AN ARCHEOLOGICAL SURVEY OF THE UPPER WHITE CANYON AREA, SOUTHEASTERN UTAH

by

PHILIP M. HOBLER and AUDREY E. HOBLER

with an Appendix by

POLLY SCHAAFSMA

ANTIQUITIES SECTION SELECTED PAPERS

Number 13

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INTRODUCTION

The field data described below were collected by the authors in the summer of 1960 and the fall of 1961. During approximately sixty man-days of fieldwork two hundred archeological sites were recorded. The Upper White Canyon area, Natural Bridges National Monument, and the country immediately surrounding it constitutes the study area (Fig. 1). It has long been known to be rich in archeological remains. There has been a history of brief visits by archeologists who have recognized the area's potential but who, for one reason or another, never undertook a detailed study. We hope that the present report may serve as the first step in such a study.

From the start we conceived of the project as an intensive survey of a relatively small area. It was hoped that such a study would complement the wide-ranging survey work being done at that time in the immense region between the San Juan and Colorado rivers by the University of Utah. Somewhat optimistically, we hoped to cover the ground thoroughly and to record all of the sites we encountered in full detail.

Only two roads provided access to the area and these run along its northern and southern limits. Virtually all of the work had to be done by long traverses on foot. Toward the end of the project the longest stretches of open country were covered on horseback. An effort to walk out every canyon in the area was about seventy percent successful. Coverage of the open country between the canyons was fairly good south of Burch and White Canyons and less complete north of them. The Highland areas, Elk Ridge, Deer Flat, and Moss Back Mesa, were covered extensively by jeep but produced few sites. More extensive work in these areas might turn up a number of additional sites.

At each site, detailed descriptive notes were made. At many, ground plans were sketched. Some five hundred photographs constitute the visual record. Full pottery collections were made. At most sites all surface sherds were collected. Flaked stone and other artifacts were also collected but for logistic reasons metates were usually recorded and then left in the field. With one exception, time limitations precluded test excavations. In the second season most sites recorded were marked with site numbers engraved on thin plates of stainless steel which were attached to posts or trees. Site numbers were assigned according to the Arizona State Museum system. These numbers are in parentheses after the more common Smithsonian trinomial designations.

Throughout the project tree-ring specimens were collected. Two purposes were to be served by this. First, it was hoped that a fairly good sample of tree-ring material from the area might make possible the establishment of a regional tree-ring master chronology for southeastern Utah. Up until that time efforts at tree-ring dating in the area had met with little success. Secondly, it was expected that tree-ring dates would clarify problems of local cultural chronology. The work served the former purpose well, the latter purpose much less so. For sampling we first employed a one-inch core borer turned by a hand brace. This device proved prohibitively time-consuming and often left the operator without the energy to carry the resulting core back to camp. It had the additional drawback of providing a limited sample of the specimen's rings. Some cross sections were taken with a small hand saw. Where this technique would have been aesthetically unpleasing in sites likely to be visited by monument visitors an inch-thick section was taken a short distance from the end of a log and the end was then glued back on. In all, seventy-three specimens were collected. The authors worked with Dr. Bryant Bannister of the Laboratory of Tree-Ring Research in the initial phase of the project involving the dating of the first set of specimens and the establishment of the chronology. Subsequent dating work was done by Bannister and by Dr. J. S. Dean.

The sherd collection is now in the Arizona State Museum. The artifacts and other collected material as well as maps and photographs are on file with the National Park Service.

AREA HISTORY

The first recorded mention of the upper White River area was by Señor Colonel Don Francisco Salazar who, on August 12 and 13, 1823, saw tracks of sheep, goats, cattle, and horses going in the direction of the Bear's Ears from Marsh Pass (David M. Brugge, personal communication). Although the heavily used old Spanish Trail from Santa Fe to Los Angeles ran along what is now the Utah-Arizona border (Euler 1966), there is no special evidence that the Spanish entered the survey area. Cattlemen were in the basin about 1878 (Judd 1950). Traces of their trails still can be seen. Their main trail goes up Tuwa Canyon from Owachomo Bridge and turns up the left branch of Tuwa. From there it leads out of the Canyon, near its head and gains the flat mesa top. Along the mesa top it continues east and follows the route of the new monument entrance road. Beyond the head of White Canyon, the trail approaches the Bear's Ears via Maverick Point and Maverick Spring. Evidence of the early cattlemen's activities can be seen at two prehistoric sites — 42Sa6778 (V:8:2) and 42Sa6798 (V:8:24) — where camps and temporary feed bins are built among prehistoric structures. One developed spring predates National Park Service activity in the same area.

The Mormon Expedition of 1879-80 came from Salt Lake City via Hole-in-the-Rock to settle southeastern Utah through Mormon Flats and Harmony Flats on the way to Bluff. Traces of their wagon route are still visible where it skirts the upper drainage of White Canyon on the south and east. It is unlikely that the members of the expedition saw any of the larger White Canyon ruins or natural bridges.

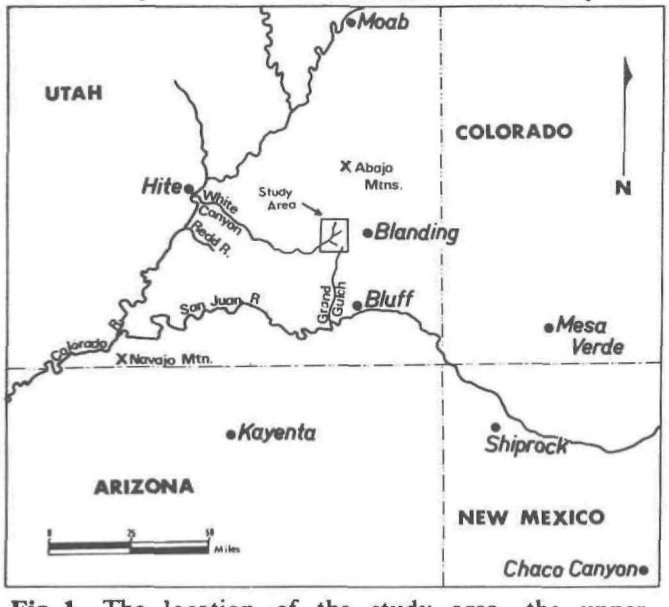


Fig. 1 The location of the study area, the upper White Canyon of southeastern Utah.

In September 1883, Cass Hite accompanied by "Indian Joe", Edward Randolph, and "Scotty" Rose, visited the area and named the bridges President, Senator, and Congressman (Judd 1968). In the winter of 1892-93, W. C. McLoyd and C. C. Howard Graham made an extensive collection in the White Canyon vicinity which was later reputed to have been sold for $5,000 (Culmer 1937). William Boone Douglass reports that collectors (probably McLoyd and Graham), found "many valuable specimens of weaving and pottery" at Bare Ladder Ruin (Douglass 1908). In 1895, Emery Knowles visited the bridges and in the fall of the same year James (Al) Scorup, Tom Hall, and Jim Jones — all cattlemen — visited the area (Dyar 1904). Scorup and Long renamed two bridges, Augusta and Caroline, as related in the August 1904 article in *The Century Magazine* (Dyar 1904). Long noted the cliff dwellings, cists, and plastered walls. On the way back from visiting Owachomo Bridge, they visited a ruin on a ledge 300 feet from the canyon bottom. Here Long excavated and removed a large olla. Long, an engineer, roughly calculated the dimensions of the bridges and took photographs of them. In April 1905, the Commercial Club of Salt Lake City sent an expedition to the natural bridges. Participants included H.L.A. Culmer, S. T. Whitaker, and C. W. Holmes, all of Salt Lake City. Scorup, Franklin Adams, Freeman Nielsen, and George Perkins were hired as guides. Culmer sketched and photographed the bridges and a few of the ruins while the others measured the bridges and explored the area. A faint painted inscription on the downstream side of Kachina Bridge noting the 1905 Commercial Club expedition can still be read. At this time they named the small bridge Edwin.

At 42Sa6789 (V:8:15) the initials P. F. have been scratched along with the date 3/5/07. Because of the national public interest due to Long's article and the Commercial Club Expedition in the summer of 1907, Bryon Cummings with Neil Judd and others went to the White Canyon area to map the bridges and record adjacent archeological sites (Judd 1950). Edgar T. Hewett (Fig. 2) was also present for a few days (Judd 1968). This early popular interest in the area seems to have had its effect since on April 16, 1908 the Natural Bridges were declared a national monument by Theodore Roosevelt. As a result, the General Land Office sent W. B. Douglass to resurvey the area in September 1908. Douglass in his report mentioned the numerous archeological ruins (Douglass 1908). The

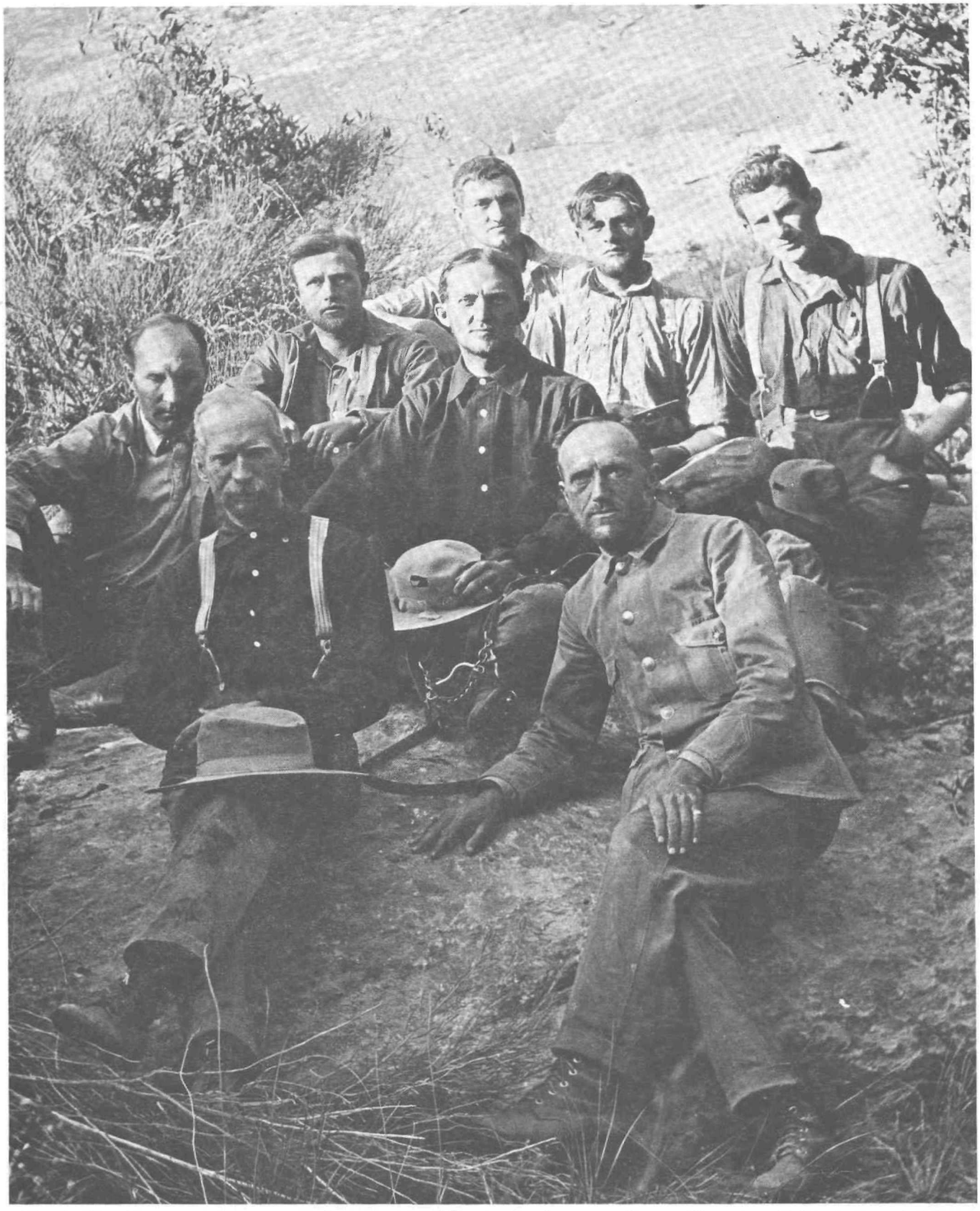


Fig. 2 The Cummings party in White Canyon, 1907. In the front are Byron Cummings (with hat) and Edgar Hewett, second row: Reverend F. F. Eddy, Fred Scranton (surveyor), and J. C. Brown (surveyor), rear row: Neil M. Judd, Dan Perkins (guide), and J. B. Driggs. The photograph was probably taken by Burl Armstrong. This print is from the Neil M. Judd Collection, Smithsonian Institution, National Anthropological Archives.

monument was enlarged on September 25, 1909, and at this time the bridges were given their present names Kachina, Owachomo, and Sipapu. The geologist Herbert E. Gregory worked in the White Canyon area in 1915 and in his excellent geological and geographical description of the San Juan country he touches on the distribution and types of archeological remains there (1938). Cummings revisited White Canyon during part of the 1917 field season. A. V. Kidder was also in the region about this time or perhaps somewhat later. Kidder's White Canyon area photographs are in the Arizona State Museum files.

In the summer of 1929, the seventh Bernheimer Expedition of the American Museum of Natural History visited the area. Accustomed to the large ruins of the middle San Juan and hoping to find similar ruins, Bernheimer and Earl Morris were unimpressed with their one day stay in the area (Bernheimer 1929). Ezekial Johnson and John Wetherill (Lister and Lister 1968) guided this expedition, with Johnson guiding the party on the north of the San Juan and Wetherill being the guide on the south. There were no other scientific expeditions until 1937 when Charles Steen spent four days excavating two kivas and a circular room at 42Sa6819 (V:8:45) (Steen 1937). He was followed by Deric Nusbaum in September of 1941. Nusbaum surveyed a part of the upper White Canyon Basin and the area to the east, and collected tree-ring specimens which were deposited at Gila Pueblo. The tree-ring specimens are now at the Laboratory of Tree-Ring Research in Tucson and many have been dated (Bannister, Dean, and Robinson 1969). Nusbaum collected 45 tree-ring specimens from two sites at Natural Bridges. Of these, 37 are charcoal specimens from "an early pueblo mound" and eight are Douglas Fir cores from two kivas at 42Sa6965 (W:5:118).

Mr. D. W. Rial of the Carnegie Museum was in the White Canyon Basin in 1945 and collected three tree-ring specimens (Sharrock and Keane 1962). Unfortunately, there is no more detailed provenience for these specimens than simply "Natural Bridges area". Two have been dated by the Laboratory of Tree-Ring Research as A.D. 449-545 and A.D. 545-675. Both of these are merely fragments and the dates represent neither true pith dates nor cutting dates.

In October of 1956, Lloyd M. Pierson and John U. Oakes recorded some of the larger sites in White Canyon and published a report (Pierson 1957).

In the summer of 1958, the University of Utah Glen Canyon Archeological Survey covered the immense area of the San Juan Triangle east of, but not including, the upper White River Basin (Weller 1959). In 1965, Schroeder conducted salvage excavations at two Basketmaker III-Pueblo I sites, 42Sa1440 (W:5:39) and 42Sa1441 (W:5:50), along the right of way of the new monument access road (Schroeder 1965).

ENVIRONMENT

The upper White River Basin is an area approximately 16 km (10 miles) in a north-south direction and 13 km (8 miles) from east to west. Within this area elevation range is from 2,920 m (9,040 ft.) on Elk Ridge to 1,580 m (5,600 ft.) in White Canyon. The entire area slopes south and west.

Today there are no permanent streams in the area but within the canyons water can often be found in bedrock pools or by digging. Heavy flash floods occur every few years.

In the north the White River drainages head up against Deer Flat and Elk Ridge. On Elk Ridge are yellow pine forests, quaking aspen, oak, scrub maple, and willow. Serviceberry, manzanita, sagebrush, chickenberry, and many grasses are also found (Gregory 1938).

To the east and south of White Canyon is the Grand Gulch Plateau where the elevation ranges from 2,140 m (7,000 ft.) down to 1,525 m (5,000 ft.). This plateau is cut by many inaccessible canyons. There is very little soil for the pinyon, juniper, sagebrush, and grasses. Sagebrush and grass predominate in the open areas at the lower elevations.

Gregory characterizes White Canyon as "a broad flat floor bordered on the south by almost continuous high cliffs and on the north by cliffs alternately with broad areas of lowland buttes, mesas and ridges . . . it appears as a roadway of white rock 2 to 5 miles wide that leads indefinitely westward between walls of banded red rock" (Gregory 1938). Within this the White River has eroded canyons into the Cedar Mesa formation as much as 153 m (500 ft.) in depth, and in places less than 92 m (300 ft.) in width (Fig. 3). Within the study area the White River has an average gradient of 1.5% (80 ft. per mile). Canyon rockshelters are common and some are huge. They tend to be found at the contact of the shale and Cedar Mesa sandstone.

Our own faunal observations include deer, mountain sheep, jackrabbit, cottontail rabbit, bobcat, porcupine, rattlesnakes, and lizards. There are persistent local reports of sightings of wolves, but we cannot consider these as fully authenticated.

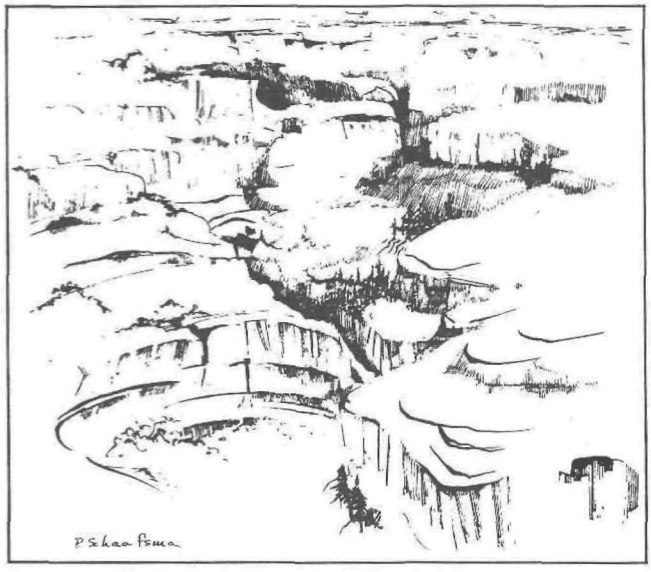


Fig. 3 A view up White Canyon at Sipapu Bridge. Within the inner canyon, rockshelter sites are common. Separating the several branches of the canyon are flat areas thinly forested in pinyon and juniper. These are the loci of most of the open sites in the region. In the background the high plateau is Elk Ridge and atop it are the Bear's Ears.

Pinyon, juniper, and sagebrush are the characteristic vegetation within White Canyon, while near the heads of the inner canyons yellow pine occurs. Just adjacent to the streams cottonwood, willow, box elder, flowering vines, and annuals are profuse. Gregory does not mention Douglas fir, but the species does occur occasionally on high talus slopes within the inner canyon. A diurnal temperature range of 28°C (50°F.) is not unusual in the summer and autumn. Southeastern Utah as a whole receives 85% of the possible sunshine.

The amount of precipitation is probably less than 15 in. (381 mm). This is variable and except for the April-June dry season there is no uniform seasonal rainfall. In our own observation the average maximum air temperature at Owachomo Bridge during the months of July and early August was 35°C (95°F.). Today the average period without killing frosts is 145 days at Blanding and 224 at Hite. Since corn requires from 90 to 150 days to mature it is likely that in White Canyon killing frosts could have presented serious problems to prehistoric agriculturalists.

Good agricultural soils usually have been transported and deposited by water. Alluvial soils are still preserved in a few canyon bottom areas. Soil is otherwise scanty and infertile. The source of local soils appears to be decomposed siliceous sandstone and, as in most arid regions, the lack of rain and paucity of vegetation inhibits this soil-forming process.

Gregory postulates an inner canyon epicycle of long duration consisting of aggradation followed by a terrace epicycle. Within the canyons today erosion has been so forceful that in most places the canyon fill has been entirely removed and the streams are cutting through bedrock once again. Gregory confirms that in the San Juan country generally "nearly all the terraces have been formed in the last 50 years . . . . The pioneers of 1880 found broad fields, meadows, clear streams flowing through willows and alders, cane swamps, little ponds, canyons floored from wall to wall and level fertile fields" (Gregory 1938).

ARCHEOLOGICAL SITE DATA

An abbreviated tabulation of site attributes is presented in Appendix II. The material in this section is organized according to a modified version of the Pecos Classification. This seems to provide about the right level of specificity. In summarizing the culture history of the Red Rock Plateau, just to the southwest of our study area, Lipe has chosen to apply a series of phase designations (Lipe 1967). We recognize a sufficient number of differences between his area and our own to discourage the direct adoption of his sequence.

Locations of the two hundred surveyed sites are shown in Figure 4. A small number of these were not actually visited because of inaccessibility. For most such sites we have sherd collections made at the base of the cliffs and some architectural detail observed at a distance. There are of course considerably more details observable on the surface in rockshelter sites than in open sites. Thus, the cultural periods in which rockshelters were most often utilized, the Pueblo II and III periods, are the ones which occupy the greatest amount of descriptive space below. In areas, such as the upper White Canyon, where there are many rockshelter sites in an excellent state of preservation, and where fill is often minimal, a fairly high percentage of the total information recoverable can be obtained by survey techniques alone.

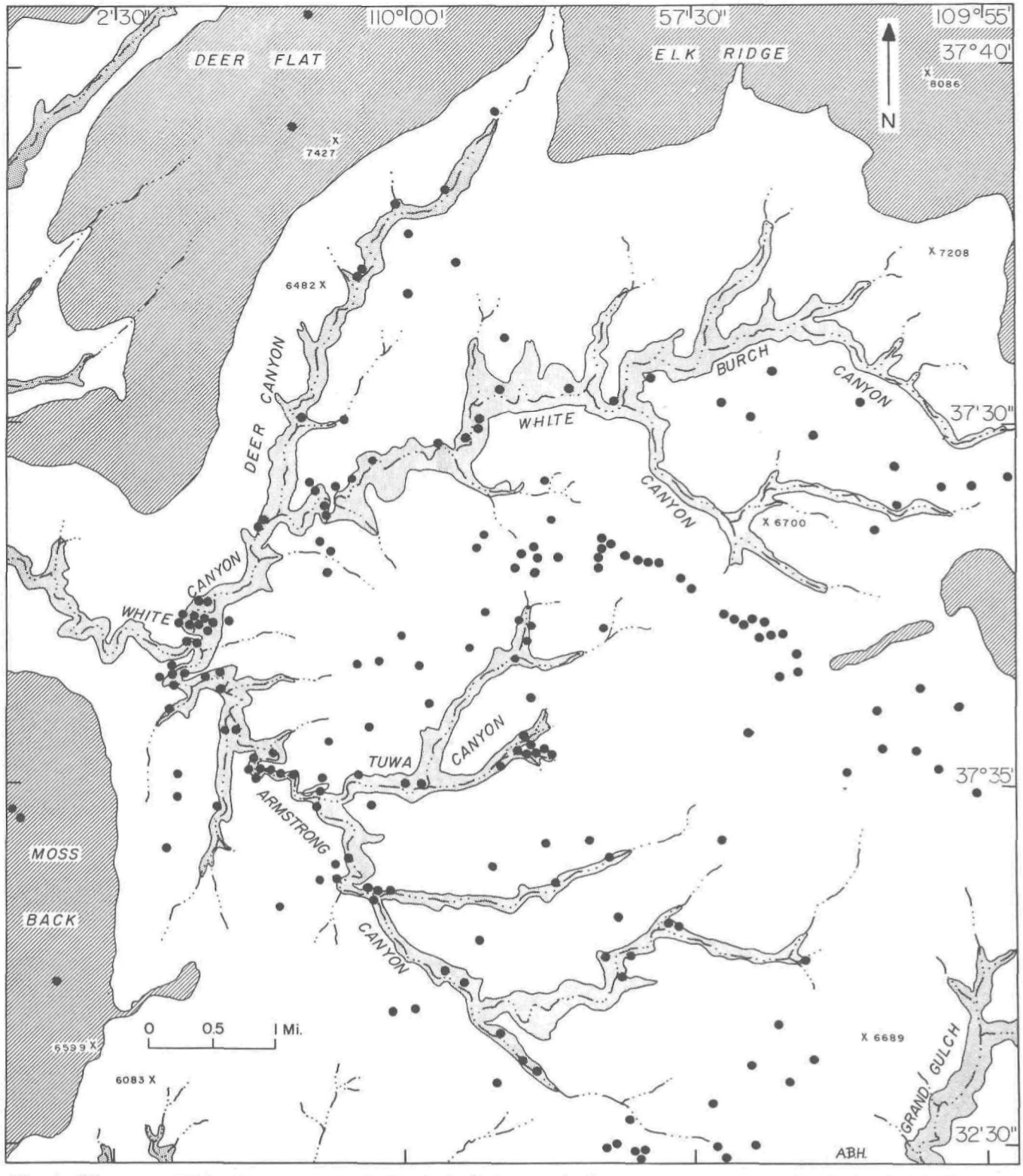


Fig. 4 The upper White Canyon area. Archeological sites are indicated by black dots. The darker hatched areas are the high ridges that surround the basin.

BASKETMAKER II

The identification of sites as Basketmaker II involves a number of difficulties. Prime among these is the problem of how to differentiate between sites that are preceramic in age and those that are of a later age but for some reason do not have any sherds on the surface. It was our initial impulse to treat all nonceramic sites as if they were preceramic, particularly those rockshelter sites consisting only of slab-lined or other types of storage pits. As the survey work continued it became obvious that not all such sites were from preceramic periods. Some were found immediately adjacent to definite Pueblo II-III cliff dwellings and must have served as storage for those settlements. Other slab structures of identical type had Pueblo II-III refuse associated. In addition, the supposedly Basketmaker II style of storage cists can be found incorporated into distinctly Pueblo II-III architecture at various rockshelter sites. Our criteria for identification of sites as preceramic are as follows: The site must be devoid of any later characteristics such as pottery or horizontally coursed masonry; it must be fairly large since the absence of sherds from a small site could be due only to sampling error; it should not be in the immediate vicinity of a later ceramic site. We have recorded seven sites which meet these requirements. Most of these are open sites. The open sites are characterized by surface refuse consisting of lithic material and ash distributed over an area from eight to 30 meters in length. Single isolated vertical slabs are found at some of the sites, as are occasional small pieces of burned adobe. It is possible that shallow subsurface houses may be present. A rectangular vertical slab structure measuring 1.2 by 2.5 meters was found at one of the Basketmaker II open sites. The structure resembles features the authors have observed on Paiute Mesa, Utah, some 70 km (45 mi.) to the southwest. The Paiute Mesa structures are also nonceramic and have been identified as Basketmaker II (Stein 1966).

Several rockshelter sites could possibly belong to the Basketmaker II period, but only three of them fit the above requirements. In rockshelter sites two general types of Basketmaker II storage cists are recognizable. Both, it should be emphasized, have also been found in sites of a later date. Less common are cists consisting of small circles of vertical slabs. These range in size from 50 cm to 2.0 m in diameter. Most typical are small excavated pits often thinly plastered with adobe. They are mostly round and vary from parallel-sided to slightly bell-shaped in vertical section (Fig. 5). A few are rectangular. The cists range from 50 cm to 1.4 m in length or diameter and depths are from 15 to 48 cm. Numerous chunks of adobe tempered with juniper bark at the two largest sites may indicate the use of simple mud covers. Quite similar structures in Sagi-ot-Sosi Canyon 100 km (60 mi.) to the south have been described by Byron Cummings. When found, a number of these were still covered. "They were covered usually with pieces of split cedar or strong sticks over which was spread a layer of cedar bark and then all covered with several inches of sand." (Cummings 1910).

In Armstrong Canyon the two largest of these storage cist sites each had nine cists arranged roughly in a row. One cist appears to have been used for burial purposes, as fragments of human bone were found scattered on the surface nearby. Most rockshelter cist sites show some evidence of disturbance by pot hunters. Little of this disturbance appears to be recent and most probably dates to the early decades of this century when horse travel made much more of the country accessible.

Site 42Sa6969 (W:5:122) shows evidence of quantities of refuse of probable Basketmaker II age. It is an open site high on the ridge between the canyon's branching tributaries. The site's surface is characterized by ash areas and lithic debris. The 25 stone objects recovered constitute by far the largest site sample of worked stone in the collection. These are listed in Table V.

Nonceramic sites are generally distributed throughout the upper White Canyon Basin, although there is some tendency for sites to cluster in lower Armstrong Canyon between the two bridges. Population undoubtedly was low and the subsistence pattern may have involved a good deal of seasonal movement. Our placement of only seven sites in this category is undoubtedly conservative. Smoke-stained roofs are present in 30 other sites. In 20 of these the blackening cannot be related to existing Pueblo period structures and must have accumulated prior to their construction. It is possible that many of these caves once housed Basketmaker II cists or camps. Unfortunately, no tree-ring dates have been obtained from Basketmaker II sites.

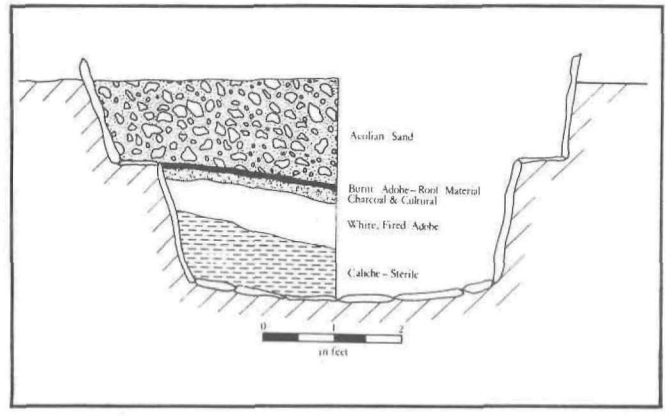


Fig. 5 Sectional view of excavated cist at site 42Sa6827 (V:8:53).

The Basketmaker II sites observed show no significant variations from the White Dog Phase as it is found either on the Red Rock Plateau or to the south in the Kayenta area. We have chosen to apply the more generalized designation simply because we lack the excavated material to justify using the more specific phase name.

BASKETMAKER III — PUEBLO I

Fifty sites, a quarter of our total sample, show evidence of a Basketmaker III — Pueblo I occupation. At least 19 of these are multiple component sites. The principal criteria for identification of these sites are ceramic. A range of distinctive Basketmaker III — Pueblo I gray and white wares make up twenty-three percent of the total ceramic collection from all surveyed sites. No sites lacking these pottery types have been identified as Basketmaker III — Pueblo I. There is some overlap between the surface characteristics of sites of this period and those of later pueblo periods. It is significant that in the absence of sherds it would often not be possible to differentiate between them.

Our reasons for the use of the composite term Basketmaker III — Pueblo I are as follows. We feel that the upper White Canyon area was not an entirely marginal environment for prehistoric farmers. Climate in the area may have indeed fluctuated through time. For example, dry farming is probably not possible today in the open flat areas between the canyons although the prehistoric evidence suggests that it may have been at one time. But, even under present rainfall conditions given sufficient growing season it should be possible to cultivate small crops in edaphically favored areas such as the alluvial deposits in parts of Armstrong, White, Tuwa, Deer, and Burch canyons. In a region having a variety of subenvironments such as this, the onset of drying climate conditions would have been met not with the abandonment of the entire area, but with a greater exploitation of the better-watered canyons. For this reason we feel that the occupation of the study area may have been continuous from Basketmaker III times until the general abandonment of the northern San Juan in the thirteenth century. But, no sites with clear Pueblo I characteristics have been found. The absence of Pueblo I ceramic traits in much of Utah has long been known. Reed emphasizes the point of view that the absence of diagnostic neck-banded and Kana-style Pueblo I pottery means only that those styles did not diffuse into an area, not that the area was depopulated in Pueblo I times (Reed 1963). Reed's suggestion, with which we tend to agree, is that in many areas Basketmaker III ceramic styles may have persisted until the diffusion into those areas of Pueblo II corrugated gray wares and black-on-white styles.

In the Navajo Mountain area 100 km (60 mi.) to the south Lindsay has observed that some Basketmaker III population segments developed Pueblo I traits while others persisted with Basketmaker III characteristics until the shift to a Pueblo II sociocultural system about A.D. 900 (Lindsay et al 1968). Pure Pueblo I sites were quite rare in the Navajo Mountain region. In this context it is of interest to note that Lindsay also feels that at Navajo Mountain the preceramic Basketmaker II stage may have lasted until at least A.D. 700.

Neck-banded utility pottery of classic Pueblo I form is absent in the White Canyon survey collections. At Mesa Verde such sherds are present at only half of the Pueblo I sites studied by the Wetherill Mesa Project (Hayes 1964). At Alkali Ridge, about midway between Mesa Verde and White Canyon, neck-banded sherds are described as very rare (Brew 1946). South of the study area at Jeddito 264, Daifuku found only 20 such sherds out of a Basketmaker III — Pueblo I collection of nearly 11,000 sherds (Daifuku 1961). At Mesa Verde, Hayes observed that in clearly Pueblo I sites the great majority of pottery demonstrates a direct survival of the Basketmaker ceramic tradition (Hayes 1965). All of this would seem to lend some support to our argument that despite the definite absence of Pueblo I neck-banded pottery and the probable absence of Pueblo I painted pottery, some occupation in the form of evolving Basketmaker III culture may have persisted in the White Canyon area during the time period characterized in other parts of the southwest as Pueblo I. While we agree that "pure" Pueblo I culture is not present in the study area, like Reed we cannot accept the implication that the area must therefore have been abandoned during this time.

The people of this time showed distinct preference for open dwelling sites. The typical open locations for Basketmaker III — Pueblo I sites must have been choice places for open site dry farming. Nearly all are located on top of the long flat east-west ridges that separate the drainages of White Canyon and its tributaries. Particularly rich in sites of this period is the ridge top just to the south of the upper limits of White Canyon itself (Fig. 4). For about 5 km (3 mi.) along this ridge archeological manifestations are almost continuous. In some cases the boundaries between numbered sites are arbitrary. The majority of these sites are located between the 1,890 m (6,200 ft.) and the 2,044 m (6,700 ft.) contours. The terrain is characterized by a fairly luxuriant pinyon and juniper forest and deep soil. Large sage flats are found in the vicinity of some of the sites. The forest appears to thin somewhat in the immediate vicinity of most of the sites.

Most single component sites of Basketmaker III — Pueblo I type show some evidence of human activity in addition to the presence of sherds. Small rectangular slab features found at five sites may have served as

hearths since ash appears just beneath the surface in some. Four such hearths were observed on one Basketmaker III — Pueblo I site that is otherwise devoid of surface features.

Thirty circular features were found, all outlined by vertical slabs. Diameters ranged from 60 cm to 3.5 meters with the majority falling close to the median of 1.5 meters. One of these structures was excavated and is described below. They appear to have been used for storage. Judging from the single excavated example most may have been slab-lined and may have had slab floors as well.

Rectangular or subrectangular slab-outlined structures have been found at ten Basketmaker III — Pueblo I open sites. About half of these structures are square and range from 1.5 m to 4.5 m on a side. The rectangular slab-outlined features average 1.5 by 2.5 m in plan with the largest measuring 2.0 by 6.0 meters. The latter probably represents at least two contiguous structures. At a few sites random vertical slabs indicate one or more structures whose shape cannot be determined. Loose angular construction stone was observed at 17 sites. This stone was probably once incorporated in mud-walled structures. Fragments of burnt adobe showing impressions of small sticks suggest the use of jacal construction techniques in at least three of these sites.

Pithouses of some description were probably present at most Basketmaker III — Pueblo I sites. Many of the larger structures outlined, or partly outlined, by vertical slabs may be shallow pithouses. In addition, shallow depressions measuring from 3.0 to 5.0 m in diameter have been found at approximately half of the sites. The maximum number of such depressions at any one site is three. In addition, there may be a good number of pithouses for which there are no surface indications.

Basketmaker III — Pueblo I open sites appear to follow no discernable ground plan. Examples of site plans for this period are shown in Fig. 6. In a few sites the roundish slab structures tend to be contiguous. At a few others, surface structures have left low but distinct elongate mounds characterized by small rocks and sometimes by pieces of burnt adobe. These mounds do not occur in any consistent relationship to the pithouse depression. There are two examples of what

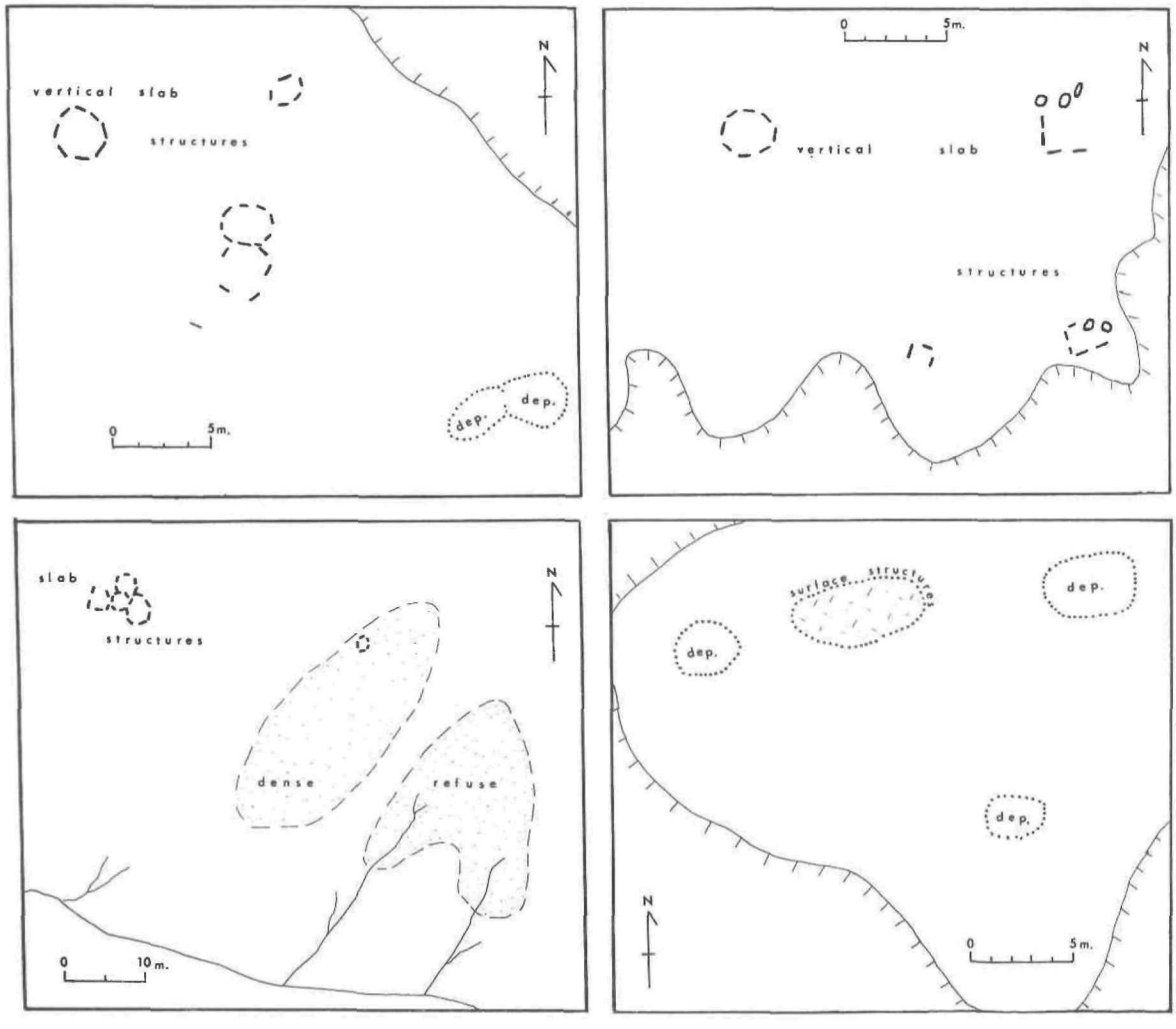


Fig. 6 Ground plans based on field sketches of Basketmaker III-Pueblo I open sites. Top row 42Sa6800 (V:8:26) and 42Sa6827 (V:8:53). Bottom row 42Sa6882 (W:5:32) and 42Sa6940 (W:5:93).

appear to be double or contiguous pithouse depressions. Eight sites have distinct refuse areas consisting of ash, sherds, and lithic debitage.

An effort to seriate Basketmaker III — Pueblo I open sites met with some success. Forty-one large sites were arranged in a series ranging from those with no structures to those with the largest number of structures. A pottery collection of 569 sherds from these sites was then inspected to see if concomitant variation would show up. Sites with no structures or with only one structure observable had Basketmaker gray ware sherds occurring in a ratio to Basketmaker white ware of 5.7 to 1. In sites with from four to seven structures this ratio drops to 3.1 to 1. This almost doubling of the relative frequency of Basketmaker painted pottery in the architecturally more complex sites seems to suggest that the period was long enough for cultural elaboration and change to have taken place within it.

Basketmaker III — Pueblo I pottery has been found at only six rockshelter sites. These are all partly mixed with later ceramic material so that it is not possible to say for sure whether the architecture is associated with the earlier or the later occupations. This is unfortunate because two of the sites have structures whose time-depth ought to be determined. These are small circular and D-shaped structures with mud-and-cobble walls built up on a foundation of vertical slabs. They are described with the Pueblo II-III architecture below because some of them are clearly associated with that time period. It is quite possible that their popularity spanned both time periods. They are about the same size as the slab-outlined structures at Basketmaker II-III open sites.

Outside of the study area similar structures were excavated at Site 2 in Molly's Nipple Canyon by Julian H. Steward (1941 pp. 291-2, pls. 43 and 44). His work showed them to be shallow pithouses with vertical slabs serving as wall footings. This site had Basketmaker gray and black-on-gray pottery as well as some early Pueblo II sherds. Steward's interpretation is that the site dates at the end of the local Basketmaker III period when outside Pueblo II influences were first being felt.

