ARCHAEOLOGICAL EXPLORATIONS IN
CAVES OF THE POINT OF PINES REGION

by

James Collier Gifford

A Thesis
submitted to the faculty of the
Department of Anthropology
in partial fulfillment of the requirements for the degree of
MASTER OF ARTS
in the Graduate College, University of Arizona

1957

Approved: Director of Thesis

Date
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PREFACE

The archaeological investigation of cave sites in the Point of Pines region was carried out as part of the University of Arizona Archaeological Field School research program under the joint auspices of the Arizona State Museum and the Department of Anthropology. Three sites were intensively investigated; Pine Flat Cave (Arizona W:10:42) in 1952, and Red Bow Cliff Dwelling (Arizona W:9:72) and Tule Tubs Cave (Arizona W:9:69) in 1955. Field camps subsidiary to the University of Arizona Archaeological Field School headquarters were maintained at Pine Flat from June 30 to July 26, 1952; and on the southern face of the Nantack Ridge from June 19 to August 5, 1955. In addition to a number of test pits and trenches, rooms at all three sites were cleared.

Permission to carry on explorations was extended under an agreement with the San Carlos Apache Tribal Council and representatives of the United States Indian Service allowing Archaeological Field School parties from the University of Arizona to excavate in the Point of Pines region on the San Carlos Indian Reservation. We consider it an honor and are indebted to the Tribal Council and authorities of the Indian Service for their continued cooperation in granting students of the Field School access to ruins within the confines of their Reservation.
The Nantack scarp, or southern exposure of the Nantack Ridge, immediately south of Point of Pines contains many caves of various sizes. As these caves often show indications of prehistoric occupation, they were explored on several occasions as part of the overall archaeological program in the area. Ash Flat Cliff Dwelling (Arizona W:10:104) is the largest of these and was initially observed by Emil W. Haury and myself from the air on a return flight to Point of Pines from Tucson in 1951. Subsequently during the 1952 summer session the site was surveyed by a party including Oyvind Freck, George S. Catbvak, Jr., Mrs. Gifford and myself who were then students at the Field School. To our knowledge this group was the first, other than Apache, to actually find and visit this fifteen room cliff dwelling. It had apparently escaped notice up to this time because of its location at the top of a cliff many hundreds of feet high and in a recess hidden by surrounding escarpments. The ruin was mapped and photographed during November of 1955. No excavation was undertaken as architectural information was of primary interest.

The Nantack caves as a group came under organized scrutiny at the close of the 1951 summer session when graduate students from the Field School, Alan P. Olsen, James F. Hall, and myself, over a period of five days from August 21 to 25 conducted an archaeological survey of the district. At this time, Red Bow Cliff Dwelling and Tule
Tubs Cave were surveyed. Four years later Sanford C. Gifford of Claremont, California, joined my wife and me during the summer of 1955 to make an intensive study of these two caves. Throughout our stay and visits to the Nantack scarp, Mr. and Mrs. George Stevens were extremely kind and helpful, extending to us every hospitality and courtesy. George Stevens is in charge of cattle operations at Arsenic Tubs, the jumping off point for our expedition.

Caves are not common near Point of Pines north of the Nantack scarp and Pine Flat Cave is one of the few in this part of the region. Actual excavations at Pine Flat Cave were conducted during the 1952 season and my field assistants for the period were John Earl Ingmanson and Oyvind Froek, both at that time graduate students in the Department of Anthropology at the University of Arizona.

To these individuals I am extremely indebted. My appreciation for their tireless work and perseverance regarding the field work is difficult to express. Without their efforts the mountains of dust and fill would still conceal the many objects and valuable information recovered. Special thanks are due Sanford C. Gifford in connection with our expedition to Red Bow Cliff Dwelling and Tule Tubs Cave, excavation of the latter having been almost entirely his own work. Not only did he furnish expert assistance in the actual field work but made available equipment without which the expedition would never have
succeeded.

It was a privilege to be assigned by Emil W. Haury, Director of the University of Arizona Archaeological Field School, the task of supervising and recording excavations at these cave sites. The completion of this project by an analysis of materials recovered and the preparation of a final report comprised a thesis problem for the degree of Master of Arts at the University of Arizona. From Dr. Haury I have received the constant benefit of his archaeological wisdom as well as any of the facilities of the Arizona State Museum which became necessary. Under his direction and guidance, many seemingly insurmountable obstacles have been overcome. I am greatly indebted to him for his unending help and sound advice.

Discussions and a free exchange of ideas are the backbone of endeavors of this kind. Much of my thinking has crystallized as a result of a valued association I have had with Emil W. Haury, Director of the Arizona State Museum; Edward B. Danson, Assistant Director of the Museum of Northern Arizona; Joe Ben Wheat, Curator of Anthropology, University of Colorado Museum; Robert F. Burgh, of Peabody Museum, Harvard University; Tucson Laboratory; and David A. Breternitz, Alan P. Olson, and Elizabeth A. Morris while they were graduate students at the Department of Anthropology, University of Arizona. These colleagues have given freely of their thoughts concerning the problems.
which have arisen, but they must not be held responsible for shortcomings due to my rendition of the present work. 

A thesis committee composed of Emil W. Haury, adviser and chairman; Harry T. Getty; and Clara Lee Tanner, read the manuscript and offered helpful criticism. I am especially grateful to Raymond H. Thompson, editor of the Contributions to Point of Pines Archaeology series, for his extensive editorial help. 

Specialized assistance has kindly been furnished by many persons during the course of the analysis of materials recovered from the cave sites. I wish particularly to thank Hugh C. Cutler, Acting Director of the Missouri Botanical Garden, St. Louis, Missouri, for an analysis of the corn and cucurbits; Lawrence Kaplan, Department of Biology, Roosevelt University, Chicago, for an analysis of beans; the late Robert H. Peebles, Agronomist, U.S. Department of Agriculture, Sacaton Field Station, Arizona, for an analysis of the cotton samples; Charles T. Mason, Jr., Director of the Herbarium at the University of Arizona for identification of plant remains; George A. Barber, Geologist, Anaconda Copper Company Exploration Division, Tucson, Arizona, for identification of rock and mineral specimens; Milton A. Wetherill, Assistant Curator of Mammology, David A. Breternitz, Curator of Anthropology, and Allan R. Phillips, Curator of Ornithology, all of the Museum of Northern Arizona, Flagstaff, for identification
of unworked bone, human bone, and feather specimens respectively; Charles C. DiPeso, Director of the Amerind Foundation, Inc., Dragoon, Arizona, for identification and information relative to Majolica pottery sherds; Robert M. Ariss, Curator of Anthropology, Los Angeles County Museum, for providing information and access to field notes concerning the Van Bergen-Los Angeles County Museum Expedition, Fort Apache-San Carlos, Archaeological Survey of 1931. The staff of the Arizona State Museum, E. B. Sayles, Wilma Kaemlein, Robert G. Baker, and Frances T. Slutes, has at all times patiently complied with my numerous and bothersome requests.

Figures 13, 14, and 122 are drawings made by Barton A. Wright, Curator of Art and Exhibits, Museum of Northern Arizona; Figures 28, 35-37, 40, 41, 44, 45, 47, 97, 102, 104, 105, 130-133, 135, 140, 141, 143, and 144 were photographed by E. B. Sayles, Curator of the Arizona State Museum; Figures 46, 49, 67, 70-72, 74, 76, 79, 134, 136, 151, and 152 were photographed by L. F. H. Lowe, Photographer for the Arizona State Museum. Dr. Lowe also contributed generously of his time and skill in finishing the prints of photographs used in the report. Figures 160-162 were photographed in Dr. Cutler’s laboratory. Robert F. Burgh advised in the techniques employed to obtain certain photographic effects. The information supplied and help given by these persons has contributed enormously to the
conclusion and pleasure of preparing this report. Line drawings, plans, and photographs not otherwise acknowledged are my own work.

In an indirect way my indebtedness to the Wenner-Gren Foundation for Anthropological Research is considerable. Although no aspect of this study was undertaken by virtue of a direct grant from this institution, the assistance and encouragement provided the Point of Pines research program at its inception and through the first eight years of its operation made it possible to survey and launch excavations in certain caves of the Point of Pines region.

To Mrs. Katharine C. Bronson, my mother, must go my sincerest thanks for her continued understanding during this archaeological project and for invaluable support given whenever necessary.

As it is with many archaeological reports, the author's wife should in this case be considered a co-author. Through the untiring efforts of Mrs. Carol A. Gifford, the detailed data charts were prepared, the manuscript proofed, corrected, and typed. Her participation in much of the field and laboratory work, constructive suggestions, and constant encouragement during every step of the way has been the major factor in the completion of this work. To her is extended my deepest appreciation.
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INTRODUCTION

The Point of Pines region of east central Arizona was a center of prehistoric population which at its peak of occupancy may have seen as many as two to three thousand persons engaged in an agricultural economy (Haury 1957: 10). Haury (1945a) and Sayles initiated the current University of Arizona archaeological program by recording for the Arizona State Museum Survey several hundred ruins in this region. Earlier expeditions did not undertake extensive excavations. They did, however, gather information which provided a background for the Arizona State Museum investigations and to a limited extent collected perishable artifacts from caves in the Nantack Ridge directly south of Point of Pines. Other caves are known to exist in the canyons of the Black and San Carlos Rivers to the west and southwest but no archaeological material has been recovered from them.

In the initial excavations which resulted from the Arizona State Museum Survey emphasis was placed on large open sites. Lack of information concerning cliff dwellings, a need for perishable items of Mogollon-Pueblo material culture, and the hope of securing archaeological evidence of the Apache led to the exploration and study of certain cave sites. This report is an account of explorations in four sites: Red Bow Cliff Dwelling, Ash Flat Cliff Dwelling, and
Tule Tubs Cave in the escarpment of Nantack Ridge and Pine Flat cave near Pine Flat five miles east of Point of Pines (Fig. 4).

Chronological placement of phases depends on the analysis and exposition of a sequence of cultural development. At Point of Pines the phase sequence is the cumulative result of research over more than ten years (Breternitz, Gifford, and Olson 1957). This regional phase sequence (Black River Branch, Wheat 1954b: 577, Fig. 1) is presented in Figure 1 along with Anasazi and Mogollon period sequences and the time spans during which cave sites were occupied. The Maverick Mountain Phase was not represented at the cave sites and is evidently confined at Point of Pines to the large ruin of Arizona W:10:50 and its immediate environs.

The terms "region" and "phase" are consistently used throughout this report as defined by Phillips and Willey (1953: 619-624). Following A.D. 1000 the phases as established at Point of Pines (Fig. 1) constitute a regional phase sequence in a sense similar to that outlined by these authors. Their views with respect to locality and region seem particularly applicable both archaeologically and physiographically to the areal unit under study.

The Point of Pines areal unit does not attain true regional status until after 1000 when phases are extended to include adjacent localities such as Pine Lawn Valley in west central New Mexico and eventually, during Canyon Creek
Figure 1. - The Point of Pines regional phase sequence with reference to periods during which cave sites were occupied.
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<td>POINT OF PINES</td>
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<td>MAVERICK MOUNTAIN</td>
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<td>TULAROSA</td>
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<td>RED BOW CLIFF DWELLING</td>
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<td>RESERVE</td>
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<td>NANTACK</td>
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<td>DRY LAKE</td>
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Phase, the Sierra Ancha cliff dwellings to the west, Kinishba ruin to the northwest, and other neighboring localities. Prior to 1000 each locality has a distinct local phase sequence and these districts lack the cultural integration necessary to a regional concept. Occupation before A.D. 950 did not occur at any cave site investigated. Therefore these cave sites are included in and form an integral part of the Point of Pines region.

The period of transition during Nantack and Reserve phases from a group of local sequences to a comparatively homogeneous regional sequence corresponds to the transition from a more or less pure Mogollon culture (Wheat 1955) to an entity displaying a blend of Mogollon and Anasazi characteristics which, as time advances, shows more and more Anasazi influence and becomes wider in its distribution.

The change from Mogollon (Mountain Mogollon as used by DiPeso 1956) to a cultural combination strongly influenced by Anasazi culture has, of course, been widely noted by all who have ever approached this problem. This development is accentuated at Point of Pines because of the extended local chronology. The 1955 Society for American Archaeology seminar at Ann Arbor took note of this circumstance in connection with a description of different kinds of traditions, using it as an example of a "Converging Tradition." "Convergence is illustrated by the blending of the Mogollon and Anasazi cultural traditions in the Southwest." (Haury
and others 1956: 44.) The term Mogollon-Pueblo is therefore used to refer to those groups of people which occupied the Point of Pines region after A.D. 1000. This term, which appears extremely well adapted to the archaeological picture, was first seriously suggested by Wheat (personal communication 1955).

Red Bow Cliff Dwelling and Ash Flat Cliff Dwelling contained evidence of only one period of occupation, the Canyon Creek Phase. It is important to recognize the differences between these two sites and Tule Tubs and Pine Flat caves. Thus, although each of these sites is treated as a distinct unit in this report, every effort is made to emphasize the fact that Red Bow and Ash Flat cliff dwellings are representative of a group of cave sites called "upper caves" which are related culturally and physiographically, while Tule Tubs and Pine Flat caves are in a similar manner representative of another distinct group called "lower caves."

Pine Flat Cave contains several cultural levels, two separate periods of Mogollon-Pueblo occupation followed by one of Apache. Tule Tubs has a parallel development but only a trace of the Apache was found. The use of these caves during several periods of occupation and over a long span of time has resulted in a mixture of the material culture. Any specific division of this material according to phases, except for pottery, is apt to be arbitrary and
might not reflect the true situation. Therefore, treatment of evidence and artifacts from Tule Tubs Cave and Pine Flat Cave is included in each site report grouped together for the most part without implication of any strict temporal values.

The presentation of the data includes a description followed at intervals by summary statements and often discussions. Included in the latter are those intangible and often only partially supportable impressions which often come to the investigator as the product of intimate contact with the subject matter in the field and the laboratory. These impressions and speculations are clearly identified in this way.
ECOLOGICAL BACKGROUND

PHYSIOGRAPHY AND GEOLOGY

The area under consideration constitutes the remote interior of the San Carlos Indian Reservation. Point of Pines is situated on the southern fringe of Circle Prairie, a vast, rather flat expanse some 10 miles in width and twelve in length, bordered to the south and southwest by Nantack Ridge. Directly across Circle Prairie to the northeast are the Willow Mountains. Willow Peak is at an altitude of 7,800 feet. To the west lies a low, forested ridge which forms a drainage divide. All waters to the west of this divide flow into Black River; all those to the east, including streams immediately adjacent to Point of Pines, flow into Eagle Creek through Willow Creek (Figs. 2 and 3). Surrounding terrain supports dense forests of Ponderosa Pine, Pinyon Pine, Gambel's Oak and juniper (Smiley 1952: 8). The Mogollon rim forms a boundary between the Colorado Plateau and Basin-and-Range physiographic provinces (Kroeber 1939: 33) placing the Point of Pines region in the northern portion of the latter.

When viewed from afar it is an area of alternating mountain ridges and valley floors forming a giant step-like cross-section from the White Mountains to the Gila River.
Figure 2. - Map of Arizona showing the location of Point of Pines and the Nantack Ridge within the state of Arizona. The area within the solid box outline is shown in detail in Figure 3; that within the dotted box outline is shown in Figure 4.
Figure 3. - Map of east central Arizona showing the Nantack Ridge and Point of Pines in relation to surrounding physiographic features and the more important settlements. Elevations of prominent mountain peaks are given in feet.

(Adapted from the Phoenix quadrangle of the Sectional Aeronautical Chart issued by the U.S. Coast and Geodetic Survey, Revised Edition, 1948.)
Figure 4. - Map of the Point of Pines region showing the location of cave sites in relation to the University of Arizona Archaeological Field School, Nantack Ridge, and Arsenic Tubs.

(Adapted from Arizona Sheets Nos. 323, 324, 346, and 347 issued by the Soil Conservation Service of the U.S. Department of Agriculture.)
From northwest to southeast, the Willow Mountains descend to the flat-bottomed valley known as Circle Prairie which is drained primarily by Willow Creek. Slopes rise again to the crest of Nantack Ridge, briefly there is a relatively level strip along the ridge crest which is abruptly terminated to the southeast by sharp cliffs forming the Nantack scarp. Ash Flat, which spreads from the foot of the scarp, is next in the series of valleys. Along the southern border of Ash Flat the Gila Mountains rise only to drop once again into a third valley, that of the Gila River. Each mountain range and each valley progressively averages a lower altitude.

Nantack Ridge runs in the same east-west direction as do the two principal valleys, Circle Prairie and Ash Flat, and lies between them. Ash Flat is at an altitude of 5,000 feet, with the ridge bordering it on the north and northeast, Ash Creek and the upper San Carlos River drainages on the west, Gila Peak on the south, Slaughter Mountain and Lone Star Peak to the southeast with Bonita Creek carrying off the eastern drainage. Eventually all water from any of the streams or creeks of Circle Prairie or Ash Flat reaches the Gila River (Figs. 2-4).

The southern face of Nantack Ridge forms a scarp which includes a series of steep, almost vertical cliffs of volcanic agglomerate that have been pocketed by erosion with numerous caves. After its initial steep rise, the
Figure 5. - Profile from the Gila River to the Willow Mountains, Arizona, showing a step-like section with alternating valleys and mountains of progressively higher elevation.
PROFILE FROM THE GILA RIVER TO THE WILLOW MOUNTAINS, ARIZONA
flat-topped ridge slopes away to the northeast far less abruptly than its southern counterpart and canyons cut foothills that roll away into Circle Prairie. The expanses of Circle Prairie average 6,000 feet in altitude. Nantaok Ridge, varying in width along its 20 mile crest from half to one and a half miles, is at a general altitude of 6,500 feet and reaches a maximum of about 7,200 feet. From Ash Flat the ridge varies in height from 200 feet toward its north-western end to 1,000 feet near what in local parlance is referred to as Coronado's Gap or the Nantack Trail at its southeastern extremity.

The Nantack Ridge is made up of alternating lava flows and beds of volcanic agglomerate which had their origins in the White Mountains roughly 40 miles to the north. The formation is a product of Tertiary igneous activity. During Quaternary times the ridge may have been tilted to its present inclination and Circle Prairie formed as an alluvial deposit, the result of regional fluvial action (Wendorf 1950: 15).

Massive yellow tuff agglomerate, containing numerous caves of different sizes, predominates along the Nantack scarp. The rim is capped by basalt porphyry flows of Quaternary or Tertiary age. Immediately underlying these flows is a siliceous pyroclastic, predominantly tuffs, welded tuffs, tuff-agglomerates, agglomerates and occasional reworked material. These beds are the cliff forming members.
Basaltic and andesitic flows with local intercalated residual conglomerate sandstones lie beneath the tuff formations. All are presumed to be of Tertiary age. Recent alluvial, fluvial, and talus deposits flow away from the cliff base (Heindl 1953) and gradually become absorbed in the expanses of Ash Flat (Fig. 6).

The structure of the agglomerates

"... strongly suggests that they were deposited by free fall from the air; the tuffs are massive for considerable thickness; completely devoid of lensing, etc.; the interfaces between successive tuffs show no evidence of weathering or having been reworked. There are very few thin water laid tuffaceous gravels above the massive yellow tuff above the cross-bedded sandstones." (Heindl 1953.)

Feth makes a number of references to the Nantack area in a paper concerning the springs of the Mogollon Rim region. He points out that normal high-angle faults are held accountable for both Mogollon and Nantack Rims. Because the fault structures extend 50 miles farther south in the east, the Nantack Ridge is considered to be the structural equivalent of the Mogollon Rim. Late Tertiary, possibly Pliocene or even near the beginning of the Quaternary period are suggested times during which final faulting may have occurred (Feth 1954: 1-23).

Of particular interest are remarks concerning the nature of the many springs and seeps which provided the aboriginal population with much of their water.
Figure 6. - Sketch of the geologic profile in the area of Arsenic Tubs, indicating the character of the transition from Ash Flat to Nantack Ridge. (After Feth 1954: Fig. 12.)
"Contact springs are most numerous in basalt-covered areas. Discharge in these areas range from less than a gallon per minute to about 100 gallons per minute... Faulting is important in controlling the occurrence of springs. Springs occur at places where the discharge is localized in part by graben structures of varying scales of magnitude and in part by contact of permeable over impermeable rocks." (Feth 1954: 2.)

It is Feth's opinion that the yield of many smaller springs could today be increased by freeing spring orifices of debris where a good portion of the discharge escapes use through seepage (Feth 1954: 37). The prehistoric population had a similar opportunity to increase their available water supply but whether or not they actually did so cannot be determined. If all cave sites in the Nantack Ridge were occupied at any time simultaneously, without man's having contrived some means to increase it, the water supply would have been barely adequate. Tule Spring discharges an estimated 20 gallons per minute, and Arsenic Cave Spring, an estimated two gallons per minute at a temperature of 71°F (Feth 1954: 63, Table 8).

Erosion is a major factor in the Nantack scarp area and a primary one in cave formation. Almost without exception each Nantack cave has a water chute above it which, when active, must have contributed heavily to its formation. In many cases where the prehistoric population has made use of particular caves, the water chute is no longer an active channel, the drainage pattern above having
shifted at some remote time so as to throw water into newer channels situated in different places to suit the more recent localized drainage pattern.

Rains come suddenly, furiously, every other day or so during July and August, lasting an hour or rarely, a few hours. The rain nevertheless causes water to flow in all gullies; waterfalls tumble over cliffs and streams appear where there were dry-rounded channels in the rock. During the wet season, and at other times in the year when it rains, water gathers in the upper slopes and reaches the cliffs in erosion channels and chutes causing it to pour over cliff rock slowly eating particles away. A chute of this kind is clearly shown directly over the entrance to the cave which is situated immediately above Red Bow Cliff Dwelling in Figure 8. This process takes advantage of the weaknesses in the volcanic agglomerate masses in such a way as to form at first small rounded recesses, and finally caves.

From a physiographic standpoint, the Nantack caves are assigned to either of two categories; those which occur at the base of the volcanic agglomerate cliffs at the zone of contact between tuff and talus, and those numerous but independent and isolated caves which occur high in the crags. The latter are called upper caves and were produced by erosion as previously discussed. Upper caves are generally small and irregular, occurring in groups according to more
easily weathered areas of mother rock. Caves of this kind, where the water chute is no longer active, appear to be undergoing very little modification. Their condition is almost static rendering them ideal living quarters, the only erosive agents being slough from cave ceilings and slight wind and rain action.

Caves of the first category are called lower caves and vary greatly in size. In some instances, as in the case of Arsenic Cave, they are unusually large with vaulted ceilings. Lower caves have always had an agent in their formation additional to those mentioned above, since they are at points where ground water, collected through the ridge strata and influenced by faulting, emerges in the form of seeps and springs. As a result the innermost recesses of these caves (Tule Tubs Cave is an example) are invariably moist, whereas upper caves (Red Bow and Ash Flat cliff dwellings are examples) are completely dry. Lower caves are larger in all dimensions because of this slight but constant inner erosion. Arsenic Cave is an extreme lower cave example as it has a running spring in its rear wall.

The division of lower and upper caves is further emphasized in the cultural evidence revealed by excavation and survey. Upper caves were inhabited by Mogollon-Pueblo people solely within the years of the Canyon Creek Phase during the 14th century. The small buildings found in them were all constructed during this period and there is no
evidence that an earlier people used these sites; Red Bow
Cliff Dwelling is typical in this respect of the many upper
caves.

Lower caves were occupied intensively by Mogollon-Pueblo
groups during at least two distinct periods, to be followed
in more recent times by the Apache. By reason of accessi-
ibilty alone they reflect more usage than those remotely
nestled in the high cliffs. The first pronounced occupation
in this group occurs in Nantack and Reserve phases during the
10th and 11th centuries. This period saw initial construc-
tion of a permanent nature and after a time of abandonment
was followed by Canyon Creek Phase building activity, the
remains of which are still visible in many instances. These
structures are similar in nature to Canyon Creek Phase
houses in upper caves. Tule Tubs Cave is an illustration
of this triple occupancy.

In summary, the Nantack scarp was formed as a result of
fault action during Tertiary or Quaternary times. The ridge
is capped by basalt lenses, and prominent cliffs comprising
the scarp are massive tuff agglomerate strata, possibly
formed during the Tertiary period as a result of free-fall,
while underlying beds are of andesite and conglomerate which
are often concealed by talus slopes of recent origin. Caves
in the massive tuff agglomerate formations have probably
been caused by water erosion. Springs at the zone of contact
between agglomerate and underlying members are evidently the
result of faulting and permeable over impermeable rocks. Cave sites are classified into upper and lower caves on the basis of physiographic and cultural evidence.

THE NANTACK CAVES

The 50 or 60 caves dotting the Nantack scarp are collectively known as the Nantack caves. Ruins located in caves along the scarp, and the multitude of open sites to the northeast which extend along the southern border of Circle Prairie near Point of Pines, roughly parallel each other and are separated by only five to six miles of straight line distance. Caves of the Nantack have a uniformly southern or southwestern exposure according to the orientation of the ridge. The country surrounding them is one of moderate to extremely precipitous slopes, and many cliffs, huge boulders, and small but steep canyons make the terrain rugged.

The Nantack caves, including Red Bow cliff Dwelling and Tule Tubs Cave, came under the University of Arizona Archaeological Field School program of study as a result of the Nantack Survey in 1951 (Gifford, Hall, and Olson 1951). The following year another party specifically located Ash Flat Cliff Dwelling. The caves stretch one after another along the scarp. Those specifically dealt with are, from west to east, Red Bow Cliff Dwelling, Tule Tubs Cave,
Figure 7. - The Nantack scarp as seen from the foot of talus slopes indicating (arrows) from left to right the location of Red Bow Cliff Dwelling, Tule Tubs Cave, and Arsenic Cave.
Arsenic Cave (T. 1S.-R. 24E.) and Ash Flat Cliff Dwelling (T. 18.-R. 25E.) (Figs. 4, 7). Pine Flat Cave (T. 1S.-R. 26E.) is not one of the Nantack caves, but lies in a canyon of its own across the ridge (Fig. 4) to the northeast. This site lies on the fringe of Circle Prairie, as do the surface ruins reported by Wendorf (1950) and Wheat (1954a) who provide adequate descriptions of the surrounding country. Therefore this site is not included in the following discussion of Nantack caves.

Arsenic Cave (Arizona W:9:63) is a primary landmark and although no excavation has thus far been attempted, a brief description will relate its importance to cultures found in nearby caves. It is the largest cave in this region and is located, with other lower caves, at the very base of the cliffs. In depth it extends approximately 100 meters and in frontal width, perhaps 60 meters. A constant flow of water issues from a seep or spring along the back wall at its innermost part. Such a source of water must have served as a focal point for aboriginal people in the region. Today this water collects within the cave and is piped to Arsenic Tubs, a ranch maintained by the Bureau of Indian Affairs and the Apache Tribal Council for their cattle operations in the area of Ash Flat. Water from the cave, prior to this usage, flowed free and cut a well-defined channel in the western portion of the cave. Because much of the moisture sinks directly into the ground
near the cave itself, the entrance is heavily overgrown. A
creek bed heads from the mouth out into the lower slopes.
Dry now except during heavy rains, it may once have had
running water in it for a short distance. Away from the
cliffs downward from the contact zone, eroded material,
detritus, and alluvial deposits stretch in a sloping manner
gradually blending with Ash Flat proper. These slopes,
although relatively steep at first, fan out about two-thirds
of a mile from the cliff base and in their more gentle
undulations are dissected by shallow erosion gullies.

According to some Apache women of the area, it has been
their custom for many years to go up to Arsenic and other
caves in the country for the sole purpose of looking for
turquoise beads. It is said that Apache men and boys often
go up to the caves to look around and hunt. It is there­
fore extremely unlikely that any cliff dwellings exist in
the entire region which have not been visited by the
Apaches of today at one time or another, particularly those
in the immediate neighborhood of Arsenic Cave.

During the survey of Nantack caves, 21 cliff dwellings
and cave sites were reported (Gifford, Hall, and Olson 1951).
Sites were designated numerically according to the Arizona
State Museum Survey System and the more important ones were
given names in accordance with prevailing practices in
designating cave sites. A large number of sites were
observed but not visited and many must have completely
escaped detection. Red Bow Cliff Dwelling and Tule Tubs Cave appeared representative of those caves which contained sites and were subsequently singled out for special study.

Ash Flat Cliff Dwelling is four miles to the east of this group. It is unusual in being the largest of the Nantack caves to contain standing architecture and is second only to Arsenic Cave in areal extent. Perched high in the cliffs on an obscure but cavernous shelf, it is difficult to reach. It has never been excavated and at present is of primary value as the best example of cliff dwelling architecture.

WATER AND AGRICULTURAL POTENTIALITIES

To travel over Ash Flat or to view it from the air, the casual observer would easily conclude that water was a scarce item. At the present time the Ash Flat country appears desolate during most of the year. Previous observers have recorded similar conditions. Geological circumstances which make possible seeps and springs at the zone of contact between the Nantack cliffs and the talus slopes have been discussed. These sources provide water today and probably met at least the minimal requirements of the prehistoric population. Springs and seeps of this kind are abundant and give small pools of clear drinking water. In some cases they even offer running water for short
distances away from the cliff. All of them are small and obscure.

Families living in the area could have collected enough water to fill containers which could then have been carried to their dwellings. The flow is constant now and must have been sufficient for the domestic uses of the assumed population. In most cases seeps occur close to, or in, lower caves. Upper caves are far more distant from these water sources but not so much so as to render the water supply an impossible problem. It must have been more a matter of convenience and inconvenience. The spring located in Arsenic Cave, even when a free agent, was probably insufficient for irrigation of any kind, and all others in their present state seem too small for any agricultural use.

The food plant remains from Red Bow Cliff Dwelling furnish an indication of the agricultural productivity of these people. Maize was most abundant, over 2,000 corn cobs having been retained for laboratory study. Hulls, stems, and seeds of squash and gourds are next in order of preponderance. Beans, walnuts, acorns, pinyon nuts, portions of the yucca plant and its seeds as well as parts of other types of cactus plants were all represented.

The sample of food plants is large and an emphasis on farming and wild plant and seed gathering is supported by the lithic complex from this site. Hunting must either have played a subordinate role or little evidence of its practice
remained. Cotton fibers, seeds, bolls, and plant stems were found indicating cotton was grown near the caves. Based on the evidence recovered, cultivated crops included corn, squash, beans, gourds, and cotton.

In presenting the results of his 1945 survey, Haury takes particular note of agricultural evidence across the Nantack Ridge.

"It may be supposed that the occupants of the many large pueblos centering along the edge of a large prairie at Point of Pines were agriculturists because no other form of economy would have satisfied the demands of population centers. Contrary to expectations the old fields were not found in the prairies but on the slopes and ridges coming down out of the mountains from the south and west. By laying up rows of rocks on the contours of gently sloping ground, these early farmers were able to make maximum use of the moisture that fell as rain by spreading it out much as the modern farmer does with his contour plowing. Large plots set off with stone rows were seen in the course of the survey, and it is estimated that the acreage so prepared runs into the thousands." (Haury 1945a: 8.)

Agriculture was probably practiced extensively in a somewhat similar manner all along the base of the Nantack scarp among gullies in the talus slopes, alluvial hills below the cliffs, and on the outwash plains where talus gives way to valley floor. With proper handling seasonal rain water could have given crops to the prehistoric people and endeavors to control and divert it remain in the form of terraces found at intervals in all the major drainage channels. Terracing extends down gully slopes for distances
up to several hundred feet depending on the conditions, and away from waterways up their more gentle sides but not out on exposed hillsides. In construction, large basalt boulders were placed in single rows across the path of runoff in such a way as to catch silt and produce a flat shelf behind the wall. Whether flat earth areas retained in this way were deliberately filled in or built up through catching silt, was not determined. Generally the retaining walls are one course between two and three feet in height and varying in interval and width between 10, 20, and 50 feet depending on the particular topographical circumstances. It cannot be said with any degree of certainty whether these were actual growing areas as at Point of Pines or only check dams designed to control the flood waters which were then diverted for flood farming at a lower altitude. Perhaps they served in both capacities.

The character of the land has been spelled out in previous sections, from ridge top to cliffs, to talus, to valley floor. After a rain, water cascades through channels cut in the cliffs into gullies and canyons, from these into arroyos and out in fingering floods onto Ash Flat. Because the people making their homes in the Nantack caves were Mogollon-Pueblo and because the physiographic situations are alike in many ways, analogies with agricultural practices of the Hopi and northern Anasazi are not without foundation.

In that region as at Ash Flat,
"... the torrential showers, with rapid run-off, characteristic of the country present a situation particularly adaptable to flood-water farming and flood-water irrigation, which is a simple diversion and distribution of the water as the flood comes down the valley." (Brew 1946: 11.)

Flood-water farming as practiced by the Hopi and by the Anasazi at Awatovi is described in detail by Hack. Since, in a general way, conditions as he records them are nearly duplicated below the Nantack scarp, placement of fields and farming procedures probably did not vary a great deal from his outline of flood-water farming techniques (Hack 1942: 26). Trinchera plot farming may also have been an agricultural method used by the Nantack people and this farming technique is also extensively defined by Hack. Of particular interest in this respect are remarks concerning special crop planting in trinchera plots well in advance of the final date for killing spring frost.

"These localities in narrow gullies with steep gradients are likely to be frost free on cold nights as there is always a good circulation of air in a gully, and nocturnal radiation from the bare rock gully walls should help warm the plants. It is believed that the Hopi go to a great deal of trouble to make such gullies suitable for planting, because of the value of the early crop, which is associated with feasts and celebrations." (Hack 1942: 30.)

FLORA AND FAUNA

General information summarized by Wheat for Point of
Pines is applicable to the Nantack scarp country.

"Temperature ranges from about 20 degrees below zero F. in mid-winter to 100 degrees F. in mid-summer. The growing season is probably 165 to 170 days. Annual precipitation averages about 18 inches." (Wheat 1954a: 10.)

Snow blankets the ridge during the mid-winter months extending at times entirely over Ash Flat.

The Nantack scarp forms the border between Transitional and Upper Sonoran Life Zones. The Transitional Zone is more clearly defined at Point of Pines and the Upper Sonoran Zone becomes identifiable on Ash Flat toward the Gila Mountains. The scarp also coincides with a precipitation zone border, the zone to the north being one of 14-28 inches of rainfall and the zone to the south one of 7-14 inches (Stanford Research Institute 1955: 172).

The terrain is steep and rugged, drainages are sharp. The ridge crest is covered with juniper and Ponderosa pine and these trees extend over the rim to the north. Stands of pine and pine forests do not occur south of the ridge top. As the scarp begins to fall away, and in the neighborhood of 6,000 feet, scrub oak, cat claw, manzanita, and other dense underbrush provide a thick cover except where bare cliff rock is exposed. Still lower on the talus slopes scrub oak, mesquite, prickly-pear, cholla, agave, yucca, and bear grass constitute a more sporadic bush growth. The climate is semi-arid. Live oak and Alligator bark juniper
grow profusely about the springs and water sources and together with pinyon, dot the scarp as individual trees.

Below the cliffs and on the valley floor, grasses cover the ground; brown and dormant in the hot dry season, they flourish and turn to patches of emerald after the rains of July and August.

Animals of different kinds are numerous. Those seen during the excavation season and on the 1951 survey include cattle and horses on the range, bear, deer, bobcat, skunk, coyote, fox, rabbit, cottontail, ground squirrel, and chipmunk. Birds did not appear to be abundant except for the Canyon wren and kinglets. Others observed were several kinds of hawk and jay, raven, owl, dove, and magpie.

Insects of all kinds, beetles, mosquitoes, ants, spiders, tarantulas, scorpions, moths, butterflies and caterpillars were indeed plentiful. Snakes and particularly lizards of many varieties were present.

More detailed and additional information regarding the climate and flora and fauna of Circle Prairie is given in the report on excavations at Arizona W:10:51 (Wendorf 1950).
Until very recently, the large section of Arizona set aside as the San Carlos Apache Indian Reservation has remained practically unexplored. Prehistoric Indian groups lived continuously in this region for many hundreds of years, finally abandoning it about 1450 for reasons at present unknown to us. Before the westward pioneer expansion to Arizona, the Apache held indisputable control over most of the land. As Apache tendencies toward warfare were gradually brought under control, cattlemen entered the high, flat-bottomed valleys south of the White Mountains and north of the Gila River using the vast prairie expanses as range land. To the north, lumbermen began reaping the great stands of pine; in the west, with Globe as their base, miners drifted toward the headwaters of the White and Black rivers, but their mining operations were not extensive. In the heart of what is now the San Carlos Indian Reservation cattle ranching became, and has remained, a principal means of Apache livelihood.

Point of Pines first became known as a cow camp and ranch headquarters for the huge Double Circle cattle outfit now located on Eagle Creek. The country was opened to archaeological investigation when the Bureau of Indian Affairs constructed a road from San Carlos across the
Nantack Ridge down into Circle Prairie in the mid-thirties (Haury 1945a: 6). Prior to 1930, no archaeologist had really conducted serious studies among the ruins near Point of Pines. Many had approached the environs of Circle Prairie but for the most part it remained just beyond their reach.

Earliest among those whose records have survived was Bandelier, who in 1884 visited Silver City, New Mexico. He did not enter the area of Point of Pines but evidently the many ruins had been seen by others and he had heard of them (Bandelier 1892: 364). Later he had occasion to journey south from Fort Apache to Globe and seems again to have been made aware of the numerous cliff dwellings in the Nantack formation but failed to make actual contact with them or the great ruins close on the northern side. He did, however, give an accurate description of the Ash Creek drainage where he records a few small "faint" ruins (Bandelier 1892: 402-405).

Shortly after Bandelier's travels, Fewkes and Hough recount visits near this region and in one case, during 1897, the collection of actual specimens for the U.S. National Museum from a cave in the Nantack Ridge. Both make reference to the acquisition of the same artifacts. Hough refers to the site as "No. 24. Cave." and states that it contained many offerings in the form of pottery, worked sherd discs, arrows, arrowheads ("generally obsidian"),
beads of turquoise, polished stone and shell, a large white kaolin disc, and weapons and pahos painted with red, green, and black decorations, all artifacts having been secured from the surface about the inside of the "cavern." He felt that the site was a repository for ceremonial objects (Hough 1907: 40-41).

It was while working in the Safford Valley that Fewkes was given the items mentioned by Hough. Fewkes takes special note of a human effigy vessel among the specimens in the collection, interpreting it as indicative of trade with Mexico (Fewkes 1898: 166-168). Like Bandelier he tells of the numerous cliff dwellings in the country north of this district but never personally explored any of them. In a later report, some of the vessels from among the cave site specimens are illustrated and the pottery a trifle more fully described providing the earliest record of specific kinds of pottery. Among these, plain ware (Alma?), red ware, corrugated, Reserve Punched Corrugated, Point of Pines Punctate, and Alma Knobby can be identified. In addition, "A long tube with tubercles over its surface, made of rough pottery, may have been an ancient pipe or cloudblower." (Fewkes 1904: 188-190.) Thus the edge of the prehistoric curtain is raised but by no means penetrated.

In 1931 Neil Judd, Curator of the Division of Archaeology at the U.S. National Museum, explored portions of this terrain on horseback. He was particularly interested
in the Ash Flat country because reports had come to his attention of baskets reposing openly in caves of the Nantack scarp. Although his expedition found cliff dwellings, they evidently offered him little attraction and to his apparent disgust collected only four Apache baskets for his trouble. Judd's brief report is nevertheless of interest. He gives the first real account of the Nantack country, describing its rugged nature, its relation to other topographic features, and is the first archaeologist to make actual contact with, and publish observations concerning, the cave sites.

"Not until we had crossed the headwaters of the Blue River, Rocky Creek, and Warm Springs Creek; not indeed, until we had passed Ash Creek Ranch, former rendezvous of the Chiricahua Cattle Company, and climbed out upon that vast and marvelously level valley ignominiously known as Ash Flat did we find the underlying formations of the Nantaks presenting themselves. Cautiously at first and then with sudden boldness thick layers of basalt, conglomerate, and limestone thrust out scarred faces to form towering cliffs. At their base, in the bank of conglomerate or volcanic breccia, rock shelters and caves of greater or lesser size occur at irregular intervals."

(Judd 1932: 129.)

As a result of Judd's recorded trip we also have four published photographs of caves, cliff dwellings, and the Nantack scarp, one of which is of Red Bow Cliff Dwelling, together with some data and an illustration of Apache basketry collected (Judd 1932: 125-132, Figs. 119-124).

The Van Bergen - Los Angeles County Museum Expedition,
Fort Apache - San Carlos, Archaeological Survey of 1931, also passed through Point of Pines in March of that year. A record of this expedition is in the field notes on file at the Los Angeles County Museum. Sites around Circle Prairie and "small cliff houses" and a "small 4 roomed cliff ruin on the south side of Nantack Mountain" were surveyed. No excavations seem to have been attempted. Aside from one "human foot bone—with traces of red paint on it" and a few stone implements, sherds were the only items collected. Black-white and red polychrome, black-on-white, a few red-on-buff, red, corrugated, and plain ware are among the 84 sherds listed. The material gathered from "Circle Prairie, Nantack Mountain, and Ash Flat, of the White Mountains, Arizona" is stored with the collections of the Los Angeles County Museum.

Judd and the Van Bergen party were the only scientists to visit these caves. Of course their guides, cattlemen, and Fewkes' prospectors had poked at the caves in passing, probably spending time in the shelter they offered and sometimes availing themselves of surface artifacts.

Over the years following these two expeditions, Cummings and Wetherill, Gabel, Sayles, and Dennison (Haury 1945a: 6) penetrated the interior to examine but not excavate sites near Point of Pines. Thus, remote and inaccessible, the sites lay dormant and only superficially investigated until 1945.
RESULTS OF CAVE SITE EXCAVATIONS
DURING 1952 AND 1955

A summary of the results of excavations in cave sites carried out under the University of Arizona Archaeological Field School program is presented. Sections of the report which follow give detailed and additional information concerning the sites and materials recovered from them. The present summary provides a comprehensive insight into the nature and meaning of this evidence.

RED BOW CLIFF DWELLING

Occupation

Within a time span of approximately 75 years during the Canyon Creek Phase, A.D. 1325-1400, Red Bow Cliff Dwelling was occupied by Mogollon-Pueblo people. Dating the ruin to a comparatively restricted number of years is a fortunate circumstance in that all cultural remains in the cave may be assigned to this period.

At some point during Canyon Creek Phase, Red Bow Cliff Dwelling was considered a permanent residence and buildings erected. The proportionate abundance of Cedar Creek Polychrome indicates that the peak of occupational concentration was toward the beginning or in mid-Canyon Creek times when
this pottery type was at its highest frequency relative to other painted types in larger ruins of the region. The presence in the site of such types as Pinedale Polychrome and Point of Pines Polychrome is explained by the principle of type overlap in a ware continuum.

However, the question of whether seasonal or continuous occupation occurred at Red Bow Cliff Dwelling during Canyon Creek Phase is not conclusively answered by the nature of the pottery. Since there was no cultural stratigraphy, the range in White Mountain Red Ware in itself can be taken to indicate an occupation over the entire 75 year range of Canyon Creek Phase. On the other hand, pottery type overlap could have been accentuated at these outlying ruins and the actual situation could have been one of limited contemporaneity among these types. If this were the case, a very short span of time during Canyon Creek Phase would more correctly be assigned to the occupation. On the basis of ceramic evidence, either line of reasoning is feasible.

In reality, a combination of both lines of reasoning probably presents the most accurate assessment when other evidence at the site is added to that afforded by pottery. Therefore, pottery type overlap in a ceramic sequence plus seasonal occupation for economic purposes (agriculture, gathering, hunting) are held accountable for the presence of types earlier than those of the principal and apparently permanent occupation. Seasonal occupation of this kind would
have been intermittent, a number of short visits over approximately the earlier 25 years, with a principal occupation of short duration occurring during early or middle Canyon Creek Phase times. Even through some of those years, use of the cave may or may not have been on a year round basis; there is no way to ascertain this fact. Seasonal occupation is meant to indicate a stay from a few weeks to gather plants, nuts, fruits, or berries, to as much as seven or eight months necessary in tending crops during an agricultural season.

Zuni is an excellent example of this type of economy and is illustrative for purposes of comparison with the prehistoric use of caves such as Red Bow Cliff Dwelling.

"At the present time Zuni village is unquestionably the center of the life of the Zuni tribe, but there are also three small farming villages, a fourth locality, and outlying single houses. Zuni is inhabited the year round but the other places are occupied (except by a few individuals) only during the agricultural season." (Smith and Roberts 1954: 11.)

Such a description might well have applied to cave occupation during the 14th century with Arizona W:10:50 as the center of life.

General paucity of culture in the caves, lack of architectural superposition or remodeling, absence of burials, absence of turkeys, and the absence of formalized kivas, tend to support an interpretation of cave use which was intermittent for some years and more concentrated over
a relatively short span of time at some point during the early or middle portion of the period 1325-1400, and that the occupation was oriented around crop tending-gathering-hunting activities.

Architecture

The ruin is made up of five rooms which face on a Frontal Area. Rooms 1 and 5, especially the former, were places of domestic activity. Rooms 2 and 3 probably also functioned in a domestic capacity but contained little distinctifying evidence. The Frontal Area was an all-purpose section.

Room 4 was of a special nature. Varying from section to section, the fill was heavy with vegetable food, particularly corn and other plant remains, large quantities of cane, broken portions of cane items, and numerous sandals; while other artifacts such as sherds, lithic material, and especially bone were sparsely represented on a comparative basis. Complete items of pottery, projectile points, stone hoes and manos were also found but the bulk of the trash contained material not of this order. Such artifacts were discovered where they had been stored. For this reason it cannot be assumed that all complete items, particularly of pottery, were actually used most of the time in this room. They could have been brought in for storage because other rooms (Rooms 2, 3, and 5) and the Frontal
Area where they were ordinarily used did not have debris or the kind of floor and subfloor fill conducive to easy burial or concealment. That the people did an excellent job of secreting the few items found cannot be disputed.

Flooring differed from other rooms. A number of very tightly packed layers of grass, plant, and dirt covered the entryway and center section raggedly extending into some other portions of the room. Packed layers of this kind were probably caused by much walking, standing, or sitting rather than a concerted construction effort. In the center of the room, charcoal, lenses of charred material, and burned debris were plentiful; walls and ceiling were extremely blackened by soot. Open fires and perhaps the use of torches may account for evidence of this kind. There were no architectural fire hearths and Room 4 was in no way intentionally modified by architecture. Masonry backed onto the room but these walls were the result of building adjacent rooms.

One particular sector contained items not found in abundance elsewhere in the cave. These objects included cane cigarettes; dice; miniature bows; arrow fragments, many of them painted; pahos; small obsidian projectile points; pottery discs; turquoise jewelry; and beads; a complex suggesting use of the area as a ceremonial repository. As this is the only room having ceremonial implications, it is possible that the type of floor encountered may have been
caused in part by ceremonies. A simple ceremonial routine could have been executed as head space in the room was adequate where the surfacing existed.

In summary, special ceremonies may have been conducted, a place designated to receive offerings, and sandals, cane cigarettes, and miniature bows and arrows manufactured and used. Since the room received no exterior lighting, large fires may have been built and torches used when the need arose. Corn must have been handled in some way and the cobs discarded to the back of the cave. Such activities may have culminated in ritual offerings for prosperous hunting or simply to insure a good life. The sacred nature of the room may have completely prevented its use for domestic purposes, as evidenced by the absence of benches, fire hearths, and plastered flooring which occurred in other more domestically oriented rooms.

General remarks concerning architecture at the site:

Masonry: Large basal rocks and boulders are used as wall footings with smaller, unshaped building stones set upon and between them cushioned by mud mortar (Fig. 13). Coursing is irregular, very crude, or absent; some walls are built entirely of smaller rock (Fig. 17c). The large rocks used probably at one time covered the cave floor, having spalled, weathered, or fallen from different parts of the cave wall and roof. Stone work is poor; none of
rocks employed are worked or shaped. Small rocks were selected for size and ease in handling. Building rocks are predominantly tuff agglomerate, the same material from which the cave was eroded, the occupants no doubt finding it difficult to haul building stones over the arduous routes into the cave. Basalt stones were occasionally used. During construction, however, an attempt was apparently made in some sections to choose rocks of more or less equal size. Spalls were often inserted where irregular rocks left gaps too wide for mortar to stay by itself. Such use of spalls and small rocks had no regularity to it. Sherds and even sandal fragments were infrequently pushed in the mortar. No surface was plastered. In most instances walls are continuous from one portion of the cave to another but where construction does adjoin, abutting ends are not bonded.

Masonry is sometimes curved and always highly irregular, its nature being determined by the cave itself and the materials used. Foundations are not constructed (Fig. 17a) and buildings extend from tightly compressed cave debris to the cave roof (Fig. 9b). No beam holes are present. Since the time of construction, walls have pulled away from the cave ceiling only a few centimeters. Average wall thickness, 30 cm.; average height, 1.40 m.

Red Bow Cliff Dwelling masonry simply represents a solution to the architectural problem of closing off a
natural section of the cave in order to make a room. There was no effort to produce a fine wall, a good-looking wall, or one which conveyed any esthetic effect. Materials immediately at hand were used in construction and these not modified in any way so as to produce a better wall. The only interest of the masons besides that of a standing wall seemed to be in maintaining a more or less even face on visible wall surfaces. Greater attention was given this consideration on exterior surfaces than interior surfaces.

This kind of masonry may be compared favorably with that in the Reserve district at Cosper Cliff-Dwelling and to a somewhat lesser degree, Hinkle Park Cliff-Dwelling (Martin, Rinaldo, and Bluhm 1954: 33-50). It is also similar to that of Arizona W:10:51 as described by Wendorf (1950: 21-28) and certain architectural likenesses exist with respect to cave sites in the Verde River drainage (Mindelleff 1896: 217-235). A good example is Richards Caves (Pierson 1956: 91-97). On the other hand, the masonry does not compare well with that of Canyon Creek Ruin (Haury 1934) or masonry of Canyon Creek Phase at Point of Pines with which it is contemporaneous. Although the Nantack caves lie geographically midway between Canyon Creek Ruin and caves of the Reserve and Upper Gila, in terms of architecture and structural use of caves, they much more closely resemble those cave sites to the east.
In addition, there is little resemblance to the walls still standing at Tule Tubs Cave some hundreds of feet below which are considered of the same time period. At Tule Tubs Cave the masonry is coursed, rooms are almost square regardless of the cave walls, building blocks were picked to make each course level, blocks were more heavily mortared together, wall plaster applied to surfaces, and fewer chinking stones or spalls used. This is masonry which reflects comparatively higher standards and approximates that of Canyon Creek Phase as featured in the large ruins across the ridge.

