and fur-string robes.

Cist 13, a shallow bowl-shaped excavation, contained the remains of two infants. One, a very young child wrapped in two fur-string blankets and a fragment of woven cloth, was lashed

¹ Kidder-Guernsey, 1919, p. 77 and plate 27.

² This grave looting so commonly found in Basket-maker cave cemeteries is not modern. Although we have no direct evidence in its support, our theory is that it was the work of the Cliff-dwellers. See Kidder-Guernsey, 1919, p. 84.

³ The mummies were, of course, not artificially preserved in any way; they are merely desiccated bodies.

tightly to a small reed-backed cradle; an umbilical pad was in place and the dried umbilical cord was tied to one of the blankets. This mummy bundle as found, and also unwrapped so that all its parts can be seen, is shown in plate 4. The second body, that of a child about 4 years of age, was completely encased in a woven bag¹ (plate 30, f). It was also shrouded in a fur-string robe. Beneath this bundle were pieces of a cedar-bark mat, and over it was spread a fur-string blanket (plate 16, a) which was in turn covered by an

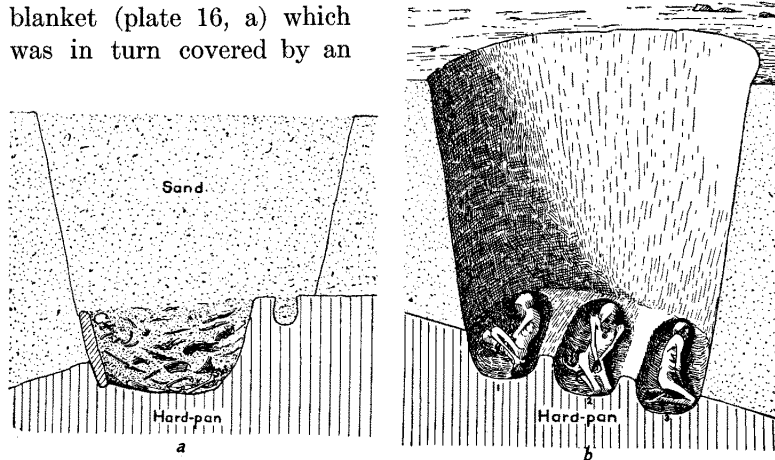


FIGURE 6

White Dog Cave: a, Cross-section of Cist 6; b, Cross-section of Cist 22.

inverted tray basket. At one side of the cist was a bowl-shaped basket also inverted. In the fill some 8 inches above the tray basket was a skin bag containing shelled corn (plate 15). At one side of the cist lay an atlatl in perfect condition save that before being placed in the cist it had been bent nearly double. This and the baskets are illustrated *in situ* in plate 10, e.

Cist 22 contained the bodies of three individuals. Its shape was roughly circular, the greatest diameter being 5 feet 2 inches, depth 2 feet 10 inches; the top was 5 feet 6 inches below the surface. Each body occupied a shallow depression scooped out of the bottom of the cist as shown in figure 6, b. The remains were partly mummified though not in a good state of preservation. The heads,

¹ The design on this bag is shown in color in plate 28.

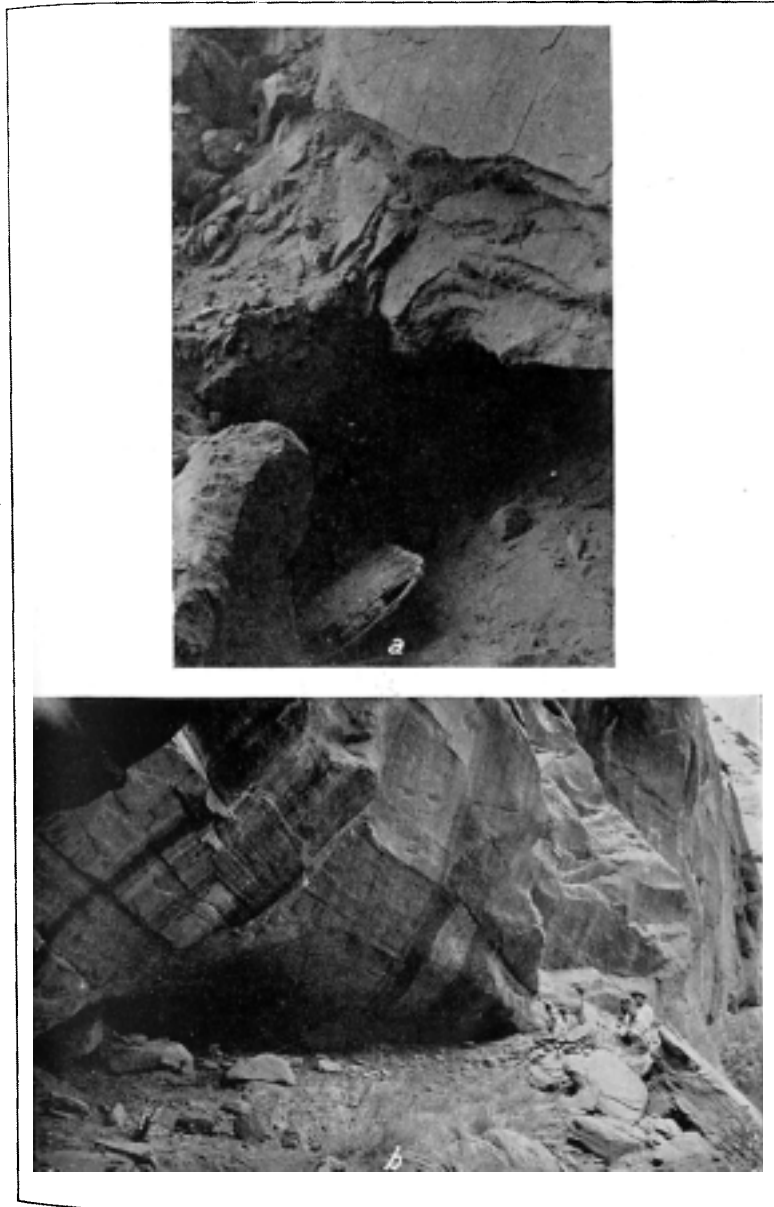
however, retained their hair and much of the dried tissue of the face. Each body had been wrapped in a fur-string blanket and sewed up in woven bags, all of which were in an advanced state of decay.

Number 1, the body of a young female, lay on its right side, knees drawn up and hands between the thighs. A skein-like rope of human hair was wound around the left forearm, passed between the thighs and made fast about the right leg below the knee. At the waist were fragments of a string apron. Some portions of bags that had been used to cover the body remained. A fragment at the feet was of very fine weave while pieces adhering to the knees were much coarser. Covering the whole were two tray baskets. Number 2 was a female. Three baskets were used to cover the body. It rested on its back with head and legs inclined to the left; the feet were drawn up close to the body; the upper legs, bent at the hips, were at right angles to the torso. The hands were in front of the lap, and were bound together at the wrists by fourteen turns of a tightly twisted cord of human hair. This cord was then knotted to a skein-like rope of human hair and both rope and cord passed through between the thighs and about the lower legs above the ankles. At the waist were remains of a string apron and on the breast lay a disk-shaped pendant of shell, ornamented with incised lines. About the neck were beads of olivella shells and thin disk-beads cut from shell, together with part of the leather string by which they had been suspended. In the bottom of the cist under the body were a number of dice-like stones and a single corn cob. Number 3 (male, 20 to 25 years of age) rested on its left side, limbs loosely flexed, hands between thighs. Two tray baskets covered the body. At the right side lay a grooved club, at the feet were a pair of badly rotted square-toed sandals with leather tie-strings and a quantity of small deer or antelope hoofs. Near the hoofs were two handle-like bone objects with small stones attached to their ends. About the neck was a string of shell beads. Among the objects found under the body was a fine chipped knife blade (plate 35, k) and its shrunken wooden haft.

Cist 24 held the mummies of two adults, one male and one female, each accompanied by the remains of a dog, and an unusual number of mortuary offerings. The remarkably fine state of preservation of everything in this cist is due to the fact that the burials were surrounded by dry sand. The excavation in the hard-pan made

to receive the bodies was a shallow hole just deep enough to hold them. As in Cist 22, each individual occupied a scooped-out place in the bottom of the cist. At the back was an upright stone slab; as none were used at the front or sides, its purpose was evidently to hold back the loose sand while the hard-pan was being excavated. Just in front of the slab was a stout log 3 feet in length, the ends and sides charred by fire. This reached to the surface and was one of the stakes observed when the cave was entered (see upper right center, plate 6, a); whether or not it was so placed at the time the burials were made we were unable to tell. It may have been a marker, but we have found no other burials indicated in this way.

Mummy 1 (female) lay on its right side, limbs loosely flexed. Two large woven bags split down the side encased the remains, one drawn over the head, the other over the feet; the tops met at the middle of the body and were sewn together with yucca leaves (plate 7, a). As usual the corpse was wrapped in a fur-string robe. Over it were inverted two baskets, a bowl-shaped one covering the feet; the other a large carrying basket with tump-line attached covering the head and upper part of the body. The baskets and the manner in which a number of digging sticks were disposed in the grave is shown in plate 6, a. The planting stick at the front with one end resting on the edge of the cist was evidently placed to hold the basket upright. The cedar bark that appears in the upper left hand corner is from another cist. On removing the carrying basket, a small dog was found lying below it on the left side of the mummy. Under the bowl-shaped basket was a substance resembling meal. On lifting the body from the cist there was found beneath it a thick bed of fur and feathers compacted by decay into a mass that was taken out unbroken. On examination at the Museum this proved to have embedded in it bundles of feathers, skin containers and skin bags; these and their contents are described under Material Culture. On the bottom of the cist was a badly shrunken, but complete atlatl and near it, but not in contact with it, was a roughly chipped piece of quartzite which may originally have been tied to its back. At one side on the bottom was a wand with a yucca braid and twigs attached to one end. Quantities of grass seed, piñon nuts and squash seeds were also found at the bottom of the cist.



a, Cradle *in situ*, Cist 54, White Dog Cave; b, Cave 10, Sagiotsosi Canyon.

Mummy 2 (male about 35 years of age) lay on its left side with feet drawn up tight against the body; head east and facing south. It was wrapped in the same manner as mummy 1 (see plate 8). Inverted over the body was a large pannier basket which is shown behind the front basket in the photograph (plate 6, a); over the head was a bowl-shaped basket. A second basket of the same shape lay just to one side, covering the fragments of a squash shell vessel. Removing the pannier, three tray-shaped baskets graduated in size with the smallest at the bottom were found beneath. The pannier also partly covered the remains of a large long haired and nearly white dog, which in turn lay across the two bowl-shaped baskets (see plate 6, b). There was also found under the pannier a large quantity of flies, the dog having apparently been already fly blown when placed in the cist. The eggs evidently hatched and the flies died in the space under the carrying basket without ever seeing the light of day. We thought that the flies might serve to fix the time of year in which these burials were made, but Mr. N. Banks of the Museum of Comparative Zoölogy, to whom we are indebted for their identification, informs us that they are *Caliphora coloradensis*, a very hardy species which flourishes from early spring to late fall, so it is not possible to fix a very definite date by them. The digging sticks might indicate that the spring planting was in progress, but this is of course mere conjecture.

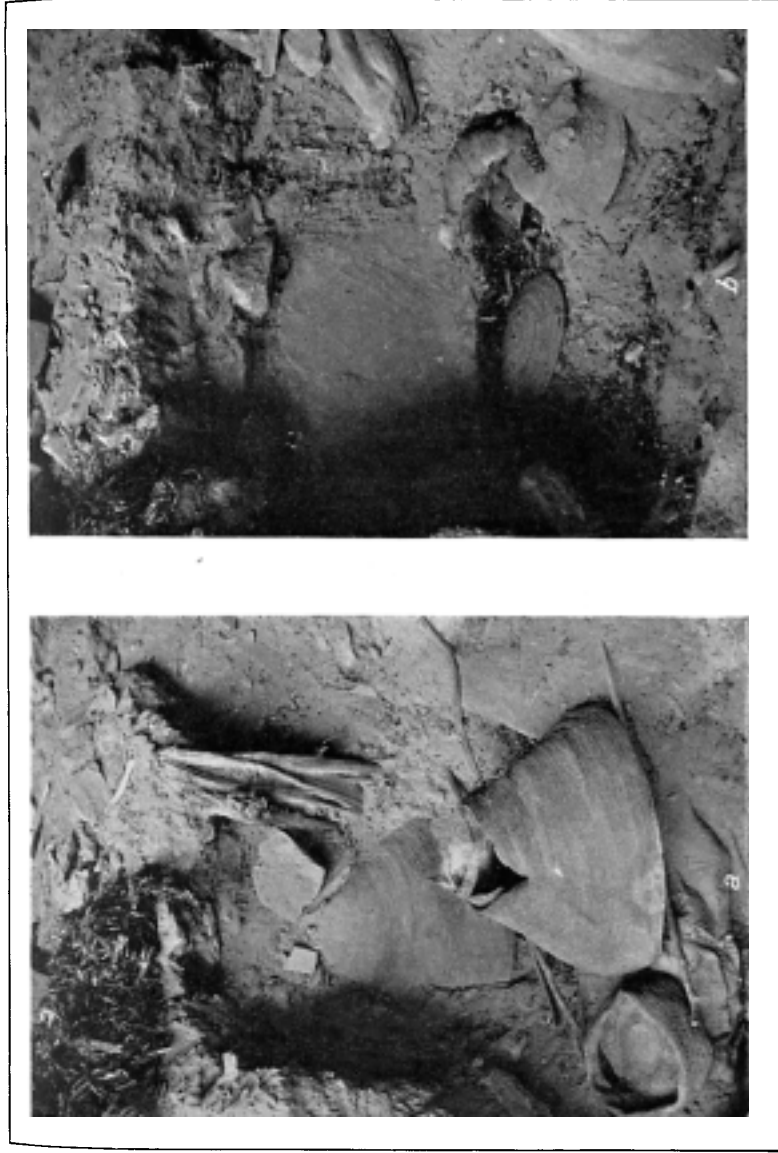
Extending from the edge of this cist on the east side was a shallow hole just deep enough and of sufficient size to contain the remains of a young infant. Only the bones, and part of a badly rotted fur-string robe were left.

Cist 27. The unusual plan of this cist is shown in figure 5. It was dug in hard-pan to a depth of 2 feet 10 inches, measured 4 feet 9 inches in length and 2 feet 6 inches at its widest point. The sand and fill above had a depth of about 1 foot. One side of the cist was formed by the face of a vertical break in the rock floor of the cave, the ledge nearly cropping through the hard-pan at this point, a circumstance which probably accounts for the elongated shape, as the rounded end seems to indicate an original intention to dig the conventional circular cist. In it were found the partly mummified bodies of two adults placed one above the other, facing in opposite directions (plate 9, a).

Number 1, the uppermost, an adult, probably male, lay face down, knees drawn up and crushed against the chest, feet under hips, left arm extended at full length along the side; the right forearm was bent across the waist. Number 2, a male of about 25 years, lay on the bottom of the cist directly under mummy 1 and with head in the opposite direction. The limbs were arranged in practically the same manner as those of the upper mummy, the feet of which rested on the face of this one.

Accompanying these remains was a large number of specimens some in a good state of preservation, though objects at the bottom of the cist and baskets at the top and sides had suffered from decay. We were, however, able to determine that there had been at least seven baskets, mostly medium sized trays. In preparing the cist to receive the bodies, a number of atlatl spear-shafts had been broken into various lengths and placed crisscross on the bottom. On the upper side a few inches out from the rock there stood on edge a rectangular frame of sunflower stalks and broken atlatl spear-shafts tied at right angles to each other. Back of it, also on edge, were placed several tray baskets. On the opposite side next to mummy 2 were bundles of sticks or reeds so badly shrunken that their nature could not be made out with certainty; they were probably atlatl spear-shafts. Placed over mummy 2 were more spear-shafts and the bundled fragments of a wooden device, part of which is figured in plate 36, d, e. At one side of mummy 1 were two grooved clubs. Quantities of grass and squash seed were found in much decayed skin containers; also a number of small objects, among them a fine chipped knife blade, beads of seed and stone, pendants of shell and stone, a comb-like head-ornament and a bone handle with leather strings attached.

Cist 30 was a jar-shaped excavation in the hard-pan, 15 inches in diameter at the top, 23 inches in diameter, 1 foot below the rim, and 24 inches in depth. In it were the skeletons of six infants. Four were found in woven bags. Of other wrappings there remained tattered pieces of dressed skin and bits of fur-string. Five umbilical pads, similar to those from *Cist 11*, Sunflower Cave, were taken from various parts of this cist. These could not be assigned to individual burials as the skeletons were more or less mixed as if the cist had been partly rifled in early times. At the bottom were two cradles in excellent condition. A few inches



WHITE DOG CAVE
a, Cist 24, partly cleared, showing baskets *in situ*; b, Pannier baskets removed, showing small baskets, mummy of white dog, and many dead flies.

above these were about 8 quarts of shelled corn; no trace of a container could be found. Scattered through the fill were beads of seed, stone, and olivella shell, a green stone pendant, a small grinding stone, and two strips of bark, like the piece found in Cist 7, Sunflower Cave. Joined to this cist by a small funnel-like hole was a second cist, the same diameter but not so deep, while cutting the rim of this was a third and larger one (Cist 33, figure 5). These were empty; they form a good example of a number of similar arrangements found in the course of the excavation (see Cist 52, figure 5). All are characterized by one or more small flue-like holes dug down from the surface and penetrating the sides of the cist, or, as in the case above noted, connecting small potholes to the cist (plate 9, d, and plate 14, a). Sometimes these holes, instead of entering the large cist obliquely, were dug at nearly right angles from the pothole to the side of the larger cist. As a rule cists of this type were empty save for bark or grass stalks. They strikingly resemble the field pit-ovens used by the Hopi for roasting corn;¹ there are no indications, however, that these had ever had fires built in them.