Excavations have been conducted at three sites of this time period. Work by Schroeder at 42Sa1440 (W:5:39) and 42Sa1441 (W:5:50) has been reported elsewhere (Schroeder 1965) but will be reviewed briefly below. We conducted a test excavation at site 42Sa6827 (V:8:53) in order to determine the nature of the ubiquitous small slab circles. At 42Sa6827 (V:8:53) three quadrants of fill were removed from a circular slab structure 2.3 m in diameter (Fig. 7). The work revealed a slab-paved floor, a bench faced with slabs, and an outer wall above the bench which is also faced with slabs. Before excavation only the tops of the largest wall slabs were visible. The slab-paved floor is slightly saucer-shaped and 1.3 m across. The bench is surfaced with clay and averages 22 cm in width and 53 cm in height above the floor. Maximum depth below present ground level is 1.2 meters.

The fill down to the level of the bench consists of eolian sand, fine ash, and quantities of burnt angular sandstone. The burnt rock could have been employed in a mud-and-rock superstructure. At the level of the bench was found ash, small burnt logs, and burnt adobe, probably the remains of roofing or covering material. Much of the adobe in the lower part of the roof fall bears impressions of the stalks and leaves of corn plants. Beneath this, about 15 to 30 cm of sterile fill rested directly upon the floor. Just outside the outer slab wall on the surface within an area 45 by 60 cm seven small posts had been set randomly into the ground. As with similar features found in rockshelters this structure could have had low walls of mud and stone set atop the slabs to a height of 1.0 meter. The flat roof was probably of poles topped by corn stalks and leaves sealed over with adobe. The structure was too small to have been a house and probably served as a storage cist, although a bench would be an inexplicable feature in such a structure.

Materials recovered in the site 42Sa6827 (V:8:53) excavations include a metate fragment on the floor and a ground stone point fragment in the fill just above the bench. Sherds and flakes of chert and chalcedony were also found in the fill. These objects are described with other Basketmaker III-Pueblo I material later in this report.

Two upper White Canyon sites with Basketmaker III-Pueblo I characteristics — 42Sa1440 (W:5:39) and 42Sa1441 (W:5:50) — were excavated as a road salvage project by Schroeder (1965). Six tree-ring dates from these range from A.D. 561 + vv to A.D. 641 + vv (Table III, Fig. 66). All show variable outer rings indicating specimen erosion and noncutting dates. At site

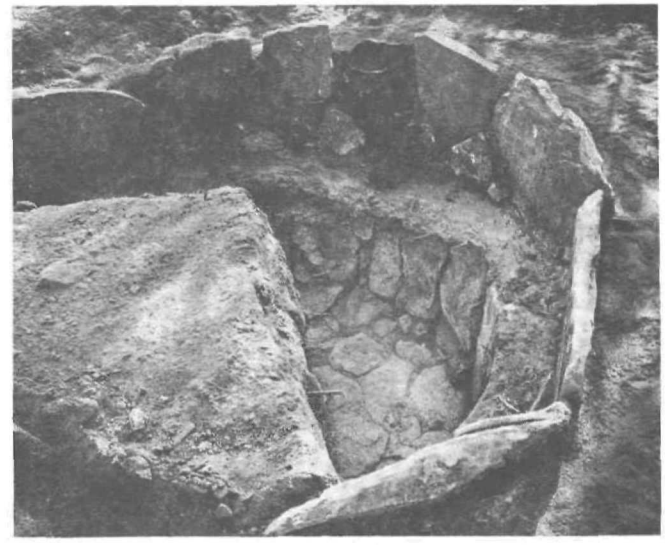


Fig. 7 Partially excavated cist at Basketmaker III site 42Sa6827 (V:8:53). Note slab floor and facing on bench.

42Sa6813 (V:8:39) two contiguous subrectangular structures are partly outlined by vertical slabs. They are shallow pit rooms measuring 1.8 by 1.5 m and 2.3 by 1.7 meters. One has a slab floor, the other an unlined hardpan floor. Lack of hearths, in Schroeder's estimation, precludes their classification as houses. At site 42Sa1441 (W:5:50) three contiguous shallow pit structures were excavated. Their shapes range from oval to subrectangular. The three slab-outlined structures ranged from 3.0 to 4.0 m in length and widths varied from 2.7 to 3.4 meters. Floor features were rare and hearths were absent. Fill at both of Schroeder's sites gave ample evidence that the structures were roofed, using poles and a heavy application of mud. In the five units dug only two small postholes were found. The structures are interpreted as storage units and Schroeder suggests that the roofs may have been quite low, perhaps resting upon the tops of the slabs. This would have provided a ceiling height of less than 1.0 meter. While the absence of floor features, particularly hearths, is difficult to explain, most of the structures are too large to have served only for storage. As for walls, there is adequate evidence in the rockshelter sites of the same period to suggest the use of mud, possibly reinforced with vegetal material to produce a thin wall built atop the slabs. Such walls could have stood fairly high and would leave little evidence if they eroded in place. One would expect, though, that some traces would have remained around the bases of the slabs. Schroeder's interpretation, with which we largely agree, is that the shallow slab-outlined contiguous structures were not the principal habitations at the Basketmaker III-Pueblo I sites and that other structures, probably deeper pithouses should be nearby. Repeated experience has shown such structures do not always leave surface depressions or other indications of their presence.

Of interest are the results of palynological analysis of soil samples from Schroeder's excavations (Schoenwetter 1965). Schoenwetter found arboreal pollen in surface samples in expected frequencies considering the present heavily wooded environment. Excavated samples from room fill and from a posthole revealed only one third as much tree pollen and showed an approximately five-fold increase of artemisia and Chenopodiaceae. In Schoenwetter's estimation this is indicative of a Basketmaker III-Pueblo I environment quite different than today with treeless conditions prevailing.

PUEBLO II-III

Pueblo II-III components were identified at 136 of the 199 sites. Our assignment of sites to this period is usually based on ceramics. A few small sites without sherds but with other diagnostic Pueblo II-III traits such as coursed masonry have also been included. We can see that a number of changes took place during the Pueblo II-III period, but we do not feel that the survey has provided sufficient evidence to permit subdivision into phases. A detailed excavation program might provide such information. We will present all of the Pueblo II-III material together and then summarize those changes that appear to have taken place within the period.

Open sites and rockshelter sites of Pueblo II-III age are described separately since the two location types tend to produce different kinds of data. Also, the pottery from each of these location types seems to indicate a somewhat different story for each.

OPEN SITES

The sixty-nine Pueblo II-III open sites constitute a little less than half of the surveyed Pueblo II-III sample. It is significant that this number is only a little more than the open site total for the Basketmaker III-Pueblo I period, perhaps implying an only slightly larger open site population during Pueblo II-III time. The geographic distribution of Pueblo II-III sites, however, shows a broader environmental tolerance than their Basketmaker predecessors. Sites are found at elevations ranging all the way from 1,708 m (5,600 ft.) to 2,290 m (7,500 ft.). Most sites are found on the long flat-topped ridges between canyons, a location type favored by people of Basketmaker III-Pueblo I times. But, many sites are in localities which are today characterized by erosion with shallow soil and little apparent agricultural potential. Some occur at much higher elevations than any Basketmaker sites for example on Deer Flat at 2,290 m (7,500 ft.). The largest Pueblo II-III open sites are found at elevations about 1,950 m (6,400 ft.) and are generally in areas of deep soil. About one quarter are located near present day sage flats while Basketmaker III-Pueblo I sites are somewhat less commonly found in such situations. For the open sites it is difficult to explain the greater geographic range simply in terms of increased population, since open sites of both periods number about the same. We have no clear explanation for this phenomenon. Environmental changes may have rendered a wider range of terrain suitable for agriculture. Any such environmental change would have to produce both more usable soil moisture during the growing season at the lower elevations and a longer growing season at the higher elevations. Alternately, given an unaltered environment from Basketmaker III to Pueblo III times, the expansion in habitable terrain could be a result of some change in subsistence technology: new races of cultigens or advances in soil conservation and agricultural techniques. It was during Pueblo II-III times that check dams seem to have come into use in the study area and its general vicinity (Brooks 1974). It is regrettable that Schoenwetter had no excavated pollen sample from the later Pueblo

period to match his Basketmaker III-Pueblo I sample. Since the latter showed evidence for an open prairielike environment, one is tempted to interpret the subsequent broadening of the geographical distribution of sites during the Pueblo period as a result of an increase in usable soil moisture. On the other hand, a cultural explanation may be more accurate. That is, Schoenwetter's pollen evidence for open nonforested conditions could simply reflect land clearing on the part of the late Basketmaker agriculturalists. Further pollen work ought to clarify this problem.

A study of the proximity of Pueblo II-III open sites to known modern water sources indicates that the occupants may not have been adverse to transporting water for domestic uses. Given environmental conditions not too unlike those of the present, the occupants of a significant number of open sites would have to have carried water distances of 1.6 km (1 mi.) and occasionally longer. Other sites, closer to water sources in a straight line distance, would have required long and inconvenient descents into canyons. The largest open sites, however, are usually not located far from usable water. The most common water sources for open sites are seeps at the heads of nearby canyons.

It is possible that many Pueblo II-III open sites are completely buried and not exposed to view. Many of the smaller sites surveyed are visible today only because wind or water erosion has cut into deposits containing the cultural remains. Construction stone and refuse often are exposed on an eroded slope in the transition zone between the deep soil of the flat ridges between the canyons and the exposed bedrock at the canyon rims. It is possible that a number of sites lie buried in the deeper soil.

Pueblo II-III open sites display a variety of surface characteristics. Some evidence of architecture is found at about two-thirds of them. Probably many sites without surface indications actually do have subsurface features. We have observed the following kinds of architectural features: masonry rooms, nonmasonry surface rooms, circular and rectangular structures outlined by vertical slabs, undifferentiated slab structures, slab-outlined hearths, pithouse depressions, and possible kiva depressions. Less common are: small towers (two sites), check dams (four sites), defensive walls (one site), metate bins (one site), and two-story structures (one site).

Although open sites of Pueblo II-III age in the upper White Canyon area are fairly numerous, no really large pueblos have been observed. The largest open site observed covers an area forty by sixty meters and has three large pithouse depressions with extensive nonmasonry surface structures. The total number of structures of all types estimated for Pueblo II-III open sites is 183. This is an average of only three structures per site.

Interestingly, masonry construction involving the horizontal coursing of building stone was observed or inferred at only 22 open sites of this period. In other words, one of the traits most diagnostic of the Pueblo II and III stages in the Pecos classification is absent at 68 percent of the White Canyon open sites of that age. Masonry construction at open sites usually consists of walls, a single stone in width, double walls being rare and rubble-cored walls absent. Lack of excavations renders most subsurface observations impossible, but erosion and occasional pothunters' holes provide some information. Mud mortar is used sparingly in open site walls. Spall chinking between courses, like mortar, is rarely seen. In rockshelter sites of the same age both of these techniques are common. There are few attempts to produce a finished appearance by dressing the exposed outer surfaces of building stone.

Slab-outlined structures are found at 27 sites. Coursed masonry structures are found only at 17 sites. Rectangular and round slab hearths, resembling those of Basketmaker III-Pueblo I age, are found at nine sites. They are distinguished by their small size and often by the presence of fine ash just below the surface. Slab circles up to 1.5 m in diameter are found at eight sites, those over 1.5 m in diameter at three sites. The subsurface nature of these features is not known, but their surface similarity to Basketmaker III-Pueblo I slab circles might imply that they too may be deep slab-lined cists. Rectangular and undifferentiated slab structures are observable at seven sites. The rectangular ones range from 1.4 to 3.5 m in length and from 1.0 to 2.5 m in width. These larger rectangular and subrectangular slab-outlined features could be shallow subsurface houses, or house-size storage units. They bear some resemblance to the large features that were uncovered in Schroeder's Basketmaker III-Pueblo I excavations.

Nonmasonry surface rooms are characterized by scattered small rocks that are sometimes associated with ash or pieces of burnt adobe with impressions of sticks. These are found at more than half of the Pueblo II-III open sites in our sample. They are probably remnants of a kind of wall often found in cliff-dwelling sites of the same age. Such walls incorporate sticks or logs and irregular pieces of rock by extensive use of adobe mortar. With only surface observations to go on, it is difficult to define the kind of structure these represent. Some may be the remains of roofs or sidewalls of pithouses. Most are probably subrectangular surface or slightly subsurface rooms. Indications are that most were probably low-walled structures, perhaps only a meter or less in height. Sizes are difficult to estimate. At larger sites, blocks of contiguous surface structures are up to 15 m in length.

The problem of true pithouses at Pueblo II-III open sites is difficult to assess because such structures do not always leave detectable depressions. Pithouse

depressions are found at fourteen sites. They range from 3.0 to 6.0 m in diameter and are seldom more than 20 cm in depth. Many of the depressions appear to collect water after heavy rains which may be an indication that compacted clay floors may exist beneath the surface. All have been found in association with sherds or other cultural material. We believe that pithouses may exist at many of those larger Pueblo II-III open sites that otherwise lack surface evidence of architecture. Recent work has shown that the pithouse is an important part of the architectural tradition in the area of Kayenta Anasazi influence during Pueblo II and III times (Hobler 1974, Lindsay 1969). In his work in the Klethla Valley, Bliss found that late pithouses existed at many sites where there were no surface indications of their presence (Bliss 1960). Bliss felt that 80 or 90 percent of the Kayenta population during these periods may have been living in pithouses.

Larger and deeper depressions that could be the remains of kivas rather than pithouses are found at only three Pueblo II-III open sites. These depressions are from 5.5 to 7.0 m across and are up to 1.5 m in depth. Their shape may be round. Masonry walls are not evident at any of these depressions, although at two sites masonry structures are found nearby.

A number of special features of Pueblo II-III open sites merit individual description. Check dams are found at four sites. Three of these consist of fewer than twenty rocks laid as loose coursed masonry walls about 2.0 m in length and a maximum of three courses in height. The largest is seven courses and is 1.1 m in height and 3.5 m long. All are in the immediate vicinity of dwelling sites and seem to have been intended to stem erosion in the residence area rather than to conserve soil or water for agricultural purposes. It is also possible that, if properly sealed, the dams could have retained runoff for brief periods after rains for domestic water supply. Structures identified as towers were found at two sites. These are isolated a short distance from other structures at their respective sites and seem to have once stood higher than other structures. Neither is of the proportions of the large towers to the east in the Hovenweep area. One is round and one square. Masonry stands to a maximum height of 1.2 meters. Diameters are 1.5 and 1.7 meters. One large site with a canyon head tower of Hovenweep type was observed about 16 km (10 mi.) beyond the eastern limit of the survey area.

A possible defensive wall at one site is built along the front of a bluff and stands 50 cm high today, although fallen rock indicates it may have been 1.0 m high.

In some of the larger sites, combinations of certain of the above architectural features can be observed. It should be emphasized again that none of these are really large sites and that specific evidence of structures is lacking at many. Ground plans of eight of the larger open sites are shown in Fig. 8. Site layout does not appear to have been rigidly standardized. Four general classes of open sites of this age can be recognized. They are: 1) sherd areas, sites consisting of sherds and refuse only without any evidence of structures; 2) sites lacking coursed masonry but with pithouse depressions, vertical slab structures, or nonmasonry surface rooms; 3) sites with coursed stone masonry rooms in combination with pithouses, or slab-outlined structures or nonmasonry surface rooms; 4) small pueblos consisting only of masonry surface rooms.

In sites of types 2 and 3 there is a tendency for the masonry and nonmasonry surface units to occur as a block or in a row adjacent to pithouse depressions. At such sites the number of pithouses varies from one to three. The rows of surface structures are either straight or somewhat curved and are generally found from northwest to east of the pithouses, that is, in an arc from 315° through magnetic north to 90°. It is easy to recognize in this pattern a village plan not unlike that associated with Pueblo I cultural material elsewhere in the southwest, particularly since few of the surface structures seem to have been large enough for habitations.

Small Pueblo sites are less common. They usually consist of a block or row of two to six rectangular coursed masonry rooms sometimes oriented north-south. The masonry mound at one such site indicates that one or two rooms may have been two stories high. Most, however, are low mounds showing only the remains of one-story structures. Two of the larger pueblo type sites appear to have consisted of a double row of rooms. The largest, on Deer Flat, may have had as many as twenty rooms.

Since there is no indication of a clear break in the Pueblo II-III period we have discussed the characteristics of open sites as a unit. Though the occupation seems to be continuous, some changes through time can be observed. Early in the period, pottery and pottery styles of both the Mesa Verde and the Kayenta areas occur together on many sites. Toward the end of the occupation of the area this was followed by a more exclusive emphasis on pottery made in the Mesa Verde style. Thirty-nine sites with pottery collections falling fairly clearly either into the earlier or the later portions of the Pueblo II-III period were studied with reference to associated architecture. The results are shown in Table I. The analysis shows that all four basic site types occur throughout the Pueblo II-III period. However, some general trends can be observed. There appears to be some decrease in the total number of sites through time with the later more exclusively Mesa Verde-influenced sites being less numerous. These sites, though, have a higher proportion of the small masonry pueblos. There seems to be an improvement in the quality and finish of masonry in the later sites.

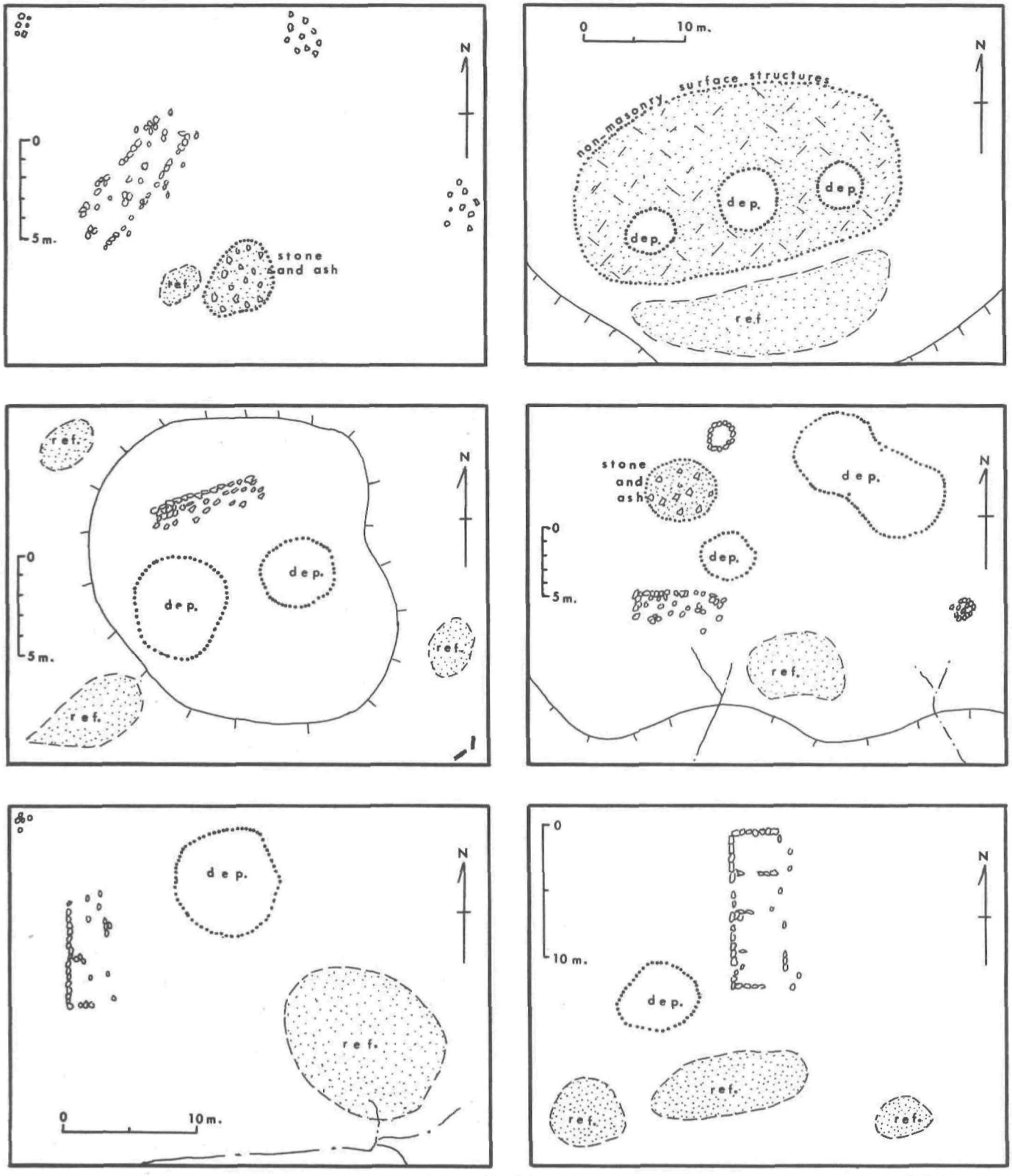


Fig. 8 Ground plans based on field sketches of some Pueblo II-III open sites. Top row: 42Sa6832 (V:8:58) and 42Sa6922 (W:5:75). Middle row: 42Sa6833 (V:8:59) and 42Sa6941 (W:5:94). Bottom row: 42Sa6834 (V:8:60) and 42Sa6903 (W:5:56).

Large ash areas, zones from three to six meters across, are found at five sites, all with early pottery. Sites with no evidence of coursed stone masonry but with pithouses, slab-outlined structures, or nonmasonry surface units occur in significantly greater numbers in association with the earlier pottery types. The prevalence of these kinds of sites earlier in time undoubtedly reflects architectural continuity from the preceding Basketmaker III-Pueblo I period.

ROCKSHELTERS

Pottery and architecture serve as the basic criteria for the identification of sites of Pueblo II-III age. Pottery was found on nearly all the 71 sites so identified. As with the open sites, those without sherds usually can be identified by the presence of coursed masonry. A few sites without pottery also lack masonry walls and have one or more kinds of storage cists of types that are also found in Basketmaker sites. If the cists are well preserved and not dismantled, and if the sites are near large Pueblo II-III sites, we have classified them as Pueblo II-III.

Caves or rockshelters that house Pueblo II-III canyon sites are described under "Environment." Few occupied rockshelters are really difficult of access. Good rockshelters located fairly high up the canyon walls where access from the canyon bottoms is difficult often do not contain archeological remains. Similar shelters located near the canyon bottoms nearly always contain evidence of human use. One gets the impression that the rockshelter users were oriented more to the canyon bottoms and were exploiting that portion of the environment. For most cliff dwellings or other rockshelter sites reliable water sources are not close by. Canyon pools are the most prevalent sources, at least in the deeper canyons. By excavating shallow wells in the stream deposits water could probably have been obtained in sufficient quantity to sustain a small settlement. Sherds of Pueblo II-III age can be found at some of the modern seeps showing that these too were used.

The distribution of Pueblo II-III rockshelter sites appears to follow a predictable pattern. As we have said, sites are usually found wherever good rockshelters are located, but particularly where these shelters are near canyon bottoms. Areas with good rockshelters in relatively open canyons with deep soil usually show signs of greatest use. But there are instances where quite suitable canyon-bottom lands are devoid of settlement. Apparently it was not essential that dwellings be located in the immediate vicinity of garden plots. A similar pattern certainly exists with the modern Hopi who are accustomed to walking great distances to their fields. In addition, it is likely that in our study area some canyon-bottom land may have been farmed by the occupants of the open mesa-top villages.

TABLE I

Types of sites associated with early and late Pueblo II-III pottery.

TYPE OF SITE	ASSOCIATED POTTERY	
	Early Types	Late Types
Masonry pueblo only.	2	7
Masonry rooms with pithouses, slab-outlined structures, or nonmasonry surface rooms.	4	2
Pithouses, slab-outlined structures, or nonmasonry surface rooms.	13	5
Sherd area only, no evidence of structures.	3	3

The 39 sites selected for this tabulation have sherd collections that appear to fall fairly clearly into the earlier or later portions of the period.

Site concentrations are found at the end of the south branch of Tuwa Canyon, in Armstrong Canyon about midway between Kachina and Owachomo bridges, and in the Kachina Bridge area. Twenty-one sites have been recorded within 0.8 km (0.5 mi.) of Kachina Bridge. It is interesting to note that where such concentrations do occur none of the sites are large and most of the structures may not be dwellings. The largest sites, 42Sa6803 (V:8:29), 42Sa6819 (V:8:45), and 42Sa6965 (W:5:118), with from 13 to 27 structures each, tend to occur more or less in isolation without a number of smaller sites in their immediate vicinity. The larger rockshelter sites — those over eight rooms — are widely scattered throughout the canyon environment and are not found close to one another.

Another trait of the White Canyon area is the state of preservation of many of the rockshelter sites. Original roofs can be observed on twenty-five structures at twenty sites. More than half of these are kivas. Two things may help to explain this phenomenon. It may be that abandonment of the area was not as gradual as at other San Juan Anasazi areas such as the Mesa Verde so that there were no remaining residents to take beams from the roofs of unoccupied structures. In addition, at Natural Bridges use by Indian groups after the thirteenth century has been minimal.

Seventy rockshelter sites are of Pueblo II-III age. Basketmaker gray ware sherds found at a few sites suggest multiple use of these sites. Smoke-blackened cave ceilings, in a few instances, also indicate prior use. In the upper White Canyon area rockshelter sites, like open sites, are not large. The largest consists of no more than 27 structures. Of all Pueblo II-III rock-

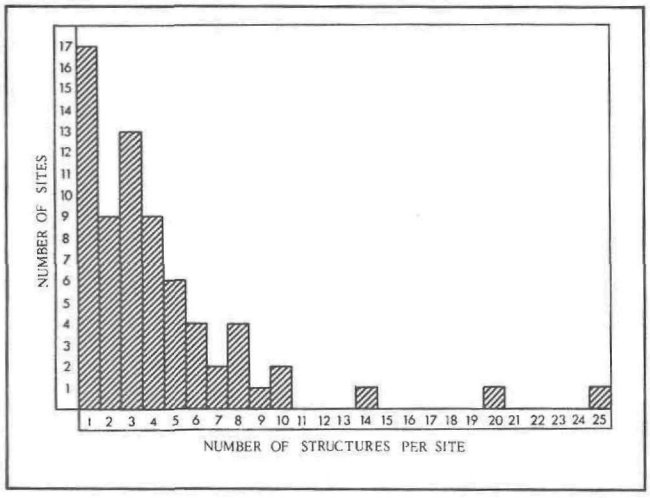


Fig. 9 Number of structures at Pueblo II-III rockshelter sites.



Fig. 10 Site 42Sa6782 (V:8:8), subterranean Class I structure (storage cist) with slab cover, inside cribbed wooden walls form a bell-shaped profile.

shelter sites 92% have fewer than nine structures each and 72% have fewer than five structures each (Fig. 9). Another notable characteristic is architectural variability. Sites in rockshelters show a wide range of construction techniques, and kinds of buildings. Their kinship with Four Corners Anasazi culture is obvious and unquestioned, but one can also observe a lack of standardization that, along with other considerations, suggests some form of cultural lag.

At the 75 Pueblo II-III rockshelter sites some 302 structures have been observed. This provides a mean figure of 4.1 structures per site. These numbers and those in Fig. 9 may be somewhat misleading. It is unlikely that all structures we observed were in use at the time of the thirteenth century abandonment of the area or at any other point in time. There is evidence at most sites and in the tree-ring record that many architectural features were built, used, abandoned, dismantled, and their parts later reused elsewhere. Tree-ring estimates ranging over 230 years for structural wood in a single room seem to point to reuse of beams from older dismantled structures. Many such dismantled structures can be observed. Even today the most thorough vandalism observable at Anasazi sites in the area remains that performed by the Anasazi themselves. Commonly one sees a small fragment of a good masonry or slab wall in an otherwise empty rockshelter. It is obvious that the missing building stone has been carried away for use elsewhere. Our records were reviewed in an effort to estimate how many structures may have been in usable condition at the time of the area's abandonment. Excluding from the total all features that seem to have been intentionally dismantled and those that may never have been finished we arrived at a figure of 97. This includes not only kivas and dwellings but a high percentage of storage and other nonhabitational features. If our estimates are correct, fewer than one-third of all Pueblo II-III structures for which we have evidence may have been in usable condition, whether or not they were actually in use, by the mid-thirteenth century.

For the purpose of analysis we have classified structures in rockshelters in four categories. These range from Class I (storage structures) to Class IV (kivas). There is an obvious continuum from tiny storage structures too small for an adult to enter to large rectangular rooms showing every indication of residential use. Even kivas show continuities with these other structures. Our distinctions between structure classes based upon size and certain signs of function are given below.

Class I (storage structures). These have floors that are less than 1.5 m across and/or have headroom of less than 1.2 m. Almost all storage structures lack evidence of smoke-blackening.

Class II (temporary dwellings). These are larger than storage structures with floors 1.5 m or more in length. They are usually lacking in headroom although not as much so as storage structures. Some show smoke-blackening from fires indicating occasional use as shelters. Doors are distinctly smaller than in Class III structures and as in Class I structures often have provisions for a fitted slab door.

Class III (dwellings). This group has floors more than 1.5 m in length and headroom greater than 1.2 meters. Hearths or other evidence of internal fires is common. Doors are larger than Class I or II structures and usually have sills located at or near the floor level. T-shaped doors are found in some dwellings.

Class IV (kivas). These are the largest structures in the sample. All have roof entries. Most are subterranean or partly so, although there are fully aboveground examples. Smoke-blacken-

ing is common. Other features are given in Table IV.

Class I (Storage Structures). At 48 sites of Pueblo II-III age 119 storage structures are recorded. It is within this class of structures that the greatest variability in building techniques can be observed. Simple round mud-lined pits, cylindrical or somewhat bell-shaped in section, that resemble Basketmaker II types are found at seven Pueblo II-III cave sites. Nineteen such cists are found at these seven sites. At five sites 16 storage structures consist only of mud plastering on rockshelter walls or mud and juniper bark used to build up thin walls. These structures were later largely dismantled and their exact nature is difficult to ascertain. It is possible that they are an earlier form of structure carried over from Basketmaker III-Pueblo I times and were in use only during the early portion of the Pueblo II-III period.

Excavated storage cists indicated by circles of vertical slabs are found at only five sites. These too may be carry-overs from Basketmaker III-Pueblo I times, as they are rare in occurrence at Pueblo II-III sites. At only one site are they found in association with fully developed coursed masonry. A tree-ring date of A.D. 909v (NBR-2) obtained from a piece of wood in the fill of a slab cist at site 42Sa6783 (V:8:9) further substantiates our view that the structures are early.

Larger bell-shaped underground cists (Fig. 10) built by cribbing small logs within an excavated pit can be seen at two sites. One of these is 1.7 m in diameter and over 1.5 m in depth. They are filled mostly with juniper bark and eolian sand. One such bell-shaped cist has a top opening built up with mud to provide an effective seal for a slab cover. Another is of similar shape and size but is built aboveground with mud and rock (Fig. 11).



Fig. 11 Small Class I structure at site 42Sa6801 (V:8:27). Note the use of mud and rocks and the apparent lack of wood.

Small Class I units are often built to take advantage of narrow ledges. Masonry walls, slabs, and sometimes jacal walls are employed in their construction (Fig. 12).

Round and D-shaped irregular Class I structures are by far the most common type found. Larger ones of similar style also make up the greater proportion of structures classed as possible dwellings. A variety of door styles and wall and roofing techniques are observable.

One style of storage structure, possibly a survival from Basketmaker III-Pueblo I times, is made up of mud walls based on thick vertical slabs. The mud is

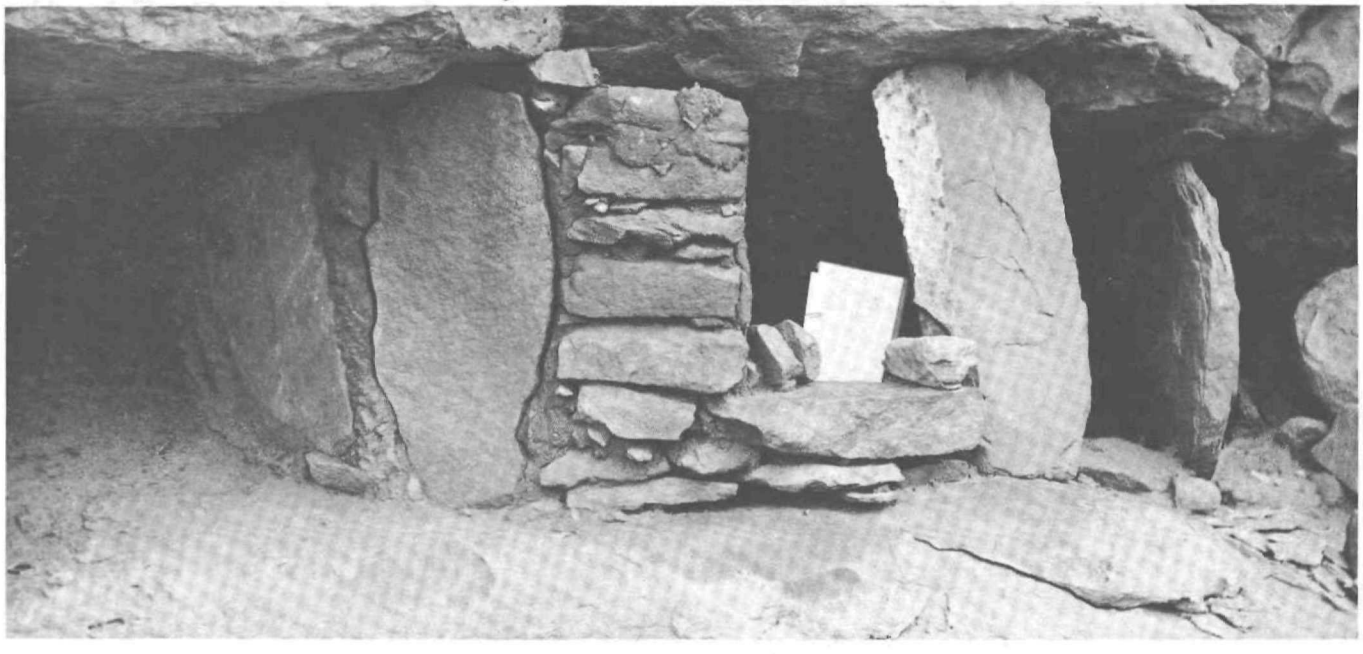


Fig. 12 A Class I storage structure utilizing vertical slabs and horizontally coursed masonry sealed in mortar, height of structure is 85 cm., site 42Sa6854 (W:5:4).

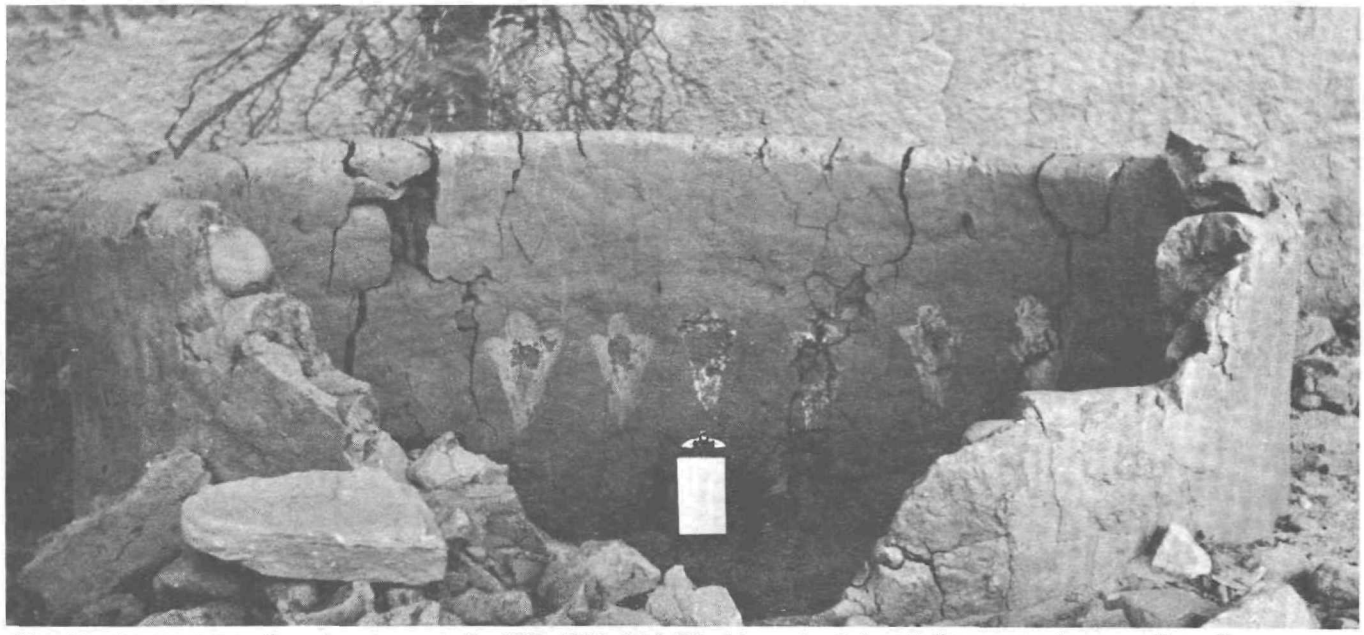


Fig. 13 Largest standing structure at site 42Sa6801 (V:8:27). Note the "ghost" figures on inner wall surface.

built up in coils. Each coil contains small river cobbles or pieces of angular rock enclosed within it in such a way that they are not visible on the exposed surfaces of the wall (Figs. 13, 14, 15). Sometimes the mud is also reinforced with grass or shredded juniper bark. This construction technique is a little like the adobe turtle-back technique used at some Fremont sites. Wormington mentions the mud and boulder structures at 42Sa6819 (V:8:45) (Horsecollar Ruin) in reviewing evidence for Fremont-like architecture in southeastern Utah (1955). In this context it is interesting to note the presence of six white-painted Fremont figurines on the interior wall of the mud and boulder structure at site 42Sa6801 (V:8:27) (Fig. 13).

At two sites there are pairs of contiguous structures. A feature unique to these is a masonry support built up beneath the doorsill, serving to prevent damage to the mud walls caused by people passing through the door (Figs. 15, 16). Steen excavated one of these mud and boulder structures at site 42Sa6819 (V:8:45) in 1937 (Fig. 15), (Steen 1937). His work showed that the mud walls were built upon a double parallel row of slabs and that a ventilatorlike hole through the base of one wall had been intentionally sealed off.



Fig. 14 Detail of wall construction at largest structure at site 42Sa6801 (V:8:27).

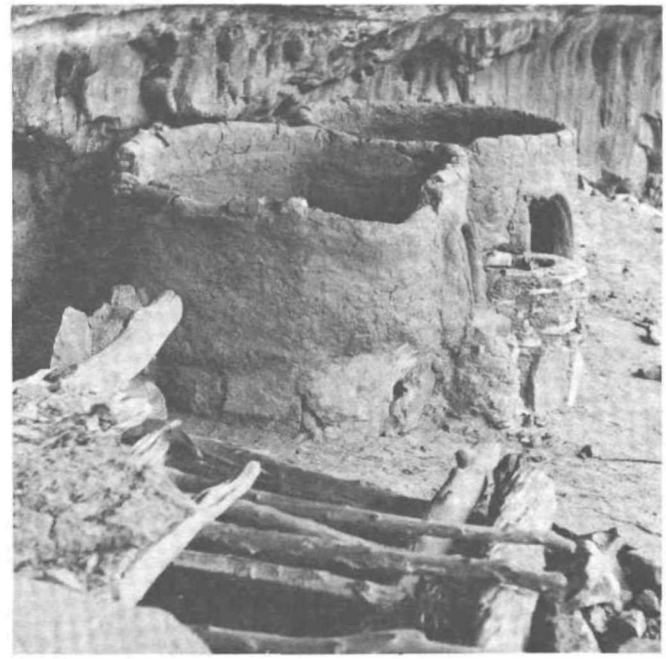


Fig. 15 Structures built of courses of mud and cobbles with walls based on vertical slabs, structure in foreground is a rectangular kiva, site 42Sa6819 (V:8:45).



Fig. 16 Masonry Class I structures at 42Sa6811 (V:8:37), note heavy masonry features just beneath the door of the structure on the left.

Simple flat roofs once covered those structures that did not use the cave ceiling as a roof. A roof preserved at 42Sa6811 (V:8:37) shows four primary beams laid atop the walls (Fig. 17). On top of these and running at a right angle to them are small willowlike branches. A layer of mud mixed with juniper bark and grass 5 cm in thickness covers the twigs and seals the structure. On top of all this are four thin branches running parallel to and above the primary beams. These are tied in several places to the beams right through the other roofing material and serve to hold the roofing "sandwich" together. Such a complex roof would be an advantage only for structures exposed to high winds or for roofs upon which people often walked. But since neither of these conditions held in the low-ceilinged rockshelters it is probable that this roofing technique was widely employed in open sites of the time and was used in the cave sites only as a matter of tradition.



Fig. 17 Slab-based mud- and stone-walled Class I structure with intact roof. This is probably the way in which most such structures were roofed, 42Sa6811 (V:8:37).