It is suggested that masonry at Red Bow Cliff Dwelling is not as carefully constructed as at Tule Tubs Cave because the latter is at the base of the scarp and therefore its occupants could much more easily obtain finer building blocks and water for mortar and plaster. They could afford to choose materials. It may be, therefore, that close masonry comparisons between small sites are not especially valid on a cultural level of abstraction. Similarity and lack of similarity is undoubtedly influenced heavily by circumstances found in the immediate environment, such as availability of building materials and the accessibility of a good mason.

Architecturally it must also be observed that walls at Red Bow Cliff Dwelling did not have to support ceilings or proceed to great heights. It is not known whether or not
the rectangular rooms at Tule Tubs Cave were roofed, but it is suspected that they were not. It is possible that if a roof were intended, the quality of the masonry would have been influenced and it is also possible that the intention alone of roofing a room may have meant that the room had to have four supporting walls no matter where it was located. If this were the case, a decision that a roof was not necessary because of overhang protection could have been made at Tule Tubs Cave after the four walls had been partially or completely constructed.

The matter of roof construction is emphasized because structures at Canyon Creek were multistoried and roofed as are open sites while this practice was less frequently used in the Reserve and Upper Gila. No evidence of a constructed roof has been found in any Nantack cave thus far explored. According to Hough (1914: 58) roofs were absent in cliff dwellings he examined in the Upper Gila. Martin has reported some instances of roof construction in the Reserve Area but it is by no means the dominant practice (Martin, Rinaldo, and Bluhm 1954). In this entire region, with the exception of Canyon Creek Ruin, little rooms are placed here and there to conform with cave recesses allowing the cave to determine the architecture. After construction, the occupants had remaining a comfortable living area uncluttered by any building.

This general situation and the type of cliff dwelling
represented by Ash Flat and Red Bow cliff dwellings is in contrast to those of the northern Anasazi. The northern pattern is to completely fill a cave or shelter with architecture, characterized by rectangular rooms with constructed ceilings and one or more kivas associated with the architectural unit.

Doorways: Average height, 1.05 m.; average width, .52 m.
Where clearance was low, the door extended from wall bottom to cave roof. Throughout these sites, in cases where the cave ceiling did not form the top of the door, small sticks of wood were used as a lintel. Only in Room 5 was a door frame fashioned with wood on one side and a lintel of slats and thin pieces of wood tied together. None of this wood has been of a type useful in procuring dendrodates. Good pine logs are abundant at the ridge crest but this source was evidently too far away to make a special trip worthwhile. Doorways are small and walls never high so lintel load is at a minimum and large logs not necessary. Doorways were generally simple, no great expense of labor having been taken in their construction. T-shaped doors have not been observed in the Nan-tack caves.

Ventilation holes: Ventilation holes were constructed as air vents to allow smoke to escape and fresh air to enter. They occurred in all rooms as holes where masonry walls contacted the cave ceiling. Shapes varied from rectangular to elliptical. Average height, 15 cm.; average width, 29 cm.
Ceilings: Room roofs were not constructed. The cave ceiling in every instance was at a height to make it do as a roof.

Other features: A variety of materials was used in the making of floors. Layers of grass covered with fine fill were tamped into a soft, dry, resilient floor which was then hard packed by use. In other instances, sotol and cactus plants were thickly spread and wet plaster smoothed over the cactus leaves, producing a floor which was completely and solidly plastered with a cement-like surface. Layers of grass were to a lesser extent employed in the same manner. Mud plaster was also used by itself to provide flooring.

Benches were constructed in Rooms 1, 2, and 5, possibly for sleeping purposes. A retaining wall of masonry was built enclosing the desired area which was then filled with trash, debris, and plant fragments, surfaced, smoothed, and plastered. The result was a bench with a level surface occupying a corner or end of a room. The exact shape varied in accordance with the actual position of the bench within the room. Similar structures do not seem to have been reported elsewhere in the Southwest, with the possible exception of Richards Caves (Pierson 1956: 92).

A number of small sticks had been vertically cemented into floor plaster. They were almost always found in groups of two or more separated by short intervals. Two
occurred immediately inside Room 4 entryway just behind the metate bin, two next to the outside of Room 2 front wall, one in the center section floor of Room 2, and a group of four inside Room 1, Block A, in conjunction with a number of floor features assumed to have been a work configuration. These sticks are from 10 to 15 cm. in length, 1 cm. in diameter and as found, were always broken off above where they had been plastered into the floor. A pair of sticks was found at Pine Flat Cave similarly buried in floor plaster. Entwining the base of one of them beneath, and encased in, plaster was a ball of human hair cordage. For this reason, association of such sticks with some type of weaving apparatus is suspected. The pegs are always placed where light would be sufficient for work. In an article concerning Mexican crafts, Sayles discusses weaving and shows a photograph wherein a man is seated before an arrangement of pegs stuck in the ground which bear a striking resemblance to sticks observed archaeologically in the caves. Sayles states that:

"...the thread is wound on a series of six wooden stakes driven into the ground, to form the warp pattern. The arrangement of the pegs is for the convenience of the weaver, to enable him to work seated while stringing the warp in such a manner that the sheds may be formed. The warp thread is continuous and forms a skein of some two hundred loops, each about eight feet long." (Sayles 1955: 962-963, Plate Vo.)

No constructed storage pits or cists were located in
any of the rooms. Black soot coated much of the cave roof and interior of most walls. Room 4 was especially smoke blackened toward the entryway.

Pottery

All whole vessels, without exception, were found completely buried and inverted in cave fill. This was evidently the customary method of storing whole vessels when the inhabitants departed. As pointed out by DiPeso (1956: 215), the most efficient tool in the inventory of material objects for digging necessary storage holes is what has been called the stone hoe.

Ceramically, considerable emphasis was placed on locally made utility types. This is readily observed by comparing relative sherd amounts. Painted types comprise only seven per cent of the whole and are a minority when the number of whole and restorable painted vessels are balanced against those termed utility types. Among decorated types, Cedar Creek Polychrome was most abundant and types of the White Mountain Red Ware exceed other kinds (Fig. 30).

Relationships with other areas as can be discerned from the pottery collection are not as diverse as in earlier times. Trade contacts with the south and east apparently were not pronounced ceramically or had terminated by this time. White Mountain Red Ware indicates a
trend from the northwest and west and Gila Polychrome from the west and southwest. Some of both of these potteries may have been locally manufactured so it is not possible to estimate the strength of ties in those directions. As regards the people who used the caves, it would appear that all lines of trade were weakened and of a second-hand nature through villages at Point of Pines.

The presence of unfired pottery fragments, local tempering material, pottery polishing stones, paint pigments, and potters' jar rests tend to indicate a degree of self-sufficiency in the matter of pottery making among families occupying such sites as Red Bow Cliff Dwelling.

Lithic Material

There is every indication that the people using Red Bow Cliff Dwelling made almost all of their stone tools themselves. The materials from which they were fashioned are available in the region and in the case of chipped stone implements, all steps of tool making are represented, from raw materials and waste chips to finished products. The lithic complex is somewhat weighted with tools having to do with agricultural and food gathering endeavors. It must be pointed out, however, that such tools are bulky, less easily destroyed and lost, and more likely to be kept around the house than hunting tools which are taken into the field, used, lost, and broken on the spot in hunting
and butchering. A number of objects normally associated with hunting were nevertheless found at the site. Chips, residue, and waste flakes were numerous and cores and raw material indicated the manufacture of hunting tools. Until the use of pulping planes and stone hoes is more completely understood, proper evaluation of hunting as an activity within the economic picture is impossible. If these tools had uses relative primarily to the preparation of hides, it would be necessary to attach more value to a hunting aspect.

When the entire lithic sample is considered, the types and frequency of pecked and ground stone tools indicate that the emphasis on preparation of foods acquired under the broadest definition of the term seed gathering was at least equal to the emphasis placed on the processing of cultivated foods, and that hunting was subordinate to these aspects. Evidence also attests the self-sufficiency of these rural or marginal groups and although their main concern must have been with their own subsistence, the raising and gathering of surpluses for use at major population centers may have been of import to them.

Miscellaneous

Other artifacts recovered include items of bone and horn, shell, cordage, a decorated bag in the coil-without foundation technique, fragments of plain weave cotton
textiles, sandals woven almost exclusively in a plaited style, leather, ceremonial objects, wood and plant artifacts, as well as cultivated and wild plant remains, all of which add significantly to an understanding of the kind of life pattern engaged in by these people.

But for its greater size, Ash Flat Cliff Dwelling is similar to Red Bow Cliff Dwelling and was probably occupied by a neighboring group for the same reasons and in a fashion much like that of the latter site. Both are upper caves and traces of Apache occupation were not found in either of them.

TULE TUBS CAVE

Occupation

Three periods of occupation took place at Tule Tubs Cave. The last was Apache and probably was confined to some time between A.D. 1800 and 1945. It is recognized primarily by the presence of Apache pottery. Two Mogollon-Pueblo occupations preceded the Apache. The later of these was contemporaneous with occupation at Red Bow Cliff Dwelling and occurred during Canyon Creek Phase (1325-1400). Initial Mogollon-Pueblo occupation took place during Nantack and Reserve phases (950-1100). The site was abandoned throughout intervals between these periods and actual prehistoric use of the cave probably was
restricted to much shorter time spans within designated phases. Economic aspects probably paralleled those reflected at Red Bow Cliff Dwelling and Pine Flat Cave.

Architecture

The oldest architectural period was present in the lower levels of Room 1. This construction was represented by a series of wall stubs which had been leveled in order to make possible the building of more recent structures. Early wall stubs are equated with Nantack and Reserve phase pottery at the site.

Architecture of the later and most recent building period (Rooms 1, 2, and 3), outlines and portions of which still stand above the surface, are contemporaneous with the Canyon Creek ceramics. In no case were more recent walls built directly on the older nor do room sections of the two periods ever coincide. The older structures lie independently beneath the more recent. No building activities are associated with Apache use of the cave and Apache evidences are thought to have followed the last Mogollon-Pueblo occupation by approximately 300 years.

Pottery

Black-on-white pottery from Forestdale represents trade from the northwest, Reserve Black-on-white from the northeast and east, and Encinas Red-on-brown and Sacaton Red-on-buff from the south during the early period of
occupation. Through the later period, evidence of trade adduced through pottery types is less distinct and with the exception of certain gray paste White Mountain Red Ware types presumably from the north or northwest, most pottery may have been made within the region.

Through the presence of diverse pottery types which were subsequently grouped into complexes and compared with dated ceramic complexes, periods of occupation were sequentially and temporally delimited.

Miscellaneous

The lithic sample at Tule Tubs Cave is not large enough to permit the making of generalizations other than to note that a high frequency of rubbing stones may indicate a gathering aspect emphasis such as at Red Bow Cliff Dwelling. Conditions for the preservation of dry material were not favorable. Consequently the number of specimens and types represented is not large. The most important information obtained by excavations at this site lay in the definition of early architecture and a contemporaneous period of occupation typical of lower Nantack caves and analogous to the earliest occupation at Pine Flat Cave across the ridge.
PINE FLAT CAVE

Occupation

The cave was in continuous use over a period or periods of time from approximately A.D. 950 to 1100 (Nantack and Reserve phases). An abandonment followed. This occupational hiatus was of sufficient length to allow natural accumulations over buried storage jars, hearths, and other remains to the extent that they were not discovered and disturbed by the next occupants. A relatively long lapse of time would be expected given these conditions and is indicated when Ceramic Complex Two and the beginning of Building Period Two are assigned to late Tularosa Phase which is the next period of cave occupation. During this time, from about 1200 to 1275, the cave was again continuously and intensively utilized. The greatest amount of building in the history of the site occurred. As a result of such population, a relatively large amount of cultural debris and trash accumulated. Subsequently, during Pinedale and Canyon Creek phases, only sporadic or seasonal use of the cave is postulated. Cultural remains are limited and replastering of rooms and floors and slight architectural modification represent the only apparent building activity. Ceramic Complex Three evidences this Pinedale-Canyon Creek Phase seasonal occupation lasting from 1275 until the beginning of the 15th century. A total
absence of Point of Pines Polychrome and other types diagnostic of Point of Pines Phase, places 1400 as the most likely estimate for the final date of Mogollon-Pueblo occupation at Pine Flat Cave. The Apache then made extensive use of the cave several hundred years after it was finally abandoned by the Mogollon-Pueblo.

Architecture

Surface remains indicated a two-room pueblo constructed in a natural cave formed by erosive agencies of wind and water at the contact between beds of volcanic ash and volcanic agglomerate. Excavation revealed a series of superimposed Mogollon-Pueblo architectural units. Altogether seven living areas were located under trash accumulations both in front of the sheltering overhang and beneath the two rooms visible at the surface.

Living areas, sometimes semi-subterranean and surrounded when necessary by low retaining walls of crude masonry, were typical of Mogollon-Pueblo Building Period One. Rooms were small and no roofs were built under the cave overhang. Fire hearths were large and of the box variety, constructed of sandstone slabs. Plastered floors occurred in some instances. Storage jars were placed below ground. A formalized storage or work area was built which contained a storage bin lined with a section of twilled basketry.
In Building Period Two, rooms are contiguous and masonry is more developed. Walls extend to the cave roof, or in the case of Room 3, some type of roof structure. Rooms were built above the surface as much as practical limitations would allow. Entrances were constructed. Box hearths, smaller than those of Building Period One were used. Floors were surfaced, generally with plaster. The masonry ranged from crude piling of blocks held in place by mortar to a more usual type which exhibited some coursing, and involved the selection of building stones so that walls could be trued. Although blocks were unshaped, when mortared together they were built so as to present an even wall on both interior and exterior.

Following the construction and use of units associated with Mogollon-Pueblo Building Period Two, certain of the rooms were slightly remodelled. Remodelling was probably effected during the postulated Seasonal Mogollon-Pueblo Occupation which occurred from the time Pine Flat Cave ceased to be intensively occupied until approximately the 15th century.

Pottery

Pottery is similar to the sample from Tule Tubs Cave except that earlier types occurred in greater abundance and types diagnostic of Tularosa Phase were present. Most important, Reserve Red, Pine Flat Neck Corrugated, and
Apache Plain were represented in quantities sufficient to suggest the definitive characteristics of these types. Five large storage jars buried deep beneath fill in an excavated area of cave bed rock furnished an excellent grouping of associated utility types. Knowledge pertaining to the sequence of development in corrugated types of the Point of Pines region was augmented by corrugated sherds and vessels from Pine Flat and Tule Tubs caves.

Miscellaneous

The pecked and ground stone sample from Pine Flat Cave, as at Tule Tubs Cave, is neither as large nor as complete an index of tools as from Red Bow Cliff Dwelling. Location, relative accessibility, and a demonstrable Apache occupation at these two sites were probably serious factors in the survival and preservation of stone, as well as other artifacts. Perishable items occurred, but because of fill mixture must be assigned to a general Mogollon-Pueblo category, 950-1450 inclusive. Most of the dry material is similar to that obtained from Red Bow Cliff Dwelling.

In the uppermost cultural layers, the first Apache archaeological remains found in the Point of Pines region occurred, primarily in the form of twined basketry, pottery, bark bins, and grass-lined storage cists covered with hides or basket fragments. Unfortunately, it is not possible to determine the precise age of this material.
Within a time before A.D. 1945 and after 1450, the Apache made use of this cave. Such indications as were present seem to place this use during the 19th century.
RED BOW CLIFF DWELLING  
(Arizona W:9:72)

THE SITE

Red Bow Cliff Dwelling is situated high in the Nantack scarp in the topmost cliff-forming tuff layer where its occupants had a grand, panoramic view of Ash Flat and the various mountain ranges to the south. The cave is at an estimated altitude of 5,900 feet, some 900 to 1,000 feet above the actual floor of Ash Flat, faces almost due south, and is nearly a half mile west of Arsenic Cave, the best known landmark of the area (Fig. 7).

The site is not easily discerned from Ash Flat but at a distance of about one and a half miles directly below and out from the cave mouth, it appears as a small black half moon set off against the surrounding buff rock bulges almost exactly midway up the scarp face. Moving to either side or proceeding up the talus and alluvial slopes, the cave is obscured from view by numerous crags and rock projections which make the cliff tiers.

To the east, a canyon with sides suitable for trail building renders the least hazardous, but by no means an easy, access to this cliff dwelling and others in the immediate vicinity. The cave was formed on a ledge in the highest cliff tier. When the volcanic agglomerate ledges disappear 100 feet above Red Bow Cliff Dwelling,
Figure 8. - Red Bow Cliff Dwelling as it appears from a nearby ridge spur southwest of the site. A deep ravine cuts between the foreground and the cliffs immediately in front of the cave.
approximately 800 feet of scarp remain as a sharp slope to the ridge crest. Immediately in front of the cave, sheer cliffs drop away into a small gully which pours into a deep ravine (Fig. 8). From a distance this ravine appears as a gash across the scarp face, and has been formed by water action scouring out a steep channel in the less resistant rock of a narrow dike.

Immediately to the west on the other side of the ravine, two other caves face out across the flats below; directly above, a small two-roomed dwelling occupies its cave; just around the corner to the east, a single room is tucked in the cliff; and 50 meters farther, ruins fill yet another multiple-chambered cave. Across the canyon up which the trail proceeds, small structures may be seen in almost any natural recess large enough to accommodate a building. Within an hours climbing distance, a dozen cliff dwellings make up a part of the community which in prehistoric times must have flourished in the Nantack scarp.

Red Bow Cliff Dwelling is well protected and the cave cannot be seen at close range until one is almost upon it. Rounding the ledge, the ruin appears set back in the cave (Fig. 9a). Use by a prehistoric population is immediately noticeable by reason of the well preserved architectural remains (Fig. 9b). Four doorways and a large opening make five chambers evident. A Frontal Area immediately beneath the overhang is free of walls and provided room for work
Figure 9. - Red Bow Cliff Dwelling. a, approached from the east the ruin is set back in the cave facing out over Ash Flat to the left; b, the eastern half of the site showing masonry, architecture, and the manner in which Rooms 3, 4, and 5 face the Frontal Area.
Figure 10. - Plan and section of Red Bow Cliff Dwelling.
and relaxation shielded from the weather. Rooms and architecture are ranged in a semicircle behind the Frontal Area (Fig. 10). Three of the rooms were purposely constructed small, the other two represent large sections of the cave walled off in such a manner as to make use of large natural recesses toward the back of the cave. Doorways and ventilation holes are the only openings in the constructed walls. The cave is 10 m. wide at the mouth, 3 m. high at the center, and 18 m. in maximum depth.

From the Frontal Area, the view is a grand spectacle (Fig. 11). In the mornings and evenings, Ash Flat has, during the early summer, a rich brown hue to it. Mornings are very quiet, but as the sun gains altitude the wind gains velocity, blowing in different directions around the cave. Evenings a light breeze which rises and falls is always present.

The ruin was selected for excavation because it was completely dry and contained five rooms, the result of the cave being modified to varying degrees by architecture. Of those surveyed, it presented every indication that it would be representative of the upper cave group. Sections of room surfaces, however, had been pitted by persons looking for antiquities, and portions of each sleeping bench were torn out. Small animals had lived in the cave and contributed to churning its contents. Much rat dung and large rat nests filled the sections under shallow
Figure 11. - Views from Red Bow Cliff Dwelling.
a, southeast showing agglomerate cliffs containing caves and the general nature of the Nantack scarp as it falls away into Ash Flat; b, southwest from the front of Red Bow Cliff Dwelling over Ash Flat, the Gila Mountains, and in the distance, upper left, the Pinaleno Mountains
overhangs. Despite these disturbances, perishable items not spectacular enough to have been removed still lay scattered about inside rooms. They represented evidence for both domestic and ceremonial aspects of life in greater abundance and in a better state of preservation than in other known caves of the region.

Red Bow Cliff Dwelling was one of those specifically visited and photographed by Judd (1932; Fig. 121). Inscribed on a rock within the cave was the name "Don Thompson Sept 24 1931," one of the members of his party. Other writings found on smooth rocks and walls indicated visits by Apache men from 1935 to 1951.

ARCHITECTURE

Frontal Area

This area is that to the fore upon which all five rooms of the cave open; no constructed features are evident in its connection. In places bedrock surfaces in this area, particularly near the drop off, in other regions fill accumulated to a depth of 20 cm. In certain portions plaster extended out over it from the base of room walls. These plastered areas should not actually be considered flooring because they conform with bedrock and appear to have been merely a coating in an effort on the part of the occupants to smooth the slope, perhaps a way
of using up some plaster that was left over after con-
struction.

The fill in the central portion of the Frontal Area
was heavily lensed with charcoal, fire areas, and other fine
pulverized refuse. Its surface was hard packed from persons
having walked on it over the years. In the west half on a
raised portion in front of Room 1, a natural feature very
convenient to sit upon, fill was a loose agglomeration of
rubbish 5 to 10 cm. deep. A number of metates were found
on the Frontal Area, strewn about in helter skelter
fashion. They are not plotted or mapped because none
seemed to be in its original position.

Room 1

Walls: The south wall alone is constructed, all other
sides of the room are natural cave walls. Large boulders
and blocks form the basal row, surmounted by irregular
courses of smaller building blocks. Building stones are
not shaped, mortar is used liberally between blocks, walls
are not plastered (Fig. 13). Thickness, 28 cm.; height,
1.25 m. The wall is built directly on either compacted fill
or exposed bedrock.

Doorway: A single door interrupts the wall and extends
from floor to cave ceiling. Height, 1.25 m.; width, .55 m.

Ventilation holes: Two, both at the top of the wall next
to the cave ceiling. One west of the door, height, 15 cm.;
Figure 12. - Plan of Room 1. 

a, Point of Pines Indented Corrugated jar (A-16146); b, cooking utensil cache, upper vessel, Point of Pines Indented Corrugated jar (A-16145), lower vessel, Kinishba Red bowl (A-16141); c, Potters' Jar Rest, found intact right side up (A-16924); d, Potters' Jar Rest, found in shattered condition upside down (A-16914); e, Point of Pines Indented Corrugated jar (A-16144); f, Kinishba Red bowl (A-16142); g, hearth containing fine white ash and constructed of a ring of small rocks; h, bin with basalt slab base surrounded by plastered curbing (most prominent of a group of floor features within Block A).
width, 18 cm.; circular outline; the other east of the door, height, 13 cm.; width, 27 cm.; rectangular outline. 

Ceiling: Cave roof.

Other features: Due to the nature of the cave walls, the overhang is low along the west, north, and to a lesser extent, along the east sides of the room pinching out to about 10 to 20 cm. on the west and north. Most of the domestic features are arranged along the east wall where the overhang permits easy access. In this part of the room, a half ring of upright rocks mortared together acts in conjunction with an artificial bench to enclose a semicircular area. The bench is narrow in back of the semicircular area and was probably used mainly as a shelf to place objects on. Toward the front of the cave, the bench widens and is well finished. It would have been suitable for a sleeping bench. This portion is rectangular in plan, its finished corner facing the hearth (Fig. 12). The surface and edges toward the room are carefully plastered, the foundation having been constructed of masonry and the bench center filled with rubble. Nothing was concealed or contained in it. Average height, .50 m.; width, .75 m.; length, 1.50 m.

Room fill and floor features: The entire room was segmented into a series of blocks designated A through H and K for convenience in excavation. The letters I and J were not used. The floor extended over most of the room so that certain blocks could be taken out in at least two levels,
Figure 13. - Room 1 as viewed from the Frontal Area, showing type of wall construction, doorway, and ventilation hole (upper right). Front wall extends from bedrock of raised portion of Frontal Area to cave ceiling closing off a large natural recess toward the rear of the cave, in this way converting it into a room.
Level 1 (fill above floor), and Level 2 (fill below floor).

**Block A:** This area, immediately inside the doorway to the west, contained several related features at floor level. These features formed a group, but due to proximity to the entryway and to an extent their location directly in the path of anyone using the door, remains were fragmentary. Just inside the door the cave floor sloped up into a small recess large enough for one person to crouch in. This area was heavily plastered and slightly trough shaped. Toward the room at the bottom of the slope, a slight curbing was built and sherds and a mano were imbedded in the plaster. Also at this end as an adjoining feature, a bin was formed with a stone slab as the base, surrounded by a plastered curbing encrusted on opposing sides with sherds. Nearby the broken portion of a small stick was imbedded upright in the floor plaster and three similar broken stick ends were arranged in a row at the far end of the recess at the head of the plastered slope. A woven pot rest had been placed in a small cave wall cavity near these sticks (Fig. 14). The cavity was just large enough to have contained a vessel. This entire area was approximately 2 m. by 2 m. The features may indicate the base for a metate, a mixing bin, a storage jar (food preparation) and perhaps some apparatus connected with the sticks (weaving or preparation of weaving materials). Certainly this area was afforded the best light in the entire room.
Figure 14. - Group of features which occurred on the floor of Room 1, Block A, indicating the nature of a heavily plastered trough shaped area (center) with curbing containing sherds and mano toward its lower end, a bin (lower left) with basalt slab base surrounded by plastered curbing encrusted on opposing sides with sherds, broken stick ends (upper right and right) imbedded in floor plaster, and woven pot rest (upper right).
In connection with certain weaving techniques among the Tajin Totonac the use of small stakes is described in a manner which could conceivably have had parallels among the Mogollon-Pueblo at Red Bow Cliff Dwelling, especially when the amount of raw cotton found at the site is also considered.

"Once the approximate length of the fabric is determined, three stakes are set vertically in the ground, within the house or outside. The terminal ones give the over-all length, plus a comfortable margin. The center post is aligned, but is one-third or one-fourth the distance from the first post. Height of the stakes varies with individual weavers; irrespective of the width of the textile, Carmen Pérez Reyes uses posts only 20 cm. tall. Warping takes place in Figure-8 fashion over the stakes." (Kelly and Palerm 1952: 229.)

This manner of warping on three stakes is illustrated in Figure 55 of their report and there is remarkable similarity between the use of stakes in this technique and the occurrence of stake ends imbedded upright in the floor plaster of Block A. Four stakes could here have been preferred rather than three in a variation of method among these different people (see also Red Bow Cliff Dwelling architectural summary, other features section, for further occurrence and discussion of similar stick ends found imbedded in floor plaster elsewhere in the site).

Flooring was of hard plaster covering bedrock and shallow cave debris. Subfloor fill was not extensive because bedrock sloped upward toward the doorway.
**Block B:** Contained the only formalized fire hearth for the room; a circular depression, .55 m. in diameter, depth, 6 cm., surrounded by a ring of small rocks mortared together and into the floor on sides away from the fire. It was filled with fine white ash. Little culture was obtained from either Block A or B because flooring and bed-rock were practically one.

**Block C:** Contained in its fill considerable amounts of burned and partially burned domestic rubbish, refuse, plant remains, and food, with high ash and charcoal content beneath the plastered floor. Floor plaster was very hard, representing a concerted plastering effort. Floor level, 10 to 15 cm. below surface; fill depth to cave floor, .50 to .60 m., the lowest 5 cm. were sterile. One Point of Pines Indented Corrugated jar (A-16144) was found buried in the fill, bottom up in a natural depression between rocks near the west cave wall. Also in the fill of another natural recess in this wall, a collection of stone tools was stored (Stone Tool Cache A).

**Blocks D and F:** Adjoined each other and were immediately adjacent to the semicircular rock enclosed area, Block K. Very large rocks and boulders were contained in the fill, some of which extended to within 5 to 10 cm. of the surface. Fill of bunch grass and other trash was tightly packed in and around the rocks, and the entire surface of both areas floored by a tightly tamped level
surface. Items of culture were rare and nothing was stored or buried here. The manner in which these two blocks were so tightly packed by comparison with fill in other areas of the room, and the cave, may be attributed to an effort to build a durable smooth floor over the rocks as well as to the result of having been walked on again and again in the capacity of a thoroughfare to the enclosed domestic section, Block K. Not much debris accumulated here. The inhabitants may have kept the area swept so that clearance in this walkway would not be cut down any lower.

Block E: Floor, packed rather than plastered, was 20 cm. below the surface. Scattered patches of surfacing continued for a further depth of 15 cm. These beneath-floor hard spots varied in consistency and were interspersed here and there with bunches of grass. Fill was .75 m. in depth at its maximum near the room center and shallowed out to 10 or 15 cm. beneath the west wall overhang. The lowest 10 to 15 cm. was devoid of culture. No architectural features were evident. This block yielded no buried fire hearths, area, pits, or any other evidence which would lead one to believe there was any occupation older than that which was responsible for the floor. The size and depth of this block made it most favorable to attempt to show stratigraphy if it existed and material was therefore carefully removed in two levels. Block dimensions may be determined from Figure 12.
Blocks G and H: In portions around the edges, particularly to the extreme rear, or north end, and along the northwestern side of the cave, fill extended .50 to 1.00 m. back under a very low overhang. The fill was largely rat manure and the remnants of rat nests. Items of culture were hauled into these blocks by the rats or thrown there by the inhabitants as rubbish. Flooring extended out under the overhang slightly, the major portion contained no flooring. There was evidence—partially burned material, charcoal, but no white ash—of an occasional fire, started perhaps to burn the trash and cut down the smell, or perhaps to create smoke which is itself a warming agent. Excessive roof and wall blackening throughout the cave leads to the belief that the occupants may purposely have built fires that gave off great quantities of smoke. Where Blocks G and H adjoined up the middle of the room, the fill was soft, and over to the domestic area, Block K, had been deposited by the inhabitants. In this area was buried a cooking utensil cache composed of a Point of Pines Indented Corrugated jar (A-16145), a Kinishba Red bowl (A-16141) and one gourd ladle. Both vessels were inverted; the corrugated jar upside down over the bowl which in turn was inverted and covered the gourd ladle (Fig. 20d). The bottom of the jar was 16 cm. below fill surface, 5 cm. below floor level; the rim of the bowl was 42 cm. below fill surface. Another Point of Pines Indented Corrugated cooking jar (A-16146)
was inverted and buried by itself nearby (Fig. 20c), fill surface to jar bottom, 19 cm.; fill surface to jar rim, 41 cm.

**Block K:** The semicircular area adjacent to the bench along the east wall was designated Block K. This area is entirely enclosed by a ring of rocks mortared together. The area was floored at a depth of 25 to 15 cm. from the fill surface by tamped fill and matted grasses, although portions next to the bench and along the enclosing ring of rocks were plastered. One Kinishba Red bowl (A-16142) occurred upside down and tucked under the bench ledge at floor level (Fig. 20b). Two potters' jar rests, side by side (Fig. 12), were on the floor next to the enclosing ring of rocks (Fig. 17b). One sat on the floor, bottom up, and was broken; the other was right side up, and complete. Fill below floor level was earthy and full of broken rock but contained no features and only small amounts of culture. Overall fill depth to cave floor was .60 to .70 m. As in Block E, it was felt that here stratigraphy might be revealed if present. Block K was therefore also removed in two levels, using the floor as a demarkation.

**Summary:** Evidently the residents of this room occupied the enclosed semicircular area, the bench area, and the section just inside the doorway to fulfill most of their domestic activities. The west and back portions were probably a repository for thrown refuse and actually used
only occasionally. Flooring varied, front to rear of the room, from hard plaster, to tightly tamped surfacing, to no floor.

Room 2

Walls: One curved wall was built to shut off the natural chamber which constitutes this room (Fig. 10). Masonry is made up of small agglomerate rocks laid in heavy mud mortar to form very crude and irregular courses. Large basal boulders, such as employed in walls of surrounding rooms, were not used. Thickness, 30 cm.; height, 1.70 m.; cave fill serves as a wall foundation. The inside of the front wall is heavily sooted. The remainder of the room is bounded by the natural cave walls. Surfaces are rough, no plastering occurs on any walls.

Doorway: A single doorway forms the only entry for this room. Its sides are rough wall ends, no attempt having been made to smooth or plaster them. At one time a lintel was in place, but it has been removed. Present height, 1.45 m.; original height probably 1.10 m. with the lintel and surrounding rock in place; width, .55 m. One row of rocks and mortar still connects the wall sections above the door.

Ventilation holes: One; height, 12 cm.; width, 15 cm.; circular in outline; located at top of wall next to cave ceiling.
Figure 15. - Interior of Room 2 showing: doorway, upper left; ramp, lower left; masonry, upper right; and bench, center and lower right.
Ceiling: Cave roof, uneven and heavily coated with soot.

Other features: Many natural recesses of various shapes and sizes sink back into the bedrock walls. No artifacts were found in them even though they appeared to be convenient storage places. A sloping ramp leads from the doorway down to the center section. Extending from the ramp to the west cave wall is an excellent bench, constructed 20 cm. above floor level at the door and 28 cm. at the far corner down the ramp. Bench width, 1.10 m.; length, now 1.30 m. but could have extended up to 1.60 m. The original length is estimated because disturbances have destroyed the inner end of the bench. The edge is built up of a layer of stone, thick plaster, another course of rock and a final bed of plaster which extends over the entire level surface. The center portion was filled in with layers of rubble, primarily grass, and coated with plaster. Inside the doorway opposite the bench are two connected recesses just large enough for a crouching person. The innermost of the two is oval shaped. A hole extending through the cave wall from this recess into the center section was filled with rock and plastered over. Flooring in both sections was hard plaster; these areas could have been used either for sleeping or storage. Two manos were beneath the surface of the oval recess.

Room fill and floor features: The central section of the room is circular, its floor was probably well plastered.
originally but now surfacing is broken. The only features remaining were a hole extending below floor level in the eastern portion, and the small round broken end of a stick such as those in Room 1, Block A, imbedded firmly into the floor. This opening had been fashioned into a crescent shaped lip and could have led to a small storage area beneath the floor, but all subfloor space had filled with fine debris. In the southeast portion of the center section, plaster had been laid over broad cactus leaves, twigs, plant material, stones, and two manos. The beds of cactus leaves appeared to have been carefully placed, one on another and crisscrossed over bedrock gravel, producing layers which were then heavily plastered over to form a smooth surface. In some instances, leaves protruded through the plaster. The rear section of the room forms a small raised chamber on a level 35 cm. above the center section. The surface is level and cave walls enclose it on all sides except that facing the room. Important items of material culture were not preserved in this room. On the surface before excavation, only a metate, several metate fragments, and a few stone tools were in evidence. Debris was not deep or extensive. Apparently when the room was built, the floor area was smoothed off, depressions filled with whatever was at hand, and the entire surface plastered. Only one true floor was present, which had evidently been recoated at least once. If the cave had
seen use before the time of present architecture, bits of evidence should have been trapped below plastered surfaces, but this was not the case. No fire hearths, metate bins, or other features of this kind had been constructed in this room.

Summary: This compact structure contained, toward the rear, a floored, raised semicircular hollow section in the cave wall; a bench; rampway; and central section; and several recesses, all with level plastered surfaces. Although this room had the best light during the day, it lacked domestic features, indicating its primary use may have been as sleeping quarters. Room 2 is, perhaps, the best example of the kind of structure most typical at upper cave sites. Having been modelled to conform with the native features of the cave, a curved wall was made to close a group of recesses into a room, all niches and hollows provided by the cave wall were utilized, and plaster was applied wherever it could produce a smooth area for living or on which to set things.

Room 3

Walls: Room 3 is a small portion of the larger Room 4 partitioned off by a roughly circular wall. The cave forms a large chamber which was modified into Rooms 3 and 4 while the cave wall naturally separates Room 3 from Room 2. Masonry here is at its poorest. Rocks are irregularly set
in mortar to build a wall from the debris on the cave floor to the cave roof. Thickness, 30 to 35 cm.; height, 1.30 m. Walls slant slightly inward at the top toward the center of the room. No corners are formed and the wall extends around in a rough ellipse connecting with the cave wall to enclose the desired area.

**Doorway:** One; no particular care was taken in any of the structural details. It extends from floor to ceiling and the wall ends at the door were not finished. Height, 1.00 m.; width, .50 m.

**Ventilation holes:** One; height, 12 cm.; width, 14 cm.; circular in outline.

**Ceiling:** Cave roof.

**Other features:** None.

**Room fill and floor features:** Flooring was of plaster and extended over the entire room. A fire area of irregular extent but approximately 1.00 m. in diameter spread over the floor in the center portion of the room. Fill was 5 cm. in depth at room center and gradually deepened to 15 cm. next to the walls. Subfloor fill varied from 0 to 35 cm. in accord with irregularities in the cave floor created by rocks and boulders. Culture was sparse above and below floor level.

**Summary:** Room 3 is a small, uninteresting cubicle. The masonry wall, the doorway, the floor, and the hearth area are its only features.
Figure 16. - Plan of Rooms 3 and 4.  

- a, Kinishba Red jar (A-16143);  
- b, Reserve Plain Corrugated jar (A-16147);  
- c, Cedar Creek Polychrome bowl (A-16925);  
- d, Stone Tool Cache F (3 manos);  
- e, low retaining wall across entryway to Room 4 connecting front walls of Rooms 3 and 5.
Room 4

This room is a large chamber comprising the back and northeast portions of the cave. It is a room by virtue of Rooms 3 and 5. Both of these architectural modifications close a large, gaping mouth into a small passageway averaging 1.00 m. in width and running between walls of the two smaller rooms. This entryway is partially obstructed by a low retaining wall connecting adjacent room walls and facing the frontal area. The cave wall, a large horizontal arc forming the rear of Room 4, grades imperceptibly at varying heights into the cave roof. Roof and wall are bumpy and were not modified by the inhabitants. Low overhangs and half circle wall pockets characterize the innermost portions of the room. One large elevated ledge-like recess in the east wall is most prominent. Its size would permit persons to sit or crouch in it as spectators in a small gallery overlooking the room proper, but the surface of this recess is uneven and sloping. Room 4 was unusual with respect to its size and the presence of a ceremonial aspect.

Excavation of Room 4 took the following form. The entryway section, which extended from the front retaining wall in through the entry passage 3 m., was separated and removed in two levels in order that any differing cultural periods might be identified if present. The walls of the cave were then followed and sections extending 1.5 to 2 m.
out from the walls were excavated. Such sections were
designated south wall section, west wall section, and so
on. These sections gave exact locations to material
recovered and each was removed as a complete unit of fill.
Flooring did not extend over the entire room and in many
areas was broken or absent. Toward the entryway and in
portions of the center section, fill contained a number of
intermittent floors and hard packed areas, all close to­
gether and in some cases blending into one another. Cave
bedrock sloped irregularly into walls producing a variation
in fill depth of 0 to .50 m. in perimeter sections.

The original definition of the ceremonial area lay in
that the area surface was very heavily laden with cane
cigarettes. Fill from this section was screened and
portions of it, behind two boulders, were run through a
fine screen yielding a high number of beads and other items
which form a distinct ceremonial complex.

**Entryway section:** Here and in the center section, the
uppermost compact surface was underlain by a series of
intermittent layers. These layers of reeds, yucca leaves,
and other loose materials had been tamped into flooring.
In some portions the layers reached a depth of 20 cm. below
floor level. Above floor fill varied from 5 to 10 cm. Two
broken stick ends similar to those in Block A of Room 1
were imbedded in plaster next to the wall of Room 5 just
inside the entryway.
South wall section: A complete Cedar Creek Polychrome bowl (A-16925) lay overturned 12 cm. deep in the fill. Apparently it had been buried there for storage purposes. It had no associated artifacts and its rim was about 6 cm. from bedrock. A cache of three manos (Stone Tool Cache F) lay just beneath the surface in the southeast corner. Flooring was sporadic but well defined where it existed and in some instances the south wall base mortar lipped into it.

East wall section: Fill proved practically devoid of culture when compared with that of other sections in the room. Bone fragments, food plants, grass layers, were absent. The fill was loose and earthy with a good deal of broken tuff from the cave floor. Some sherd material, flints, and an occasional projectile point were the only cultural indications. This area had evidently not been put to much domestic use; it lies directly below the large, elevated gallery recess in the cave wall.

Ceremonial area: On the surface of a restricted area of 4 m. along the northern portion of the east wall, cane cigarettes, arrow shafts, and loose bits of cane lay in a thick layer. The area encompassed one of the smaller semicircular recesses in the cave wall. Two large boulders occurred in front of the recess (Fig. 17a). Careful excavation produced a number of items which, when grouped together, form a ceremonial complex associated only with this restricted section. The fill did not exceed a depth of
Figure 17. - Interior features at Red Bow Cliff Dwelling. 
a, the ceremonial area of Room 4 before excavation; 
b, part of the semicircular domestic area in Room 1, 
Block K, enclosed with a row of upright rocks; one of 
two potters' jar rests (A-16924) is in situ on the floor; 
c, exterior of Room 2 wall base indicating construction 
directly on top of compressed cave debris; no masonry 
foundation is present.
20 cm. on the side of the boulders next to the wall, but approached .50 m. on the room side of the boulders. The number of objects considered ceremonial steadily diminished and trash became of a more domestic nature toward the center of the room. The actual ceremonial area could not have accommodated very many persons, three at the most, and in this portion of the room there was not enough head room to stand erect. Because of its physical aspects, it is probable that the area was a repository for ceremonial items, perhaps on an offeratory basis. Persons could have stood to one side of the boulders and sat in the elevated area nearby during any rites which might have been performed. Most of the material recovered was on or near the surface. Fill contained almost no bone, very little in the way of plant remains and near cave bedrock, was high in loose rock content and almost barren of culture. The two large boulders do not appear to have come from the roof directly above where they were found. Either of them could have been moved into position by two or more men and both had fill beneath them. However, there is no direct evidence to show how they got where they are, or whether they were purposely placed in certain positions.

North wall section: Although the surface was heavily strewn with rocks, there were many artifacts mixed in with and just beneath the rocks, extending to a depth of 10 to 15 cm. Below this level, little material was evident. The
north wall section is to the rear of the cave and the overhang is low, at times within 20 cm. of the trash. Maximum clearance was about 20 cm. to .50 m. Since the overhang rendered it unsuitable for actual day to day living and would have made it a difficult place to conduct any kind of ceremony, it may have been a kind of trash bin, and because of its convenience, trash of all kinds tossed into it. Plant food content was high and cane occurred in large quantities; most of the material lay on or near the surface where it had been thrown or dragged by rats, mice, and other animals. Rodent nests in this area were also numerous. Three miniature ceremonial bows were found in the deepest corner. As it was so heavily scattered with cane, cigarettes, and arrow portions, it was at first thought to be another ceremonial area. However, excavation revealed none of the paraphernalia associated with the real ceremonial area and cane artifacts seemed for the most part discarded remnants strewn on the surface under the overhang. Why this particular section should have differed in this respect from others is unknown.

West wall section: Bordered the masonry wall separating Room 3 from 4. Flooring was sporadic and not formalized, and a boulder occupied much of the space. Fill varied in depth from 10 to 40 cm. containing trash accumulations but nothing which would lead to the assumption that this area was used in any specialized way. Clearance was good and
the average individual could have stood erect. Beneath the surface near the adjoining north wall section, one Kinishba Red jar (A-16143) was found inverted in the position where it had been buried for storage.

Center section: All wall sections adjoined the center section. It was almost entirely floored with tightly packed and tamped layers of grass and dirt. Plastering as such was not employed and one is left with the impression that floors obtained their extremely hard packed consistency because they were incessantly walked on, as much as for any other reason. No purposely constructed fire hearth was found but irregular fire areas indicated that, although no portion was favored, over the entire section many fires had been built leaving lenses of ash, charcoal, and partially burned material which diminished toward the room walls. White ash formed a very low proportion of this burned rubbish and in this way differed from the usual domestic fire where fine powdery white ash is the most common residue. It is probable that fires in this room were intermittent and not continuously maintained from day to day for household and cooking tasks.

Room 5

Walls: Masonry represents a slight improvement structurally over that of Rooms 1 and 3. Large basal boulders are again used and on top of these, smaller building rocks laid
Figure 18. - View of the exterior of Room 5 from the Frontal Area. Room 5 doorway (right); metate bin on small table-like base (center) forms the end of a low retaining wall across Room 4 entryway (left).
Figure 19. - Plan and section of Room 5.  

a, stone tool cache I (20 pecked and ground stone tools); b, broken area of floor plaster; c, fine soft white ash filling the hearth; d, doorway lintel of slats tied together with roots and mortared into the wall at its ends.
up in mortar in an attempt at coursing. As in other rooms, interior surfaces are unplastered and soot blackened.

Doorway: The doorway is well finished. A vertical post had at one time been mortared into the wall as one side of the frame, the opposite side is smoothed and rounded with plaster. A lintel of slats tied together with roots and mortared into the wall at its ends completes the doorframe. Height, .85 m.; width, .50 m.

Ventilation holes: One; height, 23 cm.; width, .70 m.; located between masonry and cave ceiling; elliptical in shape.

Ceiling: Cave roof.

Other features: A bench formed the rear portion of the room. The main floor extended unbroken beneath it, indicating the bench had been constructed in its entirety after the floor was built and plastered. A single row of rocks was placed in such a manner as to have individual rock heights uniform. The rocks were mortared together forming a low retaining wall behind which layers of loose yucca matting, rocks, reeds, trash, sandals, sections of twilled matting, and rubble were tamped down until an even surface was formed, then the surface was plastered. Artifacts found in the bench fill must be judged as culture which was the product of the builders of the room, because these items showed no incompatibility with other material culture from the cave. The bench was probably constructed as a separate
effort after the original floor had been built. Although
the room floor extends under the retaining wall, when the
retaining wall was mortared and plastered, it was lipped
onto the floor plaster on the side facing the room. The
plastered bench surface had been broken in many places and
the retaining wall smashed out and scattered in its center
section. Bench measurements: retaining wall height, 35 cm.;
width along the retaining wall, 2.45 m.; maximum depth,
1.60 m.; the bench was semicircular in shape. A hearth was
centrally located in the room and formed by small, unworked
stones having been placed in a circle 45 cm. in diameter on
the inside. The stone ring averaged 8 cm. in width and the
hearth was filled with fine soft white ash to a depth of
10 cm. below floor surface.
Room fill and floor features: The surface of this room was
littered with grinding, pounding, and rubbing stones; and
two metates, one on its end in the middle of the floor and
the other tilted on the hearth. The floor was plastered,
smooth, and solid except for a hole broken in the northwest
corner of the room. This break was at first thought to be
the work of treasure hunters but in excavating subfloor fill
it became evident that it was probably intentionally
executed by the inhabitants at the time of their departure.
20 grinding, rubbing, and pounding tools (Stone Tool Cache
I) were found concentrated in the fill below the break and
under the floor immediately surrounding it. Because many
items were found buried in other parts of the cave in an apparent effort to hide and store them at the time of abandonment, this circumstance may well have been yet another instance of such behavior. This corner is the only area in the room which afforded any depth below floor level into which items could have been deposited.

Room 5 was excavated in three sections to be certain no temporal distinctions as to deposition were overlooked: (1) Fill above floor level, extending over it to the wall of the bench. The hearth was not covered. Depth averaged 8 cm. and varied from 5 to 12 cm. (2) The debris packed in behind the retaining wall forming the bench core, the plaster which once surfaced the bench and the small amount of material which had accumulated on the unbroken plaster portions. (3) Subfloor fill. This material was a mixture containing no levels or lenses and no distinctive features other than the group of stone tools found in the northwest corner.

Metate Bin

A metate bin was built at the northwest corner of Room 5 on the outside of the room. Structurally it is a part of and forms the end of the low retaining wall across the entryway to Room 4, but it was placed up against the wall of Room 5 and was functionally part of the Frontal Area (Fig. 19). A small table-like base of masonry was
constructed 33 cm. in height. At either end, flat rock slabs were set in place vertically; height, north end, 28 cm.; height, south end, 15 cm. A metate had been securely mortared between these two slabs. Plaster held the entire structure together, encasing the bases of the end slabs and the metate, and forming a shallow basin at the lower end for scooping up ground material. The metate sloped from north to south with the long axis of the feature. A woman grinding must have knelt in the entryway of Room 4. Whether or not the bin had been closed on the side facing the Frontal Area could not be determined. In plan view the bin is rectangular; 45 cm. along the high (north) end; .85 m. along the sides, and 32 cm. along the low end. The metate sloped from 18 to 0 cm, in a space of about 49 cm.

Manner In Which Room Fill Was Excavated

Room 1: Screened - 1/3, Blocks C, E, and K
Troweled - 2/3, Blocks A, B, D, F, G, and H

Room 2: Entirely troweled

Room 3: Entirely troweled

Room 4: Screened - 1/3, Entryway section, south wall section, and ceremonial area
Troweled - 1/3 East wall, north wall, west wall, and center sections.
Approximately 1/3 of fill was rock

Room 5: Entirely screened
Occupation of the Caves

Evidence of architectural construction points toward the conclusion that building activity at Red Bow Cliff Dwelling was confined to a single period. This is borne out by additional lines of evidence discussed under dating. Under normal conditions if an occupation older than that responsible for the visible architecture occurred, evidence would be present in the form of wall stubs, hearths, ash lenses, and other features below the younger architecture. These did not occur. It is particularly apparent in Room 2 that people decided to build, leveled whatever natural debris was about, and built walls and flooring. No older features lay beneath any portion of the structure and earth and gravel below floor level was devoid of culture with the sole exception of two manos intentionally placed beneath the floor of the east recess and plastered over at the time of floor construction. The same situation was in effect but less accentuated in all other rooms.

Sandals, manos, and sherds were found built into structural portions of the architecture. Perhaps this is evidence of people who, during the early part of the Canyon Creek period, visited the cave and lived in it on a seasonal basis before actually deciding to construct rooms. The architecture was probably not built until full Canyon Creek Phase times when population in the Point of Pines
region was at a peak and there was need for this population to expand areally. The entire sample of material culture from Red Bow Cliff Dwelling is homogeneous and may be related in time to the Canyon Creek Phase. Artifacts in the masonry, therefore, are not indications of an earlier horizon.

When the Mantack cliff dwellings are first seen, one immediately wonders why people with large pueblos so near by should go to the trouble of building and using these small homes in such inaccessible caves on a cliff face. It is easy, in fact almost inescapable, to think first of special ceremonial usage or defensive construction connected with warfare, a feud with peoples over the ridge or with invaders from outside. Could the people of the Point of Pines surface pueblos have been forced over to these lesser habitats by drought and crop failure? The initial tendency is to seek a dramatic reason in connection with a catastrophe or at least an impending catastrophe. However, reasons of a more practical nature seem in accord with the evidence. There are no indications of violence or fortifications.