Cist 31 as shown in the plan, figure 5, was partly under one end of a large rock. In order to reach it we were obliged to remove from the surface many others, some so large that they had first to be broken up. The top of the cist was 3 feet 6 inches below the surface, its greatest diameter 4 feet, depth 1 foot 10 inches. At one side was a single stone slab. In the cist was the partly mummified body of an adult, the bones of the skeleton held together by dried tissue and caked adobe (plate 7, b). The remains rested on the left side, knees drawn up level with chin, hands palms together under left cheek and supporting head. A woven bag covered the head and shoulders. It had been split down the side before drawing on, then sewn together again with yucca leaves. A portion of the bag was in good condition. Over the mouth of the mummy outside the bag, was tied a sandal of the square-toed type. About the feet and lower part of the body were the remains of a fur-string blanket. The bag and wrappings were held in place by a binding of yucca leaves. About the neck were seed beads. Inverted over the middle of the body was a coarse bowl-shaped basket; under it lay a quantity of plant stalks, apparently

¹ Hough, 1919, figure 3.

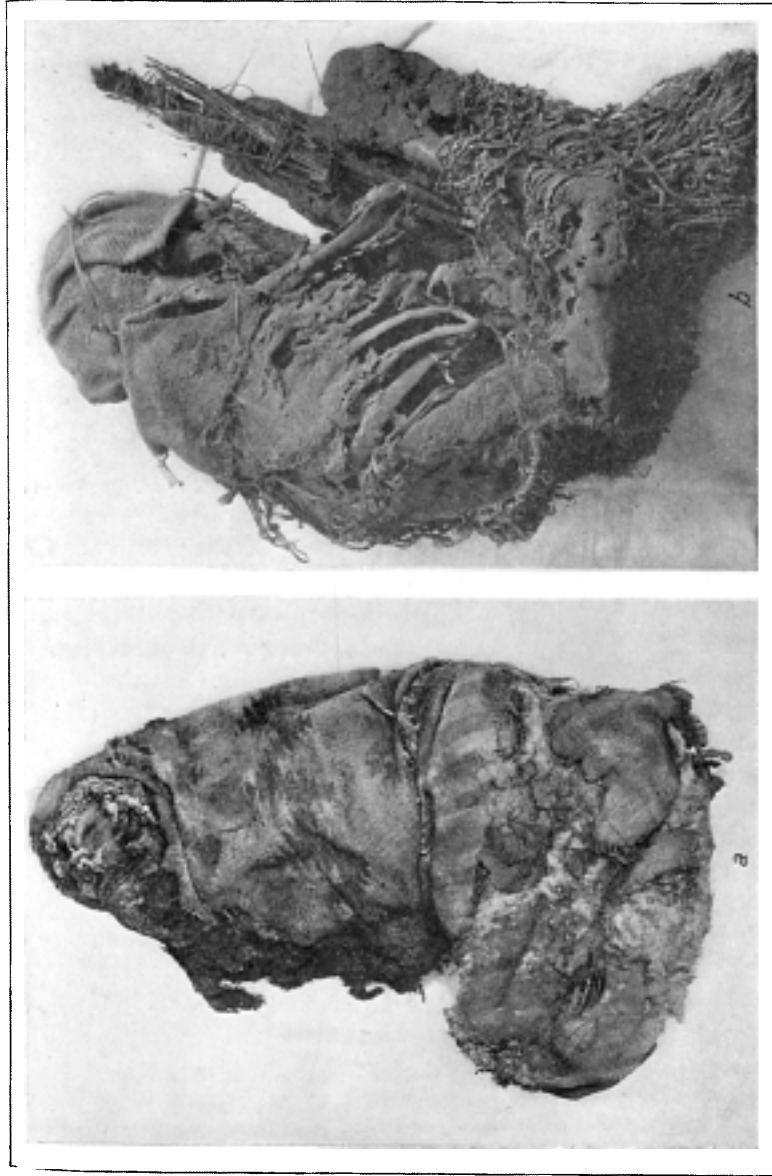
of Brigham tea, also an animal bone and a pointed twig with a string attached. In the lap, as shown in plate 7, b, was a bundle made up of two wooden implements, a foreshaft with stone point, a wand-like stick with a bunch of reddish fiber tied to the end, and a small woven object, the whole wrapped about with a feather headdress and a number of turns of fine string (plate 40). The fill about the body was caked and discolored. Nothing was found in the cist under the body.

Cist 32 gave indications of previous disturbance. It was dug in the hard-pan against the side of the cave and showed more than usual care in the smoothing of its walls. It was oval in shape, 3 feet 6 inches in length, 2 feet in width, and 2 feet 6 inches deep. In the edge of the end opposite the cave wall was a shallow groove perhaps made to seat a cover. In the upper part of the cist was the skeleton of an infant and remains of a small reed-backed cradle, both too far gone to collect. In a sub-excavation at the bottom was the skeleton of a child about six years of age, knees drawn up to chin, head north, face southeast. About the remains were traces of fur-string wrappings and coiled basketry; under them a small quantity of green powder. This cist was probably originally a storage cist and perhaps had a stone slab cover which fitted into the groove at the end. It may have contained at one time other remains than those found, for it would hardly have been dug for them alone, as it was of much greater size than necessary.

Cist 35 was not dug straight into the hard-pan, but was slightly undercut. It measured 1 foot 3 inches across at the top and 2 feet 6 inches in greatest diameter; the bottom was rounded. In it was the mummy of a baby on a reed-backed cradle; the body was enclosed in a bag and lay on a twined-woven cedar-bark mat (plate 21, d). All were in good condition. The mat appears to be part of an old cedar-bark cradle like the ones found in Caves 1 and 2 by the 1915 expedition.¹

Cist 40 was a large jar-shaped storage cist excavated in the hard-pan. It was very symmetrical in shape and measured 2 feet in diameter at the top, 4 feet in diameter 2 feet below the rim, and 4 feet 6 inches in depth (plate 9, b). The rim was 2 feet below the surface. In the top was found a rabbit net tied in a compact bundle, together with a quantity of apocynum bark done up in

¹ Kidder-Guernsey, 1915, p. 165 and plate 72.



WHITE DOG CAVE
a, Wrapped mummy of woman from Cist 24; b, Mummy of man from Cist 31.

bundles. The net had evidently been cached here after the cist was abandoned and filled up, since the hole in which it rested was partly dug in the hard-pan at the edge of the cist, and partly in the fill of the cist itself. In clearing the cist a thick layer of cedar bark was found 1 foot from the bottom; below it was clean sand. One foot from the rim on the side opposite the net there was a pot-hole, 1 foot in diameter and the same in depth.

The rabbit net, a remarkable specimen, is described in detail in another place. Its lack of definite relation to the cist or to other Basket-maker remains at first raised a doubt in the authors' minds as to whether it might not have belonged to a later period. On the other hand it will be remembered that a very similar excavation at the side of Cist 24 contained the remains of a Basket-maker infant.

Cist 41 gave evidence of previous disturbance. On clearing it a small niche was found in one side that contained the remains of an infant, a small basket, a skin covered object (umbilical pad) and the usual fur-string robe.

Cist 51, 3 feet 6 inches deep, and 2 feet 6 inches in diameter, was constructed of slabs set about the sides of a shallow excavation in the hard-pan. It contained the skeletons of an adult and an infant. The former lay on its right side, head south. The infant rested across the breast and left arm of the adult and had been wrapped in a fur-string blanket and placed in a skin bag. Both blanket and bag were in an advanced state of decay. There were traces of a woven bag that had once covered the remains of the adult. At one side of the cist near the head of the adult was a small bowl-basket containing beads and a variety of small objects, which are described elsewhere. There were also in the cist food offerings of corn and piñon nuts.

Cist 54. After removing from the surface a large number of rocks, the fill under the end of the great rock in the center of the cave was explored. Here, 2 feet below the under side of the rock in what appeared to be a rude cist, there was found a cradle in excellent condition. With it were fragments of fur-string blankets and pieces of woven bags, but no trace of a body. The photograph, plate 5, a, shows the cradle *in situ*. The thin edge of the rock had been broken off somewhat before the picture was taken; it originally extended nearly a foot further than is shown. The

rock may have broken from the roof centuries ago or in very recent times. The cradle, however, must have been in the position in which it was found when the fall occurred.

Summing up the evidence as to mortuary customs contained in the foregoing descriptions, we see that the bodies were placed in cists of three sorts: jar-shaped excavations, whose primary purpose seems to have been for storage; larger, shallower pits apparently dug expressly to contain burials; and slab cists of the type illustrated in plate 9, c. Almost every cist held more than one individual and all the indications pointed to the interments having been made simultaneously.¹

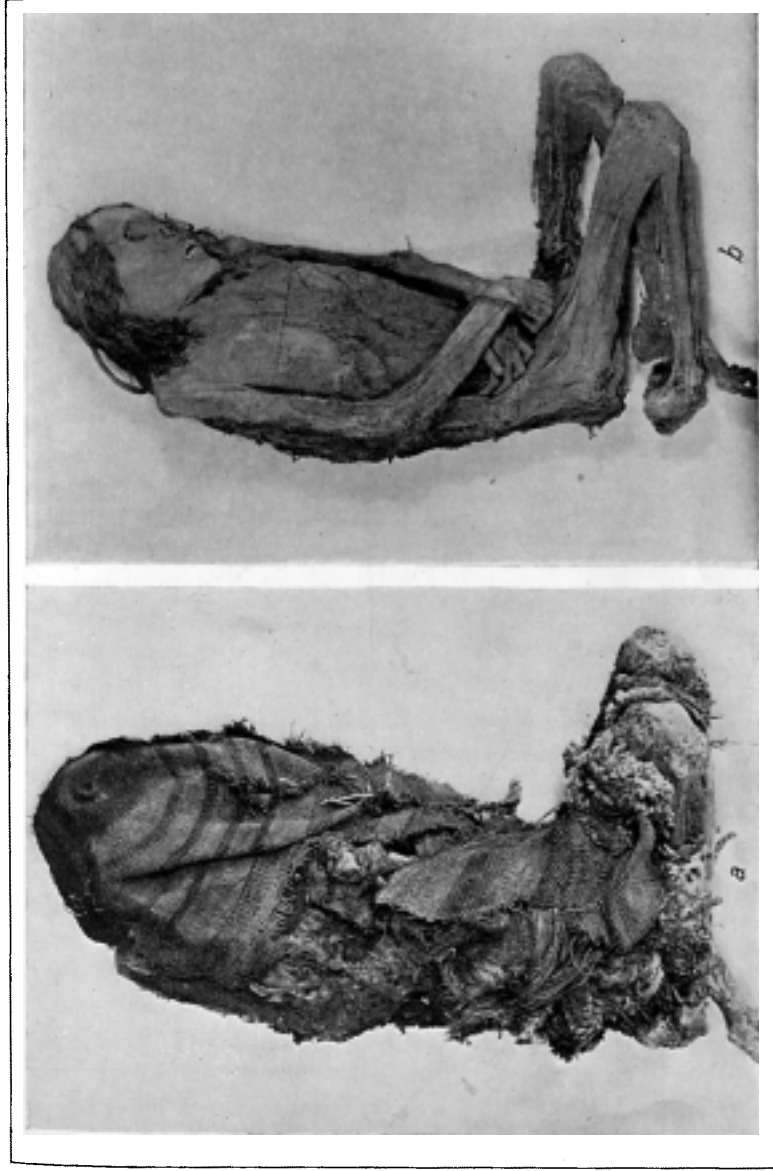
The bodies of adults were always wrapped in fur-string blankets and at the loins of most females were small string aprons. The limbs were flexed to occupy the least possible space and occasionally held in that position by cords. The bundles thus prepared were encased in large woven bags, which were cut down one side for greater ease in drawing on, and then stitched together again with yucca leaves. Babies were sometimes placed in bags, but were more commonly buried on their cradles with their blankets, umbilical pads and "diapers" of bast in place as in life.

No fixed manner of orienting the remains was adhered to, this detail having been decided, apparently, by the manner in which the body best accommodated itself to the shape and size of the cist.

Mortuary offerings were numerous and varied and seem fairly representative of the food, implements, weapons and ornaments of daily life together with some objects of a ceremonial nature. The standard gift to the dead was basketry; tray baskets were practically always inverted over the heads of adults, often over children; large panniers also served as covers; and smaller baskets, empty or filled with trinkets, were generously piled into the graves.

Kiva (?). There remains to describe a peculiar and puzzling room found at the front of the cave (see figure 5). The first intimation of its existence came when, in clearing the surface above what proved later to be the ventilator shaft, the wall of the main structure was exposed. The room, as shown in the plan, lies at the foot of the great rock pile which rises at a sharp angle to the

¹ The same thing was noted in Sunflower Cave (Cists 7 and 11); in Cave 1 Kinboko (Kidder-Guernsey, 1919, p. 83) and in the Sayodneechee burial cave (Ibid. p. 29); at the latter site there were more individuals per grave than in any of the others, one cist holding no less than 19 bodies; all, apparently, buried at one time.



WHITE DOG CAVE
Mummy of man, Cist 24: a, Wrapped; b, With coverings removed.

back of the cave. It was owing to the imminent danger of rock slides from this source that we were unable to excavate the room completely, either in 1916 or on a second visit to the cave in 1917, when another attempt was made to do so.

This chamber is, and apparently always was, entirely subterranean. The part that we were able to clear is irregularly circular. The room is sunk through the surface sand and into the hard-pan, which, standing as dug, forms the lower part of the wall (see figure 7, b). The upper wall is masonry of rough and irregular

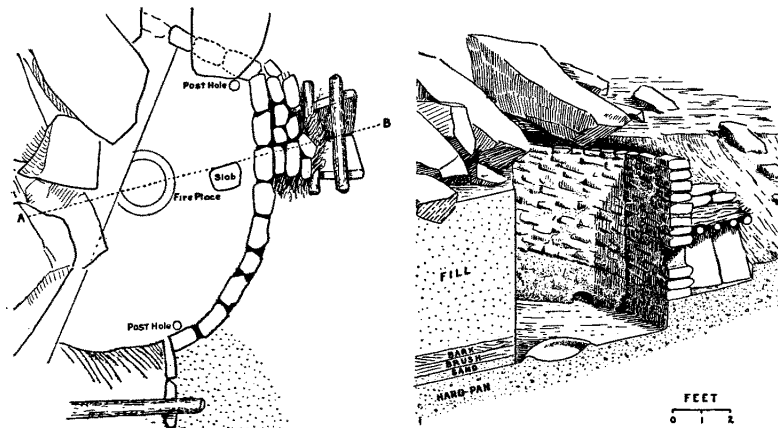


FIGURE 7

White Dog Cave: Plan and Cross-section of Kiva.

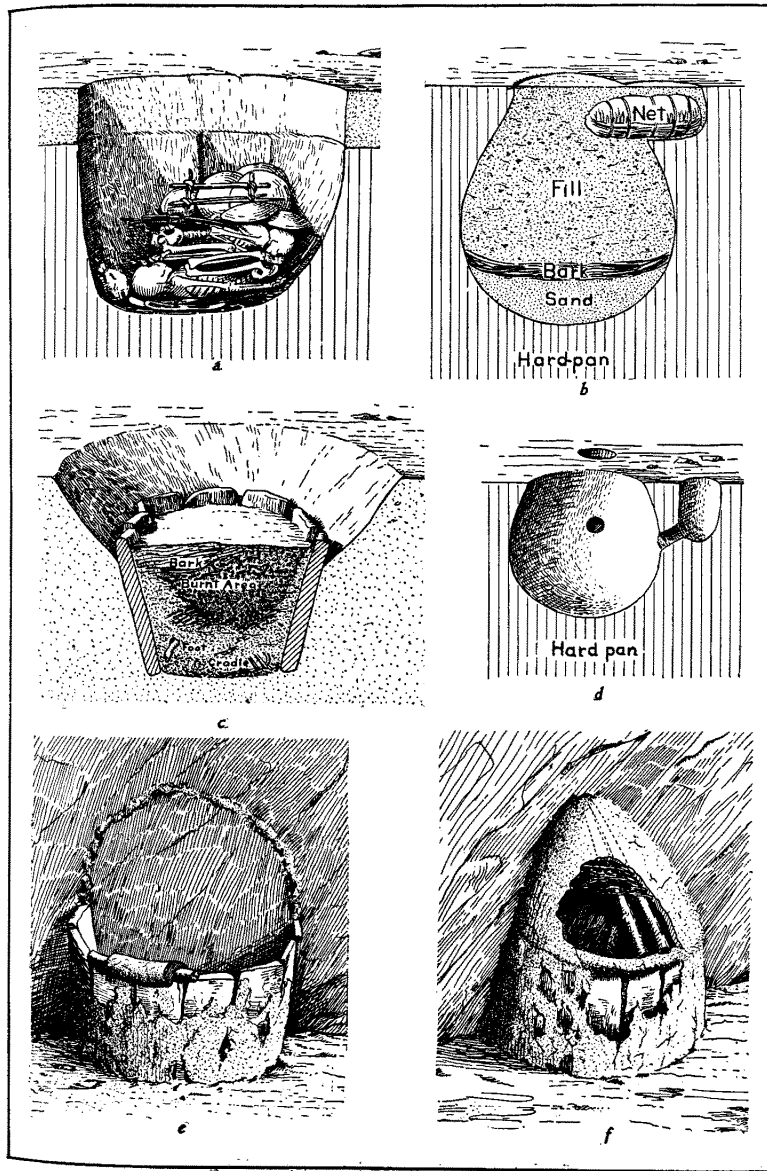
stones laid with little attempt to preserve a smooth face either within or without. At one point on the east side two upright slabs were set in and the wall was built on them. The top courses are somewhat more carefully constructed. Adobe mortar is used, sparingly below, more abundantly above. The whole structure is thickly "spalled" with small fragments of stone wedged into the cracks.