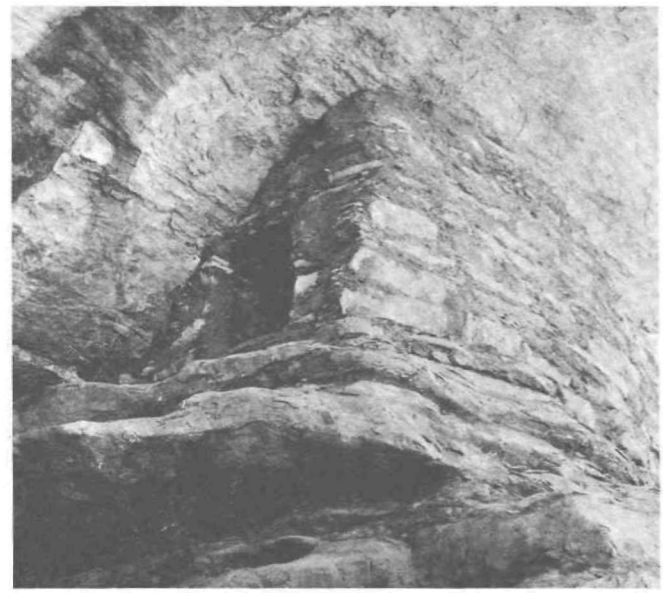


Fig. 18 A small masonry Class I (storage) structure on a high ledge some 70 m above the canyon floor, site 42Sa6638 (V:8:5).

A pair of two-story Class I units can be observed at 42Sa6961 (W:5:114). The first story of each is stone masonry. Each story is provided with a small rectangular doorway grooved to accept a slab door. Their second stories are of jacal and have walls angled inward from the bottom giving a modified conical shape to the structures, the source of the local name "Teepee Ruin". One other rockshelter site, 42Sa6946 (W:5:99) may have had two-story masonry storage units.

Most storage structures are of stone masonry (Fig. 18). In these, wall masonry typically consists of irregular-sized rocks laid horizontally, but not always in courses. A great deal of mud is often employed as mortar to make up for the uneven size of the building stone. Masonry in Class I structures is generally of poorer quality than in dwellings.

Jacal storage structures are rare. Where they are found, their walls are usually constructed in a manner similar to that described for roofing above. Thin branches are placed vertically and then covered on the building exterior with adobe. Outside and inside of these are placed pairs of willowlike rods that are tied together through the mud, thus binding the wall (Fig. 19). Doorways in storage structures are small, many less than 40 cm wide. Door shapes range from oval to subrectangular. Nearly all have mud coping built out to accept a slab door. Byron Cummings found a slab door in place at site 42Sa6965 (W:5:118) in 1907 (Cummings 1910). Judd's photograph shows that a slab was fitted to the mud-collared doorway and held in place by two small pegs on either side in the middle of the door frame (Fig. 20). Doorsills at two sites consist of a long slab protruding as much as 30 cm beyond the outside of the wall.



Fig. 19 Thin-walled jacal Class I structure with mud coping for a slab door, site 42Sa6863 (W:5:13).

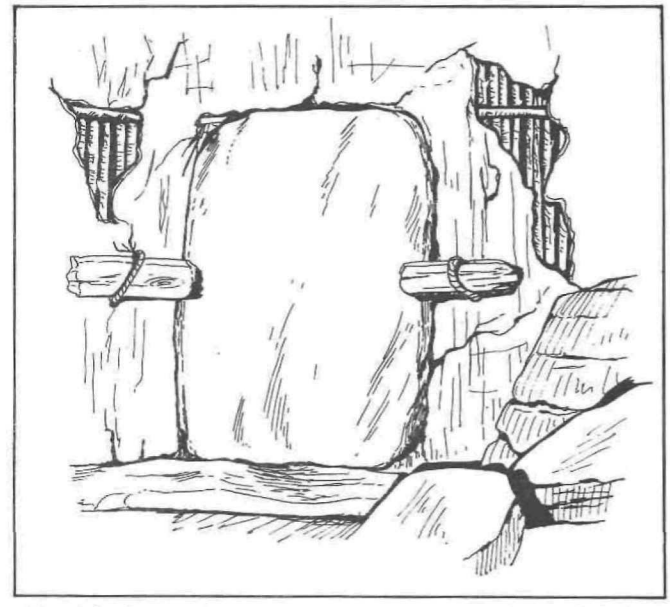


Fig. 20 Door in place on storage structure showing method of securing the slab, Bare Ladder Ruin or 42Sa6965 (W:5:118). Drawn from a photograph by Neil Judd, 1907.

Class II (Temporary Dwellings). We classify 102 structures at 39 sites as temporary dwellings. Most resemble storage structures in that they are usually of masonry and tend to be somewhat irregular in plan. They are, however, more than 1.5 m across and most are more than 1.2 m high. Most structures of this kind could and probably did serve on occasion as temporary dwellings, but permanent occupation would have been difficult because of their small size and lack of headroom. Occasionally there are traces of smoke-blackening indicating that interior fires burned for extended periods. Doors tend to be rectangular, although still small. Provisions for a fitted slab door are less common than in storage structures but do occur (Fig. 21). Slab lintels nearly always are used in conjunction with three or four small sticks set in



Fig. 21 Class II structure site 42Sa6788 (V:8:14). Roofing is intact and there is some smoke-blackening inside.

mud immediately beneath the slab. Floors are usually bedrock. There are a few in which the sloping bedrock is leveled up with sand to provide a more even surface. Presumably floor leveling would not be necessary if a structure was to be used only for storage. Compacted mud floors were not observed but may be present beneath the windblown fill and pack rat accumulations that fill most rockshelter structures. Roofing construction is similar to that employed on storage structures. In at least one instance a stone wall is continued one or two courses above the flat roof thus forming a ridge or fire wall around the roof. This technique is also used in kivas.

Class III (Dwellings). The 26 structures classified as dwellings are found at 18 sites. This figure may be somewhat conservative since a few smaller structures fail to meet our criteria for dwellings only because hearths or other diagnostic features may be covered by unexcavated fill. Next to kivas, dwellings are the largest structures observed in the Natural Bridges rockshelters. Sizes range from 1.2 x 1.5 m to 3.7 x 4.6 m. Average floor size is 7.1 sq. m (66 sq. ft.). These structures, compared with Class I and Class II, are more consistently rectangular in plan. Typically, Class III structures have somewhat rounded corners but generally straight walls (Fig. 22). In most cases floor features are difficult to ascertain because of fill and roof fall. Smoke-blackening on walls of dwellings is less common than one would expect. It is possible that excavations might reveal that many dwellings lacked hearths. The entry box, a feature common in dwellings of the Tsegi Phase in the Kayenta area, seems to be absent at Natural Bridges (Lindsay 1969, Fig. 19) although a few have been found elsewhere in the San Juan triangle (Lipe 1967).

The floors of a few Class III structures are distinctly subterranean, some as much as 30 cm below the outside ground level (Fig. 23). At 42Sa6967 (W:5:120) there is an elongate stone-walled structure with a floor almost a meter below ground level. Although the entire floor is not exposed, the room in general lacks recognizable kiva features and probably served as a dwelling. Other such partly subsurface masonry dwellings, if filled with windblown sand, might have escaped our notice.

There appears to have been little effort exerted to prepare special footings for masonry walls. In most cases the bottom courses of a wall rest on unprepared and often loose cave fill. Class III structures have a higher incidence of walls in which construction stone was selected and placed so as to produce a smooth, even surface. Examples of Class III masonry wall styles are shown in Fig. 24. As with other Pueblo II-III rock-



Fig. 22 A Class III structure at site 42Sa6789 (V:8:15). Such structures have somewhat rounded corners, but generally straight walls.



Fig. 23 Class III dwellings with subterranean floors, site 42Sa6819 (V:8:45).

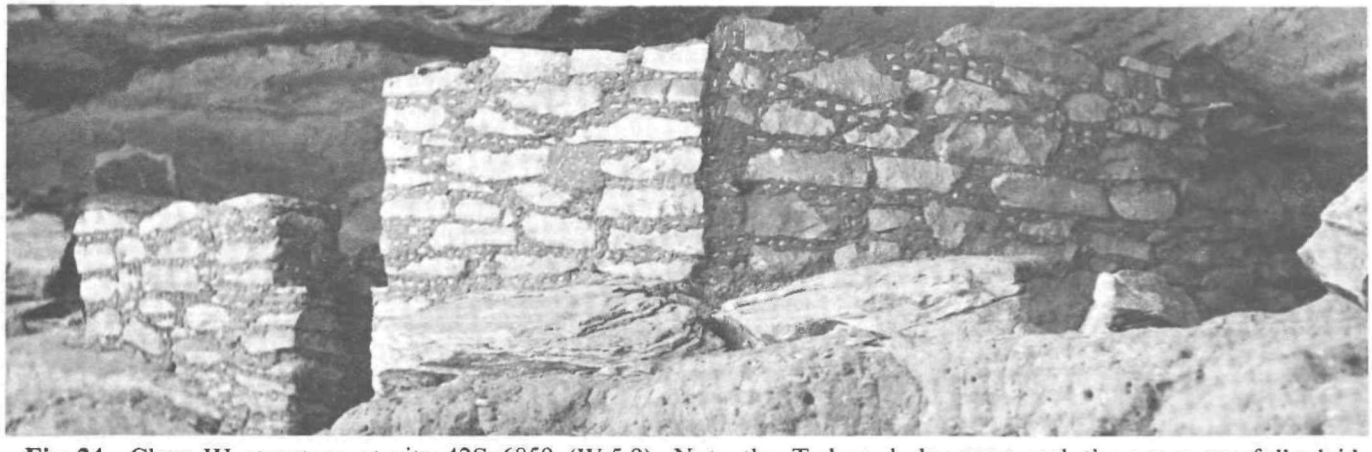


Fig. 24 Class III structure at site 42Sa6859 (W:5:9). Note the T-shaped doorway and the more carefully laid masonry with decorative use of spalls in the mortar.

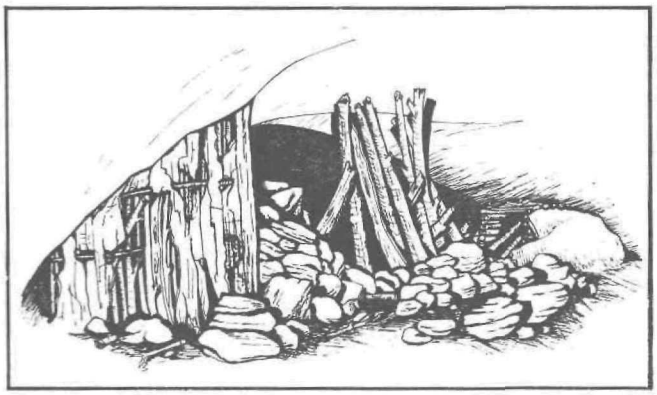


Fig. 25 The use of jacal and vertical posts for wall construction in a Class III structure site 42Sa6823 (V:8:49).

shelter structures, dwelling walls are put together with a great deal of mortar. Dry-laid walls do occur but are rather rare. In many dwellings, mud mortar makes up close to one-third of the total volume of the walls. Usually the mortar exudes onto the surface of the wall to partially cover the exposed ends of the building stone. This is carried to its fullest in the complete plastering of the walls of a few structures. Wall height in Class III structures averages about 1.5 meters. A few double-coursed walls are found, but nearly all masonry walls in dwellings are a single slab wide. Variation on simple masonry walls is found at nearly all Pueblo II-III rockshelter sites. Logs are employed in a variety of ways. Not uncommonly a large log placed on the cave floor serves as a footing for a coursed stone masonry wall. Less often one can see an occasional small log worked into a stone masonry wall. Vertical wooden posts within masonry walls can be observed at eight sites. A few Class III structures built mostly of logs were observed. Interestingly, log structures tend to be found with late cultural material and produce tree-ring dates later than A.D. 1200. Usually logs are laid in courses with mud, much like stone masonry. Rarely, vertical wooden posts are covered with mud to produce a weather-tight wall (Fig. 25). There are a few Pueblo II-III log-and-pole structures that are not mud-plastered.

Doorways in Class III dwellings are larger and often extend to floor level. Five T-shaped doors were recorded in structures classifiable as dwellings. The larger doors found in most dwellings are usually not set up for a tightly fitting slab door. In at least one instance, though, an elongate slab may have been used as a door. Sills are mostly slabs and lintels are usually a combination of a long slab and several small sticks from two to four centimeters in diameter.

Intact roofs have not been found on any dwellings.

Class IV (Kivas). Kivas can be seen at 14 Pueblo II-III rockshelter sites. A total of 23 structures is so identified. Attributes of the surveyed kivas are summarized in Table II. At first observation the group as a whole appears rather nonstandardized. They vary in plan from circular to rectangular. Many are only partially underground and at least two are fully aboveground probably due to noncultural constraints. That is, most rockshelters in the study area are relatively small in size and have little soft fill into which a kiva could have been excavated. An exception is Bare Ladder Ruin — 42Sa6965 (W:5:118) — where the rockshelter is large and the fill deep. Its several kivas tend to be fully subterranean and are more typical of the general San Juan pattern.

Round kivas outnumber rectangular or subrectangular ones in a ratio of two to one. Where two or more kivas are present at a site they tend to be the same shape. For example, there are six round kivas at Bare Ladder Ruin, and three rectangular ones at 42Sa6961 (W:5:114). Mesa Verde area pottery predominates at most rockshelter sites having kivas. Kayenta area trade wares are slightly more prevalent at sites with rectangular kivas, but the difference is probably not significant. Rectangular kivas may be somewhat more popular at the end of the Pueblo II-III occupation, since more tree-ring dates after A.D. 1200 come from rectangular kivas. Most of our tree-ring dates are from round kivas and show distinct clustering in the middle of the twelfth century. In addition, a few kivas seem to have been intentionally dismantled with roof beams and sometimes building stone removed. All of those dismantled are round.

Kivas in rockshelters do not vary greatly in size. With round kivas, inner diameters ranged from 3.0 m to 4.5 meters. Lengths of rectangular ones varied from 3.7 to 4.65 meters. Floor areas of round kivas were somewhat less than rectangular ones, the averages being 11.1 sq. m for round structures and 12.7 sq. m for rectangular ones. Since kiva excavations were not undertaken during our work, floor-features observations usually could not be made. At Horse Collar Ruin Steen cleared two kivas down to floor level (Steen 1937). In the one rectangular kiva he found a mud-rimmed firebasin 75 cm in diameter and a small floor level bin against one wall formed by two vertical slabs. Floor features in his second kiva, a round one, are a circular mud-rimmed firebasin and, off to one side, a hole 8 cm in diameter, that may have been a sipapu. Floors in both of Steen's excavated kivas are mud-plastered. In a kiva at 42Sa6960 (W:5:113) erosion has revealed part of a floor. Here the kiva had been excavated down into hard cave fill and this fill surface, left unplastered, served for the kiva floor as well as making up the sides and bottom of a small round fire-pit. Most kivas probably had deflectors. Of the four deflectors we observed, three are of coursed masonry and one is of vertical slabs.

Kiva wall construction can be observed in greater detail since many kivas are only partially buried. Kivas in rockshelters were usually dug to the maximum depth

TABLE II

Attributes of kivas at rockshelter sites.

Total	42Sa6778 (V:8:2)	42Sa6779 (V:8:4)	42Sa6803 (V:8:29)	42Sa6819 (V:8:45-1)	42Sa6819 (V:8:45-2)	42Sa6821 (V:8:47)	42Sa6847 (V:8:73)	42Sa6863 (W:5:13)	42Sa6866 (W:5:16)	42Sa6873 (W:5:23)	42Sa6875 (W:5:25)	42Sa6960 (W:5:113-1)	42Sa6960 (W:5:113-2)	42Sa6961 (W:5:114-1)	42Sa6961 (W:5:114-2)	42Sa6961 (W:5:114-3)	42Sa6965 (W:5:118-1)	42Sa6965 (W:5:118-2)	42Sa6965 (W:5:118-3)	42Sa6965 (W:5:118-4)	42Sa6965 (W:5:118-5)	42Sa6965 (W:5:118-6)
SHAPE																						
round	x	x	x		x		x		x			x	x				x	x	x	x	x	x
rectangular				x		x		x		x				x	x							
subrectangular											x					x						
POSITION																						
aboveground		x								x												x
semisubterranean	x		x	x	x	x	x	x	x		x	x	x	x	x	x					x	
fully subterranean																	x	x	x	x		
FIREPIT	—	x	—	x	x	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—
DEFLECTOR	—		—			—	—	—			—	—	—	—	—	—	—	—	—	—	—	—
slab				x						x												
masonry		x			x				x													
SIPAPU	—	—	—		x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
BENCH	—		—			—	—	—	—	x	—	—	—	—		x	—		—		x	
VENT SHAFT	—										—						—			—	—	—
horizontal		x	x	x	x	x	x	x	x	x		x	x	—								
L-shaped															x	x	x		x			
WALLS																						
horizontal stone masonry	x		x	x	x				x	x		x				x			x	x	x	x
stone & log masonry		x				x	x	x			x			x	x	x						
pit wall													x					x				
PILASTERS	—	x	x			—	—	x		x	x			—		—	x		—			
WALL PLASTER			—	x	x	—	—	—	—	x	—			—	x		x	x	x	x	x	
WALL DECORATION	—			x		—	—		—		—	—		—	—	—	x	—	—			—
SMOKE BLACKENING			—			—	—					—										—
spotty	x	x			x									x		x	x		x		x	
heavy				x				x		x										x		
NICHE	—		x	x	x	—	—	—	—	x	—			—		—	x		—	x	x	—
SOUTHERN RECESS FILL RETAINING WALL	x		—	x	x	x	—	x			x	x	—	x	x	x	x		x		x	
ENTRY																						
roof center	x	x	x	x	x		x	x			x	x	x		—				x			
roof edge														x		x						
T-door										x												
LADDER		x		x															x			
ROOFING																						
partial	x										x		x		x							x
complete		x		x			x	x		x				x		x	x		x			
ROOF TYPE			—		—				—													
flat				x		x				x		x							x	x	x	x
flat, partly cribbed								x			x			x		x						
cribbed	x	x					x						x									
FLOOR AREA ESTIMATES (sq m.)	15	11	16	16	12	17	14	14	12	13	15	9	11	9	11	12	17	7	14	7	14	16



Fig. 26 Retaining wall around partly subterranean kiva, site 42Sa6819 (V:8:45). Note the use of logs and loose rock.

that cave fill would permit. Kivas whose walls are aboveground are consistently found in rockshelters with little or no fill. The prehistoric residents of the upper White Canyon area were obviously not comfortable with an aboveground or partly aboveground kiva, since most kivas whose roofs had to be raised above ground level are at least provided with the appearance of being underground. That is, about a meter outside of the outer wall a rough retaining wall of irregular rocks and logs is constructed. Behind this kiva retaining wall is thrown earth, and loose rock fill (Fig. 26). In the case of cribbed or partly cribbed roofs this fill served also to seal the few basal logs.

The principal walls of most kivas are of coursed stone masonry. The use of vertical slabs is rare. Wall surfaces of nearly all kivas were probably plastered, since plaster can be observed on most of the well-preserved ones. At least one kiva, at Bare Ladder Ruin, shows several layers of plaster. Kiva wall decorations recorded at two sites, Horse Collar Ruin, and Bare Ladder Ruin, are discussed in Appendix I. With one exception kiva walls are finished on the inside and left relatively rough on the outside. At least one kiva and possibly one or two others have lower walls consisting simply of the sides of the excavated pit, without benefit of slab, masonry, or plaster lining.

Observed kiva wall features include benches, pilasters, niches, recesses, ventilator shafts, and, in one case, an entryway. Benches were observed in only three kivas but some may be obscured by fill. However, White Canyon kivas usually are without benches. The benches observed are all of masonry and are found in both round and rectangular kivas. They extend around only a portion of the kiva and serve as footings for pilasters. A bench height of about 80 cm is typical.

Because of the lack of fill in three of the six kivas with pilasters, some detailed observations can be made. All are of stone masonry. Most of the pilasters support primary roof beams, often in pairs (Figs. 27, 28). A small niche is built into a pilaster at 42Sa6873 (W:5:23). In kiva 1 at 42Sa6965 (W:5:118) a single vertical post is set flush into the masonry of each of six pilasters. Both Pierson (1957) and Steen (1937) have remarked on the similarity of these log and masonry pilasters to those in kivas at Chaco Canyon.

Another common kiva wall feature is the niche. Niches are recorded at seven kivas and are probably present at several more. They can be seen high in the walls between pilasters, in pilasters, or in otherwise plain masonry walls. Sizes and shapes are variable. Elongate rectangular niches are perhaps the most prevalent. Wooden rods serve as lintels over a few niches.



Fig. 27 Zeke Johnson shown in kiva interior at site 42Sa6965 (W:5:118). Note pilasters with included posts and flat roof. U.S.N.P.S. photograph by Charlie R. Steen, 1937.

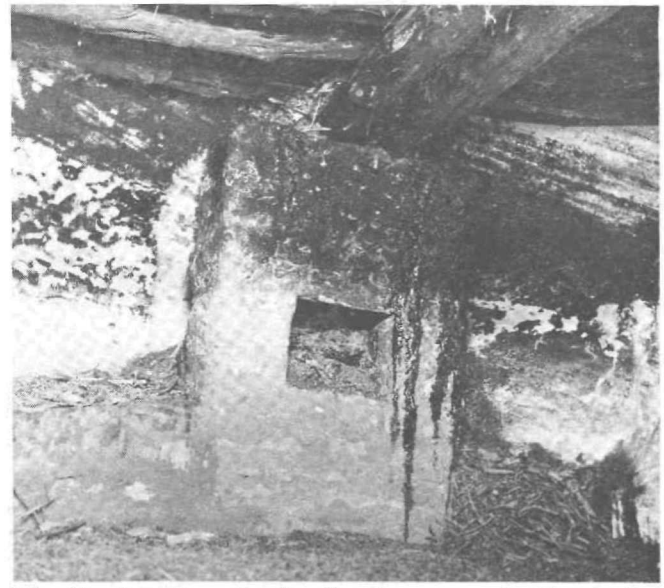


Fig. 28 Interior detail of aboveground kiva, site 42Sa6873 (W:5:23). See also Fig. 31 for exterior view.



Fig. 29 Detail of kiva roof, site 42Sa6819 (V:8:45).

Ventilator shafts are recorded at fifteen kivas and are probably present, though buried, at all kivas. By far the most common type is a simple passageway, usually a shaft, through the outer kiva wall and through the fill retaining wall. An L-shaped ventilator (a combination of the horizontal shaft with a vertical one) is employed only in those few cases where depth of fill in a rockshelter permitted the builders to sink the kiva floor well below the surface. Wooden rods were often employed structurally in ventilator shafts. In a few instances a natural gap between boulders or bedrock outcrops was utilized for a ventilator. The White Canyon kivas are reasonably consistent in the placement of firepit deflector and ventilator in a line. Ladder poles also are often placed on this line. There is no consistent direction orientation of the ventilator and related features in rockshelter sites other than outward.

True recesses are seen only at two kivas, both of which are round. Both recesses are oriented to the south.

Roofs are present, wholly or in part, at fourteen of the twenty-three kivas. There are both flat roofs and cribbed roofs. Flat roofs are the more common and are found on both round and rectangular kivas. Flat roofs typically consist of primary and secondary beams placed at right angles to one another. The primary beams are often used in pairs and rest either directly upon the kiva walls or upon pilasters (Figs. 27, 28). On top of and at right angles to the secondary beams are willow-like rods, sometimes split. These are sealed with juniper bark before a mud covering is applied. Long willow-like rods are often placed on top of the mud parallel to and just above the secondary beams. These rods are bound through the roofing to the secondary beams by means of a series of ties usually using square or granny knots (Fig. 29).

Cribbed roofs are found only on round or roundish kivas. Most are cribbed only at the edges and have a large central area that is flat. Fully cribbed kiva roofs were probably not necessary because of the abundance of long straight beams of Douglas fir and Ponderosa pine in the area. Roofs that are flush with the ground sometimes have a low "fire wall" consisting of one or two courses of masonry around the perimeter of the structure. All but one roofed kiva in our sample have a roof entry. Many may once have had a mud or rock coping around the entry hatch. At one site a large, shaped slab may have served as the kiva entryway cover. Entries are more commonly placed near the outer edge rather than the center of kiva roofs. Ladders are present at only three kivas now but obviously were once needed at all roof-entered kivas. Ladders are described below.

Two fully aboveground kivas merit brief descriptions. At Lestaki an aboveground kiva is constructed almost entirely of logs (Fig. 30). Cave boulders and a few loosely piled rocks serve as a foundation upon which logs are piled. The construction is very close to that of an ordinary cribbed roof except that the sides extend downward further and serve as walls. The top logs are sealed with mud as in an ordinary kiva, but the sides are left unsealed permitting some light and air to pass through. This is probably not an indication that the structure is unfinished, since smoke-staining inside shows that it actually has been used. Inside, one can observe a ventilator shaft, deflector, and entry ladder. Other kiva floor features may be present beneath the fill. According to one early report, a pot "filled with corn" was found on the floor of the Lestaki log kiva (Douglass 1908).



Fig. 30 Aboveground kiva with log walls and ladder, site 42Sa6779 (V:8:4).

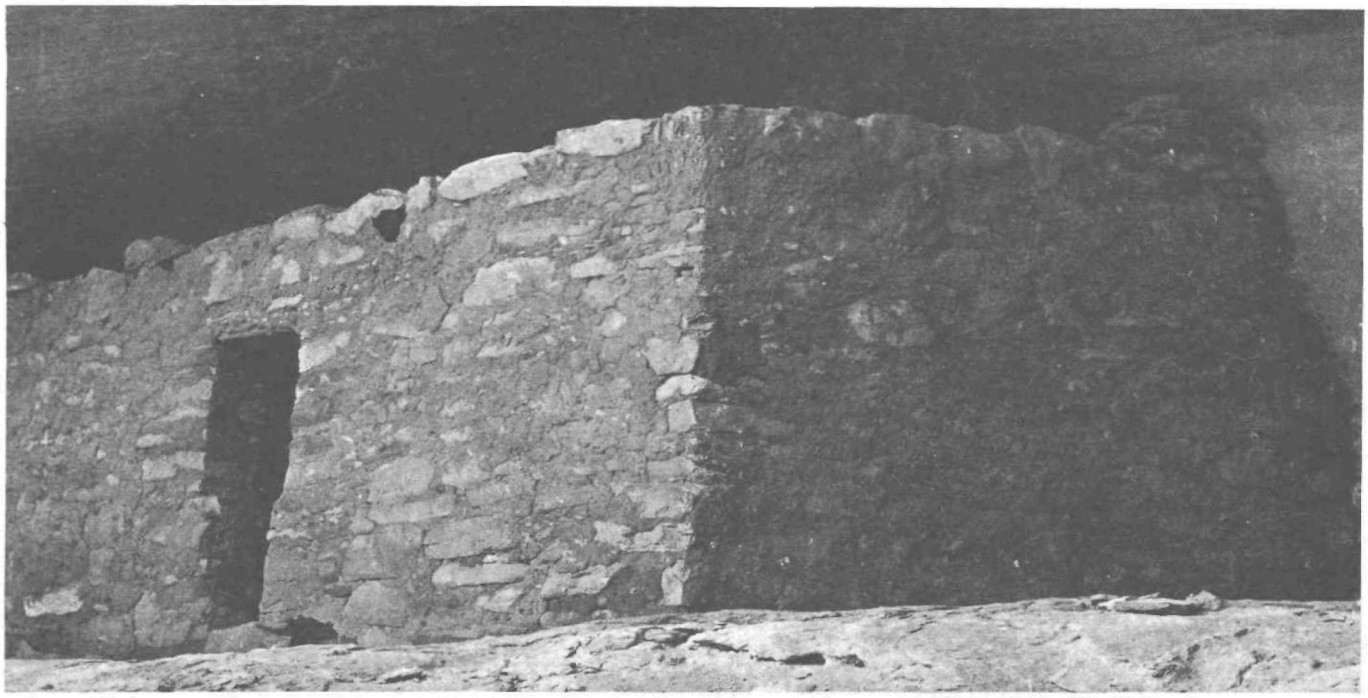


Fig. 31. Rectangular aboveground kiva (Class IV) with T-shaped door, site 42Sa6873 (W:5:23). An "entry" or smokehole is in the roof to the right of the doorway.

The other fully aboveground kiva, at 42Sa6873 (W:5:23) differs markedly from Lestaki in that its outer walls are of a good quality stone masonry and it is entered by means of a T-shaped door (Fig. 31). Externally, this kiva has all of the characteristics of a well-built rectangular masonry room. But, to the right of the T-shaped door at the base of the wall is a small ventilator opening. Just inside from the ventilator opening is a fallen slab, probably once a deflector. Fill obscures the firepit which must have been just beyond the deflector. The position of the firepit is indicated by a rectangular smokehole in the roof just above. Benches, pilasters, and niches are also features of this kiva (Fig. 28). A low masonry wall that extends about one meter into the kiva from the front wall just to the right of the doorway may have served as an additional deflector for drafts entering from the doorway. The kiva's flat roof has a low "fire wall" around its perimeter. The rectangular roof opening could only have served as a smokehole and not an entry since the ceiling of the cave is too low to permit anyone to walk on the kiva roof.

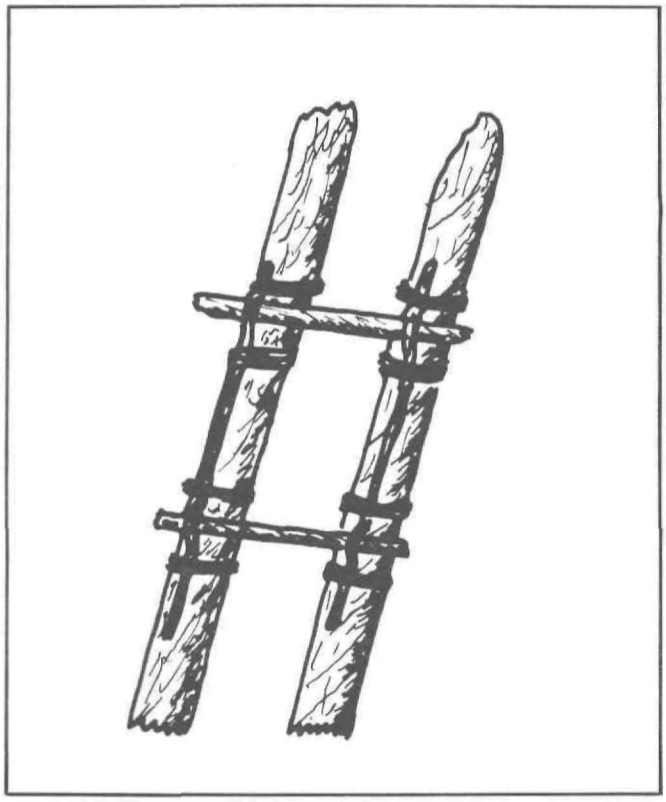


Fig. 32 Ladder construction detail, drawn from ladder at site 42Sa6819 (V:8:45).

Special features observed at other kivas include an adobe entry ramp running along the front of the rectangular kiva at 42Sa6819 (V:8:45). For most kivas with raised roofs some form of ramp would have prevented an undue amount of wear on the edges of the roof. At two sites narrow passageways may connect round kivas with adjoining rooms. Fill largely obscures these features and precludes more detailed observation. One of the passages could have been a ventilator, but it leads toward the back rather than front of the rockshelter.

MISCELLANEOUS ARCHITECTURAL FEATURES

Ladders have been found at four sites. Three are for entry to kivas and range up to 3.5 m in length. The fourth provided access to the upper ledge part of Bare

Ladder Ruin. Two of the kiva ladders are exposed to view and show how rungs are attached to the uprights. The third is buried. In building a ladder, first long willowlike rods are placed against the uprights parallel to them. Then rungs are placed between the rods and uprights and lashed in place (Fig. 32). In this type of construction the lashing becomes tighter as weight is placed upon the rungs.

The remarkable ladder at 42Sa6965 (W:5:118) is more than 15 m long, probably a record for prehistoric ladders (Fig. 33). A tree-ring date of A.D. 1137 vv was from one of the uprights. Neil Judd, who visited the area in 1907, relates the story that the first visitors to the area before the turn of the century found only one upright pole, standing against the cliff (Judd 1968). Another account states that both uprights were in place and that rungs were added by a "pottery hunter" about 1889 (Douglass 1908). The presence of the long ladder poles devoid of rungs probably was the source of the name Bare Ladder Ruin.

Photos taken by the Douglass surveying party show a notched log ladder that had been used to provide access to another site on a low but otherwise inaccessible ledge.

Structures which may be considered defensive were observed at at least five sites. Many rockshelter sites are defensible if only by nature of their locations. There are six cliff dwellings accessible only by means of ladders. Most of these, even without the addition of any specifically defensive architectural features, would have been suitable for a small group to retreat to in times of danger. On the other hand, they would have been distinctly inconvenient and even dangerous to use as regular habitations. An important function may have been storage. But, smoke-blackening from fires is not uncommon and a number of rooms falling well within our defined limits for habitations have been found in such localities. The inaccessible upper ledge at Bare Ladder Ruin has several subrectangular dwelling-size rooms and probably at least one kiva.

Loopholes, small openings in walls, probably served to admit light or to provide a view. They are present in dwellings at four sites in our sample. Interestingly, three of these also have T-shaped doors. In two other instances loopholes in special walls probably served a defensive function. At site 42Sa6803 (V:8:29) and at Bare Ladder Ruin there are long walls with many loopholes looking outward and downward. At 42Sa6803 (V:8:29) the defensive loopholed wall is located high in the back of the cave and behind it there is no evidence of habitation (Fig. 34). Here 15 loopholes look out in several directions. The wall itself is 11 meters in length and varies from 75 cm to 2.0 m in height. At Bare Ladder Ruin a similar wall somewhat longer but not as high also has loopholes. This wall is across most of the front of the upper ledge some eighteen meters above the rockshelter floor.

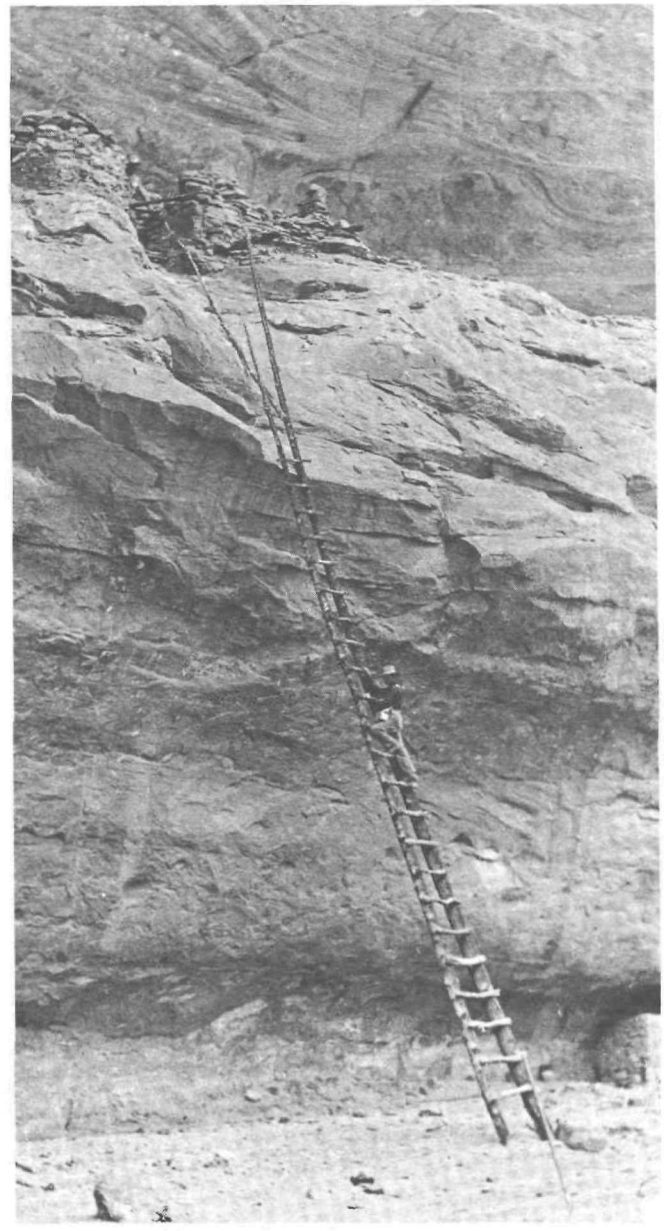


Fig. 33 Ladder to the upper level at 42Sa6965 (W:5:118), "Bare Ladder" or "Bear Cave" Ruin. At least one of the upright poles is aboriginal with a tree-ring date of A.D. 1137vv. Photo by Neil Judd, 1907, courtesy of the Smithsonian Institution, National Anthropological Archives.



Fig. 34 Possible defensive wall at the upper portion of the rockshelter at site 42Sa6803 (V:8:29).

Another class of small walls may be windbreaks. Not infrequently in cliff dwellings or in otherwise unoccupied rockshelters one encounters small walls of dry-laid masonry and, more rarely, jacal. In general such walls are on the upstream ends of sites and are oriented at right angles to the long axis of the rockshelter. In our experience, cold-weather overnight camps in these canyon rockshelters can be made quite tolerable by the addition of a simple wall to break the force of the persistent downstream winds. Many small isolated walls may have served this simple function.

Other features observable at Pueblo II-III rockshelter sites include log stockpiles. At seven sites logs for construction purposes appear to have been brought into rockshelters for dry storage. We encountered two examples of single logs in rockshelters otherwise devoid of human habitation. These produced tree-ring dates of A.D. 1057++v and A.D. 1140 +vv.

At five sites ax-grinding grooves were observed (Fig. 35). They are usually found in groups and average about eight centimeters in width. Rectangular slab metate bins are found at only four sites. All are now without their metates.

SUMMARY

Some generalizations concerning Pueblo II-III sites types can be made. As mentioned above, small sites are the rule. A fair portion, 56 percent, have three structures or less. Most of the smaller sites seem to be for storage, although other kinds of isolated structures do occur. Members of the Glen Canyon Project of the University of Utah worked in tributary canyons of the San Juan and Colorado rivers from 30 to 90 km (20-50 mi.) west and south of the upper White Canyon area. There they concluded that a significant segment of the settlement pattern in the narrow canyons may have been destroyed by erosion or buried by alluvium. They decided that most canyons in that area had been filled and flushed of sediment many times. Jennings feels that the settlement data remaining after this process lacks a significant proportion of residential and other structures that were built on alluvium and other easily erodable deposits outside of rockshelters. Thus a disproportionate number of granaries and other nonhabitational structures in rockshelters have been preserved (Jennings 1966). Our observations in the Natural Bridges area are that some canyons have undergone considerable erosion while others have not.

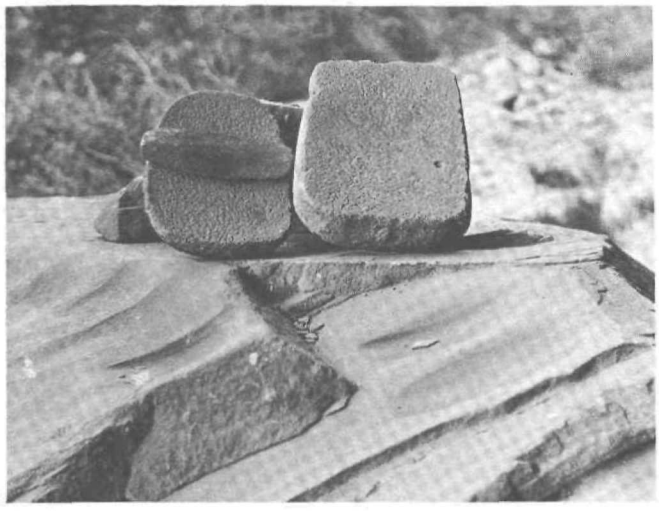


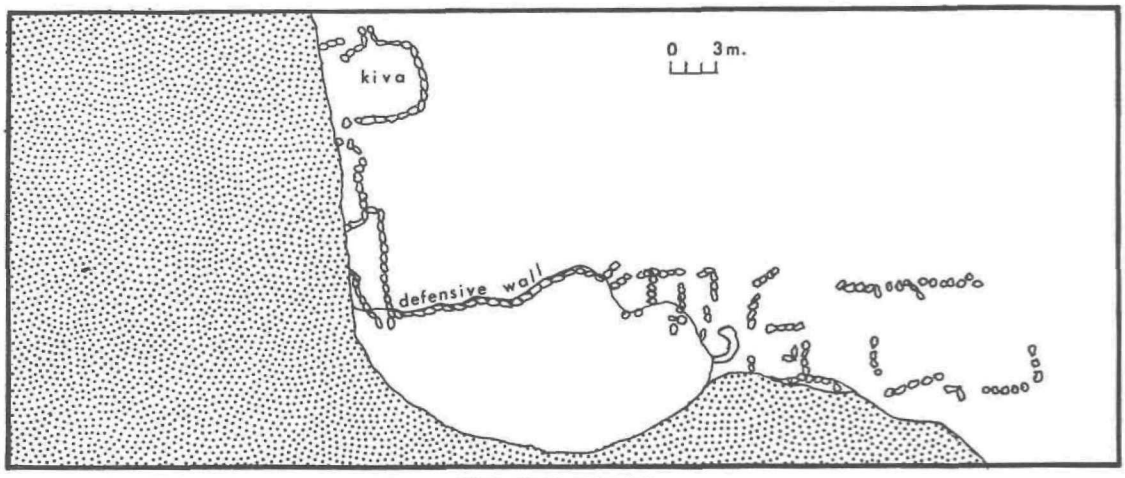
Fig. 35 Grinding grooves and metates at site 42Sa6801 (V:8:27). Photo by Neil Judd, 1907 courtesy of the Smithsonian Institution, National Anthropological Archives.

We have compiled the following totals for each type of structure found in rockshelters or on open localities within the canyons.