At Red Bow Cliff Dwelling all five rooms were built during a short expanse of time. Other architecture in surrounding upper caves has the same appearance. In all probability, a number of families from Point of Pines already familiar with the caves decided to build in them,
brought to this decision by an ever expanding population at the central points. An increasing population could have rendered land near Point of Pines inadequate for the provision of so many. To alleviate the situation, a few would then have found it necessary to seek new homes across the ridge. Since the great communities of Point of Pines were only a day's journey over the ridge, a move of this kind may have been on a permanent year-round basis or for certain seasonal periods every year. There is evidence that agriculture was practiced in the vicinity of the caves on Ash Flat and in gullies through the talus slopes, and that there was an economic emphasis on agriculture and seed gathering. It is entirely possible that these marginal groups even produced amounts of food in excess of their own needs and so provided agricultural and gathered products for those who lived in the larger neighboring communities. In a sense cave sites might then have been farmhouses. This view would be compatible with ideas put forth by Haury.

"Still another effect on the settlement plan arising from the concentration of people concerned the maintenance of the agricultural activities...Nucleation meant that some fields were far away. This demanded more time in transit to and from field work and greater risk of loss of crops to marauders. The distant farmhouse, strategically located with respect to the fields, was the solution. This served jointly as a temporary home, as an observation post, and for crop storage at harvest time. On the whole, archaeologists have not paid much attention to these units,
but, generalizing on my own experience, it would appear that the farmhouse was a function of urbanization and that few, if any, will be found dating from before about 1000. The inference may be drawn that the distant deployment of farmhouses was associated with times of peace, which if correct considerably reduces the force of the argument that towns arose in response to a need for mutual protection." (Haury 1956: 7.)

The material culture and plant remains recovered from Nantack caves, however, indicates that farming was by no means the only activity engaged in by the occupants. Gathering was perhaps of equal importance and hunting was pursued. The term "farmhouse" is therefore not quite accurate in this instance and a more realistic inference might be gained by thinking of these homes as rural in nature, used and occupied as a result of economic necessity.

In addition there may well have been those who preferred living away from the large communities. For such families no better place to live existed in the entire region than these caves, particularly one such as Red Bow Cliff Dwelling. It was observed that the wind comes only to the entryways, it is cool by day and night in the summer, and the caves afford complete shelter from the rain and sun. Water seems at first a problem but from the seeps and springs at the base of the scarp cliffs, vessels could easily have been filled. For those used to living here it may not have been so great a task as one might think to
carry water up when needed, especially if this chore were shared by a number of persons living at or near the same place.

We are naturally so a part of our own culture we tend to forget walking and carrying burdens to the Indian was as riding, driving, and shopping in an automobile is to us. One has only to observe the Tarahumara of Chihuahua to be cognizant of just how much a part of a people's way of life walking can become if that culture has never become accustomed to other methods of transportation.

Because the time of occupation, material culture, and building in Red Bow Cliff Dwelling and other upper Nantack caves seems to have coincided with the maximum population recorded at the ruins adjacent to Point of Pines, this reason appears most valid as a primary cause for their occupation.

Ceremonial Life

A ceremonial aspect of life at Red Bow Cliff Dwelling is represented in Room 4. This is significant because religious activities and ceremonial rites were as important to the average family living in the caves at this time, and as much a part of their lives, as their clothing, pottery, or food.

Red Bow Cliff Dwelling and Tule Tubs Cave lie within seven miles of Arizona W:10:50, which is called the Point of
Pines Ruin and is one of the largest prehistoric communities of the Point of Pines region. Although a trip from Red Bow Cliff Dwelling to the Point of Pines Ruin represents a considerable climb up and drop down the far side of Nantack Ridge over rough terrain, it was surely possible for anyone among the prehistoric population so inclined to make the trip from either side and back in one day. One way in a single day would have been an easy excursion even for entire families. Excavation has shown the prehistoric population on both sides of Nantack Ridge to have flourished contemporaneously, during Nantack and Reserve phases and especially during Canyon Creek times. As there is no suggestion of conflict, families from both sides probably visited each other, motivated by a desire to trade and barter necessary subsistence items, strengthen kinship ties, and visit socially with those closely related but still residing over the ridge, engage in festivities held at the large towns, and attend and participate in the numerous ceremonies and rituals which were carried on in the great kivas of the Point of Pines Ruin and other communities nearby. Knowing how much a part of life ritual and ceremonial attendance and participation is among the Zuni and Hopi, and considering the abundant archaeological evidence suggesting ritual and ceremony surrounding the use of large and small kivas in the ruins of the region, it does not seem unreasonable to suppose members of cave occupation
groups may have felt strong compunction to take an active part in a centralized ceremonial life of their day. Therefore the ceremonial aspect could have been most important among all reasons for commuting back and forth to communities from rural areas such as the Nantack caves and Pine Flat. Among the Nantack caves we do not find formalized kivas of any kind; individual rooms, parts of rooms, or very small caves seem to have been regarded as shrines. Room 4 of Red Bow Cliff Dwelling and the ceremonial area it contains is an example.

The use of caves as ceremonial shrines is widespread over southern Arizona. It was evidently a common custom among peoples of the Southwest to offer beads, cane cigarettes, and other objects as offerings to small religious shrines, caches, and special worshipping places in caves of the hills and mountains of their respective lands. Archaeological and ethnological literature substantiate the wide areal extent and temporal depth of this practice. Bear Creek Cave (Hough 1914: 90), Winchester Cave (Fulton 1941), and Double Butte Cave (Haury 1945b: 193-201) are but a few examples. Red Bow Cliff Dwelling differs from these in that the shrine took only one room or a portion thereof, the remainder of the cave being used domestically; and in that the age and cultural affiliation is not the same. Because of the direct association with domestic aspects and the absence of formalized kivas for
the domestic units, it may be that at Red Bow Cliff Dwelling the shrine idea served the cave population as a partial substitute for the true kiva, particularly as regards certain daily hunting, growing, or general welfare offerings and minor ceremonies. For affairs of greater import, the large communities could have been visited where formalized kivas, including great kivas, and their personnel were at hand and the more important ceremonies staged with comparative ease and far greater success. Whether the offeratory cave shrine served this capacity, that is as a substitute for kiva worship, in other places throughout the Southwest cannot be said without a more detailed study of the problem. Such shrines as Winchester Cave, being in a different area and representative of different time periods and cultural units, could also have held a religious function entirely apart from that which is attached to Room 4 of Red Bow Cliff Dwelling and been necessary regardless of whether a village ceremonial chamber were available or not.

At Point of Pines, however, assuming that we have attached proper significance to the situation at Red Bow Cliff Dwelling, people from these outlying portions of the country must have regularly felt inclinations to cross the Nantack Ridge to be a part of such ceremonial functions as might take place in the kivas at communities there. And while visiting, must have engaged in the numerous other
activities which suggest themselves when country people come into the metropolitan area for a brief stay. The situation would have been the same but varying in degree, if the caves were occupied permanently from year to year or only on a seasonal basis. My feeling is that we are dealing here with family units which were dependent on the large communities for more complex social and religious aspects. Being members of the same population as that of the large communities the chances are good, if following the pattern of material culture the social structure was at all puebloid in character, that they were related to other family units in those communities and perhaps for this reason, spending time among them on even a semipermanent basis. However, at the caves the individual family or extended family must have been of prime consideration. The use of caves and their relationship to the larger communities of the Point of Pines region may have wider application throughout central Arizona and New Mexico. In this regard it seems important that throughout this vast central Mogollon-Pueblo region, kivas are apparently not associated with cave sites in marked contrast with the Anasazi region where kivas are generally present in cliff dwellings.

Abandonment of the Caves

When the people left Red Bow Cliff Dwelling permanently, late in Canyon Creek or early Point of Pines Phase
Figure 20. - Pottery was stored beneath the surface of rooms at Red Bow Cliff Dwelling. Vessels were inverted and buried in room fill. a, Room 4, center section, Reserve Plain Corrugated jar (A-16147); b, Room 1, Block K, Kinishba Red bowl (A-16142); c, Room 1, Block H, Point of Pines Indented Corrugated Jar (A-16146); d, Room 1, Block H, cooking utensil cache, Point of Pines Indented Corrugated jar (A-16145), lower vessel is Kinishba Red bowl (A-16141).
times, they must have left in an orderly manner. Due to transportation difficulties, serviceable household items left behind, such as pottery and stone tools, were purposely hidden in various places in case the owners should return. Every vessel found had been overturned and buried in room fill.

What they left and the way they left it, indicates the people did not expect to return immediately. The actual reasons remain obscure but the possibility exists that these reasons were related to those which caused the great population of the Point of Pines Ruin to abandon that site. However, the idea of concealing belongings that had to be left behind is in contrast to concepts which prevailed during the final departure of people from the latest ruins near Point of Pines, where jars and stone tools were left out in the open just as they had been used. This may mean the circumstances of departure in these two cases differed.

It is therefore interesting to speculate that if at the time Red Bow Cliff Dwelling was abandoned there were other people across the ridge at Point of Pines who could have been expected to visit the site and carry away anything left out in the open, their presence could have caused the Red Bow group to hide possessions they left behind. If this idea is tenable, it is of value to reiterate that in the final exodus from Point of Pines after 1450, belongings were left out in the open, and to suggest that the reason
for it was that at that time there were no other people in the area whom the departing population thought would fall heir to their property.

POTTERY

With few exceptions pottery type samples present at Red Bow Cliff Dwelling are small and only characteristics which are important in the light of the samples themselves or represent data significant to the ceramic picture are discussed. The number of sherds in every type sample is given in the sherd tabulation chart (Fig. 30) of the dating section and from this source an idea may be had of the quantity of specimens upon which remarks are based. General statements are sometimes added which have been drawn from experience gained throughout the region. Vessel shapes and rim forms occurring among the sherds and whole and restorable vessels have been illustrated. Certain sherds and whole and restorable vessels are shown by line drawings in several colors; black, white, red by stippled areas, and brown by hatched areas. All pottery types from caves in the region occur in far greater abundance at the larger surface ruins near Point of Pines. Complete type descriptions have therefore been left for those who can deal with them more appropriately in connection with these surface pueblos. Some types are not discussed at all
because nothing beyond their occurrence was relevant and this is presented together with frequency and provenience in Figure 30. In each case, descriptive sections have been made as consistent as possible and established terminology (Gifford 1953) used whenever feasible. When accurate color symbols are used, they are from the Munsell Soil Color Charts, 1954 edition.

Painted Types

At the large surface ruin of Arizona W:10:50 near Point of Pines, decorated pottery types of the White Mountain Red Ware form what may be termed a pottery sequence (Colton 1953: 76-78). Commencing with Pinedale Black-on-red at the beginning of Pinedale Phase (1275), the progression proceeds in an uninterrupted fashion through Pinedale Polychrome, Cedar Creek Polychrome, Fourmile Black-on-red, Fourmile Polychrome, and finally to Point of Pines Polychrome in the Point of Pines Phase (1450). Time periods, when one or another was most prevalent, have been established and these types used in conjunction with others as phase markers. Although frequently used in this way as hallmarks for particular phases, pottery types never come to an abrupt end at the beginning of a new phase, but rather die out gradually and are replaced by later types.

White Mountain Red Ware types are all represented at Red Bow Cliff Dwelling and are, at this site, among the most
important decorated types. No sherds of the Maverick Mountain Series (Colton 1955: 8) or Kayenta Black-on-white appeared at any of the cave sites investigated. This fact may have significance in interpreting the effect and extent of Kayenta penetration and influence in the Point of Pines region.

POINT OF PINES POLYCHROME (Wendorf 1950: 43-47):
Pottery originally named Fourmile Polychrome, Point of Pines Variety by Wendorf has since that time become a type clearly distinct from its sequential antecedent, Fourmile Polychrome. A few of the more prominent characteristics which distinguish it from Fourmile Polychrome include a marked deterioration in perfection of decorative style, a comparative sloppiness in decoration and construction, light brown slip color as opposed to darker brighter red in Fourmile Polychrome, greater vessel wall thickness, and exclusive use of a softer brown paste local to the Point of Pines region. Only the bowl form was represented.

FOURMILE POLYCHROME (Haury 1931: 31-42): The majority show a hard, gray paste, although a few, while retaining all other Fourmile characteristics, exhibit a brown paste due to the use of local clays or firing variation. Sherds from a small globular jar no more than 15-20 cm. in height are present, the remainder represent bowls.

FOURMILE BLACK-ON-RED (New Type): Sherds are similar in all respects to Cedar Creek and Fourmile Polychromes
except that white decoration is absent. This type occurs in greater quantity at the Point of Pines Ruin and its description will appear in connection with pottery of that site. Bowl sherds only were present.

CEDAR CREEK POLYCHROME (New Type): This polychrome is one of the White-Mountain Series of the White-Mountain Red Ware (Colton 1955: 8). Cedar Creek Polychrome in name only appears for the first time in a chart prepared by Stubbs, where it is given as a type following Pinedale Polychrome and preceding Fourmile Polychrome in the development of this series. It is further equated with an early Pueblo IV time period of approximately 1300-1350 (Stubbs and Stallings 1953: Fig. 70). This initial information is correct.

Within the Point of Pines region the type is most prevalent at the Point of Pines Ruin (Arizona W:10:50), which may be regarded as the type site. Prior to excavations at the Point of Pines Ruin, examples of this pottery had been recovered from other sites but had heretofore not been distinguished from, and hence were lumped with, Fourmile Polychrome. The abundant occurrence of Cedar Creek and Fourmile Polychromes in the stratified deposits of numerous Canyon Creek Phase rooms in Arizona W:10:50 established Cedar Creek Polychrome as a recognizable type intermediate between Pinedale and Fourmile Polychromes and typical of early and middle Canyon Creek Phase times (1300-1350 estimated).
In previous reports concerning Point of Pines archaeology, sherds of this type have been referred to in sherd count tables and text passages but never described. In these instances various names were used. Wheat (1952: 192-193, Table 5) employs "Pinedale/Four-Mile Polychrome," and Smiley (1952: 58-66, Tables 2-4) uses " Transitional Polychrome." The type referred to is the same and these two temporary designations have since been discarded and the name "Cedar Creek Polychrome" supersedes them with respect to the designation of this type. The preliminary description which follows is based on sherds and whole and restorable vessels recovered from Red Bow Cliff Dwelling. Portions of it will be modified, corrected or expanded in accord with results obtained in the detailed analysis of a more complete and stratigraphically related collection from the Point of Pines Ruin.

Description - **Construction**: Coiling followed by scraping. **Firing**: Oxidizing atmosphere. **Paste**: Between individual specimens there exists a considerable variation and range in color from light gray (2.5Y 6/1) to reddish yellow (5YR 6/6 or 5/6). Even in a single vessel the range may be great within a hue—light gray to reddish yellow (5YR 6/1-6). Diversity is attributable to degree of oxidation achieved in firing. Dark gray carbon streak sometimes present. Texture fine with medium particles of quartz and other fragments which could have been derived
Figure 21. - Cedar Creek Polychrome bowl decoration
(Room 4, South wall section, A-16925).
CEDAR CREEK POLYCHROME

INTERIOR

EXTERIOR
Figure 22. - Cedar Creek Polychrome bowl decoration
(Room 5, Bench fill, A-16926).
Figure 23. - Cedar Creek Polychrome bowl sherd decoration (Room 4, Center section, A-16927).
CEDAR CREEK POLYCHROME

INTERIOR

CEDAR CREEK POLYCHROME

EXTERIOR
from tuff used as temper. Temper particles seldom protrude through finished surfaces. Vessel walls strong and shatter when broken. Surface finish: Both exterior and interior surfaces slipped and well polished to a smooth texture which may attain a gloss. A certain amount of slip crazing and powdering may come about through use. Fire clouds rarely occur. Surface color: Core and slipped surface always contrast. Slip is probably made of limonite and hematite and is uniformly a rich red (2.5YR 4/6-8). Vessel forms and rim shapes are illustrated (Figs. 26, 27). Only shallow hemispherical bowls with slightly incurved rims were found. A uniformity in vessel shape and rim form is diagnostic for this type. Range in vessel wall thickness: 3-6 mm.; average thickness (20 sherds), 4 mm. Decoration: Painted decorations are in black and white on a red base. Black pigment is presumably lead glaze with copper and manganese as other basic constituents, but varies in appearance from a bright lustrous glazy finish to solid dull mat black. White is used sparingly, generally to outline black areas and lacks the permanent qualities of the black pigment. It probably has a kaoline base.

The basis for distinguishing this type rests heavily on a style of decoration which is intermediate between that of Pinedale and Fourmile Polychromes. One of the major differences between Fourmile and Cedar Creek Polychromes is in the use of white. In the latter it is used sparingly,
especially as a part of interior designs and when used was seldom employed in any capacity other than as a single narrow bordering line for black elements. All black interior elements were by no means framed in white and an occasional exterior use of white dots pendant to a white line occurs. On the other hand, in Fourmire Polychrome white is extensively used. In addition to bordering almost every major black interior element, individual solid white elements are often found as part of interior designs and white is used in an endless number of embellishments and fancy additions, such as the pendant F, within both interior patterns and exterior zone designs. White motifs of this kind and conventional life forms are not characteristic of the black geometric designs associated with Cedar Creek Polychrome. In Pinedale Polychrome, white is generally confined to exterior decoration. Occasionally a Pinedale Polychrome bowl will have a massive area of white used in connection with an interior layout but treatment of this kind is limited and evidently does not occur at all in Cedar Creek Polychrome.

The "constant feature of inner decoration,...a black band placed immediately below the rim" which is invariably bordered by a narrow white line on the lower side only" and "in a majority of cases...completely encircles the bowl" (Haury 1931: 35) present in Fourmire Polychrome, is generally absent in Cedar Creek Polychrome. A single medium
black line with no white bordering line on the lower side usually encircles the bowl close to the rim, from which basic black designs are immediately appended; often the design may go directly to the rim. This basic difference is also true of exterior designs where in Fourmile Polychrome "the ornamentation is confined to a horizontal zone beginning immediately below the rim...and enclosed by two parallel, heavy black lines. The upper one is outlined in white on the lower side only, while the lower one is framed on both sides" (Haury 1931: 37). In Cedar Creek Polychrome the upper solid black line outlined in white only on the lower side may or may not be present but the lower black line framed with white on both sides is definitely not characteristic. Exterior decorations are most often geometric combinations of medium or wide solid black lines and half terraces pendant in pseudo-paneled fashion from the upper black line or in a series of individual unit designs arranged in a uniform zone completely encircling the vessel. Exterior solid black elements and lines are almost always framed on both sides by a fine white line.

Perhaps the most outstanding feature of Cedar Creek Polychrome is the conformity within exterior and interior design layout from one example to another. New imaginative schemes were not employed, nor were life forms evidently in vogue. There was rather a strict adherence to convention which dictated the extensive use of geometric elements.
However, such adherence to convention was not so rigid as to eliminate variety within its dictates. In fact, an emphasis was placed on a continuous but widely varied combination of certain specific elements to produce an endless array of differing interior design layouts. Most popular interior designs revolve around geometric combinations of solid black and hatched areas which include such elements as solid broad lines, stepped squares or rectangles, triangles, rectangles, triangles with stepped edges, broad lines with pendant dots, scrolls, hatched rectangular and triangular areas and scrolls. A favorite motif is a pair of interlocking scrolls, one of which is solid black, the other framed by a thin black line filled with fine parallel hatching lines.

Line work can be considered good but in some cases thickness varied with the amount and fluidity of paint on the brush; lines sometimes slightly overran initial guide lines and some blotching occurred in hatched areas. Generally speaking, designs are clearly executed and sloppiness is not in evidence. As is the case with Pinedale Polychrome, the interior "area may be treated as a whole, divided into quadrants, or made to show a circular unpainted area in the bottom." (Haury in Gladwin, W. and H. S. 1931: 41.)

One of the most pronounced and characteristic differences between Pinedale and Cedar Creek Polychromes is in the use of framing lines with respect to hatched areas. In
Cedar Creek Polychrome thin or medium lines frame hatched areas wherein hatching lines are fine. Framing lines are greater in width than are the hatching lines. However in Pinedale Polychrome framing lines are of the same width as hatching lines regardless of whether framing lines are fine or thin (Fig. 24). There are, of course, exceptions to every rule. Other differences between these two polychromes exist, such as a general lack of white decoration in interior designs of Pinedale Polychrome (occasional use of massive white background) and the use of geometric life forms which evidently do not occur in Cedar Creek Polychrome. When life forms appear again in Fourmile Polychrome they seem more freely executed, are more imaginative and apt to be less bound by the geometric rigidity of Pinedale Polychrome. Previous descriptions of Pinedale and Fourmile Polychromes included examples of what is now considered Cedar Creek Polychrome. Such examples would previously have been thought of as transitional varieties, late Pinedale or early Fourmile Polychromes. The recognition of this new type between the other two necessitates more restricted type descriptions for Pinedale and Fourmile Polychromes and the deletion of characteristics now attributed to Cedar Creek Polychrome.

Illustration: whole vessel; (Figs. 21, 27a, 28p); Provenience: Room 4, South wall section; Data: bowl; orifice diameter, 21.5 cm.; maximum diameter, 22 cm.; height, 9 cm.;
vessel wall thickness, 4-5 mm.; cat. no. A-16925.

Illustration: restorable vessel; (Figs. 22, 27b); Provenience: Room 5, Bench fill; Data: bowl; maximum diameter, 42 cm.; height, 16 cm.; vessel wall thickness, 3-5 mm.; cat. no. A-16926.

Illustration: sherd; (Figs. 23, 27a); Provenience: Room 4, Center section; Data: bowl; orifice diameter (estimated), 21 cm.; maximum diameter (estimated), 22 cm.; height (estimated), 8.5 cm.; vessel wall thickness, 3-5 mm.; cat. no. A-16927.

PINEDALE POLYCHROME (Haury in Gladwin, W. and H.S. 1931: 41-42): Geometric design elements and black glaze paint prevail. An important decorative characteristic distinguishing this polychrome from Cedar Creek Polychrome is in the use of framing and hatching lines. Geometric designs are first laid out with fine framing lines; some are subsequently filled in solid, others are hatched. In hatched areas, the hatching lines are the same width as framing lines. In later types of this sequence, such as Cedar Creek Polychrome, designs are laid out with thin, medium, or wide lines and hatched areas are filled in by fine lines of lesser width than framing lines. Paste gray, bowl forms only are represented.

Illustration: sherd; (Fig. 24); Provenience: Room 4; Data: bowl; maximum diameter (estimated), 22 cm.; vessel wall thickness, 5-6 mm.
Figure 24. - A series of sherds indicating development of design execution in the type sequence, Pinedale Black-on-red, Pinedale Polychrome, Cedar Creek Polychrome. Note framing lines are greater in width than hatching lines on Cedar Creek Polychrome, but are the same width on Pinedale Black-on-red and Polychrome, also skill in design execution is improved on Cedar Creek Polychrome sherd.
**PINEDALE BLACK-ON-RED** (Colton and Hargrave 1937: 106): In most respects resembles Pinedale Polychrome with a lack of white decoration. Geometric designs are often more ineptly executed than on the polychrome. Black paint is predominantly glaze and paste is gray. Incurved bowl forms only are represented.

Illustration: sherd; (Fig. 24); Provenience: Room 4; Data: bowl; maximum diameter (estimated), 28 cm.; vessel wall thickness, 4–6 mm.

**SHOWLOW BLACK-ON-WHITE** (Haury 1934: 130): Is a late black-on-white and a companion type to Showlow Polychrome (Colton and Hargrave 1937: 111). It was originally called Pseudo Black-on-white by Haury and again by Martin and Willis (1940: 236–237) who also illustrate a number of examples. In contrast to Showlow Polychrome no red slip was applied, but in other respects the types are similar. The vessel surface was entirely coated with a heavy white slip which appears crazed and has a tendency to flake off. Decorations resemble those which appear in the polychrome type but are executed in black only. Paste is light gray; vessel wall thickness is 5 mm. A jar form alone was represented.

**GILA POLYCHROME** (Haury 1945b: 63–80): Designs are geometric, brush strokes often run over framing lines, and line work is uneven. Exterior decoration and curvilinear designs are absent. Haury's description covers this sample
In all respects with the exception of paste. The largest sherd falls into his interior bowl ornamentation Type 2 and is a hemispherical bowl. Paste appears local and in some cases a carbon streak is not apparent. Vessel wall thickness is 7-8 mm. A single jar sherd is present, the remainder represent bowls. Because of its wide distribution both temporally and areally, this type is not, at present, especially valuable as a dating factor.

**PINTO BLACK-ON-RED** (New Type): As a contemporary and companion type to Pinto Polychrome (Gladwin, W. and H. S. 1930: 4-5), Pinto Black-on-red is the forerunner to Gila Black-on-red (Haury 1945b: 65; Wendorf 1950: 123). At this stage of work at Point of Pines, it might more appropriately be considered a variant of Gila Black-on-red. However, it is distinguishable, and its style of design is like that of the polychrome except it is executed in black on red alone. When it is found in greater quantity, it will be explicitly defined. Pinto Black-on-red is here characterized by geometric decoration made up of hatched triangles and parallel lines with diagonal hatching between them, opposed to similar triangles and bands of solid black. Framing lines and hatching lines are the same width and are uniformly very fine. Decoration is in a pattern carried directly to the rim but never carried over the edge. No exterior decoration present. Both interior and exterior slipped and the red slip color is the same as that
Figure 25. - Pinto Black-on-red bowl sherd decoration (Room 5, Fill).
used in polychromes of this series. Paste is gray in color and fine, with a few scattered larger quartz particles. Vessel walls maintain a thickness of 5 mm. Only two bowls are represented, one of these is slightly incurved.

Illustration: sherd; (Fig. 25); Provenience: Room 5, Fill; Data: bowl; maximum diameter (estimated), 21.4 cm.; vessel wall thickness, 6 mm.

Utility Types

As an overall category this group includes plain, red, and textured types. All of these types are late derivatives of pottery which appears at earlier stages in the Point of Pines region. The Point of Pines Corrugated Series is the direct outgrowth of the Reserve Corrugated Series (Breternitz, Gifford, and Olson 1957).

TULAROSA FILLET RIM (Wendorf 1950: 121; Martin and others 1952: 65): Essentially a plain polished brown pottery with interiors smudged black, sometimes highly polished. Distinguished from plain types by a textured band close to the rim on the exterior completely circling the vessel. Technologically it is much like and almost the equivalent of Tularosa White-on-red (Rinaldo and Bluhm 1956: 173) except, of course, that there is no white painted decoration. Exterior surface finish varies from rough hand smoothing to a blackened polish and interiors show the usual smoothed brown to black color, smudged and polished in
Figure 26. - Rim sections among types represented at Red Bow Cliff Dwelling.
Figure 27. - Vessel forms from Red Bow Cliff Dwelling. 

a, b, Cedar Creek Polychrome; c, Tularosa Fillet Rim; 
d-f, Kinishba Red; g-i, Point of Pines Indented Corrugated; j, Point of Pines Patterned Corrugated; k, Reserve Plain Corrugated; n, o, Alma Plain.
varying degrees. The fillet rim decoration is made up of one to four indented coils. In this sample, only bowls are represented.

**Illustration:** restorable vessel; (Fig. 27c); **Provenience:** Frontal Area, corner between Rooms 2 and 3; **Data:** bowl; smudged interior; maximum diameter, 29.7 cm.; height (estimated), 16 cm.; number of indented coils, 3; 2.5 indentations per 2 cm.; vessel wall thickness, 5-6 mm.; cat. no. A-16140.

**TULAROSA SMUDGED** (New Type): A polished brown or tan pottery shading into gray and black on the exterior with interiors smudged black varying from low to high glossy finish. This type is Tularosa Fillet Rim without the fillet rim decoration and is derived from Reserve Smudged (Martin and Rinaldo 1950: 359-360), but is a heavier pottery, somewhat more poorly made and extending temporally perhaps as late as 1450. Only bowl forms are represented.

**KINISHBA RED** (Wendorf 1950: 42-43): All surfaces except jar interiors are coated with a thin limonite or hematite slip which varies greatly in degree of polishing and in color from brown to red. These factors vary within individual vessels as much as between them. The high, lustrous polish and even red color characteristic of Reserve Red is not found in Kinishba Red. Fire clouds occur, sometimes extensively over bowl exteriors. Surfaces are relatively uneven except for bowl interiors which are
smooth, well polished red and rich black when smudged. Two whole vessels and five sherds show smudging. Paste is brown and temper particles vary considerably in size from medium to coarse angular rock fragments which appear to be ground tuff and other volcanics. A carbon streak is generally but not always present. Vessel wall thickness among bowls, 4-6 mm.; among jars, 5-7 mm. (a single sherd is 10 mm. thick). Among whole vessels, two are bowls, one is a jar. Sherds are divided almost evenly among both shapes. Exterior surfaces of whole vessels were clean and not fire blackened through use indicating these pots were probably not employed over an open fire.

Illustration: whole vessel; (Fig. 27d); Provenience: Room 1, Block K, Level 1; Data: bowl, smudged interior; orifice diameter, 25.5 cm.; maximum diameter, 27.5 cm.; height, 13.7 cm.; vessel wall thickness, 4-5 mm.; cat. no. A-16142.

Illustration: whole vessel; (Figs. 27f, 28a); Provenience: Room 1, Block H; Data: bowl, smudged interior; orifice diameter, 20.5 cm.; maximum diameter, 22 cm.; height, 9.8 cm.; vessel wall thickness, 5-6 mm.; cat. no. A-16141.

Illustration: whole vessel; (Figs. 27e, 28c); Provenience: Room 4, West wall section; Data: jar; orifice diameter, 17.8 cm.; maximum diameter, 31 cm.; height, 26 cm.; vessel wall thickness, 5-7 mm.; cat. no. A-16143.

Illustration: sherd; (Fig. 27e); Provenience: Room 5, Fill;
Figure 28. - Whole vessels from Red Bow Cliff Dwelling. 

a, Kinshipa Red jar (A-16143); b, Cedar Creek Polychrome bowl (A-16925); c, Kinshipa Red bowl (A-16141); d, f, g, Point of Pines Indented Corrugated jars (A-16145, A-16146, A-16144); e, Reserve Plain Corrugated jar (A-16147).
Data: bowl, red interior; maximum diameter (estimated), 32 cm.; vessel wall thickness, 5-6 mm.

**McDonald Grooved Corrugated** (Breternitz, Gifford, and Olson 1957): McDonald Grooved Corrugated is the most uncommon of the McDonald Corrugated Series, and there are indications it may be somewhat later than its two companion types. Vessel interiors are dull smudged but polished. exteriors are plain corrugated and in specimens from the larger ruins at Point of Pines, are normally slipped a brick-red. However, of this sample only one is red, the other two blackened, perhaps by accidental secondary firing which erased the red slip and white decoration. Coils have been lightly smoothed. Decorations are fashioned by marking off grooves with a rounded implement in geometric patterns running across coils, usually diagonally (Fig. 29). Grooves average 4 mm. in width and 1 mm. in depth. The groove hollow is painted white thereby emphasizing the designs which form diamonds and triangles. Grooves are apt to parallel one another in design layout. Paste fine texture, dark brown to black color with fine to medium angular tuff temper particles. Vessel wall thickness averages 6 mm. and bowls alone are represented.

**PrietoIndented Corrugated** (Breternitz, Gifford, and Olson 1957): This type of corrugated is unique in its surface treatment and in so far as is known, occurs only in the Point of Pines region. It reached its height of
Figure 29. - a, Prieto Indented Corrugated; b, c, McDonald Grooved Corrugated.
abundance in later times during the Point of Pines Phase (1400-1450), and is therefore scarcely represented at the cave sites. Originally called Alternating Indented by Wendorf (1950: 38), it is illustrated in Plate IX of his report and the peculiar character of its indentations described. Surface manipulations are very rarely effected on an indented corrugated base. The usual method utilizes a plain corrugated base (Fig. 29). Vessel walls are relatively heavy and thick, averaging 8-10 mm. Jars alone are represented.

POINT OF PINES PLAIN CORRUGATED (Breternitz, Gifford, and Olson 1957): The Point of Pines Corrugated Series consists of corrugated types which have roots in the Reserve Corrugated Series of earlier periods. They are a late manifestation of earlier types which developed certain characteristics that make them distinct. With time, these characteristics gain in frequency until the Point of Pines Corrugated Series dominates the ceramic picture during Point of Pines Phase. The development of traits attributable to these types is slow and begins to show in Pinedale Phase, becoming more pronounced in Canyon Creek Phase. At this time, however, they do not yet preponderate and thus corrugated pottery from Canyon Creek Phase still retains influences of the Reserve Series. During Pinedale and Canyon Creek Phases, assignment of sherds to one or another type is often an arbitrary decision because of the
blending of characteristics but at either extreme—Reserve or Point of Pines Phases—the distinctions are clear. Between types of the Point of Pines Corrugated Series, method of surface treatment distinguishes one from another. In the Nantack Caves the technology of these types is similar and except for an abundance of copper-colored mica in the temper, is as described by Wendorf (1950: 36). In Point of Pines Plain Corrugated the surface color varies greatly from tan and a reddish brown through the more usual brown or darkened brown to a black depending on the amount of carbon impregnation at the time of firing. Coils are thick and apt to be irregular with edges of each coil dripping down over lower coils. Coils are generally unevenly placed, sloppily applied and do not make very regular arcs about the vessel body. Smoothing of the coils appears in roughly half the sample and when applied does not obliterate the coils but merely rubs off the rough coil edge. Real obliteration is a conscious effort to cause the disappearance of exterior vessel texturing. Corrugations begin from 1 to 2.5 cm. below the rim and average 1.5 to 2.0 cm. Corrugations: 2-5 per 2 cm. with an average of 3 per 2 cm. Vessel wall thickness: 6-9 mm. with an average of 8 mm. Jar forms are most abundant. Interiors are usually smoothed or wiped. Of the few bowl sherds which occurred, some interiors were poorly smudged. Sherds from three small bowls were present with an
estimated diameter of less than 12 cm. Sherds of these vessels hold several characteristics more common to the Reserve Series. Fragments of one unfired vessel were also found.

POINT OF PINES INDENTED CORRUGATED (Breternitz, Gifford, and Olson 1957): Surface color is occasionally tan but usually dark brown to black. Three jar sherds show a red slip. Coils thick, large indentations common; however, spacing is comparatively regular and coils more even than in other types of the series. Indentations generally stand out in comparatively high relief. This type usually gives an appearance of being the most carefully constructed of this group. Light smoothing over coils and indentations does occur but is not the rule among sherds of this sample. Coiling begins from .8 to 2.2 cm. below the rim and averages 1.4 cm. Corrugations: 3-5 per 2 cm. with an average of 3.5 per 2 cm. Indentations: 1-3 per 2 cm. with an average of 1.7 per 2 cm. Vessel wall thickness: 6-9 mm., average, 7.5 mm. Jar forms predominate, with only a few sherds present from bowls. Interior surfaces smoothed or wiped. This type is bigger and heavier in all aspects than its Reserve Series counterpart. Fragments of one small unfired red slipped indented corrugated vessel were found. In contrast to examples of Kinishba Red, two of three whole vessels of Point of Pines Indented Corrugated were extensively fire blackened and coated with
soot indicating their protracted use over open fires, probably as cooking pots.

Illustration: whole vessel; (Figs. 27g, 28g); Provenience: Room 1, Block C; Data: jar; orifice diameter, 16.2 cm.; maximum diameter, 26.5 cm.; height, 17.7 cm.; coiling begins 1.3 cm. below the rim; 3.5 coils per 2 cm.; 2 indentations per 2 cm.; exterior surface smoothed over coils and indentations; vessel wall thickness, 7 mm.; cat. no. A-16144.

Illustration: whole vessel; (Figs. 27h, 28d); Provenience: Room 1, Block H; Data: bowl; orifice diameter, 24 cm.; maximum diameter, 28 cm.; height, 18.6 cm.; coiling begins 2.2 cm. below the rim; 3 coils per 2 cm.; 2 indentations per 2 cm.; exterior corrugated surface not smoothed; vessel wall thickness, 7 mm.; cat. no. A-16145.

Illustration: whole vessel; (Figs. 27i, 28f); Provenience: Room 1, Block H; Data: jar; orifice diameter, 17.3 cm.; maximum diameter, 25 cm.; height, 23 cm.; coiling begins 1.4 cm. below the rim; 2.5 coils per 2 cm.; 3 indentations per 2 cm.; exterior surface smoothed almost to the point of obliteration; vessel wall thickness, 8 mm.; cat. no. A-16146.

POINT OF PINES OBLITERATED CORRUGATED (Breternitz, Gifford, and Olson 1957): Surface color ranges from brown to black, occasionally a red-brown is encountered. Coils are thick but difficult to discern through the obliteration.
Both plain and indented corrugations are subject to this treatment. The result is a pottery which would be difficult to surpass from the standpoint of poor appearance. Obliteration is caused by rubbing the vessel surface only to an extent necessary to obscure or nearly obscure the coils and any indentations. The rubbing is pursued to varying degrees and in some vessels the original surface treatment is still faintly discernable and in others it has completely disappeared. It may be effected by the hand or a hard-surfaced implement such as a gourd scraper. Surfaces thus obtained vary from rough to a more usual smooth, lumpy, but unpolished finish where coils and indentations dimly show. Pits and irregular hollows, the remnants of indentations, dot the surface. Interior surfaces may be rough or smooth but are never polished. Vessel wall thickness ranges 5-8 mm.; average, 7 mm. On the whole, this type seems to be slightly more thin-walled than others of this series. This is perhaps due to the obliteration treatment. Only jar forms appeared in this sample.

**POINT OF PINES PATTERNED CORRUGATED** (Breternitz, Gifford, and Olson 1957): This type is represented by the bottom section of a large jar which was probably used as a plate or may have been saved to be made into a potters' jar rest (Morris 1939: 199). In all respects it resembles Point of Pines Plain Corrugated except that the bottom
halves of six diamond patterns show immediately below the
breakage coil. The diamonds are outlined and filled in by
fingernail indentations along the coil sections enclosed.
Illustration: restorable vessel; (Fig. 27j); Provenience:
Room 5, Bench fill; Data: plate; maximum diameter, 27.5 cm.;
height, 7 cm.; 4 coils per 2 cm.; exterior surface smoothed
over coils; vessel wall thickness, 8 mm.; cat. no. A-16148.

RESERVE PLAIN CORRUGATED (Rinaldo and Bluhm 1956: 155-
157): Represented by one whole vessel, a cooking pot. Its
presence is a result of the fact that during Canyon Creek
and Pinedale phases both the Reserve and Point of Pines
Corrugated Series were contemporaneous, used and manu-
factured during the same time periods by the same groups of
people. As time progresses, and especially during Canyon
Creek Phase; Reserve corrugated styles diminished and those
of the Point of Pines Series increased in frequency. Some
examples show characteristics of both series, and in this
vessel, for instance, all-over smoothing is a Point of
Pines Corrugated Series trait, but the remainder of its
traits are those of the Reserve Series.
Illustration: whole vessel; (Figs. 27k, 28e); Provenience:
Room 4, Center section; Data: jar; orifice diameter,
17.3 cm.; maximum diameter, 22.4 cm.; height, 21.5 cm.;
coiling begins 1.6 cm. below the rim; 5 coils per 2 cm.;
eterior surface smoothed over coils; extensively fire
blackened and coated with soot through use; vessel wall
thickness, 7 mm.; cat. no. A-16147.

**RESERVE INDENTED CORRUGATED** (Rinaldo and Bluhm 1956: 159): Two small bowls constitute the sample of this type. **Illustration:** restorable vessel; (Fig. 271); **Provenience:** Room 4, Center section; **Data:** bowl; orifice diameter, 7.7 cm.; maximum diameter, 8.2 cm.; height, 6 cm.; coiling begins 1.0 cm. below the rim; 5 coils per 2 cm.; 2.5 indentations per 2 cm.; exterior surface not smoothed; vessel wall thickness, 5 mm.; cat. no. A-16149. **Illustration:** restorable vessel; (Fig. 27m); **Provenience:** Room 4, North wall section; **Data:** bowl; maximum diameter (estimated), 13.5 cm.; height, 5 cm.; coiling begins .8 cm. below the rim; 4.5 coils per 2 cm.; 2.5 indentations per 2 cm.; exterior surface not smoothed; vessel wall thickness, 6 mm.; cat. no. A-16150.

**ALMA PLAIN** (Haury 1936: 32-34): Plain pottery in the Point of Pines region does not appear to change profoundly through time. Even though a span of roughly a thousand years is represented, the major characteristics of this type seem to remain reasonably constant. In this respect it represents the Mogollon base through the entire time span and is itself one of many reasons for terming the people a Mogollon-Pueblo group. Two variants have already been defined for the earliest phases (Wheat 1954a: 82-86). Upon closer laboratory analysis, in all probability more will be described which are themselves peculiar to other specific
temporal spans. For present purposes, however, throughout the Point of Pines sequence, plain pottery is called Alma Plain.

At Red Bow Cliff Dwelling, the sample may be described as follows. Surface color wide in its range from tan, through red-brown, dark brown, to black; fire clouds occur but not abundantly. The majority among these sherds (especially jar exteriors, bowl interiors) were tool polished, sometimes to an extent where the surface appeared slipped. Surfaces, despite smoothing, retained a certain bumpy and uneven feel, and crevices and pits frequently appear. Some sherds, however, were merely rubbed by hand, others wiped by bunched grass, and some remain rough, particularly jar interiors. Paste varies from fine to coarse texture with angular fragments of tuff and other volcanics used as temper. Carbon streak usually present. Vessel wall thickness ranged from 4-10 mm.; average, 7 mm. Jar forms predominate. Small fragments of several miniature vessels occurred. Sherds of one unfired bowl came from the bench fill of Room 5.

Illustration: restorable vessel; (Fig. 27a); Provenience: Room 5, Bench fill; Data: jar; orifice diameter (estimated), 13 cm.; maximum diameter (estimated), 20 cm.; height (estimated), 19 cm.; surface bumpy and uneven; vessel wall thickness, 6.5 mm.

Illustration: restorable vessel; (Fig. 27b); Provenience:
Room 5, Bench fill; Data: bowl; maximum diameter (estimated), 29 cm.; height (estimated), 11.5 cm.; surface smoothed but remained bumpy with crevices and pits; fire clouds present; vessel wall thickness, 6-7 mm.

Discussion

To an extent, a ceramic use specialization is apparent. With one exception, all whole corrugated vessels were extremely fire blackened. Pine ash and soot covered almost the entire exterior surface of these jars and they must have been employed largely over an open fire. The single exception was a Point of Pines Indented Corrugated vessel, more brown in color than the others, carefully smoothed, having a wide body shape with a restricted neck. The shape of this jar made it relatively unsuitable for cooking. None of the whole vessels of types other than corrugated, although found under exactly the same circumstances of preservation, showed any soot blackening. In one case a Point of Pines Indented Corrugated jar, a Kinishba Red bowl, and a gourd dipper were inverted and buried one on top of another, perhaps a housewife's utensils. The corrugated jar was coated with soot while the red bowl was very clean. Sherd samples also follow this pattern. At this site most corrugated jars must therefore have been cooking vessels. Wheat (1952: 194-195) has indicated his feeling that red vessels were used to a great degree in collecting water.
Evidence at Red Bow Cliff Dwelling tends to support this view. Bowls of corrugated, McDonald corrugated, fillet rim, and red types were in all probability used for mixing foods, food preparation, serving and eating receptacles. All of these types when found in bowl form are predominantly smudged and in the last three, often polished to a beautiful gloss. The question naturally arises whether a smudged bowl is more suitable as a utensil for mixing, serving and eating foods than one which is not. There have as yet been no positive indications concerning the specialized use of Alma Plain. Decorated types, while probably not used in actual cooking, may have had any number of other uses more varied (ceremonial, etc.) than those attributed utility types. In the main, this agrees with Barter's observations regarding utility pottery from the Jewett Gap Site. In her analysis, "the amount of wear shown on a vessel, and the darkening of the exterior from use" are criteria upon which certain generalizations are based.

"It would appear that the following were used most frequently for cooking: Reserve Indented Corrugated jars, Reserve Plain Corrugated jars and Reserve Smudged bowls. Types that may have been used primarily for storage and serving vessels, and only occasionally for cooking were: Tularosa Fillet Rim bowls, Reserve Plain Corrugated bowls, and Reserve Indented Corrugated bowls. A high percentage of Tularosa Fillet Rim bowls showed wear, but apparently were not primarily used for cooking."
"Alma Plain jars show a high percentage of wear but no use-darkening. These may have been used for water containers or dry storage. San Francisco Red jars all show wear but none are fire blackened. These, due to their narrow necks, are probably water jars. Patterned Corrugated vessels show little wear and no indication of use for cooking."

(Barter 1955: 59-62.)

The Jewett Gap material is considerably earlier in time than that of Red Bow Cliff Dwelling and comes from an open site where soot usually does not still adhere to the pottery. Before accepting any of the speculations discussed above, more observations must be recorded on large collections. The factor "use-darkening" must be studied more closely. Are there other factors in vessel firing or in conditions of preservation in open sites, particularly among corrugated types, which could simulate "darkening of the exterior from use (as would occur when a pot was placed over a fire)." (Barter 1955: 59.) It must be noted and stressed, however, that it is important to observe, whenever possible, the circumstances under which whole vessels are found and the nature of any material clinging to exterior surfaces before such evidence is washed off in the laboratory.
The dating of cave sites in the Point of Pines region is based on sherd samples obtained during excavation or from surface surveys. Reasonably accurate dates for occupations in the various caves are made possible by secondary ceramic dating because extensive work carried on at the Point of Pines Ruin (Arizona W:10:50) has made known sequential and stratigraphic evidence which, when considered along with tree-ring dates from other sites, fixes the temporal position of certain pottery types in the Point of Pines region. Surface sites excavated and tested at Point of Pines have also furnished data upon which an almost complete series of phases with a continuum of occupation from the time of Christ to 1,450 has been based. Through the systematic exploration of single phase and large multiphase pueblos, ceramic complexes have been established which are typical of each successive phase. These ceramic complexes are especially definitive for the time period 900-1,450 and accuracy has been accomplished by crossdating indigenous pottery and dated intrusive types, as well as through stratigraphic placement of types. Added evidence attesting to ceramic complex validity has been brought about by considering as many other factors as possible. Such traits as architecture and non-ceramic aspects of material culture have fortified and helped in
the determination of relative chronological value among pottery types.

With the possible exception of Arsenic Cave, caves of the Point of Pines region contain no evidence of occupation prior to 900, and therefore the dating of cave occupations may be established with considerable assurance. Total sherd collections from individual cave sites are compared with complete ceramic complexes previously established as diagnostic of phases at Point of Pines. The original cave sherd collections are thereby themselves broken into complexes which in turn date the cave occupations.

A ceramic complex is made up of a number of pottery types which, when found in association with one another and taken as a cluster, indicate a specific time period and become diagnostic of a phase. However, each type by itself may have a longer, shorter, or the same independent temporal life as the time value placed upon the complex as a whole or its phase. If it were not for ceramic complexes worked out for individual phases at Point of Pines to which complexes from cave sites can be compared, a secondary dating procedure could not be utilized. Cave occupations would, in that event, probably have then been dateable only in the broadest terms because cave fill mixture is severe and percentages with regard to sherd types found in each level show very little.

Judging from the nature of its architecture and
deposition of cultural fill, Red Bow Cliff Dwelling gave every appearance of a site belonging to a single, limited time period. Architecture was consistently of the same style and was constructed as a homogeneous unit; no architectural stratification or modifications occurred to indicate different building periods. Minor architectural features also supported this view in that none were buried at different levels or superimposed one on another.

An analysis of the pottery is final evidence that this site can, without doubt, be assigned to one time period. Pottery is tabulated in chart form (Fig. 30), showing type by type the actual number of sherds recovered from each room, section, and block. For each type the total number of sherds from the entire ruin is given together with two sets of percentages, one based on the total number of sherds from the site and the other based on a division of painted and utility types.

Percentages based on sherd counts can be misleading if taken at face value. They must only be considered as indicators of the relative abundance or significance of certain types. To cite several reasons for this: in different sections of a room and in different rooms, sherds occur which are from the same vessel, two or three or four forming a single sherd; yet for purposes of numerical recording with respect to provenience and distribution, these sherds are set down individually as being from the
area and level in which they were originally found. It is also recognized that certain sections of Pinedale Polychrome bowls, for example, when broken, leave some sherds showing only black-on-red decoration and when found apart and by themselves are so classified. Furthermore, each individual sherd is counted with the knowledge that final totals are sometimes larger or smaller merely because of the breakage and distribution about the site through time of what were once large sherds. This process happens to individual specimens of all pottery types, however, and the ultimate counting results are still valid in general terms. These are but a few of the many factors influencing sherd counts; percentages based on sherd counts must be interpreted accordingly. Therefore, relative sherd quantities of the various types, one to another, immerge as the prime value of a sherd count rather than exact amounts.

Whole and restorable vessels are listed separately (Table 1). These must be considered along with relative sherd sample percentages in arriving at the more important and abundant types. Sherds from vessels termed restorable are from restricted areas and were not tabulated in sherd counts.