The general shape of the wall, partly straight, partly curved, can best be seen in the plan and section. The southern offset, which in the plan has the appearance of a bench or banquette, we are inclined to think was not a part of the original design of the builders, but was made necessary by the occurrence here of an outcropping of the ledge, the upper surface of which slanted inward at too

great an angle to furnish a stable foundation for a wall along the inner edge. At any rate, the offset overcame this difficulty, though for some reason, instead of continuing the wall as before, of laid-up stones, stone slabs set on end were used. We do not know whether or not this method of construction is continued under the rock pile. Placed across the top of the slabs was a stout log, one end resting on the top of the offset, the other passing out of sight under the rock heap. It is possible that the entrance to the room was at this point, as the sloping surface of the ledge here is very smooth as if from wear. South of the offset and outside the room we found slabs, set at right angles to the wall, and three upright stakes burned off close to the adobe in which they were embedded. There was a large amount of charcoal in this area. The slabs of the offset wall and those outside were much blackened by smoke.

On the east side of the room 2 feet above the floor, there is a small opening leading through the wall into a ventilating shaft. This orifice is five and one-half inches high by eight inches wide; it has two slender, round lintel sticks running across its top, their ends embedded in the masonry at either side (figure 7, b). All the edges of the opening are neatly finished off with adobe, the corners carefully rounded. On the floor of the room, nearly in front of this hole, lay a thin slab of rock measuring 11 by 12 inches; on trial it was found to fit exactly into grooves around the hole that had obviously been made for it (plate 10, b).

The horizontal shaft, to which the opening gave access, extended out from the wall for a distance of 3 feet 6 inches. It was built of flat stones set on either side with their bases together and their tops slanting outward, making a V-shaped trough 2 feet 6 inches wide across the top. This was roofed over with short stout logs covered with cedar bark, brush and coarse grass, the whole held down by flat rocks. The photograph, plate 11, b, shows the east end of the shaft with its log roofing. Behind and above may be seen the outside of the top courses of the wall of the main room, the position of which is also indicated by the dotted line in plate 11, a. There is no trace of a vertical flue connecting this horizontal passage with the surface. The pitch of the deposit is so steep here that it is probable that such a shaft was unnecessary, and that the horizontal passage ran straight through to the outer air.



Types of Basket-maker cists: a, b, d, White Dog Cave; c, Cave 6; e, f, Cave 14.

The floor of the room itself, as far as we were able to lay it bare, was of hard packed adobe with a smooth but uneven surface. At what seems to have been a little east of the middle of the room there is a firepit, a saucer-shaped depression in the floor with a neatly made coping or rim of hard baked adobe (plate 10 a). It was filled to the brim with clean white ashes. In outline the pit is a perfect circle, 2 feet in diameter; the rim is raised 3 inches above the floor, and the bottom is somewhat scooped out giving a depth of 5 inches to the center of the pit.

At the floor level in the back of the room is an oval niche dug horizontally 12 inches into the hard-pan of the wall, and measuring 18 inches across the front (see figure 7, b). There are two holes five and one-half inches in diameter and twelve inches deep, dug in the floor, one at the angle of the back and east wall, the other at the front directly opposite. So close are these holes set to the wall that at the back the sides of the holes are continued up through the adobe of the wall for some 6 inches. For this reason we are quite sure they are intended for post-holes though no post ends were found in them.

The filling of the room was entirely free from rocks, showing that the great pile that now covers its rear portions and its northeast wall must have fallen after the place had already been deserted for a long time. On the floor was a 3-inch bed of pure sand; above this was an equal amount of coarse brush and charcoal, topped by a layer of cedar bark. The remaining 4 feet 6 inches to the surface was a homogeneous deposit composed of equal parts of rat dung and sand, laid down in perfectly regular, thread-like horizontal strata, separated from each other by thin layers of clean wind-blown sand.

The peculiar make-up of this fill has been a matter of much discussion between the authors. A plausible history of the fill might be that the room, with roof still intact, was abandoned for a period sufficient to allow the three-inch layer of clean sand to sift in and accumulate on the original floor, after which it was reteneanted for a short time, the brush and bark brought in, and fires built, then vacated finally by man to become the rendezvous of rats through the long period which must have been required to build up the deep deposit of rat dung and sand found in it. During this latter period the roof remained; otherwise, instead of thin regular layers of ap-

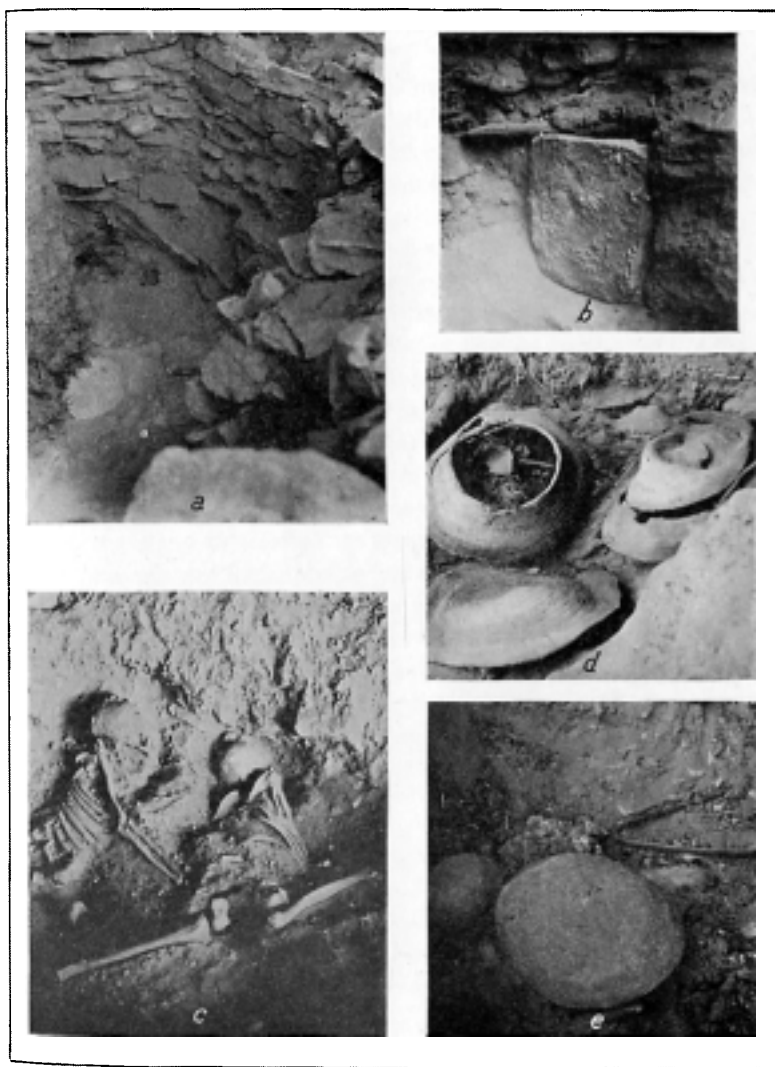
parently sifted sand, there would have been sand deposits of varying thickness, marking the occurrence of high winds such as we experienced while at work in the cave. Finally, and prior to the falling of the rocks from the ceiling of the cave, there came other visitors who found the roof a convenient source of fuel supply thus accounting for its complete disappearance.

Such a long discussion on the foregoing may appear unnecessary, but any condition which marks the lapse of time seems worthy of careful consideration.

It is unfortunate that we were unable to clear this room completely as there may be concealed beneath the débris which still covers the unexplored portion some evidence that would settle definitely the question of whether it is the work of the people who excavated the cists and buried their dead here, or of the Cliff-dwellers who came after. Such artifacts as were found in it are of little assistance in identifying the builders since they are either devoid of character or of such a nature as might easily have been dragged into it by rats. Outside the wall on the northeast and east sides we found some evidence of disturbance, such as might have been made in excavating for the foundation of the room, and in this disturbed area, close against the wall, lay two sandals with side-loops, of a type quite common in cliff-dwellings but which we have not yet found directly associated with Basket-maker remains. One of these was touching the wall at a depth of about 3 feet below the surface.

Had the chamber just described been found in a pueblo or cliff-dwelling, it would have occasioned no particular surprise, for while its ventilator opening is smaller and higher set than usual and the V-shaped horizontal passage is of unfamiliar construction, yet the mere presence of a ventilating apparatus, the adobe rimmed fireplace full of white ashes, and the subterranean situation of the room itself are all features perfectly normal in Cliff-dweller kivas. Furthermore the kivas of this particular district are typically variable and unspecialized.¹ The sandals seem to be Cliff-dweller and to have been left where found while the wall was under construction. All these things point to an origin subsequent to that of the Basket-maker cists. On the other hand we have never seen, nor have we read of, a kiva built as is this room all by itself

¹ Kidder-Guernsey, 1919, p. 201.



White Dog Cave: a, Interior of kiva; b, Ventilator cover in kiva; d, Baskets in Cist 22;
e, Objects in Cist 13. Sunflower Cave: c, Skeletons in Cist 7.

with no living-chambers in the vicinity. All kivas with which we are familiar form integral parts of house-clusters. The only surely identifiable Cliff-dweller remains found in the cave are enumerated as follows:

A storage room foundation was built on the sloping rock floor against the west side of the cave (see figure 5); it measured 5 feet in length, 2 in width and consisted of a low wall, 8 to 10 inches high, the stones mudded in with adobe mortar. In the enclosure was a bed of plant stalks, "Brigham tea"; the floor is bare uneven rock. We collected in the top sand of the cave a few handfuls of Cliff-dweller potsherds, for the most part plain gray and black-and-white ware, and a few pieces of feather string. A small corrugated pot covered by a flat stone was found cached in the sand 1 foot 6 inches below the surface; the mouth had been sealed with adobe mudded on to corn cobs, but this had crumbled and was found at the bottom of the jar. About the jar was a harness, made, with the exception of one short section, of Cliff-dweller feather string. The short piece is apparently Basket-maker fur-string and was probably a stray bit picked up from the surface.

The above is not an imposing list and leads us to doubt that the place was ever regularly used as a dwelling by the Cliff-house people. As to the identity of the kiva-like room, the writers themselves are not agreed; the senior author believes that it may possibly be of Basket-maker origin, the junior considers it surely Cliff-dweller, but can offer no explanation for its isolated situation.

FIELD WORK, SEASON OF 1917

REACHING Kayenta by the usual route via Farmington, New Mexico, and the Chinlee, the party first attempted explorations near Sayodneechee Canyon in Monument Valley, but was forced by lack of water to abandon the work after a few caves had been examined. Returning to Kayenta the exploration of the South Comb was resumed. White Dog Cave was revisited and an unsuccessful attempt was made to move the rocks from above the kiva-like room. Two new caves were discovered and investigated. Again forced to move by lack of water, the remainder of the season was spent in Sagiotsosi Canyon, where nine caves were either wholly or partly explored (see map, figure 1).

SAYODNEECHEE CANYON

This is one of the numerous short canyons which head near the Agathla rock and run northward into Monument Valley. Although it is without living water, the Navajo are able to cultivate corn in certain places. In the winter, rain and melting snow furnish sufficient drinking water for the Indians and their flocks; and in some years enough of this is held in pockets among the rocks to last until the showers of July and August. Generally, however, these natural reservoirs go dry in June and the Navajo must move away for a month or so to some more favored locality, returning after the rains to harvest their crops.

Aside from its dryness, Sayodneechee is a most attractive place; the scenery is magnificent, grass and firewood are abundant, and the cliffs contain many caves to tempt the archaeologist's shovel.

Caves 3, 4 and 5 are in a break of the rock ridge that forms the west wall of Sayodneechee Canyon, and are nearly opposite the Basket-maker burial cave in the above canyon excavated by the 1914 expedition.¹

Cave 3 is a mere shelter measuring 15 feet in depth by 30 feet in width. The wash of a small canyon has cut away the floor at the front. On the back wall are a number of pictographs done in white, red, and yellow paint; some of these are reproduced in plate 13, a. We found several slab cists buried beneath the sand floor. They contained nothing except cedar bark.

¹ Kidder-Guernsey, 1919, p. 27 and figure 1.



WHITE DOG CAVE

a, Rock pile in center of cave; b, Southern wall and ventilator in kiva.

Cave 4, a short distance up the canyon, is 20 feet above the wash. It has a depth of 12 feet and measures about 24 feet across the front. The floor is of hard-pan free from surface sand. In it are a number of small cists or pot-holes. At the front the hard-pan formation has a vertical break, in which is dug a small cubby hole measuring 4 feet in depth by 3 feet 6 inches in width. At the entrance to this little room, shown at the left in plate 12, a, are a number of flat slabs arranged like steps, a single slab 2 feet long and 8 inches wide serving for a sill. There are several small holes dug through the top of the room to the surface above. The largest of these holes is plugged with a rock.

A little further along the cliff is a rectangular Cliff-dweller room, the dimensions of which are, length 12 feet, width 7 feet, height of wall 6 feet 6 inches. In the center of the front wall is a doorway 29 inches high, 16 inches wide. At the top is a flat stone slab lintel supported by two round sticks built into the wall, another slab serves as a sill. The edges have grooves or jambs for the reception of a slab door. The masonry of this room is good. There were no pictographs. Potsherds were plentiful and along the cliff near the room there was some rubbish and a number of ash beds.

Cave 5 is still further up the canyon. It measures 45 feet across the front, and 15 feet in depth. At the back are the foundations of a room 10 feet long by 6 feet wide built out from the cliff. The masonry is of stones laid flat in adobe mortar. Two slab cists and two cists dug in the hard-pan floor were found in the cave, but no specimens.

Near the sites just described is a small shelter on the ground level of such insignificant size that no number was assigned to it in our field notes. We dug here, however, and at a depth of one foot below the surface found two slab cists partly filled with cedar bark. These were undoubtedly storage cists, as near by is a Navajo cornfield, located in a small basin which collects and retains such water as in time of rain runs off the surrounding cliffs, an advantage probably recognized by the early occupants of the region as readily as by the present day farmers.

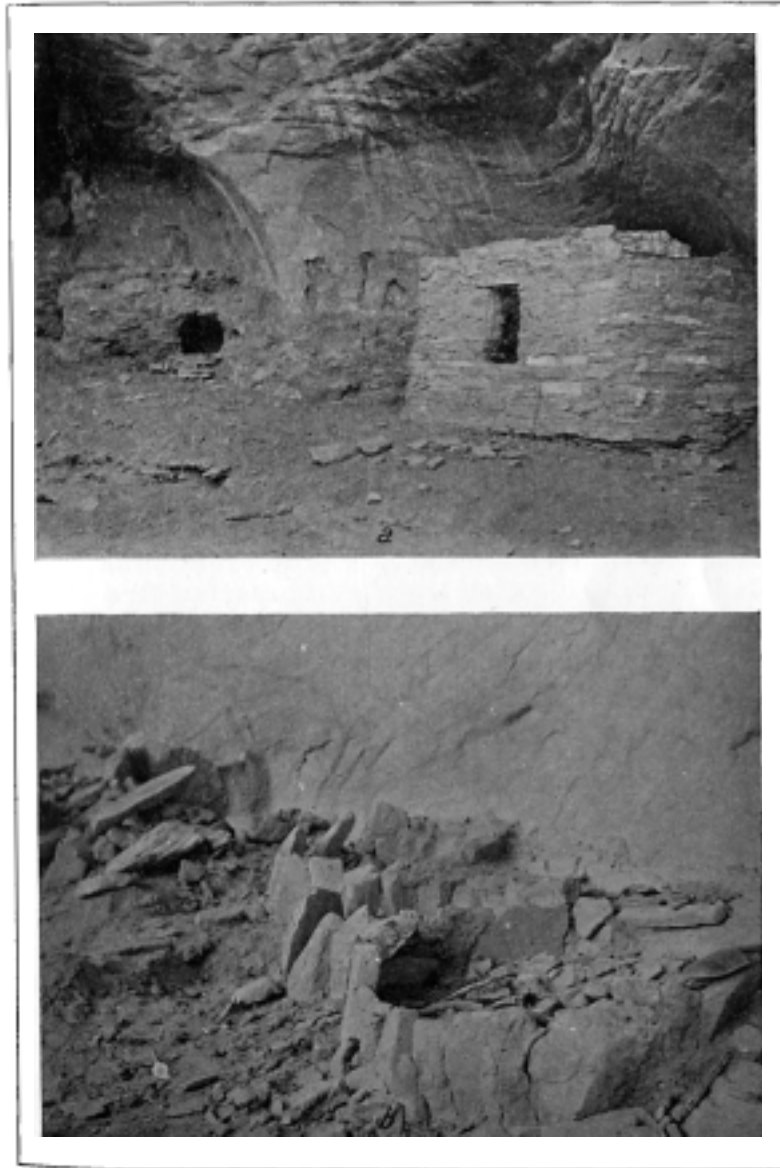
The principal structures in these caves are of course Cliff-dweller. The slab cists and possibly some of those excavated in the hard-pan we are inclined to think are Basket-maker. No great amount of work was done at any of the sites, as we were on such

short rations of water that our examination really only amounted to a reconnoissance. Continued drought finally drove us away, and we returned to the South Comb.