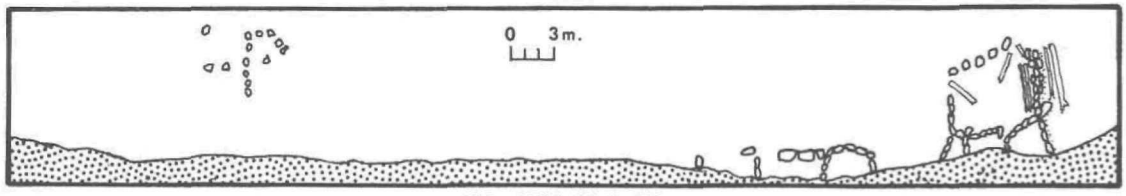
Class I	(storage structures)	119
Class II	(temporary dwellings)	102
Class III	(dwellings)	26
Class IV	(kivas)	24

The significance of these totals depends in great part upon the function served by the structures we have classed as temporary dwellings. We feel that most structures so classified are too small, inaccessible, or in other ways too inconvenient to have served as full time permanent habitations. Their main purpose was probably for temporary field camps and for storage. If this interpretation is correct, then we have a disproportionate number of nondwelling structures in the canyons. This is also shown by the fact that dwelling rooms and kivas are found in almost equal numbers, whereas in the general Anasazi pattern there are several residences for each kiva. This disproportion need not necessarily imply that there were once a large number of canyon sites that have since been destroyed by erosion. The simplest explanation seems to be that most of the apparently supernumerary storage structures and kivas found in canyon rockshelters were built and used by occupants of the open mesa top sites nearby. At the lower elevations studied by the University of Utah Glen Canyon Project the open country between canyons is largely devoid of soil and of archeological sites. Thus, the hypothesis that many open mesa top sites have been destroyed seems both valid and necessary.

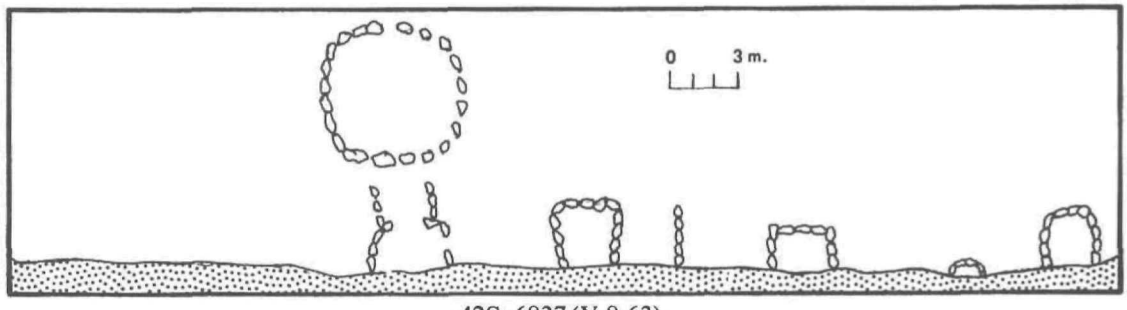
Representative plans of some of the larger Pueblo II-III rockshelter sites are shown in Fig. 36. In general, each type of structure we have identified, including kivas, can be found alone. Sites with kivas are definitely the largest in terms of total number of structures. The mean number of structures per site for sites with kivas is 9.1 as compared with the general average for all Pueblo II-III rockshelter sites of 3.9. Interestingly, in several sites kivas seem to have been added as an afterthought. That is, they seem to have been built after the main part of the site was already occupied and are sometimes off to one side or otherwise not integrated into the main construction of the site. Kivas built after other rooms often are placed partially beyond the drip line of the cave. In these kivas one can note the differential deterioration that results



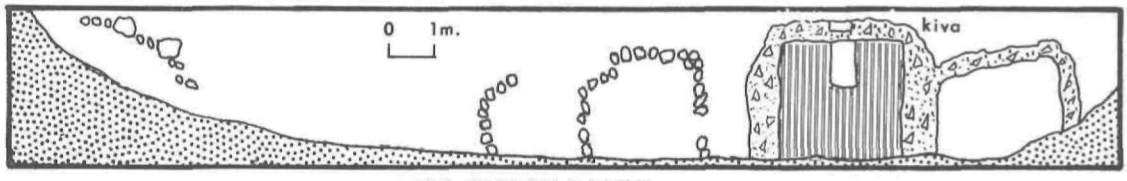
42Sa6803 (V:8:29)



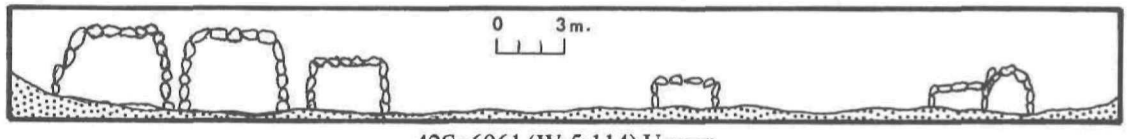
42Sa6821 (V:8:47)



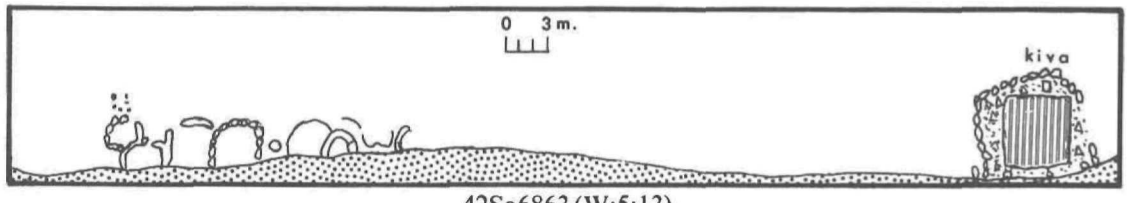
42Sa6837 (V:8:63)



42Sa6961 (W:5:114) Lower



42Sa6961 (W:5:114) Upper



42Sa6863 (W:5:13)

Fig. 36 Plans of larger Pueblo II-III rockshelter sites, based on field sketches.

from the exposure to water. The dry side of such partially protected structures is well preserved with roofing usually intact while the exposed half lacks any trace of roofing and often even the masonry walls are fallen and washed away.

Structures in the larger sites tend to be contiguous (Fig. 37). In the predominant pattern a row of contiguous or mostly contiguous dwellings, temporary dwellings, or storage structures is built along the back wall of a rockshelter. Usually within any site all structures are about the same size. Round kivas tend to be more tightly integrated into village plans, often with other kinds of structures adjacent to the kivas on two or three sides. Rectangular flat roof kivas are more commonly set apart from other structures in the same cave. At two sites — 42Sa6961 (W:5:114) and 42Sa6965 (W:5:118) — kivas outnumber all other dwelling-size structures. It is possible that these sites, particularly Bare Ladder Ruin which has at least seven kivas but almost no dwellings, may have served some special ritual function for the whole area. Perhaps more likely, because of cultural lag in the upper White Canyon area, kivas may still retain much of the residential function of the pithouse. In this context it is significant that of the 14 rockshelter sites with kivas only half have associated structures classifiable as dwellings.

Subcommunity units such as courtyards are rare at Pueblo II-III rockshelter sites. Such features are most typical of certain Kayenta area Pueblo II-III sites but, like entry boxes, have been found mostly in that part of the San Juan triangle where Kayenta influence is strongest.

USE OF THE AREA: A.D. 1300-1900

Throughout most of this period the upper White Canyon area was probably uninhabited. Field data are exceedingly meager. At site 42Sa6798 (V:8:24) two nonstructural logs from within the rockshelter have been tree-ring dated at A.D. 1433 ++vv and A.D. 1528 ++vv. Associated rock art, pottery, and traces of small adobe-and-slab structures, however, are of Pueblo III or earlier types. All that can be said for sure concerning these dates is that at sometime after A.D. 1528 the two trees were brought into the rockshelter. Although the date suffixes indicate that an undetermined number of rings are missing from the specimens, the fact that the two dates are within 95 years of one another suggests that the specimens have not undergone severe erosion and that the event may have occurred within a century or so of the indicated date. A surface find of a single sherd of Jeddito Yellow Ware may also be taken as evidence of some local travelers in the area after Pueblo III. At two cave sites bed-size masses of juniper bark are found. One of these is on top of fill overlying a Pueblo II-III structure and the other is in a rockshelter devoid of sherds or other evidence of Anasazi occupation. At least one temporary brush shelter that may be of post-Pueblo III age has been observed. This structure, now collapsed, was built partly beyond the drip line of a rockshelter and only that part in the protected zone now remains. It may have been a simple lean-to or windbreak.

In White Canyon on open alluvial flats one occasionally encounters small cleared areas five or ten



Fig. 37 Contiguous structures showing jacal, coursed masonry, and vertical slab construction, site 42Sa6863 (W:5:13).

meters in length that do not appear to be natural. In two instances they seem to center about one or two small tree stumps. A thorough search of one of these areas turned up a single small copper rivet. Scattered fine ash is sometimes also found in these clearings.

There is no doubt that in the last century some Paiutes, probably many of them, had knowledge of the Natural Bridges country. In attempting to discover Indian names for the three White Canyon natural bridges the surveyor W. B. Douglass learned that the area was "known only to the Paiute Indians who passed them in former days when enroute to their hunting grounds in the Elk Mountains" (Douglass 1908). In Douglass' statement we are left a little uncertain as to where these Paiutes were coming from. It is unlikely that Indians from the larger Paiute groups west of the Colorado River would have known of the Elk Ridge hunting ground or would have risked the rather formidable journey involved in getting to it. On the other hand, Indians from the old Ute-Paiute settlement at Allen Canyon some twenty-five miles to the east of the Natural Bridges would never have gone to Elk Ridge via White Canyon, since Elk Ridge stands, in effect, between the Allen Canyon settlement and White Canyon. Douglass' informants must have meant a route north from the old Paiute reservation to the south crossing White Canyon in the vicinity of the Natural Bridges, and ascending Elk Ridge not far from the Bear's Ears. According to Byron Cummings as quoted by Euler (1966) this old "Paiute Strip" extended southward from the San Juan River to the Utah-Arizona boundary and from the 110th meridian westward to the Colorado River. This would include Paiute Farms, most of Paiute Mesa, and the area just north of Navajo Mountain. Elk Ridge and the Bear's Ears are clearly visible from these areas. Among Douglass' informants there was the Paiute "Posey" who was killed in 1923 in a skirmish which eventually involved the U.S. Army and resulted in the formal recognition of the Allen Canyon area as Indian land. Another informant was "Old Mike" who claimed to have been born near one of the White Canyon natural bridges about 1850 and who said that the upper White Canyon area was well known to his father even before that time. Despite the latter statements we are inclined to believe that Paiutes did not have permanent settlements in the Natural Bridges area and that their knowledge of it came largely from occasional trips through there. Incidentally, Douglass did obtain three Paiute names for the bridges. He transcribes these as *Ma-va-talk tump, Io-wam-pi-a,* and *te-ump.* Since he believed these to be generic names rather than specific names for individual bridges, they were never adopted.

The possibility of a Paiute origin of the polychrome rock art near 42Sa6801 (V:8:27) under Kachina Bridge is discussed in Appendix I by Polly Schaafsma.

Despite Douglass' statement that the White Canyon area was known only to Paiutes it is likely that at least a few Utes also had some knowledge of it. Some Utes once lived in the predominantly Paiute settlement of Allen Canyon according to Douglass. In 1885 a band of renegade Utes, probably from southwestern Colorado, attempting to escape pursuit followed a route down White Canyon. They got about twenty miles beyond the Natural Bridges before soldiers caught up with them (Lyman 1960).

The question of Navajo knowledge and use of the upper White Canyon area is rather more complex. If the hunting grounds on Elk Ridge were known to the Paiutes of the Navajo Mountain-Paiute Farms area they were probably also known to their Navajo neighbors at least by the latter half of the nineteenth century. The English name for the Bear's Ears, the twin buttes on Elk Ridge at the head of White Canyon, is a direct translation of the Spanish *Orejas del Oso* which occurs on a number of old maps (Macomb 1860). David M. Brugge believes that the Spanish name is itself a translation of the Navajo *Shash Jaa!* (personal communication 1963). According to Brugge this name lacks the possessive prefix *bi-* required by modern Navajo grammar which would make it *Shash Bijaa.* For this reason he feels that the Navajo name is an old one.

In the upper White Canyon area proper only one site in our sample may be of Navajo origin. Site 42Sa6966 (W:5:119), not far from Sipapu Bridge in White Canyon, consists of two low dry-laid stone walls and a small rectangular slab hearth. The walls resemble Navajo sheep pens at shepherds' camps such as can be seen today in isolated canyons on the Navajo Reservation.

In describing his fieldwork in the Grand Gulch area immediately adjacent to White Canyon on the east, Mitchell T. Prudden mentions in passing the presence of "Navajo and Ute cornfields and camps" (Prudden 1897). Their location is not made specific but they may have been in the canyon itself near the mouth. A Navajo camp consisting of two forked stick hogans, a cribbed hogan, and a small forked stick sweat lodge was tested on Cedar Mesa just south of the head of White Canyon (Day 1964). Seven tree-ring dates from this site range from A.D. 1869 to 1879. All of these dates involve ring counts from 1842 onwards but cutting dates are probably close to 1879. Two other recent camps that may be of Indian origin are found near Grand Flat just above the heads of White Canyon and Grand Gulch. They have simple conical shelters of logs or brush partly covered with mud. A sweat lodge at one of the sites has evidence of several fires and quantities of burnt rock indicating repeated use. The latter two sites are undoubtedly of quite recent age and represent the continuance of a long-standing pattern of intermittent Indian use of the area, a pattern going back at least to the beginning of the nineteenth century and possibly existing as far back as the late thirteenth century when the area was abandoned by its last permanent Indian inhabitants.

DENDROCHRONOLOGY

A list of tree-ring dates from archeological and non-archeological contexts is given in Table III. These dates are plotted graphically in Fig. 38. The rather wide scatter of dates from some sites is striking. Sites 42Sa6848 (V:8:74). 42Sa6779 (V:8:4), and 42Sa6799 (V:8:25) have dates that spread over 411, 390, and 239 years respectively. This is more remarkable considering that each is a small site with few structures and little evidence of lengthy occupation. In fact, clustering of dates is the exception rather than the rule. The great majority of the dates listed are not "cutting" dates but rather dates from specimens whose outer rings are variable or very variable, an indication that the wood has undergone an undetermined amount of erosion and that the "cutting" dates must necessarily be from one to many years after the date given. A further complication is that many dates involve ring counts. This indicates a tight series of rings near the outside of the specimen, or other difficult conditions pointing to the likelihood of missing rings.

The most often used explanation for a wide scatter of dates from a single structure is that some beams were reused, that is, salvaged from older abandoned structures. In areas where tree-ring sampling has been intensive, as it has at Chaco Canyon, dates from reused beams can often be detected by their deviation from the clustering of other dates from the same structure (Bannister 1965). With samples as small as ours this is not usually possible. Our observations at White Canyon area sites include at least three indications of reuse of beams. Many structures have obviously been intentionally dismantled. A rough estimate is that only one-third of all structures, storage and otherwise, found in rockshelters remained in usable condition by the early 1200's. Beams from the earlier structures undoubtedly were used in the later ones. In a few instances one can actually observe differential weathering on beams used in the same roof. Some kiva roofs have smoke-blackened and non-smoke-blackened beams side by side. Occasionally one can see roof beams with adobe from previous structures still adhering to them.

People of Pueblo and Basketmaker times at Natural Bridges seem to have been averse to cutting wood. Of the hundreds of pieces of prehistoric structural wood we observed, few appear to have actually been cut with stone axes or other tools. Some are burned at the butt ends and may have been felled in this manner, although such burning seldom extends more than 20 centimeters up the trunk. Most appear to have been roughly broken at the upper and lower ends. Butt ends are usually distinctly thicker indicating that the roots were broken off just at the ground level. It is not possible for one person or even a small group of people to fell and break up a living tree of usable size in this manner. The tree

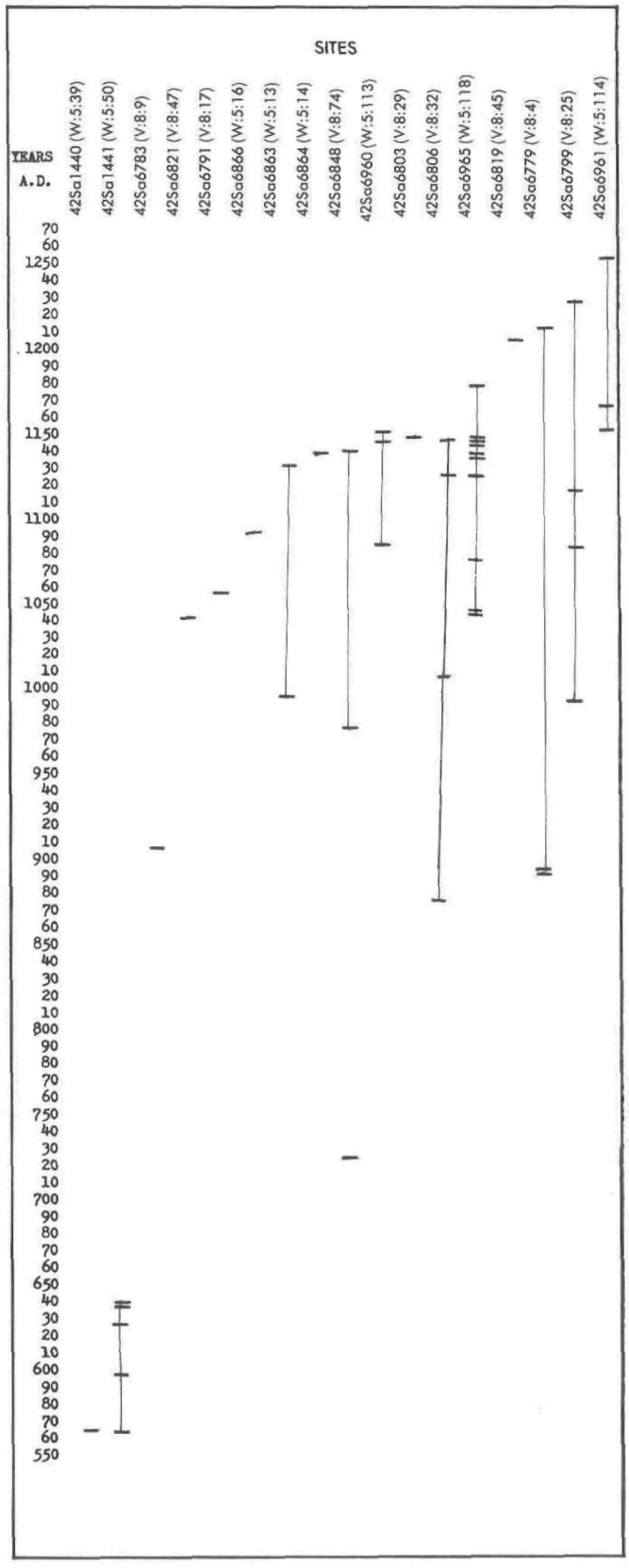


Fig. 38 The distribution of tree-ring dates from surveyed sites. Dates from 42Sa1440 (W:5:39) and 42Sa1441 (W:5:50) are from excavated proveniences. Not plotted are the two post-Pueblo III dates from 42Sa6798 (V:8:24).

TABLE III

Tree-ring dates from surveyed sites.

Site	Date	Specimen	Provenience
42Sa6779 (V:8:4)	887p — 1053v	NBR-49	A loose log on the inside of the kiva, appears to have recently fallen from the structure's wall.
42Sa6779 (V:8:4)	1046p — 1211++g	NBR-50	A small log in the outer wall of the structure.
42Sa6779 (V:8:4)	685p — 891++vv	NBR-51	A loose log on the inside of the kiva, appears to have been used in the structure.
42Sa6783 (V:8:9)	856p — 909v	NBR-2	Wood found in fill of cist 1, not a part of the cist's construction.
42Sa6791 (V:8:17)	853p — 1057++v	NBR-4	A loose timber in an occupied rockshelter.
42Sa6798 (V:8:24)	1181p — 1433++vv	NBR-34	Log on cave floor not directly related to occupation of the rockshelter.
42Sa6798 (V:8:24)	1169p — 1528++vv	NBR-35	Log on cave floor not directly related to the occupation of the rockshelter.
42Sa6799 (V:8:25)	748±p — 991++v	NBR-68	Sixth log up from the base of the front log wall.
42Sa6799 (V:8:25)	900±p — 1082vv	NBR-69	Vertical post in front wall of log structure.
42Sa6799 (V:8:25)	887±p — 1230++G	NBR-67	Second log up from the base of the log wall.
42Sa6799 (V:8:25)	948 — 1115vv	NBR-72	Loose wood within log structure.
42Sa6803 (V:8:29)	825p — 1149++v	NBR-10	From a log in room 8 probably a roof beam, ends broken and charring on one side.
42Sa6806 (V:8:32)	687p — 1007++v	NBR-26	Bottom log in log wall.
42Sa6806 (V:8:32)	834p — 1129v	NBR-28	Fifth log up from base of log wall.
42Sa6806 (V:8:32)	1004p — 1149+v	NBR-27	Third log up from base of log wall.
42Sa6819 (V:8:45)	788p — 1208+vv	NBR-38	From wall of kiva, charred prior to use in kiva construction.
42Sa6821 (V:8:47)	843p — 1041++vv	NBR-16	From jacal wall of room 3. Specimen shows charring.
42Sa6848 (V:8:74)	462 — 729++vv	NBR-52	Loose log in rockshelter.
42Sa6848 (V:8:74)	674 — 979++v	NBR-54	Loose log on top of cultural deposits.
42Sa6848 (V:8:74)	896+p — 1140+vv	NBR-53	Loose log on top of cultural deposits.
42Sa6863 (W:5:13)	855+ — 944+vv	NBR-32	A primary roof support near the middle of the kiva.
42Sa6863 (W:5:13)	915p — 1132++v	NBR-33	Log in place in cribbing at the edge of the kiva roof, log was originally broken not cut.
42Sa6864 (W:5:14)	960+p — 1140++v	NBR-21	Appears to have fallen from top of masonry wall in room 1.
42Sa6866 (W:5:16)	801p — 1091++vv	NBR-23	Part of roof of fallen log structure near room 5.
42Sa1440 (W:5:39)	443 — 563+vv	NBR-76	Storage structure, room A (see Schroeder 1965).
42Sa1441 (W:5:50)	485p — 561vv	NBR-78	Slab structure, room A, (Schroeder 1965)
42Sa1441 (W:5:50)	432±p — 599vv	NBR-79	Slab storage structure, room A, (see Schroeder 1965).
42Sa1441 (W:5:50)	530±p — 641+vv	NBR-80	Slab storage structure, room A, (see Schroeder 1965).
42Sa1441 (W:5:50)	537p — 629vv	NBR-81	Slab storage structure room B, (see Schroeder 1965).
42Sa1441 (W:5:50)	461p — 638++vv	NBR-82	Slab storage structure room B, (see Schroeder 1965).
42Sa6960 (W:5:113)	951p — 1084vv	NBR-56	Part of roof of kiva 2.
42Sa6960 (W:5:113)	1027p — 1148vv	NBR-55	Part of roof construction, kiva 2.
42Sa6960 (W:5:113)	1047 — 1150+vv	NBR-57	Part of roof construction, kiva 2.

TABLE III
(continued)

Site	Date	Specimen	Provenience
42Sa6961 (W:5:114)	1163p — 1251rGB	NBR-60	Roof timber from kiva (feature 7).
42Sa6961 (W:5:114)	1056p — 1167vv	NBR-58	From roof of feature 4.
42Sa6961 (W:5:114)	903p — 1153++c	NBR-59	From roof of kiva (feature 6).
42Sa6965 (W:5:118)	931 — 1041rB	GP-4476	Kiva 1 (O'Bryan's south kiva)
42Sa6965 (W:5:118)	898p — 1042vv	NBR-73	Kiva 1, the lower of the two roofed kivas.
42Sa6965 (W:5:118)	622 — 1076++rB	GP-4477	Kiva 1.
42Sa6965 (W:5:118)	1024p — 1125vv	GP-4478	Kiva 1.
42Sa6965 (W:5:118)	733p — 1143rB	GP-4479	Kiva 1.
42Sa6965 (W:5:118)	977 — 1136vv	GP-4482	Kiva 2, O'Bryan's north kiva.
42Sa6965 (W:5:118)	961 — 1142rB	GP-4481	Kiva 2.
42Sa6965 (W:5:118)	984 — 1147vv	GP-4483	Kiva 2.
42Sa6965 (W:5:118)	838 — 1179++r	GP-4480	Kiva 2.
42Sa6965 (W:5:118)	1065p — 1137vv	NBR-66	Splinter from top of large ladder to the upper ruin.
No site	1564p — 1860++v	NBR-39	Standing dead pinyon.
No site	1474p — 1797vv	NBR-40	Standing dead pinyon.
No site	1545p — 1849++v	NBR-41	Standing dead pinyon.
No site	1483p — 1716++G	NBR-48	Standing dead pinyon.

would have to be dead long enough for its roots to decay to the point that it could be pushed over and the top, branches, and remaining roots broken off. Judging from the appearance of most White Canyon prehistoric structural wood, a dead tree left long enough for such decay of its root system to have taken place usually has lost most of its bark and has undergone some visible surface erosion. The majority of structural wood used in the White Canyon cliff dwellings appears to have been obtained from just such dead snags rather than from living trees. The tree-ring dates obtained from these specimens do not reflect the time of construction as much as they show the time of the death of the individual trees. If the Anasazi builders had cut a living tree, the date of the tree's death would be the same or nearly the same as the time of construction. But, since they used mostly dead snags the discrepancy between the time of the tree's death and the time of construction must be taken into account. It becomes important to know in an environment such as White Canyon's how long a tree must stand after death before it can be pushed over for use in construction. In an attempt to answer this question the authors collected a series of tree-ring specimens from standing dead trees and from some that had recently fallen. We sampled only those standing trees whose roots had decayed to the point that they could be pushed over and only those fallen trees whose trunks were still sound and unaffected by rot. In other words, just those kinds of trees that seem to have been used by the Anasazi. Four of the snag specimens collected in 1960 have been dated as follows:

NBR 39	1564 p	—	1860++v
NBR 40	1474 p	—	1797vv
NBR 41	1545 p	—	1849++v
NBR 48	1483 p	—	1716++G

The snag dating 1716 ++G was standing in sound shape, and even had some bark remaining! These dates give an error range from 100 to 244 years. That is, they are that much older than any structure that we might have built with them. Obviously a sample of only four dates is too small to be more than suggestive. If this kind of study were carried on in greater detail it might be possible to establish an error range for dates from snags used in construction. It should also be observed that when interpreting dates from structures in which both snags and freshly cut wood were used one should expect a fairly wide scatter of dates. In fact when only snags are used our very small sample indicates that a range of 150 years is easily possible.

A good deal more work needs to be done on this subject. Obviously, snags were not used in most of the major ruins of the Southwest, nor were they used much in historic times when the steel ax was common. But, in smaller sites such as these it is a factor well worth serious consideration.

ARTIFACTS

CERAMICS

For the ceramic study, all sherds were first stamped with provenience data. It was then possible to sort the entire collection of 3,940 sherds into boxes according to type. This kind of initial sorting is suited to sherds from areas whose external trade relationships are not well known because it permits inspection of type-groups as a whole. When all sherds of a given type are placed together as a group, it is easier to spot atypical or imported pieces.

Sherd identifications were made largely on the basis of published descriptions, (Table IV), particularly those of Colton (1955, 1956) for the Kayenta area and Abel (1955) for the Mesa Verde.

The Natural Bridges area falls roughly between two major study areas which are thought to correspond with prehistoric population centers. Because of its geographic position, the area can be expected to have been particularly sensitive to cultural influences from these external sources.

One of the main objectives of the pottery study was to seek as much information as possible about external relationships manifested through such cultural processes as trade and migration. Ceramic design styles proved to be of greatest utility in this task. Temper and paste characteristics, long considered important as sorting criteria, were found to be of restricted usefulness. Paste characteristics were studied macroscopically as well as with the aid of a ten-power hand lens. More technical ceramic analyses were not performed. Descriptive data on pottery will be presented according to time period.

BASKETMAKER III-PUEBLO I POTTERY

Gray Ware. (713 sherds). Temper characteristics of the sherds of Basketmaker Gray Ware (Fig. 39) were inspected to determine whether it would be possible to differentiate Lino Gray from Chapin Gray. These types are traditionally differentiated on the basis of sand temper in the former and crushed rock temper in the latter. Our observations showed the sherds fall into the following four temper categories.

Quartz rough. (34%). These are tempered with crushed quartz sand and some crushed calcite. The surfaces of the temper grains reflect light well. This is a rough-surfaced pottery in which the temper grains protrude through the surface giving a pitted and bumpy appearance. A limited amount of surface smoothing is in evidence on most Gray Ware sherds.

Crushed rock. (36%). Sherds having temper consisting of crushed igneous rock are identifiable by the appearance of angular white and black flecks visible under ten-power magnification. As a group these sherds have smooth surface texture.

Quartz sand. (28%). Sherds tempered with quartz sand show grains with a frosted nonreflective appearance. Vessel surfaces are smoother and temper particles protrude through the surface little, if at all. Nearly all sherds show surface scraping and smoothing.

Vegetable temper. (2%). These sherds are distinctively atypical, but are, however, found on otherwise unmixed Basketmaker III sites. Six could be fragments from the same or very similar vessels and bear the impressions of a type of matting or possibly a simple three-over, three-under twill ring basket. The sherds vary from six to nine mm in thickness. A sectional

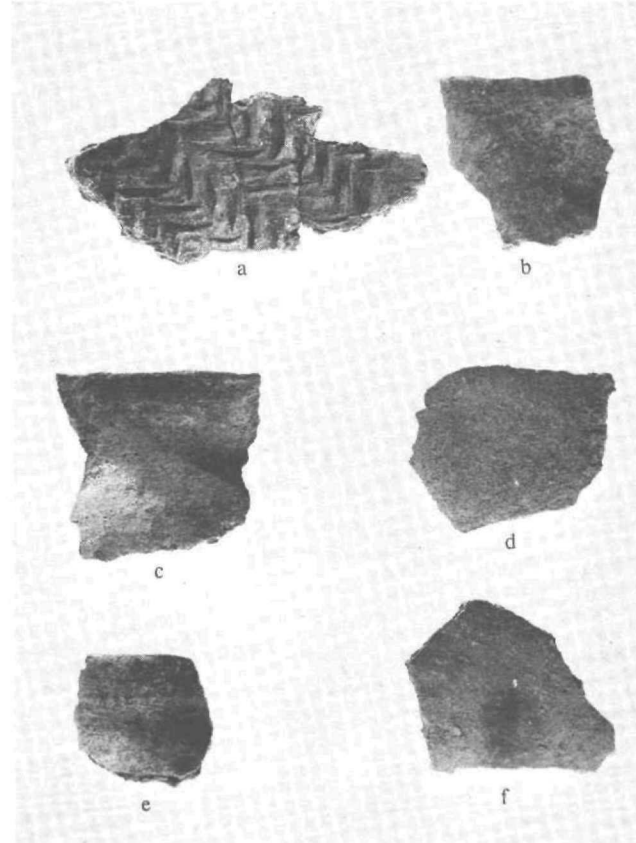


Fig. 39 Basketmaker Gray Ware sherds: (a) impressed gray, vegetal temper; (b) quartz sand temper; (c-d) quartz rough temper; (e-f) igneous temper.

TABLE IV

Identified sherds from surveyed sites.

	42Sa6777 (V:8:1)	42Sa6778 (V:8:2)	42Sa6673 (V:8:3)	42Sa6779 (V:8:4)	42Sa6638 (V:8:5)	42Sa6782 (V:8:8)	42Sa6784 (V:8:10)	42Sa6785 (V:8:11)	42Sa6786 (V:8:12)	42Sa6788 (V:8:14)	42Sa6789 (V:8:15)	42Sa6797 (V:8:23)	42Sa6798 (V:8:24)	42Sa6799 (V:8:25)	42Sa6800 (V:8:26)	42Sa6801 (V:8:27)	42Sa6803 (V:8:29)	42Sa6804 (V:8:30)	42Sa6807 (V:8:33)	42Sa6809 (V:8:35)	42Sa6812 (V:8:38)	42Sa6813 (V:8:39)	42Sa6815 (V:8:41)	42Sa6816 (V:8:42)	42Sa6819 (V:8:45)	42Sa6821 (V:8:47)	42Sa6823 (V:8:49)	42Sa6824 (V:8:50)	42Sa6826 (V:8:52)	42Sa6827 (V:8:53)	42Sa6828 (V:8:54)	42Sa6829 (V:8:55)	42Sa6830 (V:8:56)	42Sa6831 (V:8:57)	42Sa6832 (V:8:58)	42Sa6833 (V:8:59)	42Sa6834 (V:8:60)	42Sa6835 (V:8:61)	42Sa6837 (V:8:63)	42Sa6838 (V:8:64)	42Sa6840 (V:8:66)	42Sa6845 (V:8:71)	42Sa6848 (V:8:74)	42Sa6849 (V:8:75)	42Sa6850 (V:8:76)	Total
Basketmaker																																												
Basketmaker gray ware	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	16	—	—	—	3	—	—	5	—	3	—	—	2	—	17	17	—	1	16	—	—	—	—	—	—	—	—	—	92
Basketmaker white ware	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	1	—	—	—	2	—	—	—	—	—	—	—	—	—	4	5	—	—	2	—	—	—	—	—	—	—	—	—	17
Tusayan White Ware																																												
Black Mesa B/w	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—	2
Sosi B/w	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	4	—	—	6
Dogoszhi B/w	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	3	—	—	—	2	—	—	7
Flagstaff B/w	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Tusayan B/w	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Unclassified	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Cibolla White Ware																																												
Gallup B/w	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	3	2	—	—	—	—	—	—	7
Mesa Verde White Ware																																												
Mancos-McElmo B/w	5	—	—	3	—	—	—	4	2	—	6	—	—	6	—	—	7	2	—	2	—	—	—	—	6	9	8	—	7	—	—	12	—	8	—	18	7	1	5	—	6	4	—	1	2	131
Mesa Verde B/w	1	—	—	1	—	—	—	—	—	—	—	—	—	2	—	—	2	—	—	—	—	—	—	—	13	1	15	—	4	—	—	1	—	—	—	2	—	—	1	—	5	—	—	1	1	50
Unclassified	10	2	—	2	1	—	3	1	2	1	6	23	—	15	—	—	15	5	2	7	1	7	—	—	36	6	3	—	7	—	—	10	—	5	1	11	2	3	2	2	12	—	—	13	5	221
San Juan Red Ware																																												
Abajo R/o	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Unclassified	—	—	—	—	—	—	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Tsegi Orange Ware																																												
Medicine B/r	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	20	—	—	—	—	—	—	—	21
Tusayan B/r	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	1	—	1	1	—	—	—	—	—	—	7
Cameron Poly	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Citadel Poly	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	2
Tusayan Poly	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—	—	4
Tsegi R/o	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Kiet Siel B/r	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Unclassified	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	1	4	4	2	—	—	—	2	—	4	2	25
Pueblo II and III gray wares																																												
Plain gray	—	12	1	4	1	—	2	2	—	7	1	—	3	2	—	—	5	1	—	4	1	6	1	—	24	3	2	—	2	—	—	—	—	1	1	1	2	—	9	2	—	1	—	5	—	106
Indented corrugated	1	10	6	11	1	9	9	9	4	2	4	—	—	6	—	2	4	3	—	2	6	8	—	24	106	2	133	—	8	—	—	5	—	3	4	3	7	2	30	—	11	3	—	4	2	444
Clapboard corrugated	—	2	—	1	—	1	1	—	1	—	—	—	—	1	—	—	1	—	—	2	—	—	—	—	—	1	—	—	—	—	—	1	—	—	1	—	2	—	3	—	1	—	1	—	1	21
Exuberant corrugated	1	—	—	2	—	—	—	—	—	—	—	—	—	2	—	1	1	—	—	—	—	—	—	—	14	—	11	—	1	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	34
Patterned corrugated	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	1	—	—	—	—	—	—	—	—	4
Incised corrugated	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Unknown smudged	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
Jeddito Yellow Ware	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
Total	18	27	7	24	3	11	16	16	9	10	18	23	3	40	16	20	35	11	2	23	8	21	6	24	203	22	172	2	29	21	22	35	1	41	13	46	49	7	51	4	35	20	1	28	13	

TABLE IV
(continued)

	42Sa6851 (W:5:1)	42Sa6853 (W:5:3)	42Sa6854 (W:5:4)	42Sa6855 (W:5:5)	42Sa6856 (W:5:6)	42Sa6857 (W:5:7)	42Sa6859 (W:5:9)	42Sa6860 (W:5:10)	42Sa6862 (W:5:12)	42Sa6863 (W:5:13)	42Sa6864 (W:5:14)	42Sa6865 (W:5:15)	42Sa6866 (W:5:16)	42Sa6868 (W:5:18)	42Sa6870 (W:5:20)	42Sa6871 (W:5:21)	42Sa6873 (W:5:23)	42Sa6874 (W:5:24)	42Sa6875 (W:5:25)	42Sa6877 (W:5:27)	42Sa6878 (W:5:28)	42Sa6879 (W:5:29)	42Sa6880 (W:5:30)	42Sa6881 (W:5:31)	42Sa6882 (W:5:32)	42Sa6883 (W:5:33)	42Sa6884 (W:5:34)	42Sa6885 (W:5:35)	42Sa6886 (W:5:36)	42Sa6887 (W:5:37)	42Sa6888 (W:5:38)	42Sa1440 (W:5:39)	42Sa6889 (W:5:40)	42Sa6890 (W:5:41)	42Sa6891 (W:5:42)	42Sa6892 (W:5:43)	42Sa6646 (W:5:44)	42Sa6893 (W:5:45)	42Sa6894 (W:5:46)	42Sa6895 (W:5:47)	42Sa6896 (W:5:48)	42Sa6897 (W:5:49)	42Sa1441 (W:5:50)	42Sa6899 (W:5:52)	Total
Basketmaker																																											
Basketmaker gray ware	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	—	13	28	18	4	3	119	—	—	11	58	—	26	—	—	11	4	—	—	14	—	16	337
Basketmaker white ware	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	3	7	2	2	—	51	—	—	1	22	—	5	—	1	7	11	—	—	9	—	—	122
Tusayan White Ware																																											
Black Mesa B/w	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	2	—	—	—	—	—	—	4
Sosi B/w	3	—	—	—	—	—	1	—	—	—	—	—	—	—	1	—	—	—	—	2	—	—	—	—	—	—	—	—	—	1	—	—	—	1	—	2	8	—	—	—	—	3	—	23
Dogoszhi B/w	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	1	—	7
Flagstaff B/w	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Tusayan B/w	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Unclassified	6	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	13
Cibolla White Ware																																											
Gallup B/w	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Mesa Verde White Ware																																											
Mancos-McElmo B/w	6	—	2	—	7	1	3	—	—	42	—	—	2	—	—	—	7	2	13	2	—	6	5	—	1	—	—	—	1	9	—	—	—	14	—	10	8	—	—	2	3	—	2	—	148
Mesa Verde B/w	—	—	—	—	2	1	—	—	—	23	—	—	—	—	—	—	—	2	5	—	—	9	3	—	—	—	—	—	1	1	—	—	—	2	—	—	—	—	—	2	—	—	—	51
Unclassified	7	1	—	3	14	—	—	—	2	36	—	4	1	2	1	—	8	—	17	—	2	11	1	—	—	—	1	—	5	5	—	—	—	9	1	4	2	—	1	1	2	—	6	—	147
San Juan Red Ware																																											
Abajo R/o	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Unclassified	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Tsegi Orange Ware																																											
Medicine B/r	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—	3
Tusayan B/r	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	—	—	—	2	—	7	3	—	—	—	—	2	—	25
Cameron Poly	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	1	—	—	—	—	—	1	—	6
Citadel Poly	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	6	—	—	—	—	—	—	—	—	—	—	—	—	—	7
Tusayan Poly	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	2	—	—	—	—	—	—	—	1	—	8
Tsegi R/o	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Kiet Siel B/r	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Unclassified	11	—	—	—	3	—	—	—	—	2	—	—	—	—	—	—	2	—	3	1	—	—	1	—	—	—	—	—	—	10	—	—	—	8	—	—	1	—	—	—	—	3	—	45
Pueblo II and III gray wares																																											
Plain gray	5	1	—	—	2	2	—	—	2	16	—	9	—	—	4	3	4	—	9	1	1	—	4	—	—	—	—	—	5	9	—	—	—	1	1	—	2	1	—	2	—	3	4	1	92
Indented corrugated	21	8	2	2	7	1	5	1	—	30	2	3	2	7	3	—	26	3	20	10	9	6	3	—	—	—	—	—	6	5	10	1	—	3	—	6	12	1	—	2	3	—	6	—	226
Clapboard corrugated	3	2	—	—	—	—	1	—	—	3	—	—	1	—	1	—	4	—	2	—	—	1	—	—	—	—	—	—	—	3	—	—	—	2	1	—	5	—	—	—	—	3	—	32
Exuberant corrugated	7	—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	4	—	4	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	18
Patterned corrugated	5	—	—	—	1	1	—	—*	—	2	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	12
Incised corrugated	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	2	—	3
Unknown smudged	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Jeddito Yellow Ware	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Total	80	12	4	5	38	6	10	1	5	158	2	16	6	9	10	3	57	7	76	19	12	46	17	16	36	20	8	3	188	66	10	13	80	48	34	30	50	20	16	7	10	27	35	17	

TABLE IV

(continued)