The total sherd sample is small beyond that which might be expected for a ruin of this size. A comparable surface site would probably have yielded a greater sample.
Figure 30. - Sherd tabulations from Red Bow Cliff Dwelling.
### RED BOW CLIFF DWELLING
Arls. W:9:72

#### sherds tabulation

|                  | Block A | Block B | Block C | Block D | Block E, Level 1 | Block E, Level 2 | Block F | Block G | Block H | Block K, Level 1 | Block K, Level 2 | Room 2, Fill | Room 3, Fill | North Wall Section | West South Wall Section | East Wall Section | Center Section | Ceremonial Area | Room 5, Fill | Room 6, Bench | Total | % Based on TOTAL SHRED SANCE | % Based on DIVISION OF UTLITY TYPES |
|------------------|---------|---------|---------|---------|------------------|-----------------|---------|---------|---------|-----------------|-----------------|--------------|--------------|-----------------|-----------------|----------------|----------------|--------------|--------------|--------|--------------------------|----------------------|
| Point of Pines Polychrome | 1       | 1       | 1       | 1       | 1                | 1               | 1       | 1       | 1       | 1               | 1               | 1            | 1            | 1               | 1               | 1             | 1            | 1             | 1           | 1          | 149    | 7.05                      | 100%                   |
| Fourmile Polychrome     | 4       | 2       | 11      | 10      | 4                | 2               | 3       | 10      | 5       | 1               | 3               | 1            | 1            | 47              | 2.22            | 47            | 31.54                  |                            |                            |                    |
| Fourmile B/R           | 2       | 2       | 3       | 3       | 2               | 3               | 1       | 2       | 1       | 1               | 1               | 1            | 1            | 1               | 3               | 6            | 6            | 3.62                  |                            |                            |                    |
| Cedar Creek Polychrome  | 6       | 2       | 2       | 2       | 2               | 2               | 5       | 2       | 1       | 30              | 1               | 30           | 30           | 1.42            | 30              | 20.13        |                            |                            |                            |                    |
| Pinedale Polychrome    | 2       | 1       | 1       | 1       | 1               | 1               | 1       | 1       | 1       | 1               | 1               | 1            | 1            | 1               | 1               | 22           | 22           | 10.04               |                            |                            |                    |
| Pinedale B/R           | 1       | 1       | 1       | 1       | 1               | 2               | 1       | 1       | 1       | 1               | 3               | 1            | 1            | 1               | 3               | 1            | 1            | 0.05                 |                            |                            |                    |
| Showlow B/W           | 7       | 1       | 2       | 1       | 1               | 1               | 1       | 1       | 1       | 24              | 11              | 24           | 24           | 11.14           | 24              | 16.11        |                            |                            |                            |                    |
| Gila Polychrome        | 7       | 1       | 2       | 1       | 1               | 1               | 1       | 1       | 1       | 24              | 11              | 24           | 24           | 11.14           | 24              | 16.11        |                            |                            |                            |                    |
| Pinto B/R             | 2       | 3       | 1       | 4       | 1               | 1               | 1       | 1       | 1       | 2               | 1               | 2            | 2            | 1               | 2               | 1            | 1            | 0.24                 |                            |                            |                    |
| Total                | 149     | 7.05    | 149     | 7.05    | 149             | 7.05           | 149     | 7.05    | 149     | 7.05            | 149             | 7.05         | 149          | 7.05            | 149             | 7.05        | 149          | 7.05                 |                            |                            |                    |
| Tularosa Fillet Rim   | 3       | 1       | 1       | 1       | 1               | 1               | 1       | 1       | 1       | 1               | 1               | 1            | 1            | 1               | 1               | 1            | 1            | 0.05                 |                            |                            |                    |
| Tularosa Sugged       | 66      | 3       | 2       | 7       | 3               | 8               | 5       | 2       | 3       | 16              | 2               | 124          | 124          | 5.97            | 124             | 6.32        |                            |                            |                            |                    |
| Kinishba Red          | 2       | 3       | 1       | 1       | 1               | 1               | 1       | 1       | 1       | 1               | 1               | 1            | 1            | 1               | 1               | 1            | 1            | 1.04                 |                            |                            |                    |
| Reserve Red           | 2       | 1       | 1       | 1       | 1               | 1               | 1       | 1       | 1       | 1               | 1               | 1            | 1            | 1               | 1               | 1            | 1            | 0.14                 |                            |                            |                    |
| McDonald Painted Corrugated | 1   | 1       | 1       | 1       | 1               | 1               | 1       | 1       | 1       | 1               | 1               | 1            | 1            | 1               | 1               | 1            | 1            | 0.14                 |                            |                            |                    |
| McDonald Patterned Cor. | 2      | 1       | 1       | 1       | 1               | 1               | 1       | 1       | 1       | 1               | 1               | 1            | 1            | 1               | 1               | 1            | 1            | 0.14                 |                            |                            |                    |
| McDonald Grooved Corr. | 1       | 1       | 1       | 1       | 1               | 1               | 1       | 1       | 1       | 1               | 1               | 1            | 1            | 1               | 1               | 1            | 1            | 0.14                 |                            |                            |                    |
| Prieto Indented Corr. | 1       | 1       | 1       | 1       | 1               | 1               | 1       | 1       | 1       | 1               | 1               | 1            | 1            | 1               | 1               | 1            | 1            | 0.14                 |                            |                            |                    |
| Point of Pines Plain Corr. | 27  | 2       | 3       | 1       | 16              | 12              | 2       | 46      | 35      | 35              | 10              | 7            | 30           | 28              | 46              | 57            | 66          | 21              | 15          | 20          | 526              | 21.98                | 526              | 28.77                  |                            |                            |                    |
| Point of Pines Indented Corr. | 49  | 9       | 1       | 17      | 12              | 22              | 9       | 5       | 2       | 3               | 6               | 10           | 15           | 41              | 34              | 15            | 14           | 9               | 316          | 14.95       | 316              | 16.09                |                            |                            |                    |
| Point of Pines Obliterated Corr. | 33  | 3       | 4       | 12      | 2               | 49              | 42       | 80      | 22      | 1               | 3               | 5            | 16           | 6               | 29              | 31            | 8            | 14             | 16          | 34          | 442              | 20.91                | 442              | 22.50                  |                            |                            |                    |
| Alma Plain            | 58      | 7       | 5       | 25      | 7               | 23              | 6       | 1       | 32      | 34              | 32              | 7            | 13           | 10              | 19              | 15            | 20          | 11              | 52           | 28          | 23              | 35          | 22          | 488              | 23.05                | 488              | 24.83                  |                            |                            |                    |
| Total                | 2114    | 100%    | 1965    | 100%    | 149             | 7.05           | 149     | 7.05    | 149     | 7.05            | 149             | 7.05         | 149          | 7.05            | 149             | 7.05        | 149          | 7.05                 |                            |                            |                    |
**TABLE 1. - LISTING OF WHOLE AND RESTORABLE VESSELS FOUND AT RED BOW CLIFF DWELLING**

Cedar Creek Polychrome bowl (1), whole (A-16925)

Cedar Creek Polychrome bowl (1), restorable (A-16926)

Tularosa Fillet Rim bowl (1), restorable (A-16140)

Kinishba Red bowls (2), whole (A-16141, A-16142)

Kinishba Red jar (1), whole (A-16143)

Point of Pines Indented Corrugated jars (3), whole (A-16144, A-16145, A-16146)

Point of Pines Patterned Corrugated plate (1), whole (A-16148)

Reserve Plain Corrugated jar (1), whole (A-16147)

Reserve Indented Corrugated miniature bowls (2), restorable (A-16149, A-16150)

Alma Plain jar (1), restorable

Alma Plain bowl (1), restorable

Provenience is given under appropriate type discussion within pottery section. Vessels may be correlated by cross-checking catalogue numbers.
Figure 31. - The secondary ceramic dating of Red Bow Cliff Dwelling by a comparison of the pottery from this site with ceramic complexes of known temporal value.
A reason for this may lie in the site location. Immediately in front of the cave is a sheer cliff, and below it a chute which empties into a ravine. All material remains tossed over the cliff were permanently gone. This natural circumstance, when taken together with the human urge to dispose of broken pottery and other rubbish, must be a factor in the amount of sherd material and other cultural items which were allowed to remain at Red Bow Cliff Dwelling.

Despite this, good deposition of trash in various parts of the cave occurred. Inasmuch as such deposition was certainly not selective, the sample recovered from the cave, although small, is representative and when complete vessels deliberately abandoned are included, the entire lot becomes meaningful.

Having presented sherd counts and indicated the relative importance of the various types by comparative percentages, the entire sample from the site is listed by type and the more important types shown in large lettering (Fig. 31). Those types considered important occur in quantities above one percent within their category, painted or utility, or are represented by whole or restorable vessels. This kind of consideration is admittedly arbitrary, but what is really important is the relative abundance of types and this seems a method of arriving at such an estimate. Certain percentage considerations are,
of course, markedly strengthened by the occurrence of whole and restorable vessels, especially in the case of Cedar Creek Polychrome. This list is then placed as the first column to the left of a chart (Fig. 31) and compared with a second column which represents the complete sherd complex of Pinedale, Canyon Creek, and Point of Pines phases as determined from large surface sites at Point of Pines. It is then shown that all the types from Red Bow Cliff Dwelling as listed in the first column occur through to the second. In addition, these correspond to a majority of types indicated as diagnostic in the second column. Certain of the most popular among those from the first column, in company with others, carry on through to a third column representing the sherd complex of Canyon Creek Phase alone. These correspond to most of the more diagnostic types of Canyon Creek Phase as found at Point of Pines, and in this way indicate the cave occupation to have been of this phase. In both second and third columns, the diagnostic types within the ceramic complexes considered are shown in large lettering. Throughout the chart (Fig. 31), exclusive of the first column, those types shown in small lettering are either minor types occurring in small quantities or types abundant but not temporally diagnostic.

The fourth column represents the generalized phase sequence. Dotted gathering lines from the second column
come to the fourth in a manner indicating the maximum time allowance which could possibly be ascribed to the initial sample listed in column one. Solid gathering lines from the third column point to the section of the phase sequence, Canyon Creek Phase, which ceramic evidence taken as a whole indicates is the most probable time during which Red Bow Cliff Dwelling was occupied.

Inspection of the painted pottery indicates that the oldest of the decorated types are Pinto Black-on-red and Pinedale Black-on-red, and these represent the earliest possible time Red Bow Cliff Dwelling could have been occupied; Point of Pines Polychrome represents the latest. For purposes of an actual occupation date, the relative amounts of the various types are most important. When whole vessels, restorable vessels, and relative sherd percentages are all taken into account, it is seen that Cedar Creek Polychrome, most prevalent at the Point of Pines Ruin during the middle of Canyon Creek Phase (1350), is at this site by far the most abundant and consequently an important painted pottery type. In evaluating the painted types, it must be recalled that a series such as the White Mountain, represents a gradation of types from early to late, and that each of these types overlaps the other in its individual time span, so that a few examples of Pinedale Polychrome would probably have been in use during a time period when Cedar Creek and Fourmile
Polychromes were the dominant types. Also toward the end of Canyon Creek Phase it would be likely that a few of the first examples of Point of Pines Polychrome might appear contemporaneously with Cedar Creek and Fourmile Polychromes. The change from one type of painted pottery to another is more sensitive and there is less overlap than in utility pottery, but the same situation holds true for both categories. As a result of this circumstance there is usually a considerable block of pottery between any two types which exhibit stylistic and manufacturing characteristics common to both and that there is also a time block between the frequency peaks of any two types during which both types overlap. For these reasons, criteria such as the types represented in the entire sherd sample and their relative abundance must receive greatest weight in arriving at an occupation date for a site on ceramic evidence alone.

Recognition of these factors provides a ceramic explanation for the presence in small amounts of Pinedale Black-on-red and Polychrome, Pinto Black-on-red, and Point of Pines Polychrome at a site where the actual intensive occupation took place only during Canyon Creek Phase times. From column one of the dating chart it is apparent that only a small range of types was originally present, that an even smaller range is represented by important and diagnostic types and that this may be interpreted as giving the cave occupation a time span of approximately 75 years
within the Canyon Creek Phase. Inferentially, all of the material culture from Red Bow Cliff Dwelling may be assigned to this same phase, or in time to about A.D. 1325-1400.

STONE IMPLEMENTS

In classifying stone tools, it has not been possible to adhere to any one system. However desirable this might have been, there is still no one system which covers all types. New names have been avoided and specific type names originally applied by others have been chosen for tools under consideration on the basis of similarity.

In the formation of artifact categories attention has been given the study concerning Tularosa and Cordova Caves (Martin and others 1952) because the material culture in Point of Pines caves bears resemblances to that from sites in the Reserve district. Ventana Cave (Haury 1950) and the study of Awatovi stone artifacts (Woodbury 1954) were also extensively consulted and utilized, but the material covered in these reports largely pertains to different cultures or horizons, and only general presentation patterns and nomenclature could be followed.

Study of stone artifacts from caves in the Point of Pines region points to an understanding of why the Indians made use of the caves. They evidently made their homes in
these caves basically for economic reasons; to raise additional crops, gather wild plants, and hunt, apparently in order to augment the supply for a large regional population. Other material culture and the plant remains also reflect an emphasis on agriculture, food gathering, and to a limited extent, on hunting.

Data have been synthesized in various charts and tables and provenience is given with that of all other artifacts in a provenience summary chart.

Pecked and Ground Stone Objects

List of Artifacts

<table>
<thead>
<tr>
<th>Classification</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mano</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mano with single grinding surface</td>
<td>26</td>
<td>15.85</td>
</tr>
<tr>
<td>Type a</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Type b</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Type c</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Type d</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Mano with two grinding surfaces</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>One-hand Mano</td>
<td>14</td>
<td>8.54</td>
</tr>
<tr>
<td>One-hand mano with single grinding surface</td>
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<td>8.54</td>
</tr>
<tr>
<td>One-hand mano with two grinding surfaces</td>
<td>5</td>
<td>2.83</td>
</tr>
<tr>
<td>Metate</td>
<td>26</td>
<td>15.85</td>
</tr>
<tr>
<td>Slab metate</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Trough metate closed at one end</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Trough metate open at both ends</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Basin metate</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Grinding Slab</td>
<td>3</td>
<td>1.83</td>
</tr>
<tr>
<td>Paint Pounding Slab</td>
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<tr>
<td>Worked Slab</td>
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<td>0.61</td>
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<tr>
<td>Type b</td>
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</tr>
<tr>
<td>Pestle</td>
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<td>0.61</td>
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HAMMERSTONE

Cylindrical Hammerstone

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<th>Value</th>
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<tbody>
<tr>
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<td>4</td>
<td>12.20</td>
</tr>
<tr>
<td>b</td>
<td>2</td>
<td>3.66</td>
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3/4 Grooved Axe, Reused as Hammer

<table>
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<th>Value</th>
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</table>

Abrading Stone

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<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
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<td>5.49</td>
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</table>

Cylindrical Stone

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<td>a</td>
<td>1</td>
<td>.61</td>
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</tbody>
</table>

Stone Ball

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<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1</td>
<td>.61</td>
</tr>
</tbody>
</table>

Total 164 100.00

ORNAMENTS

Pendant

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</thead>
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<td>1</td>
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</tbody>
</table>

Bead

<table>
<thead>
<tr>
<th>Type</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
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<td>a</td>
<td>796</td>
</tr>
<tr>
<td>b</td>
<td>25</td>
</tr>
<tr>
<td>c</td>
<td>78</td>
</tr>
</tbody>
</table>

GRINDING TOOLS: Three broad categories are recognized. Manos refer to larger stone grinding tools probably used with two hands on trough or slab metates, primarily in grinding corn. One-hand manos refer to smaller grinding tools probably used with one hand on basin or slab metates. One-hand manos may have been used to grind foods other than corn to a greater degree than manos. Distinctions recognized by Woodbury (1954: 66-84) concerning manos and one-hand manos are followed. Rubbing stones refer to small grinding tools irregular in outline and shaped almost exclusively by wear; grinding with these tools may have been accomplished in a rotary fashion as well as with the back and forth motion typical of the first two categories.
Figure 32. - Data synthesis chart for pecked and ground stone objects from Red Bow Cliff Dwelling.
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<th>No. of Specimen</th>
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<th>Width (mm)</th>
<th>Thickness (mm)</th>
<th>Weight (g)</th>
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</thead>
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<td></td>
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<td>Mean</td>
<td>Range</td>
<td>Mean</td>
<td>Range</td>
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<td>Nano with single grinding surface Type a</td>
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<td>150-220</td>
<td>182.9</td>
<td>89-110</td>
<td>104.3</td>
</tr>
<tr>
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<td>156-205</td>
<td>174.2</td>
<td>92-157</td>
<td>110.4</td>
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<tr>
<td>Nano with single grinding surface Type c</td>
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<td>192.8</td>
<td>101-117</td>
<td>108.5</td>
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<td>162</td>
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<td>60</td>
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<tr>
<td>Nano with two grinding surfaces</td>
<td>1</td>
<td>155</td>
<td>101</td>
<td>63</td>
<td>61.5</td>
</tr>
<tr>
<td>One-hand mano with single grinding surface</td>
<td>9</td>
<td>87-114</td>
<td>116.4</td>
<td>75-106</td>
<td>92.1</td>
</tr>
<tr>
<td>One-hand mano with two grinding surfaces</td>
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<td>85-132</td>
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<td>250-323</td>
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<td>Basin metate</td>
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<td>Paint pounding slab</td>
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<td>114</td>
<td>50</td>
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</tr>
<tr>
<td>Worked slab</td>
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<td>341</td>
<td>269</td>
<td>70</td>
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</tr>
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<td>63-108</td>
<td>81.5</td>
</tr>
<tr>
<td>Polishing stone Type a</td>
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<td>29-65</td>
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<td>Pestle</td>
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<td>92.5</td>
<td>55-91</td>
<td>50.0</td>
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<td>Three-quarter-grooved axe, reused as hammer</td>
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<td>100.0</td>
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<td>87.6</td>
<td>51-105</td>
<td>73.7</td>
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<td>12</td>
<td>3</td>
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<td>72</td>
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<table>
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<th>Perforation</th>
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<th>Thickness (mm)</th>
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<td>Range</td>
<td>Range</td>
<td>Range</td>
<td>Range</td>
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<tr>
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<tr>
<td>Bead Type c</td>
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<td>2.9-7.4</td>
<td>3.4</td>
<td>7.1-1.8</td>
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<td>Stone bell</td>
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<td>34</td>
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</tbody>
</table>

* One or more specimens broken in this dimension; range and mean determined for complete specimens only.
TABLE 2. - SUMMARY LISTING OF MATERIALS FROM WHICH PECKED AND GROUND STONE OBJECTS WERE MADE

<table>
<thead>
<tr>
<th>Classification</th>
<th>Sandstone</th>
<th>Limestone</th>
<th>Mudstone</th>
<th>Quartzite</th>
<th>Quartz Latite</th>
<th>Andesite</th>
<th>Diabase</th>
<th>Diorite</th>
<th>Granite</th>
<th>Basalt</th>
<th>Scoria</th>
<th>Tuff</th>
<th>Rhyolite</th>
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<tbody>
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<td>2</td>
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<td>2</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>One-hand Mano</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>8</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>Metate</td>
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<td>3</td>
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<td>1</td>
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MANO: A majority of the manos are similar in overall characteristics, especially with respect to their rectangular outline and convex grinding surface. That almost all manos exhibit a convex grinding surface indicates a preference at Red Bow Cliff Dwelling for trough metates when using these tools, and that the smaller one-hand manos and rubbing stones were those used with slab and basin metates. The few manos with flat grinding surfaces probably were used on slab metates.

MANO WITH SINGLE GRINDING SURFACE

Type a: Outline rectangular with rounded ends and corners; in a few instances an ovoid outline is approached; shaped by pecking; thin cross-section; surfaces vary from parallel to wedge-shaped; upper face ranges from unshaped, roughly flat, to a convexly-shaped surface in some cases rounding into edges and in other specimens forming more angular junctions with edges; grinding face is generally moderately convex on longitudinal axis with upturned ends, almost flat to slightly convex on the transverse axis; finger grips absent. (Fig. 33)

Type b: Outline rectangular with rounded ends and corners; thick, heavy, loaf-shaped; shaped by pecking; thick cross-section; surfaces parallel; upper face shaped slightly convex forming rounded angles with edges; grinding surface moderately convex on longitudinal axis with slightly upturned ends; slightly convex on transverse axis;
Figure 33. - Representative type examples of manos, one-hand manos, rubbing stones, and polishing stones found in caves of the Point of Pines region.  a, mano with single grinding surface Type a; b, mano with single grinding surface Type b; c-e, polishing stones Type a; f, polishing stone Type b; g, mano with single grinding surface Type c; h, mano with single grinding surface Type d; i, l, m, n, rubbing stones Type a; j, mano with two grinding surfaces; k, rubbing stone Type b; o, p, one-hand manos with single grinding surface; q, one-hand mano with two grinding surfaces.

Arrows indicate directions grinding motion may take. Solid black indicates grinding surfaces. Hatching indicates medial sections.
finger grips absent. (Fig. 33)

**Type c:** Outline rectangular but irregular; roughly shaped by pecking; surfaces not parallel; upper face unshaped or merely roughed off around edges; grinding surface varies from flat to slightly convex on both longitudinal and transverse axes; finger grips absent. One of these specimens was imbedded in the plaster curbing surrounding one of the floor features in Room 1, Block A. (Fig. 33)

**Type d:** Outline oval; shaped around edges by pecking; surfaces not parallel; upper face flat but not intentionally modified; grinding surface slightly convex on longitudinal axis; moderately convex on transverse axis; finger grips absent. (Fig. 33)

**MANO WITH TWO GRINDING SURFACES:** Outline rectangular with rounded ends and corners; shaped around edges by pecking; surfaces parallel; grinding surfaces vary slightly from flat to gently convex on both axes; finger grips absent. (Fig. 33)

**ONE-HAND MANO:** One-hand manos, as a category, grade almost imperceptibly into the rubbing stone group. The fundamental difference is one of utility. One-hand manos were used primarily for grinding, probably with a back and forth motion, on slab or trough metates. They were also generally shaped to some degree and tend to be symmetrical in outline. Rubbing stones, on the other hand, are of
irregular outline and as Woodbury (1954: 78, 88) points out, may have served equally as pounding and rubbing implements and the rubbing and grinding may have been effected in almost any manner. These tools were used primarily on basin metates.

**ONE-HAND MANO WITH SINGLE GRINDING SURFACE:** Outline oval to rectangular; more expertly fashioned examples are carefully shaped by pecking until corners and edges are rounded and surfaces are parallel; at the other extreme, examples of minimum workmanship exhibit an outline that is irregular to roughly rectangular or oval with slight outline shaping and surfaces which are not parallel; upper face ranges from an unshaped to a flat or moderately convex shaped surface; grinding surface is flat to slightly convex on longitudinal axis; ranges from flat to moderately convex on transverse axis; finger grips absent. Two specimens represent broken ends of larger manos reshaped into smaller one-hand manos. (Fig. 33)

**ONE-HAND MANO WITH TWO GRINDING SURFACES:** Outline predominantly rectangular with a slight tendency toward an oval in several cases; edges well shaped by pecking; surfaces parallel, one exception is wedge-shaped in cross-section; grinding surfaces vary from flat to moderately convex on both axes; two grinding surfaces are seldom exactly alike, one usually shows greater wear and greater convexity than the other and often on the opposite axis;
finger grips absent. In one specimen, vesicles in the
grinding face contain particles of hematite. (Fig. 33)

METATE: The classification of metates is made diffi-
cult by the variation in terminology used by different
workers in the Southwest. Each site presents a different
problem because the primary use to which the various types
of metate-like stone implements were put varies with the
kind of site and its temporal position. Woodbury indicates
that he prefers the term "basin metate" be dropped. Instead
he would include such artifacts under the term "grinding
slabs" (Woodbury 1954: 50-51). However, under his defi-
nition of "grinding slabs" he infers that paint grinding
was their main use (Woodbury 1954: 113). At Red Bow Cliff
Dwelling a high number of metate-like stone implements
occurred which were of the same general size as others
termed metates under Woodbury's classification but distinct
from them in that a shallow basin had been formed by
grinding in various directions with short strokes or in a
rotary fashion, presumably the result of seed grinding and
pounding rather than corn grinding. The term "basin
metate" is here applied to this type. At this site, still
other implements occurred which cannot correctly be termed
slab, trough, or basin metates but were similar to these
except that they were smaller and apparently used in paint
grinding more than in any other capacity. Accordingly,
Woodbury's term "grinding slab" was applied to objects of
this kind, and retention of the term "basin metate" preserves the distinctions which apply to the larger seed grinding apparatus. "Slab metate" and "trough metate" are used to designate the remaining metate types. A back and forth grinding motion must have been used exclusively on these and they may have served almost entirely in the preparation of corn. None of the metates from Red Bow Cliff Dwelling show what might be considered evidences of extended or protracted use. Several were broken but none had been worn out by grinding. It is, however, impossible to estimate how long a period of time would have been necessary under prehistoric conditions at this site to "use up" a metate, therefore no inferences can be drawn from this condition. Metates strongly resemble those described from Tularosa and Cordova Caves (Martin and others 1952: 132-135) and other caves in the Reserve district (Martin, Rinaldo, and Bluhm 1954: 101-104).

**SLAB METATE**: Large, thin, roughly rectangular stone slabs with original top and bottom surfaces approximately parallel; upper surface flattened or rendered slightly concave by grinding; bottom and sides unworked; grinding surfaces are not well worn and clearly show roughing indentations produced by pecking; grinding motion appears uniformly longitudinal; manos and one-hand manos were probably used with these metates; 1-basalt porphyry, 1-basalt, 1-quartz latite, 2-tuff, 1-sandstone. (Fig. 34)
Figure 34. - Metate types. a, slab metate; b, trough metate closed at one end; c, trough metate open at both ends; d-f, basin metates. Length of e, 445 mm.
TROUGH METATE CLOSED AT ONE END: Fashioned from roughly rectangular to ovaloid stones which were comparatively thick; bottom and sides unworked; grinding surface represents a trough closed at one end with approximately parallel sides; grinding surface concave or shallow scoop-shaped; troughs quite shallow; grinding motion uniformly longitudinal; manos were probably used with these metates; 1-basalt, 1-rhyolite. (Fig. 34)

TROUGH METATE OPEN AT BOTH ENDS: Fashioned from thick, roughly rectangular to ovaloid stones; bottom and sides unworked; grinding surface represents a shallow trough open at both ends with parallel sides; grinding surface concave or shallow scoop-shaped; troughs are markedly shallow; grinding motion uniformly longitudinal; manos were probably used with these metates; 1-rhyolite, 1-sandstone, 1-vesicular basalt. (Fig. 34)

BASIN METATE: Outline varies widely from irregular, triangular, circular, oval, rounded rectangular, rectangular, to roughly square; the majority approximate a rectangle; bottom and sides unmodified; original bottom and top surfaces generally parallel; grinding surface represents a closed basin, oval or circular in extent; grinding basins shallow, none having achieved anything approaching their natural depth limitation; grinding was in any convenient direction or with a rotary motion; grinding basin surfaces not always uniformly smooth and show marks produced either
by pecking to roughen surfaces or as a result of pounding materials to be ground; top surfaces surrounding basins often rough and occasionally show pecking marks; one-hand manos and rubbing stones in particular were probably used with these metates. The reverse surface, or bottom, of one basin metate is smoothed in one small section by grinding, the remainder being rough; in addition this entire reverse surface is covered by a light reddish coloration; 4-basalt, 6-tuff, 2-quartz latite, 2-limestone, 1-sandstone.

(Fig. 34)

METATE BIN: A single metate bin was located in the Frontal Area built out from the exterior of the front wall of Room 5 at its junction with the low front retaining wall of Room 4. None of the metates found at the site fit the bin. From its structural nature, a large slab metate was used. For additional details, see Room 5 architectural description. Certain features on the surface of Block A in Room 1, described under the appropriate architecture section, also suggest a metate base. The evidence is not conclusive, however. Although many of the cave sites in the Nantack scarp were surveyed, no other metate bins were observed. Pine Flat Cave, across the ridge, contained vestiges of a single bin in association with the final Mogollon-Pueblo occupation. Accordingly, metate bins must be considered a Pueblo IV feature of rare occurrence in these cave sites. Metate bins are, on the other hand, a
common Pueblo IV feature in large open sites, and this may be an indication of a greater emphasis at such community sites on the grinding and preparation of corn foods.

**GRINDING SLAB:**

"A flat slab, generally irregular in shape, with one or both faces worn smooth and slightly concave as a result of grinding or rubbing. It is believed that they were frequently used for paint grinding, but they could have served many other purposes equally well...Most are irregular but with corners and edges somewhat smoothed by pecking and grinding. A few are approximately oval or rectangular...None appear intentionally hollowed out thus distinguishing them from raised border palettes and from mortars." (Woodbury 1954: 113.)

Grinding slabs from Red Bow Cliff Dwelling were probably used in the preparation of paint and are smaller in overall size than those stones referred to as basin metates which were used more exclusively in food preparation. Grinding slabs seem to resemble those also termed "small, metate-like grinding stones" (Martin and others 1952: 136). Red hematite particles remain on the grinding surface of one specimen; white kaolin remains are caked about the edge of the grinding surface of another. (Fig. 35)

**PAINT POUNDING SLAB:** A small irregular chunk of stone with one flat surface; no smoothing evident; a chipped layer of red paint almost covers the flat surface, some paint also on edges; because the surface does not show any evidence of grinding, hematite must have been merely pulverized on the stone; but some of the paint must have come
in contact with liquid to have hardened and remained adhering to the surface.

**WORKED SLAB**: Outline rectangular, cross-section trapezoidal; shaped by pecking with top surface slightly smoothed by pounding; top surface area less than bottom; bottom flat due to natural exfoliation; use unknown.

**RUBBING STONE**

**Type a**: Characterized by a wide diversity of shapes and sizes; outlines range from round, oval, globular, rounded rectangular shape to angular and irregular natural stones which were often river cobbles; thickness is also inconsistent with a range from flat to thicknesses as great as the width; these tools were not intentionally shaped but assume their shape through use in pounding, pecking, and rubbing on or against other objects; ends and edges are often battered, chipped, pecked, rounded, and blunted through use; those showing battered ends may have served in a secondary capacity as hammerstones; one or more grinding surfaces are present; the range in number and degree of surface convexity is wide; at one extreme the tool is thin, irregular in outline with one flat grinding surface; at the other extreme, a thick rounded rectangular block with as many as four convex grinding surfaces, one of which may be markedly convex; grinding striations are sometimes deep and clear and often crisscross each other; all rubbing stones could have been manipulated with one hand and presumably
are those tools primarily used in working with basin metates. In one specimen, vesicles of the grinding surface contain hematite particles. (Fig. 33)

**POLISHING STONE**

*Type a:* Small water-worn cobbles, pebbles or pieces of fine grained rock; some have highly polished surfaces over their entire area, others one or more varying from flat to high in degree of convexity and often forming sharp angles with one another; some light striations occur; outlines vary from irregularly rounded, to angular, to oval; this type of stone tool is not intentionally shaped but is modified through use and probably served primarily in polishing pottery. (Fig. 33)

*Type b:* Generally similar to Type a with the following distinguishing characteristics: surfaces are not so highly polished; a few exhibit rough polishing surfaces; wear facets are broader; greater variety in shape in that stones used may be more irregular, elongated, or flattened; in a few examples there is slight indication that some shaping through pecking was effected; in several examples edges and ends are pitted as if the tool had been used to tap or lightly pound another hard object. Generally speaking, these polishing stones are rougher varieties of the former type and were probably put to a greater variety of uses. In addition to those of Type b, a number of small water-worn stones were found at all sites which
resembles polishing stones except that they showed no sign of ever having been used. Perhaps they were picked up and brought in, someday to serve as polishing stones. (Fig. 33)

**PESTLE:** Outline roughly rounded; multifaced; slightly tapered; elongated implement; sides flattened by abrading; ends rounded and slightly battered through use.

**HAMMERSTONE:** A category which includes all those tools of various sizes and shapes which show little or no initial shaping, but as a result of use are battered about the ends and rounded to a greater or lesser extent depending on the intensity of their use. These tools do not show grinding or rubbing surfaces. This characteristic is the most important in differentiating hammerstones from rubbing stones. Hammerstones may have been put to a great number of uses in their capacity as tools with which other objects could be pecked, pounded, bashed, or hammered. Such tools are numerous and may not have been very highly regarded in contrast to purposely shaped implements and may therefore have been used for a time and set aside or thrown away.

The term hammerstone is here preferred to pecking stone because at the cave sites, pecking was not the primary function of these implements. Building blocks were seldom shaped and only certain tools required pecking in their manufacture. Hammerstones were used for pecking when necessary but other, more important, uses did exist for
Figure 36. - Pecked and ground stone objects.  a-c, hammerstones;  d, stone ball;  e, grooved pebble;  
f, paint pounding slab;  g, cylindrical stone. Length of  g, 236 mm.
such tools within the economy, and many still retained mashed and pulverized plant pulp caked on the pounding surfaces. Furthermore, pecking stones as classified by Morris (1939: 128) imply an intentionally prepared tool, that is "chips were struck off on two converging sides, leaving sharp, jagged points and edges." Still other analysts would term tools prepared in this manner "choppers." Intentional preparation of this kind is not characteristic of hammerstones as they occurred at cave sites near Point of Pines.

Hammerstone outlines range from angular, irregular, round, to globular; no modification of original selected river cobbles and stones is apparent except through use; although Woodbury calls hammerstones "pecking stones," a portion of his description very well characterizes the tools here considered. "None has been used for rubbing or grinding. Some are almost spherical with the entire surface worn. These may be termed 'globular.'" Within the category the entire range presents "a continuum which begins with the irregular piece of stone not yet used and ends with an almost spherical tool." (Woodbury 1955: 86.) The typical hammerstone is an irregularly shaped rock, suitable for use in one hand. A few large tools used more successfully with two hands occurred. Some hammerstones were cores which became hammerstones through use. In a few instances where the tool is large, the rock originally
selected had one edge wedge-shaped which would have given the pounding surface a greater renting effect. (Fig. 36 a-c)

**CYLINDRICAL HAMMERSTONE**

**Type a:** This term is used because the tools fall into the category so named by Woodbury (1955: 89), "shaped by pecking to an approximately cylindrical form, usually somewhat flattened in cross-section. The ends are rounded by wear from pounding." The shape of examples here considered is uniform with one end more rounded and thicker than the other, the entire object vaguely resembles a truncated pyramid; these tools have been deliberately shaped and in this respect differ markedly from regular hammerstones; one end uniformly shows the most use and is very blunt and rounded to a convex surface by wear but not fractured. These implements seem to have been used for pounding, crushing, mashing, or pulverizing and may have been used in shallow mortars or basin metates. (Fig. 37a, b)

**Type b:** Outline round when viewed from top; in vertical section appear as a squat, truncated, rectangular-based pyramid with depressed or squeezed in sides; differs from other tools in that the depressed area circles the sides almost forming a shoulder and making a neck which provides a satisfactory grip so that the tool may be grasped in one hand; the rounded or smaller end fills the
Figure 37. - Cylindrical hammerstones. a, b, Type a; c, d, Type b. Length of a, 95 mm.
palm and it may be used as an implement for light pounding with a rocker motion to mash food or other substances, possibly in a shallow mortar or basin metate; the head or working surface is moderately to highly convex, smooth from grinding and light pounding but not striated or scarred; initially shaped by pecking but not with excessive care; represent tools far more specialized than hammerstones and might be classed as "mullers" by some analysts.

(Fig. 37c, d)

THREE-QUARTER-GROOVED AXE, RE-USED AS HAMMER: Groove is rounded, shallow, continuous on both faces and outer side; ridges absent; one specimen poorly polished with a flattened poll having rounded sides; bit is badly battered on the edge; second specimen has finer polishing with rounded, somewhat battered poll; bit is only slightly chipped and battered on the edge. Full-grooved axes were not found at any of the cave sites.

ABRADING STONE

Type a: Irregular and angular, some roughly rectangular in outline; unshaped or very slightly modified pieces of tabular, fine-grained rock; upper face uneven; all have a single abrading surface with one exception which has two abrading surfaces on opposite flat sides that are not parallel; abrading surfaces are uniformly flat; all tools in this category are small and could have been held between the fingers of one hand in rubbing them against
other objects.

**CYLINDRICAL STONE:** This object was found at a depth of 20 cm. below the surface of Room 4, center section, its long axis horizontal. Two cotton cords, one of 16 brown yarns, one of 2 white yarns, were placed side by side and together formed a single wrap encircling the stone. The ends were not tied but had been cut and draped over one another on the upper surface as the stone lay in position. In cross-section the stone approaches an oval; sides and ends shaped by pecking; sides evenly rounded; ends form flat surfaces but are rounded in joining sides. The object does not show use marks but small projections left all over the rounded sides by initial pecking seem slightly smoothed and to have acquired a certain slight sheen as if the object had been rolled on a hard surface. (Fig. 36g)

**STONE BALL:** An almost perfect sphere; shaped by pecking; use unknown. (Fig. 36d)

**PENDANT:** A single turquoise pendant (A-16151) came from Room 4, ceremonial area; front face highly polished bright green to blue; sides slightly convex; corners rounded; edges slightly beveled toward back face; back face dull brown solid matrix; shape trapezoidal, 7 mm. at narrowest end; one biconical perforation centrally located near narrow end, 2 mm. diameter. (Fig. 38b)

**BEAD:** In several instances stone beads were found strung on original strands of cord. These are best
described individually.

1) A 2-yarn strand, brown cotton cord, Z-S twisted, strung with three minute turquoise beads at one end followed by two circular shell beads, alternated with single bi-lobed shell beads, and four red beads alternated with bi-lobed shell beads, with a single minute black bead terminating the sequence, A-16156. (Fig. 38e)

2) A 7-yarn strand, brown cotton cord, Z-S twisted, strung with 23 black beads of uniform diameter, 3.8 mm., but varying slightly in thickness, 1.0-1.8 mm.; loosely strung with nine beads to the half-inch, A-16258-X1. (Fig. 38c)

3) A single yarn, brown cotton cord, strung with 33 black beads of uniform diameter, 2.5 mm., but varying in thickness, .7-1.2 mm.; tightly strung with 22 beads to the inch, A-16258-X2. (Fig. 38f)

4) A 3-yarn strand, brown cotton cord, Z-S twisted, strung with 10 black beads of uniform diameter, 2.5 mm., with variation in thickness, .7-2.0 mm.; with 10 beads to the half-inch, A-16258-X3.

5) A 2-yarn strand, white cotton cord, Z-S twisted, strung with one black and one red bead side by side, both 3.5 mm. in diameter. The 2-yarn strand is part of a cord twisted back on itself to form a 6-yarn strand, A-16258-X5. (Fig. 38d)

6) A 3-yarn strand, white cotton cord, Z-S twisted, strung with one black and three turquoise beads; the black at one
Figure 38. - Ornaments of stone and shell.  a, black tubular bead;  b, turquoise pendant;  c-f, black, red, and turquoise beads strung in various series on cotton cords (e includes shell bi-lobed beads);  g, black beads, Type a;  top row, disc shell beads;  bottom row, turquoise beads, Type c. Length of b, 20 mm.
end; all differed in diameter and thickness, A-16258-X4.

7) A cane cigarette is wrapped with brown cotton cord about its node. Strung on different strands are a single turquoise bead and a single red bead, A-16797.

All stone beads are thin flat discs with a single central perforation, except for one tubular bead. A total of 899 stone beads were found, all of them exclusively within Room 4, ceremonial area. Other than those listed above on particular strands, stone beads were individually loose in the upper layer of this section, principally in fill behind and enclosed by the two large boulders. Methods of stone bead manufacture and perforation are described in detail by Judd (1954: 80-116) and Haury (1931: 80-87). Stone beads are here separated into types on the basis of color and consequently material.

**Type a:** Black stone beads of fine grained slate or steatite, A-16254, (Fig. 38g), expertly fashioned into flat discs which are more evenly executed in circumference, sectioning, and perforation than either of the other types. The diameter range of 1.5-5.6 mm. includes 44 percent within 3.0-3.9 mm. Three black beads, probably individually manufactured, are irregular in outline but otherwise similar to the main sample. A single atypical black tubular bead (Fig. 38a) has a diameter of 6 mm.; length, 10 mm.; perforation diameter, 3 mm.

**Type b:** Red stone beads of argillite, A-16205, color
varies from pale to dark red; two are irregular in circumference, the remainder round; of the 2.4-6.4 mm. diameter range, 64 percent are 3.5-4.9 mm. Red beads were rare.

**Type c:** Turquoise stone beads, A-16796, (Fig. 38 bottom row). Possibly due to the hardness of the rock, these beads are more unevenly fashioned than other types, a number having flattened (circumference) sides and non-parallel flat surfaces; diameters range from 1.8-7.4 mm. with 42 percent 2.0-2.9 mm. Of all beads, only 78 are turquoise and their quality and color show a wide range; only a few are high grade. Either good turquoise was a rare commodity to these people or they kept the best for their own adornment rather than deposit them as offerings. A single squared mosaic section was found; 4 mm. wide; 1.5 mm. thick.

Discussion

Although a wide variety of materials was available, a definite preference was exercised in the selection of certain kinds of stone for specific types of stone implements. Among manos, 62 percent are basalt. Among one-hand manos, 57 percent are basalt. The remaining tools in both categories are of a variety of material but none is fashioned of limestone. Limestone is, however, the predominating material utilized in rubbing stones and
polishing stones. Of all rubbing stones, 48 percent, and of polishing stones, 86 percent, are limestone. This factor is further evidence for the separation and in the validity of the one-hand mano and rubbing stone categories. Metates were made of a number of different stone materials; a range in desired texture may account for this. Limestone was most often used for hammerstones, basalt for cylindrical hammerstones, diorite for axes, and sandstone for abrading stones. Texture and hardness or durability were probably factors most influencing selection of materials. It would be difficult to determine if selectivity represented individual or family inclination toward special kinds of stone for certain uses, or a cultural preference, or both.

Rubbing stones are the most abundant pecked and ground stone tools and when placed with one-hand manos, hammerstones, cylindrical hammerstones, and basin metates, a group of stone tools is formed which outweighs all others. An assemblage of this kind is most useful in the grinding and pounding of seeds, wild plants, roots, berries and nuts, but any of these implements can, of course, also be used in preparing agricultural products. Cylindrical hammerstones and rubbing stones in the company of basin metates do, however, form a complex particularly adapted to seed grinding.

Manos predominantly have a single grinding surface and occurred in a 5:8 ratio to rubbing stones and a 5:2 ratio
to slab and trough metates. Rubbing stones occurred in a 2:1 ratio with respect to basin metates.

The high number of basin metates present at Red Bow Cliff Dwelling (58 percent of all metates) is itself an indication of the emphasis on seed gathering, and also shows that this type of metate was retained during later periods. Generally speaking, the basin metate is thought to have given way to other types as time advanced, populations became more centralized, and corn became more abundantly utilized (Martin, Rinaldo, and Bluhm 1954: 107). Types of metates other than basin seem to have developed largely because they were better adapted to the grinding of corn; this is especially true of those used in mealing bins (Woodbury 1954: 50-65). However, when much seed grinding and pulverizing was to be accomplished, the basin metate may either have been preferred for, or the result of, such activities. During later times basin metates might therefore occur in some abundance at outlying sites where seed gathering was of importance, whereas in large communities where corn foods were important to the exclusion of other kinds, may be rare or not occur at all. It is suggested that where seed gathering took place, basin metates occur regardless of temporal implications.

The striking similarity between pecked and ground stone artifacts from caves in the Point of Pines region, especially from Red Bow Cliff Dwelling, and those recovered
from Tularosa and Cordova caves is brought out time and again with the consideration of different types. There is a temporal difference between artifacts from these sites. Those from Point of Pines caves are later than those from Tularosa and Cordova. Some of the similarities, however, may be attributed to the resistance to change through time of stone artifacts. The uses to which most types of stone tools were put altered slowly, if at all, and as a consequence such types themselves, with few exceptions, reflect little development.

Another factor which may account for similarity is that in both instances, cave sites are considered. In the case of Point of Pines caves, since gathering wild food plants occupied a strong position in the economy, certain stone tools were abundant. On the other hand, a lithic complex from a surface site, particularly a large pueblo, might be quite different because the economic emphasis there lay on the preparation of corn while gathering occupied a minor position. This would be reflected in the lithic complex and at larger communities stone tools used in preparing foods resulting from gathering would be far less abundant than at isolated cave sites where this aspect was more important. This is not to say that agriculture was not practiced and corn not used at cave sites, for the evidence is quite the contrary. Assuming that circumstances of this kind existed, a reason is furnished as to
why stone tools recovered from cave sites within a region may show a greater resemblance to each other, type for type, than to those of larger communities.

Despite the nature of its causes, the fact remains that lithic material from caves in west central New Mexico is remarkably similar to stone tools from Nantack cave sites. A similar likeness is evident in other artifact categories, architecture, and cave appearance, and there is apparently a physiographic and cultural bond relating cave sites all along the great expanse from the Mimbres Mountains of New Mexico (Cosgrove 1947) to the western end of the Nantack scarp in Arizona.

Apache Occupation With Respect to the Lithic Complex

When the Apache occupy a cave site for living purposes, several generalities seem evident. The cave surface and fill, to the depth of half a meter or more, are extensively disturbed because of the Apache inclination to construct grass-lined and other buried storage facilities. There is a marked absence of metates because the Apache use, and upon departure take with them, any they may have found. Projectile points are also scarce, which may also be due to a tendency among the Apache to make use of any they came by rather than fashion new ones. It is with interest that an absence of metates is noted for Y Canyon Cave among cave sites of the Reserve district (Martin,
Y Canyon Cave is the only one of these four caves studied by Martin and his colleagues (1954: 74-76) in which they found Apache sherds. In the Point of Pines region, both Tule Tubs and Pine Flat caves were occupied by the Apache. Complete metates were absent from these sites. Cordova Cave in west central New Mexico contained a cache of Apache material which included several metates and slabs. Martin (1952: 481) offers as a comment on these artifacts, "The metates looked like prehistoric types and may well have been, because the Apaches often picked up and used old metates left by the 'ancient people,' although they sometimes made their own." At Point of Pines, present day Apache women have been observed salvaging metates excavated by the Field School from nearby sites. Often these women carry the heavy stones some distance to their homes, evidently considering them of value and obviously preferring the reuse of a prehistoric metate to the manufacture of a new one.

Because no Apache material culture (pottery, grass-lined storage areas, etc.) was found at Red Bow Cliff Dwelling, no Apache occupation was postulated at this site. In contrast to Tule Tubs and Pine Flat caves, room surfaces and floor disturbances were not excessive, a large number of metates and projectile points were present, and the Mogollon-Pueblo lithic sample from this site is far more completely represented.
The following primary classification was used in considering smaller chipped stone implements. Those tools which owe their shape to accident and therefore have an outline which depends entirely on the original random flake used and are in no instance chipped or retouched about the entire perimeter, are considered scrapers. On such tools, one or more adjacent edges are unworked and remaining edges exhibit limited chipping, the result either of use or by intention, but predominantly from one side. This category also includes examples which others have called flake knives. No separation is made of this type because of an overall crudeness within the entire scraper group and a general resemblance, one to another, despite the fact that extremes of range did exist. Moreover, individual tools of the entire group were evidently put to much the same use. Those implements which are chipped or retouched about their entire perimeter, generally from both sides, and therefore owe their shape to a conscious effort are considered projectile points and blades. In this category are also several more specialized types such as ceremonial projectile points, crescentic blades, and drills, which are distinguished and appropriately designated within the category. The distinguishing of types within main categories is arbitrary by reason of the fact that such
designations are largely a laboratory convenience and do not necessarily reflect use specialization. All scrapers were used for cutting and scraping and it would probably be an error to imply that any given type of scraper was used solely for any special scraping, cutting, or other single function. Types grade imperceptibly into one another and only on the category level do the distinctions clearly manifest themselves.

Regarding chipped stone, Kidder's basic ideas are interesting, especially when it comes to that delicate distinction between a knife (blade as used here) and a scraper, "a knife being a tool whose cutting edges have been produced by chipping from both sides; a scraper one whose edges are chipped from one side only." (Kidder 1932: 14.) In the present consideration, the term blade is used following Rinaldo rather than knife because Kidder himself recognizes that both blades and scrapers as well as certain other tools could have and probably did serve in the capacity of a knife.

Tools in the scraper category are predominantly chipped from one face only. As has been noted however, this characteristic is not used as the most important in overall classification because a few examples do exhibit bifacial chipping, even though they are obviously tools of the type here considered scrapers. A rigid separation on the basis of chipping from one side or chipping from two
sides does not lend itself to this material. This seems to be true also in the Reserve area where tools which are most certainly scrapers and had to be classified as such show chipping from two faces though the majority are chipped from a single face.

The scraper among the Mogollon-Pueblo was not a planned artiface in the sense that its shape had to conform to certain standards. It was rather an artifact arrived at by producing flakes whose shape was more or less accidental and in use represented the minimum satisfaction of necessity. A wide variety in shape, comparatively large numbers of specimens all uniformly poor in workmanship, absence of preconceived form, and the method of giving the flake a more functional working edge are peculiar attributes of the Mogollon-Pueblo scraper. Traits of this kind will, with the addition of more data, form a configuration distinguishing the various aspects of the Mogollon-Pueblo.

List of Artifacts

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<tr>
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Type m ................................................. 12
Type n ................................................. 3
Type o .................................................. 1
Type p .................................................. 6
Type t .................................................... 7
Ceremonial projectile point
Type a .................................................. 16
Type b .................................................. 2
Type c .................................................. 4
Type d .................................................. 1
Type e .................................................. 1
Type f .................................................. 1
Type g .................................................. 3
Type h .................................................. 3
Crescentic blade
Drill
Type a .................................................. 1
Type b .................................................. 3
Type c .................................................. 2
Scraper
Type a .................................................. 9
Type b .................................................. 19
Type c .................................................. 133
Type d .................................................. 1
Type e .................................................. 7
Graver

| Total | 285 | 100.00 |

Pulping plane
Chopper
Core
Hoe

| Total | 49 | 100.00 |

PROJECTILE POINTS, BLADES, CEREMONIAL PROJECTILE POINTS, CRESCENTIC BLADES, AND DRILLS: Chipped tools are placed in this group because they are chipped on all edges indicating their shape and form were not accidental but the result of a conscious effort. Almost without exception, such tools
Figure 39. - Data synthesis chart for chipped stone objects from Red Bow Cliff Dwelling.
## CHIPPED STONE OBJECTS
### (Red Bow Cliff Dwelling)

#### Data Synthesis Chart

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*One or more specimens broken in this dimension; range and mean determined for complete specimens only.
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were chipped from both faces. The quality of these artifacts varies. Some examples are very fine, others mediocre. This represents a sharp contrast to chipped stone tools in the following group where the majority barely come up to the demands of necessity. In the present group, standards were higher and a few beautiful blades and projectiles indicate that the manufacturer sometimes perfected his tool beyond the demands of necessity. When the desire was present, fine chipped stone tools were fashioned by these people, but generally speaking the presence of this desire was the exception rather than the rule. Insofar as descriptive terminology is concerned, Haury (1950: 262) is followed and the term shoulder is used as defined by Woodbury (1954: 121). Projectile point and blade measurements were taken as follows: length, tip to base; width, maximum width across shoulder or base, whichever is wider; thickness, maximum wherever it occurs.