SOUTH COMB REVISITED

Cave 6. This site is in the next break in the Comb north of White Dog Cave, a distance of about one mile in an air line. It consists of a small alcove at the back of a huge crescent-shaped bay or cove in the cliff wall. Filling the open end of the crescent and hiding the cave from view in front is a high sand hill covered by a growth of thick brush and tall pines. The cliff on either side of the cave overhangs, sheltering a wide strip along the wall some fifteen feet lower than the floor level of the cave proper. On this level to the left of the entrance there is part of a roughly laid wall, built against the cliff. It forms a small enclosure and is probably the work of Navajo herders or possibly Ute, as on the smooth cave wall back of it are a number of drawings in charcoal (plate 13, f), one of which, a female figure, is shown wearing a dress that has characteristic features of the Ute woman's dress. Inside this enclosure were traces of recent fires and on the surface was a small mudded-up fire pit, which gave us the impression of having been the work of children.

The walls and ceiling of the inner cave are much blackened by smoke. It had been used as a sheep shelter and the old floor was covered by a thick layer of dung. The most careful search of the surface on the first level and the bank leading up to the cave proper failed to produce a single Cliff-dweller artifact and our excavations later showed not a vestige of Cliff-dweller occupation. Here for the first time we had a cave containing only Basket-maker remains, and while but a few specimens were found they were for the most part very true to type, the exceptions being entirely new material. A single burial was encountered. This was in a stone slab cist (plate 9, c), exactly like those found in such numbers in Cave 1, Kinboko (1915). Unfortunately, however, it had not only been plundered at some early date, but what remained of its contents had been partly destroyed by fire. The top of the cist was 18 inches below the surface. It measured 3 feet 4 inches in diameter at the top, 2 feet 6 inches in diameter at the



a, Structures in Cave 4 Sayonsoochee Canyon; b, Cists in Cave 14, Sagiotsael Canyon.

bottom, and was 2 feet, 4 inches deep. Ten slabs were used in its construction. In the upper part was a quantity of cedar bark and a few bones from the skeleton of a child, then a mass of charcoal and charred wood in which were fragments of human bones. On the bottom at one side was a partly burned cradle frame, and the mummified foot of an adult. Other objects found scattered in the fill are as follows: fragments of fur-string robe, dressed skin robe, twined-woven grass mat, string apron, a sandal, an atlatl, a grooved club, a skin-covered umbilical pad, the bark core of another, a skin bag, a bunch of human hair, a fragment of squash shell, and many small bits that could not be identified. All these specimens were more or less charred.

But one other slab cist was encountered. Its only unusual feature was a bottom lining of thin slabs of spruce bark.

Nearly all the level portion of the cave floor was occupied by a deep ash bed in which only a few minor specimens were found. Just outside this area at a depth of 1 foot 6 inches was a tray basket, and buried in the loose fill near it at about the same depth was the small woven bag in which was the little skin pouch shown with its contents in plate 44.

On the right of the cave the floor rises and narrows until it gives place to a mere bank of débris piled up against the back wall. At the highest point of this bank and next to the wall, three deer or possibly mountain-sheep snares were found. They had been cached in a shallow hole scooped out of the fill, and were covered with cedar bark and a thin layer of dirt. These snares are new items in our Basket-maker list. They are described and figured in another place (plate 32). A few feet from where the tray basket was found, and at the same depth, were three sherds of a substance resembling pottery of unbaked clay, tempered with shredded cedar bark, and bearing on one side the imprint of coiled basketry (plate 25, a). This may really be a primitive form of pottery or may represent only some left-over material for smearing joints in a slab cist, which was prepared outside the cave where both water and clay could be had, and then brought into the cave, while soft, in a convenient tray basket, from which it was not removed until it had hardened by drying. It is the nearest approach to pottery we have yet encountered under circumstances that would free it from suspicion of Cliff-dweller origin. Mr. John Wetherill,

to whom it was shown, said it recalled the pottery found in the Basket-maker caves of Grand Gulch. This, according to McLloyd and Graham's description as quoted by Pepper,¹ was "a very

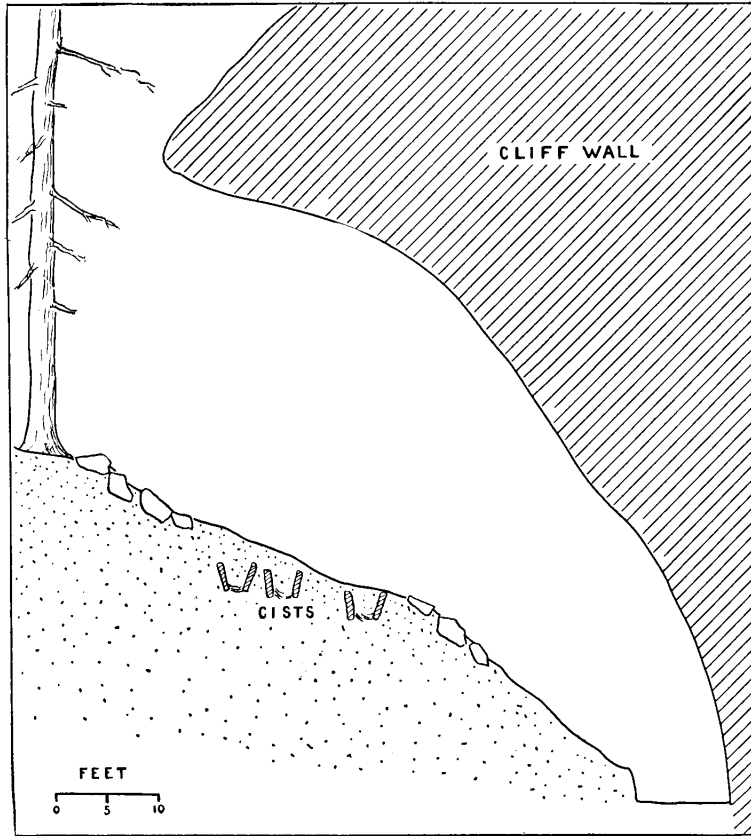


FIGURE 8
Cross-section of Cave 7, South Comb.

crude, unglazed ware, some of the bowls showing the imprint of the baskets in which they were formed."

As stated before, all our work in this cave brought to light not one trace of Cliff-dweller occupation, which includes not only potsherds, but also turkey droppings and turkey feathers, beans

¹ 1902, p. 9.

and rubbish layers. Hence the collection obtained here, though not extensive, is important as it supplies unmixed material with which to check our previous identifications.

Cave 7. About one mile north of Cave 6, we found another shelter very similar to it, except that it lacked the alcove room at the back. A steep hill rises directly in front of it. The slope of the hill next to the cliff lies almost wholly inside the line of shelter and its base at that point is cut away by an arroyo which continues along the wall for some distance. This seemed a very unpromising site, but on investigation we found a number of slab storage cists filled with cedar bark or grass, located as shown in the cross-section, figure 8. No Cliff-dweller remains were found here and only two Basket-maker specimens. These were the digging sticks shown in plate 37, e, f. This shelter seemed never to have been used as a place of abode for any great period as we found no extensive ash bed. Perhaps it was conveniently near some cornfield and was used only for storage purposes or as a temporary dwelling place while farming was in progress.

By the time that the work in Cave 7 was completed, the water in this section had become so bad that we were again forced to move.

SAGIOTSOSI CANYON

Sagiotsosi Canyon, though small in size compared with many others in this region, exceeds all that the writers have visited in the number of caves to be found in it and its branches. Its scenery is exceedingly picturesque, and it is rendered doubly attractive in this parched land by a stream of clear cold water fed by numerous springs that emerge from the base of the cliffs on either side at the upper end. This stream flows the entire length of the canyon finally to disappear in the thirsty sands just outside the entrance. In one place where it has cut a deep arroyo, a dark peat-like stratum can be seen in the vertical sides of the cut, marking an old lake bottom that probably once provided a natural reservoir for the ancient inhabitants. Today a number of well-irrigated Navajo cornfields and thrifty peach orchards show the water supply to be still ample for the requirements of primitive farming.

The caves in the main canyon are for the most part high up under the rim-rock and are perhaps more properly described as shelters. Some are of huge size with high arched openings, but of

no great depth. Occasionally they occur in groups of three or four, quite close together. To enter them one must first climb over huge fallen rocks to the first bench of the cliff, then up a steep talus of finer detritus to the caves, the bottoms or floors of which are really nothing but the truncated apex of the talus. Several of these caves have in them small Cliff-dweller structures. A number have already been explored by Professor Cummings.¹

On the right about half way up the canyon and high in the cliff is a fair sized cliff-dwelling which to date has not been excavated. An interesting feature of this ruin is a tower that commands every approach to the cave. A cursory examination indicated that the roof had been destroyed by fire. On the back wall of the cave is a pictograph similar to the one illustrated in plate 13, e.

Cave 8. This cave is in the first branch-canyon leading out of Sagiotsosi to the west. It is in reality a shelter under the overhang of the cliff, 30 feet in width, some 70 feet in length and about 25 feet above the bed of the wash. There is in it ample evidence of Cliff-dweller occupation, consisting of some foundation walls, a good depth of rubbish, with many potsherds, and a number of Cliff-dweller pictographs (plate 13, d, e); there is also a square-shouldered human figure done in white and yellow paint. This shows very faintly and a small Cliff-dweller painting of a snake overlaps it in one place (d). It was this square-shouldered pictograph that induced us to dig here, as our previous experience had shown these figures to be of Basket-maker origin.

Our excavations disclosed considerable Cliff-dweller rubbish with hard-pan below it in which we found a number of cists, empty except for cedar bark or coarse grass. These cists and the square-shouldered figure are the only remaining evidences of Basket-maker occupation. From the general digging we obtained a number of Cliff-dweller specimens including the skeleton of a young child on a perfectly preserved cradle which had been buried under the rocks at the top of the bank at the front.

This shelter seems insignificant in comparison to the huge caves in the main canyon. It provides, however, a further illustration of the fact that no cave or shelter in this region is so small that it has not at some time attracted tenants who have left traces of their occupancy.

¹ 1910, pp. 9-18.

Cave 9. Across the canyon from Cave 8 is a small Cliff-dweller ruin in a low cave that shows signs of previous investigation. Rooms along the back wall have been reroofed by the Navajo and used for storage purposes. This cave in the writers' opinion gives evidence of two occupations. This belief is, however, based wholly on the presence of typical Basket-maker cists excavated in the hard-pan floor (plate 14, c, d), for we found here no objects that could be classed as Basket-maker. The cists occurred in a small unoccupied area in the center and were completely filled with Cliff-dweller rubbish. There is, nevertheless, evidence at one place

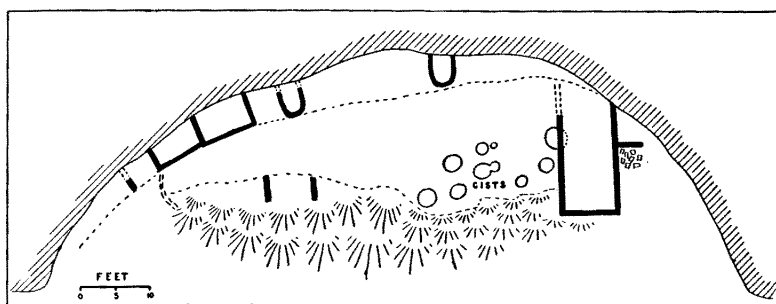


FIGURE 9

Plan of Cave 9, Sagiotsosi Canyon.

that the cists were here when the Cliff-dweller structures were erected, for the side wall of one room is built partly across a cist (see figure 9). The latter could hardly have been made by the Cliff-dwellers, since they could have easily avoided weakening the foundation of their wall by digging the cist a little to one side.

In objection to the foregoing it may be said that the cists are of Cliff-dweller origin; they are, however, exactly like ones found in other caves containing Basket-maker burials, and since all Basket-maker cists have a certain unity of design and a certain "look," hard to describe but at once apparent to anyone who has opened a number of them, the authors are satisfied that their identification of the present examples is correct. Compare c and d, plate 14 with a and b of the same plate; the latter are from photographs of Basket-maker cists in White Dog Cave.

Cave 10. Just below Cave 8 there is a narrow break in the canyon wall with a length of perhaps 400 feet. About half way up this

gulch is a shelter 20 feet in depth and 40 feet across the front (plate 5, b). The only sign of occupation noticed on entering was the top of a stone slab cist which just showed above the surface sand and a number of hand-prints in red on the back wall at one side. Excavation proved, however, that the place had been occupied by both the Basket-makers and the Cliff-dwellers. The Cliff-dweller remains consisted of a few potsherds, several bone scrapers of a typical Cliff-dweller form,¹ and a quantity of corn-cobs which we think are Cliff-dweller because they are much longer and larger than the Basket-maker corn-cobs we have found.

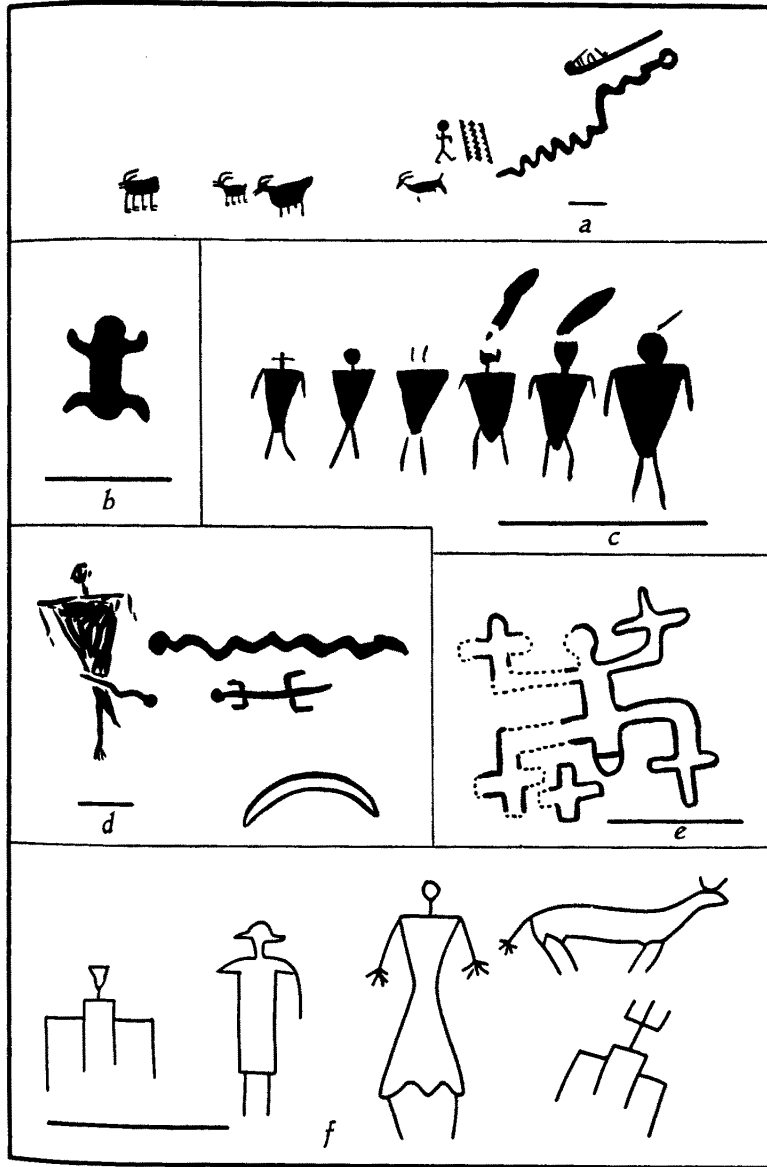
The Basket-maker remains were empty storage cists, both slab and excavated, with cedar bark in their bottoms. There was also one Basket-maker burial cist containing the partly mummified and headless body of a child, wrapped in a fur-string robe. With the body was part of a large dressed skin bag and at the feet lay badly rotted square-toed sandals. This burial was identical with those found in other Basket-maker caves. Evidence appeared that this or other cists had been plundered, as in the general digging there were found a number of fragments of Basket-maker basketry and a small piece of rabbit net made of human hair and fiber-string combined.