	42Sa6900 (W:5:53)	42Sa6901 (W:5:54)	42Sa6902 (W:5:55)	42Sa6903 (W:5:56)	42Sa6904 (W:5:57)	42Sa6905 (W:5:58)	42Sa6907 (W:5:60)	42Sa6908 (W:5:61)	42Sa6909 (W:5:62)	42Sa6910 (W:5:63)	42Sa6911 (W:5:64)	42Sa6912 (W:5:65)	42Sa6913 (W:5:66)	42Sa6914 (W:5:67)	42Sa6915 (W:5:68)	42Sa6916 (W:5:69)	42Sa6917 (W:5:70)	42Sa6918 (W:5:71)	42Sa6919 (W:5:72)	42Sa6920 (W:5:73)	42Sa6921 (W:5:74)	42Sa6922 (W:5:75)	42Sa6923 (W:5:76)	42Sa6924 (W:5:77)	42Sa6925 (W:5:78)	42Sa6926 (W:5:79)	42Sa6927 (W:5:80)	42Sa6928 (W:5:81)	42Sa6929 (W:5:82)	42Sa6930 (W:5:83)	42Sa6931 (W:5:84)	42Sa6932 (W:5:85)	42Sa6934 (W:5:87)	42Sa6935 (W:5:88)	42Sa6936 (W:5:89)	42Sa6937 (W:5:90)	42Sa6938 (W:5:91)	42Sa6939 (W:5:92)	42Sa6940 (W:5:93)	42Sa6941 (W:5:94)	42Sa6942 (W:5:95)	42Sa6943 (W:5:96)	42Sa6944 (W:5:97)	42Sa6946 (W:5:99)	Total
Basketmaker																																											
Basketmaker gray ware	–	4	41	–	–	–	25	–	–	–	3	–	14	–	–	5	5	10	–	21	–	–	1	18	2	–	–	–	–	16	5	–	1	–	8	–	11	1	7	1	–	15	–	–	214
Basketmaker white ware	–	4	10	–	–	–	5	–	–	–	1	–	–	–	–	–	2	–	–	–	–	–	–	1	–	–	–	–	–	1	1	1	–	–	–	–	6	–	5	–	–	–	–	–	37
Tusayan White Ware																																												
Black Mesa B/w	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
Sosi B/w	–	–	–	–	3	–	–	1	–	4	–	4	–	–	–	–	–	–	1	–	1	6	–	–	–	1	–	1	–	–	–	–	–	10	–	1	–	2	–	5	–	2	–	42
Dogoszhi B/w	–	–	–	–	1	–	–	1	–	–	–	–	–	–	–	–	–	–	2	–	–	5	2	–	–	–	–	–	1	–	1	–	–	–	–	–	–	5	1	–	–	–	19
Flagstaff B/w	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1
Tusayan B/w	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
Unclassified	–	–	–	–	2	–	–	–	–	2	–	1	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–	–	1	1	–	–	–	–	2	–	–	–	11
Cibolla White Ware																																												
Gallup B/w	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	6
Mesa Verde White Ware																																												
Mancos-McElmo B/w	6	–	–	24	5	–	–	–	2	1	–	3	–	23	4	–	–	–	6	–	–	42	8	2	–	20	1	1	–	–	–	7	–	8	–	5	–	1	–	24	3	–	3	1	200
Mesa Verde B/w	2	–	–	17	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	16	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	40
Unclassified	16	–	–	15	3	–	–	2	5	1	–	6	–	6	1	–	–	–	4	1	8	8	3	–	1	4	–	–	1	1	–	3	–	4	–	1	–	–	1	5	–	–	1	3	73
San Juan Red Ware																																												
Abajo R/o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
Unclassified	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
Tsegi Orange Ware																																												
Medicine B/r	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	7
Tusayan B/r	–	–	–	–	–	–	–	–	–	1	–	5	–	–	–	–	–	–	5	–	–	20	–	–	–	–	1	1	1	–	–	–	–	–	–	3	–	–	–	5	–	–	2	–	44
Cameron Poly	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	4
Citadel Poly	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	4	1	–	–	–	–	–	1	–	–	–	–	2	–	1	–	–	–	–	–	3	–	15
Tusayan Poly	–	–	–	–	3	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	5
Tsegi R/o	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
Kiet Siel B/r	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
Unclassified	2	–	–	–	7	–	–	1	–	1	–	5	–	–	3	–	1	–	5	–	–	7	2	–	–	–	1	1	2	2	–	1	–	3	–	–	–	–	–	3	–	–	–	–	47
Pueblo II and III gray wares																																												
Plain gray	4	–	–	2	3	–	1	–	–	–	1	–	–	1	–	–	–	1	3	–	–	2	1	–	–	3	1	–	1	1	–	2	–	1	–	–	–	–	1	1	1	1	–	–	29
Indented corrugated	3	–	–	2	3	5	–	3	3	2	–	9	–	7	3	–	9	–	3	–	–	10	6	–	1	6	6	–	5	4	–	1	15	2	5	2	–	3	–	4	8	–	2	3	166
Clapboard corrugated	1	–	–	1	1	–	–	1	1	–	–	2	–	2	2	–	6	–	1	–	–	1	1	–	–	–	–	–	–	2	–	1	1	–	1	–	–	–	–	2	–	–	–	27
Exuberant corrugated	3	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	8
Patterned corrugated	2	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	2	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	–	10
Incised corrugated	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
Unknown smudged	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Jeddito Yellow Ware	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
Total	36	8	51	65	32	6	31	9	14	12	5	37	14	40	13	5	24	11	32	22	11	115	27	21	4	53	9	6	12	28	6	17	18	34	15	14	17	8	14	58	16	16	13	7	

TABLE IV
(continued)

	42Sa6947 (W:5:100)	42Sa6949 (W:5:102)	42Sa6950 (W:5:103)	42Sa6951 (W:5:104)	42Sa6952 (W:5:105)	42Sa6953 (W:5:106)	42Sa6954 (W:5:107)	42Sa6955 (W:5:108)	42Sa6956 (W:5:109)	42Sa6957 (W:5:110)	42Sa6958 (W:5:111)	42Sa6959 (W:5:112)	42Sa6960 (W:5:113)	42Sa6961 (W:5:114)	42Sa6962 (W:5:115)	42Sa6963 (W:5:116)	42Sa6964 (W:5:117)	42Sa6965 (W:5:118)	42Sa6967 (W:5:120)	42Sa6968 (W:5:121)	Total
Basketmaker																					
Basketmaker gray ware	8	7	17	—	—	—	5	10	6	—	4	4	—	—	—	—	9	—	—	—	70
Basketmaker white ware	3	—	1	—	—	—	—	2	8	—	6	2	—	—	—	—	2	—	—	—	24
Tusayan White Ware																					
Black Mesa B/w	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2
Sosi B/w	—	—	—	7	—	—	—	—	—	6	—	—	—	—	—	—	—	—	—	4	17
Dogoszhi B/w	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	2
Flagstaff B/w	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Tusayan B/w	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Unclassified	—	—	—	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Cibolla White Ware																					
Gallup B/w	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Mesa Verde White Ware																					
Mancos-McElmo B/w	—	—	—	16	4	18	1	—	—	8	—	—	2	5	—	—	—	13	—	9	76
Mesa Verde B/w	—	—	—	—	2	15	—	—	—	4	—	—	2	—	—	—	—	5	—	—	28
Unclassified	—	1	—	1	2	1	1	1	—	—	—	—	5	3	3	—	—	27	3	1	49
San Juan Red Ware																					
Abajo R/o	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Unclassified	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Tsegi Orange Ware																					
Medicine B/r	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Tusayan B/r	—	—	—	5	—	—	1	—	—	1	—	—	—	—	2	—	—	1	—	1	11
Cameron Poly	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Citadel Poly	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	3
Tusayan Poly	—	—	—	4	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	7
Tsegi R/o	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Kiet Siel B/r	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Unclassified	—	—	—	2	—	1	8	—	—	1	—	—	—	2	1	—	—	2	—	5	22
Pueblo II and III gray wares																					
Plain gray	—	—	—	—	—	—	25	—	—	—	—	—	—	3	—	7	1	—	—	4	40
Indented corrugated	—	—	—	9	3	4	8	—	—	1	—	—	1	4	3	—	—	3	2	4	42
Clapboard corrugated	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	2	—	1	4
Exuberant corrugated	—	—	—	—	—	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	2
Patterned corrugated	—	—	—	—	—	2	—	—	—	—	—	—	1	—	—	—	—	—	—	—	3
Incised corrugated	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Unknown smudged	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Jeddito Yellow Ware	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Total	11	8	18	52	11	42	51	13	14	24	10	6	11	18	9	7	12	56	5	30	3953

view shows numerous thin layers of vegetal material, possibly fine grass, interspersed with layers of relatively pure clay. The two or more vessels represented in this group have relatively straight sides and may have been flat-bottomed and cylindrical.

An attempt was made to see if there was a noticeable pattern in the distribution of the four temper classes. Counting only the unmixed Basketmaker III sites, the sherds with quartz rough temper were found at all but one site. The crushed rock sherds were found at all but twelve sites. The quartz sand sherds appear on all but nine sites. Thus, there appears to be little significance in the distribution of these variants. At none of the sites from which we have a reasonable sample do any of the variants occur to the exclusion or near exclusion of any of the others. This is particularly significant when one considers that sampling error, even with the larger collections, might be expected to produce some exceptions. In this area, therefore, we feel that a subdivision of the Basketmaker III gray wares into Lino Gray and Chapin Gray, on the basis of temper and any consequent inferences concerning areal affiliations based upon these distinctions, are not justifiable.

White Ware. (200 sherds). (Fig. 40). Of the 58 sites with Gray Ware of Basketmaker III type, only 38 have White Ware. Some of the remaining 20 have large enough collections that sampling error alone cannot explain the absence of White Ware. It may be that a time range is represented in this. That is, some of the larger sites with only Gray Ware probably predate the appearance of White Ware in the area.

In general, White Ware sherds are harder, better finished, and much lighter in color than Gray Ware. A few appear to have been lightly polished. Crushed rock temper was favored, possibly because without a slip, sand tempering grains tend to protrude on the surface. Painted designs appear on 127 Basketmaker White Ware sherds. Designs have elements in common with Chapin Black-on-white and Lino Black-on-gray. One painted sherd has nonfugitive red exterior.

Red Ware. (1 sherd). A single painted sherd of an Abajo Red-on-orange bowl from 42Sa6800 (V:8:26) is associated with Basketmaker Gray Ware and White Ware, but with no later types. Its rim type in Colton's system is I-A-4. An orange slip extends over the rim onto the exterior of the vessel. Abel (1955) states that this type was made in the Mesa Verde area between 750 and 850 A.D. Brew (1946) dates it in the eighth century on Alkali Ridge.

PUEBLO I POTTERY

Sherds of distinctive Pueblo I types have not been found in the Natural Bridges area, although a cultural hiatus seems unlikely. Basketmaker sites, particularly those with quantities of White Ware, may have been occupied later in time than the traditional ending date for Basketmaker III. In terms of stylistic and technological evolution, however, there still remains a gap between even the late Basketmaker pottery from Natural Bridges and the Pueblo II and III collections.

PUEBLO II AND III POTTERY

Tusayan White Ware. (161 sherds) (Fig. 41). Sherds of this ware are easily distinguishable in the Natural Bridges collections and presented few difficulties in sorting. Quartz sand temper holds throughout. It is significant that 77% of the Tusayan White Ware collection falls into two types that share the same time distribution, Sosi Black-on-white and Dogoszhi Black-on-white (Fig. 41, c-i). The earlier Black Mesa Black-on-white represents only 5% of the Tusayan White Ware collection. The Black Mesa designs are solid triangles, pendant dots, broad lines, and an interlocking scrolls. Flagstaff and Tusayan Black-on-white, both later in time than Sosi or Dogoszhi, represent less than 3% of the Tusayan White Ware.

Cibola White Ware. (13 sherds). This group could easily be differentiated from Mancos Black-on-white with hatched designs. They may be classified as Gallup Black-on-white.

Mesa Verde White Ware. (1,214 sherds). Throughout this group, sherd and particularly crushed rock tempering materials predominate. It is interesting to note that 40% of the Mesa Verde White Ware sherds from sites with predominantly Kayenta pottery types are sand-tempered. By far the most common groups are Mancos and McElmo Black-on-white (Fig. 42). This group covers a Pueblo II and III time range. Over this span designs and technology seem to have remained relatively unchanged. In the White Canyon area the distinction between Mancos and McElmo based on mineral and organic paints does not hold up. Paste is hard and medium gray in color. The slip ranges from very thin to thick, a few pieces appearing to be unslipped. Tempering particles often protrude through the surface.

A variation within the Mancos-McElmo category is what Brew has called a "polychrome within the Mancos wares" (1946, Fig. 101 y-aa, cc). Similar treatment is illustrated by Martin (1938, pl. 23 center, third row from bottom). A confusion has grown up in the literature concerning this. The four sherds of this Mancos variation from 42Sa6851 (W:5:1) (Fig. 42, r) and those shown by Brew and by Martin are clearly the same thing. They are vessels with designs made up of white slipped areas bounded with black lines on an unslipped gray background. They are not what Abel has called Mesa Verde Polychrome, the latter involving the use of both carbon and mineral paint to provide two tones of black on the same vessel (1955, Ware 10B, Type 3). But Abel references Brew (1946) as the first to describe Mesa Verde Polychrome

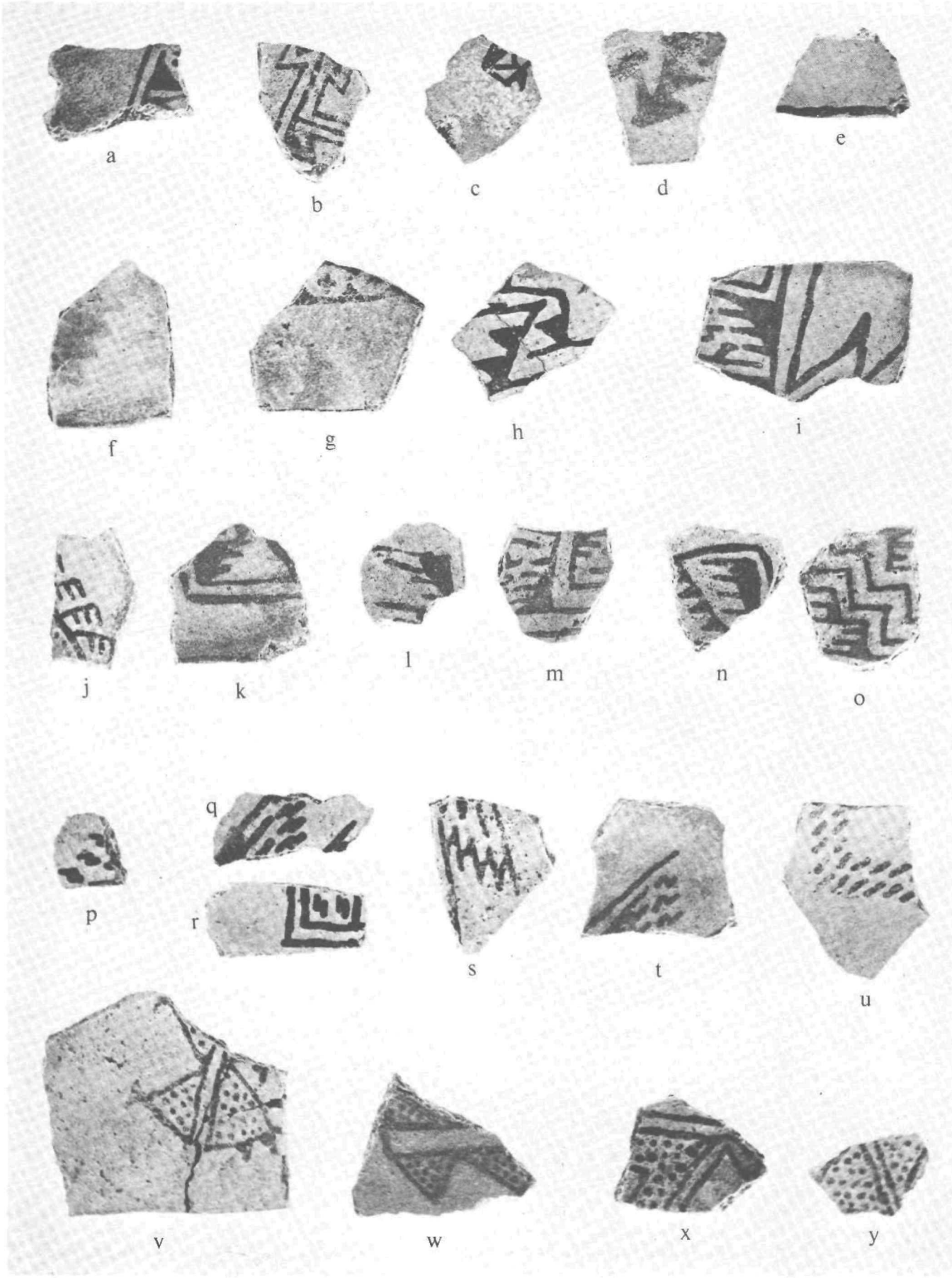


Fig. 40 Painted pottery from Basketmaker III-Pueblo I sites.

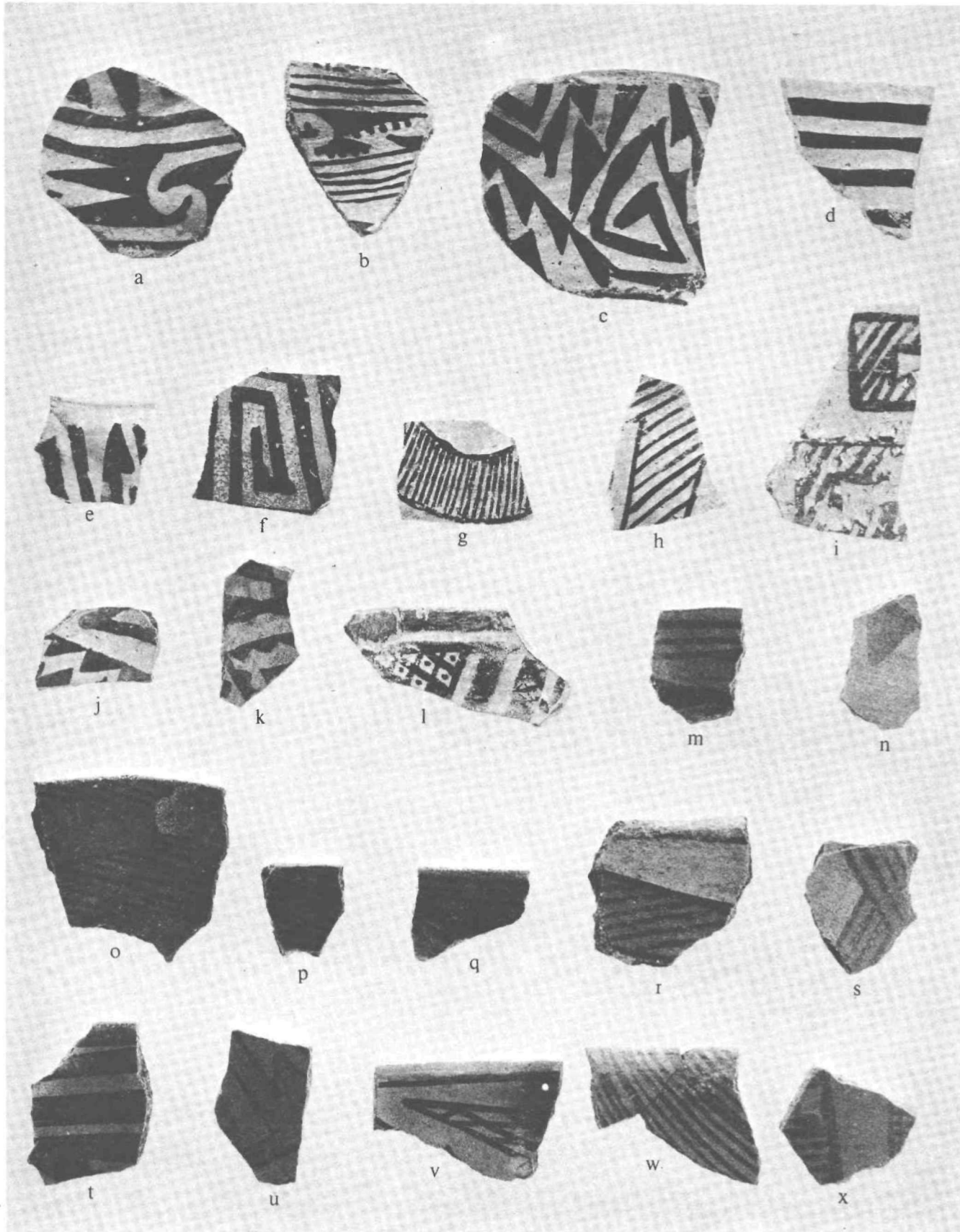


Fig. 41 Tusayan White Ware and Tsegi Orange Ware sherds in the survey collection: (a-b) Black Mesa Black-on-white; (c-f) Sosi Black-on-white; (g-i) Dogoszhi Black-on-white; (j-k) Flagstaff Black-on-white; (l) Tusayan Black-on-white; (m-n) Medicine Black-on-red; (o-q) Tusayan Black-on-red; (r-s) Cameron Polychrome; (u) Tusayan Polychrome, variety A; (v-w) Tusayan Polychrome, variety B; (x) Kiet Siel Black-on-red.

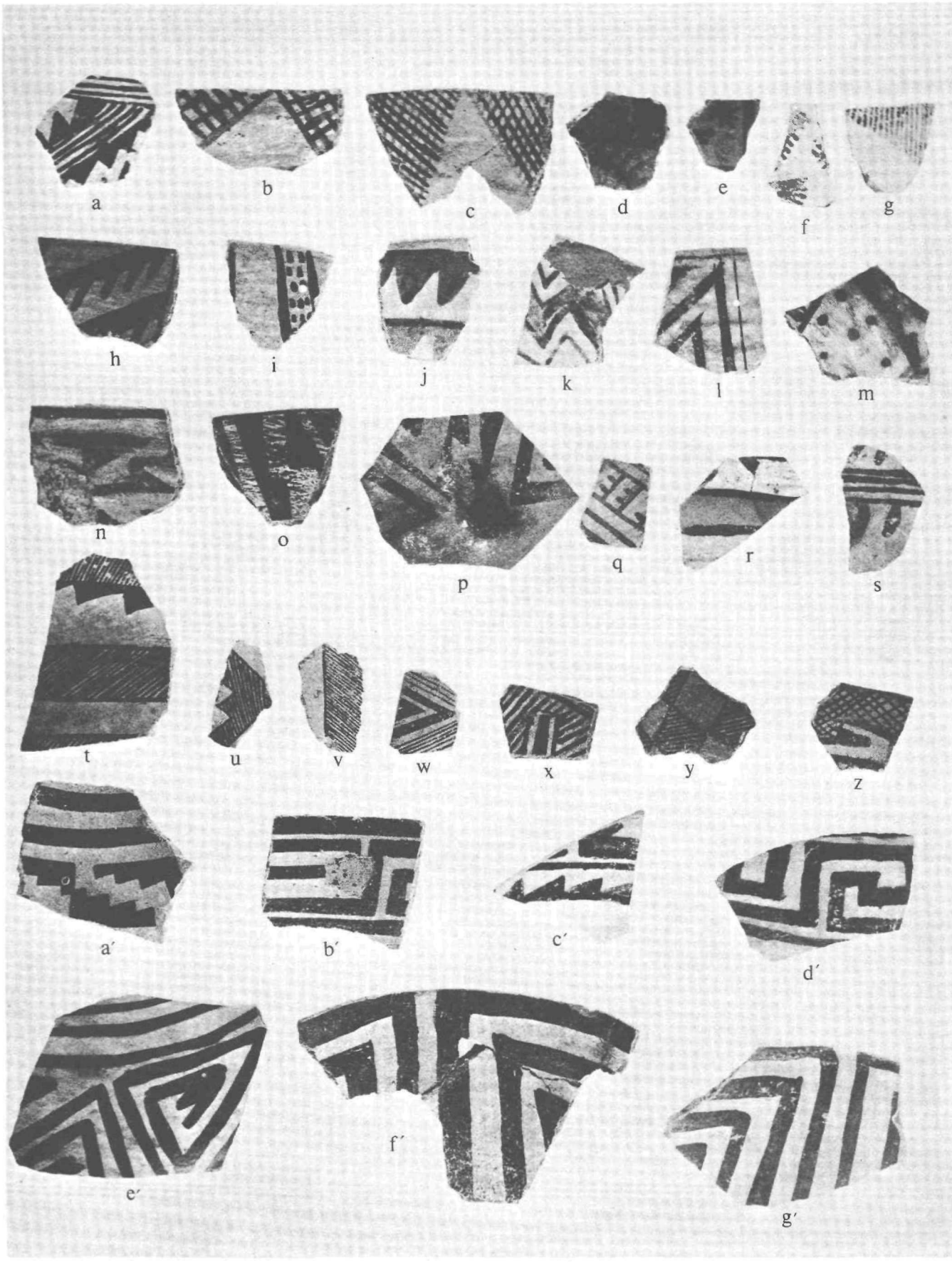


Fig. 42 Mancos and McElmo Black-on-white sherds from surveyed sites. r. is a variant in which unslipped gray areas are worked into the design.

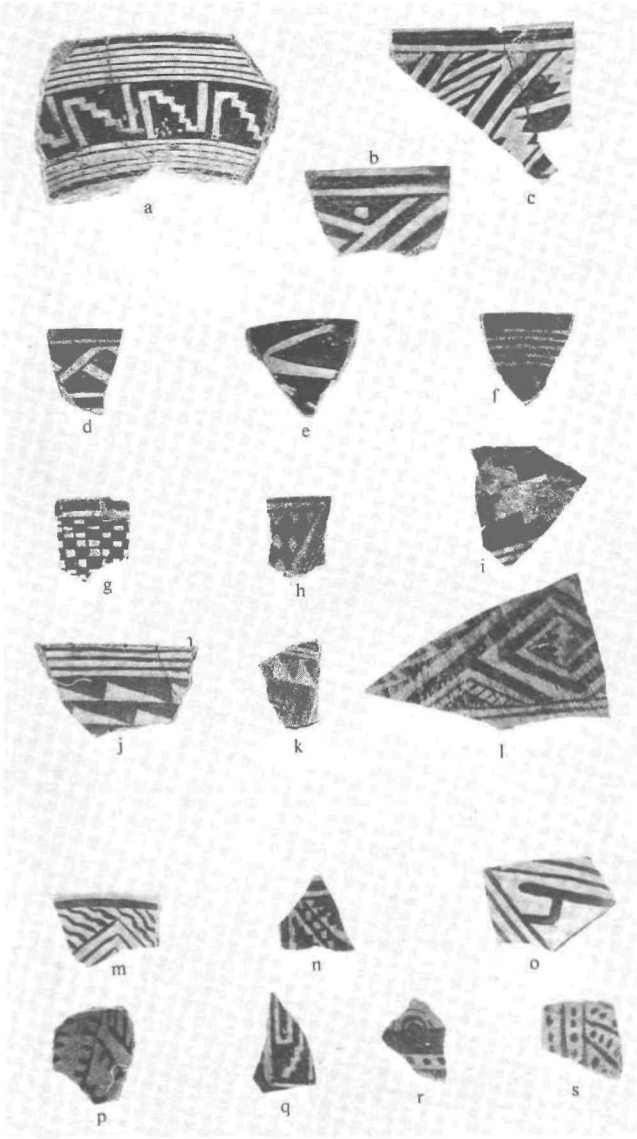


Fig. 43 Mesa Verde area pottery, mostly Mesa Verde Black-on-white from the surface of site 42Sa6823 (V:8:49) (figs. 46, 47).

when, indeed, it is the above black-gray-white "polychrome" that Brew describes and not the two-tone black paint variation. The numbers of sherds involved are small, but the distinction is clear. Mesa Verde Polychrome bears Mesa Verde Black-on-white designs, the other does not. Brew has suggested that these are imitations in black and white of Tusayan Polychrome. This is a reasonable suggestion since the designs fall within the range of Tusayan Polychrome. The black-gray-white sherds at Natural Bridges are associated with predominantly Kayenta pottery types, Tusayan White Wares, and Tsego Orange Wares. We submit that the black-gray-white sherds may be only variations of Tusayan Polychrome fired in a reducing rather than an oxidizing atmosphere.

The occupants of a few sites showed a preference for certain design elements within the Mancos-McElmo group. For example, 42Sa6926 (W:5:79), there are sherds from at least four different vessels with ticked solid lines. Examples of design preference such as this may represent the products of potters resident at such sites or possibly only the tastes of the householders living there.

Sherds of Mesa Verde Black-on-white account for only 13% of the Mesa Verde White Ware sample (Fig. 43). Sand temper is the least common in this group, represented by only two sherds. The slip ranges from quite thin to thick. More attention was paid to the preparation of the slip, smoothing, and polishing than in the Mancos-McElmo group. Bowls with square rims were most common. Rim decoration consists of painted "ticks" or dots. Occasionally these are incised. Other design elements fall within the range for the type.

Few if any of those sherds we have identified as Mancos-McElmo or Mesa Verde Black-on-white appear to have been imported directly from the Mesa Verde (Arthur H. Rhon, personal communication). They do, however, fit the published descriptions, particularly for pottery from Mesa Verde sites in the Mesa Verde population center to the west and northwest of the Mesa Verde itself. Within this triangular zone from the Mesa Verde to Bluff, Utah, and north to the Abajo Mountains, we find that P. S. Martin's Mancos Black-on-white collections from the Ackmen-Lowry area (1938) bear the greatest specific similarities to the Natural Bridges Mancos-McElmo material.

Tsegi Orange Ware. (322 sherds). (Figs. 41). These sherds clearly fall within the published ranges for the respective types and are not local imitations of Kayenta styles. The following types have been identified: Medicine Black-on-red, Tusayan Black-on-red, Cameron Polychrome, Citadel Polychrome, Tusayan Polychrome, Tsegi Red-on-orange, and Kiet Siel Black-on-red. of the total Tsegi Orange Ware collection, 44% have not been identified as to type.

Gray Wares. (1,324 sherds). An analysis of paste and temper characteristics of the Pueblo II-III Gray Ware sherds was made in order to test whether specific type identifications ought to be made. No significant co-occurrence of Gray Ware temper types with other pottery types was observable. That is, the Gray Wares at Mesa Verde sites or at Kayenta sites in our study area could not consistently be differentiated from one another. In each of the larger site collections one can observe most of the Gray Ware paste and temper attributes that have been recognized in the study area as a whole. For these reasons it was decided not to apply specific Gray Ware type designations. Instead, we recognize six categories of Gray Wares, one with plain vessel surfaces and five with surfaces altered while the clay was in a plastic state. These are characterized by distinct styles of surface treatment.

Plain Gray. These sherds make up 23% of the Gray Wares. This heterogeneous group ranges in surface appearance from smoothed to rough. Sherd and some crushed rock temper are found in half of the sherds, sand temper in the rest. Both types of temper are often found on the same site. A few crumbly, thick-walled sherds show a combination of the above materials with crushed dry grass.

Indented Corrugated. Sixty-three percent of the Gray Wares are of this type (Fig. 44, a-b). Tempering material is variable. Rims are often long and moderately flared. A few unfired sherds of this kind from 42Sa6863 (W:5:13) substantiates the conclusion that Gray Wares were usually manufactured locally.

Clapboard Corrugated. These sherds show unindented, unobliterated coils (Fig. 44, c-e) in the style of Moenkopi Corrugated. They account for only 6% of the Gray Ware category. A preference for sand temper can be observed.

Exuberant Corrugated. Only 5% of the Gray Ware collection are of this type. (Fig. 44, f-g). They are characterized by deep indented corrugations with the indentations often emphasized by the use of a long fingernail or other object.

Patterned Corrugated. These sherds account for 2% of the Gray Wares (Fig. 44, h-i). Two or more styles of corrugation are combined on the same vessel with one style serving as background and the other used in bands, triangles, parallelograms, or other geometric designs.

Incised Gray Ware. These sherds are from vessels that are either plain gray or corrugated (Fig. 44, j-k). Rectilinear or diamond-shaped designs are incised with a sharp pointed object. Tempering material consists of mixed crushed rock and sand. Only four of these sherds were found.

Unknown Smudged. Rim sherds from two bowls (Fig. 44, l) with smudged and highly polished interiors

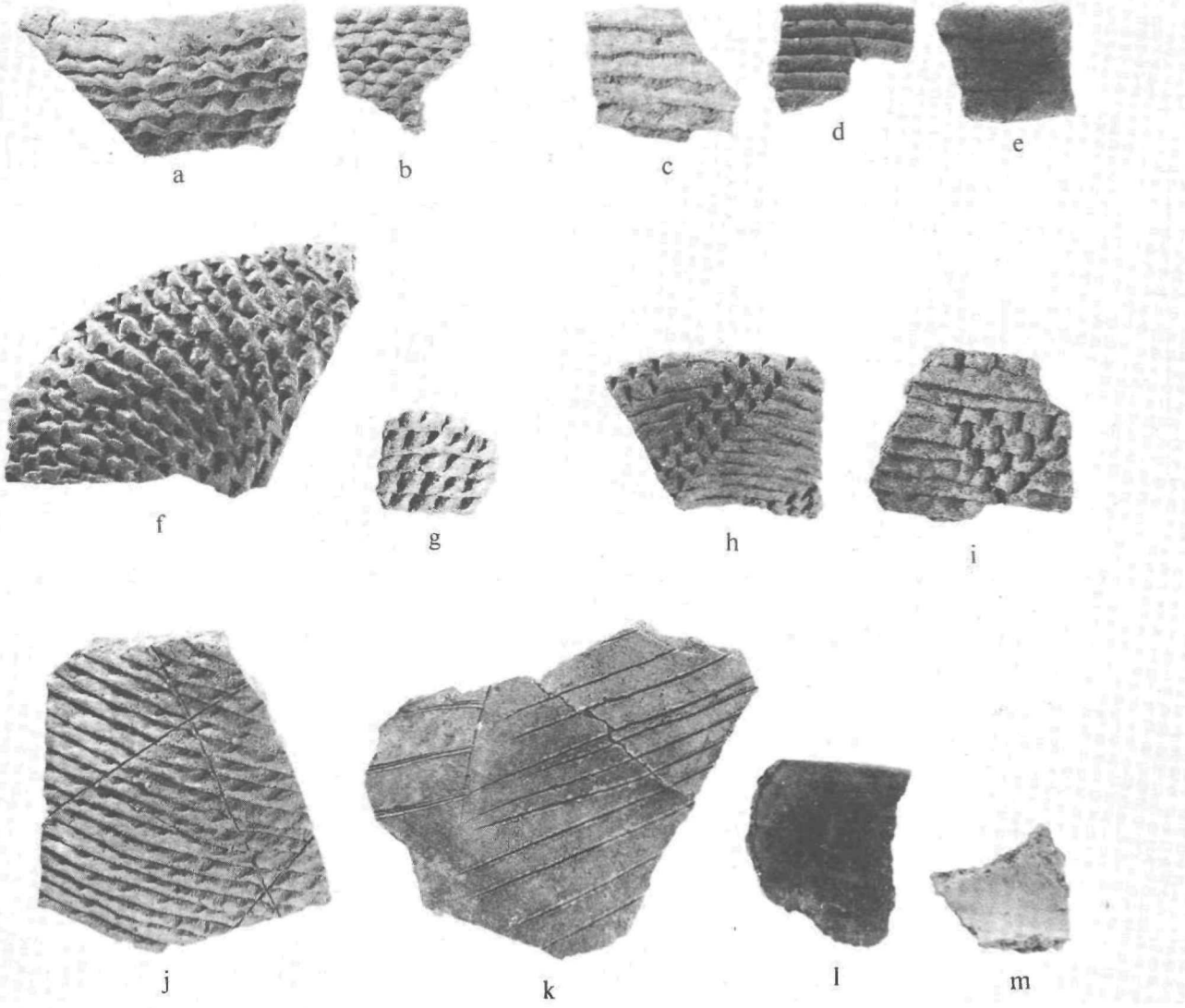


Fig. 44 Surface-altered Gray Wares and miscellaneous: (a-b) indented corrugated; (c-e) clapboard corrugated; (f-g) exuberant corrugated; (h-i) patterned corrugated; (j-k) incised; (l) unknown smudged; (m) Jeddito plain.

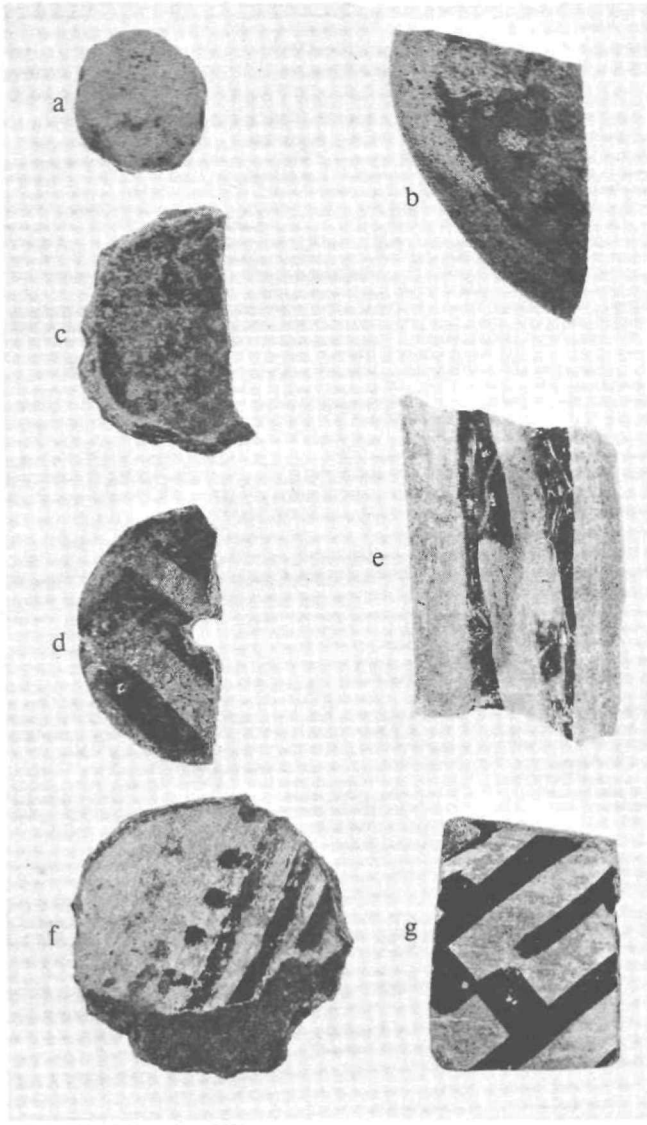


Fig. 45 Sherd artifacts.

were found. They are gray-brown in exterior surface color. On one, the polished black zone extends over the rim. On the basis of paste characteristics these sherds appear to be local ware rather than trade ware.

Jeddito Yellow Ware. A single sherd of Jeddito Plain (Fig. 44, m) constitutes the sole ceramic evidence for post-Pueblo III utilization of the area.

WORKED CERAMICS

Eighteen sherds have been worked into a variety of shapes (Fig. 45). Disks are the most common. Some disks are shaped by chipping rather than grinding. One sherd disk is perforated. Several beveled-edge pieces are fragmentary and appear to have been shaped by use rather than by intent. Rectangular specimens have a single beveled edge. Some preference was shown for black-on-white sherds.

STONE ARTIFACTS

CHIPPED STONE

Chipped stone artifacts found on the survey are listed in Table V. The raw materials used for the majority of the implements are chalcedony, chert, and limited amounts of quartzite. No obsidian artifacts were recovered. Unworked chips occur on virtually all sites.

Projectile points and knives. As a general rule symmetrical bifacially chipped implements that are stemmed are classified as projectile points. Most specimens that are stemless are less finely flaked and are best called knives. Specimens with their basal portions missing have been listed as unclassified point and knife fragments. The collection contains side-notched, corner-notched, and diagonally notched projectile points as well as a full range of examples intermediate between these categories. Although our sample is small, projectile points seem to fall into two size ranges. The smaller group average 2.5 cm in length and the larger 4.5 cm. In the Natural Bridges collections three classes of projectile points are recognized: stemless, expanding stem, and tapering stem.

Stemless concave base point. (1). This fragmentary specimen is 1.3 cm wide, and 0.4 cm thick (Fig. 46, b).

Stemless convex base point. (1). The only side-notched example in the collection measures 2.1 by 1.4 by 0.3 cm (Fig. 46, c).

Expanding stem straight base points. (5). Only one of these is unbroken and its length is 4.4 cm (Fig. 46, d-e). For the group as a whole, widths average 2.3 cm and thicknesses average 0.6 cm.

Expanding stem concave base points. (4). These are corner or diagonally notched (Fig. 46, f). The size range in this group is variable. Mean length is 3.2 cm, width 1.6 cm and thickness 0.4 cm.

Expanding stem convex base points. (7). These encompass a fair range in size (Fig. 46, g-j). The larger are all fragmentary, but may have averaged over 5 cm in length. The smaller ones average 2.6 cm in length. Thicknesses for all specimens average 0.4 cm.

Tapering stem projectile points. (4). These points average 4.6 cm in length (Fig. 46, k-m). Mean widths and thicknesses are 2.2 and 0.6 cm. Two are triangular in shape and two are leaf-shaped. One specimen has denticulate edges.

Crude knives are distinguished from knives in that the former are not intentionally shaped. Both are bifacially retouched.

TABLE V

Stone artifacts from surveyed sites.