ROUGH BLADE: Roughly leaf-shaped in outline; thick, heavy; convex edges and base; point and base sometimes almost indistinguishable; crudely chipped about the entire perimeter. These artifacts show no great variety from one to another and are probably the crudely shaped blanks from which finer blades were to be fashioned. In no case do they appear to be a finished tool. (Fig. 40)

PROJECTILE POINT AND BLADE

Type a: Leaf-shaped; rounded base; convex edges.
Figure 40. - Chipped stone projectile points and blades. 

a, b, rough blades; c–p, projectile points and blades; 
c–f, Type a; g, h, Type b; i, Type c; j, Type d; 
k, l, Type e; m, Type f; n, Type g; o, Type h; 
p, Type i. Length of a, 49 mm.
Obsidian used in one specimen is a clear variety seldom employed for tools. In another specimen, strands of sinew are wound tightly about a restricted section at the widest point of the base; the sinew is wound thickly over itself in places; 9-obsidian, 5-chert, 1-quartzite. (Fig. 40)

Type b: Leaf-shaped; straight base; convex to roughly straight edges; 1-obsidian, 5-chert. (Fig. 40)

Type c: Leaf-shaped; rounded tip; rounded base; slightly convex edges; 1-obsidian. (Fig. 40)

Type d: Triangular shape; convex base; convex edges; 2-chert. (Fig. 40)

Type e: Triangular shape; concave base; slightly convex to straight edges; 3-chert, 1-quartzite. (Fig. 40)

Type f: Triangular shape; parallel-sided stem slightly narrower than shoulder; straight base; slightly convex to roughly straight edges; 3-chert. (Fig. 40)

Type g: Triangular shape (large); straight base; roughly straight to slightly convex edges; 2-chert, 1-quartzite. (Fig. 40)

Type h: Triangular shape; straight base; straight to slightly convex edges; 2-chert, 1-obsidian. (Fig. 40)

Type i: Triangular shape; lateral notched; straight base; straight edges; 2-chert. (Fig. 40)

Type j: Leaf-shaped; lateral notched; expanding stem narrower than shoulder; slightly convex base; slightly convex to straight edges; 1-rhyolite, 1-obsidian. (Fig. 41)
Figure 41. - Projectile points and blades. a, b, Type j; c, d, Type m; e, Type n; f-h, Type p; i, j, drill Type b; k, drill Type c. Length of a, 43 mm.
Type m: Leaf-shaped; parallel-sided stem markedly narrower than shoulder; straight base; convex edges. Type m is the most abundant projectile point type at Red Bow Cliff Dwelling and is distinctive of Canyon Creek Phase at this site. Hafting of sinew is intact on two specimens; strips of sinew are wound tightly round and round the stem of the projectile and down the foreshaft 3 to 6 mm.; the foreshaft has fallen away leaving a hollow sinew shell suspended from stem (Fig. 43a, c); 1-obsidian, 1-chert. (Fig. 41)

Type n: Triangular shape; lateral notched; expanding stem wider than shoulder; downcurved spurs; concave base; convex edges; 3-chert. (Fig. 41)

Type o: Triangular shape; very small size; concave base; roughly straight edges; 1-chert.

Type p: Triangular shape; lateral notched; expanding stem as wide as or slightly narrower than shoulder; clear cut shoulder; straight base; slightly convex to straight edges. Hafting of sinew is in tact and wound tightly around the stem in one specimen; 4-obsidian, 1-chert, 1-chalcedony. (Fig. 41)

Type t: Tips too fragmentary to classify. This category cannot strictly speaking be considered a projectile point and blade type.

CEREMONIAL PROJECTILE POINT: Certain projectile points were placed in this separate category primarily
because of their provenience and size. All were found within the confines of the ceremonial area of Room 4 and seem certainly to have been an integral part of a ceremonial complex of offerings. They are uniformly triangular in shape and under 27 mm. in length and 12 mm. in width.

In other characteristics they resemble types normally under the projectile point and blade category. The uniformity of their small size, however, renders them so entirely distinct visually from all specimens in the projectile point and blade category that they have been treated as separate types under a ceremonial projectile point category. Accordingly, ceremonial projectile point types are distinguished on the basis of notches and stem and base shape indicative of different hafting methods, but there is no indication that these minor variations had any special bearing on the use to which the points were put.

Three specimens still retain portions of hafting, two of which also have foreshaft sections. Others have pitch adhering to sides of the blade and base. Methods of hafting are more fully shown by illustration (Figs. 42a, 43a, f). The hafted examples and those with pitch still adhering to stem or blade are positive evidence that at least some of these points were affixed to small arrows and thus offered to the shrine rather than presented as individual points. The great quantity of broken arrow portions in and around the ceremonial area is added
evidence that makes it seem likely most of the ceremonial points were originally hafted.

At other sites and under differing circumstances where a ceremonial area or cache is not clearly defined, minute points are merely considered small projectile points or "bird points." In this instance at Red Bow Cliff Dwelling, the ceremonial implications are clear with respect to all the small points in the ceremonial area. Throughout the site many other larger types of projectile points and blades were found and were presumably used in actual hunting and meat dressing operations. At this site, the size and subsequent usage difference are clear-cut. Perhaps such small points always had ceremonial implications during this time period and were never used for actual hunting. On the other hand, perhaps only this group of people at this particular site made the differentiation and others in the region made and used such points in warfare or for hunting as well as, or instead of, using them as offerings. Only repetitions of the evidence at Red Bow Cliff Dwelling can solidify and justify implying a more widespread distribution of this pattern.

Type a: Triangular shape; lateral notched; expanding stem as wide or slightly wider than shoulder; slightly concave to straight base; slightly convex to straight edges. In one specimen a few patches of pitch still adhere to the neck; in another pitch adheres to the base;
Figure 42. - Ceremonial projectile points. a-e, Type a; f-g, Type b; h-i, Type c; k, Type f; l-m, Type g; n-o, Type h. Length of k, 19 mm.
Type b: Triangular shape; lateral notched; expanding stem narrower than shoulder; slightly convex base; slightly convex to straight edges. In one specimen bits of pitch adhere to base; 2-obsidian. (Fig. 42)

Type c: Triangular shape; diagonal notched; expanding stem narrower than shoulder; slightly concave to straight base; slightly convex, straight or slightly concave edges. In one specimen the hafting is present in its entirety although the foreshaft is not; a strand of sinew lashing is wrapped crisscross over the stem and base then wrapped round and round down the foreshaft for a distance of 9 mm.; the foreshaft has slipped out leaving a hollow shell; pitch does not seem to have been employed (Fig. 42j); 2-obsidian, 2-chert. (Fig. 42)

Type d: Triangular shape; lateral notched one-third distance from base to tip; concave base; straight edges. In this specimen (A-16778-X23) the hafting is present in its entirety as is a portion of the foreshaft; a strand of sinew lashing is diagonally crisscrossed over the lower third of the blade extending from notches to the base at either side of the foreshaft joint, the sinew is then wrapped round and round down the foreshaft for a distance of 14 mm.; the foreshaft is notched to allow short flanges to extend up flush with and hold fast to the projectile neck beneath the lashing; 1-chert. (Fig. 43e)
Type e: Triangular shape; lateral notched one-third distance from base to tip; straight base; straight edges. In this specimen (A-16778-X24) the hafting is present in its entirety as is a portion of foreshaft; the method of attachment is exactly the same as in Type d; sinew wrapping extends down the foreshaft for a distance of 15 mm.; 1-chert. (Fig. 43f)

Type f: Triangular shape; lateral notched one-half distance from base to tip; notched base; convex edges; 1-chert. (Fig. 42)

Type g: Triangular shape; notched base; straight to slightly convex edges; the jasper used for one of these points is bright orange; 2-chert, 1-jasper. (Fig. 42)

Type h: Triangular shape; serrated edges; straight base. In one specimen the remnants of two strips of molded pitch extend up both sides of the blade approximately three-fourths the distance from base to tip; in another example fragments of pitch adhere to the base; 3-obsidian. (Fig. 42)

CRESCENTIC BLADE: The resemblance between two crescentic blades from the early man site of Lind Coulee together with those from other early man stations as shown by Daugherty (1956: 247-249, Figs. 21, 22) and the two crescent-shaped stone objects from Red Bow Cliff Dwelling is striking. Objects of this kind from the two sites are almost identical, even to measurements. Of such artifacts,
Figure 43. - a, c, projectile point and blade Type m; b, d, crescentic blades; e, ceremonial projectile point Type d; f, ceremonial projectile point Type e. Width of b, 53 mm., length of e, 64 mm.
Daugherty ventures to say:

"It appears entirely possible that the crescentic blades found in 'Early Man' sites in western North America were originally functional cutting implements, probably hafted, and that these same implements survived into more recent times, but with a ceremonial function..." (Daugherty 1956: 249.)

Kidder reports similar objects from Pecos Pueblo and from the ruin of Puye. Both occurrences led him to feel such crescentic blades were used ceremonially (Kidder 1932: 35). It is also of considerable interest to note that "an unusual chipped stone crescent and a small projectile point" were found in "a unique prehistoric Pueblo Indian ceremonial cache" dating approximately A.D. 1300-1400 from the Hale Ranch in Lincoln County, New Mexico (Lambert 1956: 145).

Both crescentic blades from Red Bow Cliff Dwelling were found in the ceremonial area of Room 4. There can therefore be little doubt of their ceremonial nature with respect to later periods of Mogollon-Pueblo culture. One of the specimens is chipped about its entire perimeter; the other shows secondary chipping primarily along the concave edge with slight irregular chipping on remaining edges.

**DRILL:** Small, pointed tools chipped from both faces intended primarily as perforators, but some types may have been used as much for graving as for drilling.

**Type a:** Thin, slender flake; plain shaft; tapering to a slightly rounded point.
**Type b:** Thin flakes, slender shafts tapering to slightly rounded points; base represents an abrupt flare from shaft and varies from a small triangular to a bulbous base. (Fig. 41)

**Type c:** Thin flake; relatively wide base and shaft which gradually tapers to point; resemble leaf-shaped blades and are chipped on all edges from both faces, but pointed tip is needle-like and is the characteristic which provides the basis for classification as a drill type. (Fig. 41)

**SCRAPER:** From the standpoint of workmanship, poorer examples of this category represent minimum modification of a random or primary flake. Very slight, irregular secondary chipping has been effected to improve working edges, sometimes intentionally, at other times through use. It is difficult to compare these tools to scrapers described from other Pueblo sites because more often than not, tools of such little apparent interpretive value have not been retained for laboratory study. Nevertheless they, as well as other stone artifacts displaying poor workmanship, do constitute an important aspect of the material culture and should therefore be accorded proper attention. These artifacts at one time might have been thought primitive and typical only of Paleo-Indian culture. In reality they are a tool type which has persisted in time for many thousands of years to be overlooked and ignored even though present at sites of later cultures which show a greater diversity
of material culture, much of which is so spectacular as to overshadow simple but important tools of this kind. In addition, although scrapers have been found at almost all sites from earliest times up through the centuries, uses to which they were put have not been precisely pinpointed. In connection with the numerous scrapers at Ventana Cave, Haury observes that, "scrapers may be put to a multitude of uses and do not, in my opinion, necessarily reflect specialization in working skin." (Haury and others 1950: 212.)

Type a: Large, thick flakes; irregular and angular shapes; form determined by original flake; tendency is toward ovaloid or triangular rather than a long, slender implement; rough surfaces; face opposite to that chipped being least rough; roughly plano-convex; retouching is usually steep and generally along one edge but sometimes extends irregularly around immediately adjacent edges; chipping occurs in a few specimens along a working edge from both faces; varies from intentional retouch to slight chipping through use; no uniformity of scraping edge; chipping is poor and irregular; in the poorest examples only small portions of any given edge were worked or chipped through use; in a few cases chipped edges have been intensively worn as if dulled through scraping other hard materials. (Fig. 44)

Type b: Small, thick flakes; distinguished from the preceding type only as to size and in that the average
Figure 44. - Scrapers. a-c, f-h, i, k, Type c; d, e, Type e; i, Type d; l-n, g, Type b; o, p, Type a. Length of p, 70 mm.
chipping is less steep. (Fig. 44)

**Type c:** Thin flakes; manufactured from what in all probability were random flakes; outline irregular and angular; great variety in shape is characteristic but the tendency is toward rough ovaloid or triangular, (this type includes a few slender and roughly rectangular examples which might have been considered flake knives by others); chipped face is rough; unchipped face usually smooth, being the face of conchoidal fracture; cross section thin and flat to plano-convex; chipping varies from one to several edges, but never extends around to include all edges; any serviceable edge was usually chipped but it is difficult to distinguish intentional from unintentional chipping; chipping generally not steep owing to thinness of edges and is almost exclusively from one face, although in a few specimens chipping occurs along a working edge from both faces; no uniformity of scraping edge, with variation from slightly irregular to straight, to convex; chipping is largely of a poor and irregular order. In one specimen (Fig. 44a) the primary edge was ground down to a marked extent. (Fig. 44)

**Type d:** Hollow-edge scraper; distinguished from the preceding category only in that the working edge is concave, resembling a crescent rather than straight or convex. (Fig. 44)

**Type e:** Pointed scrapers; "Pointed scrapers are distinguished from all others in that they have two working
edges which converge, forming a point. While there are scrapers with points among some other categories...in these the point is accidental as opposed to the intentional forming of the same in this group." (Haury and others 1950: 221.) Otherwise such scrapers are only a variant of the thin flake scraper; shape is consistently triangular, some being more elongated than others. The most refined examples are thin, triangular flakes, smooth on both faces, with slight chipping from one face on two of the three edges, the base being usually unmodified. Poorer examples are rougher and thicker. (Fig. 44)

GRAVER: Short, stocky shape; made from irregular flake; chipped on one face so that a point was effected which rendered a tool for scratching or incising other objects.

PULPING PLANE: Pulping planes and similar artifacts have received most attention in connection with early man sites. However, like basin metates, such tools have survived in late times in association with gathering and hunting aspects of an economy. At Ventana Cave, Haury points out that in his opinion, "planes are strongly diagnostic of the gathering-hunting people of pre-pottery times." (Haury and others 1950: 209.) Despite the fact that caves in the Point of Pines region were primarily occupied at a much later date than the time of the plane-bearing levels of Ventana Cave, the implied relationship
Figure 45. - a-e, pulping planes. Height of d, 73 mm.
between these tools and a gathering-hunting aspect still holds true, in this instance with respect to the Mogollon-Pueblo. Haury feels "tools of this sort were evidently intended to be used as push or pull planes, the flat face held more or less parallel to the material being worked," and that they were "probably used in removing excess tissue and fat from hides and likely in the preparation of certain plant foods." (Haury and others 1950: 208.)

"In constructing such an implement it was essential either to begin with a stone which possessed one broad planate face, or to create such a core by fracture. The face which formed the flaking platform, and from whose margin all flakes were struck off by percussion, in the finished object became the base of the tool." (Rogers 1939: 50.)

This statement holds true for those here considered. The only outward difference between these pulping planes and those pictured from early man sites, is that the examples from Point of Pines cave sites are cruder in appearance, but this characteristic pervades the entire lithic sample, and is a Mogollon-Pueblo lithic trait.

Horizontal outline is uniformly irregular ranging from round, half-circle, to oval; in cross section from a flat base an irregular dome, triangle, trapezoid, or cone is formed; suitable cores, sometimes chunks, or thick flakes were used; from the flat base, large flakes were struck at a steep angle to form a sharp working edge; in some instances, secondary chipping was effected to further
sharpen the edge; the dressed working edge in no case extended about the entire perimeter but was restricted to the forward edge when the tool is pushed away from the user along the flat base; such edges were also the most rounded.

CHOPPER: Highly irregular in shape; some deliberately fashioned, others are rejected cores or large flakes which suited the purpose; a rock was either chosen because it already had a suitably sharp, ragged cutting edge or an edge was produced by spalling off rough chips from one or both sides leaving the opposite edge dull so that it could be held against the palm; this type of tool was evidently not important at the cave sites; the few examples found barely pass as tools; none show any great wear.

CORE: Cores are irregular in shape but generally about the size of a fist. They are primary chunks of rock ranging from pieces of raw material picked up and brought into the cave for future use to pieces of chipped stone, scarred and fluted from having furnished all the usable flakes it possibly could. Some cores were put directly to use as tools and are treated under the appropriate category, such as hammerstone or chopper. It is certain that at the Nantack caves raw material was brought to the caves and tools manufactured at "home." The presence of cores ranging from unused to completely used and the great abundance of chips, flakes, small core fragments, and pieces
are evidence of this. It also may be supposed that members of each group in the Nantack caves picked up or bartered for their own raw material, brought it "home" and worked on it themselves. (These observations do not necessarily apply to the situation at Pine Flat Cave where chips and cores were less abundant.)

HOE: These artifacts exhibit great variety in outline shape from almost square, rectangular, oblong, petaloid, to triangular. The shape and size was generally determined by the original thin plate. All are consistent in having one or more straight or gently curved sides which provided working edges. All are thin slabs of an impure quartzite with flat faces (Fig. 46). None are shaped to any great extent. Thin slabs may have been struck from larger slabs or suitable natural plates may have occurred weathering out of the original outcrop. Of the 28 specimens, 21 have a single, and 7 two, working edges which are chipped from one face only. When two working edges are present, they are adjacent or opposite to one another. Range in weight, 1.0-24.0 ounces; mean, 9.5 ounces.

Of the hoes recovered, 47 percent were found in three separate caches, hoes in each case being stacked one on another. No other type of stone artifact was ever found in a hoe cache, nor were hoes ever found in caches containing different kinds of stone implements. Seven hoes had been placed in the bench fill of Room 5, but this occurrence is
Figure 46. - Stone hoes. Height of lower left, 134 mm.
not considered a cache because the specimens were at random through the fill. However, the bench had been disturbed subsequent to the final Mogollon-Pueblo occupation and it may be that these seven hoes also originally comprised a cache. The percentage of cached hoes, therefore, may have been even greater. Like the storing of whole vessels, the caching of stone hoes is perhaps an indication of the value of these artifacts. Their weight and bulk were factors against their transportation at the time of cave abandonment.

Stone hoes could have been hafted, although no evidence of this is present. They may also have been gripped in one or both hands so as to be perpendicular to the forearm and in this manner used as a hoe or scraper. Either way they could have been used for agricultural purposes and employed in the same manner are ideal tools for digging in cave fill and moving cave debris about; they would also have been extremely serviceable as grubbing tools, for cutting and chopping wild plants, or as hide and plant scrapers. Smallest examples are only large enough to be gripped between the fingers of one hand and would have made good scraping or sawing tools. DiPeso associates stone hoes with house building.

"These tools could have been used in the excavation of house pits, digging post holes, making cooking pits, digging graves and for any chore which called for removal of earth."
Further experiments indicated that the tool could have been used in cutting bunch grass or Sacaton grass, which was utilized in the fabrication of house roofs and walls. (DiPeso 1956: 215.)

It must be emphasized that all of these uses are postulated as no hoe has yet been found in a decisive association.

At Red Bow Cliff Dwelling one of the stone hoes recovered from the center section of Room 4 (A-16168) retained caked remains along its working edge. The actual edge is clean but the material adheres close to it and for a short distance up from the edge as if the stone hoe had been held perpendicular to material which contained a soft pulpy substance and either one or the other scraped back and forth so as to allow the soft substance to build up on the blade. Only in a dry cave would material of this kind be preserved. Cutler has examined this tool and felt the caked remains could be that of the yucca or agave plant but that some of the material is animal tissue. "At present it looks to me as though it might have been used both as a hide scraper and a scraper for preparing hard vegetable fibers." He was, however, unable to give a positive identification (Cutler 1957: personal communication).

In the light of this tentative identification, it is suggested that at Red Bow Cliff Dwelling and within the Mogollon-Pueblo configuration, some of these tools were used in the preparation and processing of yucca leaves as
was in Morris and Jones' estimation a notched bone rib from the Durango sites. This bone tool was "apparently designed to be held in the hand and pressed down while the leaves were drawn under it." (Morris and Burgh 1954: 99-100.)

**MISCELLANEOUS CHIPS, FLAKES, AND SMALL CORE FRAGMENTS:** At Pecos Pueblo many miscellaneous chips "were serviceable in that they had one or more good cutting edge useable without modification. Such tools were used until dull and then thrown away much as we would use a single edge razor blade in pursuit of various handicrafts." (Kidder 1932: 40.) A similar situation held true at all three cave sites.

Of the numerous chips, splinters, and flakes present at Red Bow Cliff Dwelling, some showed very fine chipping resulting from use, others were dulled, and still others, although serviceable for cutting and scraping, were apparently never actually used, being only the residue from the manufacture of chipped stone artifacts.

An indication of what portions of the cave were preferred and used in the working and production of chipped stone tools may be gained by listing the proportionate abundance of chips, flakes, and small core fragments in connection with provenience designations. This has been done by using the terms light, medium, and heavy to refer to the relative bulk quantity of this type of material present in any provenience designation. The absence or presence of
obsidian chips in any sample is also noted.

<table>
<thead>
<tr>
<th>Provenience</th>
<th>Flakes</th>
<th>Obsidian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room 1, Block A</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Room 1, Block B</td>
<td>Light</td>
<td>Absent</td>
</tr>
<tr>
<td>Room 1, Block C</td>
<td>Light</td>
<td>Present</td>
</tr>
<tr>
<td>Room 1, Block D</td>
<td>Light</td>
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</tr>
<tr>
<td>Room 1, Block E, Level 1</td>
<td>Medium</td>
<td>Absent</td>
</tr>
<tr>
<td>Room 1, Block E, Level 2</td>
<td>Heavy</td>
<td>Present</td>
</tr>
<tr>
<td>Room 1, Block F</td>
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<td>Absent</td>
</tr>
<tr>
<td>Room 1, Block G</td>
<td>Medium</td>
<td>Present</td>
</tr>
<tr>
<td>Room 1, Block H</td>
<td>Heavy</td>
<td>Present</td>
</tr>
<tr>
<td>Room 1, Block K, Level 1</td>
<td>Heavy</td>
<td>Present</td>
</tr>
<tr>
<td>Room 1, Block K, Level 2</td>
<td>Medium</td>
<td>Present</td>
</tr>
<tr>
<td>Room 2, Surface and Fill</td>
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<td>Absent</td>
</tr>
<tr>
<td>Room 3, Surface and Fill</td>
<td>Light</td>
<td>Absent</td>
</tr>
<tr>
<td>Room 4, Entryway Section</td>
<td>Heavy</td>
<td>Present</td>
</tr>
<tr>
<td>Room 4, South Wall Section</td>
<td>Medium</td>
<td>Present</td>
</tr>
<tr>
<td>Room 4, East Wall Section</td>
<td>Heavy</td>
<td>Present</td>
</tr>
<tr>
<td>Room 4, Ceremonial Area</td>
<td>Light</td>
<td>Present</td>
</tr>
<tr>
<td>Room 4, North Wall Section</td>
<td>Medium</td>
<td>Present</td>
</tr>
<tr>
<td>Room 4, West Wall Section</td>
<td>Heavy</td>
<td>Present</td>
</tr>
<tr>
<td>Room 4, Center Section</td>
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<td>Present</td>
</tr>
<tr>
<td>Room 5, Fill</td>
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</tr>
<tr>
<td>Room 5, Subfloor Fill</td>
<td>Heavy</td>
<td>Present</td>
</tr>
<tr>
<td>Room 5, Bench Fill</td>
<td>Medium</td>
<td>Absent</td>
</tr>
<tr>
<td>Frontal Area</td>
<td>Heavy</td>
<td>Present</td>
</tr>
</tbody>
</table>

On the basis of such a listing alone it appears that the front portion of Room 1, Rooms 2 and 3, and the ceremonial area of Room 4 were little used in the preparation of chipped stone tools. Block K of Room 1, the center, west, east, and entryway sections to the front of Room 4, Room 5, and the Frontal Area show an abundance of material and consequently it is possible that they were preferred as chipped stone work areas. The back and side areas of Room 1 also show some quantity but as headroom was, for the
most part, insufficient here for the maintenance of even a sitting position, it might be assumed that chips were thrown here with other debris.

Discussion

Chert and obsidian were expressly preferred in about equal proportions for the manufacture of projectile points and blades. Of those types which seem more blades than projectile points, Type a (leaf-shaped, rounded base, convex edges) is dominant. Of those types which seem more projectile points than blades, Type m (leaf-shaped, parallel sided stem markedly narrower than shoulder, straight base, convex edges, with one exception manufactured of obsidian) occurs most frequently. These two types were most abundant, and perhaps most popular, among projectile points and blades at this site during Canyon Creek Phase.

A group of projectile points are classified as being ceremonial in nature. Each of them was found in the ceremonial area of Room 4, and they are uniformly small and thin. A majority are of obsidian. There is little doubt that these points were, at this site, used ceremonially. Several examples show remains of three different types of hafting. One method employs sinew running diagonally up the blade from the base at one side of the foreshaft then down the opposite side of the blade around the foreshaft to repeat the process with the other notch. In this method the fore-
shaft is notched to allow two short extensions of wood to be bound against the neck under the lashing. A second method uses sinew lashing wrapped crisscross over the stem and base of an unnotched point; the sinew is then wound round and round down the foreshaft. This hafting technique allows the foreshaft to terminate at the point base. A third method is inferred by the presence of pitch patches on the stem and base of a number of specimens. Every specimen with remnants of pitch is obsidian. One of these has the remains of fingers of molded pitch extending up either side of the blade almost three-quarters of the distance from base to tip. It would seem that these points were merely glued to the foreshaft using pitch as a bond.

Crescentic blades are distinctive and also peculiar only to the ceremonial aspect.

Scrapers are either of chert or quartzite with a minor number obsidian and other materials. Type c (thin flakes) are excessively abundant and equally nondescript. Choppers are scarcely represented at cave sites. Pulping planes are of quartzite, chert, and limestone; until their use during Pueblo III and IV times is more clearly shown, their diagnostic value will remain vague. This generalization applies also to those intriguing stone tools called hoes, which are so much alike and are so well represented at Red Bow Cliff Dwelling.

Workmanship in all chipped stone implements, except
projectile points, is uniformly poor when compared with examples from sites such as Pecos Pueblo or early Texas material. Even though a wide range in categories is represented, individual tools were evidently hastily and carelessly manufactured for immediate use in accomplishing work at hand. The entire assemblage of chipped tools suggests that members of individual groups or families living in the different caves made tools for themselves or their groups, and that there was little or no importation of these artifacts. It is evident that stone tools were not made to please any esthetic feeling, to produce a superior tool, or for purposes of trade. Workers were evidently not specialists or master craftsmen, but represented self-sufficient individuals who produced tools in accordance with the dictates of necessity, adhering to forms generally in use among their people. In the case of projectile points, more care was taken and a greater degree of skill brought to bear, but even these objects do not attain excessively high standards. Of the upper Gila district, Hough (1914: 11) says, "The region lacks in the quantity, boldness, and fineness of chipped artifacts found in other regions." He feels this is due to the unavailability of good materials. But an indication that this may not be the real answer is given when it is stated that, "The art of working stone among the inhabitants of the upper Tularosa was limited in extent and the artifacts crude, but a few miles away, in
the valley of the lower river, aboriginal artifacts are superior, equalling the best in the Pueblo region." (Hough 1914: 12.) The objects Hough refers to from the lower Gila were probably of a different culture from those found in the upper. Under differing circumstances or culture patterns it would seem that people, when they so desired, produced good to excellent chipped stone objects regardless of the local availability of material. Individual desire, a culture pattern which produces pressure of a kind inducive to the stimulation of a general desire for excellence or other intangible factors seem to be operative in such instances. With respect to Mogollon-Pueblo culture, such factors are, generally speaking, absent. Chipped stone tools from the Reserve Area, from Hough's upper Gila, and from caves in the Point of Pines region all show uniformly low manufacturing standards, and it is my feeling that this characteristic is in itself a trait of the Mogollon-Pueblo.

Miscellaneous Unworked Objects of Stone

List of Artifacts

<table>
<thead>
<tr>
<th>Classification</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hematite</td>
<td>(77.5 ozs.)</td>
</tr>
<tr>
<td>Limestone fetish</td>
<td>3</td>
</tr>
<tr>
<td>Weight</td>
<td>1</td>
</tr>
<tr>
<td>Basalt stone</td>
<td>100 +</td>
</tr>
<tr>
<td>Basalt stone with chopping edge</td>
<td>4</td>
</tr>
<tr>
<td>Basalt stone with painted edge</td>
<td>3</td>
</tr>
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</table>
PAINT PIGMENT: As has been the case at almost all sites in the Southwest, lumps of red hematite and evidences of other coloring material occurred in the cave deposits. That the raw materials were ground down and reduced to paint pigment with the aid of stone tools is evidenced by a total of eleven stone artifacts from Red Bow Cliff Dwelling and Pine Flat Cave bearing paint particles on certain of their surfaces (1-manö, 1-one-hand mano, 2-rubbing stones, 3-grinding slabs, 1-paint pounding slab, 3-basalt stones with painted edges). Rinaldo suggests that since "manos or rubbing stones with pigment on their grinding surfaces have rarely been recovered in this area" hematite lumps with faceted surfaces found in sites of the Reserve Area indicate "that the pigment was ground against the stone directly rather than between a hand stone and paint grinding stone." (Martin, Rinaldo, and Bluhm 1954: 157.) The presence of hand stones and other paint stained artifacts as well as numerous lumps of hematite with faceted surfaces shows no singular preference in method of grinding pigments was in vogue at Point of Pines.

Hematite was by far the most abundant pigment at
cave sites, particularly at Red Bow Cliff Dwelling. Irregular red hematite lumps ranged in size from 11 to 85 mm. in length, 9 to 78 mm. in width, and 6 to 34 mm. in thickness. One lump exhibits smoothed facets on all sides, others one or several facets only; such facets are the result of grinding off limited amounts of finely powdered pigment. A lump from the bench fill of Room 5 is composed of coarsely broken hematite kneaded together, perhaps the unused excess of a particular painting job. A single fragment of malachite occurred in Room 1, Block E, Level 2, and four small pieces of gypsum were found in the Frontal Area. The actual source of hematite used prehistorically in the Point of Pines region is unknown, but it has been suggested that it may have come from known deposits in the Clifton-Morenci area.

<table>
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<tr>
<th>No. of Sample</th>
<th>No. of Lumps</th>
<th>No. of Lumps With Smooth Facets</th>
<th>Weight of Entire Sample (Ozs.)</th>
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<td>5.0</td>
<td>R1-BK-L1</td>
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</table>
LIMESTONE FETISH: Three large waterworn limestone fragments had been brought to the site for unknown purposes. They had apparently been selected for their shape as this is held in common by all three. In outline the specimens are pointed toward one end, rounded or irregular toward the other, and thick about the middle or in the direction of the base; overall shape roughly conical; none shows any evidence of having been worked and all are heavy chunks of limestone. One specimen (A-11849) is distinctive in that much of its surface area is coated with red hematite paint pigment. It was probably at one time completely red in color. That they were of ceremonial value is the only function which can be suggested. Length: range, 190-316 mm.; mean, 238 mm.; width: range, 118-142 mm.; mean, 132 mm.; thickness: range, 113-129 mm.; mean, 123 mm.

WEIGHT: An irregular chunk of tuff, not shaped or worked in any way, is tied about its girth by a double strand cord as if the object had been suspended. Length,
Figure 47. - a, weight; b, c, limestone fetishes. Length of c, 316 mm.
BASALT STONE: Many pieces of a particular kind of hard, durable black basalt which had a tendency to break out in flat sections were brought to the cave. Over a hundred of these stones were found throughout the site. Of these, only seven (one isolated specimen was also found at Tule Tubs Cave) show any actual evidence of having been used. These exceptions are classified and described separately. The remainder occurred for the most part without association. Were it not for the fact that two caches of these stones were found and several of them also occurred with other stone tools in different caches, their status as artifacts might not have been discovered.

All are of black or dark gray fine-grained crystalline basalt, flat, tabular, or wedge-shaped; the tendency is toward a rectangular or squarish shape, uniform in thinness. Some have thin, sharp, jagged edges, in others the edges are squared. No marks due to use or shaping are apparent; therefore the way in which they were utilized cannot be postulated. These specimens are chunks of raw material eroded from or purposely struck from a source outside the cave and carried to the site to serve in an unknown capacity. As indicated in the summary cache listing, 21 specimens were part of different stone tool caches. Data are given for the eight basalt stones of Stone Tool Cache B in order that they may serve as an example for the
rest. Length: range, 97-198 mm.; mean, 128 mm.; width: range, 82-109 mm.; mean, 93 mm.; thickness: range, 20-50 mm.; mean, 29 mm.; weight: range, 9.5-29.0 ozs.; mean, 15.0 ozs.

**BASALT STONE WITH CHOPPING EDGE**: Similar to basalt stones in all respects except that a natural sinuous sharp edge has been dulled or somewhat chipped through use. This might have come about through chopping, pounding, scraping, hammering, or any number of other friction-producing activities. None show any intentional shaping. Length: range, 76-129 mm.; mean, 103 mm.; width: range, 60-90 mm.; mean, 77 mm.; thickness: range, 15-50 mm.; mean, 29 mm.; weight: range, 7-12 ozs.; mean, 9.5 ozs.

**BASALT STONE WITH PAINTED EDGE**: Similar to basalt stones in all respects except that in each instance a single edge, in one case sharply pointed, is stained or encrusted with red hematite. These stones must have been used to break up, mash, or pulverize lumps of hematite while the pigment was moist. Dulling of the working edge was slight. Length: range, 65-100 mm.; mean, 78 mm.; width: range, 43-76 mm.; mean, 56 mm.; thickness: range, 19-35 mm.; mean, 25 mm.; weight: range, 2-10 ozs.; mean, 5 ozs.

**BASALT SLAB**: Four slabs of fine-grained crystalline basalt of the same material as basalt stones, and probably from the same source, were also brought to the site. Basalt slabs and basalt stones should not be confused as they differ markedly in shape and size, and although the
function of neither is clearly understood, they could not be used in the same capacity. Three of the specimens occurred loose in fill under circumstances which gave no hint of their use. One was, however, found in place indicating its particular function. Whether or not the remaining unassociated slabs were similarly employed is unknown but in shape and appearance they are alike with variation only in actual measurements. In no case does any surface appear worked or altered, but the unusual durability of the material would have made extensive use necessary before any marks were left. The tendency is toward a square outline but due to a complete lack of intentional shaping, some slabs were less square than others. The single example in situ was employed as the bottom of the square, clay and sherd lined bin which occurred as one of a group of floor features in Room 1, Block A. Further details may be found under the architectural description of this room block. Length: range, 215-285 mm.; mean, 256 mm.; width: range, 193-273 mm.; mean, 231 mm.; thickness: range, 31-54 mm.; mean, 46 mm.

**GROOVED PEBBLE:** A small pointed piece of limestone (A-11855), smoothed by erosion and completely encircled about its center portion by a diagonal natural groove, could have served as a pendant or a small fetish. Length, 28 mm.; width, 25 mm.; thickness, 12 mm. (Fig. 36e)
INCISED PEBBLE: A small tabular waterworn piece of sandstone (A-11856) is lightly incised across one flat surface. Two parallel lines 5 mm. apart filled in by a number of short perpendicular lines, resembling a ladder on its side, run the width of the face in a band 12 mm. from the base. Length, 53 mm.; width, 39 mm.; thickness, 12 mm.

Summary Listing of Stone Tool Caches
Found in Red Bow Cliff Dwelling

STONE TOOL CACHE A: Room 1, Block C, Cache #1
3 cores
3 basalt stones

STONE TOOL CACHE B: Room 1, Block C, Cache #2
8 basalt stones

STONE TOOL CACHE C: Room 1, Block G
2 hoes

STONE TOOL CACHE D: Room 1, Block H
2 manos with single grinding surface, Type a,
were cached as a pair in the fill.

STONE TOOL CACHE E: Room 1, Block H
2 manos with single grinding surface, Type a
3 rubbing stones, Type a
1 hammerstone
1 abrading stone, Type a
2 choppers
This cache of nine stone tools occurred beneath a very shallow natural overhang immediately to the rear of the cave from a point where the low wall enclosing the semicircular area of Block K abutted cave wall.

STONE TOOL CACHE F: Room 4, south wall section
3 manos with single grinding surface, Type a
These specimens were cached together in fill, but near the surface in the extreme southwest corner of Room 4.
STONE TOOL CACHE G: Room 4, center section
3 hoes

STONE TOOL CACHE H: Room 4, center section
7 basalt stones

STONE TOOL CACHE I: Room 5, subfloor, northwest corner
3 one-hand manos with single grinding surface
2 one-hand manos with two grinding surfaces
6 rubbing stones, Type a
1 pestle
2 hammerstones
2 cylindrical hammerstones
1 abrading stone
3 basalt stones

This cache of 20 stone tools occurred in the fill of a hole in room floor and beneath adjacent projections of the floor in the northwest corner of Room 5. The floor plaster was probably intentionally broken through and these tools deposited as a cache in order to hide them at the time of abandonment (see Architecture, Room 5, floor features).

STONE TOOL CACHE J: exterior cache
7 hoes

The location of this cache was outside the cave on the slope below the site. The seven stone hoes were stacked one on top of another and hidden in a recess beneath a huge boulder.

Discussion

All stone tool caches and whole vessels were apparently deliberately buried or hidden in order to conceal them at the time occupation of the cave terminated. They represent articles used for the most part in domestic activities. However, at the time of abandonment they were objects too bulky or heavy to be carried by persons undoubtedly already loaded with lighter items more easily transported or of greater value. The scarcity of fine examples among light objects, such as basketry, may in part be due to this factor.
That the stone objects left behind in caches or the whole vessels buried upside down were of value to the inhabitants is evidenced by the care and trouble resorted to in order to hide them. The way in which they were deposited would seem to indicate an orderly departure. The fact that such caches remained undisturbed indicates that these people did not return.

MISCELLANEOUS OBJECTS OF CLAY

List of Artifacts

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<td>Type f</td>
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<tr>
<td>Pendant(?)</td>
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<td></td>
</tr>
<tr>
<td>Potters' jar rest</td>
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<tr>
<td>Total</td>
<td>24</td>
<td>100.00</td>
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MINIATURE VESSEL: Artifacts of this kind are usually considered children's toys, but at least two of these probably had a more specialized use. One (A-16932) has a flattened bottom wider than the orifice or straight sides (Fig. 48a). The object could have served as a base for holding a rod or stick vertical, but there is no direct evidence for this apart from its ceremonial area provenience. Only half of this specimen was recovered; it is crudely molded of unfired reddish clay. Another unusual form
(A-16928) is illustrated by a very small plain but
blackened bowl-shaped specimen which has a sharply pinched
projection extending from what would ordinarily be the
bottom (Fig. 48b). The object is fired; rim is roughly
rounded; surfaces are not smoothed or polished. Whether
it served with the projection pointing down as a tiny con­tainer or inverted as a cover is uncertain.

Two of the specimens are miniature bowls; one (A-16933),
a small Alma Plain vessel, smoothed, with slight polishing,
probably served a utilitarian purpose (Fig. 48c). A small
half-circle portion of the rim and side is broken away in
a manner which suggests a handle was once attached at this
portion. Perhaps the specimen is actually the bowl of a
ladle, but its present outline shape gives no indication
of this. The second (A-16934), also plain, was crudely
pressed with the fingers from a lump of clay and seems the
work of a child (Fig. 48d). It is fired and about half
the bowl is represented. These vessels are not slipped.
Height: range, 18-34 mm.; mean, 28 mm.; diameter: range,
32-69 mm.; mean, 44.5 mm.; vessel wall thickness: range,
4-7 mm.; mean, 5.5 mm.

WORKED POTSHerd:

Type a - Round: The principal characteristic held in
common by these specimens is their approach to a rounded
form (Fig. 48e, f, j). The degree to which edges are
worked varies from roughly chipped to well-rounded, smoothed
curves. Three (A-16935-X1, X2, A-16936) of the five decorated examples, one (A-16937-X1) neck corrugated, and one (A-16935-X3) Reserve Indented Corrugated represent types which are of a time period earlier than that of the occupation phase at Red Bow Cliff Dwelling. No sherds of early types other than these worked specimens occurred and there is little doubt that they were picked on the surface of lower caves where an earlier occupation was present. This represents a conscious effort to secure the unusual; however, these particular decorated worked sherds (early pottery types) are among those least carefully worked.

Another interesting fact lies in that a high number (9 of 14) were found in Room 4, ceremonial area; but again, nothing beyond this is indicated because within the type characteristics in these nine are just as diverse as in the remainder. There is, however, in the provenience and selection of those mentioned the barest suggestion that such sherds, no matter how poorly made, were of value, and because of their value were among ceremonial area offerings. One (A-16935-X4) is more a rounded square than others, and what appears to be a grease spot is prominent in the center of the decorated and concave surface of the Mimbres Black-on-white (A-16936) example. Pottery types represented and condition of worked edge: 1-Sacaton Red-on-buff, rough (A-16935-X1); 1-Pueblo I Black-on-white, rough (A-16935-X2); 1-Reserve Indented Corrugated, Smudged Interior Variety,
smooth (A-16935-X3); 6-Alma Plain, 3 rough, 3 smooth (A-16935-X4-X7, A-16937-X2, A-16939); 2-Tularosa Smudged, 1 rough, 1 smooth (A-16935-X8); 1-Mimbres Black-on-white, rough (A-16936); 1-neck corrugated, smooth (A-16937-X1); 1-Fourmile Polychrome, smooth (A-16938). Maximum diameter: range, 41-71 mm.; mean, 56 mm.; thickness: range, 4-9 mm.; mean, 5.5 mm.

Type f - Round, central perforation: Central hole is biconically drilled; decorated surface convex; edge smoothed and rounded to an even circle; sherd type, Pine- dale Black-on-white (Fig. 48i). Perforated sherds of this kind are thought to be spindle whorls. A number of spindle whorls made of other materials, gourd, wood, were also found at this site. Maximum diameter, 58 mm.; thickness, 5 mm.; perforation diameter, 4 mm.

PENDANT(?): Two clay lumps, crudely pressed into a pendant shape, are inconclusively classified as pendants (A-16941, A-16942) because in each case a conical hole drilled near the center of one end is not continued through to the opposite side (Fig. 48g, h). The two are alike in all details except size, and in that the smaller is unfired. Surfaces were smoothed and irregularities removed in compressing the clay to the desired form. Length: 33, 31 mm.; width: 20, 15 mm.; thickness: 12, 10 mm.

POTTERS' JAR REST: Of these specimens, one is complete (Figs. 48k, 49) with an Alma Plain base plate
Figure 48. - Miscellaneous objects of clay. a-d, miniature vessels; e, f, i, worked sherd Type a; i, worked sherd Type f; e, h, pendants; k, potters' jar rest. Diameter of c, 69 mm.
Figure 52. - Data concerning cordage specimens from Red Bow Cliff Dwelling.
(A-16924), one is restorable (A-16914), and a third is only a fragment (A-16915). The latter two have Point of Pines Obliterated Corrugated base plates. All are identical in construction and in each case a complete bottom section is taken from a discarded storage vessel, edges are chipped and less frequently, ground to a circular shape to form a plate or dish. Into this a soft mixture of white ash and water which often contained bits of dirt, tuff, and charcoal is spread. The paste is distributed over the entire interior surface so that it lenses out at and rounds into the plate edge. Thickness of the paste coating therefore grades from as much as 22 mm. at the center to 0 mm. at the edge, and the concavity of the interior surface is materially lessened although never leveled. A reasonably concave interior surface was evidently desired and maintained in the finished product. Wipe marks are clearly evident on the final smooth light gray interior surface because completed objects are never fired and consequently upper surfaces can easily be marred or scratched. Despite this, none of the specimens are disfigured or severely worn in any sense. Morris points out in connection with the peculiar characteristics of such lining material that although severely affected by any sharp instrument being drawn over it, it is never rendered soft or sticky when moistened by wet clay or spilled water. Morris is first to apply the name used here and is careful
Figure 49. - Potters' jar rest (A-16924), upper surface. Diameter, 212 mm.
to explain that these objects were never used in the same sense as a pot mold. The potters' jar rests he found are assigned to Mesa Verde phase of Pueblo III (Morris 1939: 199-200).

Measurements for the three specimens from Red Bow Cliff Dwelling: maximum diameter: 212, 197, 242 mm.; height: 38, 34, 40 mm.; thickness range: 7-26, 4-18, 8-28 mm.

Three other occurrences of potters' jar rests have been recorded from ruins near Point of Pines: A-16289, Room 1, floor, Arizona W:9:39, Reserve-Tularosa phases; A-5320, Room 7, floor, Arizona W:10:50, Canyon Creek Phase; A-11061, Room 1, fill, Arizona W:10:50C, Point of Pines Phase. These finds establish the time range in the Point of Pines region as A.D. 1000-1450 for this trait.

OBJECTS OF BONE AND HORN

List of Artifacts

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<tr>
<td>Type c</td>
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<tr>
<td>Awl with articular head modified</td>
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<td></td>
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<tr>
<td>only by splitting</td>
<td>4</td>
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<tr>
<td>Awl with articular head removed</td>
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<tr>
<td>Type a</td>
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<tr>
<td>Type b</td>
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<tr>
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<tr>
<td>Gaming piece:</td>
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<tr>
<td>Dice</td>
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Bone tools from cave sites were identified as to species by Milton Wetherill. Bones of Mule deer (Odocoileus hemionus), Mountain sheep (Ovis canadensis), antelope (Antilocapra americana), Whitetail deer (Odocoileus virgineanus), fox (Urocyon cinereoargenteus scottii), turkey (Meleagris gallopavo merriami), and eagle (Aquila chrysaetos) were used in the manufacture of tools. Mule deer bones are most abundant; Mountain sheep bones are second in frequency, a reasonably good clue to the prehistoric abundance of this animal along the Nantack Ridge. Today Mountain sheep are not seen in this district.

**AWL WITH ARTICULAR HEAD UNMODIFIED**

**Type a - Ulna:** One (A-16968) is made from a Mule deer ulna and is short and stubby with a sharp point that quickly tapers from the proximal end. The other (A-16969) is of a Mountain sheep ulna and has a long sharp point tapering in an arc from the proximal end (Fig. 50a). Length: 96, 197 mm.; maximum width: 31, 43 mm.; thickness: 11, 22 mm.
Type c – Tibia: From the triangular distal end of a fox tibia (A-16972), the bone narrows to a slender tube which has been ground away on one side to produce a sharp point (Fig. 50b). Length, 117 mm.; maximum width, 20 mm.; thickness, 7 mm.

AWL WITH ARTICULAR HEAD MODIFIED ONLY BY SPLITTING:
Three fashioned from proximal ends are sturdy, broad-bladed awls which taper abruptly to a sharp point within 30 mm. of the working end. The points are ground out; this is shown on two examples by many short parallel scratches entirely about the tip at nearly right angles to the long axis. All surfaces show a high polish. Two (A-16975, A-16976) are Mule deer metatarsals (Fig. 50g) and one (A-16974) is a Mountain sheep metacarpal. The fourth (A-16977) is long and flat, fashioned from a Mule deer radius (Fig. 50h). Evidently in splitting the bone a notch was unintentionally formed about midway down the tool from which the slender sharp point gradually tapers. Length: 141, 117, 149, 220 mm.; maximum width: 16, 17, 16, 22 mm.; thickness: 10, 9, 10, 6 mm.

AWL WITH ARTICULAR HEAD REMOVED
Type a: All have the head broken away and were used without further modifying this end. One (A-16978) is a section of a Mule deer radius which at one time was a pointed awl, but when the point snapped the broken end was reused to a limited extent as a chisel-like tool. The
three remaining specimens are the smoothly tapered and pointed split sections of an antelope femur (A-16979) with numerous crisscrossed abrading scratches on its upper end (Fig. 50c), a Mountain sheep ulna (A-16980), and (Fig. 50d) a Mountain sheep metatarsal (A-16981). Length: 178, 136, 160, 147 mm.; maximum width: 17, 15, 19, 13 mm.; thickness: 6, 5, 12, 9 mm.

**Type b:** This split Mule deer metatarsal (A-16982) has the broken head ground down and rounded smooth (Fig. 50e). It is made from a thin, flat, slat-like section of bone which is slightly twisted with a gentle curve and pointed more abruptly than most other types. It is well worn but not highly polished. Length, 127 mm.; maximum width, 10 mm.; thickness, 4 mm.

**BIRD BONE AWL:** A long, slender, tubular eagle bone (A-16986) with an expanding head which contains a hole (Fig. 50i). Because of this, the tool could also be used as a needle. The working end was made by cutting the bone at a low angle and abrading it to a point. Length, 190 mm.; maximum width, 14 mm.; thickness, 5 mm.

**AWL FRAGMENTS AND BROKEN TIPS:** These two specimens are too small to be classified into types, but one is identified as being from the split radius of a Mule deer (Room 1, Block G); the other is unidentified but is an unusually flat and rounded tip recovered from Room 1, Block K, Level 2.
Figure 50. - Objects of bone and horn.  a, awl with articular head unmodified, Type a;  b, awl with articular head unmodified, Type c;  g, h, awls with articular head modified only by splitting;  c, d, awls with articular head removed, Type a;  e, awl with articular head removed, Type b;  i, bird bone awl;  o, p, gaming pieces;  f, dice;  n, bone bead;  l, ring;  k, spatula(?);  m, unidentified bone object;  j, antler tine implement.
GAMING PIECE: These are small, thin sections cut from larger bone shafts. One (A-16995) is from a femur (Fig. 502), another (A-16994) from a rib (Fig. 502), of the Mule deer. A third (A-16996) specimen, only the cracked half of the original, is unidentified. Because they are exterior segments of bone, each is slightly convex or concavo-convex, but edges and surfaces have been thoroughly worked and smoothed to form rectangular pieces with rounded edges. Length: 17, 25, 19 mm.; maximum width: 16, 19 mm., incomplete; thickness: 3, 4, 3 mm.

DICE: Small, unidentified ovoid sections of bone, extensively shaped, smoothed, and polished into a form which resembles a squash seed. They are thin with both surfaces originally polished flat but subsequently rounded to a slightly convex shape; all edges are smoothly rounded. The upper surface of each is marked by a series of incised lines running parallel to one another at a slight diagonal across the short axis. The incised lines were blackened by rubbing the surfaces with charcoal, wiping the smooth inbetween sections clean to expose the white bone and allowing charcoal to remain in the cuts. Each has a different number of black incised lines, 9, 10, 11, and 12 respectively. Otherwise the four specimens are almost identical and although somewhat scattered when found, may have been a set. Gaming pieces and dice similar to these and the previous category have often been found in
Basketmaker and Pueblo association. Examples which appear particularly like these are specimens from Pueblo Bonito (Judd 1954: 280, Fig. 80), and from early Durango sites Morris and Burgh 1954: 63). Similar objects of wood also occur in ruins of this time period. Length: 20, 20, 21, 19 mm.; maximum width: 8, 9, 9, 8, mm.; thickness: 3, 3, 3, 2 mm.; cat. no. A-17006-X1-X4 (Fig. 50f).