To gain entrance to the gully in which this cave is located one must cross a smooth, waterworn ledge. Up this is pecked a series of tracks representing the hoof-marks of a horse. They are very neatly executed and are the first instance that has come to our notice of pecked pictographs of recent (Navajo or Paiute) origin.

Cave 11. This cave is in the east wall of the main canyon near its head. It is some 200 feet above the wash and consists of a narrow shelter with a frontage of about 150 feet. On the back wall are a number of hand-prints and some nearly obliterated human figures all in white. On the surface were scattered a few bleached human bones. Large flat rocks along the front show deep axe-grinding grooves.

We were only able to spend a half day here. Our limited digging showed that for a considerable period the cave had been used by Cliff-dwellers and we recovered a number of their characteristic

¹ See Morris, 1919, figure 23, e. We found none of this variety in our cliff-house excavations in 1914.



Sayodneechee Canyon: a, Pictographs in white paint, Cave 3. Sagiotsosi Canyon: b, Pictograph in red paint, Cave 12; c, Pictographs in white paint, Cave 14; d, e, In white paint, Cave 8; f, In charcoal, Cave 6.

artifacts from the rubbish. At one point we found a loom-anchor in place. This consisted of a smooth pole one and one-half inches in diameter and six feet long, having loops of braided yucca and heavy fiber cord strung on it at regular intervals. It was buried several inches below the floor and held down by flat rocks, the tops of the loops just protruding above the surface. Under some large rocks at the front of the cave, we uncovered a small Basket-maker pannier basket in a poor state of preservation, inverted over a quantity of corncobs; probably the corn had been stripped by rodents. Attached to it was part of a carrying-strap of human hair string.

In a narrow part of the shelter and under what must have been the path ordinarily used in entering it, we found a disturbed Basket-maker burial. Some of the bones including the skull were missing. There were with the remains fragments of a coiled basket, square-toed sandals and a piece of finely woven cloth.

Cave 12. This is a deep cavern a short distance down the canyon from Cave 11 and on the same side. It is about 90 feet above the wash and has a fairly level floor area 40 feet deep by 70 feet across the front. The walls and ceiling are much blackened by smoke, and the floor is thick with charcoal. At one point the top of a rude enclosure of stone slabs shows just above the surface. This is circular in shape and has a diameter of 12 feet. At one place in the back wall are a group of hand-prints in red placed as near together as possible and covering a space of 6 feet or more; the only other pictograph noticed is the small figure shown in plate 13, b, also done in red. On a flat rock at the front are a number of axe-grinding grooves.

Our digging here was confined to test holes, as it was obvious that it would be too much of an undertaking for our small party to clear the cave completely. We found rubbish along the back wall to a depth of a little more than one foot. It was very compact and contained a large amount of broken sticks and twigs, straw and charcoal. There were two or three slab cists partly filled with cedar bark but holding no specimens.

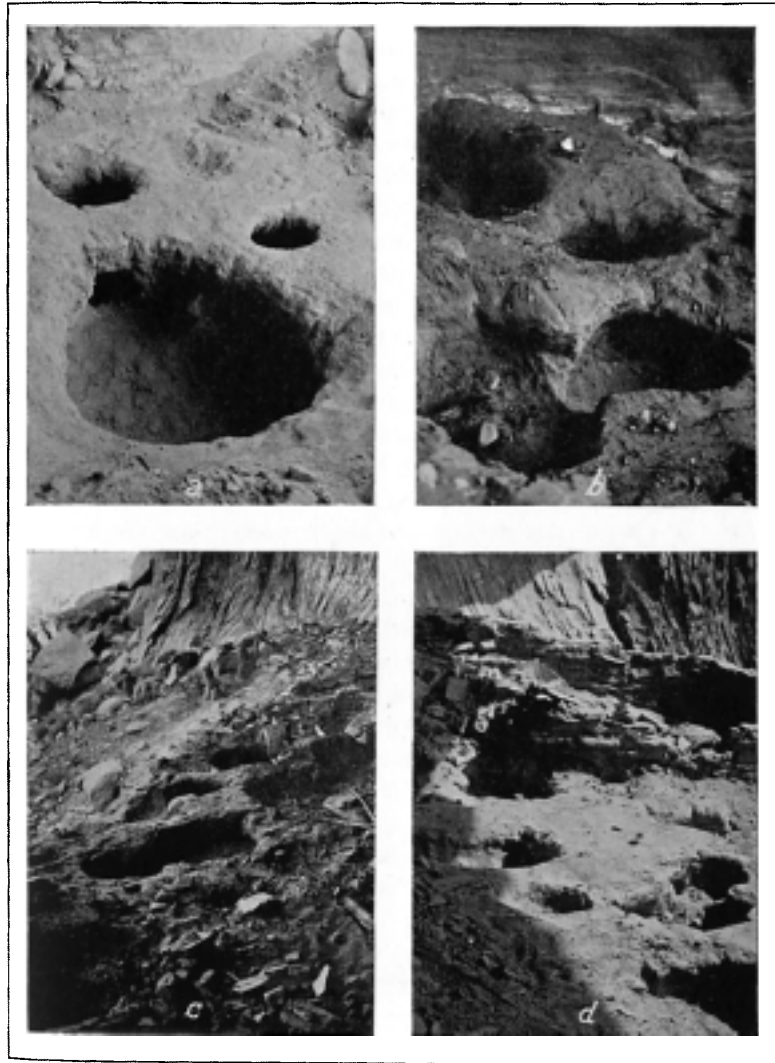
We do not think any great returns would reward further work at this site. It had apparently been used by Basket-makers and Cliff-dwellers in turn, but did not appeal to the latter strongly

enough to warrant the erection of any structures. It is set very deep in the cliff and gets but little sun; it may have been considered undesirable on this account.

Cave 13. This is a very long shallow shelter high up in the cliff near the head of the branch canyon in which Caves 8, 9 and 10 are located. At some not very remote time a great quantity of the roof had scaled off, burying almost the entire floor beneath tons and tons of rock. At one end of the cave is a series of small cliff-house rooms, some of which still retain roofs; others are crushed and the walls partly buried beneath the fallen rocks. Along the whole front of the cave can be traced a low roughly built wall. It seems probable that beneath the rocks are structures similar to those in the end of the cave, but to reach them would be a very large undertaking. We noticed no pictographs here.

Cave 14. This cave, the last to be explored, is but a short distance from Cave 13. It consists of a shallow shelter 200 feet above the canyon bottom, and has a usable floor space 20 feet deep by 70 feet in length. The line of shelter extends some 20 feet beyond the point where the floor breaks away at the front. At one end is a small niche in the back wall 7 or 8 feet above the floor. Leading up to it are a number of pecked toe-holes. The ceiling and some parts of the walls of the cave are blackened by smoke. On a smooth area of the wall near the center is a group of square-shouldered human figures painted in white, while other similar figures show faintly at other points (plate 13, c). These are distinctly Basket-maker. Built against the back wall of the cave is a series of seven stone slab structures, six of which are in a fair state of preservation. These will be given a more detailed description further on.

In our excavations here we found below the surface several slab cists of the usual Basket-maker type. From one we obtained a small skin pouch, which with its contents is shown in plate 38, a-c; also, in the loose fill, a wooden implement plate 36, a; and the bundle of human hair wrapped with string illustrated in plate 32, e. At the extreme right of the cave a single square-toed sandal was found in the general digging, and several ears of corn cached in the loose dirt against a large flat rock. So near is this cave to Cave 13 that it is inconceivable that it had not been frequented by Cliff-dwellers to some extent, yet careful search of the surface, and



a, b, Cists dug in hard-pan, White Dog Cave; c, d, Cists, Cave 9.

watchfulness throughout the digging failed to produce a trace of their handiwork with the possible exception of the corn which may be Cliff-dweller, as it is unlike the characteristic Basket-maker corn. It was found in a part of the cave quite remote from the cists. There were no potsherds, twilled sandals, feather cloth or even axe-grinding grooves. The latter are seldom absent from caves in which the Cliff-dwellers have lived.

The most interesting things in the cave are the slab structures along the back wall (plate 12, b). They average about 5 feet in diameter, the best preserved standing three and one-half feet above the surface. Large stone slabs are used in their construction, in most cases overlapping. The space between the joints is filled with adobe mortar which in some instances has been plastered all over the slabs both outside and in. Small stones are set in to fill holes between the slabs and the cave wall to reinforce the slabs at their bases. In the structures and on the surface about them were a number of timbers from 4 feet 6 inches to 6 feet in length and 4 to 6 inches in diameter, probably roof timbers. Other shorter sticks were found which had once formed a part of a rim molded on to the top of the slabs. These pieces had traces of adobe on one side; there were also found large lumps of adobe tempered with cedar bark with one side moulded round, the other bearing imprints obviously made by the short timbers just mentioned. These sections of stick and adobe are important because they show that the present above-ground cists are identical in rim construction with a subterranean Basket-maker storage place (Cist 14) found in Cave 2, Kinboko during the 1915 season.¹ Another larger cist (12) in the same cave had a similar rounded adobe coping strengthened with stones instead of sticks. The drawing, plate 9, e, represents one of the Cave 14 cists with a short section of the rim restored. The slabs are shown partly denuded of the adobe plaster, while on the wall behind the cist a line of adobe is indicated which probably marks the outline of the roof. This structure more fully restored appears in f, of the same plate.

Why so much care should have been taken to finish the rim, if the roof timbers were to rest directly on it, we are unable to say, though it is evident that a rim made in this way would greatly

¹ Kidder-Guernsey, 1919, p. 88.

strengthen the whole structure. These slab cists seem hardly large enough for living rooms or even for sleeping places. It seems more probable that they were storage cists. We do not hesitate to identify them as Basket-maker, because they are exactly like the Basket-maker structures in Cave 2, Kinboko.

MATERIAL CULTURE¹

FOOD

Vegetal Food. *Maize.* In 1914 and 1915 we found indications that the Basket-makers cultivated but a single and rather primitive type of corn, while that grown by the Cliff-dwellers seemed to have been more highly developed and more varied in character. Our evidence was not, however, absolutely conclusive, for certain specimens of the advanced corn were taken from Basket-maker caves, though from so near the surface that we regarded them as probably intrusive. The expeditions of 1916 and 1917 supply us, fortunately, with enough new finds to settle the question beyond any reasonable doubt. A number of Basket-maker caves were thoroughly investigated and many samples of corn were recovered from undisturbed and surely identifiable burials and storage cists; among all this material there is not a single kernel of any of the parti-colored flour or large white flint corns that are so common in the cliff-houses.²

On specimens submitted to him for examination Mr. G. W. Collins of the United States Bureau of Plant Industry has kindly given us the following report:

The collection of maize samples from the Basket-maker caves is of unusual interest.

The specimens all appear to belong to one general type, a type we have called Tropical Flint. This type resembles the New England flint varieties in having a large part of the endosperm hard or corneous. It differs from New England flint in having a larger number of rows and smaller seeds. Tropical flint varieties are common in Central and South America but are rare among the types grown by the Indians of the United States. So far as our collections show the Papago is the only tribe with varieties uniformly of this type.

The cobs of the specimens from the Basket-maker caves are all light brown in color. The pericarp is either red or colorless. The endosperm is either light yellow or white. The aleurone or layer of cells just beneath the pericarp in all the specimens is a yellowish red. This is a color entirely unknown in the aleurone of existing varieties. If this color is not the result of some slow disintegration, it constitutes the first clearly marked distinction between prehistoric maize and present day varieties.

Most of the specimens are remarkably well-preserved. The embryos have of course disintegrated but the colors are much brighter than is usual with old specimens.

¹ Only objects believed by us to be of Basket-maker origin are included. Specimens recovered from the cliff-houses will be treated in a later paper.

² See Kidder-Guernsey, 1919, p. 154.

The specimens cannot be referred to any existing variety with which I am familiar but with the possible exception of the unusual aleurone color they present no new characters.

Here then is an undifferentiated, and judging from its distribution, a primitive form of corn grown by a people whom the purely stratigraphic evidence shows to have antedated the highly developed agriculturists of the region. This agrees very well with the other manifestations of Basket-maker culture, and particularly with its lack of true pottery, stone architecture, and cotton weaving, all of which traits are characteristic of the perfected puebloan civilizations. We have thus good evidence that the Basket-makers were the pioneer corn growers of the district.

To what degree these people depended upon maize is uncertain, but quantities of it were found in the burial cists and cached for future use as food or for seed. There were also recovered agricultural implements such as would be needed for its cultivation, and the large number of storage cists in the caves would indicate by their capacity that a considerable harvest was obtained. The sites explored by us were all within easy reach of tillable land and this is also true of the Grand Gulch Basket-maker caves.

Of the actual finds of corn the best example is the skin bag full of shelled kernels from Cist 13, White Dog Cave (plate 15); there are about four quarts, every grain in perfect preservation. This may represent a food offering deposited with the dead, or perhaps it is carefully selected seed cached unknowingly in the same cist with the burials (it was found some 8 inches above the remains shown in plate 10, e). Other interments, however, were accompanied by corn and the remains of rotted hide containers, so that it may indeed be a food offering. A selection of the more perfect ears of Basket-maker corn is shown in plate 15.

Squash. This seems to have been the only other cultivated crop of the Basket-makers.¹ We unearthed with the burials varying quantities of squash seed, *Cucurbita pepo*, and many pieces of rind, as well as the complete vessel made from a squash shell that is shown on plate 31, b.

Seeds. In a number of the burial cists in White Dog Cave, large quantities of coarse grass seed were found. We saw growing in the

¹ Though we were constantly on the watch for beans in the Basket-maker sites, none were found. This strengthens our belief that they were not grown by the Basket-makers.

vicinity, the same variety of grass from which it was obtained. Mr. W. E. Safford of the Bureau of Plant Industry identifies this as follows:

Oryzopsis hymenoides, commonly called Indian Mountain Rice, is used by several Indian tribes for food; by some only in times of scarcity, by others as a regular food staple. Mr. F. V. Coville states that the squaws of the Panamint Indians of southern California gather it by means of a wicker paddle resembling a small tennis racket with which they beat the seeds from the standing grass into wicker baskets, after which they are winnowed and sifted, and parched and ground into *pinolli*. The late Dr. Edward Palmer found this seed in use among the Paiute and Pueblo Indians, who store it for winter use.

Cummings¹ found caches of seed in Sagiotsosi ("coarse bunch grass"), which may be the same. No doubt other seeds were gathered and stored for food, as we found in 1915 several quarts of *Coreocarpus* seeds in a burial cist in Cave 1. Powell in his explorations of the Colorado found a tribe which subsisted chiefly on wild fruits, nuts and native grains. In our own explorations we came upon an old Navajo squaw in the vicinity of Sagiotsosi who was gathering the small seeds of a low weed. She told us that these were cooked and made into a kind of mush by mixing with goat's milk, also that they were now (1917) being used again for the first time since the "great war" (Navajo war, 1863). These are identified by Mr. Safford as *Chinopodium sp.*, who writes as follows regarding them:

They are perhaps the most interesting of the collection. It has been impossible to determine their specific identity. They are much larger than the seeds of *Chenopodium fremontii*, gathered for food by the Klamath Indians, and those of *Chenopodium leptophyllum* eaten by the Zuñi. In shape they bear a close resemblance to the seeds of *Chenopodium quenua*, the well-known food staple of the Peruvian and Bolivian Plateau, but they are of smaller size and of a much darker color than the latter. These seeds have been carefully compared with those of the species growing commonly in the southwestern United States; they bear a closer resemblance to *Chenopodium petiolare* than to any other species in the herbarium, but they do not seem to be identical with the seeds of that species. They are evidently rich in starch and would undoubtedly form a nutritious article of food.

Piñon Nuts. These were also an important item of diet and were found with other food offerings in many of the graves.

¹ Cummings, 1910, p. 14.