	Gen Surface Collection	42Sa6777 (V:8:1)	42Sa6778 (V:8:2)	42Sa6779 (V:8:4)	42Sa6784 (V:8:10)	42Sa6788 (V:8:14)	42Sa6789 (V:8:15)	42Sa6790 (V:8:16)	42Sa6798 (V:8:24)	42Sa6799 (V:8:25)	42Sa6800 (V:8:26)	42Sa6801 (V:8:27)	42Sa6803 (V:8:29)	42Sa6809 (V:8:35)	42Sa6811 (V:8:37)	42Sa6812 (V:8:38)	42Sa6815 (V:8:41)	42Sa6819 (V:8:45)	42Sa6821 (V:8:47)	42Sa6824 (V1.8:50)	42Sa6825 (V:8:51)	42Sa6826 (V:8:52)	42Sa6827 (V:8:53)	42Sa6828 (V:8:54)	42Sa6829 (V:8:55)	42Sa6830 (V:8:56)	42Sa6831 (V:8:57)	42Sa6835 (V:8:61)	42Sa6837 (V:8:63)	42Sa6839 (V:8:65)	42Sa6840 (V:8:66)	42Sa6843 (V:8:69)	42Sa6845 (V:8:71)	42Sa6848 (V:8:74)	42Sa6850 (V:8:76)	42Sa6851 (W:5:1)	42Sa6852 (W:5:2)	42Sa6859 (W:5:9)	42Sa6863 (W:5:13)	42Sa6865 (W:5:15)	42Sa6873 (W:5:23)	42Sa6877 (W:5:27)	42Sa6879 (W:5:29)	42Sa6880 (W:5:30)	42Sa6881 (W:5:31)	42Sa6882 (W:5:32)
CHIPPED STONE																																												
Points																																												
Stemless Concave Base	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–
Stemless Convex Base	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Stemmed																																												
Expanding Straight Base	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Expanding Concave Base	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Expanding Convex Base	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tapering	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Drills																																												
Plain Shaft	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–
Expanded Base	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–
Flake	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Unclassified	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Crude Knives																																												
Leaf-shaped	–	1	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–
Other	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Knives																																												
Rectangular	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	–	1	–
Triangular	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–
Leaf	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	1	1	–	–	–	–	1	–	1	–	–
Asymmetrical	1	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Crescentic	1	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Unclassified Knife and Point Fragments	1	–	–	–	–	–	–	–	–	1	1	–	–	–	1	1	–	–	–	1	1	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	1	3	–	–	–	1	3	–
Ovoid Choppers	2	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–
Choppers	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Scrapers																																												
Flat Limited Edge	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	1	–
Nodular	–	–	–	–	–	1	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Worked Flakes	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1	–	1	–	1	3	–	1	3	1	2	2	1	–	1	1	–	1	–	–	–	–	1	–	–
Hammer Stones	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
GROUND STONE																																												
Manos																																												
One-Hand																																												
One Grinding Surface	–	–	1	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	3
Two Grinding Surfaces	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–
Two-Hand																																												
One Grinding Surface	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Two Grinding Surfaces	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Three Grinding Surfaces	–	–	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Metates																																												
Trough	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Basin	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Rubbing Stones	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	1	–	2	–	–	–	–	–	–
TOTAL	11	1	2	1	1	1	1	2	1	3	4	2	2	2	1	1	1	1	1	1	9	2	4	1	1	6	2	3	3	1	3	4	1	2	3	5	1	3	8	1	1	2	1	3	8	5

TABLE V
(continued)

	42Sa6883 (W:5:33)	42Sa6886 (W:5:36)	42Sa6887 (W:5:37)	42Sa6888 (W:5:38)	42Sa6889 (W:5:40)	42Sa6890 (W:5:41)	42Sa6892 (W:5:43)	42Sa6893 (W:5:45)	42Sa6894 (W:5:46)	42Sa6896 (W:5:48)	42Sa1441 (W:5:50)	42Sa6902 (W:5:55)	42Sa6904 (W:5:57)	42Sa6911 (W:5:64)	42Sa6913 (W:5:66)	42Sa6914 (W:5:67)	42Sa6915 (W:5:68)	42Sa6916 (W:5:69)	42Sa6919 (W:5:72)	42Sa6920 (W:5:73)	42Sa6921 (W:5:74)	42Sa6922 (W:5:75)	42Sa6924 (W:5:77)	42Sa6925 (W:5:78)	42Sa6926 (W:5:79)	42Sa6930 (W:5:83)	42Sa6932 (W:5:85)	42Sa6935 (W:5:88)	42Sa6937 (W:5:90)	42Sa6941 (W:5:94)	42Sa6946 (W:5:99)	42Sa6948 (W:5:101)	42Sa6949 (W:5:102)	42Sa6950 (W:5:103)	42Sa6952 (W:5:105)	42Sa6953 (W:5:106)	42Sa6954 (W:5:107)	42Sa6956 (W:5:109)	42Sa6959 (W:5:112)	42Sa6960 (W:5:113)	42Sa6963 (W:5:116)	42Sa6967 (W:5:120)	42Sa6968 (W:5:121)	42Sa6969 (W:5:122)	TOTAL
CHIPPED STONE																																												
Points																																												
Stemless Concave Base	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Stemless Convex Base	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Stemmed																																												
Expanding Straight Base	–	1	–	–	–	–	1	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5
Expanding Concave Base	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
Expanding Convex Base	1	2	–	–	–	–	1	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	7
Tapering	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
Drills																																												
Plain Shaft	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Expanded Base	1	–	1	1	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
Flake	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	7
Unclassified	–	1	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	4
Crude Knives																																												
Leaf-shaped	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	8
Other	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
Knives																																												
Rectangular	–	–	–	–	–	–	3	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	7
Triangular	–	–	1	–	–	–	1	1	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1	11
Leaf	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	–	–	–	2	14
Asymmetrical	–	–	–	–	–	–	1	–	–	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	7
Crescentic	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	6
Unclassified Knife and Point Fragments		2	1	–	–	–	2	–	–	–	4	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	4	30
Ovoid Choppers	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
Choppers	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Scrapers																																												
Flat Limited Edge	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	11
Nodular	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5
Worked Flakes	–	–	–	–	–	–	–	–	–	–	–	–	1	2	2	4	1	–	1	1	–	–	1	3	1	–	–	2	1	1	1	1	1	–	1	2	3	–	–	–	1	–	–	9	61
Hammer Stones	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	5
GROUND STONE																																												
Manos																																												
One-Hand																																												
One Grinding Surface	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8
Two Grinding Surfaces	2	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	8
Two-Hand																																												
One Grinding Surface	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	3
Two Grinding Surfaces	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3
Three Grinding Surfaces	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3
Metates																																												
Trough	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Basin	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Rubbing Stones	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
TOTAL	4	9	6	1	3	1	14	3	2	2	7	3	1	3	2	4	3	1	1	1	1	1	1	5	1	2	1	2	2	1	1	2	1	1	1	2	3	1	1	1	1	1	25	253

Leaf-shaped crude knives. (8) (Fig. 47, a-b). These range in size from 3.4 by 2.3 by 0.8 cm to 5.3 by 3.6 by 1.2 cm.

Other crude knives. (4) (Fig. 47, c). This group is irregular in shape. Many may be pieces that were rejected during manufacture. They are altered only along the cutting edge. Working edges are usually convex and often sinuous when viewed edge-on. They range in size from 4.7 by 4.2 by 1.6 to 3.1 by 3.0 by 0.9 cm.

Rectangular knives. (7) (Fig. 47, d-e). We have no whole specimens, but fragments indicate an elongate rectangular outline and a straight base. Workmanship varies, but all are thinner and better made than the crude knives. Widths vary from 2.0 to 3.8 cm. Thicknesses average 0.7 cm.

Triangular knives. (11) (Fig. 47, f-g). These have a straight or convex base and two sides which slant equally to the tip. Three are unbroken. Lengths range from 2.2 to 8.9 cm; widths from 2.1 to 3.6 cm, and thicknesses from 0.2 to 0.8 cm.

Leaf-shaped knives. (14) (Fig. 47, h-j). Half of the points of these specimens are very blunt. On one, the working edges are ground for 2.3 cm down from the tip. Lengths of complete pieces range from 2.9 to 6.4 cm. Widths range from 1.5 to 3.5 cm and thicknesses vary from 0.5 to 1.0 cm.

Asymmetrical knives. (7) (Fig. 47, k-l). Only one specimen is stemmed. The knives are characterized by having one working edge longer than the other. Usually one edge is straight and the other convex. The single whole specimen is 7.3 by 3.5 by 0.7 cm.

Crescentic knives. (6) (Fig. 47, m-n). These are characterized by one concave and one convex working edge. Tips are mostly rounded and bases relatively straight. The dimensions of the two whole specimens are 4.5 by 2.2 by 0.7 cm and 4.7 by 2.0 by 0.8 cm.

Ovoid choppers. (6) (Fig. 48, h-i). These are relatively small implements ranging from 5.3 by 1.2 by 4.4 cm to 7.0 by 5.7 by 2.1 cm. They are characterized by oval shape and bifacial retouch that is sometimes discontinuous along the perimeter of a specimen.

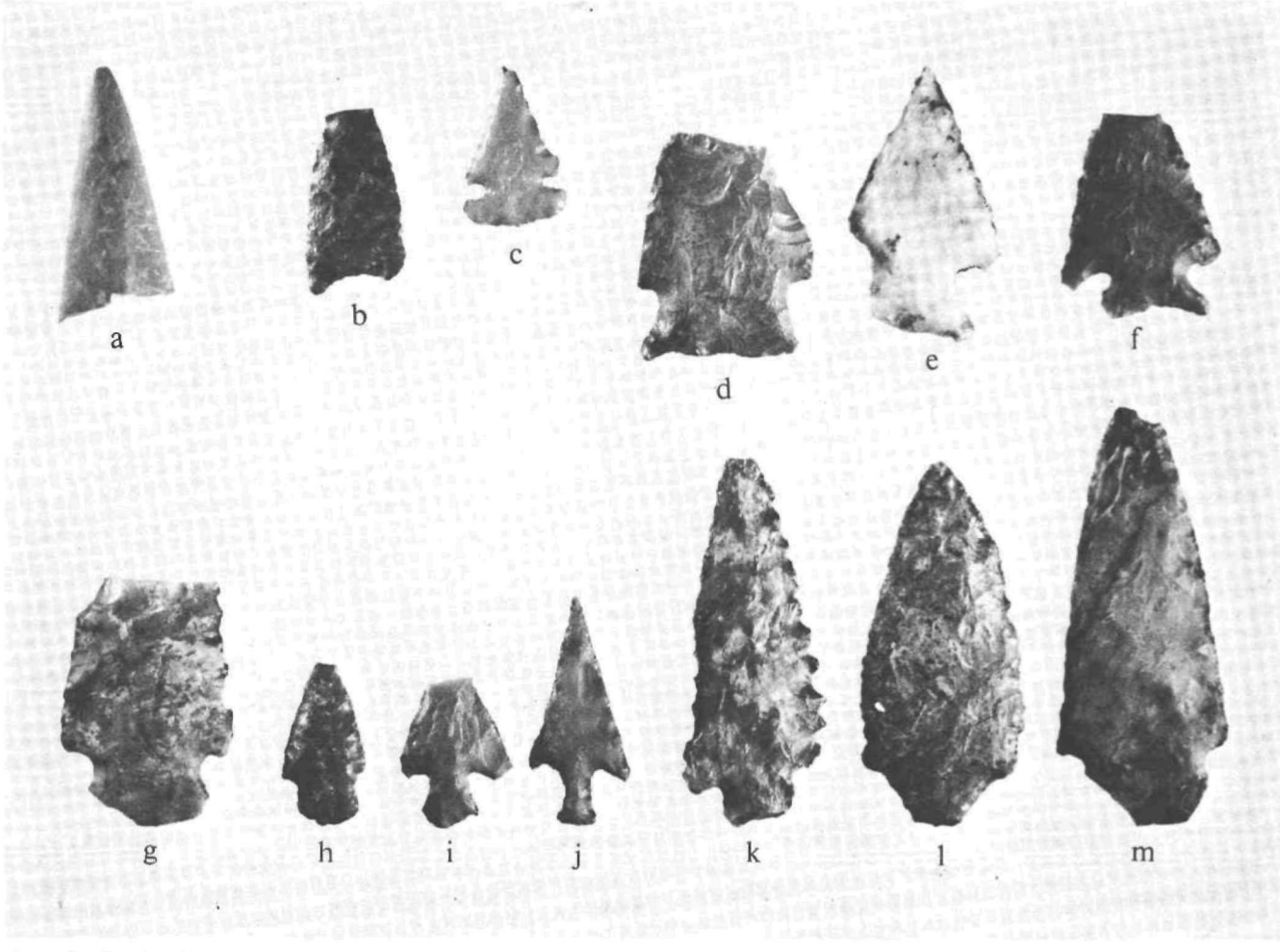


Fig. 46 Projectile points: (a) ground stone point; (b) stemless, concave base; (c) stemless, convex base; (d-e) expanding stem, straight base; (f) expanding stem, concave base; (g-j) expanding stem, convex base; (k-m) tapering stem. The length of m. is 5.2 cm.

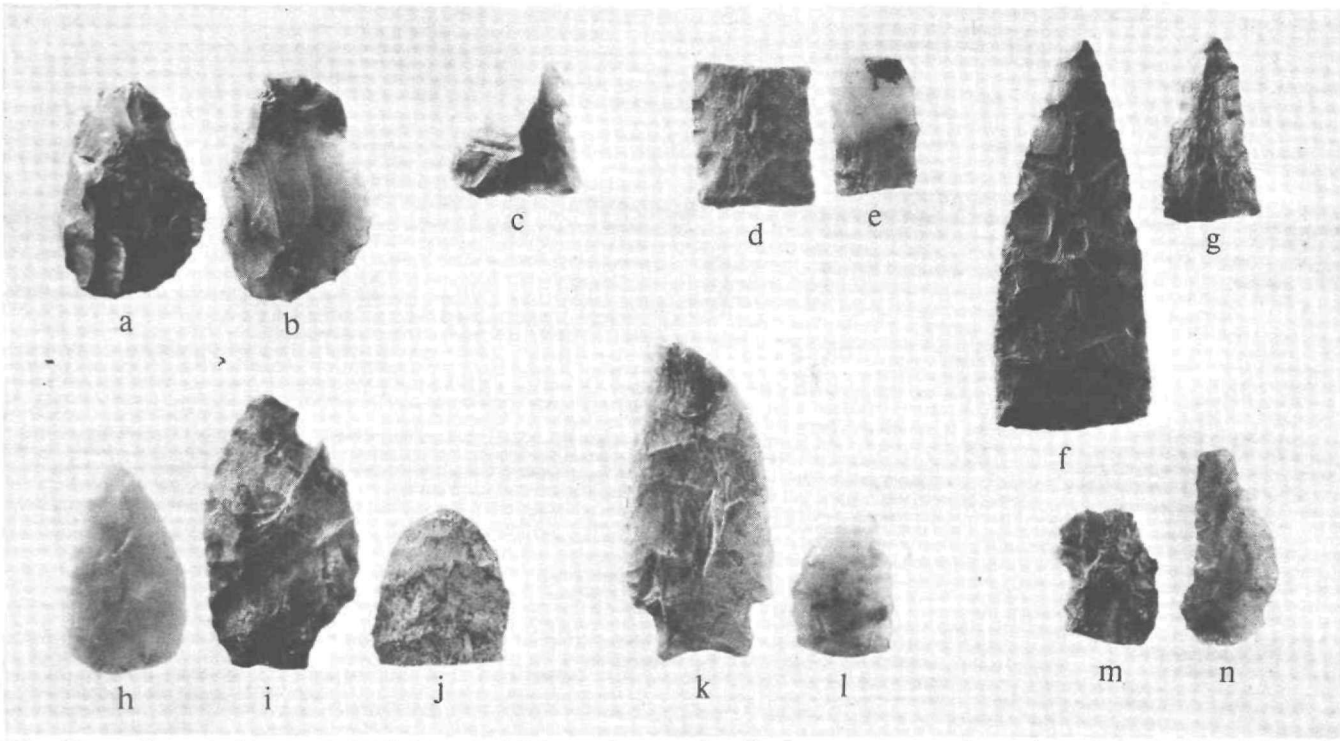


Fig. 47 Knives. (a-b) crude, leaf-shaped; (c) irregular, crude; (d-e) rectangular; (f-g) triangular; (h-j) leaf-shaped; (k-l) asymmetrical; (m-n) crescent-shaped. The length of f. is 8.9 cm.

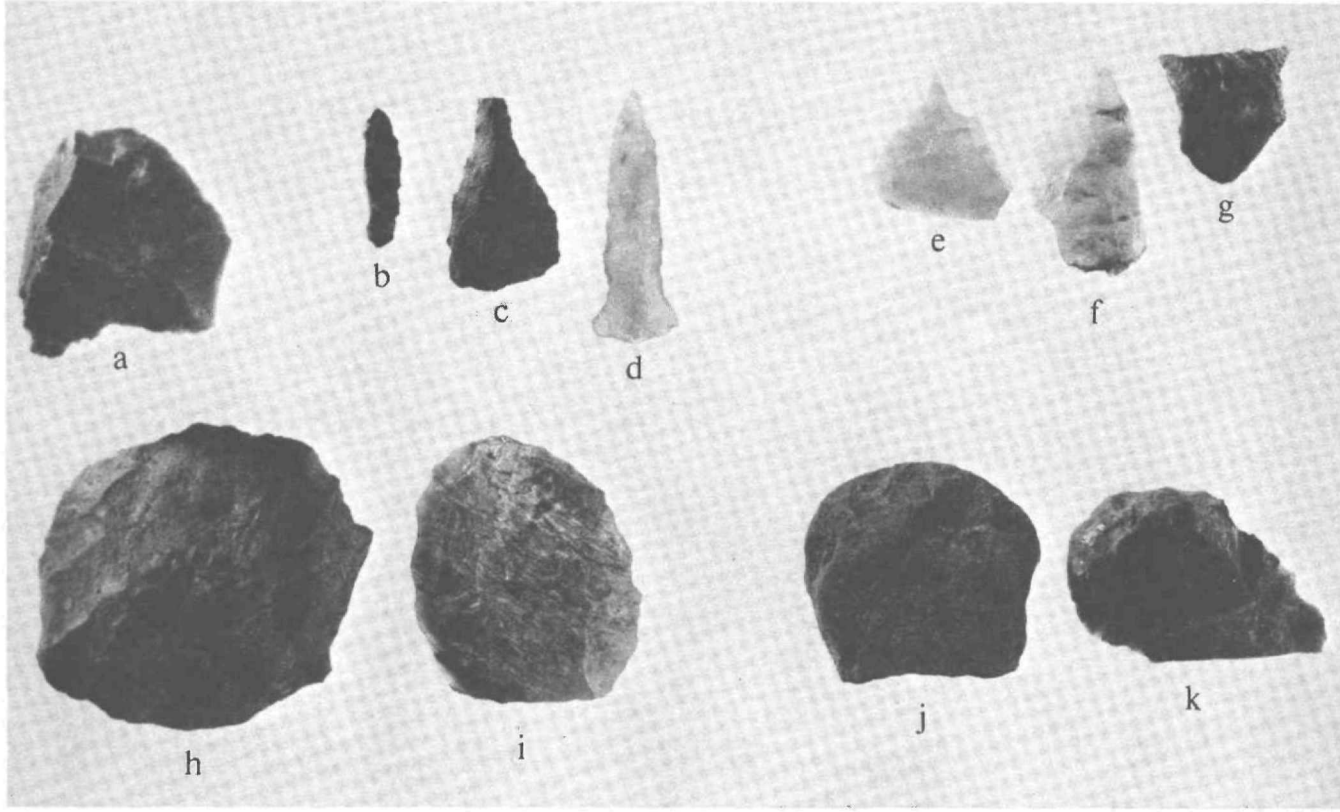


Fig. 48 Miscellaneous flaked stone artifacts: (a) nodular scraper; (b) plain shaft drill; (c-d) expanding base drill; (e-f) flake drills; (g) flake drill with two bits; (h-i) ovoid choppers; (j-k) flat scrapers. The length of b. is 2.6 cm.

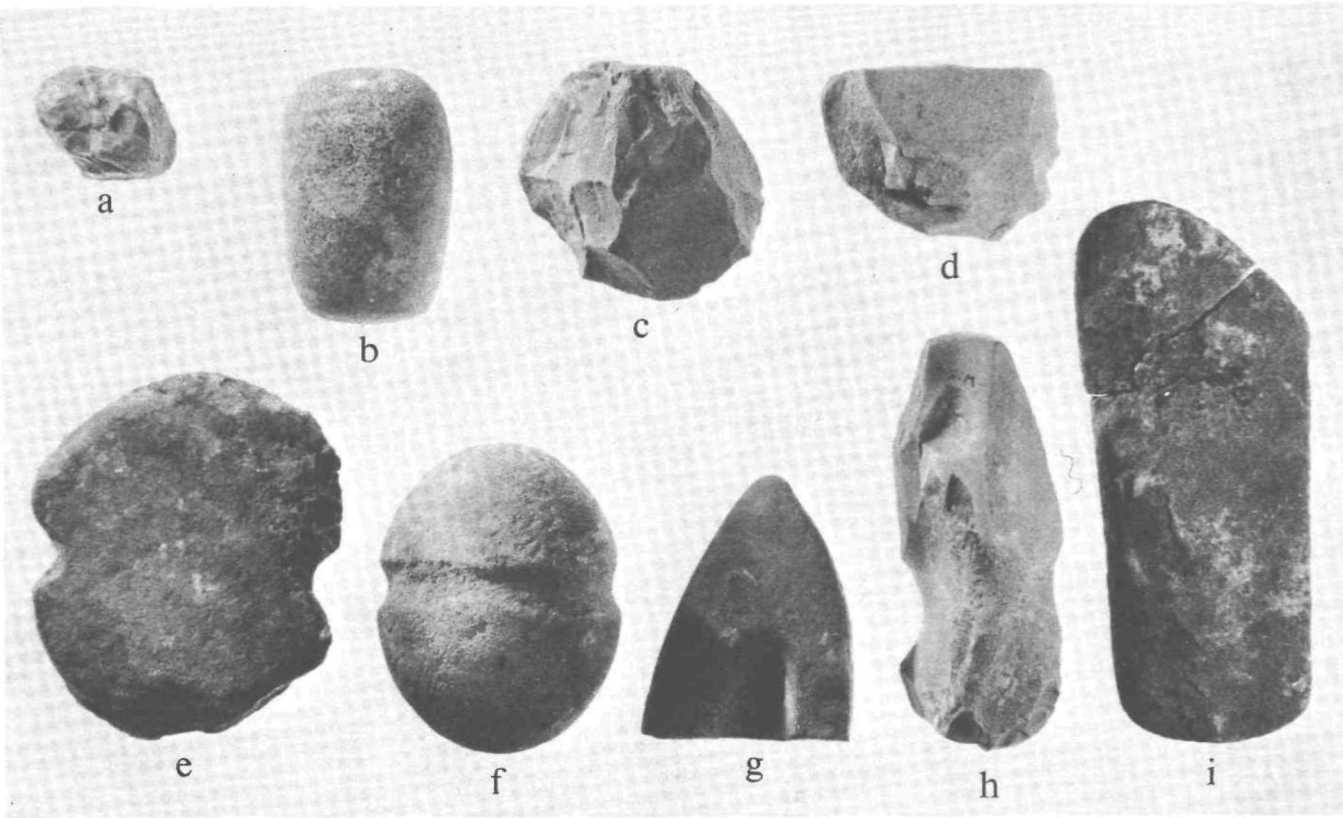


Fig. 49 Stone artifacts manufactured by flaking or by pecking and grinding: (a-b) hammerstones; (c-d) choppers; (e) hoe; (f) grooved maul; (g) palette; (h) ax; (i) possible sandal last. The length of i. is 24.5 cm.

Choppers. (2). These are larger implements ranging up to 15 cm in length. Their shape is irregular. Bifacial retouch is marginal (does not cover all of either face) and discontinuous. Viewed edge-on, the working edge is sinuous. Choppers are made on cores or core fragments.

Scrapers. Scrapers are defined as unifacial implements fashioned from flakes, cores, or core fragments.

Flat scrapers. (11) (Fig. 48, j-k). Most flat scrapers are made on irregularly shaped flakes. Convex working edges are the rule and are usually limited to only a portion of the perimeter of the specimen. Sizes range from 1.9 by 1.9 by 0.3 cm to 4.9 by 3.9 by 1.1 cm.

Nodular scrapers. (5) (Fig. 48, a). Among these specimens the ratio of thickness to width is 1:2 while the same ratio for flat scrapers is 1:3. There are both convex and concave working edges. The working edge extends only part way around the perimeter. Sizes vary from 3.1 by 2.7 by 1.4 cm to 6.6 by 4.5 by 3.2 cm.

Worked flakes. (61). These randomly shaped flakes are irregularly chipped, usually unifacially. Most of the chipping caused by use rather than by intentional retouch.

Drills. Drills are bifacially retouched pieces with tips too long and slender to have served as projectile points or knives. Drills found in the Natural Bridges area fall into three categories.

Plain shaft drill. (1) (Fig. 48, b). This piece is roughly parallel-sided, pointed at one end, rounded at the other, and oval in cross section. Its dimensions are 2.6 by 0.7 by 0.4 cm.

Expanded base drills. (8) (Fig. 48, c-d). Bases about twice the width of the shaft characterize this class of drills. Bases are rounded. Whole specimens average 4.7 by 1.6 by 0.6 cm.

Flake drills. (7) (Fig. 48, e-f). Unlike the above drill categories these pieces are only partially shaped by chipping. They are of irregular shape and share in the technique of bifacial retouch to opposing edges of a natural corner of a flake to produce a drill point. Average dimensions are 2.8 by 2.1 by 0.5 cm. A unique piece is made by retouching a basal fragment of a projectile point to produce a double-tipped drill (Fig. 48, g).

Hammerstones. (5) (Fig. 49, a-b). Two are sandstone, one chert, and two quartzite. They show evidence of use on all corners and edges. Heaviest use was made of the ends of the somewhat elongate cylindrical pieces. Sizes range from 4.5 by 4.0 by 2.4 cm to 12.1 by 7.5 by 6.0 cm.

GROUND STONE

Manos. Twenty-six manos are in the Natural Bridges collection. Sandstone and quartzite were the raw materials used. Of these, sandstone is the most common. Manos fall into one-hand (17) (Fig. 50, a-d) and two hand (9) (Fig. 50, e-g) classes and have been further subdivided according to grinding surfaces. A length of 18 cm seems a clear dividing line between one- and two-hand manos in this collection. Analysis showed that the Basketmaker III-Pueblo I sites had seven times as many one-hand as two-hand manos. The later Pueblo sites are not as conclusive in this regard, there being three one-hand manos for every two two-hand ones. Pueblo sites did show a predominance of manos with two grinding surfaces, this type being twice as common as those with only a single grinding surface.

One-hand, one grinding surface. (8). These manos ranged in shape from oval to subrectangular. The grinding surfaces were flat except for two that were convex. One-hand manos appear to have been used with both reciprocal and circular movements. Cross sections are variable ranging from oval to almost rectangular. One had a finger groove pecked into one side. Manos of this type range in size from 9.0 by 7.5 by 3.5 cm to 16.0 by 10.0 by 3.5 cm.

One-hand, two grinding surfaces. (8) Shapes are similar to the single grinding surface specimens. Most specimens are wedge-shaped in cross section through their width. The distribution of grinding surfaces is as follows: two convex surfaces (2); two flat grinding surfaces (3); one flat, one convex grinding surface (4). The majority (7) of the manos are wedge-shaped in transverse cross section. This group ranges in size from 8.8 by 6.5 by 3.5 cm to 16.0 by 8.5 by 4.0 cm.

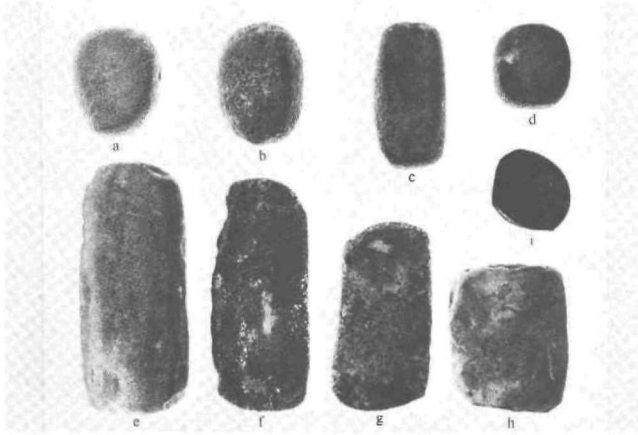


Fig. 50 Manos from surveyed sites. (a) one-hand, one grinding surface; (b-d) one-hand, two grinding surfaces, (e) two-hand, two grinding surfaces; (f) two-hand, three grinding surfaces; (g) two-hand, one grinding surface; (h-i) rubbing stones. The length of e. is 27.5 cm.

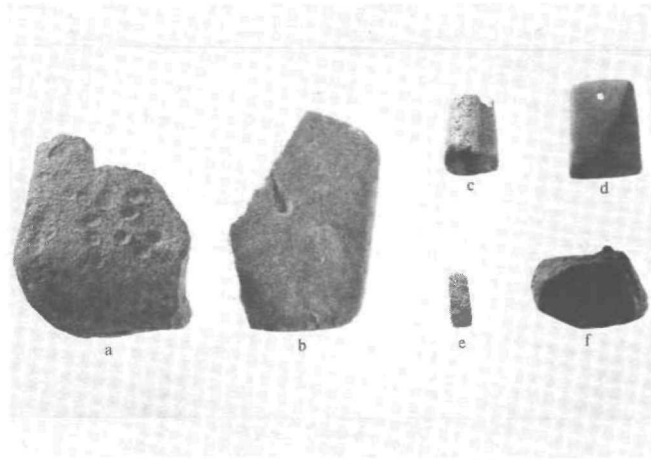


Fig. 51 Miscellaneous worked stone: (a) pitted piece of worked sandstone; (b) ground calcite slab; (c) pipe of oolitic limestone; (d-e) pendants; (f) piece of ground hematite. The length of b. is 10.4 cm.

Two-hand, one grinding surface. (3). Pecked finger grips occur along the sides of one of these. The single whole specimen measures 20.5 by 10.5 by 3.0 cm.

Two-hand, two grinding surfaces. (3). These are subrectangular in outline and wedge-shaped in cross section. Two have two flat grinding surfaces and one has one flat and one convex grinding surface. The one whole specimen measures 27.5 by 11.75 by 2.5 cm.

Two-hand, three grinding surfaces. (3). One of these has finger grips. One has one flat grinding surface and two adjoining convex grinding surfaces. Two have two parallel surfaces and one is at an angle (see Woodbury 1954, Fig. 8a). The only whole mano in this group is 25.0 by 10.5 by 3.8 cm.

Metates. (3). Two trough metates and one oval basin metate were recorded on the survey. The trough metates both were associated with Basketmaker III-Pueblo I refuse. Their troughs' widths average 17 cm. Metate widths average 47 cm.

Rubbing stones. (6) (Fig. 50, h-i). These range from rectangular to circular in outline. Rubbing stones are smaller than manos and are usually made of more fine-grained rock, often water-worn stream pebbles. Their rubbing surfaces are slightly convex and usually highly polished. Two are simply adapted from fragments of manos. Rubbing stones range in size from 8.0 by 4.5 by 2.5 cm to 11.3 by 8.5 by 3.5 cm.

Point. (1) (Fig. 46, a). This fragment was excavated from the roof fall of the Basketmaker III cist at 42Sa6827 (V:8:53). It has been entirely shaped by grinding. The tip is blunt, but this may have resulted from the tip being broken and then reground. The edges are also blunt but from the grinding striations this would appear intentional.

Leaf-shaped knife fragment. (1) (Fig. 47, j). Although primarily shaped by chipping, this knife has the edges ground flat for 2.3 cm down from the tip. This specimen was found at 42Sa6881 (W:5:31) a Basketmaker III-Pueblo I site.

MISCELLANEOUS STONE ARTIFACTS

Sandal last. (1) (Fig. 49, i). This chipped and partially ground stone object was found at 42Sa6646 (W:5:44). It was made from a mano that had worn too thin to be used. The sides are slightly concave. Its dimensions are 24.5 by 10.4 by 2.3 cm.

Maul. (1) (Fig. 49, f). At site 42Sa6882 (W:5:32) this implement was associated with Basketmaker III refuse. It is oval in cross section and was shaped by both pecking and grinding. It is fully grooved, but shows little evidence of use. The dimensions are 13.8 by 10.6 by 9.3 cm.

Ax. (1) (Fig. 49, h). This implement was shaped by rough chipping and then ground to form the bit. It is not grooved but rather three notches were pecked along the edges to facilitate hafting. Bit wear consists of both the dulling of the edge by grinding and the removal of several small flakes. This wear pattern suggests the implement may have been used at least part of the time for digging. It was found at 42Sa6852 (W:5:2).

Hoe. (1) (Fig. 49, e). A sandstone hoe from 42Sa6826 (V:8:52) is nearly circular in outline and an elongate oval in section. One side has been smoothed but because of the conglomeritic nature of the sandstone the opposite side is unworked. Two notches were chipped on opposite edges.

Palette. (1) (Fig. 49, g). This specimen, from 42Sa6887 (W:5:37), is made from a hematitic and limonitic sandstone. The piece is fragmentary, but shows a trough 3.8 cm wide and 1.2 cm deep. The specimen is 9.2 cm wide and 3.7 cm thick.

Pipe. (1) (Fig. 51, c). This oolitic limestone piece was recovered from the surface of 42Sa6825 (V:8:51). It was shaped by grinding and the interior is drilled from both ends. The narrowest interior diameter is 0.6 cm. The drilled holes are not symmetrical, indicating that the pipe was held at at least two different angles during the drilling. Overall length is 2.9 cm. The greatest outside diameter is 2.1 cm and the smallest is 1.7 cm.

Pendants. (2) (Fig. 51, d-e). Both pendants are made of Mexican onyx, a type of calcite. The larger is trapezoidal in shape and drilled biconically. It was found at 42Sa6940 (W:5:93) in association with Basketmaker III refuse. The smaller gives the appearance of being unfinished. Three incomplete drill holes were found on one side at one end. The smaller piece was found at 42Sa6799 (V:8:25). Both pendants were shaped and finished by grinding but neither was highly polished. Their dimensions are 3.9 by 2.9 by 0.5 cm and 2.1 by 0.9 by 0.7 cm.

Worked sandstone. (1) (Fig. 51, a). A fragment of sandstone from 42Sa6829 (V:8:55) has a number of small shallow holes drilled randomly on one surface. The drilled pits range from 0.4 to 0.8 cm in diameter.

Shaped calcite slab. (1) (Fig. 51, b). This fragmentary object, shaped by grinding but not polished, was found at 42Sa6779 (V:8:25). Its longest remaining dimension is 7.6 cm. The thickness is 0.9 cm.

SUMMARY OF STONE ARTIFACTS

From an analysis of the site distribution of projectile points it appears that Basketmaker III-Pueblo I people used only stemmed projectile points, particularly the variety with convex bases and tapering stems. Basketmaker II sites show only expanding concave base types. Pueblo period sites have produced all varieties of projectile points except for those with tapering stems. During the early part of the Pueblo II-III period stemless points are not represented.

As for drills, the Pueblo period saw the utilization of all varieties. Basketmaker III-Pueblo I drill styles are similarly varied except for the absence of the plain shaft variety. Basketmaker II drills are all of the expanding base variety. Interestingly, there are no drills of any type for the later Pueblo II-III period. Knives of all descriptions are found throughout the Pueblo period but rectangular and leaf-shaped knives are more common on Basketmaker III sites. Basketmaker II sites produced all knife types except rectangular knives and crude knives.

There appears to be no recognizable pattern in the distribution of choppers. Hammerstones were not observed at Basketmaker III sites. Flat, limited edge scrapers appear to have been more popular in the later part of the Pueblo II-III period than the earlier.

One-hand manos were preferred by the Basketmaker III occupants of the area although one two-hand mano was found on one site. At Basketmaker II sites a single example each of one- and two-hand manos has been found. The Pueblo II-III period is also evenly split on the use of one-hand and two-hand manos.

WORKED BONE

BONE AND ANTLER ARTIFACTS

Only two pieces of worked bone were found in the survey. The butt end of what may have been a bone awl at 42Sa6863 (W:5:13) is a split mountain sheep metacarpal with the butt end squared and all surfaces ground and smoothed. Its width is 1.1 cm and it is 0.5 cm thick. A second piece of worked bone from

42Sa6789 (V:8:15) is a mountain sheep phalange with the proximal end removed leaving a roughly cut beveled edge.

ELK HORN WRENCH

This heavy object (Fig. 52, b) was found in the interstices of a rough wall among cave roof boulders at 42Sa6801 (V:8:27). It is 30 cm in length and 4 cm in diameter along the shaft. An oval hole 2.8 by 3.4 cm at one end just before the fork is lined with a pitch-like substance. The wear patterns are distinctive. Beginning a few centimeters along the shaft below the hole, the antler shaft is polished much as an ax or shovel handle becomes polished through use. On each end of the oval hole on both sides of the specimen polishing indicates that relatively pliable objects, possibly leather thongs, had been repeatedly passed back and forth nearly parallel to the main axis of the shaft and at an angle of perhaps 45° to the axis of the hole.

PERISHABLE ARTIFACTS

COTTONWOOD SCOOP

This unique implement (Fig. 52, d), found on the surface of a slab-lined cist in the rockshelter, 42Sa6801 (V:8:27), was carved with a sharp tool to produce a point. Its length is 4.5 cm.

SHARPENED STICK

This fragmentary object (Fig. 53, h) from 42Sa6801 (V:8:27) was carved with a sharp tool to produce a point. Its length is 4.5 cm.

CANE CIGARETTE

This consists simply of a section of cane (Fig. 53, g) cut at one end and showing charring at the other. The septum has been perforated to allow the passage of smoke. It was found at 42Sa6965 (W:5:118). It is 3.8 cm long and 0.9 cm in diameter.

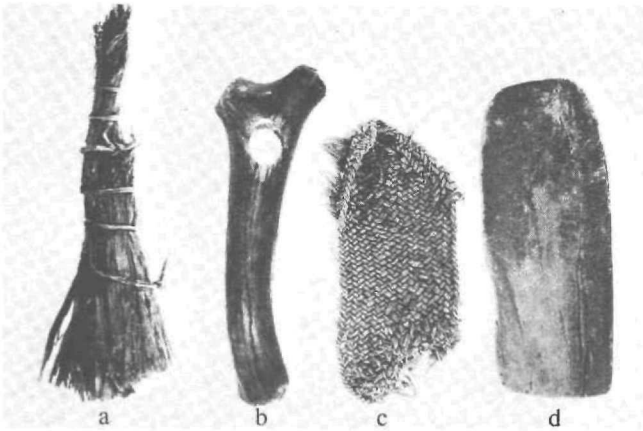


Fig. 52 Objects of wood, plant fiber, and antler: (a) juniper bark bundle; (b) perforated elk horn; (c) yucca-twilled sandal; (d) cottonwood scoop. The length of (a) is 34 cm.

BASKETRY

The only fragment of basketry found on the survey (Fig. 53, c) is from 42Sa6859 (W:5:9). Parts of six coils from the basket wall are preserved. One coil shows the two-rod-and-bundle technique while the remainder are of the one-rod-and-bundle type. All show a bunched foundation. The bundle appears to be made of yucca and grass. Simple uninterlocked stitches slant to the right. Coils average 60 mm in width. Width of stitches varies between 1.5 and 2.0 mm.

CANE MATTING

A fragment of cane matting (Fig. 53, a) was found at Bare Ladder Ruin. Five cane shafts are secured by yucca fibers passing over and under each shaft. At each end the yucca fiber is tied with a square knot.

SANDALS

A nearly complete sandal was found in collapsed roofing material at 42Sa6789 (V:8:15) (Fig. 52, c). Although part of the heel is missing, measurements of 25.5 cm by 10.8 cm could be obtained. The thickness averages 0.7 cm. Narrow yucca leaves are woven in a two-over and two-under twill. Butt ends of fibers protruding from the lower surface of the sandal have shredded through use and form a padding. Four narrow yucca leaves near the toes may have been part of the ties. Three perforations spaced evenly along the left edge may also have been for ties but no matching holes occur along the opposite side. The generally tight plaiting shows wear primarily at the heel where there appears to have been some mending.

A more fragmentary sandal from the surface at 42Sa6960 (W:5:113) (Fig. 53, d) is of complex manufacture. In its construction a fine, well-made two-over two-under twill of narrow yucca leaves appears to have been combined with heavy cordage on the lower surface. The loosely twisted cordage, some 8.0 mm in diameter, appears to be four-ply consisting of two-ply cords that have been Z-twisted together. Construction suggests that the twilled sandal was made on top of the cordage.

CORDAGE

Cordage data are summarized below in Table VI. The three-ply example, while assembled with a Z-twist, is made up of one Z-twist and two S-twist strands.