BONE BEAD: Two sections from tubular bones were segmented in the usual manner by encircling the bone with an incision and snapping off the desired portion. Both are smoothed and worn on all surfaces and edges. One (A-16992) is from the tibiotarsus of a turkey (Fig. 50n) and has two carelessly scratched incisions (the result of many short cuts) encircling it at a distance about equal lengths from either end which could be ornamental or the remnants of sectioning cuts which were never completed; this bead is also flattened its entire length on one side. The other (A-16993) has a single incision about its center identical to those on the first bead. A jagged fragment remains on one end, the result of an imperfect break. It was made from a small unidentified bird bone. Length: 55, 29 mm.; maximum width: 11, 7 mm.; thickness: 9, 6 mm.

RING: A single small fragment (A-16991) with carefully ground and polished surfaces and edges (Fig. 50l) had been cut from a Whitetail deer femur(?). Diameter: incomplete; maximum width: 8 mm.; thickness: 3 mm.
SPATULA(?): A portion of an antelope pelvis was cut out and worked into a flat ovoid piece. All edges are cut and smoothed, corners rounded, sides gently curved and a transverse medial ridge ground down to achieve uniform thickness but exposing rough cancellous bone in this limited portion. One end is thinner, narrower, and more squared, and when the object is held horizontal this end curves upward slightly. There is no evidence as to how the artifact was actually employed, but it is well suited for use as a spoon or spatula. Width at narrow end, 24 mm.; at opposite end, 30 mm.; maximum width, 38 mm.; length, 72 mm.; thickness, 1-5 mm.; provenience, Room 4, north wall section; cat. no. A-17003 (Fig. 50k).

UNIDENTIFIED BONE OBJECT: Made from an antelope scapula, the object gives no indication as to its proper classification. It is best described by outline and cross-sectional drawings which bring out its salient characteristics. Ends are cleanly cut and one of three edges is smooth. Surfaces bear the polish of long use, particularly the bottom which gives the appearance of having been pushed back and forth on a soft surface. The underside also has a small area at one corner that was abraded away to increase flatness. Scratches in this area run the short axis while other scratches run the long axis, but all were effected before the surface became smoothed. The two cracked edges seem intentionally produced as part of trimming down the
tool. Maximum height, 27 mm.; maximum width, 45 mm.; minimum width, 22 mm.; length, 76 mm.; provenience, Room 4, center section; cat. no. A-17004 (Fig. 50m).

**ANTLER TIME IMPLEMENT:** The specimen (A-16999) is a Mule deer antler (Fig. 50j), the tip of which has been used on one side only to abrade other objects and form a flat, low-angled, slightly convex bevel or facet covered with minute scratches. Slightly darkened and smoothed areas indicate where the fingers contacted the tool surface as it was being gripped for use. The butt remained broken and unmodified. Length, 101 mm.; maximum width, 23 mm.; thickness, 13 mm.

**WRENCH:** Three small badly burned unidentified fragments of what was probably antler had been parts of wrenches. Two from Room 1, Block Q have remnants of four circular holes each, 7-9 mm. in diameter; one from Room 1, Block E, Level 2 has a single large hole 15 mm. in diameter. Interior surfaces of holes are smooth. Wrenches of this kind were presumably used to straighten wooden objects, especially arrow shafts. Their scarcity at this cave is at first puzzling, but it must be noted that most long, slender pieces at this site are of reed which does not need artificial truing.
OBJECTS OF SHELL

List of Artifacts

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Shell artifacts are not numerous at this site, are absent at Tule Tubs Cave, and scarcely represented at Pine Flat Cave. No wastage by-products of manufacture or unworked shell occurred at any of the cave sites. Every shell artifact recovered is a finished ornament or a fragment thereof. It is unlikely that shell was worked at cave sites and ornaments of this material were probably procured through trade either from sources to the south and west or through neighboring communities such as the Point of Pines Ruin. Even these avenues were limited.

**WHOLE SHELL BEAD:** All shell beads, with the exception of four Olivella, are from the ceremonial area of Room 4.

**Olivella:** These specimens (A-16800) are unmodified except that in each the spire is ground down until a perforation is achieved which, together with the natural
shell cavity, serves as a passage for a suspension cord. They are similar to the Olivella shown by Haury (Gladwin and others 1937: Plate 63). Generally the spire is removed no farther than necessary to produce a hole, but in four cases grinding removed shell below the last spiral whorl. A single example also has a small round (accidental?) hole in the mid-body whorl opposite the mouth. One specimen (A-16799) from Room 1, Block C was strung by itself on a three strand S-twisted brown cotton cord which was knotted to form a loop about 20 mm. in diameter. All other whole shell beads occurred loose in fill. Length: range, 9-20.5 mm.; mean, 14 mm.

**Nassarius**: Each of these three small beads (A-16801) is perforated by a small hole (1 mm. diameter) through the lip near the mouth, rather than through the spire. Length: 7, 5.5, 5.5 mm.

**DISC SHELL BEAD**: All disc shell beads (A-16804) were mixed with the numerous stone beads also found in the ceremonial area of Room 4. The range in size is far greater than among stone beads (Fig. 38 top row) although there are significantly fewer minute beads, perhaps because thin plates of shell are more easily snapped. This type of bead is illustrated by Haury (Gladwin and others 1937: Fig. 54a, b) and is circular and flat; edges and surfaces straight, with a central perforation which in most cases is finished with straight sides; evidence of biconical
drilling remains in a number of examples; in some instances surfaces are polished; the majority are dead white, but 16 show a color range from light yellow through orange and pink to deep purple with some banding. A single tiny dark pink bead is triangular. Beads of this kind are shaped on all surfaces by cutting and grinding, therefore the shell cannot be identified. Diameter: range, 3.0-9.4 mm.; mean, 4.9 mm.; thickness range, .6-4.0 mm.; perforation diameter range, 1.5-3.0 mm.

**BI-LOBED SHELL BEAD:** These beads might be considered small pendants in that the perforation in each case is centrally located within one of the lobes and consequently is toward one end of the object (A-16805). Nevertheless their use as beads is clearly shown in the set strung in combination with disc beads (A-16156) which is described under the ground stone bead section and illustrated in Figure 38e. Many of the loose examples are distinctly grooved in a circle about the perforation due to constant wear brought about by alternate stringing with smaller disc beads. Side notches vary in depth, some retain only the barest suggestion of constriction. Surfaces and edges are smooth and straight. The perforated end is generally thinner than the solid lobe, sometimes markedly so, producing a wedge-shaped cross-section. The character of this bead type is shown by Haury (Gladwin and others 1937: Fig. 54d, e), Judd (1954: 92-93, Fig. 14d, e), and DiPeso
Figure 51. - Shell effigy pendant carved in the likeness of a fish or mud puppy. Length, 93 mm.
(1956: Fig. 11, Plate 24). Length: range, 5.1-10.6 mm.; mean, 7.4 mm.; thickness: range, 1.3-2.7 mm.; mean 2.1 mm.; perforation diameter: range, 1.5-2.5 mm. These specimens also occurred exclusively in the ceremonial area mixed with other bead types.

EFFIGY PENDANT: An unusual pendant carved in the likeness of a fish, or perhaps a mud puppy without feet, was recovered from Room 1, Block G. Both side and upper views of this artifact (A-16851) are given in Figure 51. The snout is squared, the mouth is indicated by a light slit; eyes are emphasized by knobby protuberances and a ridge was carved above the suspension hole; the back and abdomen arc in the manner of a jumping fish and the body is slightly twisted; these characteristics lend a life-like touch to the specimen, but may be the result of fortuitous material circumstances rather than artistic intention; the tail is tapered and rounded; back color is dead white while the abdomen is polished a golden brown to orange; color range in the abdomen is due to material but again adds measurably to the life-like appearance. The shell is unidentified but must necessarily have come from an exceptionally large and heavy species since the pendant is solid. All features were carefully executed by carving, grinding, and polishing; edges and surfaces are rounded. Suspension hole is drilled straight through. Length: 93 mm.; maximum width at eyes: 23 mm.; thickness
at mid-point: 16 mm.

**TRIANGULAR PENDANT:** A flat specimen (A-16806); triangular outline; surfaces parallel, smoothed and polished; edges and corners squared and slightly rounded; perforation biconical and in the wide end; color, white with slight banding effect. Length: 16.3 mm.; width: 8.2 mm.; thickness: 2.7 mm.; perforation diameter: 2.3 mm.

**RECTANGULAR PENDANT:** Made from a very thin, tabular, almost flat section of opalescent shell (A-16852) which has a slight natural longitudinal twist. Edges are worked and smoothed parallel with rounded corners, three of the corners are broken; perforation is 1.5 mm. in diameter and was drilled from one side. The entire object is coated with a very thin rough layer of an unidentified black to rusty brown substance. It resembles pitch and has flaked away from portions of the two flat surfaces. Length: 21 mm.; width: 11 mm.; thickness: .5 mm.

**CORDAGE**

Data concerning 229 specimens of cordage from Red Bow Cliff Dwelling are presented in Figure 52. Existing nomenclature and terminology is used. A yarn is the simplest unit considered. It is made up of fibers or filaments which are spun. Two or more yarns are twisted into strands and two or more strands are twined into multiple strands.
The direction (left or right) in which cordage is spun, twisted, and twined is indicated by the symbol S or Z such as S-Z-S-twined, meaning S-spun yarns are Z-twisted into an S-twined multiple cord. The S or Z direction is always determined by holding the specimen vertical. The number of yarns and strands in a cord is indicated numerically, such as 2-3-yarn strands, meaning two, 3-yarn strands are twined into one multiple strand. The various combinations are indicated pictorially in Figure 53a. The range and frequency of specimen diameter among the total sample is shown (Fig. 52) as is the number of turns per 5 cm. The latter is a function of the former and is an indication of how tightly a cord is spun, twisted, or twined. A turn is counted each time it comes up within the 5 cm. distance. A piece of cordage 1-1.9 mm. in diameter with 16-18 turns per 5 cm. may be considered very tightly twisted. The degree to which cords were macerated is also indicated (Fig. 52).

From Figures 52 and 53a certain generalizations can be made. These, together with other remarks, are given below under three different fiber headings. A group of cordage specimens chosen to show the range within the entire sample is given in Figure 54.

**COTTON:** With a single exception (1 of 53), cotton yarn was exclusively Z-spun and when formed into strands was generally Z-S-twisted. One S-Z-twisted specimen was
<table>
<thead>
<tr>
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<th>BAST FIBER</th>
<th>COTTON FIBER</th>
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* per 5 cm.

DATA CONCERNING CORDAGE FROM RED BOW CLIFF DWELLING
Figure 53. - Types of cordage and a plain weave detail section illustrating specimens from Red Bow Cliff Dwelling.
CORDAGE

2-2-YARN STRANDS, S-TWINED
(S-Z-S-TWINED)

2-YARN STRAND, Z-TWISTED
(S-Z-TWISTED)

SINGLE YARN, S-SPUN
(S-SPUN)

FIBER
104 HARD
43 BAST
1 COTTON

2-YARN STRAND, S-TWISTED
(Z-S-TWISTED)

SINGLE YARN, Z-SPUN
(Z-SPUN)

WARP

PLAIN WEAVE
COTTON TEXTILES

WEFT

BRAIDED CORDAGE

FEATHER CORDAGE
Figure 54. - Cordage specimens chosen to show the range within the entire sample from Red Bow Cliff Dwelling. Length of upper left, 77 mm.
recovered from Room 1, Block E, which is 2 mm. in diameter and shows 4 turns per 5 cm. Single yarns and 2-yarn strands are most abundant. Yarns and strands 1-1.9 mm. in diameter with 1-3 turns per 5 cm., and 2-2.9 mm. in diameter with 4-6 turns per 5 cm. were also most abundant, indicating a small diameter loosely spun or twisted cotton cord was preferred. Cotton cordage was, in many instances, dyed: natural white, 32; brown, 8; dark brown, 2; red, 4; salmon pink, 1; yellow, 1; tan, 3; black, 2.

**BAST FIBER:** Bast fiber cordage is almost always initially S-spun and S-Z twisted. 2-yarn strands, yarns and strands 1-1.9 mm. in diameter with 7-9 turns per 5 cm., and 2-2.9 mm. in diameter with 4-9 turns per 5 cm., and medium to advanced maceration are characteristics most often represented. There are no thick loosely twisted specimens such as occur in the hard fiber series, and the majority of bast are more tightly twisted than cotton cordage. Diameter range: 1-4 mm.

**HARD FIBER:** Hard fiber cordage is overwhelmingly S-spun initially which, like bast, is opposite to the way cotton is spun. 2-yarn strands, yarns and strands 1-1.9 mm. in diameter with 7-11 turns per 5 cm.; 2-2.9 mm. in diameter with 4-9 turns per 5 cm.; and 3-3.9 mm. in diameter with 4-6 turns per 5 cm.; and light to medium maceration are characteristics most often represented. The range in size and degree of twist tightness is far greater than in
bast or cotton. Diameter range: 1-6 mm. There are over twice as many specimens of hard fiber than either of the others.

In addition, single yarn hard fiber cordage which was not spun or twisted is not tabulated. Great numbers of loose ends, sections, knotted ends, and knotted loops of this kind of cordage occurred. For the most part, they are yucca, either not at all macerated or only slightly so. Several coils of straight yucca fiber, varying from 2 to 8 cm. in diameter, macerated and prepared but not spun into cordage were also recovered.

Long sections of yucca leaves split lengthwise were often used as crude cords without maceration or preparation of any kind. Frequently cordage of this kind was tied in a knot and was apparently most useful for hastily tying up burdens or in hanging up objects. This type of cordage varies in width from 3 to 8 mm.

Fine cordage other than hard fiber ceremonial bow strings is preponderantly bast or cotton. This is not clearly shown in Figure 52 because ceremonial bow strings are included with all other hard fiber specimens. Most fine cordage also generally occurred as small straight unknotted segments.

**CEREMONIAL BOW STRINGS**: Among the 124 hard fiber specimens of cordage, 37 are without doubt sections from ceremonial bow strings (Fig. 55). Of the 52 bast fiber
Figure 55. - Ceremonial bow strings from Room 4 of Red Bow Cliff Dwelling. Normal bow string, lower left. Ends are spring coiled and looped for attachment to bow end. Length of right, 130 mm.
specimens, only one is of this kind. Positive identification is made possible because portions of other bow strings remain attached to several miniature ceremonial bows. These compare favorably with the 38 loose unattached specimens.

Ceremonial bow strings are all S-Z-twisted and, with one exception (a single 3-yarn specimen), are 2-yarn strands; the diameter of each is between 1 and 2 mm.; turns per 5 cm. range between 5 and 16, with 14 specimens between 7 and 8, remaining distribution is fairly even; all examples show medium maceration; 12 are painted red, 1 green, others are natural brown. A small knotted loop or a set of tight spring coil loops for attachment to bow ends is present on a number of these pieces (Fig. 55). On the whole, ceremonial bow strings are tightly twisted, fine gauge, durable cordage of excellent quality. All of these specimens are from Room 4.

BRAIDED CORDAGE: Three examples of this type occurred. Two are entangled with other pieces of ordinary cordage in a cordage bundle (Fig. 56c) recovered from Room 1, Block H. The bundle (A-16853) is a wad of differing cordage specimens that are variously wound, knotted, and bunched into a tight mass which defies adequate analysis or diagnosis as to purpose or use. The specimens wound together in this way are unexplainably among the finest short lengths in the cordage lot. All of
them are hard fiber.

Only a small section of one of the braided specimens in the bundle comes to the surface. It is a complex type which was not dissected because we did not wish to dismantle and thus destroy the bundle. More of the other braided cord is available as it is the principal strand of the bundle. It is indicated by an arrow in Figure 56c and is the simplest kind of braiding, "Three-Strand Sennit" (Fig. 53c). It is 8 mm. wide.

The third specimen is a small length found loose in Room 4, north wall section. It is also "Three-Strand Sennit," hard fiber, 5.5 mm. wide.

FEATHER CORDAGE: Four specimens (A-16854) are all manufactured in the same way. The technique is shown in Figure 53d and is the same as used in making certain fur cordage (Haury and others 1950: Fig. 93a). Fur cordage was not found at Red Bow Cliff Dwelling but the sample is too small to categorically state that feather cordage had supplanted it.

Used as a base are 2-yarn strands of hard and bast fiber, S-Z-twisted, 2-4 mm. in diameter, 4-6 turns per 5 cm. Strips and pieces of bird skin with feathers in place are tightly wrapped about the 2-yarn strands and at intervals of 40 to 60 mm. pass between the two yarns. In this way the skin is held firmly to the strand. A lump is formed wherever this occurs. Body skins of small birds
Figure 56. - a, b, carrying-loop chains; c, cordage bundle of differing cordage specimens wound and knotted into a mass; includes a specimen of braided cordage, arrow. Width of a, 117 mm.; width of c, 103 mm.
were used because soft feathers were desired.

**CARRYING-LOOP CHAIN:** The term carrying-loop chain has been used because it is felt that objects, particularly plants and plant foods, were caught in the loops to hang them up or carry them (Martin and others 1952: 214, 226). Little absolute evidence exists for this association however.

In these two specimens (A-11840), strips of untwisted hard fiber cordage are chained into a series of three and two circular loops (Fig. 56a, b). Loops are made continuous with overhand knots in one case and a type of figure-of-eight knot in the other and are closed by square knots. The loops vary in diameter, 22-40 mm.; width of cord, 2-4 mm.

**HUMAN HAIR:** The only distinct specimen of human hair is a hank (A-16886) 110 mm. long which is deftly turned back on itself and bound tightly into position with a single leaf wrapping of bear-grass. The wrapped portion begins immediately above the turn and continues 40 mm. up the hank encircling it about eight times with the leaf end pushed under a wrap as a termination. This is perhaps an indication of one hair style used during Canyon Creek Phase times (Fig. 62). (See Guernsey and Kidder 1921: Pl. 19d.)

Several small loose wads of human hair occurred in the fill of Rooms 4 and 5 but none were wound or prepared in any way.
Figure 57. - Various types of knots, temporary ties, and loops found in the cordage of three cave sites in the Point of Pines region. g, t, w, ceremonial bow string loop ends.
The various types of knots, temporary ties, and loops found in the cordage from all three cave sites are pictured in Figure 57. Of these, the following occurred at Red Bow Cliff Dwelling:

- **Figure 57a**: overhand knot, 11 examples
- **Figure 57b**: square knot, 59 examples
- **Figure 57c**: sheet bend, 5 examples
- **Figure 57d**: carrick bend, 4 examples
- **Figure 57e**: draw knot, 2 examples
- **Figure 57f**: figure-of-eight knot, 2 examples
- **Figure 57g**: variation of the figure-of-eight knot, 2 examples
- **Figure 57h**: loops in varying diameters tied with square knot, 5 examples
- **Figure 57i**: 2 examples
- **Figure 57j**: 1 example
- **Figure 57k**: 1 example
- **Figure 57l**: 2 examples
- **Figure 57m**: 1 example
- **Figure 57n**: loops in varying diameters, 4 examples secured with this type of temporary tie
- **Figure 57o**: lark's head, 4 examples
- **Figure 57p**: eccentric tie, 1 example
- **Figure 57q**: 2 examples
- **Figure 57r**: double loops in varying diameters tied with overhand knots, 2 examples
- **Figure 57s**: ceremonial bow string loop ends showing the different types of ties, knots, and loops used to fasten the string to the bow end (also Fig. 55). Specimens of this kind were numerous in Room 4 and all of them are one of the three types illustrated. The type shown by Figure 57s is the most common.

The square knot is definitely the kind of knot most often employed; overhand knots and sheet bends are second and third in frequency. Of the remainder, the most widely recognized types are given names. Those left unclassified
seldom occurred in more than two examples and represent variations on standard knots, experiments in the art of knot tying, temporary ties, or hasty attempts at tying up a cord or two. Loops are finished with various simple knots and ties as indicated.

TEXTILES

PLAIN WEAVE: The 17 plain weave textile fragments are alike in almost all characteristics. In each example, the weave is the simplest of its kind, each weft being over one and under one of the warps. Weft threads are always slightly thicker than warp threads. This is shown in Figure 53b by a stylized plain weave detail section. Every specimen is woven from single yarn cotton thread which is Z-spun. No section is large enough nor complete enough to suggest its use. Edges are frayed in each instance with the exception of four small selvage portions enumerated as follows: (A-17031-X5), portion of one end selvage, 3-yarn, S-twist, Z-spun yarn; same specimen, portion of one side selvage which shows self selvaging; (A-17031-X9), portion of one end selvage, 5-yarn, S-twist, Z-spun yarn; (A-17032), portion of one side selvage, 2-yarn, S-twist, Z-spun yarn. The number of wefts per cm. ranges from 6 to 11; mean, 9.5. One specimen (A-17032) is mended by a simple fagot stitch. Another (A-17031-X3) is loosely repaired by
Figure 58. - Three plain weave textile fragments from Red Bow Cliff Dwelling. Length of top, 150 mm.
running a 2-yarn, S-twisted strand of Z-spun yarn irregularly through it. The color of each specimen is white or tan depending on the degree to which it has been soiled. Only one (A-17031-X15) is dyed (dark brown). All are irregular fragments ranging in size: maximum width, 25-120 mm.; maximum length, 30-320 mm.; most pieces are, however, small. Three are shown in Figure 58 and may serve as examples for the remainder.

**COIL-WITHOUT FOUNDATION:** The only other textile weaving technique employed in examples from cave sites at Point of Pines is simple looping or coil-without foundation. The single specimen (A-17037) of looped weaving is from Block C of Room 1 and is a section of a bag. Additional small fragments are from the same piece. The procedure is the same throughout, with three horizontal loops and three vertical rows per cm.; woven of 2-yarn, Z-twist thread with S-spun bast fiber yarn. The beginning or extreme bottom of the bag is a single coil with bunched threads as foundation around which each among the first row of loops is anchored by completely encircling it. This initial coil is 130 mm. in diameter, 4 mm. in thickness. Loops are added to rows as the bag diameter increases. The bag rim is not selvaged in any complicated manner other than to allow the last row of loops to tighten down on themselves in a form of self-selvage. The weaving technique and decoration is shown in Figure 59, and a section
Figure 59. - Reconstructed section of a bag woven in a simple looping or coil-without foundation technique. Decoration is in the form of concentric alternating bands of tan and red. The rim band is red. Scale: from top to bottom of specimen is approximately 220 mm.
Figure 60. - Section of a bag woven in a simple looping or coil-without foundation method. Alternating bands of tan and red provide decoration; top band is red.
of the actual specimen is given in Figure 60. The bag is decorated by alternating tan and red bands; decoration begins approximately 25-30 mm. from the bottom with the first zone of red followed by a thin band of tan. This scheme is continued to the rim; the rim band is red. Red bands are about the same width, 25 to 30 mm., but tan bands increase in width toward the rim from 5 mm. to 20 mm. Red yarn is dyed, tan yarn is natural bast fiber color. Overall dimensions of the piece as it is spread flat are as follows: maximum depth, 218 mm.; maximum width, 392 mm.; what remains of the sample does not permit an accurate estimate of the rim diameter.

Two examples of this same technique occurred at Hidden House and data concerning archaeological occurrences of other specimens in the Southwest are summarized in the description of them (Dixon 1956: 16, 28). In time, the bag from Red Bow Cliff Dwelling is one of the latest of its kind, and looped weaving extends back into Basket-maker II. Bags were very often made in this way. Historic Papago and Pima carrying baskets are also basically this technique.
PLANT ARTIFACTS

NEEDLE: The spines of various cactus plants make extremely fine needles for sewing. Little modification is necessary before a yucca or agave leaf with its spine is ready for service. At this site, the fact that of the many agave spines present a high number were severed from the leaves immediately at the spine bases, suggests that these leaves were themselves generally desired free of the spine and yucca was perhaps favored for sewing. Yucca needles (A-17038) often retained at least a small portion of unused but prepared leaf or cord attached to the needle base after the main leaf section had been used and cut off.

A new needle is prepared by macerating the leaf until only its long straight fibers remain. The needle may then be used as is or the fiber twisted into a cord depending on the article to be sewn. When the leaf fiber was almost used up, the needle was cut off and thrown away. The range of variation in leaf fiber treatment and the character of the needles is shown in Figures 61 and 62. Other specimens have been found at Canyon Creek Ruin (Haury 1934: 85, Fig. 55b) and Ventana Cave (Haury and others 1950: 426).

WRAPPED YUCCA FIBER END: The tip ends of yucca leaves, which had been macerated until all fibers were separated, are bound or wrapped with one or two single yucca fibers, generally with an S-twist but sometimes in a double S and Z
Figure 61. - Cactus leaf spine needles from Red Bow Cliff Dwelling. Vertical length of specimen to the right, 82 mm.
Figure 62. - Wrapped hank of human hair; wrapped yucca fiber ends; cactus leaf spine sewing needles. Vertical length of needle to the right, 55 mm.
HUMAN HAIR

WRAPPED YUCCA FIBER ENDS

CACTUS LEAF SPINE NEEDLES
fashion (Fig. 62). The loose fibers of a leaf treated in this way cannot fall apart or separate and are brought to a collective point. Although spines are not present, when these fiber bunches had served their purpose, the ends were cut off in the same manner as leaf spine needles and discarded.

Artifacts of this kind may have been used in either of two ways. First, their use could have been identical to that of cactus leaf spine needles, although of necessity restricted to rougher work where it was not necessary to force a hole, such as sandal manufacture or repair, because wrapping fiber would scrape off if this kind of article were forced through a hole. In this method the wrapped ends would have been cut away after initial use of the leaf fibers. In an alternate way, the wrapped ends may have been cut off before initial use of the leaf. "To prevent the untwisting of freshly made cords, it was customary to treat the ends by worming with a few filaments of the fiber...these ends taper to a point, the twisting being completed to the very tip. When ready for use, the wrapped ends were cut off and discarded." (Haury 1934: 85.)

In addition to Canyon Creek Ruin, a wrapped yucca fiber end was found at O Block Cave and classified as a yucca leaf spine needle (Martin, Rinaldo, and Bluhm 1954: 196, Fig. 99), and similar specimens occur individually at sites such as Winchester Cave (Fulton 1941). These
unspectacular bits of fiber are probably more prevalent than this would indicate. Length of wrapped section: range, 35-88 mm.; overall length of specimen: range, 57-165 mm.

CANE CIGARETTE: An extraordinary number of cane cigarettes (1211) were found in Red Bow Cliff Dwelling, most of them (1038) in Room 4, and most of these in the ceremonial area (573) and the north wall section (269). All the specimens are exactly alike in their basic manufacture (Fig. 63). Hollow sections of carrizo cane (Phragmites communis) were cut to the desired length in such a way that a single cane node is always near one end. End cuts are at right angles to the long axis and have been executed by rotating the cane beneath a very sharp cutting edge, such as an obsidian blade, as evidenced by many specimens that retain the tiny cutting trough and others which show off-center cutting circle junctions where the cutting tool was held slightly to one side of a perpendicular angle while the cane was rotated. If the incision is not complete, the end is snapped and in such instances specimens are produced which retain ragged edges.

The node or dividing wall is generally pierced centrally by a small hole about 1 mm. in diameter in order to allow the passage of air and smoke. This seems to be the second manufacturing step and evidently precedes the packing stage because pieces of packing material often get jammed into or through the hole when the packing is inserted.
Figure 63. - Cane cigarettes from the ceremonial area of Room 4. Uniformity of manufacture and range in size is shown by these examples which are indicative of the entire undecorated sample from Red Bow Cliff Dwelling. Length of specimen to the left, 138 mm.
Holes could easily have been pierced through the septum by using cactus needles.

The butt or node end is kept uniform in length and is always empty. The opposite end, or tip, varies considerably in length and is that part of the cane cigarette which is packed with plant material. Packing is the third step. The plant material used at Red Bow Cliff Dwelling has not been identified but is aromatic and is for the most part the small-diameter, stiff, dried stem sections of a low shrubby plant or weed. The stem sections are never pulverized but are stuffed lengthwise down into the cigarette tube until contact is made with the node. The parts which remain protruding from the tube are neatly cut off, often a little beyond the tube end.

These three steps provide a functional cane cigarette and the vast majority are of this order (Fig. 63). A fourth step, that of decoration, is sometimes indulged in for special reasons apart from those functional.

Measurements for the entire sample are given in Figure 64. Total length: complete sample range, 15-205 mm.; length of butt: complete sample range, 3-36 mm.; diameter of butt: complete sample range, 4-19 mm. The upper extremes in range are few in number. The major portion of the sample (752 specimens) clusters within remarkably narrow limits, indicating a marked degree of homogeneity and that there was a preference for a cigarette which
Figure 64. - Frequency distribution of cane cigarette dimensions representing the entire sample from Red Bow Cliff Dwelling and indicating the area of measurement cluster.
### Diameter of butt as shown in each square

<table>
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<tr>
<th>Length of butt in mm.</th>
<th>Total length in mm.</th>
<th>4-7</th>
<th>8-11</th>
<th>12-15</th>
<th>16-19</th>
<th>TOTALS</th>
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<td>2</td>
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TOTALS 273 564 161 101 45 27 20 10 5 3 1 1 1211

**Frequency Distribution of Cigarette Dimensions from Red Bow Cliff Dwelling**
approximated a certain size. Cigarette size, however, was obviously influenced by the cane itself as well as by human inclination (diameter more so than lengths). Therefore size is not completely a matter of preference. The 752 clustered specimens are within 15-46 mm. in length, butt length is within 3-12 mm., 506 of these specimens are 4-7 mm. in diameter and 234 are 8-11 mm. in diameter. Of the entire sample, 88 percent of cane cigarette nodes are pierced; of those from the ceremonial area, 98.5 percent have pierced nodes. Of the entire sample, 18 percent are not packed. Those specimens with unpierced nodes and those which are not packed probably represent examples mislaid or lost in room fill before completion. Quantities of broken cane and cane fragments lay about the surface of the ceremonial area and the north wall section of Room 4 (Fig. 17a). Unfinished specimens and the abundant cane debris are probably evidence that cane cigarettes were made in Room 4.

One of the most remarkable features of the sample is that not more than 31 of the entire 1211 are charred about the packed extremity. This means that cigarettes made at Red Bow Cliff Dwelling were not made to be smoked at this site by these Indians. Taken with the fact that most of the cigarettes occurred in the ceremonial area it must be assumed that they were made to serve as offerings to the shrine. If additional cigarettes were made for normal
smoking they were taken elsewhere for use or trade. Experiment shows that once lighted, this type of cigarette burns excellently. Cane and packing form a coal which, although rather hot, burns slowly down toward the butt. By drawing on the butt, great quantities of smoke can be produced emitting a sweet pungent aroma. Cigarettes from other sites, such as Ventana Cave (Haury and others 1950: 426) and the Canyon Creek Ruin (Haury 1934: 114), are often no more than charred butts found in refuse. These cigarettes were certainly smoked.

There is, then, a dual function which may be attributed to cane cigarettes. One function is their use as cigarettes to be smoked, as cited above; the other is their use as offerings to shrines in caves as in Room 4 of Red Bow Cliff Dwelling, Bear Creek Cave (Hough 1914: 107-110), Winchester Cave (Fulton 1941: 20-24), and certain upper Gila caves reported by Cosgrove (1947: 121-122). The occurrence of cane cigarettes through the Southwest is summarized by Grange (Martin and others 1952: 351-354). The large sample from Red Bow Cliff Dwelling is in the offertory category. If a sample of cigarettes equally as large but prepared solely for smoking were measured, the frequency of small thin examples would probably be appreciably less, since many of this kind are actually too short and slender to have served properly as smoking cigarettes. Nevertheless, standards in offertory cigarettes
were rigidly adhered to and both the smallest and largest extremes in the Red Bow Cliff Dwelling sample are cut, pierced, and packed as if they had been prepared for smoking.

When used as offerings or pahos, cane cigarettes are sometimes decorated. This was carried to greater extremes at sites other than Red Bow Cliff Dwelling, such as Bear Creek Cave, but a few at this site are so treated.

Eight specimens (A-17041) retain pigment particles on various surfaces as evidence of their having been at one time entirely painted. Two are green (malachite), six are red (hematite). Painted specimens have no other adornments, such as cord wrapping, nor is there evidence that any were tied together. Relatively long slender cigarettes were selected to be painted. Total length: 77, 94, 116, 94, 94, 89, 55, 77 mm.; butt diameter: 8, 7, 7, 10, 7, 9, 10, 8 mm.

One cigarette (A-17029) is tied to a twig as a paho (Fig. 67b). The twig is 350 mm. long; a piece of 2-yarn strand hard fiber cord is wrapped and knotted around it near one end; fragments of corn husking are caught in this tie next to the twig; the 30 mm. length of cord terminates by tying onto a single cigarette just above the node constriction. At the opposite end, a similar cord is tied to the twig but the cigarette has broken off. Four small, slender cigarettes, almost identical to the one used in the twig paho, are similarly wrapped and knotted just above the
node constriction with thin hard fiber pieces of cord. These are undoubtedly paho cigarettes broken or cut from their paho twig. Total length: 46, 31, 30, 34, 32 mm.; butt diameter: 5, 5, 8, 6, 5 mm.

Two groups composed of five and two cigarettes are bound together in rows next to each other with thin 2-yarn hard fiber cord (Fig. 65a, c). The cord is given a tight overhand knot between each cigarette and completely encircles each specimen above the node. In appearance, the group of five resembles a panpipe. The cigarettes and the binding cord are almost exactly like those used for pahos. Both also have a loose binding cord end as if cut or broken and it is very possible they were at one time also tied to twigs, sticks, or ceremonial bows, as pahos. In the group of five (A-17044), cigarettes are identical: total length, 33 mm.; butt diameter, 6 mm. In the group of two (A-17043), the difference is slight: total length, 36, 39 mm.; butt diameter, 7, 7 mm. Short, slender cigarettes were selected for all paho cigarettes. Hough (1914: 99, 107-110) describes a number of cigarettes used in stick pahos and tied with miniature bow pahos from Bear Creek Cave. At that site the placement in shrines of myriades of cane cigarettes, some of them elaborately prepared, must have been comparable in motivation to the cigarette deposits at Red Bow Cliff Dwelling. This seems to be true also of such cave shrines as Mule Creek Cave as discovered by Cosgrove (1947).
Figure 65. - Cane cigarettes tied into groups or decorated for ceremonial purposes. Bottom row: five of a set of ten matched but unadorned cane cigarettes. All specimens are from the ceremonial area of Room 4.
Length of lower left specimen, 70 mm.
One specimen (A-16797) is tightly bound by numerous turns round and round the node with tan cotton cord (Fig. 65d). The specimen diameter is thereby increased from 7 to 11 mm. at the node. Two circular stone disc beads, one turquoise and one red argillite, are included in the cotton wrapping. Total length, 45 mm.

Four cigarettes (A-17045) are bound together as a quartet with a 2-yarn cotton cord (Fig. 65b). Each cigarette is individually wound immediately above the node, sometimes twice around, and tied with an overhand or square knot before being joined to the group. The four cigarettes are in this way secured into a quadrated position so that there is no way they can slip into a flat row. The cotton cord is now predominantly white but there are traces of red coloring. The cigarettes are perfectly matched. Total length: 42 mm.; butt diameter, 9 mm.; diameter of bundle, 20-26 mm. This quadrated arrangement is most often found in the Hohokam area (Hough 1914: 108-109; Haury 1945b: 195). Haury also notes "that the number four is doubtless to be interpreted as being a magical number, relating to the cardinal points."

Finally, the occurrence of a matched set of ten plain cane cigarettes (A-17046) must be noted. They were found together in a pile in the ceremonial area of Room 4 and were not burned, tied, or decorated in any way. Five of these are shown as the bottom row of specimens in Figure 65.
They are longer than the maximum length among the 752 specimens clustered within the entire sample (Fig. 64) but are more nearly a size most suitable for actual smoking. Total length: range, 68-78 mm.; length of butt: range, 11-13 mm.; diameter of butt: range, 9-11 mm.

The collection of cane cigarettes described by Haury (1945b: 194-196) from Double Butte Cave must, for the present, be taken as typical of the Hohokam area. Many of the cigarettes from that site are distinguished by having a woven cotton sash wrapped about their mid-portions. Cotton sashes did not occur at Red Bow Cliff Dwelling nor does this trait seem to appear at other Mogollon or Mogollon-Pueblo sites. Haury does, however, associate these specimens with a ceremonial aspect as offertory objects and notes that not a single example from Double Butte Cave was smoked. On the whole, cigarettes of the Hohokam area also tend to be shorter and stubbier (greater diameter) than those of the Mogollon-Pueblo area.

There are a number of ethnological accounts which depict the use and smoking of cigarettes in rites connected with the curing of individuals by medicine men. There are also ethnological accounts to the effect that smoking of cigarettes and pipes was indulged in ritualistically in order to produce a large volume of smoke which in turn was an excellent rain omen. If cane cigarettes were actually smoked within the prevailing culture pattern
in the Point of Pines region during Canyon Creek Phase times for either or both of these reasons, unsmoked cigarettes may well have been placed in the ceremonial area as offerings to insure the success of those rites. Rituals of this kind might even have been performed in distant kivas as far away as at the Point of Pines Ruin but offerings for their success still made locally. This would account for the absence of smoked cigarettes and the presence of unburned examples in quantity at Red Bow Cliff Dwelling and be in harmony with the dual function of cane cigarettes previously suggested.

**CANE DICE**: Short sections of carrizo cane (*Phagmites communis*) containing a single node are sliced along one side with the long axis to produce one flat surface. The sectioning is never down the middle but always along a single edge. This leaves a maximum curvature for rolling, yet provides a flat side which, when a die is tossed, must come to rest either up or down. The cut surfaces of two specimens are shown in Figure 66b, c. The node is most often in the center of the specimen but apparently this does not have to be the case. Diameter varies greatly and is not a factor in material selection. Each example is under 27 mm. in length.

All 12 specimens (A-17048) are from the ceremonial area of Room 4. Six of them are decorated (Fig. 66d-i), and six are plain (Fig. 66a). The decoration in four
Figure 66. - Examples of cane dice showing plain and decorated types; b and c indicate the nature of flat sliced surfaces. Length of e and h, 14 and 27 mm.; maximum diameter, 7 and 13 mm.
specimens was accomplished by burning short lines, tiny triangles, and dots into the smooth outer layer of the cane, forming small geometric patterns (Fig. 66d-g). The slice used to produce a flat side often leaves a thin opening into the hollow section on either side of the node. In the specimen shown as Figure 66f, the interior of one of these hollow compartments is encrusted with green paint (malachite). In one specimen a crisscross design is incised into the outer layer (Fig. 66h). In the final specimen, the outer cane surface layer is peeled away so that the small parallel natural rib grooves of the cane interior serve as decoration (Fig. 66i). Dimensions may be ascertained on a comparative basis from Figure 66 and the three specimens not shown are very similar in size and appearance to Figure 66a.

When actually used, the dice may have been thrown in groups, the value of the throw depending on how many and which dice finally came to rest flat or decorated side up. However, these particular specimens in all probability were offertory in the sense that they had been placed in the ceremonial area shrine to insure success and good fortune when the individual who consummated the offering happened actually to play a game.

Hough (1914: 127, Fig. 335) pictures several cane dice from Tularosa Cave. These are somewhat similar to the Red Bow Cliff Dwelling examples and some have burned
Figure 67. - a, seed beater; b, cane cigarette tied to a twig as a paho; c, brush. Length of c, 625 mm.
line decorations, but they are simply sections of cane without a node cut in half lengthwise. Culin discusses dice games at great length and provides many ethnological instances where long pieces of cane are sliced in half lengthwise, decorated, and used as dice. Wooden examples very similar to those described here are also frequently discussed and a set shown in Figure 97 of his monograph. The only examples in the literature which I have been able to locate that are precisely like those from Red Bow Cliff Dwelling are a collection of nine from Grand Gulch, Utah in the American Museum of Natural History that "consist of small fragments of cane (figure 8a), made to include a joint, and slightly flattened and marked with notches at each end on the flat side." (Culin 1907: 48-49, Fig. 8.) These specimens are about an inch long.

BRUSH: A bundle of carefully selected, long, stiff grass stems (A-17050) is tied one-third of its length from the base so that at the base all of the straws come to a uniform end straight across (Fig. 67c). The binding cord is an untwisted strand of about 20 hard fibers which is wound tightly around twice and tied with an overhand knot. Flowering ends of the straws are all placed together at the opposite end and do not terminate uniformly. Total length, 625 mm.; base diameter, 45-65 mm.

An identical object of this kind is pictured by Stevenson in use by Zuni or "Moki" women as a hair brush.
The specimen is listed as a "Combing broom, or broom and comb combined, composed of fine grass, bound in the center; the butt end being used for combing, the top end as a brush or broom. It is also used as a strainer."

(Stevenson 1884: 583, Pl. XLIII.)

**JUNIPER SEED BEAD**: Individual seeds identified by C. T. Mason, Jr., Director of the Herbarium at the University of Arizona, as juniper berry seeds (*Juniperus deppeana*) were often encountered in room fill, especially in and about Room 4, ceremonial area. A good many of these are unworked and are no doubt specimens left over or lost during the grinding of juniper seeds for food. Some, however, have a hole pierced into one side (due perhaps in a few instances to rodent chewing) and still others, although for the most part otherwise unworked, have this hole extended on through and occasionally show slight grinding about the ends. These specimens are used as beads. The completed hole is punctured through the seed center with the long axis and seeds are strung end to end. A single strand of juniper seed beads (Fig. 68) strung on a 2-yarn, Z-S-twisted tan cotton cord was recovered from Room 1, Block K, Level 1. Overall length, 270 mm.; individual seeds average 6 mm. in length and 4 mm. in diameter; 55 beads are strung on this strand (A-17051). It was probably originally a much longer strand.

Morris (1939: 141, Pl. 172) discusses the nature,
Figure 68. - Juniper seed beads strung on a cotton cord. Total extended length, 270 mm.
method of manufacture, and occurrence of this type of bead and gives excellent illustrations of specimens he found in La Plata sites and again in Basket Maker II Durango sites (Morris and Burgh 1954: 70, Fig. 97a). Hodge also records juniper seed beads from a burial at Hawikuh (Hodge 1921: 15). From all of these finds we may infer that juniper berry seed beads were used as ornaments by Basket Maker and Puebloid groups from BM II through Pueblo IV times.

**GAMING BALL:** A single oak gall (A-17052), 24 mm. in diameter, is decorated by short lines which intersect one another over the curved surface (Fig. 69b). The lines are about 3 mm. wide, burned black, and they mark off irregular triangular and rectangular areas. Oak galls are natural, round balls which have a smooth brown surface. Many undecorated individuals were found throughout the cave and they must have been gathered and used as gaming devices or by children as play things. (See also Oak Galls, Appendix C.)

**CORN COB MOUNTED ON A STICK:** The use and function of corn cobs mounted on sticks are not clearly understood. It may be of importance to note that none are from the ceremonial area in Room 4. Two types of mounting are represented in the collection. The first is discussed in detail by Grange (Martin and others 1952: 356-357, 367, 428, Fig. 158), in which a twig or small stick is pushed up into the pulpy base of the corn cob with no further
Figure 69. - a, c, corn cobs mounted on sticks; b, an oak gall decorated with burned lines and perhaps used as a gaming ball. Length of a, 110 mm.
modification. The stick is missing in the longer example of the two specimens (A-17054, A-17055) present, but a hole indicates the cob was once mounted in the same way as the complete specimen shown in Figure 69a. The second type is affixed to a stick that runs at an angle to the long axis as if the cob had been hung upon the twig (Fig. 69c). A piece of corn husking is bound tightly around the cob, anchoring another wide strip of husking that is run up and over the end of the cob to provide the loop through which the stick passes. The single specimen (A-17053) is 91 mm. long; the stick is 74 mm. long, has one end broken, the other cut, and is 2 mm. in diameter.

WRAPPED BUNDLE: Five bundles of assorted sizes and materials (A-17058) have in common the fact that the materials are cut, stacked, and wound back and forth into rectangular bundles which are wrapped and tied tightly about the mid-section with a cord. As shown in Figure 70, they are: a, a bundle of sinew strips, some of them twined back and forth on themselves, tied by a thin cord of sinew, length-98 mm., width at the tie-39 mm.; another slightly smaller but similar sinew bundle is not shown; b and c, bundles of yucca strips neatly cut off at the ends, some of them turned back and forth on themselves, strips in b are not macerated while those in c are slightly so, they are tied by yucca cords, length-105, 108 mm., width at the tie-39, 22 mm.; d, a bundle of twigs and a yucca leaf tied
Figure 70. - Wrapped bundles of raw materials from Red Bow Cliff Dwelling. Length of a, 98 mm.
by a somewhat thicker strip of the same kind of wood bent
around and around the bundle and finally knotted,
length-260 mm., width-75 mm. These specimens probably rep­
resent bundles of raw material for use in various crafts
or in the case of d, a stack of medicinal plant material.

GOURD DIPPER: The gourd was used by Indians as food
and its shell or rind was converted into utilitarian
objects. Gourd rind is relatively fragile and is apt to
crack if dried out too suddenly; therefore gourd specimens
seldom survive in open sites and are probably not abundant
in accurate proportions relative to their actual use even
in cave sites.

Three dippers are represented in the collection
(Fig. 71c, d), made by cutting off the peduncle, slicing
the gourd in half lengthwise, and scraping out the seeds
and interior pulp. The neck serves as handle, the half
body as bowl. When dried and hard, such dippers are
reasonably impervious. Edges are beveled about the bowl,
probably from long use in scooping liquid from the bottoms
of pottery vessels where edges would abrade. Length: 165,
121 mm., incomplete; maximum bowl depth: 55, 41, 48 mm.;
maximum bowl width: 115, 87, 98 mm.; handle width: 51, 23,

GOURD DISC: Two complete discs and two half sections
are carved from gourd rind. Three of these are centrally
perforated with a small hole and were probably spindle
Figure 71. - Plant artifacts. a, sahuaro callus receptacle; b, gourd disc with central perforation, spindle whorl?; c, d, gourd dippers; c, interior; d, exterior. Length of c, 121 mm.
whorls (Fig. 71b). Diameter: 116, 75, 55 mm.; thickness: 4, 3, 2 mm.; perforation diameter: 5, 4, 4 mm.; circular edges: 2-smooth, 1-rough; cat. nos. A-17062, A-17066, A-17063.

The fourth specimen (A-17064) is more a small gourd ring, wherein the central perforation is very large in proportion to the diameter of the object. The perforation edge is burned but together with the outer edge is smoothed. Diameter, 24 mm.; thickness, 4 mm.; perforation diameter, 11 mm.

WORKED GOURD FRAGMENT: One specimen from Room 1, Block E, Level 1; triangular; two broken edges but has one edge rounded and slightly beveled. It could be a small segment of a large disc or gourd scraper.

One specimen from Room 4, west wall section; triangular; all edges broken; has on its smoothest surface three roughly incised zig-zag lines radiating from the peduncle apex which is grooved as if perforated.

One specimen from Room 1, Block G, irregular outline; all edges broken; has one surface painted red.

All three fragments are 50-70 mm. in maximum width.

WOVEN PLANT ARTIFACTS

SANDAL: Sandal terminology used by Bluhm (Martin and others 1952: 232-240, 259-293) is followed because sandal technology at Red Bow Cliff Dwelling is analogous to that
which occurred at Tularosa and Cordova caves, and specimens are exactly duplicated in most details. The significant difference between the two locales as to sandal technology is that sandals made and weaving techniques employed at Red Bow Cliff Dwelling show far less diversity than at Tularosa and Cordova caves where the final occupation was several hundred years earlier. At Red Bow Cliff Dwelling only two examples of wickerwork were found, the remaining 60 specimens are all in the plaited technique and the majority of these were executed within a relatively limited set of sandal weaving standards. At Canyon Creek Ruin the prevailing Red Bow Cliff Dwelling types are also duplicated but again there is a somewhat greater diversity in types present, a diversity which follows still other lines from those prevalent in the Reserve district during earlier times. The lack of sandal type range in caves of the Point of Pines region could be due to the rural nature of these sites in relation to the larger communities, or it may be an actual indication of a cultural homogeniety in fiber craft weaving in the Point of Pines region at this time. A few examples or fragments of elaborate sandal types should have been present, were such types then in use among the regional population. The evidence both here and at Reserve suggests that wickerwork is an early technique that had almost completely died out by Canyon Creek Phase times. Fitted sandals, sandals with notched toes, true "fish tail"
sandals, cordage or leather sandals are types not repre-
sented at caves in the Point of Pines region.

PLAITED SANDAL MADE WITH WIDE ELEMENTS: The plaited
sandal is extremely abundant and is the Canyon Creek Phase
sandal type at Red Bow Cliff Dwelling. If a pair of san-
dals displaying all characteristics most abundantly repre-
sented at Red Bow Cliff Dwelling were prepared they would
be woven in the plaited technique of over-two-under-one
with long single wide elements of natural unprepared yucca
so that both toe and heel are square and side edges straight;
weaving would run from toe to heel where elements would
turn up and back toward the toe and fasten down into the
basic weave on the top side providing a heel pad as well
as terminal attachment; toe ties would loop under the two
most centered elements about 30 mm. from the tip (presum-
ably the second and third toes pass through this loop),
brought up to a knot which at the same time joins the
loop to the two instep cords coming together from the heel
edges where they emerge having passed through the heel pad;
heel ties would in each case be a simple strand wound once
around the instep cord on either side then back on itself
to knot over the heel; tie cords would be long single wide
elements similar to those used in weaving the sandal
proper except that pulp is removed and fibers separated
but not twisted; left and right sandals would be indis-
tinguishable; dimensions would be approximately (mean for
entire sample) 21½ mm. in length, 90 mm. in width, 11 mm. in thickness, woven elements 1¼ mm. in width.

Of this total (55) sample, 24 are complete specimens, 31 are fragmentary. The following general remarks pertain to those in a state of completeness sufficient to judge the character of the feature discussed. All are basically woven of unprepared single yucca leaves called wide elements, range in element width, 8-19 mm.; of those with toe complete, 20 are square (Fig. 72b), 12 round (Fig. 72e, f), Bluhm makes subtypes of square and round toe varieties but here one grades into another and other differentiating characteristics do not consistently accompany the two criteria; heels are square or at a slight angle; heel elements are always turned upward, back toward the toe and bound down into the upper side by a few of the principal weaving elements (Fig. 72b, e, f); manufacturing techniques are lucidly presented by Bluhm (Martin and others 1952: 266); finished sandals with little wear are relatively stiff because elements are not macerated before weaving; the shape of these sandals is consistently rectangular and there is little or no indication of whether a sandal was intended for right or left foot; 48 specimens are in an over-two-under-one weaving technique (Fig. 72b, f), 7 are in an over-one-under-one technique (Fig. 72e); thickness, range, 5-21 mm.; width range 68-120 mm.; length range, 162-258 mm.
Figure 72. - Sandal types from Red Bow Cliff Dwelling; a, b, e, f, plaited sandals made with wide elements; c, wickerwork sandal; d, scuffer-toe sandal. Length of a, 335 mm.
One specimen (A-17069) is not included in measurements previously cited because it is abnormally large and was never finished or worn. It is 340 mm. long; 112 mm. wide; 15 mm. thick; and its woven elements are 7-18 mm. in width; it is shown as Figure 72a and is an excellent example of the over-two-under-one plaited sandal weaving method.