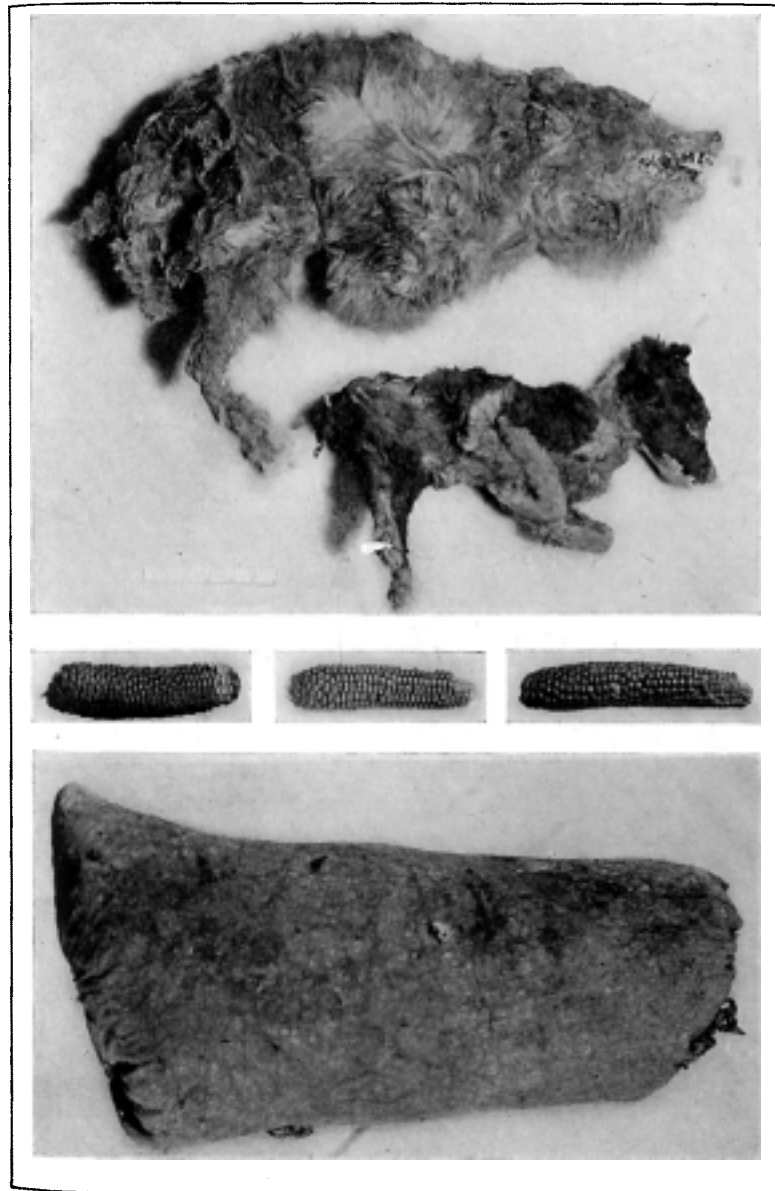
Unidentified Food. Small quantities of plant stalks, shriveled beyond recognition, accompanied some burials. These are probably from certain edible plants that grow in the region, and which are eaten today by the Navajo.

Animal Food. The bones of mammals and birds, generally so common about the dwelling places of primitive people, were entirely lacking in the group of Basket-maker caves examined. We do not believe that this indicates a preponderatingly vegetarian diet, but rather that it proves the caves to have been used merely as temporary shelters and as burial places for the dead. That these people killed a great deal of large game is evidenced by the abundance of articles made from the hides of deer and mountain-sheep; while quantities of the pelts of badgers, rabbits, prairie-dogs, and other small animals were employed for bags, pouches, and in furs-string robes. It is probable that the flesh of all the above was eaten.

As to the birds we have less evidence. Such feathers as were found came principally from hawks and owls, species not commonly relished as food by any people; or from very small birds of bright plumage such as warblers, bluebirds, and woodpeckers. As we have never come across a single identifiable turkey feather, it is reasonably certain that the turkey was not domesticated, nor indeed does it appear to have been commonly hunted.

Although there is no evidence that the Basket-makers used the dog for food, it may be well to refer here to the finding of two remarkably well-preserved dog mummies in White Dog Cave. They represent different types, formerly of wide distribution in the warmer parts of America (plate 15). Dr. Glover M. Allen of the Museum of Comparative Zoölogy, who has made an exhaustive study of the native Indian dog, has kindly contributed the following regarding these specimens:

The larger is a long-haired animal the size of a small collie, with erect ears and long bushy tail. The hair is still in good condition and though now a light golden color, with cloudings of dark brown, it may in life have been darker. It is, apparently, a breed very similar to the long-haired Inca dog found at Ancon, Peru, in a mummified condition and described by Nebring (*Sitzb. Ges. Naturf. Freunde*, Berlin, 1887, pages 139-141). The latter specimen is also described as yellowish in color, though this may have been in part due to fading. A more detailed comparison of the two specimens is not possible without removing and cleaning the bones and so injuring the present example for exhibition purposes.



WHITE DOG CAVE

Mummies of two varieties of dogs, ears of corn, and skin bag containing shelled corn.

The other dog is a much smaller, black-and-white individual, about the size of a terrier, with short, but not close, shaggy coat, erect ears, and long full-haired tail. Its muzzle is rather short and stubby in contrast to the fine slender muzzle of other Indian dogs of about the same size. In common with many skulls of American Indian dogs, the first premolar is lacking in the adult dentition of the lower jaw. This specimen is of especial interest as establishing beyond doubt the identity of certain dog bones from Ely Cave, Virginia, described as *Pachycyon robustus*, for they agree perfectly with corresponding parts of the Arizona dog. An identical breed is represented among the mummified remains of dogs from the necropolis of Ancon, Peru, and has been figured by Nebring as *Canis ingae vertagus* in the folio report of Reiss and Steubel, plate 118, figure 1. Evidently it had a wide distribution in our south and southwest, and was known also to the Peruvians. I have called this the short nosed Indian Dog.

These and other dog remains, are true dogs, in no way derived from Coyotes or other native dog-like animals of America. Their forebears probably reached America with their human masters, but their Old World ancestors still remain to be determined.¹

DRESS AND PERSONAL ORNAMENTS

Body Clothing. We have few data on this subject; it is probable, indeed, that the Basket-makers wore very little clothing except robes of fur-string or hide,² and "gee strings" or cord aprons. It so happens that all the robes found in sufficiently good preservation to permit of measurement had been interred with babies; the largest of these (plate 16, a) is only 25 by 23 inches. About an adult mummy (A-2939) from Cist 22, White Dog Cave, however, there is wrapped what appears to be a very large blanket of fur-string; and we have fragments from deer and mountain-sheep hides which seem to have been originally of ample size for use as mantles by grown people.

Nothing resembling fitted garments of leather or cloth has so far come to light; it is possible, however, that certain woven fabrics, bits of which were recovered from the caves³ may have been used as ponchos. This guess is based on the resemblance between a zigzag decoration on one of the cloth specimens (plate 26, c) and similar patterns painted on the chests of Basket-maker human pictographs from the Monument country.⁴ It must be admitted,

¹ For a discussion of the types of prehistoric American dogs, see Allen, 1920.

² For details of the weave of these robes, see p. 65.

³ See plate 26, b, c.

⁴ Kidder-Guernsey, 1919, figures 100, 101.

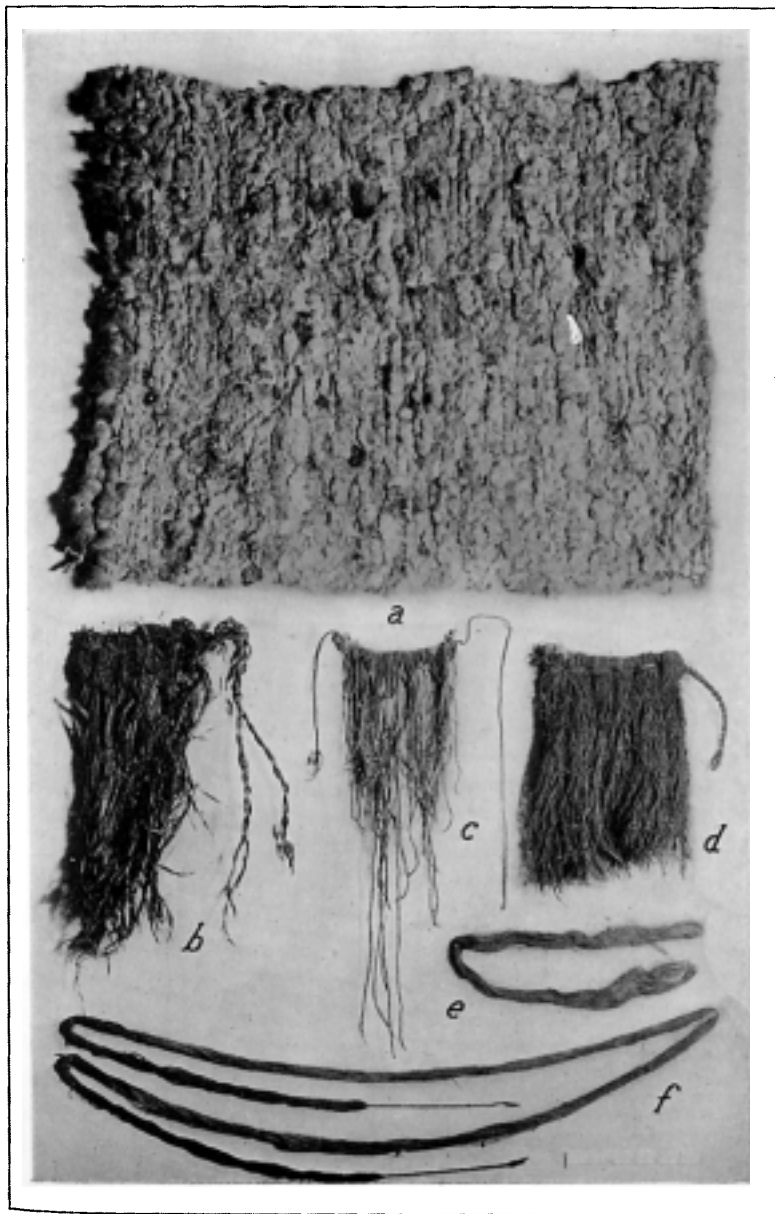
however, that the zigzag was a favorite Basket-maker design, and that the marks on the pictographs may perfectly well represent body-painting.

A string apron recovered by the 1915 expedition still remains our best specimen of this type. Although it was illustrated in our former report (plate 66, a), we have since succeeded in unraveling it for a somewhat clearer photograph; this, with a picture of a second example from the general digging in White Dog Cave, are here reproduced (plate 16, c, d). It will be seen that in both cases there is a waist cord to which is attached a fringe of pendent strings. In the 1915 specimen the strings are of apocynum and are looped over the human hair waist cord and gathered in bunches of about three hundred; the fringe is 12 inches long.¹ The apron from White Dog Cave (plate 16, c) is more fragmentary; the yucca-fiber waist cord is double; over it are hung yucca strings which are gathered together in pairs and held, close under the waist cord, by a row of twined weaving, one strand yucca, the other human hair. Although somewhat longer than the first apron this garment is much thinner and contains fewer strings.

Plate 16, b, shows part of a similar skirt made of cedar bark. The pendent strands are about 12 inches long and are held together by a twining of twisted cedar-bark string, the prolongations of which once formed the waist cord.

As the term apron implies, the fringes of these articles did not extend all the way around the body, but merely covered the front of the waist; it is probable that they hung loose, for the strings are too short to have been pulled between the legs and fastened over the waist cord behind. They are evidently a woman's garment, as in every case where they were discovered in place on a mummy, the body proved to be that of a female. Though we have never found any covering at the loins of a male, there are in the collection two objects that may well have been the ties of "gee strings." One is a loose twist of thirty animal wool threads (plate 16, f); it is nearly 7 feet long and its ends are tapered as if for knotting. The other is 5 feet 2 inches long and made of fifty to sixty thin strings of human hair; the ends are seized with fiber thread to prevent raveling.

¹ For a fuller description, see Kidder-Guernsey, 1919, p. 157.



Clothing: a, Fur cloth blanket; b, Apron of shredded bark; c, d, Aprons of fiber string; e, f, String belts. All from White Dog Cave except d, f, which are from Kinboko Canyon, Marsh Pass. (About $\frac{1}{2}$.)

Sandals. As most of the specimens recovered by the 1916 and 1917 expeditions are very badly rotted and as no new types appear, the reader is referred to the classification and descriptions of the 1914, 1915 material given in the previous report.¹

Necklaces. These were of two sorts: strings of beads; and twisted skin or fiber cords, to the middle of which were attached a few pendants or extra handsome beads. Of the latter class there was recovered only one fragmentary example (plate 17, b); it bears two very beautifully polished lignite discs strung on a fiber cord, which is itself attached to a sinew-bound thong; the whole was probably fastened to a longer neck cord as was done with a similar specimen found in 1915.²

The second type is more fully represented, several strings of beads having been taken from the necks of skeletons in White Dog Cave. A selection is given in plate 25, e-h. The most interesting of these is composed of seventy-one thick discoidal black lignite and white limestone beads strung alternately on a narrow thong. They are graduated in size from a maximum diameter of $\frac{5}{8}$ of an inch at the center of the string, to $\frac{3}{8}$ of an inch at the ends. An unusual refinement of technic was practised by cutting several of the beads to a wedge-shape (see figure 10, c, and plate 25, h) and introducing them here and there throughout the set in order that it might hang evenly. Loose behind the neck of the mummy who wore this string were fourteen olivella shells that apparently had once been fastened together to form a sort of "dangler" attached to the tie-strings of the necklace.

Another string (plate 25, f), which was recovered in order, is made of one hundred little saucer-shaped shell beads (figure 10, g); seventy-five thin, roughly discoidal shell beads (figure 10, f); and eighteen olivella shells, one of which bears an incised zigzag decoration (figure 10, i). These different kinds of beads were grouped together. Plate 25, e, shows a third necklace composed of ninety-five beads arranged as follows: one of lignite, seven olivella shells, one of seed, one of bone, one of red shale, one of green shale, one of red shale, eighty-one of white limestone. Plain strings of olivellas designed to go once or twice around the neck are not uncommon.

¹ Kidder-Guernsey, 1919, pp. 157-160.

² Kidder-Guernsey, 1919, p. 161 and figure 72, a. A full description of this type of necklace is there given.

Beads. Under this head are considered all the beads found, whether strung into necklaces, discovered loose in the cists, or included in "medicine outfits." The commonest of all are little cylinders averaging $\frac{3}{8}$ of an inch long (figure 10, e, and plate 25, g); some are of albatite, a phase of asphaltic shale, but the great majority (hardly distinguishable from the above except under a magnifying glass) are made from some hard black seed so cut down in manufacture as to be unidentifiable. Other seeds were used un-

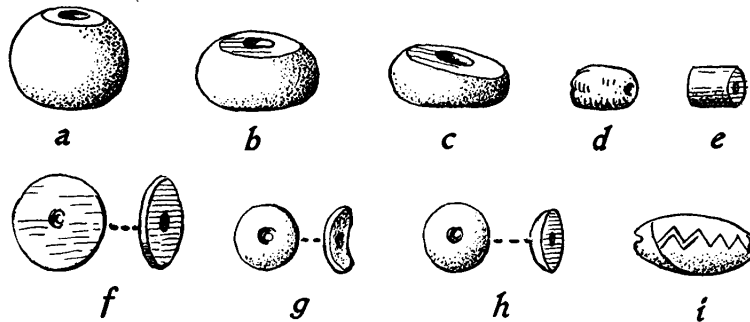


FIGURE 10
Beads from White Dog Cave. (Full size.)

worked except for a narrow bore.¹ Two varieties of these seed beads are identified by Mr. Safford:

The first is the polished white nutlet of *Onosmodium occidentale*, a plant of the Boraginaceae family, belonging to a genus not far removed from *Lithospermum*. These beautiful little nutlets may well be called pearl-seeds, since when strung they must bear a close resemblance to small seed-pearls. Accompanying these is a small longitudinally grooved dull brown seed, somewhat resembling the seeds of the bead tree (*Melia azedarach*) in form. The terminal scar is removed by the perforation, and it has been impossible to identify this, or even to determine to what botanical family it belongs.

Stone beads are of fine-grained white limestone, lignite, serpentine, quartz, hematite and alabaster. Most of them are large, no minute beads, such as those from Aztec² or the Upper Gila,³ occurring. In shape they run from the flattened spherical type (figure 10, a)⁴ to the more or less thickened discoidal form (figure 10, c).

¹ See also Kidder-Guernsey, 1919, plate 70, k, a string of acorn cups.

² Morris, 1919, p. 99.

³ Hough, 1914, p. 24.

⁴ Wrongly called "hemispherical" in our former report (p. 163).

Most of the shell beads were made from olivellas simply by cutting off the end of the spire. There are in one of the strings (plate 25, f) seventy-five very thin disc-shaped beads, $\frac{7}{8}$ of an inch in diameter cut, apparently, from the shell of a fresh-water clam (figure 10, f). The same necklace contains one hundred shell beads made from the curving wall of the large olivella (figure 10, g). The saucer-like form of these allows them to fit closely over each other when strung. Enormous quantities of identical beads are in the Museum's collection from the Channel Islands, California. There are a few small bone beads (figure 10, h) apparently made in imitation of these.

Pendants. These were less common in the burial cists of White Dog Cave than they were in the mortuary cave of Sayodneechee.¹ The single stone specimen (plate 17, h) is of a hard brown stone mottled with brownish green; the surface is highly polished and has a waxy texture.

Four shell pendants were found, all of abalone; three are illustrated in plate 17, c, d, e; the fourth is attached to a ceremonial object (plate 39, b). The largest (plate 17, c) is round and 2 inches in diameter. It has two perforations in the center from which radiate the four arms of an incised cross figure. Along the edge are two other round holes and three pairs of minute perforations. At the bottom of this disc there is a drilled hole which has been stopped up by inlaying a little piece of abalone shell carefully shaped to fit the aperture. The second abalone pendant (plate 17, d) is the reused half of a disc similar to the above; it fractured, apparently, along an incised median line. Traces of the favorite Basket-maker zigzag may be seen along the upper edge of the old break. The third specimen (plate 17, e) is a bit of the thickened rim of an abalone, the edges ground down and polished.