KNOTS

No knotted cordage was found. But ten yucca leaves and pieces of corn husk tied into knots are in the collection. Seven of these are square knots

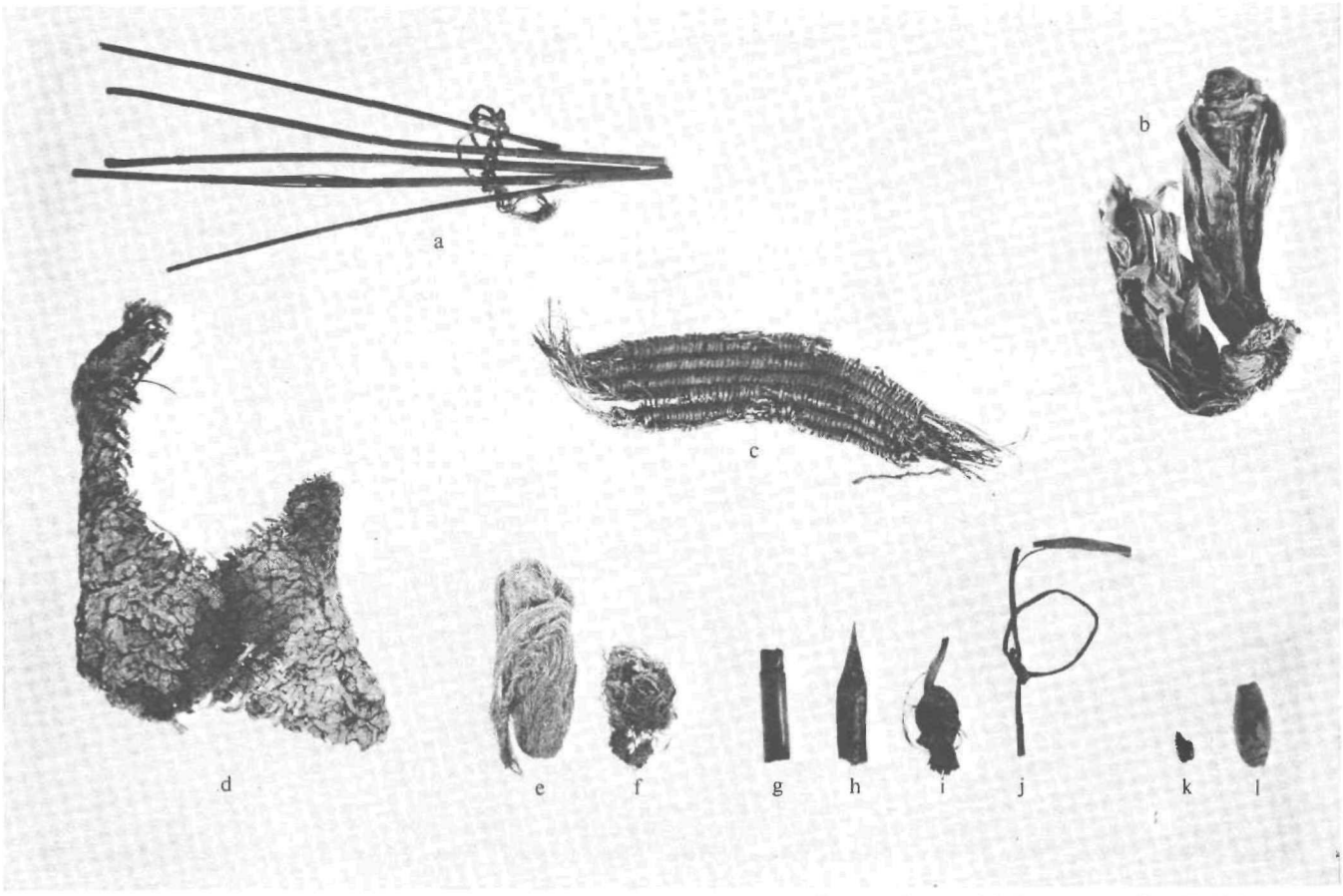


Fig. 53 Small perishable artifacts: (a) cane mat fragment; (b) knotted corn husk; (c) fragment of coiled basketry; (d) sandal fragment; (e-f) quids; (g) cane cigarette; (h) sharpened stick; (i) square knot; (j) granny knot; (k) *Olivella* shell; (l) *Oliva* shell.

(Fig. 53, i) one an overhand knot and one a multiple knot consisting of a square knot with an overhand knot in one of the loose ends. A single granny knot was observed. Two loops formed by knots are in the collection. These appear to have once enclosed objects measuring 13 by 18 mm and 25 by 30 mm.

Juniper bark bundle. This whisk broomlike object of shredded juniper bark is from 42Sa6789 (V:8:15) (Fig. 52, a). Elongate bundles of bark are tied together forming an object 34 cm in length and 11 cm at its greatest width. Charring at the wide end indicates that it may have been a torch.

QUIDS

One of these (Fig. 53, e-f) appears to be the well-chewed leaf of a corn plant. The remainder could not be identified as to plant species. One appears to have been intentionally folded and could possibly have been bundle material for use in basket manufacture as suggested by Jennings (1957). Quids have been found at 42Sa6789 (V:8:15), 42Sa6966 (W:5:119), and 42Sa6801 (V:8:27).

TABLE VI

Cordage from rockshelter sites.

SITE	Ply	Twist	Dia (mm.)	Twists (cm.)
42Sa6965 (W:5:118)	2	Z	3.0	3.0
42Sa6965 (W:5:118)	2	Z	3.8	2.5
42Sa6799 (V:8:25)	3	Z	2.5	4.0
42Sa6801 (V:8:27)	1	Z	4.0	—

MISCELLANEOUS REMAINS

PERISHABLE REMAINS

Plant specimens in the survey collection have been identified by Hugh T. Cutler (Table VII). They are exclusively from the dry rockshelter sites in the canyons. Samples from most sites are small; although on the basis of surface indications, one site, 42Sa6970 (W:5:123), may have perishable plant materials in quantity in the subsurface deposits. The best represented of the plant materials are corncobs and fragments of corn plants. One hundred thirteen of 127 identified plant specimens are corn. Of these, 82 are cobs. Corncobs are tallied below and are shown according to number of grains and according to cupule widths (Figs. 54, 55). In these tabulations sites are grouped according to time period. This arrangement of the data was done in order to test the distribution through time of corn having high and low row numbers and wide and narrow cupule widths. Cutler says of the problem posed by row numbers:

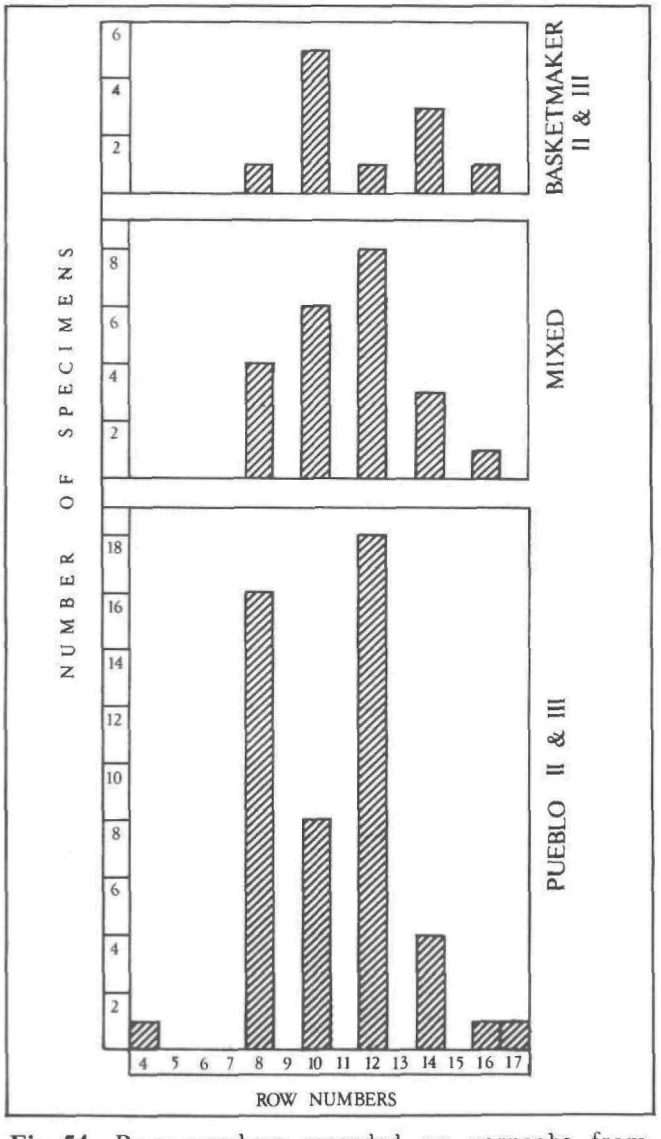


Fig. 54 Row numbers recorded on corncobs from surveyed sites.

> "In general Basketmaker corn has 12 to 14 rows of grains and relatively few, if any, ears with eight rows of grains appear. About A.D. 900 or thereabouts eight-rowed corns come into Utah. They appear in southern Arizona: Slightly later other kinds of corn appear so that by the middle of Pueblo II there is a wide range of corn types. This range of corn continues to increase and in Pueblo III you have large-cobbed corn beginning to dominate in the Verde Valley and in the upper Rio Grande Canyon area. At the same time many of the earlier kinds of corn continue to be grown in decreasing amounts and all kinds of corn continue to hybridize.
>
> "Dents appear to come from the Fremont Culture area in Utah to some extent and then a later introduction of dents probably directly from Mexico appears in the upper Rio Grande Pueblo region. Hopi corn is thus still dominated by the kinds grown by the Basketmakers and by the river tribes of today, Pima, Papago, and Yuma, while the Rio Grande Pueblo corn is more like some of the corn of Mexico with very little of the earlier corn present."
>
> (personal communication 1963)

In view of Cutler's statements it is interesting to note that in the White Canyon collection the eight-row corn specimens represent 33% of the cobs from the Pueblo II-III sites, 18% of those from mixed or indeterminant sites, and only 9% of the cobs from the Basketmaker sites. Although our sample size is small these figures do seem to bear out Cutler's conclusions. Cupule width figures are less conclusive but do seem to show somewhat larger widths in the later sites.

MAMMAL BONE

Very few mammal bones were observed on the survey. Preservation of bone in surface exposure on open sites is unlikely. However, the rockshelter sites also produced surprisingly little bone. In the total sample we have only seven bones: five mountain sheep (*Ovis canadensis*), one mule deer (*Odocoileus hemionus*), and one marmot (*Marmota flaviventer*). The marmot is not native to the area at present but has been found in Pueblo II and III sites in nearby areas.

SHELL

Four *Oliva* shells have been found in the refuse area of 42Sa6883 (W:5:33). Their mean measurements are: length 28 mm, width or thickness 12 mm. In each case the tip of the spiral has been removed to facilitate stringing but the shells are not otherwise modified. An

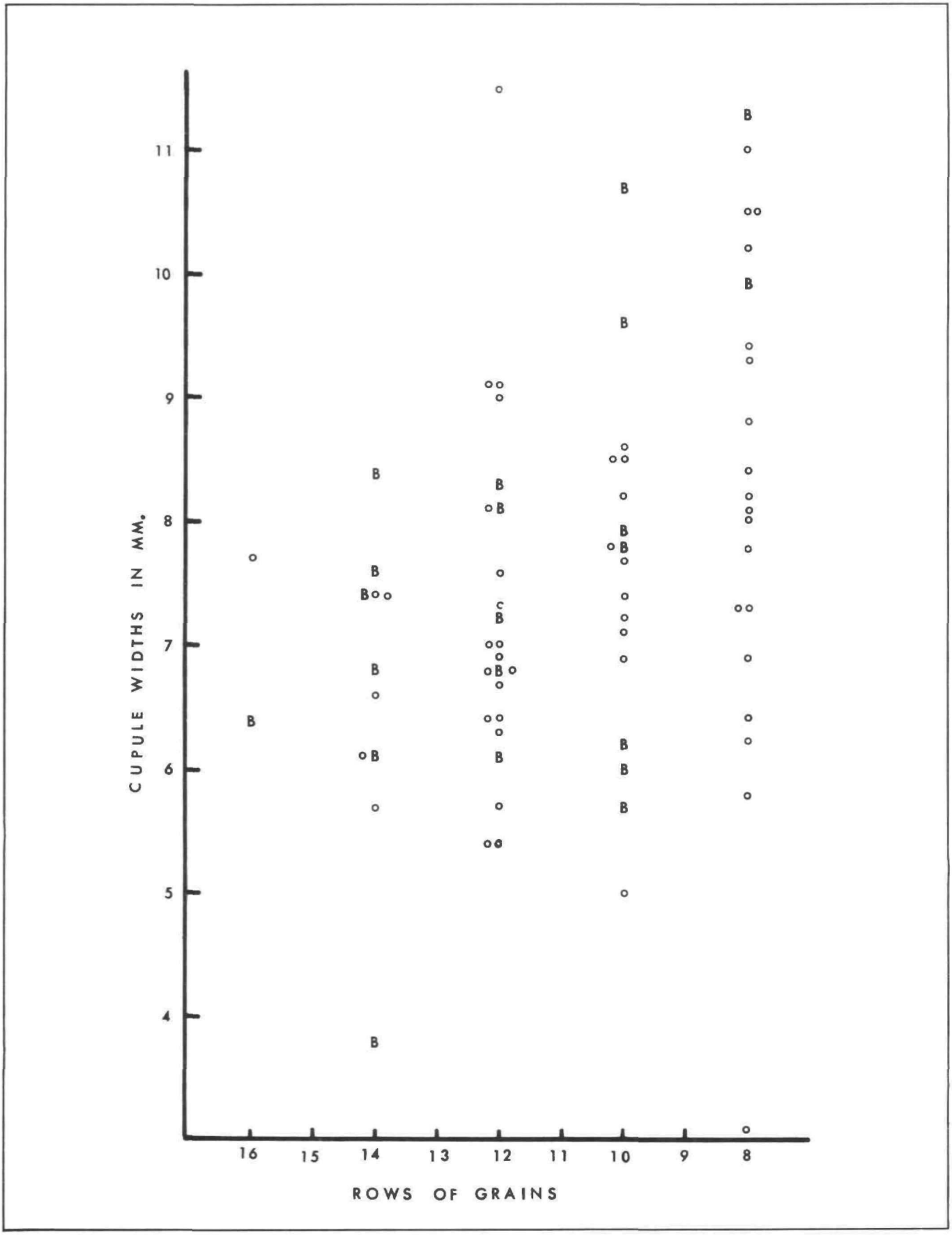


Fig. 55 Row numbers and cupule widths of corn from surveyed sites. Sites for which there is a Basketmaker II or III component are indicated by a *B*. Occurrences at Pueblo II-III sites are shown as an *o*.

TABLE VII

Plant specimens from rockshelter sites.

SITE	corncob	corn tassels	corn husk	corn stalk	corn ear shank	juniper seeds	cucurbita pepo	acorn shell	willow twig	pinyon cone	pinyon nut shell	squash vines	oak leaf	TOTAL
42Sa6673 (V:8:3)	1													1
42Sa6779 (V:8:4)	1													1
42Sa6638 (V:8:5)	2													2
42Sa6781 (V:8:7)	6													6
42Sa6782 (V:8:8)	3					6		1						10
42Sa6783 (V:8:9)	8													8
42Sa6785 (V:8:11)	2													2
42Sa6788 (V:8:14)	1													1
42Sa6789 (V:8:15)	2	4	1						1					8
42Sa6792 (V:8:18)	1													1
42Sa6793 (V:8:19)	1													1
42Sa6794 (V:8:20)	1													1
42Sa6797 (V:8:23)	6													6
42Sa6799 (V:8:25)	2													2
42Sa6801 (V:8:27)	7	1		1	1		1							11
42Sa6803 (V:8:29)	1													1
42Sa6812 (V:8:38)	1													1
42Sa6815 (V:8:41)	2													2
42Sa6819 (V:8:45)	2													2
42Sa6823 (V:8:49)	5													5
42Sa6837 (V:8:63)	1													1
42Sa6859 (W:5:9)	2													2
42Sa6864 (W:5:14)	1													1
42Sa6866 (W:5:16)	3													3
42Sa6870 (W:5:20)	1													1
42Sa6880 (W:5:30)	1													1
42Sa6961 (W:5:114)	1													1
42Sa6962 (W:5:115)	2													2
42Sa6963 (W:5:116)	2													2
42Sa6964 (W:5:117)	1													1
42Sa6965 (W:5:118)	3													3
42Sa6966 (W:5:119)	3													3
42Sa6967 (W:5:120)	1													2
42Sa6970 (W:5:123)	5	4	12	6	1					1	1	1	1	31
TOTAL	82	9	13	7	2	6	1	1	1	1	1	1	1	126

Identifications have been made by Hugh T. Cutler.

Olivella shell from 42Sa6969 (W:5:122) has been comparably prepared for hafting.

HUMAN BONE

Human bones were observed at only two sites. At 42Sa6962 (W:5:115) a single adult human patella was found on the surface.

At 42Sa6794 (V:8:20), a possible Basketmaker II site, the remains of at least four individuals were exposed on the surface. The site consists of nine Basketmaker II type cists. It is probable that these cists were used for burial but the skeletal remains are scattered throughout the rockshelter. The bones observed on the surface are those of a fully mature adult, a young adult, a child between six and eight years old, and an infant.

DISCUSSION

The characteristics of four cultural periods have been described. We are reluctant to assign specific phase designations to these because survey data is not sufficient for such a level of specificity and also because to do so would attribute a greater importance to the "centers" (Mesa Verde and Kayenta) than they may have had in the study area. The evidence suggests that regular use of the White Canyon area may have begun about 2000 B.P. One site 42Sa6969 (W:5:122) with large unnotched leaf-shaped projectile points may be earlier.

Our criteria permit the identification of Basketmaker II components at only seven sites. More liberal criteria would double this number. We have no tree-ring dates or other absolute age dates to apply to the Basketmaker II period. The upper White Canyon Basketmaker II sites show little surface evidence of architecture other than slab-lined and unlined storage cists. At Natural Bridges, as elsewhere in the Southwest, the presence of corn in dry caves indicates that the early Basketmakers were aware of and to a certain extent dependent upon this and other plants. The settlement pattern, however, does not indicate an entirely sedentary lifeway. We agree with Lipe who emphasizes that in the nearby Red Rock Plateau area Basketmaker II culture is characterized by an older essentially Archaic settlement pattern and resource utilization (Lipe 1967). This has recently been expanded upon by Camilli who proposes a Southern Paiute subsistence model for Basketmaker II data (Camilli 1975).

The Basketmaker III-Pueblo I period constitutes the first full-scale utilization of the upper White Canyon area. This occupation may be the most dense Basketmaker III settlement in southeastern Utah west of Alkali Ridge. The Natural Bridges sites differ markedly from those of Alkali Ridge in being small but numerous while the Alkali Ridge sites are fewer in number but larger in size. Sites of this type are almost all open sites. The few rockshelter sites give some clues as to architectural forms present at the time as do the three excavated sites. Typical Basketmaker III pithouses are not in the excavated sample but probably do exist in quantity. A tally of open sites indicates that sites with proportionally little or no painted pottery are usually without surface evidence of architecture while sites with greater percentages of painted pottery show more indications of architecture. This suggests change through time probably involving the development of semisurface nonhabitational structures such as were excavated by Schroeder. Clear surface evidence, such as loose stone and vertical slabs, is left by these structures more often than by true pithouses.

The transition to the Pueblo II-III period saw the adoption of Pueblo II pottery styles at many sites where people appear to have been continuing the Basketmaker III-Pueblo I architectural tradition. This more than anything seems to document the continuity of the two periods. A crucial question concerns the way in which the new traits came into the area. At Natural Bridges, Pueblo II-III ceramic styles reflect types from both the Mesa Verde and Kayenta areas. The Kayenta pottery seems to have been obtained through trade from south of the San Juan since temper, paste, and surface characteristics are highly similar to homeland Kayenta types. Sherds resembling Mesa Verde types have a distinctly local flavor and probably were not obtained through trade. The Kayenta types are distinctly less numerous. Kayenta pottery shows up in cliff dwellings only in traces while in some open sites it is predominant. The pottery at Natural Bridges cliff dwellings during Pueblo II and Pueblo III more or less reflects Mesa Verde styles. The same is true of open sites during this period but in addition these sites show definite evidence of trade of varying intensity with the Kayenta center during Pueblo II but not during the Pueblo III Tsegi Phase. These observations should not be too surprising. The Kayenta center is known to have been a vigorous exporter of pottery if not culture or population during Pueblo II and early Pueblo III. But, in the San Juan triangle this influence decreases markedly as one moves north and east.

The Natural Bridges area is about an equal distance from the Kayenta and the Mesa Verde areas. But in terms of distance and ease of travel it is distinctly closer to the Mesa Verde settlements in the Blanding-Monticello area. In historic times the major travel routes ran east from White Canyon toward Bluff and Blanding.

Some comparisons should be drawn between the study area and the Red Rocks Plateau immediately to the southwest. Lipe feels that there were two main phases of occupation of the Red Rocks Plateau after Basketmaker times. The first of these he identified as Klethla Phase and the second he named Horsefly Hollow Phase. Lipe believed that the earlier Klethla Phase with its strong Kayenta ties came to an end about A.D. 1150. Sites of the later Horsefly Hollow Phase show a mixture of ceramic influences from both the Kayenta and Mesa Verde areas. Although he originally postulated a hiatus between these two phases from about A.D. 1150 to A.D. 1200, Lipe no longer feels that this is necessarily the case (personal communication 1973). Interestingly, at Natural Bridges the tree-ring record shows that at a number of rockshelter sites there may have been a major construction phase around the middle of the twelfth century just at the end of Lipe's Klethla Phase. Were it not for the ceramic evidence we would be tempted to suggest some of the

TABLE VIII

The distribution of pottery types at Pueblo II-III open and rockshelter sites.

Pottery Types	Open Sites	Rockshelter Sites
Black Mesa B/w.	8	—
Sosi B/w.	87	1
Dogoszhi B/w.	34	1
Flagstaff B/w.	2	1
Tusayan B/w.	—	1
Unclass. Tusayan W.W.	23	3
Gallup B/w.	13	—
Mancos-McElmo B/w.	402	60
Mesa Verde B/w.	96	73
Unclass. Mesa Verde W.W.	226	264
Abajo Red/orange	1	—
Unclass. San Juan R.W.	—	2
Medicine B/r.	32	1
Tusayan B/r.	82	5
Cameron Poly.	10	—
Citadel Poly.	24	3
Tusayan Poly.	20	4
Tsegi Red/orange	1	—
Kiet Siel B/r.	1	—
Unclass. Tsegi O.W.	112	22
Plain Gray	119	148
Indent Corr.	678	200
Clapboard Corr.	55	29
Exuberant Corr.	20	42
Patterned Corr.	25	4
Incised Corr.	4	—

departing population from the Red Rocks Plateau might have settled in the upper White Canyon area.

To explore this ceramic evidence sherd counts from open and rockshelter sites at Natural Bridges are shown in Table VIII and are summarized as percentages of wares in Table IX. Since the Natural Bridges tree-ring evidence for a mid-twelfth century construction spurt comes from rockshelter sites it should be noted that no rockshelter site has a preponderance of Kayenta types, the types one would expect a departing Klethla Phase population to have brought with them. Also, those open sites in our sample with dominantly Kayenta pottery types are too early to match up with a mid-twelfth century date.

To return to the question of how Pueblo II-III traits came to the study area, it looks as if two things happened. First, the indigenous Basketmaker III-Pueblo I population learned of and began to practice newer ways of pottery-making from the east. The newer kind of pottery was made locally in imitation of other types seen or traded from the east. At first the pottery styles were probably all that changed. Site types and architectural forms, as much as we can infer from surface evidence, were slow to change and at many sites changed little, if at all, during the Pueblo II-III period. Second, there was some direct movement of Klethla Phase materials into the area as a part of the general northward expansion of Kayenta trade and cultural influence during Pueblo II. The Kayenta influence ceased to exist as a ceramically identifiable entity by the mid-to-late twelfth century.

Surface masonry architecture eventually began to appear at some sites and, judging from associated ceramic styles, may have come through imitation of Mesa Verde settlements to the east. But, even a few large open sites with late Mesa Verde-like pottery have no surface masonry architecture. Some form of pithouse, the prevalent residence type at the end of the Basketmaker III-Pueblo I period, probably remained the principal dwelling form at many sites throughout the Pueblo II-III period. While no one on the Mesa Verde proper would have thought of living in a pithouse much after A.D. 1000, this more ancient house type seems to have remained quite respectable in the Kayenta area right up until the end of Pueblo III (Hobler 1974). At Beef Basin, to the north of White Canyon, Rudy has excavated true pithouses with good Mesa Verde pottery in association (Rudy 1955).

It is not possible to exactly place the beginning of the Pueblo period occupation of the White Canyon rockshelters. Most of the first Pueblo II sites in the area were probably open sites as evidenced by the probable architectural continuities with the preceding period. Tree-ring dates in rockshelters go back to A.D. 729, but do not show any clustering until just before A.D. 1060. Both specimen erosion and the fact that most of the wood employed is from snags account for the scatter of dates and suggest that even this dating may be too early. Full scale use of the rockshelters may not have begun until nearly the end of the Pueblo II period. Suggestive of this is the scarcity of Pueblo II Kayenta pottery types at rockshelter sites. Also, at open sites less than one-quarter of the identified Mesa Verde White Ware sherds are in the style of Mesa Verde Black-on-white, whereas in the rockshelter sites more than one-half resemble Mesa Verde Black-on-white. The rockshelter occupation was, however, neither brief nor insignificant judging from the number and size of sites and from the numerous sites in which structures were built, used, then dismantled to make room for other structures.

TABLE IX

Pueblo II-III pottery other than gray wares.

	Open Sites	Rockshelter Sites
Mesa Verde White Ware	61.7	92.0
San Juan Red Ware	0.1	0.3
Tusayan White Ware	13.0	1.3
Tsegi Orange Ware	24.1	6.4
Cibolla White Ware	1.1	—
	100%	100%

Most of what can be learned of Pueblo II-III architecture comes from the well-preserved rockshelter sites. In these sites one is struck by the lack of standardization in building style and technique. Kivas, dwellings, and storage structures can be found aboveground or below ground and are made of stone masonry, log masonry, jacal, vertical slabs, or coursed adobe. Often one finds combinations of several of these techniques in a single structure. For open sites we have much less to go on. Architectural nonconformity is evidenced by the relative scarcity of coursed masonry at many sites, even the larger ones. This suggests the presence of other kinds of structures employing perishable construction materials, as well as pithouses.

It is not enough to attribute this nonconformity to Anasazi norms to marginality. What is the reason for such marginality? In fact, are the Natural Bridges settlements Anasazi at all? In this respect the kivas provide some insight. Few would argue that the architectural essential of the San Juan Anasazi is the kiva. There is no problem in recognizing the kivas in the study area. Despite oddities of wall technique or location they all possess a significant cluster of those attributes commonly recognized as necessary and sufficient for the identification of a structure as a kiva. But, in the upper White Canyon it is the distribution of kivas and their associated structures that distinctly sets the area apart. Kivas are often found associated only with storage structures, sometimes with no other structures at all. Among the rockshelter sites, kivas are found in almost equal numbers to dwelling-size rooms. In terms of total floor area kivas constitute a square footage almost equal to dwellings. We have suggested that the Natural Bridges kivas may have been built and used principally as dwellings. If this is so, then the functional complex usually associated with the kiva elsewhere in the San Juan may not have diffused along with the form of the kiva. Numerous anthropological studies have shown that not all attributes of a complex cultural pattern will diffuse across cultural boundaries with equal ease and speed. Simple material items (such as kiva form) diffuse rapidly while complex nonmaterial aspects involving basic lifeway and world view (the kiva ritual and social complex) are more resistant to transfer.

Such an interpretation is in agreement with our general impression of a stable indigenous population existing in the study area from early Basketmaker III times onward. These people appear to have absorbed ideas more slowly and to have participated in a culture not entirely in step with the rest of the San Juan although trade in material items did occur. Such cultural lag appears to have been due to lack of clear and repeated communication with the nearby Anasazi centers and may well have come about as a result of a language barrier. In any event, we would see any attempt to explain cultural change in the upper White Canyon area as the result of migrations of people from the Mesa Verde or Kayenta centers as contrary to the evidence.

As for the abandonment of the area, the latest tree-ring date is A.D. 1251. The area does not appear to have undergone the same settlement nucleation that took place in parts of the Kayenta area just across the San Juan. Several of the upper White Canyon sites have clearly defensive features. At least some of these are late sites and in one instance a defensive wall built atop a late structure appears to have been the last architectural unit added to that site.

Environmental factors undoubtedly were critical in the abandonment although it is difficult to imagine aridity so severe that corn and other crops could not have survived if carefully tended in certain parts of the main canyon bottoms. Jennings has emphasized the prehistoric utilization of a broad range of wild and semiwild plant foods (1966). These gathered foods may have constituted a more significant proportion of the total food intake than in less environmentally marginal areas. Ecological shifts that affected a significant number of these species, particularly if such shifts similarly affected game populations, could have constituted a sufficient erosion of the subsistence base to render the area uninhabitable.



Fig. 56 Part of petroglyph panel at Ruin Rock, 42Sa6813 (V:8:39).



Fig. 57 Part of petroglyph panel at Ruin Rock, 42Sa6813 (V:8:39).

APPENDIX I

ROCK ART IN THE WHITE CANYON BASIN

By Polly Schaafsma

During the Hoblers' fieldwork in the Natural Bridges area fifteen rock art sites were recorded. Paintings and other decoration were also recorded from the adobe plaster on ruin walls at five sites. In addition, the petroglyphs at 42Sa276, located just to the east of their survey area at the top of the west side of Comb Wash, have been included in this study. Data from these sites are tabulated below.

Rock paintings and petroglyphs within the Bridges district are found almost entirely at or near rockshelter habitation sites. Out of the 86 rockshelter sites included in the Hobler survey, rock art was found at 16 sites, or in other words, at one out of every 5.4 sites. The close association of rock art with habitation sites at Bridges is consistent with findings elsewhere within the Anasazi area, as evidenced by surveys on the Mesa Verde (Hayes 1964), Glen Canyon (Turner 1963), and in Tsegi Canyon (Schaafsma 1966).

With one exception, the Anasazi-authored rock and wall decorations seem to fall within the Pueblo II and III periods — both in regard to the graphic styles represented, in as far as these are identifiable, as well as in their association with other cultural remains. Painted handprints, a popular motif in Anasazi rock art from Basketmaker II through Pueblo III, are found as positive, and less often as negative, images in seven Bridges sites. At each site, late Pueblo II-III pottery or architectural remains from this time period have been in evidence. Equally as undiagnostic are the painted anthropomorphs with feathered headgear and "cloaks" at 42Sa6801 (V:8:27). Pottery, however, from a nearby habitation site dates within the Pueblo II-III range.

The Pueblo II-early Pueblo III Glen Canyon Style 4 as defined by Turner (1963) for the Glen Canyon region is well represented in the Bridges district by the large petroglyph panels at Ruin Rock, 42Sa6813 (V:8:39) (Figs. 56, 57, 58), and at 42Sa6844 (V:8:70) (Fig. 59) as well as by the rectilinear lizard man with decorative side frets at 42Sa6962 (W:5:115). (Fig. 60). The Glen Canyon Style 4 includes sites with both Mesa Verde and Kayenta affiliations. It is interesting in this connection that Turner found in the Glen



Fig. 58 Part of petroglyph panel at Ruin Rock, 42Sa6813 (V:8:39).



Fig. 59 Petroglyphs at 42Sa6844 (V:8:70), Armstrong Canyon. In 1907 a short, notched log ladder provided access to this site.



Fig. 61 White painted rock art at 42Sa6967 (W:5:120), White Canyon.

Canyon that the Mesa Verde sites had triangular-bodied anthropomorphs with a tendency toward curvilinear arms and legs, anthropomorphs with bird-topped headgear and a lack of the lizard design, all of which are features of the Ruin Rock panel. Specific resemblances to Kayenta rock art can be seen in the paintings from 42Sa6967 (W:5:120) (Fig. 61), and in the large circular designs at 42Sa6779 (V:8:4) and 42Sa6962 (W:5:115), all of which are found associated with Pueblo III cliff dwellings in Tsegi Canyon (Schaafsma 1966). The geometric designs scratched on the walls of Bare Ladder Ruin (Pierson 1957) are paralleled in the Tsegi by similar designs on the plastered walls of rooms in Betatakin. A detailed analysis of the Mesa Verde or Kayenta affinities of the Bridges work, however, is not feasible until more is known of the features which distinguish these two regions. By the same token, no characteristic distinctive of the Bridges district can currently be isolated.

A further complexity of the Bridges district is suggested in the Ruin Rock panel by the presence of the running figures with high dot headdresses. These figures seem to be specifically relatable to types found in the Virgin Kayenta Cave Valley Style complex found in Zion National Park and in the vicinity of Kanab (Schaafsma 1971). The style in the Virgin

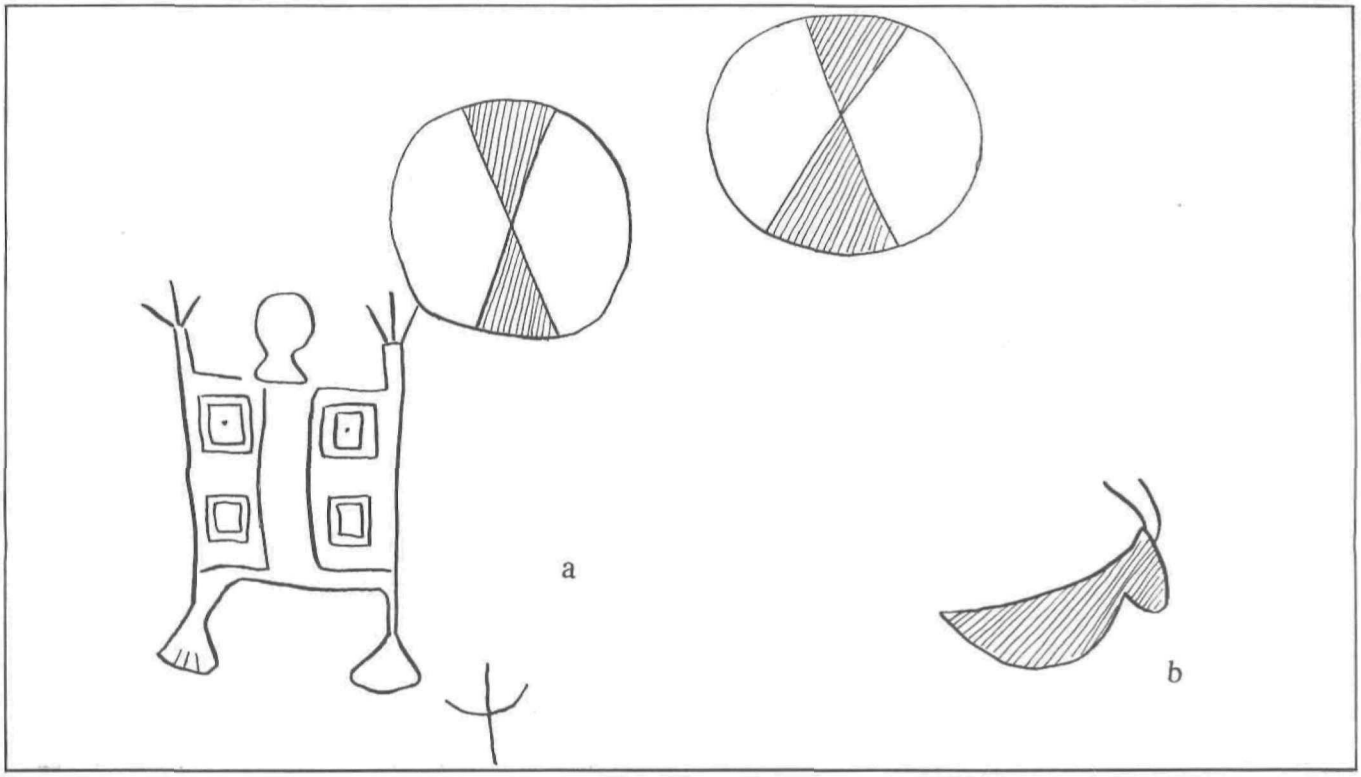


Fig. 60 Site 42Sa6962 (W:5:115) paintings in blue and white.

Kayenta area has not been closely dated. Other forms of Virgin Kayenta influence in this part of Utah are notably absent, (Sharrock and Keane 1962).

The one possible major exception to the late Pueblo II-III affiliation of the Anasazi rock art at Bridges may be found in the large painting in the shallow rock shelter at 42Sa6798 (V:8:24) (Fig. 62). The anthropomorphs pictured here are not particularly distinctive, and yet their general configuration is suggestive of an earlier origin. Butterfly headdresses and helmets are also present, both of which are more commonly found on early Anasazi work and are notably absent at other Bridges sites. The fragments of jacal structures inside the shelter are believed to be similar to the Pueblo II and Pueblo III remains in the area (Hobler personal communication). It is significant, however, that Basketmaker III pottery was found just outside the shelter. The late tree-ring dates on the logs inside may not apply to the paintings.

In addition to the Anasazi rock art which predominates in the Bridges district, one site shows Fremont influence. At Kachina Bridge Ruin the six small anthropomorphs or "ghost figures" painted on the wall of a round room are typologically identical to certain neighboring southern San Rafael Fremont anthropomorphs, found throughout the southern and eastern portions of this Fremont zone (Schaafsma 1971). This conjunction of Fremont painting with an otherwise Anasazi site is not unique. Fremont rock paintings have been found on the left bank of the Colorado in Canyonlands National Park in association with otherwise Mesa Verde cultural remains (Sharrock 1962). Whether or not these instances represent a wholesale Mesa Verde borrowing of Fremont designs, or whether they are, in fact, of Fremont origin, is still a matter of debate (Ambler 1970). The Bridges example, in which the Fremont type figures appear on the architecture itself, clearly indicates that the Fremont type work does not necessarily precede the Anasazi occupation.

The remaining work at Bridges is probably historic in origin. This includes the scratched cross-hatching at 42Sa6779 (V:8:4) and 42Sa6816 (V:8:42), as well as the incised cross at 42Sa6801 (V:8:27). Animal-back figures at 42Sa276 including most of the hunt scene depicted here, as well as the animal-back figure pecked into the kiva plaster above fill level at 42Sa6819 (V:8:45) appear to be of recent, probably Ute, origin. It is possible that the bison shield, and shield bearer at 42Sa276 were also done by Utes but without definite evidence of superposition or differential patination this is difficult to determine.

A summary of rock art sites is given below. Time placement was by pottery unless otherwise indicated. Appendix II should be consulted for a tabulation of other archeological features associated with each of these sites.

Site 42Sa6779 (V:8:4). Several positive small white handprints, some with round holes in palms; red triangles and red hourglass figures that are not necessarily anthropomorphic; white circular design on red background; petroglyph: small scratched area that is cross-hatched and looks recent.

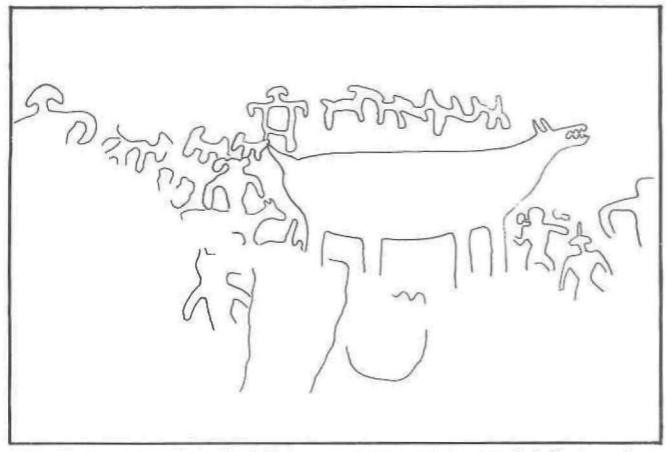


Fig. 62 Rock paintings at 42Sa6798 (V:8:24) in the Kachina Bridge area.

Style Handprints are general Anasazi; circular design is Pueblo III; compares with Tsegi Phase in Tsegi Canyon.

Period Late Pueblo II-Early Pueblo III.

Illustration Fig. 63.

Site 42Sa6786 (V:8:12). Paintings: several red handprints; a "chain"; wavy lines.

Style General Anasazi.

Period Pueblo III.

Site 42Sa6798 (V:8:24). Paintings: faded figures in reddish-brown form a group composition of anthropomorphs and animals that surround a large open-mouthed quadruped resembling a wolf. Anthropomorphs have square- or broad-shouldered torsos with arms held down. A helmet and possibly a butterfly headdress are represented. Animals except the wolf are extremely simple, almost schematic.

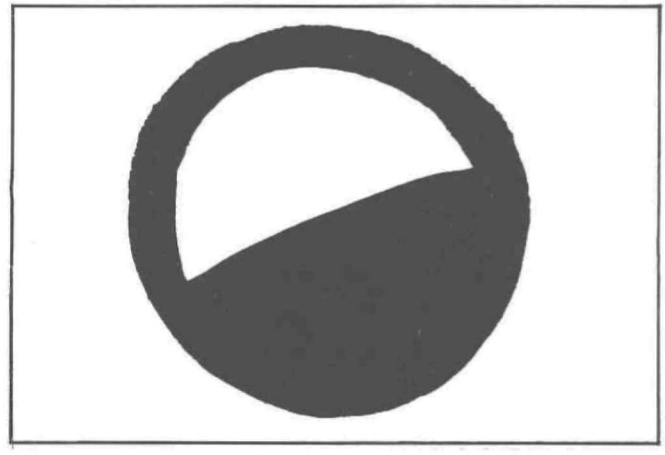


Fig. 63 White painted circular design on red background near Lestaki Ruin, 42Sa6779 (V:8:4).