The prevailing sandal tie has already been described and is as consistent as the sandal type itself. It is similar in concept to two examples shown as left and center specimens in Figure 94 of Bluhm's description (Martin and others 1952: 271). However, the cord used in those at Red Bow Cliff Dwelling is consistently a wide macerated yucca leaf 6-9 mm. in diameter that retains little pulp but is made up of many long, bare, usually untwisted, fibers. An almost exact duplication of the sandal tie most common at Red Bow Cliff Dwelling is shown by Cosgrove (1945) in Figures 91 and 92, Type 9b, and described on page 89 of his monograph. Variations in the minutia of toe and heel tie knots and looped tie-ins between heel and instep cords occur due to the vagaries of individual wearers or craftsmen, but the overall pattern is the same throughout. Basically this kind of tie or a slight variation thereof was used on 20 specimens. Of these 20, 13 retained the complete arrangement, three lack the heel tie (Fig. 72b), and four retained only the toe tie. The missing elements in these cases seem to be due to loss rather than intent.
during construction. The remaining specimens (34) are either too fragmentary or contain no sandal tie evidence (Fig. 72f).

A single (A-17071) marked departure from the norm is shown in Figure 72e. It too is but a modification of the standard tie, in that the instep cord is merely crossed over itself instead of being knotted near the center of the sandal tip and is run under two elements in the sole to form the simplest of toe loops. There is no heel tie cord to this arrangement.

**PLAITED SANDAL MADE WITH NARROW ELEMENTS:** Two specimens of this type were recovered. One is but half of a sandal (A-17086), the heel section. Its basic method of construction is similar to the previous category except that narrow strips of yucca 2-4 mm. in width are used as weaving elements and it is over-two-under-two weaving, a method not employed in wide element plaited sandals. This particular specimen was evidently not completed because, although bent up and back, heel elements are not fastened into the sole, and no tie cord evidence is present. Thickness, 4 mm.; width, 82 mm. Methods of manufacture are discussed and illustrated in greater detail by Bluhm (Martin and others 1952: 272-273, Fig. 96 center).

The other specimen is extremely fragmentary, almost destroyed through use. It is woven in an over-two-under-one technique with extensively macerated elements 3-5 mm.
wide. There is, however, enough of its unusual sandal tie left to positively identify it as an example of a type found at Canyon Creek Ruin, Tonto Ruin, and sites in Rarick Canyon of the Verde drainage and classified by Haury as a plaited sandal tie woven into an intricate and handsome band or strap. The weaving is over-two-under-two using very small elements (2 mm. or less in width) and is neat and precise. This kind of sandal tie is excellently described by Haury (1934: 66, Pl. XLIIb, c, Fig. 12a) and does not seem to be recorded elsewhere for sites earlier than Canyon Creek Phase.

**MINIATURE PLAIBLET SANDAL:** The overall method of construction cited for other plaited sandals, particularly as to heel structure, is applicable. These three specimens are exact duplicates of plaited sandals made with narrow elements built on a smaller scale, in all probability for children (Fig. 73).

The three specimens are woven of narrow elements, 3-5 mm. in diameter, of split yucca leaf fiber, in an over-two-under-two technique, two are of the usual single elements, one has double (parallel) elements run side by side in a two-by-two over-and-under manner; left and right foot examples are distinguishable in that the inside edge is straight while the outer edge is curved; all three have round toes, square heels; a few loose cords on one indicate it possessed a tie; the other two are without evidence of
Figure 73. - Miniature plaited sandals from Red Bow Cliff Dwelling; example of bottom surface structure, left; upper surface, right. Length of left, 129 mm.
sandal ties; thickness: 4, 3, 4 mm.; width: 69, 57, 61 mm.;
length: 138, 129, 158 mm.; cat. nos. A-17089, A-17087,
A-17088.

WICKERWORK SANDAL:

"Two-warp wickerwork sandals are those with
two warp fibers, usually of crushed leaves,
which are knotted at the heel...over these two
warps are woven whole or crushed leaves, in a
plain over-one-under-one pattern..."

"As additional weft strands are added during
the course of weaving, the ends are left on
the under side of the sandal, where they fray
out, providing additional cushioning for the
sole. These sandals are oval and symmetrical;
lefts cannot be distinguished from rights."
(Martin and others 1952: 232, 259-260.)

One sandal from Red Bow Cliff Dwelling is of this order
(Fig. 72o) but the material is not crushed leaves and,
although shredded and fibrous, is more woody and brittle
than cactus leaves. It contains no evidence of a sandal
tie. Thickness, 16 mm.; width, 83 mm.; length, 252 mm.;
cat. no. A-17073.

A second wickerwork specimen is fragmentary with both
ends missing. It is manufactured of the same shredded
woody fiber as the previous specimen, but it is an eight-
 warp wickerwork sandal. The eight warp elements are all
parallel with approximately 5 mm. between each of them.
Weft fibers are tightly woven over and under each of them
in a simple over-one-under-one technique back and forth
across the width of the sandal. This method provides a
comparatively rigid and sturdy sandal. No sandal tie
evidence is present. Thickness, 13 mm.; width, 106 mm.; cat. no. A-17091.

**SCUFFER-TOE SANDAL**: A single specimen (A-17070) was found. It is circular, and in fact seems to be no more than a circle of plaiting in the over-one-under-one technique built on a small double foundation cord circle. The foundation cords appear at either side where, after several twists around each other, they separate for about 80 mm. when each two end pairs knot to form two tie loops. The entire arrangement is shown as Figure 72d. Both plaiting elements and tie cords are single unprepared yucca leaves. Plaiting element width, 11 mm.; tie cord diameter, 5 mm.; central diameter, 15 mm.; exterior (maximum) diameter, 86 mm.; thickness, 7 mm.

**TOY SANDAL**: Four specimens have been placed in this category because their use by children is obvious as play things or as practice examples made by children in learning or by parents in teaching the art of sandal making. They are distinct from the "miniature plaited sandal" type because miniature sandals, although very small, are the proper size to have actually been worn by children. "Toy sandals" are so small as to be useless as real footgear, even for an infant, and three out of four are woven from bear-grass which is never used in making sandals but is usually restricted to twilled articles such as matting or ring basketry. This distinction in manufacturing material
concerning those plaited objects prepared for wear and those not is probably in effect because bear-grass is too coarse and its tiny saw-tooth leaf edges too rough on the foot, whereas its toughness is desirable for such things as matting, potrests, and basketry.

One toy sandal is a round-toed example complete with sandal tie and heel fold over. Every detail found in larger sandals is here present. It is woven in an over-two-under-one pattern with double elements of split bear-grass leaves. Elements are 4 mm. wide, each split leaf being about 2 mm. in width. A single split leaf is also used for the tie. This toy sandal is shown as Figure 74e. Length, 129 mm.; width, 32 mm.; thickness, 4 mm.; cat. no. A-17096.

The two others made from bear-grass are no more than square toes, started but never completed (Fig. 74g). They look as though they were idle practice endeavors. Width: 38, 30 mm.; thickness: 3, 5 mm.; width of elements: 2-6 mm.

The fourth specimen (A-17094) is a minute wickerwork sandal toe. Yucca fiber is used and it is faithfully modeled on larger examples of its kind. Width, 14 mm.; thickness, 4 mm.

POTREST: Two kinds of potrests are present. Two specimens of one kind are rough, flat coils of grass loosely held together and in a circle by twisting the grass on itself with a lazy S-twist. This type is not made with
Figure 74. - Woven plant artifacts from Red Bow Cliff Dwelling.  a, b, twilled potrests, a side view, b top view;  c, e, toy sandals;  d, mid-section of a twilled quiver;  f, segment of twilled matting;  g, unfinished twilled strap. Maximum diameter of b, 121 mm.
any care, is fragile, and is not the kind of rest that would last long under prolonged use or if it were moved about to any extent. Maximum diameter: 134, 148 mm.; width of the ring: 46, 37 mm.; thickness: 19, 21 mm.

The second type is a twilled potrest. A side view (A-17090) as well as top view (A-17097) of two different specimens are shown in Figure 74a and b. Haury feels that this kind was employed "as a head-ring in carrying loads" (1934: Pl. XLVI), and he cites its use among the Pima as an ethnographic example. Interestingly, the twilled potrest was not found in Tularosa and Cordova caves (Martin and others 1952) but did occur at Canyon Creek Ruin. It may therefore be a late Mogollon-Pueblo trait in this region.

The four specimens here considered vary considerably in thickness, but are otherwise alike. The finest is a beautifully constructed ring of bear-grass woven in a herring-bone twill; stiff and rigid, it displays handsome craftsmanship. Herring-bone twill differs from ordinary twill in that elements cross one another at a sharp angle considerably less than ninety degrees. Potrests of this kind are constricted in mid-diameter, some much more so than others.

Two specimens are woven in an over-two-under-two pattern, two are in an over-three-under-three technique. Bear-grass leaves are used throughout which are generally
untrimmed. One of the specimens is actually a combination of both types, a grass potrest having been tied directly under a twilled one with a 2-strand piece of bast cordage. This arrangement, after it was tied, was certainly a potrest and not a head-ring. Maximum diameter: 113, 121, incomplete, 130 mm.; width of ring: 32, 28, 19, 37 mm.; thickness: 66, 45, 24, 32 mm.; width of elements: 4, 4, 3, 5 mm.

Potrests from Red Bow Cliff Dwelling are notably clean, especially the twilled type. No soot black, charcoal, or ash clings or adheres to them. This suggests that these rests were never used for cooking pots, because the exterior of bottoms and sides of all corrugated cooking pots are covered with thick black greasy soot and ash which easily smears onto anything that the pot contacts. Most likely candidates for use on either potrests or head-rings are, of course, large clean-surfaced red ware water jars which, when full, must be kept upright on the floor at home or on the head while in transit.

**TWILLED STRAP:** A number of narrow twilled specimens seem to be unfinished strap ends; none are complete. One specimen is small and tightly woven over-two-under-two with very narrow (1 mm.) elements; it is 74 mm. long, 7 mm. wide and 1 mm. thick, bound at one end with a thin thread-like filament. It is an exception compared with the others and is not included below. Among the eight other examples (Fig. 74g), the range in number of elements used
is three to nine, usually unmodified bear-grass leaves. A round end is begun 8-16 mm. in width and woven in an over-one-under-one (one specimen over-two-under-one) technique for 25-70 mm., only to terminate with a group of free elements extending out in different directions. Some of these might well be no more than the remnants of a beginner's practice.

**QUIVER:** The mid-section of a quiver (Fig. 74d) was recovered from among rubbish in Room 4, north wall section. It (A-17099) is a continuous hollow cylindrical piece of tight herring-bone twill flattened into an oval cross-section. It is woven of unmodified bear-grass leaf elements 3-4 mm. wide in an over-three-under-three pattern. The section is 295 mm. in maximum length; 67 mm. wide, and 30 mm. thick through the woven portion.

**TWILLED MATTING:** A dozen sections from different specimens of twilled matting were found. This kind of matting is regular twilling where elements cross one another at a ninety degree angle (Fig. 74f) and, being a most common all-purpose type of weaving, is generally used in a variety of ways such as for flooring, in ring-baskets, and as cradle backing. The sections found at Red Bow Cliff Dwelling are, with two exceptions, too small and fragmentary to provide any insight into their specific use. The two exceptions include one small fragment which is curved as though it were once a part of a ring-basket bottom, and
two segments of a large floor mat that ended up being placed immediately below the final layer of plaster in the surface of the bench in Room 5 to give added strength to the surface plaster. This specimen is woven of split yucca leaf elements 6 mm. wide in an over-three-under-three technique. Another unusual fragment is very small (maximum width, 27 mm.) and is woven of elements not wider than 1 mm. in an over-two-under-two pattern. It has a 20 mm. stretch of self selvage. The remaining eight specimens are all woven with long lengths of unmodified bear-grass leaves 3-5 mm. wide; four in an over-three-under-three, three in an over-two-under-one, and one in an over-two-under-two technique. No selvage remains in any of these examples. The weaving in all of them is somewhat loose but this may be due to their fragmentary condition. None of the woven portions exceeds 120 mm. in its maximum dimension. Thickness is uniformly about 4 mm.

TWINED BASKETRY: A single fragment was found which is made of bear-grass warps that are taken to the rim and folded over a weft and directly back on themselves to form what are actually double leaf parallel warps with about 1 mm. of intervening space. Two weft elements, other than the selvage, occur at 20 mm. intervals. Wefts are two 2-yarn hard fiber cords that pass alternately back and forth over, between, and in back of warps, always separated by a warp except when crossing each other. Weft
crossings also alternate as to which weft cord is uppermost. In this way the warps are kept upright in the shape of a loose basket or container. Specimens which show a basic methodological resemblance to this fragment are pictured from Mule Creek Cave (Cosgrove 1947: Fig. 102a) and Tularosa Cave (Martin and others 1952: Fig. 122).

COILED BASKETRY: There are 13 fragments (A-17101) and one complete example of coiled basketry. These are assigned to three types according to Morris and Burgh's (1941) classification. There is surprisingly little variation in the collection and all specimens are sewed with an uninterlocking simple stitch, in a close coiled technique with a / slant; split stitching is limited to one instance and this could have been accidental; foundation rods are round slender solid lengths of wood, bundles are of fiber and grass. Differing wall techniques are shown in Figure 75.

The majority, nine fragments and the complete basket, are two-rod-and-bundle foundation, bunched, simple stitch, uninterlocked; stitching splints are close together in a tight weave; one bottom portion is a normal center; two rim fragments are self rims but one of these, for added rigidity and protection, has a single rod rim sewed on top of the self rim with one wide splint by means of a heavy crude simple running stitch that sometimes takes in one coil, sometimes two; on the average there are 2 coils and 4 stitches per cm.
Figure 75. - Basketry and leather object. a, close coiling, simple stitch, uninterlocked; two-rod-and-bundle foundation, bunched; b, close coiling, simple stitch, uninterlocked, bundle foundation; c, close coiling, simple stitch, uninterlocked, bundle foundation with rod core; d, close coiling, simple stitch, uninterlocked, three-rod foundation, bunched (found at Tule Tubs Cave); e, twined basketry fragment; f, three stepped triangle decoration executed in black splints appears at three equal points about the rim of the complete coiled basket shown in Figure 76; g, leather pouch tied about its midsection contains a single broken hardwood tip (shown in black) from a wooden awl or arrow foreshaft.

(Coiled basket wall techniques after Morris and Burgh 1941: Fig. 3.)
Figure 76. Coiled basket, shallow bowl; wall technique: two-rod-and-bundle foundation, bunched, simple stitch, uninterlocked; diameter, 142 mm.
The complete basket (A-17092) of this type is a shallow bowl (Fig. 76) with a diameter of 142 mm. at the rim and a depth of 43 mm.; it is begun from a normal center and terminated with a self rim; there are 2 coils and 3.5 stitches per cm. At three equal points about the rim, a simple three stepped triangle decoration is pendent down to the fourth coil. It is executed in black splints. This specimen and fragments in this category are manufactured in the same wall technique as, and are extremely like, the primary type at Tularosa Cave (Martin and others 1952: 250, 306-308, Fig. 117), and the same type of coiled basketry was also most abundant in caves of the upper Gila (Cosgrove 1947: 99-105).

Three fragments are bundle foundation, simple stitch, uninterlocked; stitching splints are relatively far apart (3 mm.); there are 2.5 coils and 2.5 stitches per cm.

One fragment is bundle foundation with rod core, simple stitch, uninterlocked; one split stitch occurs in the small specimen; stitching splints are relatively far apart (3 mm.); 1.5 coils and 2.5 stitches per cm.

OBJECTS OF WOOD

Grange has recently summarized the occurrence of many wooden artifacts in the Southwest (Martin and others 1952: 331-371). Most individual types of wooden objects
recovered from Red Bow Cliff Dwelling are represented in
the collection which he examined; and his comparative
material can therefore be extended to types found in the
Point of Pines region. Grange points out that the tech-
niques of wood working which

"...are recognizable from marks remaining on
specimens include peeling of bark, breaking,
whittling, splitting, sawing, scraping,
incising, smoothing and polishing...Presum-
ably woodworking was accomplished through
the use of stone tools such as choppers,
scrapers, knives, drills, saws, abrading and
polishing stones." (Martin and others 1952:
335-336.)

DIGGING STICK: Three specimens; one complete
(Fig. 79h), flat blade, handle rounded to afford a comfor-
table grip, surfaces smoothed and worn by extended use;
two broken working tip ends are smoothed to a sharp point
from small diameter sticks. All are natural hard pieces
of wood with bark peeled away with ends fire-hardened and
subsequently smoothed through use. Length: 430 mm., two
incomplete; maximum diameter: 25, 23, 12 mm.

FIRE DRILL HEARTH: Five specimens (Fig. 79f); all
soft sticks of wood, no bark, probably stalk sections of a
monocotyledonous plant; each split to provide at least one
flattened surface into which sockets are set. In two,
sides opposite the sockets are also flattened. Drill hole
sockets are always set in single rows along one surface of
each stick (5-20 mm. between sockets); the bottom of every
hole is rounded and blackened and a slot in the socket wall
is present; slots never face in opposite directions on the same stick (Fig. 79f). Length: 346, 152 mm., three incomplete; width: 15, 14, 12, 14, 13 mm.; thickness: 13, 9, 10, 8, 9 mm.; socket diameter: range, 7-10 mm.; socket depth: range, 4-10 mm.; number of sockets: 9, 2, 3, 2, 2.

FIRE DRILL: Three specimens; small diameter, peeled, hardwood sticks with one end rounded and slightly charred from being twirled in a hearth socket; two are broken end fragments; the third is complete but is unmodified on the opposite end. Length: 261 mm, two incomplete; diameter at socket tip: 7, 9, 8 mm.

WOODEN AWL: The 14 specimens in this category are of peeled hardwood and are divided into four types.

Type a: Three specimens; small, relatively short awls that taper evenly to a sharp thin point from a base intentionally cut off square; these implements are nicely fashioned with smooth rounded surfaces. One is a twig with small, but smoothed, knot stubs. Length: 137, 116, 84 mm.; width at base: 6, 4, 5 mm.

Type b: Eight specimens; slightly longer, thicker, and rougher than those of Type a; the principal difference is that the base is a rough broken end, the ragged edges of which have been worn down and smoothed by constant pushing against the palm of the hand; working tips taper evenly and smoothly to a sharp point; two are more rounded on the tip and the entire end is smoothed to a polish.
constituting long, heavy, expertly fashioned wooden awls which may have been weaving implements (Adams 1957: 53). Length: range, 138-254 mm.; width at base: range, 5-8 mm.

Type c: Two specimens, similar to Type b and having broken unworked base ends, differ in that the working tip is a thin flattened wedge-shaped spatulate point; edges of the point are smoothed, the tip of one is round, the other is broken. Length: 176, 188 mm.; width of working tip: 5, 6 mm.

Type d: One specimen; very small but pointed at both ends with sharply tapering points. Length, 72 mm.; maximum width, 5 mm.

WEAVING TOOL: One specimen, which has been badly chewed and disfigured by rodents; it is a long, slender piece of peeled hardwood that has been entirely carved into a flat rectangular cross-section; edges are squared but smoothing and polishing have given them convex grinding surfaces; edges and faces are not absolutely straight and the carving on them is wavy; one end is squared with rounded corners, the other is broken; there is a slight long axis twist to the entire artifact; no decoration, notching, or incising is present; it gives an appearance of having been a carefully conceived tool extensively smoothed by wear on soft materials such as would be the case with a shed or heddle rod in weaving (Adams 1957: 51-52). Length, 343 mm.; width, 13 mm.
SPINDLE WHORL: Thirteen specimens; all thin, flat, rounded discs carved from hardwood slats. Every one recovered is a broken half and no two fit together; in nine the halves are large enough so that a segment of the round central perforation remains; one specimen is concavo-convex as are most gourd and pottery spindle whorls, the other twelve display flat, smoothed surfaces; edges rounded, smoothed, and often thinned to a sharp wedge-shape; six are perfect circles, six are extensively rounded squares that retain suggestions of the original square; the shape of the squared variety (Haury 1934: Pl. LXVI) is unexplainably consistent in all specimens of this kind and is best shown by illustration; perforations are straight walled. Wooden spindle whorls are not recorded for Tularosa and Cordova caves (Martin and others 1952) and may possibly be a late manifestation peculiar to the Mogollon-Pueblo. Thickness: range, 3-9 mm.; diameter (6 circular): range, 68-99 mm.; maximum diameter (6 squared): range, 78-95 mm.; minimum diameter (6 squared): range, 68-76 mm.; perforation diameter (9): range, 4-6 mm.

A single specimen not included above is only a 16 mm. strip out of the center of a wooden spindle whorl. It is unusual in that the original whorl had been broken directly up the middle through the perforation and the crack mended with a 3-fiber, Z-twisted strand of sinew cord. Small holes are pierced in single rows on either side of the break
and the sinew run back and forth, drawn tight, and tied to hold the pieces together. The exact method is illustrated and measurements of the whorl fragment fit the ranges previously given.

**SPINDLE SHAFT:** Wooden spindle whorls and spindle shafts found at Canyon Creek Ruin are similar to Red Bow Cliff Dwelling examples. Haury's remarks are therefore applicable to weaving methods in the Point of Pines region and with regard to spindles are important because not only is his sample larger, but a complete weaver's kit of spindle shaft, whorl and cop of spun yarn shows the proper arrangement of these artifacts (Haury 1934: 88-89, Pl. LVIII).

"For preparing textile yarns, the whorl and distaff method of spinning was used. The spindle shafts or distaffs were made of hard wood, and fitted, near the centers, with wooden discoidal whorls, which were seated on a wrapping of cotton or other fiber. Shafts were usually tapered to a point at each end, and never notched, as was the custom among some peoples. Several different sizes were used, the range being from 14 to 16 inches. The longest shafts were probably used in spinning the coarser yarn for the apocynum cloth, while the shorter ones served for the lighter cotton yarns." (Haury 1934: 110, Pl. LXVI.)

Haury's illustration of the weaver's kit also shows that when only one end of the spindle is pointed, as is the case with the Red Bow Cliff Dwelling specimen, that is the end toward which the thread is spun.

The Red Bow Cliff Dwelling spindle shaft is a long,
slender hardwood stick, peeled, smoothed and tapered to a sharp point; a cotton strand is wrapped and tied tightly around 20 mm. of the shaft mid-section, increasing its diameter from 5 to 8 mm. The total length is 334 mm.

WOODEN RUBBING TOOL: A short stocky piece of a peeled hardwood stick has one end extensively rounded; smoothing and rounding is unequal, more so on one side than on the other, as if the rubbing tool had been held at an angle while being worked around on another object; all surfaces and edges are smooth but not polished; except for the base which is broken off and charred; burning seems accidental; diameter is uniform without any tapering. Length, 157 mm.; width, 21 mm.

SEED BEATER: This specimen is questionably identified as a seed beater but bears a superficial resemblance to one shown by Grange (Martin and others 1952: Fig. 147a) from Tularosa Cave. It is an unmodified twig with an awkwardly fashioned head made by haphazardly bending two small branches about themselves and securing them with a few bends of another piece of the same material. A knot of twigs is consummated in this manner which reposes at the head of a thin mainstem. The base or handle is slightly discolored as if it had been extensively held in the hand. Otherwise the small branch is unworked and still retains original bark. It is at best a makeshift artifact. Length, 460 mm.; diameter of handle, 5 mm.; maximum width
PRONGED SEED BEATER: This type of seed beater is more authentic in its identification but even its use is somewhat hypothetical. A number of specimens such as the one here discussed have been found in the Anasazi area. Some of the finest were recovered by Kidder and Guernsey as a cache in Ruin 1 associated with their Cliff-house culture. These are pictured by them (1919: Pl. 48) and their resemblance to the Red Bow Cliff Dwelling specimen is extremely close.

Six identical straight slender hardwood sticks are cut, peeled, tip ends rounded and smoothed, base ends carved and worked into thin blades. A small hole is drilled through each blade at exactly 88 mm. from the end. A cord is forced through the hole in each so that it holds the blade ends of all six prongs tightly together, flat sides against each other. Cotton cordage is then extensively wrapped around and over each prong on up toward the tips for a distance of 83 mm. The wrapping around and in between the prongs becomes progressively greater toward the tips so that the prongs are permanently and rigidly spread apart toward their tips and yet held in the same flat plane. The cotton cord wrapping is extremely tight so that the object could have withstood rough treatment before the binding would loosen. Total length, 525 mm.; 140 mm. wide at tip end, 10 mm. at base end; wrapped area
grows from 22 to 51 mm. in width; uniformly 5 mm. thick.

This six pronged seed beater is shown in Figure 67a.

Morris, with regard to the use of these objects, relates:

"An old Navajo told me that at least twice since their return from Fort Sumner, his people had been reduced to gathering tlo-tai (a certain kind of grass seed) from which to make flour. It was late summer. He pointed out the gray-white weed spreading low upon the ground, and described the gathering process, which consisted of sliding a tray basket under the plant and knocking the seeds into it with a beater of spread twigs." (Morris 1939: 118.)

**WOODEN FLUTE:** This object might equally well be called a whistle because one end is broken away and it is impossible to determine if, in its entirety, it had more than one finger hole. It is a round, gently curved, natural piece of soft wood which has been hollowed through its entire length; the mouth end is cut square, edges rounded and smoothed; all surfaces are peeled and roughly smoothed; a circular hole 6 mm. in diameter is cut through one surface of the tube 84 mm. from the mouth end. Exterior diameter, 11 mm.; interior diameter, 7 mm.; length of broken segment, 135 mm.

**WOODEN RASP:** A round stick of peeled hardwood is carved toward one end so that its sides are flattened and a rounded ridge is formed. This ridge is notched by a series of 17 parallel slices at right angles to the long axis. The notches are about 1 mm. deep, are at 2 mm. intervals and cover 60 mm. of one end; the opposite end is
Figure 77. - Objects of wood from Red Bow Cliff Dwelling. 
a-c, spindle whorls (reconstructed from broken half sections); 
d-h, carved wooden pahos; i-l, crook-staff pahos; 
m-r, painted stick pahos; s, wooden rasp; 
t, wooden rubbing tool; u-y, wooden awls; u, v, Type a; 
w, Type b; x, Type c; y, Type d; z, fire drill hearth; 
z', fire drill. Diameter of a, 99 mm.
unmodified and was used as the handle; the teeth produced by the notches show a uniform wear and polish which resulted when another object (a stick or bone) was raked back and forth to produce the sound normally associated with this musical instrument. Both ends are broken and have been damaged by rodents to an extent that it is impossible to say if they were simply not smoothed or were originally longer. Diameter of handle, 8 mm.; width of rasp end, 6 mm.; thickness of rasp end, 8 mm.; length, 172 mm.

HOLLOW ENDED STICK: A long, straight piece of soft, peeled wood was carefully hollowed out at both ends, its center portion left solid; both ends are cut off straight; edges and surfaces roughly smoothed; use is unknown but it must have served in some capacity as a double socket though no lashing or binding evidence is present. Exterior diameter, 14 mm.; diameter of holes, 7 mm.; length, 234 mm.

TWIGS TIED IN LOOPS: While they were green, flexible twigs of various sizes were twisted and wrapped into a variety of shapes. When thoroughly dried they hardened and retained these shapes. A number were found at Red Bow Cliff Dwelling; none were found in any coherent association, but they must have served as a rough kind of cordage or as tying devices. Twigs are looped on themselves, in irregular masses or bundles, in single loops and in a few cases, several small twigs are S-twisted into a cord which is then
looped into a circle. Twig loops vary in diameter from 20 to 130 mm.

Ceremonial Wooden Pahos

**CARVED WOODEN PAHO:** Pahos of this kind have been found at almost all cave sites in the Mogollon-Pueblo area which contain ceremonial aspects. Especially fine examples were recovered by Hough and are classified by him as "roundel pahos." Hough's specimens are "painted in lively colors of red, yellow, green and black" and carved in a variety of head forms as shown by his excellent illustrations (Hough 1914: 62, 96-97, Fig. 139, Pl. 20). This type of paho is also common in the Anasazi area. Morris records an extraordinary find which also includes crook-staff and miniature bow pahos from Mummy Cave and pictures examples identical to those recovered from Red Bow Cliff Dwelling (Morris 1941: 227-230, Figs. 1, 2).

Of those from Red Bow Cliff Dwelling one is nearly complete (Fig. 79g), being 375 mm. long and 10 mm. in diameter. The remaining five are carved head fragments not more than 90 mm. long. Their nature is best shown by outline illustrations. Heads are carved round so that raised bands of wood alternate with rounded depressed bands. One example retains traces of a black spiral stripe decoration on a raised band and solid green on an adjacent depressed band. The single complete specimen is entirely
painted red and the head and stave further embellished by a series of black stripes in conjunction with a solid black area which encircle the paho stick. Diameter of incomplete carved paho heads varies from 7 to 11 mm. All are fashioned from soft, peeled woody sticks. Three were found in the ceremonial area, one in the north wall section of Room 4.

PAINTED STICK PAHO: These devices apparently have no function other than as offerings. Construction is extremely simple; a small, reasonably straight, stick or twig is peeled and slightly smoothed, decoration is often elaborate and beautiful although painting is never applied with any extreme care. Evidently special offertory and ceremonial situations called for sticks that were painted, perhaps with certain colors in a certain way and these were made as quickly and easily as possible. Nine stick fragments from the ceremonial area and north wall section of Room 4 are decorated with red, green, blue, and black stripes (3–8 mm. wide) and solid areas. With slight variation in stripe positioning, most of these are identical with two specimens shown in color by Cosgrove (1947: Frontispiece, k and l) from Steamboat Cave.

A subtype among this group is similar in every way except that banded decoration is not painted but is achieved by carving away complete bands of bark, leaving a series of natural brown sections of bark alternated with
bare tan peeled sections. Three of these specimens are present from the ceremonial area.

Measurements for the entire group of fragments (12) range as follows: length, 35-265 mm. (7 specimens, 80-150 mm.); diameter, 4-7 mm. Cosgrove (1947: 124-125) indicates most painted pahos in the upper Gila are normally from 10 to 15 inches long. As is the case with almost all pahos at Red Bow Cliff Dwelling, most of the specimens seem to have been intentionally broken.

CROOK-STAFF PAHO: The nature and use of crook-staffs by prehistoric people in the Southwest has always puzzled the archaeologist and no plausible answers have yet been suggested. Excellent examples of large crook-staffs, presumably used in a utilitarian way within the living pattern, have been found throughout the Anasazi area in both early and late contexts. Kidder and Guernsey (1919: 121, Pl. 47) recovered examples from cliff-dweller ruins and Morris obtained beautiful specimens carefully fashioned with surfaces reduced to a satin finish by what must have been endless handling or polishing from Broken Flute Cave, a Basket Maker site in the Lukachukai Mountains of northeastern Arizona (Elizabeth A. Morris 1957: personal communication). Specimens of this kind give every indication of prolonged use, and conceivably they could have been held in such high esteem as to have been passed on from generation to generation. That crook-staffs were
viewed with high regard is evidenced by crook-staff pahos which are exact duplicates in miniature of their larger counterparts. Wherever painted stick pahos, carved wooden pahos, and miniature ceremonial bows occur, crook-staff pahos are also generally found (previously cited instances recorded by Morris 1941; Hough 1914; and Cosgrove 1917 are most outstanding).

In the eight fragmentary specimens from Room 4, ceremonial area, thin twigs or pieces of wood are smoothly bent back on themselves to form a half loop or crook, as in a shepherd's crook. Wood must have been wet when bent because very few specimens show cracks even though bending is severe. Three are undecorated, three solid green, two solid red. Diameter of crook loop: range, 9-33 mm.; diameter of sticks: range, 4-8 mm.; fragments are less than 65 mm. long.

**BOUND STICK PAHO:** The single specimen is an unmodified stick still covered with bark, 203 mm. long and 3 mm. in diameter; the wrapping consists of eight strands of cotton cord, each tightly wound once around the stick, then entangled with one another to form a cordage streamer 116 mm. long. The binding is two-thirds the distance from one end to the other.

**TWIG PAHO:** Fourteen small twig fragments have filaments of fiber cordage wrapped and tied tightly about them. The cordage and nature of the broken twigs and ties are
similar to the arrangement in a twig paho to which a cane cigarette was tied (Fig. 67b). The broken ends are in all probability remnants of twig pahos which once had cane cigarettes, feathers, or other ceremonial objects tied to them. All fragments are from Room 4, ceremonial area, are less than 115 mm. long, have broken ends, and are from 3 to 5 mm. in diameter; all but two are peeled and four of the peeled sticks are painted solid green; none of the cordage ties are decorated.

Ceremonial Bows and Arrows

CEREMONIAL BOW: Grange defines ceremonial bows "as bows of more than 35 and less than 87 cm. in length and of such delicate nature that they probably could not have been used for warfare or hunting" and miniature bows "as bows of less than 35 cm. in length and are so slender and so small that they are often referred to as 'toy bows.'" But he goes on to say, "Obviously, these bows could not have been used in hunting or warfare, and thus in a broad sense they too are really 'ceremonial' in nature." (Martin and others 1952: 347-348.)

Evidently these distinctions applied in the case of bows at Red Bow Cliff Dwelling but they cannot be followed because complete examples or long segments of the larger category did not occur. Specimens from this site are therefore arbitrarily subdivided into three types based on
maximum diameter of the bow or fragment. With but two exceptions, bows occurred in the ceremonial area or adjacent north wall or center sections of Room 4 and all are considered ceremonial bows manufactured for use as offerings, having been carved with the grain from long slender pieces of peeled wood. Grange's observations concerning Tularosa Cave bows to the effect that all of them "are self-bows, are simple wooden staves with curved limbs,...bear no reinforcements of sinew, rawhide, or any other material,...would probably have pulled not more than five pounds" are applicable here as are his comments concerning distribution and occurrence at other sites (Martin and others 1952: 347-349). In addition to Tularosa Cave, the most important and similarly associated finds are those of Hough (1914) in Bear Creek and other caves, and Cosgrove (1947) in Mule Creek and other caves in neighboring New Mexico.

**Type a:** Includes the largest bows, widest diameter 9 mm. or more. Fragments from 13 bows are present; of these six are Cosgrove (1947: 61) Type 1, two are Type 2, two are Type 3, and three are flat back wing tip fragments. It may be estimated that at least four exceeded 600 mm. in length. Wing tips are nocked in two cases and in one of these, a 2-yarn, S-Z-twisted hard fiber cord bow string end is wound around and down the wing from the nock. Wing tips in this type are always terminated by rounded ends. One nocked wing tip fragment is expertly polished. It and
four others are undecorated; three are solid red; and five are painted with various solid areas, bands and alternating diameter stripes in red, green, and black.

**Type b:** Ceremonial bows having a diameter range from 5 to 9 mm. are most common at Red Bow Cliff Dwelling. Of the 30 specimens, five are complete and are shown in Figure 79. All of them are from Room 4, ceremonial area and adjacent center and north wall sections. Each is round through its entire length, gently tapering toward wing tips. Complete examples are 52, 46, 33, 29, 28 cm. in length. Fragments range from 70 to 360 mm. in length. Eight specimens are undecorated, nine are solid red, one solid black, and the remainder are painted with solid areas, diameter stripes and an occasional longitudinal line in red, green, and black. Wing tips are side nocked in two cases; are terminated by the cut and snap method, and, in contrast to Type a, are most often left rough and only occasionally rounded. Hard fiber, 2-yarn, S-Z-twisted bow string remnants remain tied and wound about wing tips in seven cases. (For additional information concerning ceremonial bow strings, see Cordage and Knot sections.)

In a single specimen, broken bow string end segments are attached to both wing tips (Fig. 79c). At one end the cord was made fast by wrapping it about the wing tip eleven times and knotting a final loop; at the opposite end a loose loop has been caught in a set of side nocks;
this kind of loop and others found terminating ceremonial bow strings are illustrated in detail by Figures 55 and 57a, t, w; a bow string arrangement of this kind, if found on a large hunting bow, would mean that the bow was braced by sliding the looped string to the notch and that it was not necessarily left permanently strung.

**Type c:** Includes the smallest bows, widest diameter less than 5 mm. No example is flat backed, nor does any exceed 168 mm. in length, most specimens are between 100 to 110 mm. These are no more than little pieces of brightly decorated peeled wood with a bow-like bend. Of a 21 specimen total, 13 are broken fragments, eight are complete examples. Two of these are a matched pair which typify the remainder. They are small twigs bent to a shallow arc; ends cut by circle and snap method; length, 108 mm.; diameter, 4 mm.; entirely painted a bright red with single black stripes circling each wing 18 mm. from the tip; tips do not retain any evidence of bow string attachment.

Of the entire sample, 10 are completely painted red, four green, three have black stripes and four are undecorated. One specimen with black stripes on either wing is further decorated with two rows of short incised marks between the stripes. Wing tips are not nocked but four retain coiled remnants of fine 2-yarn, S-Z-twisted hard fiber bow strings. The entire group is from Room 4,
Figure 78. - Objects of wood from Red Bow Cliff Dwelling. 

a-g, ceremonial bows; a, b, Type b; c-g, Type c;  
h, broken center strip from a wooden spindle whorl showing the manner in which a previous split was mended with a sinew cord; i-n, proximal arrow ends and sections of shafts; o-w, arrow foreshafts; o-u, shoulder-tanged foreshafts; v, w, tapered tang foreshafts. Length of a, 330 mm.
Figure 79. - Objects of wood. a-e, ceremonial bow; f, fire drill hearth; g, carved wooden paho; h, digging stick. Length of g, 375 mm.
ceremonial area.

**ARROW**: Although broken portions representing every part of an arrow were abundant (total of 433 fragments), not a single complete specimen was found at Red Bow Cliff Dwelling. Most of the shaft and foreshaft sections were scattered about the ceremonial area and north wall sections of Room 4. A number of cane fragments seem intentionally bent double to effect a break. This evidence, when taken together with the occurrence of so many arrow segments without one whole specimen, leads inevitably to suggestions of ceremonial arrow breakage in conjunction with or in addition to other offertory rites.

Proximal arrow ends and shafts are made exclusively of carrizo cane. Foreshafts are fashioned from excellent pieces of hardwood. Carrizo cane is selected to secure straight pieces and needs no modification to serve as an arrow shaft which is not only light and sturdy, but provides a natural hollow socket at the distal end to receive the foreshaft. Sections of shaft cane are occasionally spliced by inserting a narrow ended piece into a wider diameter segment near a node and securing the junction with sinew binding. Similarly, splits in a cane shaft are mended by sinew wrapping. Arrow shafts are from 4 to 10 mm. in diameter.

Proximal ends are cut off straight and nocked with a V- or U-shaped notch cut and abraded across the end 1-4 mm.
deep. Nocks are stabilized to prevent the bow string from splitting the cane in three ways: by making the proximal end cut immediately above a node; by filling and packing the hollow proximal end with tough pieces of straw pushed down the cane until seated on a node; by filling the hollow proximal end with a purposely cut wooden plug. In each case, the nock is cut into the reinforcement and in all three methods, a tight binding of sinew is usually placed immediately below the nock cut to keep plugs in place and add further rigidity to the place of bow string contact.

In one case, unusual in this collection, the wooden plug extends out beyond the end of the cane, providing a nock end by itself. Pitch is only used to attach foreshafts and arrow points while sinew is always relied upon in base construction to keep feathers and nock plugs in place. Approximately 94 of the total number of fragments can be identified as proximal (nock) ends of arrows.

About 25 of these retain feathering. Feathers of the red shafted flicker are most often used but brightly colored feathers, such as from the bluebird, are also present. Feathering is exactly as Cosgrove found it in specimens from the upper Gila and the reader is referred to his description for precise details (Cosgrove 1947: 63, Fig. 75). Feathers halved longitudinally splitting the quill are evenly spaced about the nock end in sets of three and attached by sinew bindings at either end, leaving
the mid-section free. Various red and black bands, stripes, and fine delicate lines in differing combinations decorate many of the proximal ends. Green is also used on rare occasions. Decoration is executed before the attachment of feathers. In two specimens, small dabs of black paint adhering to nock ends were made unusual by sprinkling powdered specularite on the paint while wet in order to give it sparkle. This technique is also recorded by Cosgrove (1947: 64) and Hough (1914: 66).

Foreshafts are carved with the grain from pieces of hardwood. The primary difference between foreshaft types is in the method of seating the foreshaft in the cane arrow shaft socket. In order to accomplish this, the proximal end of the foreshaft must be reduced to the proper size. At Red Bow Cliff Dwelling this was done in two of the three ways discerned by Cosgrove among the foreshafts of the upper Gila collection and these specimens are technological duplicates of his. The simplest type of foreshaft is finished with a "tapered tang." The more complex is finished with a straight tapered tang and with a shoulder which fits against the end of the reed. In the first, the reed end may not be beveled, but it is usually sanded down to a thin edge. About the end of the reed, a tight wrapping of sinew leaves a slight bulge at the junction. With the shoulder-tanged foreshaft, the reed is made to abut the shoulder perfectly, and the junction of the reed and foreshaft is sanded down. The wrapping of thin sinew around the reed does
not materially increase the thickness of this perfect joint. All foreshafts are cemented into the reeds with pitch. They are smoothed and rounded by sanding, sometimes even polished, and taper gradually to the forward end, which may be left sharp, or, for the attachment of a stone point, a small notch may be cut in the end, much like the string nock but with thin sides, or lips." (Cosgrove 1947: 63.)

Of the total number of fragments, 177 can be classified as carved hardwood foreshafts. Of this number, many are complete, 74 are shoulder-tanged foreshafts, and about 25 are broken too badly for accurate classification.

In this collection, only shoulder-tanged foreshafts were prepared to receive projectile points. There are seven specimens modified for this purpose with a slot at the tip of the foreshaft. Evidence suggests pitch was used in addition to sinew binding to fasten the point. Rigid attachment was generally achieved by a figure-eight wrapping which was wound tightly around and down the foreshaft below the point base for a distance of 5 to 15 mm. (For additional details concerning point hafting, see Ceremonial Projectile Point section and Figures 42 and 43e, f.)

Foreshafts are often decorated with solid colors; 69 red, 16 green, 4 black; a few have bands and stripes, and a number are undecorated. A single elaborate specimen was carved at the tip to resemble a series of barbs and is similar to two examples shown by Cosgrove (1947: Fig. 20,
The decoration of the proximal ends and foreshafts of arrows at Red Bow Cliff Dwelling does not attain the diversity and elaboration which Cosgrove notes in the collection secured by him (1947: 62-65, Figs. 20-22, Pl. 75). The number of sites considered and the size of the collection dealt with, however, exceeds that from the Point of Pines region. The basic techniques of arrow making and decoration are nonetheless fundamentally the same in the two collections and both of these compare favorably with specimens examined by Hough (1914: 63-66, Figs. 140-144) from the same district.

**STICK-WORK ARROW POINT BUNT**: A normal tapered tang plain hardwood foreshaft is transformed into a bunt point by tying three small pieces of wood at right angles to the long axis, the ends of each one overlapping the other to form a triangle about the foreshaft. The small pieces of wood are about 18 mm. long in one specimen, 35 mm. in the other, and 4 mm. in diameter. They are lashed to the foreshaft by the many over, under, and around twists and turns of an untwisted hard fiber cord which in one case, is then wrapped around and down the foreshaft. The net effect of this procedure is to produce an irregular bundle approximately 25 mm. from the point tip which acts as a penetration stop when the point pierces its target. Stick-work arrow point bunts are recorded from Ventana Cave (Haury and others 1950: 419-420, Pl. 35h, 1), Bear
Creek Cave, and the Blue River vicinity (Hough 1914: 66, 98, Figs. 143, 203). They are probably not ceremonial objects and as Forde observed among the Yuma, may have been articles made and used in hunting certain kinds of game such as perhaps "water birds...which were valued for their plumage and shot while at rest with blunt arrows." (Forde 1931: 91.)

OBJECTS OF LEATHER

LEATHER POUCH: A small piece of tanned leather is folded up from a conical bottom to act as a container (A-17102). It is tied about its mid-section 23 mm. up from the end by a 4-yarn, S-Z-twisted bast fiber cord in order to prevent the sides from flattening out. The pouch (Fig. 75) contains a broken hardwood tip from a wooden awl or arrow foreshaft and was evidently a receptacle for objects of this kind fashioned to protect tips from damage. Folds in the leather indicate that when in use, it held a number of awls or foreshafts. Maximum diameter: base, 15 mm., orifice, 42 mm.; height: 68 mm.

LEATHER PATCH: There are four roughly circular and ovaloid pieces of leather and membrane which have a row of small perforations about their perimeter 4-8 mm. from the edge that contain remnants of hard fiber cord or thread. These purposely cut segments must have been used to patch
other articles by attaching them over a hole or break with a running stitch. All four are dried into a concave shape which may also be an indication of their use as bottom reinforcements for woven receptacles. The largest patch is made of leather dyed red before stitching. Maximum diameter: range, 42-69 mm.; thickness: range, .5-1.0 mm.

LEATHER FRAGMENT: Of the three specimens recovered, one is an almost complete small rodent skin with fur which has not been modified; the second is a strip of hide with fur removed cut off square at one end; the third is made up of three ragged pieces sewed together along mutually straight cut edges. This latter object is fragmentary and its original use cannot be discerned; the leather was tanned to some extent, fur removed, and the pieces joined by a simpler fagot stitch. All of the specimens are small and do not exceed 135 mm. in maximum dimension.

SUMMARY DISCUSSION

The occupation at Red Bow Cliff Dwelling occurred within the Canyon Creek Phase over a span of time during the period A.D. 1325-1400. There is no evidence that the site was ever occupied at any other stage in human history, consequently all of the artifacts may be taken as objects in use within the living pattern of a rural Mogollon-Pueblo group from 1325-1400. Both ceremonial and domestic
FIGURE 80. - SUMMARY PROVENIENCE CHART FOR ARTIFACTS FROM RED BOW CLIFF DWELLING

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aspects are represented. From an inventory of artifact types found at Red Bow Cliff Dwelling, such as is presented in the summary provenience chart (Fig. 80), individual types may, in the light of their descriptions, be relegated to one or the other of these aspects. A few types are both domestic (utilitarian) and ceremonial in nature. Nevertheless, if architectural features and pottery are also considered, research workers can provide themselves with what may have been the domestic and ceremonial complexes peculiar to everyday life at this time. A full study of this interesting facet cannot, however, be properly undertaken and evaluated until archaeological analysis of materials recovered from the Point of Pines Ruin is complete.

Red Bow Cliff Dwelling was occupied because population pressures at large communal centers in the region made rural settlement necessary, possibly by small family groups on a seasonal basis, to satisfy increased economic demands in the realm of agriculture and seed gathering. An excellent cross-section of ordinary household material culture was obtained from the site. As is the case with the large lithic collection, overwhelming similarities in perishable material demonstrate conclusively the homogeneity of culture recovered from cave sites throughout the Mogollon-Pueblo area from the Mimbres Mountains in New Mexico to the Sierra Ancha in Arizona. Since the Reserve
and upper Gila districts were depopulated during the Tularosa Phase the similarities in artifact types (especially with respect to perishable material) also tend to demonstrate and emphasize cultural continuity in the Point of Pines region from early in the twelfth to late in the fifteenth century, and may perhaps be the surviving evidence of a population shift during that time from east to west within the Mogollon-Pueblo area.
Figure 81. - As seen from Ash Flat, the cave which provides shelter for Ash Flat Cliff Dwelling is situated above a series of sharp cliffs in the Nantack scarp.
ASH FLAT CLIFF DWELLING
(Arizona W:10:1014)

THE SITE

Hundreds of feet above Ash Flat beneath a massive overhang, Ash Flat Cliff Dwelling is situated amidst circumstances almost identical to those at Red Bow Cliff Dwelling (Fig. 81). Associated features are, however, on a more grandiose scale. The cavern is larger, the cliffs directly in front greater in height (Fig. 82), and the number of architectural rooms exceed that of any other cliff dwelling in the group.

The cave is located three miles east of Arsenic Cave (Fig. 4) in the highest level of the uppermost agglomerate cliff strata at an estimated altitude of 6,000 feet. Cliffs do not occur above it but the scarp face continues to retreat precipitously to the rim.

The chamber is only a shadow in the cliffs from below (Fig. 81) and the closer it is approached, the more hidden from view it becomes. That the cave contains dwellings can be ascertained only from the air or from a single nearby promontory to the west, and its true size is not apparent until it has been entered. Although the cave can be reached from the ridge above or the flats below, no route is easy. This large cliff dwelling is due south and directly across the ridge from the Point of Pines Ruin.
Figure 82. - From a ridge spur to the west, Ash Flat Cliff Dwelling appears under a large protective overhang.
Not over four and a half linear miles separate the two and unless undiscernible circumstances intervened, there is no reason why close touch between the two ruins did not exist.

The cave is approximately 45 m. across the front and 20 m. in maximum depth and is an uneven crescent shape; exposure is to the southwest. Cliffs fall away several hundred feet in a sheer drop from the cave mouth. Building for the most part occupies recesses to the rear, leaving a large open frontal area (Fig. 82). In plan the ruin indicates twelve rooms (Fig. 83).

The site was briefly visited twice by Field School survey parties and is described on the basis of these two trips. Because of the difficulty in reaching the cave, time spent there was short and although photographs, a sketch plan, and observations relative to the architecture were secured, no excavations were undertaken. Ash Flat. Cliff Dwelling represents the best example of cliff dwelling architecture in the Point of Pines region and for this reason, its description is of value.

The surface of the site is in no way littered with culture and except for a few bushes and bunches of grass, the frontal area is almost clean. Several stone tools and debris accumulated on the surface of Room 1 and a few, small, scattered sherds and stone implements represent all the culture that is evident. Fragments of dry material, metates, and stone tools commonly found in some quantity
on the surface of other caves in the Nantack are absent. The only names inscribed on any portion of the ruin are James and George Stevens, July 15, 1933, both Apache men who lived in the area. There is no record of this cave having received the attention of any expedition and no surface disturbances indicated visits by persons interested in antiquities.