Feathered Pendant. This object (plate 18, f) is described under the head of personal ornaments although it may have served some other, possibly ceremonial, function. It consists of nine two-ply twists of rawhide thong, seized with sinew to a loop of the same material. Small feathers, whose butts alone remain, were once fastened to the ends of the streamers.²

¹ See Kidder-Guernsey, 1919, p. 164.

² Compare Kidder-Guernsey, 1919, figure 77.

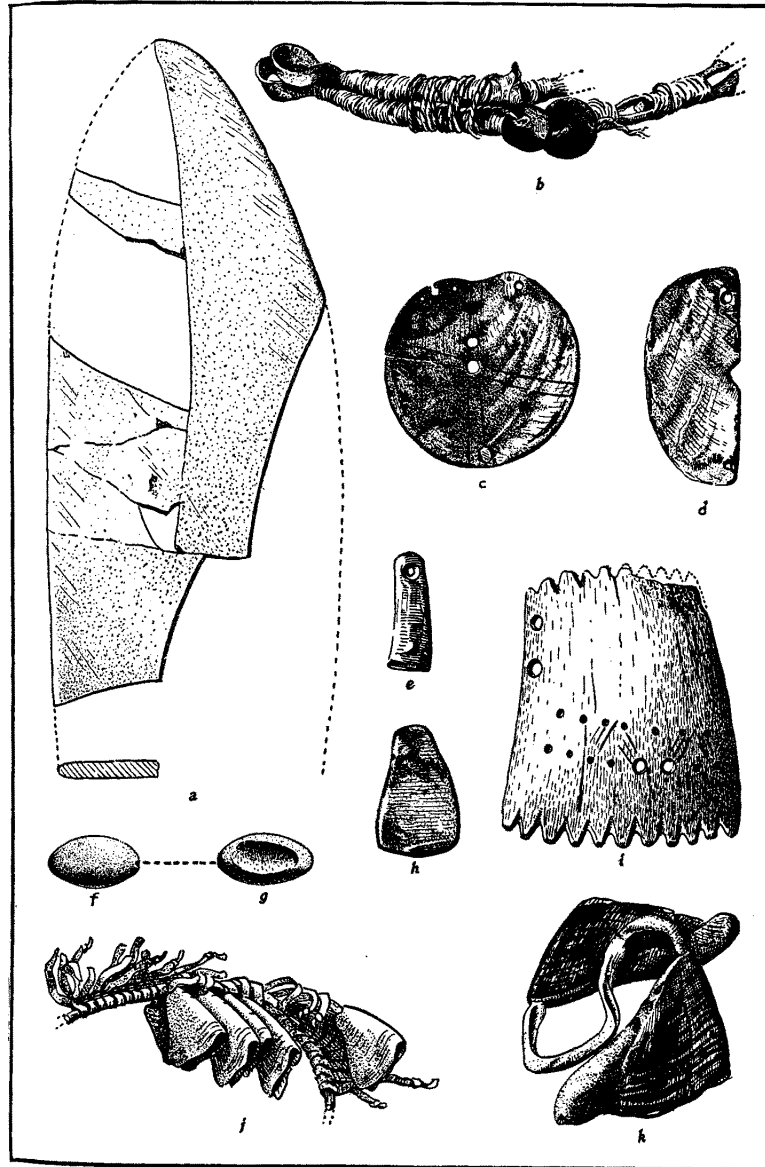
Ornament of Mountain-sheep Horn. This object (plate 17, i) is 3 inches long by $2\frac{1}{2}$ wide. The convex side shown in the drawing bears, besides two pairs of drilled perforations, a double series of small holes which do not run through. Incised lines drawn between the two series, seem to show a start at a zigzag decoration. The toothed ends of the specimen were produced by sawing broad notches along the upper and lower edges. The bottoms of the notches are well worn and smooth, but whether from general use or from friction of threads (supposing the object to have served as a weaving comb), we do not know.

Deer-hoof Rattles. As in the preceding two cases, the identification of these specimens (plate 17, j, k) as ornaments is open to question; a ceremonial use is quite as likely. One of them consists of the horny outer coverings of two large hoofs, attached to the ends of a buckskin thong.¹ The other shown in j is made of much smaller hoofs; these are fastened to the ends of thongs which themselves are looped over a slim pliable twig and held to it by a twining of fine cords. This is an incomplete specimen, as is another similar one (not figured, A-2930) which had, in place or detached, nearly a hundred hoofs. There is little doubt that the stringing together of these dry resonant hoofs was done to produce a rattling sound, but whether the assemblages were employed as belts, as fringes, or fastened to handles to form true rattles we have no means of telling.

Unfinished Ornament. This object (plate 35, h, i), found in the general digging in White Dog Cave, is a neat example of two processes in working stone: flaking and grinding. The specimen is a disc of grey flint, convex on both sides. It was first chipped roughly to its present form, then ground to efface the chipped surface. The grinding process was, however, not completed and there remain on either side marks of chipping, as well as numerous grinding facets.

Tablet. Plate 17, a, shows, partly restored, a tablet-like object of compact white limestone found in Cist 6, White Dog Cave. The pieces fitted together have a length of 7 inches, but a number of fragments that could not be joined show that the original length was considerably more; the greatest width is 3 inches, the thickness

¹ Modern Hopi hoof rattles are figured by Hough (1919, plate 22).



WHITE DOG CAVE

a, Tablet-like object of stone; b, Neck ornament; c, d, e, Shell pendants; f, g, Object of stone; h, Stone pendant; i, Object of mountain-sheep horn; j, k, Hoof rattles. (About $\frac{1}{2}$.)

uniformly $\frac{3}{16}$ of an inch. The edges are rounded and all surfaces very smoothly worked down by grinding. The fine finish and the fragile nature of this object seem to indicate that it was used as an ornament.

Head Ornaments. An object, of whose function we are not positive, but which was probably used to decorate the hair, was found on the breast of mummy 2, Cist 27 (plate 18, b). It consists of five neatly made bone pins, each $5\frac{1}{2}$ inches long and a little less than $\frac{1}{8}$ of an inch in diameter, fastened together side by side. The bindings are of sinew; the upper set is overwrapped with fine fiber cord evidently as a finish, since the string, though badly decayed, shows traces of a central red band. Projecting from the top, and held by the wrappings just described, were bundles of small feathers, of which only the butts of the quills and traces of the pile now remain.¹

Figure a, plate 18, shows a similar ornament from Cist 6, made up of three wooden pins each 10 inches long and $\frac{1}{8}$ of an inch in diameter. A bundle of six wooden pins, each 8 inches in length and $\frac{1}{8}$ of an inch thick, possibly ready to be made into a pair of ornaments like the ones just described, is figured in c. A number of finely fashioned but broken bone objects, of about the same size and shape as large knitting needles, some tied up in bundles, others loose, were found in the course of the excavations in White Dog Cave; most of them show signs of long use. These no doubt are also unassembled parts of head ornaments. There are in the 1915 collection similar broken bone pins.²

Just how these contrivances were worn we do not know, but from their comb-like structure we judge that they were probably stuck in the hair, singly or in pairs. Some basis for this belief is found in certain Basket-maker square-shouldered pictographs depicted with objects which may represent ornaments such as these protruding from their heads.³ In the Peabody Museum there is a Paiute "warrior's plume," made of five wooden pins placed side by side and held together by colored strings woven about them in such a way as to produce a simple pattern; this specimen is not feathered, but is otherwise much like those from White Dog Cave.

¹ A fairly well-preserved example from Grand Gulch is in the American Museum of Natural History, New York (cat. no. H-13375).

² Kidder-Guernsey, 1919, plate 86, e.

³ Ibid., figure 101.

In the Coahuila, Mexico, cave collection in the Museum there is an arrangement of six wooden pins which may be either a head ornament or a comb; we are inclined to think the former, as the same collection contains an object that is surely a comb, constructed in an entirely different manner.

The object shown on plate 18, d, may be an ornament, a projectile for a dart game, or possibly a ceremonial object; it is a thin twig with three small feathers seized to it at their butts and tips by sinew; the ends of the stick are broken off, so that its original length is unknown.

Hair-dressing. Several of the mummies from White Dog Cave are in so good a state of preservation that their heads still retain the hair, dressed, probably, as in life. On plate 19 are illustrated the various methods; figures a, b, c are drawn from mummies, and d, is restored from a scalp found in the same district in 1915.¹

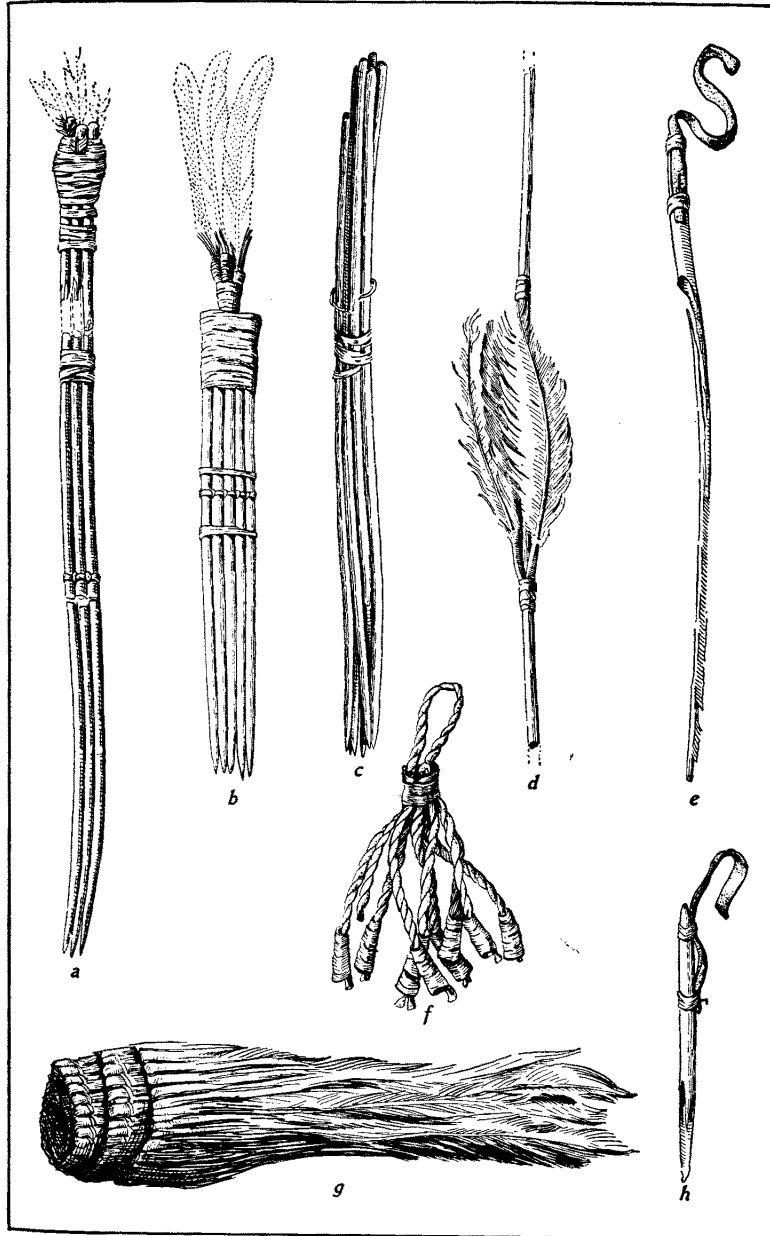
Figure a, shows the simplest manner of wearing the hair, which in this case is cropped to an average length of 2 inches. The raggedness of this haircut is apparently the result of gathering together and hacking off a single lock at a time. The individual in question was a female about twenty years of age found in Cist 22 (mummy 2).

Figure b, shows the arrangement of the hair of an adult male from Cist 24. It is parted in the center from forehead to crown and falls loose on either side; that of the back of the head is gathered into a queue, the end of which is turned back on itself and wrapped for a space of 2 inches with a fine string. From the crown there hangs a lock the thickness of a pencil closely wound with string for nearly its entire length.² The end of this tress is bound up with the end of the queue. Where this lock grows from the scalp, the surrounding hair is clipped away for a little space.

Figure c, is drawn from the head of a male about twenty-five years old, from Cist 22. The hair is arranged as follows: from a strip $1\frac{1}{2}$ inches wide straight back from the middle of the forehead the hair has been cut off close to the scalp. This exaggerated "part" terminates at the crown in a circular tonsure in the center of which there is a thin lock of long hair. The hair on either side

¹ For pictures of this interesting specimen, and for a description of its preparation, see Kidder-Guernsey, 1919, plates 87, 88, and pp. 190-192.

² As was noted on p. 13, a section of a similar lock wound spirally with a leather cord was found in Cist 6, White Dog Cave.



WHITE DOG CAVE

a, b, d-g, Feather ornaments; c, Package of wooden pins, probably used in making feather ornaments. (About $\frac{1}{2}$.)

of the "part" is gathered together and tightly bound $3\frac{1}{2}$ inches from the ends with fine human hair string; these tresses hang in front of the ears. The back hair, which is about 14 inches long, is similarly gathered together and bound near the end for a space of 2 inches. The lock from the center of the tonsure is included in this binding.

The following description of the scalp shown in d, is quoted from our previous report:¹ "A 'part' 1 inch wide, from which the hair has been clipped, runs up to a large semilunar tonsure at the crown. The brow tresses on either side are gathered together in 'bobs' that fall in front of or over the ears, and are tied up with wrappings of apocynum (?) string. The long hair from just behind the tonsure is braided into a thin plait, the lower end of which is doubled back on itself and bound with hair string. The remainder of the back hair is made into a single short thick 'bob,' string-wrapped, that falls to the nape of the neck." As shown in the drawing this specimen combines features of both figures b and c, but is more elaborate than either. It seems to have been preserved as a trophy and for this reason, when discussing it in the earlier report, we were in doubt as to whether it represented a method of hair-dressing practised by the Basket-makers, or that of some tribe of which we had no knowledge. The side-bobs inclined us to the belief that it was a Basket-maker style, as Basket-maker pictographs are often shown with "bobs" on either side of the head. The finds from White Dog Cave serve of course to confirm this idea.

Although many tribes shaved one portion or another of the head, and the thin scalp-lock was not an unusual thing, we can find no reference to analogous coiffures ancient or modern with the exception of those of the Maya thus described by Bishop Landa:

They wore their hair long, like women. On the top they burned a sort of tonsure; they let the hair grow around it, while the hair of the tonsure remained short. They bound the hair in braids about the head with the exception of one lock, which they allowed to hang down behind like a tassel.²

Judging from our material it would seem that the men dressed their hair more elaborately than did the women.

¹ Kidder-Guernsey, 1919, p. 191.

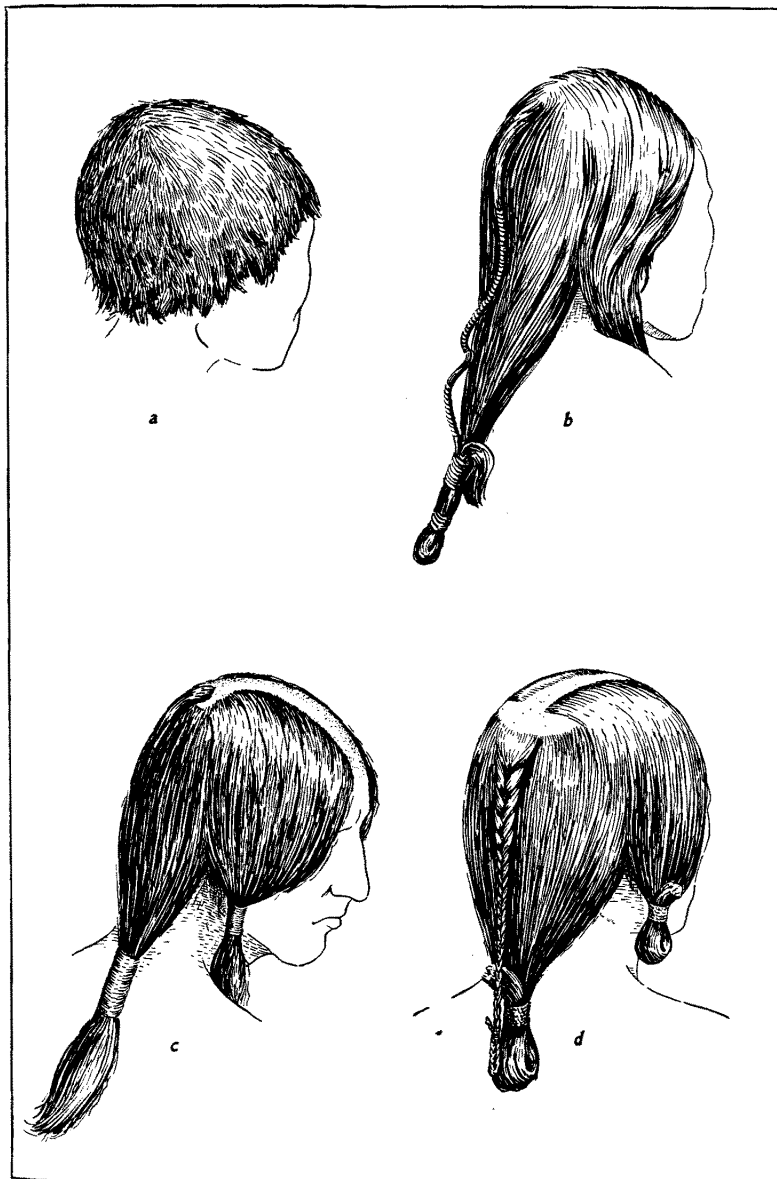
² Schellhas, 1904, p. 617.