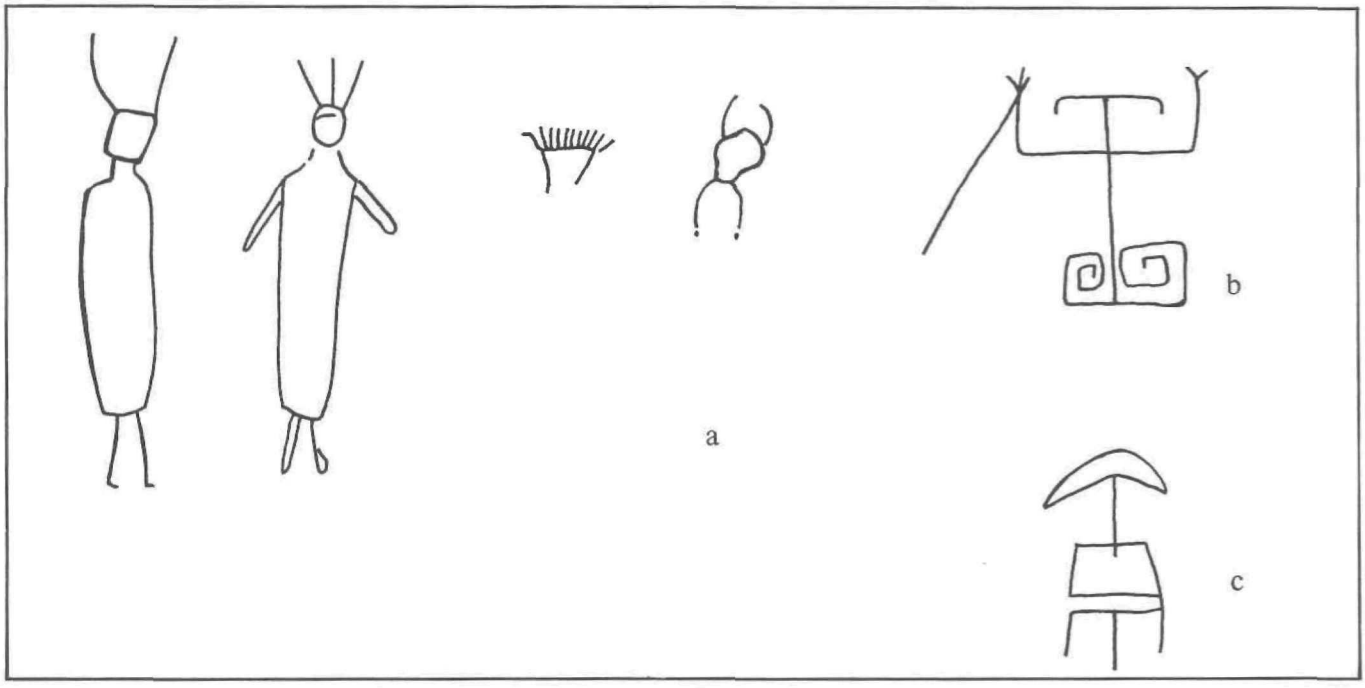


Fig. 64 Rock paintings in the immediate area of Kachina Bridge.

Style Anasazi, possibly Basketmaker III-Pueblo I.

Period A small multiple component site is immediately associated. Architecture appears to be Pueblo II-III, and two tree-ring dates on logs not directly associated with the architecture fall within Pueblo IV.

Illustration Fig. 62.

Site 42Sa6801 (V:8:27). Paintings: on house wall six triangular anthropomorphs lacking appendages. Zigzag line on cave wall 1.2 m long. Beneath Kachina Bridge a series of tall "cloaked" figures with horned and feathered headdresses are some 2.8 m above present ground level; rectilinear anthropomorph; petroglyph: 30 cm long cross on cave floor in double outline.

Style Six anthropomorphs are in southern San Rafael Fremont style; cross may be recent; rectilinear anthropomorph in Pueblo II-III style.

Period Pueblo II-III.

Illustration Figs. 13, 64.

Site 42Sa6804 (V:8:30). White negative handprints on rockshelter wall above storage structure, paint appears to have been blown on.

Style General Anasazi.

Period Early Pueblo III.

Site 42Sa6808 (V:8:34). Paintings: six to ten red handprints; long zigzag and squiggly lines; large mountain sheep; anthropomorphs. Petroglyphs: dinosaurlike zoomorph; spirals, anthropomorph.

Style General Anasazi.

Period Pueblo II-III by architecture.

Illustration Figs. 65, 66.

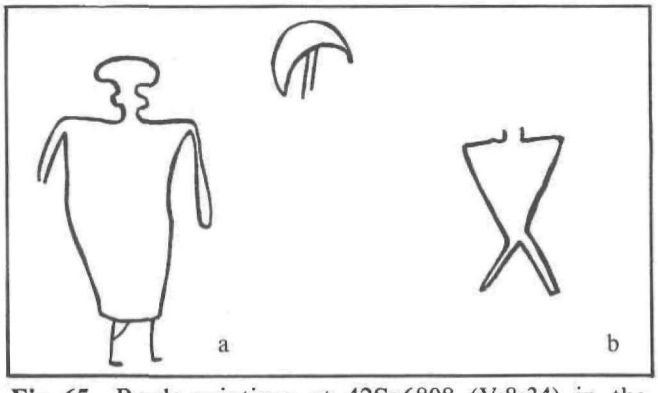


Fig. 65 Rock paintings at 42Sa6808 (V:8:34) in the immediate area of Kachina Bridge.

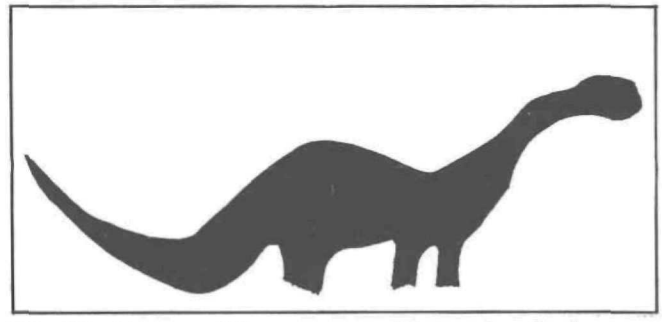


Fig. 66 Dinosaurlike zoomorphic petroglyph on Kachina Bridge, 42Sa6808 (V:8:34). Patination is comparable to that on other clearly Anasazi petroglyphs.

Site 42Sa6813 (V:8:39). Extensive panel of petroglyphs: mountain sheep; atlatls and arrows or darts given emphasis in hunt scenes; triangular-bodied anthropomorphs with bird-topped headgear; human figures apparently in pursuit of one another; birds also appear alone; wavy lines and spirals predominate among abstract elements; one single pole ladder.

Style Glen Canyon Style 4 Pueblo II-early Pueblo III. Figures in pursuit resemble Cave Valley style, Virgin Kayenta.

Period Early Pueblo III.

Illustration Figs. 56, 57, 58.

Site 42Sa6819 (V:8:45). Black figures on kiva wall: double sawtooth design; large triangular-bodied anthropomorph; other faint small-bodied anthropomorphs; circle with wavy lines; human figure on animal back; circle with dot scratched in wall plaster above level of the fill.

Style Anasazi, Pueblo II-III. Animal-back human figure could be recent although similar figures elsewhere appear prehistoric.

Period Pottery Pueblo III, tree-ring date A.D. 1208.

Illustration Fig. 67.

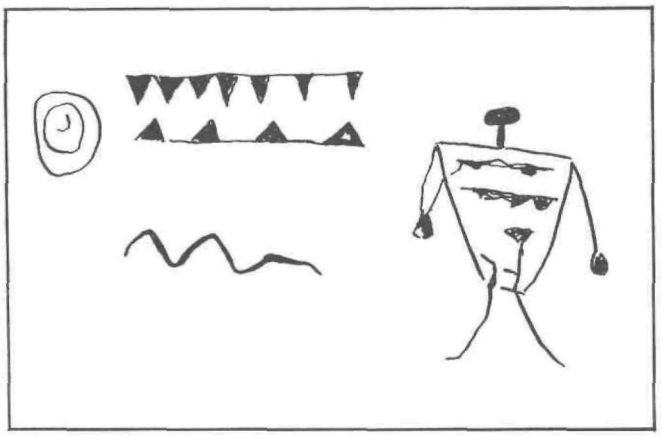


Fig. 67 Black figures on inner surface of kiva wall at Horsecollar Ruin, 42Sa6819 (V:8:45).

Site 42Sa6821 (V:8:47). Petroglyphs: repeated Y-shaped design cut into boulders within rockshelter.

Style Unknown.

Period Late Pueblo II-early Pueblo III.

Site 42Sa6837 (V:8:63). Punctate design in adobe wall: inverted triangles ten cm in length.

Style General Anasazi.

Period Pueblo II-III.

Site 42Sa6844 (V:8:70). Petroglyphs, a large panel: double sawtooth design; rectilinear stick figure; anthropomorphs; rectilinear meander; wavy lines; mountain sheep.

Style Glen Canyon Style 4.

Period Pueblo II-III by architecture.

Illustration Fig. 59.

Site 42Sa6859 (W:5:9). Punctate design in adobe wall: diamond with center hole and concentric circle 50 cm in diameter.

Style General Anasazi.

Period Pueblo II-III.

Site 42Sa6961 (W:5:114). Paintings: negative and positive red handprints.

Style General Anasazi.

Period Pueblo II-III.

Site 42Sa6962 (W:5:115). Paintings in blue and white: two large circles; mountain sheep; rectilinear lizard man with decorative side frets.

Period Pueblo II-III.

Illustration Fig. 60.

Site 42Sa6965 (W:5:118). Paintings: negative and positive red handprints. Scratched designs in kiva plaster. "In the outer layer of plaster of kiva there are a great many geometric designs scratched into it with a sharp point. All of the incisions are oblong . . . similar in shape and appearance to the embroidery on the ends of ceremonial sashes used by the present day Pueblos." (Pierson 1957, p. 228).

Style Handprints are general Anasazi. Scratched designs Pueblo II-III resemble Glen Canyon Style 4 or Betatakin incisings.

Period Pueblo III. Tree-ring dates from the site range from A.D. 1041 to 1179 with clustering in the mid-twelfth century.

Site 42Sa6967 (W:5:120). Paintings: large figures in white; T-shaped figure; large anthropomorph 50 cm high; complex sawtooth motif.

Style Resembles rock art associated with the Tsegi Phase in Tsegi Canyon.

Period Early Pueblo III.

Illustration Fig. 61.

Site 42Sa276. Petroglyphs: shield-bearing figures, shields, bison, mounted figures, animal tracks, mountain sheep, deer, horned anthropomorphs.



Fig. 68 Petroglyphs at site 42Sa276 near Comb Wash. A kind of shield figure, bison, and a hunter armed with a bow are depicted.



Fig. 69 Petroglyphs at 42Sa276. Mounted bow hunters on this panel are depicted within a few meters of a Pueblo II-III site.

Style Possibly two components present. Hunting scene and mounted figures appear recent and may be Ute. Some figures could be Anasazi. Differential weathering is not observable.

Period Immediate association with Pueblo II-III kiva.

Illustration Figs. 68, 69, 70.

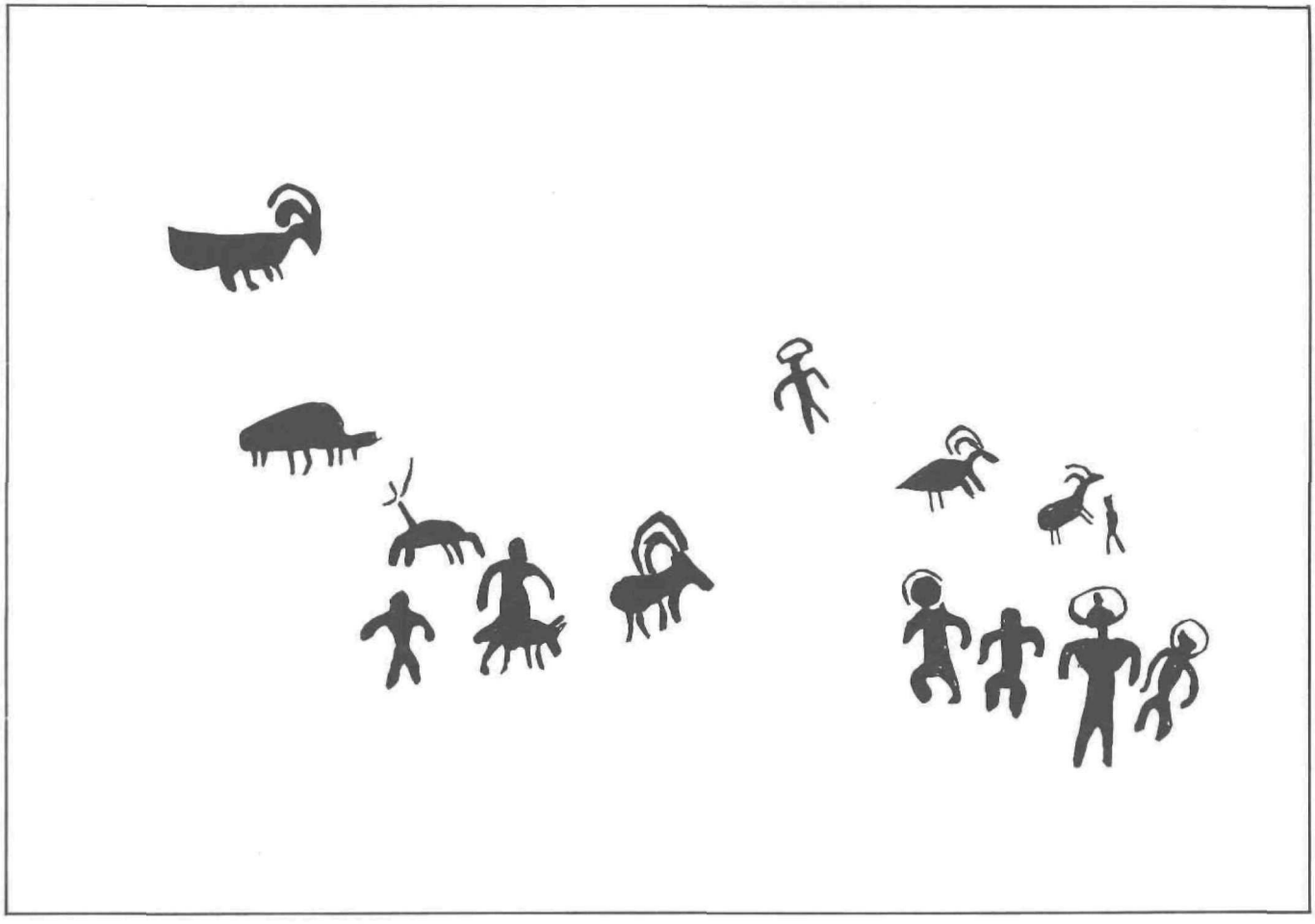


Fig. 70 Petroglyphs at 42Sa276 near Comb Wash.

APPENDIX II

ARCHEOLOGICAL SITE DATA

SITE	PERIOD	TREE-RING DATE(S)	LOCATION TYPE	STRUCTURES	DESCRIPTION
42Sa6777 (V:8:1)	Pueblo II-III	—	Open	10±	Rectangular pueblo, walls of coursed masonry.
42Sa6778 (V:8:2)	Pueblo II-III	—	Rockshelter	9	Masonry cliff dwelling, kiva with log roof partially intact.
42Sa6673 (V:8:3)	Pueblo II-III	—	Rockshelter	2	Masonry cliff dwelling, modern use as a camp.
42Sa6779 (V:8:4)	Pueblo II-III	X	Rockshelter	2	Aboveground log kiva with ladder uprights still in place.
42Sa6638 (V:8:5)	Pueblo II-III	—	Rockshelter	2	Stone and log masonry rooms.
42Sa6780 (V:8:6)	Pueblo II-III	—	Rockshelter	1	A single fallen masonry wall.
42Sa6781 (V:8:7)	Pueblo II-III	—	Rockshelter	3	Fallen masonry walls, one rectangular structure.
42Sa6782 (V:8:8)	Basketmaker II & Pueblo II-III	—	Rockshelter	4	Vertical slab cists, one cist of underground log cribbing.
42Sa6783 (V:8:9)	Indefinite	X	Rockshelter	3	Storage pits formed by shallow excavations.
42Sa6784 (V:8:10)	Pueblo II-III	—	Rockshelter	2-5	Cliff dwelling, rectangular masonry rooms, badly eroded.
42Sa6785 (V:8:11)	Pueblo II-III	—	Rockshelter	1	Single low-roofed room formed by masonry walls under large boulder.
42Sa6786 (V:8:12)	Pueblo II-III	—	Rockshelter	4	Contiguous rectangular masonry rooms.
42Sa6787 (V:8:13)	Pueblo II-III	—	Rockshelter	3	A fragment of a masonry wall and two loosely excavated cists.
42Sa6788 (V:8:14)	Pueblo II-III	—	Rockshelter	3	Three rectangular masonry rooms, one fully preserved.
42Sa6789 (V:8:15)	Pueblo II-III	—	Rockshelter	4	Rectangular masonry rooms and jacal structures.
42Sa6790 (V:8:16)	Indefinite	—	Rockshelter	2	Small stone- and adobe-lined cists.
42Sa6791 (V:8:17)	Pueblo II-III	X	Rockshelter	1	Storage structure of vertical slabs.
42Sa6792 (V:8:18)	Indefinite	—	Rockshelter	6	Fragments of circular storage structures of adobe and vertical slabs.

SITE	PERIOD	TREE-RING DATE(S)	LOCATION TYPE	STRUCTURES	DESCRIPTION
42Sa6793 (V:8:19)	Indefinite	—	Rockshelter	2	Adobe-and-slab storage structures and cribbed underground cist.
42Sa6794 (V:8:20)	Basketmaker II	—	Rockshelter	9	Nonceramic refuse and underground cists, both adobe-lined and unlined, human skeletal material.
42Sa6795 (V:8:21)	Basketmaker II	—	Rockshelter	6	Circular storage structures of adobe and slabs, small round cists.
42Sa6796 (V:8:22)	Indefinite	—	Rockshelter	9	Adobe storage structures.
42Sa6797 (V:8:23)	Pueblo II-III	—	Rockshelter	5	Two storage cists and three rectangular vertical slab structures.
42Sa6798 (V:8:24)	Pueblo II-III & later	X	Rockshelter	2	Red pictographs and two or more rooms indicated by fragments of adobe.
42Sa6799 (V:8:25)	Pueblo II-III	X	Rockshelter	8-12	Rectangular structures of stone and log masonry.
42Sa6800 (V:8:26)	Basketmaker III	—	Open	4	Circular slab cists.
42Sa6801 (V:8:27)	Pueblo II-III Basketmaker III	—	Rockshelter	4-6	Circular structures of adobe and vertical slabs.
42Sa6802 (V:8:28)	Indefinite	—	Rockshelter	7	Storage structures of vertical slabs dug into cave fill and lined with adobe.
42Sa6803 (V:8:29)	Pueblo II-III	X	Rockshelter	27	Large cliff dwellings with a defensive wall in back.
42Sa6804 (V:8:30)	Pueblo II-III	—	Rockshelter	7	Habitation and storage structures of poorly coursed masonry.
42Sa6805 (V:8:31)	Pueblo II-III	—	Rockshelter	1	A small storage structure of drylaid stone masonry.
42Sa6806 (V:8:32)	Pueblo II-III	X	Rockshelter	1	A rectangular room of stone and log masonry.
42Sa6807 (V:8:33)	Pueblo II-III	—	Rockshelter	1	A fragment of a fallen masonry wall.
42Sa6808 (V:8:34)	Pueblo II-III	—	Rockshelter	3	Pictographs and storage structures of coursed masonry, vertical slabs, and adobe.
42Sa6809 (V:8:35)	Basketmaker III & Pueblo II-III	—	Open, dune top.	1	Large, roughly rectangular kiva or pithouse depression.
42Sa6810 (V:8:36)	Pueblo II-III	—	Rockshelter	3	Storage structures dug into cave fill and lined with adobe.
42Sa6811 (V:8:37)	Pueblo II-III	—	Rockshelter	2	Two well-preserved masonry structures.

SITE	PERIOD	TREE-RING DATE(S)	LOCATION TYPE	STRUCTURES	DESCRIPTION
42Sa6812 (V:8:38)	Pueblo II-III	—	Rockshelter	3	Two rectangular masonry rooms and one roundish adobe and masonry slab structure, well preserved.
42Sa6813 (V:8:39)	Pueblo II-III	—	Rockshelter	6	Four masonry rooms, two storage structures, and a large petroglyph panel.
42Sa6814 (V:8:40)	Pueblo II-III	—	Rockshelter	2	Storage structures partially formed by adobe plastering the cave walls.
42Sa6815 (V:8:41)	Basketmaker III & Pueblo II-III	—	Rockshelter	4	Storage structures, masonry as well as slab and adobe.
42Sa6816 (V:8:42)	Pueblo II-III	—	Rockshelter	1	Pictographs and badly eroded rectangular masonry structure.
42Sa6817 (V:8:43)	Indefinite	—	Rockshelter	0	Several chunks of burned wood and large mass of shredded juniper bark.
42Sa6818 (V:8:44)	Pueblo II-III	—	Rockshelter	3	Single rectangular masonry room, and two cists.
42Sa6819 (V:8:45)	Pueblo II-III & Basketmaker III	X	Rockshelter	13	"Horse Collar Ruin" a masonry pueblo with two kivas, two slab and adobe storage structures, and nine other rectangular masonry structures.
42Sa6820 (V:8:46)	Pueblo II-III	—	Rockshelter	10+	Masonry pueblo with rectangular rooms.
42Sa6821 (V:8:47)	Pueblo II-III	X	Rockshelter	7	Rectangular structures of masonry and jacal with possible kiva.
42Sa6822 (V:8:48)	Pueblo II-III	—	Rockshelter	2	Small rectangular masonry rooms. One or two courses remain.
42Sa6823 (V:8:49)	Pueblo II-III	—	Rockshelter	6	Irregularly shaped rooms with some masonry but mostly jacal.
42Sa6824 (V:8:50)	Basketmaker III	—	Rockshelter	2	Circular cists outlined by vertical slabs.
42Sa6825 (V:8:51)	Basketmaker II	—	Open	?	Large refuse area with fine gray ash ten cm deep and stone artifacts.
42Sa6826 (V:8:52)	Pueblo II-III	—	Open	1	A rectangular slab structure with two slab hearths.
42Sa6827 (V:8:53)	Basketmaker III	—	Open	4	Circular and rectangular structure outlined by vertical slabs.
42Sa6828 (V:8:54)	Basketmaker III	—	Open	2	Area of thin refuse and two cists outlined by vertical slabs.
42Sa6829 (V:8:55)	Pueblo II-III	—	Open	4-8	Masonry pueblo with scattered loose construction stone.

SITE	PERIOD	TREE-RING DATE(S)	LOCATION TYPE	STRUCTURES	DESCRIPTION
42Sa6830 (V:8:56)	Basketmaker III	—	Open	?	Sherd and refuse area.
42Sa6831 (V:8:57)	Basketmaker III & Pueblo II-III	—	Open	6-20	Large sherd and refuse area with loose construction stone.
42Sa6832 (V:8:58)	Pueblo II-III	—	Open	5	Sherd area with concentrations of loose construction stone and fragments of burned adobe.
42Sa6833 (V:8:59)	Pueblo II-III	—	Open	8-20	Pueblo with masonry and possible jacal surface units, also small kiva depression.
42Sa6834 (V:8:60)	Pueblo II-III	—	Open	6-12	Small pueblo with kiva depression.
42Sa6835 (V:8:61)	Pueblo II-III	—	Open	4-6	Small multiroomed pueblo and slab hearth, badly eroded.
42Sa6836 (V:8:62)	Pueblo II-III	—	Rockshelter	4	Rectangular masonry rooms, one is well-preserved.
42Sa6837 (V:8:63)	Pueblo II-III	—	Rockshelter	8	Pueblo of rectangular rooms, heavy use of adobe mortar, kiva just out of the cave.
42Sa6838 (V:8:64)	Pueblo II-III	—	Open	2+	Sherd and ash area with two circular slab structures.
42Sa6839 (V:8:65)	Basketmaker II	—	Open	1	A small area of refuse, ash, and burned adobe, slab cist.
42Sa6840 (V:8:66)	Pueblo II-III	—	Open	10	A masonry pueblo in two sections with rectangular rooms.
42Sa6841 (V:8:67)	Indefinite	—	Open	2	A circular structure of vertical slabs.
42Sa6842 (V:8:68)	Indefinite	—	Open	0	Chip area.
42Sa6843 (V:8:69)	Indefinite	—	Open	1	Nonceramic refuse and a single large vertical slab.
42Sa6844 (V:8:70)	Pueblo II-III	—	Rockshelter	3	Pictographs, two rectangular masonry rooms, and a small storage structure.
42Sa6845 (V:8:71)	Pueblo II	—	Open	4-8	Pueblo, masonry mound.
42Sa6846 (V:8:72)	Pueblo II-III	—	Rockshelter	2	Rectangular, contiguous masonry rooms.
42Sa6847 (V:8:73)	Pueblo II-III	—	Rockshelter	1	Cribbed roof kiva with roof partially intact.
42Sa6848 (V:8:74)	Pueblo II-III	X	Rockshelter	1	Thin trash and loose, burned logs, one vertical slab.
42Sa6849 (V:8:75)	Pueblo II-III	—	Rockshelter	1	A single masonry structure.
42Sa6850 (V:8:76)	Pueblo II-III	—	Open	?	Sherd area with scattered loose construction stone.
42Sa6851 (W:5:1)	Pueblo II-III	—	Open	?	Sherd area with fragments of burned adobe.
42Sa6852 (W:5:2)	Indefinite	—	Rockshelter	1	A single circular unlined "cist".

SITE	PERIOD	TREE-RING DATE(S)	LOCATION TYPE	STRUCTURES	DESCRIPTION
42Sa6853 (W:5:3)	Pueblo II-III	—	Rockshelter	1	A single masonry storage room.
42Sa6854 (W:5:4)	Pueblo II-III	—	Rockshelter	5	Masonry and slab structures, circular and rectangular in shape.
42Sa6855 (W:5:5)	Pueblo II-III	—	Rockshelter	3	Fragments of rectangular masonry storage rooms under a low ledge.
42Sa6856 (W:5:6)	Pueblo II-III	—	Open	1	Dense refuse and badly eroded room.
42Sa6857 (W:5:7)	Pueblo II-III	—	Open	1	Large square room of good coursed masonry.
42Sa6858 (W:5:8)	Pueblo II-III	—	Open	3	Masonry rooms and possible defensive wall.
42Sa6859 (W:5:9)	Pueblo II-III	—	Rockshelter	1	A single well-made masonry room, with a T-shaped door.
42Sa6860 (W:5:10)	Pueblo II-III	—	Rockshelter	1	Masonry storage room.
42Sa6861 (W:5:11)	Pueblo II-III	—	Rockshelter	1	Nearly inaccessible log masonry storage structure.
42Sa6862 (W:5:12)	Pueblo II-III	—	Rockshelter	1	Fragment of a single masonry wall.
42Sa6863 (W:5:13)	Pueblo II-III	X	Rockshelter	6	Contiguous masonry, jacal, and slab rooms of irregular shape and a rectangular, roofed kiva.
42Sa6864 (W:5:14)	Pueblo II-III	X	Rockshelter	2	Rectangular masonry rooms.
42Sa6865 (W:5:15)	Pueblo II-III	—	Rockshelter	2	Roughly rectangular rooms of masonry and jacal.
42Sa6866 (W:5:16)	Pueblo II-III	X	Rockshelter	5	Irregularly shaped rooms of stone and log masonry, masonry kiva.
42Sa6867 (W:5:17)	Indefinite	—	Rockshelter	3	Irregularly shaped storage structures of slabs and adobe.
42Sa6868 (W:5:18)	Pueblo II-III	—	Rockshelter	3	Masonry and jacal storage rooms.
42Sa6869 (W:5:19)	Indefinite	—	Open	1	Circular, slab-outlined structure two meters in diameter.
42Sa6870 (W:5:20)	Pueblo II-III	—	Rockshelter	4	Rectangular noncontiguous masonry structures and pictograph.
42Sa6871 (W:5:21)	Pueblo II-III	—	Rockshelter	3	Masonry walls partially outlining rectangular rooms.
42Sa6872 (W:5:22)	Pueblo II-III	—	Rockshelter	1	A single rectangular masonry room with a well-preserved roof.
42Sa6873 (W:5:23)	Pueblo II-III	—	Rockshelter	1	Well-preserved rectangular aboveground masonry kiva with T-shaped door.

SITE	PERIOD	TREE-RING DATE(S)	LOCATION TYPE	STRUCTURES	DESCRIPTION
42Sa6874 (W:5:24)	Pueblo II-III	—	Rockshelter	2	Rectangular masonry rooms.
42Sa6875 (W:5:25)	Basketmaker III & Pueblo II-III	—	Rockshelter	5	Pueblo with contiguous rectangular masonry rooms and kiva.
42Sa6876 (W:5:26)	Pueblo II-III	—	Rockshelter	2	Difficult access. Appears to be adobe and jacal storage structures.
42Sa6877 (W:5:27)	Pueblo II-III	—	Rockshelter	?	Small sherd area.
42Sa6878 (W:5:28)	Pueblo II-III	—	Rockshelter	3	Rectangular masonry structures, one with a large roof beam in place.
42Sa6879 (W:5:29)	Basketmaker III & Pueblo II-III	—	Open	?	Large sherd area with loose construction stone.
42Sa6880 (W:5:30)	Pueblo II-III	—	Open	?	Sherd area.
42Sa6881 (W:5:31)	Basketmaker III	—	Open	1	One or more pithouse depressions, slab hearth, and check dam.
42Sa6882 (W:5:32)	Basketmaker III & Pueblo II-III	—	Open	5	Large sherd area with isolated and contiguous structures outlined by circles of vertical slabs.
42Sa6883 (W:5:33)	Basketmaker III	—	Open	6	Sherd area with structures outlined by vertical slabs ranging from circular to triangular in shape.
42Sa6884 (W:5:34)	Basketmaker III & Pueblo II-III	—	Open	5	Sherd area with structures outlined by vertical slabs ranging from circular to rectangular in shape.
42Sa6885 (W:5:35)	Basketmaker III	—	Open	1	Sherd area, slab cist and loose construction stone on surface.
42Sa6886 (W:5:36)	Basketmaker III & Pueblo II-III	—	Open	3	Sherd area, 3-m circle of vertical slabs, and two rock and slab-outlined hearths.
42Sa6887 (W:5:37)	Pueblo II-III	—	Open	?	Sherd area.
42Sa6888 (W:5:38)	Pueblo II-III	—	Open	?	Small sherd area and loose construction stone.
42Sa1440 (W:5:39)	Basketmaker III & Pueblo II-III	X	Open	3	Sherd area and subrectangular slab structure.
42Sa6889 (W:5:40)	Basketmaker III	—	Open	?	Very extensive sherd area, possibly some subsurface structures.
42Sa6890 (W:5:41)	Pueblo II-III	—	Open	1	Large sherd area, a roughly 3-m square vertical slab structure.

SITE	PERIOD	TREE-RING DATE(S)	LOCATION TYPE	STRUCTURES	DESCRIPTION
42Sa6891 (W:5:42)	Basketmaker III & Pueblo II-III	—	Open	?	Large sherd area with much loose construction stone.
42Sa6892 (W:5:43)	Pueblo II-III	—	Open	1	Small sherd area with 3-m square structure outlined by vertical slabs.
42Sa6646 (W:5:44)	Pueblo II-III	—	Open	2	Sherd area with concentrations of ash and broken rock, and circular hearth outlined by loose rock.
42Sa6893 (W:5:45)	Basketmaker III & Pueblo II-III	—	Open	?	Large sherd area with loose construction stone.
42Sa6894 (W:5:46)	Basketmaker III	—	Open	?	Sherd area with loose construction stone.
42Sa6895 (W:5:47)	Pueblo II-III	—	Open	?	Small sherd area and check dam.
42Sa6896 (W:5:48)	Pueblo II-III	—	Open	?	Sherd area with loose construction stone.
42Sa6897 (W:5:49)	Basketmaker III	—	Open	?	Dense sherd area.
42Sa1441 (W:5:50)	Pueblo II-Early Pueblo III	X	Open	5	Contiguous masonry rooms, kiva depression, and 4.5-m circle of vertical slabs.
42Sa6898 (W:5:51)	Indefinite	—	Open	1	Isolated rectangular slab hearth.
42Sa6899 (W:5:52)	Basketmaker III	—	Open	1	Pithouse outlined by depression and four vertical slabs.
42Sa6900 (W:5:53)	Pueblo II-III	—	Open	7-10	Masonry mound and sherd area.
42Sa6901 (W:5:54)	Basketmaker III	—	Open	1	Sherd area and circular slab structure 4.0 m in diameter.
42Sa6902 (W:5:55)	Basketmaker III	—	Open	1	Sherd area and circular slab structure 4.0 m in diameter.
42Sa6903 (W:5:56)	Pueblo II-III	—	Open	4-8	Row of contiguous masonry rooms and possible kiva depression.
42Sa6904 (W:5:57)	Pueblo II-III	—	Open	3	Contiguous masonry rooms.
42Sa6905 (W:5:58)	Pueblo II-III	—	Rockshelter	6	Partially outlined rectangular masonry rooms built among large boulders.
42Sa6906 (W:5:59)	Indefinite	—	Open	?	Flaking area.
42Sa6907 (W:5:60)	Basketmaker III	—	Open	?	Sherd area with scattered loose construction stone.
42Sa6908 (W:5:61)	Pueblo II-III	—	Open	?	Sherd area.
42Sa6909 (W:5:62)	Pueblo II-III	—	Open	6?	Small pueblo damaged by road construction.
42Sa6910 (W:5:63)	Pueblo II-III	—	Open	?	Sherd area.
42Sa6911 (W:5:64)	Basketmaker III	—	Open	?	Area of sherds and lithic debris.

SITE	PERIOD	TREE-RING DATE(S)	LOCATION TYPE	STRUCTURES	DESCRIPTION
42Sa6912 (W:5:65)	Pueblo II-III	—	Open	6	Contiguous masonry rooms with slab hearths.
42Sa6913 (W:5:66)	Basketmaker III	—	Open	4	Sherd area with circular slab cists.
42Sa6914 (W:5:67)	Pueblo II-III	—	Open	1	Sherd and ash area with loose construction stone.
42Sa6915 (W:5:68)	Pueblo II-III	—	Open	1	Area of sherds, ash, and some loose construction stone.
42Sa6916 (W:5:69)	Basketmaker III	—	Open	?	Sherd area and scattered construction stone.
42Sa6917 (W:5:70)	Basketmaker III & Pueblo II-III	—	Open	?	Dense refuse and possible subsurface structures.
42Sa6918 (W:5:71)	Basketmaker III	—	Open	1	A roughly rectangular structure partially outlined by sandstone blocks.
42Sa6919 (W:5:72)	Pueblo II-III	—	Open	2+	Dense sherd area with two small slab cists.
42Sa6920 (W:5:73)	Basketmaker III	—	Open	?	Sherd area, possible structures, site destroyed by Highway 95.
42Sa6921 (W:5:74)	Pueblo II-III	—	Open	?	Sherd area with one vertical slab.
42Sa6922 (W:5:75)	Pueblo II-III	—	Open	15+	Sherd area with very dense refuse. Three pithouse or kiva depressions, and surface units roughly outlined by small loose stone.
42Sa6923 (W:5:76)	Pueblo II-III	—	Open	2+	Sherd area with scattered loose construction stone.
42Sa6924 (W:5:77)	Basketmaker III & Pueblo II-III	—	Open	?	Sherd area with scattered loose construction stone.
42Sa6925 (W:5:78)	Basketmaker III & Pueblo II-III	—	Open	?	Small sherd area, a fragment of a shallow slab-lined subsurface house is exposed.
42Sa6926 (W:5:79)	Pueblo II-III	—	Open	?	Dense refuse, may have been a masonry pueblo but recently bulldozed.
42Sa6927 (W:5:80)	Pueblo II-III	—	Open	?	Sherd area.
42Sa6928 (W:5:81)	Pueblo II-III	—	Open	?	Two small concentrations of sherds and loose construction stone.
42Sa6929 (W:5:82)	Pueblo II-III	—	Open	?	Low mound with central depression 4 m in diameter, no masonry structures in evidence.
42Sa6930 (W:5:83)	Basketmaker III & Pueblo II-III	—	Open	?	Sherd area.

SITE	PERIOD	TREE-RING DATE(S)	LOCATION TYPE	STRUCTURES	DESCRIPTION
42Sa6931 (W:5:84)	Basketmaker III	—	Open	1+	Disturbed site, one or more slab-lined subsurface houses have been destroyed.
42Sa6932 (W:5:85)	Late Pueblo II-III	—	Open	4+	Small masonry pueblo mound.
42Sa6933 (W:5:86)	Basketmaker II	—	Open	1	Rectangular structure 1 x 2.2 m partially outlined by vertical slabs. No sherds or refuse.
42Sa6934 (W:5:87)	Pueblo II-III	—	Open	?	Small sherd area with a rectangular depression which may be a shallow subsurface house.
42Sa6935 (W:5:88)	Pueblo II-III	—	Open	?	Moderately dense area of sherds and loose stone.
42Sa6936 (W:5:89)	Pueblo II-III & Basketmaker III	—	Open	5±	Sherd area and a line of small masonry structures.
42Sa6937 (W:5:90)	Pueblo II-III	—	Open	2+	Sherd area with two rectangular structures, 1 x 1.5 m, outlined by vertical slabs.
42Sa6938 (W:5:91)	Basketmaker III	—	Open	2+	Sherd area with two irregular depressions which are probably subsurface houses.
42Sa6939 (W:5:92)	Pueblo II-III	—	Open	Indef.	Sherd area, loose stone but no definite structure outlined.
42Sa6940 (W:5:93)	Basketmaker III & Pueblo II-III	—	Open	3?-7	A fairly large refuse area. Two circular depressions and a concentration of loose stone and vertical slabs.
42Sa6941 (W:5:94)	Pueblo II-III	—	Open	8±	Five surface masonry structures, both round and rectangular, and three shallow depressions.
42Sa6942 (W:5:95)	Pueblo II-III	—	Open	1+	Small sherd area with fairly dense refuse.
42Sa6943 (W:5:96)	Basketmaker III	—	Open	3±	Sherd area, a low mound may contain jacal structures, a structure 2.5 m in diameter outlined by vertical slabs, and a shallow depression 6 m in diameter.
42Sa6944 (W:5:97)	Pueblo II-III	—	Open	4+	Small eroded masonry pueblo.
42Sa6945 (W:5:98)	Pueblo II-III	—	Rockshelter	1	Masonry storage room 1 x 2 m.
42Sa6946 (W:5:99)	Pueblo II-III	—	Rockshelter	4	Cliff dwelling, masonry rooms on two ledges.
42Sa6947 (W:5:100)	Basketmaker III	—	Open	4+	Three rectangular or semi-rectangular subsurface houses partially outlined by vertical slabs.

SITE	PERIOD	TREE-RING DATE(S)	LOCATION TYPE	STRUCTURES	DESCRIPTION
42Sa6948 (W:5:101)	Indefinite	—	Open	?	An area of ash, chips, and some loose rock. May be a burned subsurface house. No sherds.
42Sa6949 (W:5:102)	Basketmaker III	—	Open	1+	Sherd and ash area. Burned adobe indicates a subsurface structure.
42Sa6950 (W:5:103)	Basketmaker III	—	Open	1+	Sherd area. Some evidence of a shallow subsurface structure 3 x 4 m and a possible jacal surface structure.
42Sa6951 (W:5:104)	Pueblo II-Early Pueblo III	—	Open	?	Dense sherd and ash area.
42Sa6952 (W:5:105)	Pueblo II-III	—	Open	?	Sherd area with some loose stone.
42Sa6953 (W:5:106)	Pueblo II-III	—	Open	6±	Small pueblo, concentration of vertical slabs and loose stone. No coursed masonry.
42Sa6954 (W:5:107)	Pueblo II-III	—	Open	4±	Sherd area with small loose stone probably indicating structures.
42Sa6955 (W:5:108)	Basketmaker III	—	Open	2±	Sherd area. Two structures indicated by areas of ash and loose construction stone.
42Sa6956 (W:5:109)	Basketmaker III	—	Open	2±	Sherd area with loose stone and depressions possibly indicating two houses.
42Sa6957 (W:5:110)	Pueblo II-III	—	Open	2±	Refuse area, pithouse depression with possible surface unit associated.
42Sa6958 (W:5:111)	Basketmaker III	—	Open	3±	Sherd area, pithouse depression and rectangular structure 2 x 3 m outlined by vertical slabs.
42Sa6959 (W:5:112)	Basketmaker III	—	Open	2	Sherd area and two houses partially outlined by vertical slabs. One circular 2.5 m and one rectangular approximately 3 x 4 m.
42Sa6960 (W:5:113)	Pueblo II-III	X	Rockshelter	8	"Unnamed Ruin" a cliff dwelling with two kivas, four masonry rooms, and two storage cists.
42Sa6961 (W:5:114)	Pueblo II-III	X	Rockshelter	11	"Tee Pee Ruin", an upper and lower cave, two-story storage structures of masonry and jacal, rectangular masonry habitation rooms, and three rectangular kivas, one with roof intact.
42Sa6962 (W:5:115)	Pueblo II-III	—	Rockshelter	1+	Surface refuse, pictographs, and one or more jacal rooms of indefinite outline.

SITE	PERIOD	TREE-RING DATE(S)	LOCATION TYPE	STRUCTURES	DESCRIPTION
42Sa6963 (W:5:116)	Indefinite	—	Rockshelter	9	Thin refuse and nine cists, two outlined by vertical slabs and six simply indicated by depressions. All are dug into the cave fill and range from 1-1.3 m in diameter.
42Sa6964 (W:5:117)	Basketmaker III	—	Rockshelter	4+	Thin refuse, four storage cists.
42Sa6965 (W:5:118)	Pueblo II-III	X	Rockshelter	25±	"Bare Ladder Ruin". A large well-preserved cliff dwelling in two levels connected by a 16-m ladder, seven kivas, two w/ roofs, rectangular and circular rooms, and mud-lined excavated storage cists.
42Sa6966 (W:5:119)	Pueblo II-III	—	Rockshelter	3+	Small storage structure and two low masonry walls forming an outline 3 x 6 m with fallen boulders.
42Sa6967 (W:5:120)	Pueblo II-III	—	Rockshelter	8+	"Lightning House". One possible kiva, storage structure, and masonry habitation rooms.
42Sa6968 (W:5:121)	Pueblo II-III	—	Open	4+	Dense refuse, concentrations of black ash and loose stone may indicate four or five shallow subsurface houses.
42Sa6969 (W:5:122)	Basketmaker II or earlier	—	Open	?	An area of dense nonceramic refuse in sand dune blowout. Many chips, gray ash, projectile point fragments, fragments of grinding stones, and fire-cracked rock.
42Sa6970 (W:5:123)	Pueblo II-III	—	Rockshelter	1	A collection of plant materials. One structure partly outlined.

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