CRADLES AND ACCESSORIES

Rigid Cradles. It seems well, before taking up the several empty cradles in the collection, to describe the one case in which we have the baby with all its wrappings still in place. The bundle is shown as found in plate 4, g, and plate 21, c; its different parts are separated and spread out in the other figures of the former plate. The infant, enveloped in robes, is tied in by means of a criss-cross lashing. The binding cord is of human hair, four-ply and 5 feet long (plate 4, i); it is rove through a series of string loops that are attached to the sides of the cradle. The seven stout cords that may be seen hanging loose on the left side of the unwrapped bundle (plate 4, g and plate 21, c), and laid out separately in h, had probably been used for hanging up or transporting the cradle; if the baby had not died so soon (it can hardly be more than a few days old), these cords would undoubtedly have been woven into a regular carrying strap like those shown in plate 23, k, l.

The outermost wrapping is a much tattered remnant of woven cloth (plate 4, a); it is described on page 63. The second cover is a fur-string baby blanket, measuring 17 by 17 inches. The body of the robe is of cords overlaid with strips of rabbit skin, its outer sides have a border, two strands in width, made of string, between the plies of which are caught bunches of long, coarse hair, probably dog. We have called coverings of this sort baby blankets because they were obviously woven to their peculiar bifurcated shape for the special purpose of leaving an opening at the place where they would otherwise constantly have been wet and soiled. Inside this blanket there was another of exactly the same size and shape; (plate 4, f) but, because it was to hold the baby itself, much softer and more carefully made. It is also of string, wound with strips of fluffy white fur from the bellies of rabbits. In handling this specimen, one is so impressed by the freshness of the fur that it is difficult to reconcile its perfect condition to its great antiquity.

The mummy of the infant (plate 4, c) lay on this inner blanket with the lower side-pieces folded over its legs. It was provided with a loose bundle of shredded cedar bark to serve as a diaper (c). On the abdomen, covering the navel, was a pad (d), made of cedar bark sewed up in prairie-dog skin, the hair side out. This obviously acted as a binder to prevent rupture. The umbilical



Styles of hair-dressing as shown by the remains from Basket-maker caves.

cord itself had been dried and was attached by a string to one corner of the outer baby blanket, so that it hung directly before the face of the infant;¹ it may be seen at the upper right-hand edge of the blanket (b).

The cradle (i) is 14 inches long and 10 inches wide. The frame is a single unpeeled withe, $\frac{1}{2}$ inch in diameter, bent into an approximate oval. The body is made of fifty straight, unpeeled twigs placed close together; these run transversely and are fastened underneath the frame by a continuous lashing of fiber string. Along each side of the cradle there extends a stout cord, fastened to the hoop at intervals and forming loose loops for the attachment of the binder that held the baby and its wrappings in place.

This cradle is much the smallest in the collection and is crudely made. It shows none of the careful finish and ornamental features of the specimens about to be described. The uncompleted carrying strap, the roughly put-together umbilical pad and the small size of the baby itself all point to the probability of birth having taken place before the usual elaborate "layette" was ready.

There are five other more or less complete cradles in the collection, all of which were found in White Dog Cave. Four had been buried with babies upon them but disturbance in some cases and decay in others rendered it impossible to recover the "mummy bundles" in their original condition; the fifth cradle was found in rude Cist 54 (plate 5, a) that contained no bones. While these specimens are all much alike in general make-up, they differ considerably in details. As no account of a rigid Basket-maker cradle has yet been published, it seems worth while to describe each one of this exceptionally well-preserved lot.

The handsomest cradle is the one illustrated, front and back, in plate 20, a, b. It is $23\frac{1}{2}$ inches long, by $14\frac{1}{2}$ inches wide at the broadest part. The rim is composed of two trimmed and peeled hardwood sticks $\frac{1}{2}$ inch in diameter, each bent into a U; the open ends of the two U-shaped pieces are spliced together with their sides overlapping a little; tight ligatures hold them in that position, and so envelop the joined ends that they cannot be seen. The

¹ As recorded by Catlin in 1842, Vol. II, p. 133. The custom of preserving the cord as a charm was practised by many tribes, particularly those of the plains. The Ute, Dakota, Arapaho, and Gros Ventre enclosed the dried cord in more or less elaborate coverings of skin ornamented with quill or bead work and fashioned usually to represent reptiles. These were hung on the front of the cradle (see Kroeber, 1908, pp. 166, 167).

body of the cradle is made of two series of slim willow twigs, from which the bark has been scraped. The transverse rods are ninety-nine in number; they are laid as close together as they will fit and are fastened at their ends to the under side of the frame by a continuous figure-eight lashing of yucca string. This binding is overwrapped with soft fiber, until the slightly protruding ends of the rods are entirely hidden, and each side of the cradle is built up into a soft, bolster-like roll an inch in thickness; this in turn is sewed up in a cover of deer or mountain-sheep hide dressed with the hair on. The hard sides of the hoop and the sharp projecting rod ends are thus completely padded and form a sort of rim along the two edges of the cradle on its upper surface.

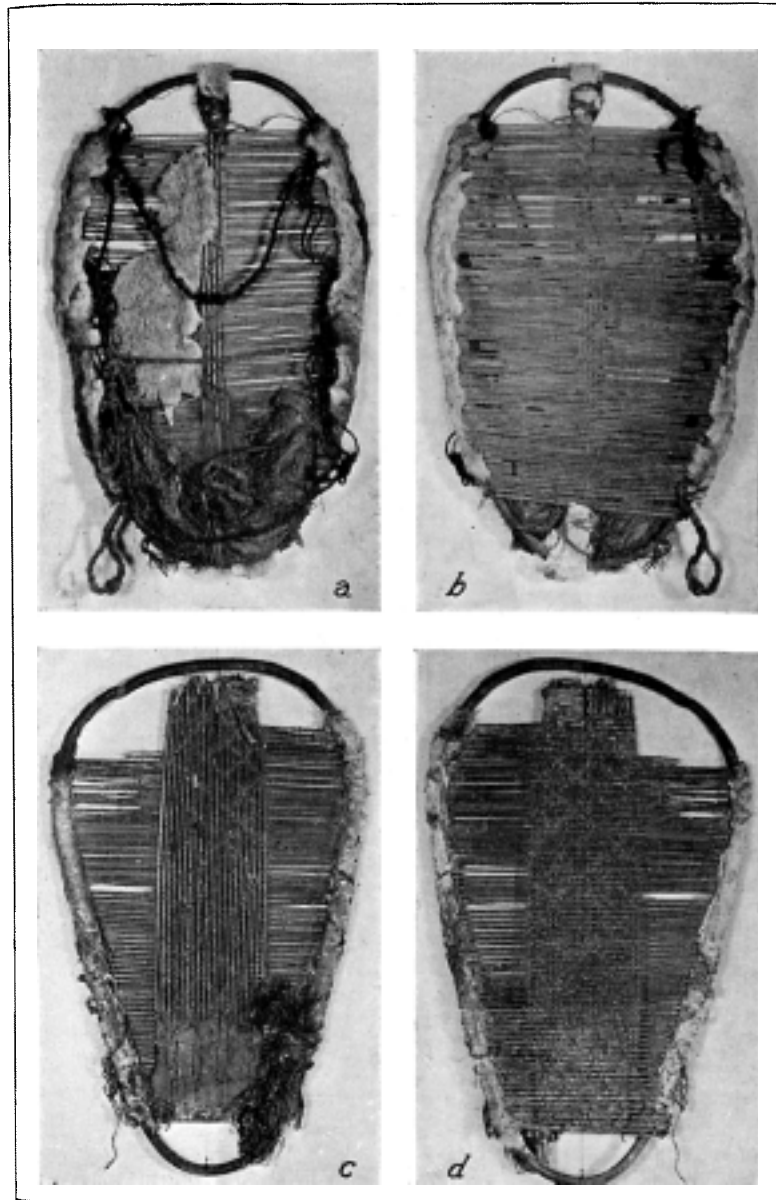
The second, or longitudinal, set of rods consists of five twigs running up the middle of the transverse rods and attached to them by a lashing of heavy sinew, so arranged as to produce the zigzag design seen in the photograph. The ends of the longitudinal twigs are fastened to the head and foot of the hoop in some manner which cannot be made out, because the attachment is padded and tightly sewed up in a hide covering.

Tied around the bottom of the hoop there is a horse-shoe shaped roll of cedar bark, which must have formed a kind of soft platform for the baby's feet to rest against when the cradle was held upright. A series of human hair strings are caught into the "bolsters" along the sides of the cradle; these, like the loops on the specimens first described, were to hold the laced binding cord. At the head and foot are much longer loops, designed, apparently, for suspending the cradle in a horizontal position.¹

A double yucca string is tightly stretched across the upper surface of the cradle about 8 inches above the foot. From just below this string to the foot, the cradle is much discolored by the excreta of the baby. The purpose of the string was probably to hold in place the rather inefficient diaper-bundles of cedar bark or fiber.

Plate 20, c, d, illustrates a cradle very similar in shape to the above; its measurements, $23\frac{1}{2}$ by $14\frac{1}{4}$ inches, are almost identical; the hoop is also made of two pieces tied together at the sides. The backing is of reeds instead of twigs; there are eighty-three in the transverse series and twenty-two in the longitudinal, the latter is secured to the former by narrow rawhide thongs whose emergences

¹ See Saunders, 1912, photograph facing p. 86.



WHITE DOG CAVE

a, b, Front and back of cradle, Cist 35; c, d, Front and back of cradle, Cist 54. (About 1/9.)

produce a pattern of diamond figures. The longitudinal reeds were once attached to the head and foot of the bow, but their ends are now missing. The sides are padded with fiber and covered with hide, and there are the remnants of a cedar-bark foot rest. The ends of a diaper string are present, but there are no side loops for the laced binding cord.

The remaining three specimens are more nearly oval than the two preceding. The largest one (plate 21, b) is 25 inches long by 12 inches wide. Viewed from the side it is rocker-shaped, but this curve is probably due to warping. The frame and its side-padding (mostly decayed) offer no new features, nor does the method of attachment of the seventy-nine transverse willow backing-rods. As will be seen in the plate, the longitudinal rods are differently arranged; they are in two sets of six each, spaced well apart and curving away from each other as they approach the head of the cradle where each set is bent about the side of the frame and tied back on itself; the lower attachments are gone. The diamond-pattern lashings that hold the longitudinal to the transverse rods are of strips of rawhide. Between the two longitudinal sets, and also alongside them, the transverse rods are bound together by a sort of over-eight-under-eight twilling of leather thongs painted red. Side loops and diaper string have disappeared; the mark of the latter, however, can be made out on the backing, and below it there are as usual heavy stains and caked mud.

The cradle shown in plate 21, a, is from the same cist as the foregoing. It is an elongated oval, $19\frac{1}{2}$ by $10\frac{1}{2}$ inches. Of the two sticks bent to form its frame, the upper one is peeled, the lower unpeeled. The sides are padded into the usual long rolls, but there is no evidence that they were ever encased in skin; no loops or diaper string remain. The transverse twigs are ninety-eight in number; the first seventeen, counting from the top, are in natural color; then comes a row of eight rods dyed black, then eight in natural color, eight black, eight natural, eight black, eight natural, and eight black; the last twenty-five to the bottom are undyed. The eight longitudinal twigs are not attached to the transverse ones by the usual ornamental bindings. They are turned about the frame at the head of the cradle and tied back on themselves; at the bottom they are cut off at the level of the last transverse element and their ends are made fast to it by a row of twined yucca string.

The last of the three oval cradles is $21\frac{1}{2}$ inches long, and $11\frac{1}{4}$ inches across. The two sticks of its frame are unpeeled. There are seventy-seven transverse rods (willow twigs, scraped and trimmed as usual) and seven longitudinal ones, bound to the former with the conventional diamond pattern of thong-emergences; their attachments to the top and bottom of the frame have been broken off. The frame padding along the sides is of string and yucca fiber, and was once encased in hide. There are no side-loops, but the diaper string is still in place, stretched tightly across the upper surface of the cradle at a point one-third of the distance from the head to the foot.

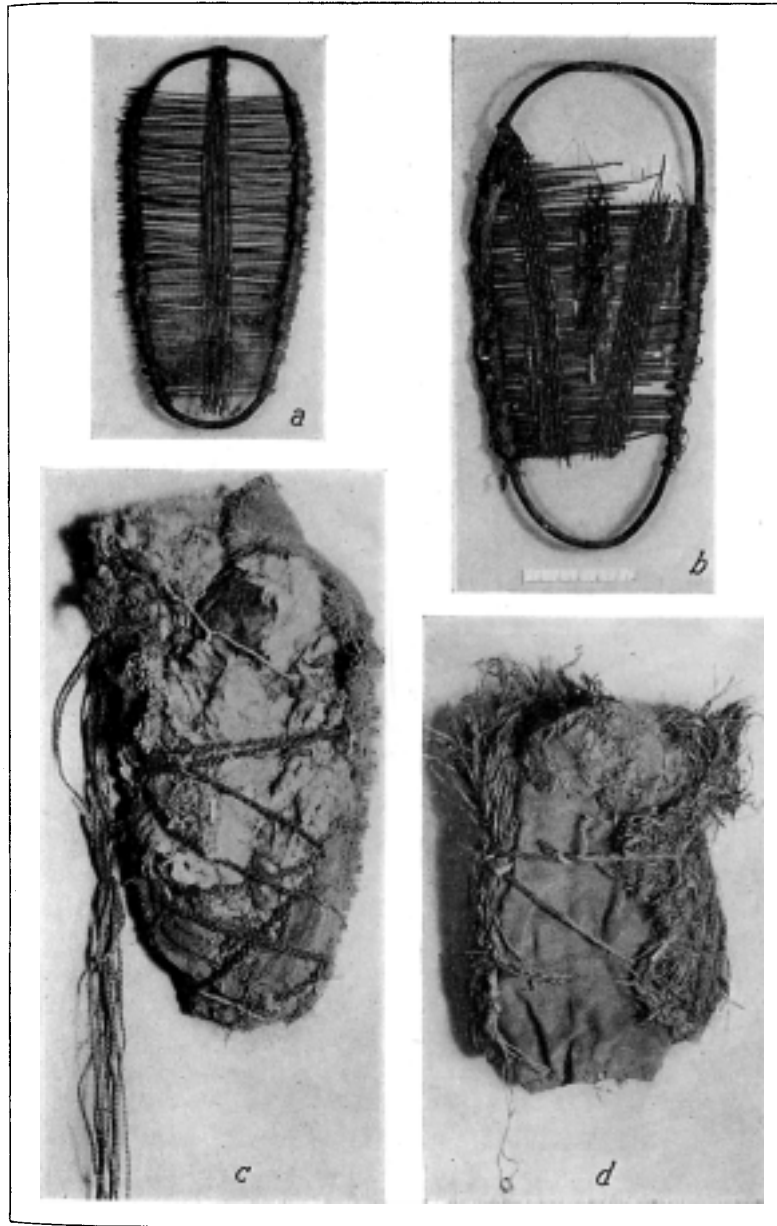
Flexible Cradles. These are of two types. The first has a rim made of a long thin bundle of grass rolled tight, tied with yucca leaves and bent to the same shape as the wooden hoop of the rigid cradle. The body or filling is a rough mesh of yucca leaves. The second type is a sort of mat made from long strips of cedar bark held together by twined-woven rows of yucca leaves; the edges of the mat are turned up and fastened together by a yucca network. Both types are illustrated and more fully described in the report on the 1914-1915 expeditions;¹ all the specimens recovered in 1916-1917 were very fragmentary, but enough of them were found to show that these cradles were in common use.

Umbilical Pads. During the early part of the 1916 season there were taken from the graves of infants a number of flat pads, made by sewing up various substances in covers of prairie-dog hide. Their use, at first doubtful, was made clear when the well-preserved baby burial from Cist 13 was examined, and a similar pad (plate 4, d) was found lying against the navel of the infant; a second case (infant from Cist 35) was discovered later. It was then obvious that all these specimens had been used as are our modern "binders" to prevent umbilical hernia by exerting pressure on the navel of the new-born child.

Each of these pads has a light but rigid or semi-rigid core, most commonly made of five or six corncobs cut to equal length and bound together side by side; several examples are whittled from slabs of yellow-pine bark (plate 22, c);² still others consist of a rope or tight twist of cedar bark, coiled and sewed to itself to form

¹ Kidder-Guernsey, 1919, pp. 165, 166; plates 71, b; 72, a, b.

² The piece of bark figured in our first report (Kidder-Guernsey, 1919, plate 85, b), and classed as problematical is one of these.



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a, b, Cradles; c, Cradle containing mummy of child, Cist 13; d, Package containing mummy of child, Cist 35. (About 1/10.)