ARCHITECTURE

Masonry: Basic wall construction is consistently of one type (Fig. 85a) and represents the best architecture observed among dwellings in the caves. Unshaped building blocks were laid up in irregular courses, but in a way which produced a uniform wall from top to bottom. The dressing or shaping of stones was not attempted, yet an effort was made to place the smoothest side of a rock outward toward the wall surface. Tuff agglomerate predominates as building block material and large basal boulders are not present. Pebbles, small jagged rocks, and fragments are set as spauls amidst the heavy mud mortar. In the walls of Rooms 1, 2, and 3 mortar was not smoothed or worked after blocks were set (Fig. 84b). In contrast to this type of surface finish, sections of walls in Rooms 6, 7, and 8 received a smooth coating of surface plaster (Fig. 85a, right). The cave floor or cave debris serves as a
Figure 83. - Plan of Ash Flat Cliff Dwelling.
Figure 84. - Architectural units in Ash Flat Cliff Dwelling. Construction details concerning masonry, doorways, and square observation or ventilation holes are shown. Note lintels of sticks or slats placed across door tops and imbedded in walls at either end. a, Room 7 (left), Room 8 (right); b, Room 3; c, doorway connecting Rooms 5 and 6.
foundation for all masonry. Most walls are straight but curved walls are a part of several rooms built on a natural shelf at the west end of the ruin. Wall height: range, 1.40-1.65 m.; wall thickness: range, 26-31 cm.

**Doorways:** Doorways in various stages of preservation (Fig. 84) are present in all rooms but 10, 11, and 12. They are rectangular; wood is used for lintels; in some cases vertical sides are smoothed off and plastered (Fig. 84c), in others the rough wall ends are unmodified (Fig. 84b). Doorway height: range, .82-.96 m.; doorway width: range, 46-50 cm. Occasionally a sill or step is present which was built of mud mortar and flat rocks (Fig. 84b). Lintels vary from one to several parallel sticks or slats placed across the door top imbedded in walls at either end. No dendrodate specimens were obtained from Ash Flat Cliff Dwelling because lintels and wood used in construction are branches and slats too small or thin to provide samples. Two windows serve in each instance to connect two rooms (Rooms 2 and 3, Rooms 8 and 9).

**Ventilation holes:** A number of square and rectangular ventilation holes are a constructed part of walls at odd intervals. Several are placed in such a position as to make them serviceable for either observation or ventilation (Figs. 84a, c; 85b).

**Hearth:** Surface indications probably do not accurately
tell of fire areas in rooms. Room 8 contains the only slab-lined hearth which remains standing. Other fire areas appear as shallow clay-lined basins or irregular ash areas. In Room 9, a single stone slab is set in an upright position between fire area and doorway.

Benches: Benches are an unusual architectural feature characteristic of the upper Nantack caves. They are excellently built and comparatively well preserved at Ash Flat Cliff Dwelling. The actual areal extent of a bench is usually determined by the room where it was constructed but generally a rectangular outline is approached. At this site, some of the lower benches (Fig. 85c) seem to have been built entirely from mud and mortar while larger, higher benches (Fig. 85d) have masonry retaining walls on sides fronting the room. Heights range from 15 to 40 cm. Surfaces are uniformly smoothed and plastered, the result of careful work. A rounded curbing often occurs on sides facing the room. An indication of their approximate extent and location may be obtained from the sketch plan (Fig. 83) and an idea of their overall nature from Figure 85c and d. In some cases rubble from disintegrated room walls covers large bench areas, in other instances sections of benches have crumbled into destruction.

Bins: An area in the north corner of Room 7 was originally closed off by a thin L-shaped wall. Small circular holes in mortar of the room back wall above this section indicate
Figure 85. - a, characteristic masonry at Ash Flat Cliff Dwelling; b, observation or ventilation holes, southwest wall Room 4; c, Room 2, east corner bench showing smooth plastered surface and rounded curbing on sides facing the room; d, Room 4, northwest bench (left) with retaining wall facing the room, northeast bench (right) with low plastered curbing facing the room.
the area enclosed by the L-shaped wall was roofed and the entire structure must have been a storage bin. No constructed metate bins occur relative to surface architecture. **Floors:** Those floors not covered by rubble are plastered surfaces. Other types of flooring may have been present but remain obscured from view. **Ceilings:** Most of the rooms in the ruin are close to the rear of the cave where clearance barely affords space for a room. As a result artificial roofing is, for the most part, not necessary and the cave ceiling is used as a roof in every room except 6, 7, and 8. In the case of these rooms, there is no evidence of roof construction and although standing front walls may have at one time, they do not now extend to the cave ceiling. Not enough of Room 10 remains to determine the character of its roof. Rooms 11 and 12 comprise an isolated structure out on the frontal area. Walls stand to a uniform height of 40 to 60 cm. Indications of a roof are lacking, room fill is shallow, and the surrounding quantity of rubble not extensive, leading to the supposition that the unit was either never completed or designed to serve as it is today.

**SUMMARY DISCUSSION**

The idea of an architectural unit is conveyed by the overall appearance of the ruin. Rooms extend naturally
from one to another. There are no breaks in architectural continuity nor are there any modifications, additions, or remodeling efforts which might have occurred at a time removed from initial construction. The contemporaneity of Ash Flat Cliff Dwelling and Red Bow Cliff Dwelling is demonstrated by the marked similarity in architecture, by the fact that architecture at both sites show: only one building period, and most conclusively of all, by the mutual occurrence of diagnostic sherd types at the two ruins. Certain architectural portions of the ruin appear as though they had been started but never completed, and often where a roof might normally be expected there is no evidence of any. In contrast to other ruins in the area, very few sherds or stone tools are lying about, trash is almost non-existent or concealed from view, and room fill seems extremely shallow. Admittedly there is a cliff conveniently located in front of the site over which much could have been dumped, but this factor does not seem a reasonable explanation for the general appearance of this cliff dwelling. The architecture exhibits higher standards when compared to that of other cave ruins and has a clean, unused look to it marred only by the depredations of time. Because there is an obvious lack of accumulated cultural debris and due to the clean swept look of the standing masonry, a visit to Ash Flat Cliff Dwelling leaves one with the impression that the ruin had never been used to
any great extent and that the construction of parts of it may never have been entirely finished.
TULE TUBS CAVE
(Arizona W:9:69)

THE SITE

The Ash Flat terrain has been used during recent years by the San Carlos Apache and before them by the Chiricahua Cattle Company as range land. From the valley floor, talus deposits slope in a smooth gradient up to the series of agglomerate cliffs which form the bottommost level of the Nantack scarp. The alluvial and talus deposits are broken by water ways into low hilly slopes which cover the actual base of the scarp and account for the initial 500 feet of rise from valley floor to cliff rock. Tule Tubs Cave faces south and is situated in the zone of contact where cliff rock disappears beneath talus deposits at an estimated altitude of 5,500 feet (Fig. 86).

When nature finished her more formidable work, Tule Tubs Cave stood in outline as a black hourglass at the cliff base, where it can be seen flanked by bulges of tan taffy colored rock from the lowest slopes a mile or more distant. The cave itself is almost directly below and slightly to the east of Red Bow Cliff Dwelling and a third of a mile west of Arsenic Cave (Fig. 4). It is easily reached and has no doubt always been a sheltering place for humans and animals alike, a fact which may account for
Figure 86. - Tule Tubs Cave is located at the base of the Nantack scarp in the zone of contact between cliff rock and talus deposit.
the lack of archaeological material, especially perishable objects, on the interior surface.

At its location in the contact zone, Tule Tubs Cave is representative of the lower caves in the scarp. From surface indications it housed a small three room dwelling with room walls that extended to the cave ceiling near the cave walls (Fig. 87a). The cave center extends many meters up into the cliff, formed in this way by an ancient water chute; nevertheless innermost recesses are protected from weather at all times by the overhang. Even in the worst rains, water does not pour into main portions of the cave and rain drops reach the back wall only as driven spray when wind conditions are extremely adverse. Moisture does exist in the rearmost portions of the cave, however, as a result of slight groundwater seepage. Immediately to the west of the site, a larger active seep appears that is of a kind which must have been a constant source of water during the times the caves were occupied. The hillside down and away from the front of the ruin displayed more surface sherd material than any other site surveyed and a wide range in pottery types was represented. The cave surface was, before excavation, strewn with building blocks and mortar from collapsed walls (Fig. 87a).

Cow manure and cattle bones extended over the cave surface as evidence that cattle had recently used the cave as a shelter, but despite this and the cave's obvious
Figure 87. - Pertinent features at Tule Tubs Cave.
a, interior before excavation showing architectural remains, Room 1 (left front), Room 2 (center rear), Room 3 (right front); b, mortar holes in bedrock in a natural shelf in the north corner of Room 1; c, pictographs on the underside of a small ledge in the northeast cave wall above Room 1.
merits as a temporary stopping place the fill surface was level. A very low overhang, 20 to 30 cm. in height extends several meters under the northeast cave wall. The main portion of the cave housing the architecture is protected by two overhangs extending from east and west cave walls but falling between one and two meters of joining. This leaves the center section open forming a chimney which is finally closed by successive overhangs at a height of about 20 m. (Fig. 89). Erosion has hollowed spaces into the native rock above each overhang which together form a series of ledges up the chimney on each side. If made accessible, these ledges would have been excellent lookout perches.

Tule Tubs Cave was selected for excavation because the diversity of sherds collected from the surface indicated an earlier period of occupation than that represented by standing walls which were contemporaneous with architecture at Red Bow Cliff Dwelling. Depth within the cave and that of the midden suggested that a stratigraphic sequence might possibly be worked out on the basis of sherd material recovered. One of the primary objectives of excavation at this site, then, was to disclose architecture or other evidence beneath standing walls which, if present, would be proof of the presence of an earlier occupation in lower caves along the Nantack scarp.
Figure 88. - Plan of Tule Tubs Cave.
Figure 89. - Section A-A' of Tule Tubs Cave
This room was excavated without adherence to levels in order that a general picture of the subsurface architectural situation and vertical cultural distribution might be gained. Room fill at its maximum depth in the east end was .50 m.; at its minimum in the west end, 20 cm. It contained no whole vessels or other large complete artifacts. Lower portions of three walls discernible at the original surface became more clear. On the southwest and southeast, a single course of large blocks is all that remains of the wall structure. The wall dividing Rooms 1 and 2 extends down for a depth of 30 cm. Wall foundations rest on cave debris and on the cave floor.

Near wall bases a hard packed level of earth, probably remnants of a floor, was detected. It covered only small portions of the area but led up to and surrounded a burned area with several flat rocks about the edges which constituted a hearth. In the south corner, wall remnants were interrupted and flat rocks placed in the void at the base of the walls. The rocks were unevenly fitted together to form a relatively level surface and extended from 30 cm. inside the room into the fill on the outside of the walls. This arrangement suggests a roughly paved
entryway.

Below the upper walls and extending out into the room as indicated in Figures 88 and 90, there are several distinctly older wall stubs. The tops of these walls had been leveled and all that remain are footings built up from the cave floor which average 20 cm. in width and 25 cm. in height. They are constructed of small tuff rocks irregularly mortared together. At a level 5 cm. above cave floor a hard packed dirt level (floor) occurred in the east corner which, together with lenses of trash and charcoal beneath the upper wall sections, is associated with the older wall stubs. The only other feature which can be assigned to this period is a clay-lined pit with a purposely fashioned rim of clay that is partially overlain by an upper wall; depth, 12 cm.; diameter, 45 cm.; rim width, 8 cm.

Four mortar holes are worn in the bedrock of two natural shelves along the northwest cave wall and were probably a functional part of Room 1 (Fig. 87b). Various pictographs also occur on the underside of small ledges about the site where they can easily be seen by persons standing on the cave floor. These are shown in Figures 87c and 91.
Figure 90. - Architectural features at Tule Tubs Cave. Wall dividing Rooms 1 and 2 (center rear) contains large building blocks set in mortar that is filled in when necessary with chinking stones. Surfaces were coated with plaster. This type of masonry and the fire hearth (left foreground) represent the most recent building period. Leveled wall stubs (arrows) constructed of small tuff rocks irregularly mortared together represent older building period.
Figure 91. - Pictographs painted in red and black on portions of the natural rock walls in Tule Tubs Cave.
In Tule Tubs Cave the highest wall remnant stands 1.8 m. above the present cave fill surface and extends up to the western cave wall overhang. This is the southwest wall of Room 2, dividing it from Room 1 (Fig. 90). The entire surface of this room was littered with fallen building blocks; some extending into the fill, others merely strewn about the surface. The room has the best of the more recent architectural remains as it is afforded more protection than the others. All four corners of the almost square room are evident and portions of standing walls are plastered on both sides. No evidence exists in the cave walls or in architectural remnants of Room 2 to suggest a constructed roof. If all the walls extended as high in the cave as the remnant of the southwest wall, a roof was not necessary for protection additional to that afforded by the cave itself.

In the walls of Room 2 large building blocks are set into regular courses. Mud adobe is filled in between blocks and chinking stones are employed where a bad fit makes them useful. Building blocks, generally agglomerate, are not modified but must have been selected with an eye for the desired size and shape. Sections of the interior surface of walls are plastered. Even though it occupies a portion of the cave adjacent to cave walls, the room is almost square and masonry walls were built on all four sides.
which do not show post-construction modification or remodeling. A hole 15 cm. in diameter was built into the southeast wall, but no evidence of a doorway was detected and no other wall features are present.

Room 2 was excavated as a stratigraphic test, each 20 cm. level carefully troweled but not screened.

**Level 1 (0.00-0.20 m.):** Heavily strewn with building blocks and chunks of mortar from architecture fallen in recent times; also contained surface layers of finely powdered cow manure and cow bones.

**Level 2 (0.20-0.40 m.):** Also contained building blocks, large and small, but not as many as in the first level. Large amounts of fine, white ash centered in the middle of the room in a roughly 2 m. square. At outer extremities, the ash was mixed with the general fill. Ash area extended down into Level 3 but became progressively smaller in areal extent. The ash area in profile appeared as an inverted truncated pyramid centered on the middle of the room. Sherd and rubbish content of the ash area was high.

**Level 3 (0.40-0.60 m.):** The architectural floor appeared in this level, hard packed, not plastered; its remains were broken and not well defined, occurring in patches and in no place extending from wall to wall. No floor artifacts occurred nor did any architectural features other than a short gnarled post. The post had not been sunk in the
floor but was surrounded at floor level and held upright by the piling of rocks around its base. Plaster on the interior of the wall terminates at this floor level. Floor depth, .55 to .60 m. In Level 3, five artifacts (one deer mandible section with painted red striped decoration, one obsidian projectile point, and three concretions of peculiar shape) formed a cache located in the northwest corner of the room, 5 cm. above floor level. At a depth of 43 cm. in the center section of the room (above floor level), a lense of broken plaster occurred. The under surfaces of the pieces of plaster contained the impression of slats. This section was broken up and the pieces askew but covering an area of about 40 cm. in diameter. Midway along and very close to the front wall, Level 3 contained a quantity of rock but less than that of the two upper levels. Building blocks were usually of volcanic agglomerate out of which the cave itself is formed, but in this level rocks were of fine-grained basalt, showing no workmanship but with a black coating and sometimes a residue of ash. This kind of stone had to be transported into the cave from an outside source. Fill of the area between Room 2 north and east walls and the back of the cave (Areas A and B) and the area under the low overhang outside Room 2 east wall (Overhang area) were removed. These sections contained artifacts and trash but no architectural features.
Stratigraphic Tests

Stratigraphic tests in Tule Tuba Cave were all removed in 10 cm. levels. All levels were screened. Four tests were excavated and with the exception of Test 2, their locations are shown in Figure 88. Test 2 is located 5 m. south of Test 1.

Test 4 in the west corner of Room 3 contained the only architectural information. Test 4 fill is an indication of the character of the remaining fill in Room 3 and is along the northeast wall of Room 3 where bedrock is at an average depth of .80 m. The difference in depth between this test and the fill of Room 2 is due to surface accumulation and a slight depression in cave floor level. A sahuaro callus receptacle was found 1 m. east of the southwest corner stuck loosely in a hole in the wall at a depth of 10 cm. below present fill surface. The niche was not purposely constructed.

Dry material on the surface of Test 4 extended to a depth of about 20 cm. together with fine grained, gray earth. At a depth of 20 cm. there were spots of what could have been hard packed flooring but nowhere did it contact either wall. At about .50 to .55 m. plaster flooring occurred in patches but did not extend to walls. This level contained a greater quantity of ash lenses, bits of charcoal and numerous rocks. Floor in the shallow end of the test pit, toward the front of the cave, was 5 cm.
thick and rested on bedrock. Loose bedrock under the plaster was sterile and represented the weathered bottom of the cave.

**POTTERY**

Painted Types: The 11 small majolica sherds recovered at this site were identified and described by Charles C. DiPeso as follows:

- **MAJOLICA:** The 11 small majolica sherds were identified and described by Charles C. DiPeso as follows:

  - **T3-L1:** Unclassified white majolica (1)
  - **R3-Surf:** Unclassified white majolica (3)
  - **R3-Surf:** Huejotzingo Blue-on-white (1)
  - **R2-L1:** Unclassified white majolica (1)
  - **R2-L1:** Huejotzingo Blue-on-white (2)
  - **R1-Fill:** Huejotzingo Blue-on-white (1)
  - **Surface:** Huejotzingo Blue-on-white (1)

**HUEJOTZINGO BLUE-ON-WHITE** (Identified by John Goggin; 1954, Spanish Colonial Art Round Table; description in unpublished manuscript)

This majolica is a Puebla blue-on-white variant which is identified by the presence of a single blue rim line. It lacks the dual blue colors as well as the black emphasis lines which characterize these general Pueblo blue-on-whites. The approximate dating, as suggested by Goggin, is post 1700 to the present. (Note: the pastes in these particular sherds are similar to Quiburi specimens where both Huejotzingo and Pueblo blue-on-white is present.)

**UNCLASSIFIED WHITE MAJOLICA** (Identified by John Goggin; 1954, Spanish Colonial Art Round Table; description in unpublished manuscript)

These sherds of majolica are undecorated sections of Puebla blue-on-white or, more probably, of the Huejotzingo blue-on-white rim decorated. Little can be done with the identification of these undecorated sherds.
because most of Goggin's descriptions are based on variations in decoration taking cognizance of variations in blue pigments, thickness of same and of additional duo-chrome colors and of the black emphasis line. He has also studied the placement and type of decoration used, and the above-mentioned Huejotzingo is typified by the presence of a solitary blue rim line with no other decoration appearing on the vessel.

"Sherds are very small and the above identification is made with a certain amount of reserve due to this factor and to the paucity of specimens." (Dipeso 1956: personal communication.)

**POINT OF PINES POLYCHROME** (Wendorf 1950: 43-47):

Geometric decorations are based upon wide black line work framed by fine white lines. Certain design panels are filled with diagonal hatching and closed stepped squares in black, a decorative technique very popular in Fourmile Polychrome. The Fourmile feature of a black stripe with white line below it encircling bowl interiors immediately below the rim is also retained. Exterior design is in the nature of a band commencing immediately below the rim and extending, in one case, 7.8 cm. wide down the side of the vessel. Wide black lines provide the base and fine white lines provide panel filling with hatching and parallel lined triangles in company with solid white stepped triangles. Slip varies in color from dull red to brown; paste is characteristically soft brown; vessel wall thickness ranges from 5 to 8 mm., averaging 7 mm.; bowl forms alone are represented.
FOURMILE POLYCHROME (Haury 1931: 31-42): Hard gray paste is again characteristic; two jars and a number of bowls are represented by the small sherds in this sample.

FOURMILE BLACK-ON-RED, CEDAR CREEK POLYCHROME, PINEDALE POLYCHROME, PINEDALE BLACK-ON-RED, and SPRINGERVILLE POLYCHROME are represented by extremely small sherds and bowl forms alone are represented.

SHOWLOW BLACK-ON-WHITE (Haury 1934: 130): Exterior surface covered with heavy white slip which is marred by polishing marks, by crazing and crackling, and by flaking. Those portions of designs which are evident show a bold, relatively heavy technique executed in black and made up of medium width encircling lines, solid triangles with hypotenuse scalloped, half terraces, hatched geometric areas in combination with stepped squares, and solid triangles with pendent dots. Paste is light gray and finely textured with occasional larger particles of quartz; vessel wall thickness, 4-5 mm. Only jar sherds are present, none of these are rim sherds.

GILA POLYCHROME (Haury 1945b: 63-80): Haury's description covers this sample. Designs are almost purely geometric. Only a few small curvilinear elements, such as scrolls, are represented. Designs are often carelessly applied and no great attention is paid to line junctions. Solids and hatched areas are common. All sherds are from hemispherical bowls, with the exception of one restorable
Figure 92. - Gila Polychrome bowl decoration (Room 2, A-16904).
vessel which is recurved in shape and may be classed into Haury's interior bowl ornamentation Type 3. No exterior decoration is present. White pigment is thick and creamy, probably kaolin. In all sherds it tends to flake away leaving many small sections of the original vessel paste exposed. Some sherds show this characteristic to a more pronounced degree than others. Paste is probably local but there is a considerable range of variation from coarse brown with medium to coarse temper particles, predominantly quartz, to finer particles and a more uniform gray color. Vessel wall thickness, 4-6 mm.

Illustration: whole vessel; (Figs. 92, 95a); Provenience: Room 2; Data: bowl; orifice diameter, 26.5 cm.; maximum diameter, 28.7 cm.; height, 14.8 cm.; vessel wall thickness, 4-7 mm.; cat. no. A-16904.

In the design layout illustration, restored portions are not indicated because a major part of the design was available and no alternative possibilities presented themselves with respect to small missing sections.

RESERVE BLACK-ON-WHITE (Martin and Rinaldo 1950: 502-519): Although this type comprises roughly 25 percent of the decorated pottery, the sherds are without exception small and unsatisfactory for analytical purposes. In general, conformance to published descriptions seems evident. The white slip is, in most cases, apparent and in some is crackled and crazed. Paste is uniformly gray.
but varies in texture and nature of inclusions. Jar forms make up approximately 40 percent of the sample, the remaining sherds are from bowls.

**BLACK-ON-WHITE (Forestdale Area) (Haury Ms.):** As the name implies these few black-on-white sherds are of a type traded into the Point of Pines region from the Forestdale district to the northwest whereas most other black-on-white types, such as Reserve Black-on-white, come to the Point of Pines area from the northeast and east. Designs are confined to bowl interiors; patterns commence at the rim and are made up of solid black medium width lines encircling the vessel or forming concentric circles and triangles pendent from the vessel rim filled with fine hatching lines equal in width to the framing line. Brush work is uneven and lines expand and contract in width in accordance with pressure applied to the brush by the potter. Paste is gray, rhyolitic texture with tiny vesicles and inclusions of quartz. Vessel wall thickness, 4-5 mm.; three sherds are from bowls, one is of a jar.

**BLACK-ON-WHITE (Unidentified Fragments):** The small sherds which comprise this sample are apparently bottom sections from Reserve Black-on-white vessels.

**SACATON RED-ON-BUFF (Gladwin and others 1937: 171-178):** Designs are a combination of wavy, squiggled, fringed and hatched line work. Fine lines make up hatching while framing lines and main elements are executed in short
Figure 93. - a, McDonald Painted Corrugated, white design; b, e, Encinas Red-on-brown, bowl sherds, interior design; d, Sacaton Red-on-buff, small jar sherd, exterior design.
strokes and thin lines to achieve interwoven and interlocking geometric patterns with an emphasis on parallel lines. Use is also made of a sawtooth edge to boarder entire panels. Paint used for design execution is thin and easily lost through weathering. It is also applied with limited care. Surface color is buff which in some cases seems to take on a grayish cast, but such specimens are also those most intensively weathered and their surface color may be due to this fact. The pinkish tinge of Gila Basin specimens is not present in this sample. There is some feeling that the Point of Pines Sacaton Red-on-buff was made in the Safford Valley of the Gila River and traded northward to the Point of Pines region. If this supposition is true, minor variations from Snaketown Sacaton Red-on-buff in paste, surface color and perhaps design technique, might be expected. Paste is soft and at times crumbly with rough texture; large, rounded, medium to coarse size particles of quartz and other minerals are frequent but mica is scarce or entirely absent. Vessel wall thickness, 4-8 mm. with a greater thickness noted toward the bottom and at rims of vessels. Jar sherds far outnumber bowl sherds.

Illustration: sherd; (Figs. 93d, 95g); Provenience: Room 1, Fill; Data: jar; orifice diameter (estimated), 7.5 cm.; maximum diameter (estimated), 12 cm.; height (estimated), 10.8 cm.; vessel wall thickness, 6-8 mm.
**Encinas Red-on-Brown** (Sayles 1945: 43): Designs are wrought in combinations of thin parallel lines which run into and blend with a line or solid band of medium to wide width which encircles the vessel interior immediately below the rim, and in some cases even lips over the rim to show slightly on the exterior (Fig. 93b, c). A single scroll is present, remaining sherds show rectilinear line patterns. Designs appear only on vessel interiors, paint is a dark maroon color which shows a tendency to wear thin. General interior surface color is brown, apparently the result of a slipped surface smoothed or polished. Exterior surfaces vary from gray to tan and are finished with less care. As is the case with Sacaton Red-on-buff, it is likely that Encinas Red-on-brown came to Point of Pines from localities to the south. Paste is hard, of medium texture, is filled with tiny vesicles and contains angular fragments of quartz and other minerals. Vessel wall thickness, 4-8 mm. Rims are often the thinnest portion of a vessel. Bowls are significantly the only forms represented.

**Utility Types**

When considering this group of pottery types a special effort should be made to keep in mind that sherd counts indicate temporal trends and relative popularities in a general way only. Even in this, there are certain short-
Figure 94. - Rim sections among pottery types represented at Tule Tubs Cave.
Figure 95. - Vessel forms from Tule Tubs Cave. a, Gila Polychrome; b, Tularosa Fillet Rim; c, Sacaton Red-on-buff; d, Point of Pines Punctate; e, McDonald Painted Corrugated.
comings. For example, body sherds from Tularosa Fillet Rim vessels may be placed into the Tularosa Smudged category. Neck Corrugated types are scarcely reflected since body sherds are placed in with plain types and neck sherds not showing a body junction fall into various corrugated categories. Large sherds and whole vessels are apt to be the only true evidence of neck corrugation. However, until a system of pottery analysis is devised which overcomes these difficulties, sherd tabulations will be retained and continue to be presented in their present form as the only means for placing such data at the disposal of other research workers. There is no serious objection to this if the shortcomings are pointed out and realized because as has been stressed repeatedly, generalities based on sherd counts are valid.

**TULAROSA FILLET RIM** (Wendorf 1950: 121; Martin and others 1952: 65): Exterior surface color ranges from a burnished red to brick red to brown with heavy fire clouding. Interiors show smudging as well as plain smoothed brown or gray surfaces. Fillet rim decoration is made up of from one to three indented coils, two being preferred most often. Only bowl sherds are present. **Illustration:** sherd; (Fig. 95b); **Provenience:** Room 2, Level 3; **Data:** bowl, smudged interior; maximum diameter (estimated), 26 cm.; height (estimated), 14 cm.; 4 indentations per 2 cm.; number of indented coils, 2; vessel wall
POINT OF PINES PUNCTATE (New Type): An unusual type, at present known only from the Point of Pines region. It is essentially a combination of the punched design patterns from Reserve. Punched Corrugated and areas slipped red in the manner of red ware types; with both of these features being placed on plain ware jar forms. Designs are formed by using two or three parallel rows of punch marks to form lines which in turn form rectilinear geometric patterns, such as interlocking rectangular scrolls, triangles and nested diamonds. In some instances, diamonds and triangles are solidly filled with punch marks. Lines and areas filled with punch marks are, as a rule, unslipped and retain the brown or gray color of the base pottery. Areas between or surrounding punched designs are, however, slipped red (Fig. 971-1). Paste is brown with an uneven fracture; tiny vesicles appear throughout as do large coarse angular particles. Sockets where these larger particles have fallen away are common. Quartz or mica grains do not seem to be present. Vessel wall thickness, 3-6 mm., averaging 5-6 mm. Vessel forms are most often jars, usually small in size. A detailed description will accompany reports concerned with Reserve and Tularosa Phase sites of the Point of Pines region (A. P. Olson, in preparation). An example of Point of Pines Punctate is illustrated by Fewkes as a "small amphora from a cave in
the Nantacks" (1904: 189, Fig. 120).

Illustration: sherd; (Fig. 951); Provenience: Room 2, Level 1; Data: jar; orifice diameter (estimated), 14.5 cm.; vessel wall thickness, 5-6 mm.

Illustration: restorable vessel; (Figs. 95j, 97j); Provenience: Room 1, Fill; Data: jar; orifice diameter, 10.0 cm.; maximum diameter, 15.3 cm.; height, 10.8 cm.; vessel wall thickness, 4-6 mm.; cat. no. A-16905.

The McDonald Corrugated Series is divided into three types; McDonald Painted, McDonald Patterned, and McDonald Grooved Corrugated. All these types are essentially the same technologically; bowl interiors smudged, exterior of plain or indented corrugation slipped red; but they differ in the method of white exterior decoration. McDonald Patterned Corrugated is the most abundant and is derived directly from Tularosa Patterned Corrugated with added features of a red slip over the vessel body and a white pigment over the patterns. These added traits are, perhaps, derived from Tularosa White-on-red and combined with Tularosa Patterned Corrugated to produce McDonald Patterned Corrugated. Chronologically, this development is satisfactory.

McDonald Painted Corrugated is a type strongly resembling Reserve Plain Corrugated. However, vessels are slipped red on the exterior and a white design painted over
the corrugation. The designs stand by themselves, freely executed, and unlike McDonald Patterned, Corrugated, do not fill any indented predetermined pattern. In this respect, the type also owes a great deal to Tularosa White-on-red. McDonald Painted and McDonald Patterned Corrugated are companion types, the former owing its decoration to its predecessor type Tularosa White-on-red and the latter, deriving its decoration from both Tularosa White-on-red and Tularosa Patterned Corrugated.

**McDonald Painted Corrugated** (Breternitz, Gifford, and Olson 1957): Decoration is confined to vessel exteriors and is executed in white with lines of medium width forming geometric patterns in rectangular panels made up of staggered and stepped lines and solid sawtooth triangles. A single line, often completely encircles vessel exterior, usually just below the rim. Of the sample, five are indented corrugated, one is plain, three show an exterior slip of dull brick red and four have smudged interiors. Two jars and four bowls are represented.

**Illustration:** sherd; (Figs. 93a, 95e); **Provenience:** Room 2, Level 4; **Data:** jar; orifice diameter (estimated), 14.5 cm.; maximum diameter (estimated), 28 cm.; height (estimated), 23 cm.; coiling begins 1.5 cm. below the rim; 4 coils per 2 cm.; 3 indentations per 2 cm.; exterior surface slightly smoothed over coils and indentations; vessel wall thickness, 6 mm; location from the Northeast District.
CORRUGATED TYPES: Unpainted corrugated sherds from Tule Tubs Cave have been classified into eight principal types. These types fall into either of two larger groupings termed the Point of Pines Corrugated Series and the Reserve Corrugated Series. The typological breakdown as it pertains to this sample may be enumerated as follows: Point of Pines Corrugated Series - Prieto Indented, Point of Pines Plain, Point of Pines Indented, Point of Pines Obliterated, and Point of Pines Patterned Corrugated types; Reserve Corrugated Series - Reserve Plain, Reserve Indented, and Tularosa Patterned Corrugated types. Other types of the Reserve Corrugated Series did occur but will receive separate attention.

As may be seen from the sherd tabulation chart (Fig. 98), these corrugated types make up the quantitative bulk of the pottery sample from this site. The corrugated sample, however, is composed entirely of sherds, no whole vessels having been recovered, and the sherds are in general quite small. In addition, cave debris mixture was severe and pottery cannot be equated to temporal periods on the basis of stratigraphy. Because of this situation, these principal types are not considered individually but are reviewed from a broad standpoint and the two larger series groupings are contrasted. The Point of Pines Corrugated Series has been described in a preliminary manner by Wendorf (1950: 36-41). The Reserve Series from the Reserve district has been
treated (Rinaldo and Bluhm 1956: 149-187) and the taxonomic problems discussed (Breternitz, Gifford, and Olson 1957).

In the overall view, gross traits which set the Point of Pines Corrugated Series apart from the Reserve Corrugated Series in the Point of Pines region may be enumerated (Fig. 96) as follows:

In the Point of Pines Series, coils are thicker, are far more irregular and unevenly placed about the vessel. There is a general feeling of sloppiness attributable to the later types and an impression is conveyed that no great care or precision was taken in their manufacture. Indentations are larger and farther apart (Fig. 96a, b). The tendency to obliterate is not present in the Reserve Series. In fact, the light smoothing which leads to obliteration seems to have developed with the Point of Pines Series. This may have been caused by the use of larger coils which had a tendency to droop over lower coils. Both plain and indented corrugation was obliterated in varying degrees. The "Prieto" method of indentation is peculiar to later times only. Decorative patterns (grooving) effected with a tool, such as an awl, apparently died out. Patterned decoration persists but conforms with other trends toward lack of perfection. Jar shapes predominate and they are characteristically larger in overall dimensions than earlier forms. Jars are also less tall in proportion to their widths and as
a result are generally more squat even though larger. Bowls are not common and when they do occur, are never smudged and polished with the care and in such a manner as to produce the beautiful gloss so common to the Reserve Series. Vessel walls are thick and vessels are therefore heavier. The tendency is toward larger, more thick-walled vessels, not as carefully or as well executed as those of the Reserve Series. The trend is to one of sloppiness and boldness from the artistic point of view.

In the Reserve Series, coils are thin and are laid up evenly about the vessel. Vessel exteriors are textured in a precise manner and the general impression is one of neatness and compactness. Emphasis seems to have been placed on careful manufacture (Fig. 96c, d). Both coils and indentations tend to be closer together to the point where some examples are extremely condensed. Even light smoothing is uncommon and obliteration absent. Numerous decorative styles, such as punched, incised, and patterned, were developed and executed with far more perfection than in later times. Of these, only patterned decoration survived in the Point of Pines Series where this treatment was poor by comparison. Particular styles of obliteration and the "Prieto" indentation replaced earlier decorative techniques which were effected with a tool. Vessel wall thickness is thinner by comparison to later types. Bowl and jar forms seem about equally popular. Jar forms tend
Figure 96. - Sherd examples which are typical of the Point of Pines and Reserve Corrugated Series are contrasted to show gross traits which set the two series apart. a, Point of Pines Plain Corrugated; b, Point of Pines Indented Corrugated; c, Reserve Plain Corrugated; d, Reserve Indented Corrugated.
to be pear shaped. Fine smudging, expertly polished to a fine gloss, is characteristic of bowl interiors. A striking difference between the Reserve and Point of Pines Series is the abundance in the Reserve Series and and an apparently overwhelming preference at that time for small vessels. Some large forms were made but the tendency in both bowl and jar forms was definitely toward smaller vessels. This tendency is restricted to vessels of all-over corrugation. Neck corrugated vessels of the early Reserve Series, not separately distinguished by Rinaldo and Bluhm, and of the Nantack and Three Circle phases are apt to be large. It may be that neck corrugation itself, although textured in the style of the Reserve Series, will be discerned as meaningful in terms of time and space.

These two corrugated series blend one into another as time advances. Traits therefore overlap and "pure" samples occur only at extreme ends of the temporal continuum. Occupations at Tule Tubs Cave embrace the entire period of time during which corrugated types of both series were made. All types are therefore represented to greater or lesser degrees, reflecting the fact that Point of Pines was a center of manufacture of corrugated pottery. Both indented and plain corrugated types usually appear together and whenever they do, the quantity of indented exceeds that of plain. It seems there was a very
definite preference for indented corrugated but never to the exclusion of plain corrugated types.

**RESERVE INCISED CORRUGATED** (Rinaldo and Bluhm 1956: 164-167): Of all the textured types, this is one of the most pleasing, with its clear clean incisions crisscrossed and run at diagonals across the fillets to mark out parallel-lined designs (Fig. 97a-d, g). Incised lines were executed by running a sharp tool across the wet clay at an angle to the direction of the coils. The resulting pattern is made up of grooves or incisions 1-2 mm. wide and deep. Some of the incisions are the complete vertical width of the corrugated neck, others are short elements. Very rarely lines are made by closely spaced punch marks in combination with incised lines. Designs are never extended to intentionally cover portions of rim or body which are plain or not corrugated but are restricted to that portion of the vessel (neck) which is textured by plain corrugation. Coils are evenly applied and fillets are never smoothed. A single sherd is slipped red and its finer fillet widths indicate it is a late manifestation. Corrugations begin from 1.2 to 2.6 cm. below the rim. Corrugations: 3-5 per 2 cm., with an average of 3.5 per 2 cm. Vessel wall thickness, 6-8 mm. Paste is brown and appears to be of local origin. Vessel interiors are smoothed. Jar forms only are represented. That this type is early is evidenced by the fact that all sherds
Figure 97. - a-d, g, Reserve Incised Corrugated; 
e, f, h, Alma Knobby; i-l, Point of Pines Punctate.
are from neck corrugated vessels, that coils are thicker and vessel walls are thicker, all characteristics more related to Three Circle Neck Corrugated than to Reserve Plain Corrugated. From an overall view, Reserve Incised Corrugated, Pine Flat Neck Corrugated and Three Circle Neck Corrugated seem to be the predecessors to Reserve Plain, Indented, and Punched Corrugated and Tularosa Patterned Corrugated.

**RESERVE PUNCHED CORRUGATED** (Rinaldo and Bluhm 1956: 162-164): A plain corrugated type with small sharp indentations or punch marks in the fillets of corrugated portions of the vessel which are placed in rows or groups to effect geometric patterns. Punch marks were usually made with a pointed implement but occasionally circular punch marks clearly indicate a small hollow straw or tube was also used. Rarely punching and incising are used in combination on the same vessel. Jars are the only form represented. A vessel of this type is illustrated by Fewkes as an "Indented bowl from a cave in the Nantacks" (1904: 188, Fig. 119).

**ALMA KNOBBY** (Martin, Rinaldo, Bluhm, and Cutler 1956: 155, 159): A plain ware of the Alma Series, Alma Knobby is crude and rough in exterior appearance. Its most distinctive characteristic is a proliferation of small rounded knobby welts appliqued to the vessel exterior (Fig. 97a, f, h). On sherds of the present sample, the
nodes have been placed in parallel rows which commence near the rim and extend diagonally down the exterior surface. Interior surfaces are smoothed. A seed jar is the only vessel form which can be identified. Shards of this type appeared at Nantack Village. One of these was also identified as being from a seed jar. Breternitz (1956: 33) termed the type Alma Plain with appliqued nodes following Martin who illustrated a sherd (Martin, Rinaldo, and Bluhm 1954: Fig. 28g) from caves in the Reserve area. Martin also lists several sherds of the same type from Higgins Flat Pueblo under the type name of Alma Knobby which is retained here because of the priority of his published reference (Martin, Rinaldo, Bluhm, and Cutler 1956: 155, 159). It is interesting to note that Suhm and Krieger (1954: 280, Pl. 24g) illustrate a vessel which appears almost identical to this type and term it a noded bowl from the Fulton Aspect of Texas. Fewkes also mentions vessels among those from a cave in the Nantacks which could be of this type (1904: 189).

**ALMA PLAIN** (Haury 1936: 32-34): This sample contains a certain amount of plain ware which was associated with the Nantack-Reserve occupation. Such plain ware is indistinguishable from more recent plain ware. The entire sample, therefore, is essentially the same as that from Red Bow Cliff Dwelling. In color, brown and tan are most abundant rather than dark brown or black. Surface
treatment is more uniform in that only a small portion of
the sherds are rough, the greater amount being polished
and smoothed. Despite this a certain surface bumpiness
remains. Jar forms are very numerous and certain sherds
indicate rather large, thick-walled, heavy jars. Jar
interiors are rough, sometimes excessively so. Bowl
interiors are polished and smoothed to a greater degree
than their exteriors. Striations such as those produced
when a surface is smoothed or wiped with a bunch of grass
are present on some sherds among both jars and bowls.
Vessel wall thickness, 4-11 mm., average, 6.5 mm.
Several miniature vessel fragments occurred.

**APACHE PLAIN (New Type):** Rim shapes for those rim
sherds found at Tule Tubs Cave are illustrated but the
sherd sample itself is so similar to the larger collection
recovered from Pine Flat Cave, that the description of
Apache Plain for that site adequately covers these sherds.

**DATING TULE TUBS CAVE**

Following the previously established pattern for
dating the cave sites, the entire sample of pottery is
tabulated in chart form (Fig. 98) showing type by type
the number of sherds recovered from all portions of the
cave. In addition, three restorable vessels were found:
one Gila Polychrome bowl (A-16904), one Point of Pines
Punctate jar (A-16905) and one McDonald Painted Corrugated jar. The tabulations conclusively demonstrated that the fill throughout this site had been thoroughly churned and mixed, obliterating all but the barest suggestion that certain pottery types are later than others.

Within Tule Tubs Cave, the few consistent type occurrences are Majolica on the surface or in topmost levels, Apache Plain on the surface or in the upper two levels, a major portion of Gila Polychrome in the upper three levels, and a major portion of Reserve Black-on-white in the lower three. Otherwise, the sherd tabulation chart reveals a confusing mixture which is clarified only by treating the complete array of pottery types as a group of individual entities which are in turn components of known ceramic complexes. The sherd sample is therefore first considered as a whole, the overall relative abundance of types is noted, the total sample is broken into ceramic complexes by comparison with known ceramic complexes, and dating is determined on a comparative basis.

The step by step procedure and evaluation of important and diagnostic types is identical to that used in dating Red Bow Cliff Dwelling. The entire pottery sample from Tule Tubs Cave is listed by type. Those types considered important are shown in large lettering. The complete list of the pottery types is placed as the first column to the left of the late period dating chart (Fig. 99)
Figure 98. - Sherd tabulations from Tule Tubs Cave.
<table>
<thead>
<tr>
<th>Shard Tabulation</th>
<th>Room 2</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Test 3</th>
<th>Test 4</th>
</tr>
</thead>
</table>
|                  | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 | Total
| Majesty           | 2       | 1       |        |        |        | 3
| Point of Place Polychrome | 2       | 1       |        |        |        | 3
| Fouralla Polychrome | 2       | 1       |        |        |        | 3
| Cedar Grass Polychrome | 2       | 1       |        |        |        | 3
| Pindale Polychrome | 2       | 1       |        |        |        | 3
| Serpentine Polychrome | 2       | 1       |        |        |        | 3
| Glaze Polychrome | 2       | 1       |        |        |        | 3
| Axis Polychrome | 2       | 1       |        |        |        | 3
| Horses E/W | 2       | 1       |        |        |        | 3
| Horses Dead Bag E/W | 2       | 1       |        |        |        | 3
| RV (Identified Fragments) | 2       | 1       |        |        |        | 3
| Cansion E/W | 2       | 1       |        |        |        | 3
| Baskets E/W | 2       | 1       |        |        |        | 3

Total 472 7.20 472 100%
Figure 99. - The secondary ceramic dating of late periods at Tule Tubs Cave by a comparison of the pottery from this site with ceramic complexes of known temporal value.
and compared with a second column which represents the complete sherd complex of Pinedale, Canyon Creek and Point of Pines phases as determined from large surface sites at Point of Pines. It is shown that all the types from Tule Tubs Cave as listed in the first column do not occur in the second. In the second column diagnostic types within the ceramic complex considered are shown in large lettering. It is evident that the majority of these are present in the first and are correspondingly considered diagnostic in this column. It may therefore be correctly inferred that a portion, but not all, of the total original pottery sample belongs to the time period encompassed by Pinedale, Canyon Creek, and Point of Pines phases.

The ceramic situation is less distinct at Tule Tubs Cave because the site is small and the deposits of culture extremely mixed. Relative abundance of one pottery type to another, in itself, here tells less than at Red Bow Cliff Dwelling and only a maximum Pinedale-Canyon Creek time value can be given on the basis of the pottery alone. Therefore, a direct Canyon Creek Phase ceramic complex comparison is not made.

The third column of Figure 99 represents the generalized phase sequence for the Point of Pines region. Dotted gathering lines from the second column come to the third in a manner indicating the maximum time allowance which can be ascribed to this portion of the initial sample.
listed in column one. Solid gathering lines point to the Canyon Creek Phase which, by extension of evidence at Red Bow Cliff Dwelling, indicates the most probable time during which the latest Mogollon-Pueblo occupation occurred at Tule Tubs Cave.

Two pottery types, Majolica and Apache Plain, represent that portion of the entire original sample which indicates an Apache occupation at Tule Tubs Cave. Little is known archaeologically of the Apache, and the ceramic complex is limited in this region to these two types. They are drawn from the first column to the second and a tentative date is shown by gathering lines to the generalized phase sequence. Dotted gathering lines indicate the maximum ascribable time allowance as A.D. 1850-1945. Solid gathering lines indicate a more probable minimal time evaluation from 1800-1945 during which Apache occupation or occupations took place. The basis for this dating is primarily contingent on evidence from Pine Flat Cave which is discussed under Apache occupation of that site. Local evidence in support of the late Apache dating exists at Tule Tubs Cave in that the only real stratigraphic evidence apparent from the entire sherd tabulation is the occurrence of Apache Plain and Majolica on the surface or in the uppermost two levels of the site. The deposition of these two types must have occurred more recently than the Mogollon-Pueblo types and apparently at
a time so recent that whatever factors cause cave fill mixture affected them only slightly.

From the sherd tabulations in Room 2 (Fig. 98), it is apparent that most of the Gila Polychrome occurred in the upper three levels and most of the Reserve Black-on-white occurred in the lower three. In the discussion of architecture, a distinct building period is described beneath Room 1 which does not conform to walls of a later building period and definitely appears older. In the complete pottery sample listed in column one of the late period dating chart (Fig. 99), certain important types do not extend themselves into the Pinedale, Canyon Creek, Point of Pines phase ceramic complex. Most notable among these are Reserve Black-on-white, Sacaton Red-on-buff, Encinas Red-on-brown, Reserve Incised Corrugated, and Three Circle Neck Corrugated. These types are diagnostic of Nantack and Reserve phases at surface pueblos near Point of Pines.

When all of these factors are taken into account and the presence of types such as Pine Flat Neck Corrugated and Alma Knobby and the relative abundance of Point of Pines Punctate and the Reserve Corrugated Series are considered, it is at once apparent that a second complex due to an occupation during Nantack and Reserve phases is present at Tule Tubs Cave.

A dating chart for the early period (Fig. 100) shows how the original pottery sample may again be broken into a
second Nantack and Reserve phase ceramic complex. This is accomplished by the same procedure described for the later period but the comparison in this case is with the complete sherd complex representing Nantack and Reserve phases as determined at Point of Pines. Such a sherd complex and its relative time value is further substantiated by the work of the Chicago Natural History Museum in the Reserve Area of New Mexico.

Dotted gathering lines from the second column to the generalized phase sequence indicate the maximum time allowance at Tula Tubs Cave of the occurrence (Nantack and Reserve phases, 900-1150) ascribed to this site. Solid gathering lines in the second column point to this portion of the initial sample listed in column one. Solid gathering lines point to the section of the phase sequence (950-1100) which, when the early ceramic evidence is taken as a whole, is the most probable time during which the early Mogollon-Pueblo occupation at Tule Tubs Cave took place. The time period from 950 to 1100 is the most likely focal time of occupation because of the diagnostic types themselves. Types such as St. Johns Polychrome, Wingate Black-on-red, and Tularosa Black-on-white would be expected if any Tularosa Phase occupation were present, and would probably have appeared in at least small quantities if the occupation were late Reserve Phase. If very early Nantack Phase use of the cave occurred, such types as Broad Line Red-on-brown, San Francisco Red and more Pine Flat Neck Corrugated would be
Figure 100. - The secondary ceramic dating of the early period at Tule Tubs Cave by a comparison of the pottery from this site with ceramic complexes of known temporal value.
COMPLETE POTTERY SAMPLE FROM TULE TUBS
COMPLETE SHERD COMPLEX REPRESENTING CAVE-LISTED BY TYPE
SNEAKEY AND RESERVE PHASES (900-1300 AD) AS DETERMINED FROM SURFACE SITES AT POINT OF PINES

MAJOLICA
APEX PLAIN
POINT OF PINES POLYCHROME
FOURMILE POLYCHROME
FOURMILE B/W
CEDAR CREEK POLYCHROME
PAINTED POLYCHROME
PINEDALE B/W
SPENCEVILLE POLYCHROME
SHOWLOW B/W
GILA POLYCHROME
PAINTED B/W
PINEDALE B/W
RESERVE B/W
WINDATE B/W
TULAHOSA B/W
RESERVE B/W
RESERVE B/W
MIMBRES BOLD FACE B/W
MIMBRES SNUCEO B/W
PINE FLAT NECK CORRUGATED
TULAHOSA PATTERNED CONNUBATE
RESERVE PLAIN CORRUGATED
RESERVE INDENTED CORRUGATED
TULAHOSA PATERNED CORRUGATED
RESERVE INCISED CORRUGATED
RESERVE PUNCHED CORRUGATED
PINE FLAT NECK CORRUGATED
THREE CIRCLE NECK CORRUGATED
ALMA AROMI
ALMA TEXTURED SERIES
ALMA PLAIN

RESERVE PLAIN CORRUGATED
RESERVE INDENTED CORRUGATED
TULAHOSA PATTERNED CONNUBATE
RESERVE INCISED CORRUGATED
RESERVE PUNCHED CORRUGATED
PINE FLAT NECK CORRUGATED
THREE CIRCLE NECK CORRUGATED
ALMA AROMI
ALMA TEXTURED SERIES
ALMA PLAIN

NOTES:
expected. Considering the size of the sample, however, the specific time evaluation must remain only an estimate based on what was recovered.

With respect to the two dating charts (Figs. 99 and 100), the word "complete" used in connection with ceramic complexes means complete in terms of archaeological work in this region as of 1955. The basis for types being held as diagnostic has been worked out at the surface site where the complex was originally formed and bears no relation to the method of evaluating important types in the first column. Types shown in small lettering in column one are those present in quantities less than one percent and in column two, are either minor types occurring in small quantities or types abundant but not diagnostic from a temporal standpoint at Point of Pines. Maverick Mountain Phase, a localized phase peculiar only to Arizona W:10:50, was not manifested at cave sites and therefore is not included in the generalized regional phase sequence. Pottery types attributed to this phase are also omitted.

Three occupations are apparent from the ceramic evidence at Tule Tubs Cave. The third and latest of these is Apache, maximum time allowance A.D. 1450-1945, most probable temporal span 1800-1945. The earlier two are
Mogollon-Pueblo. Of these, the later is equivalent to the occupation at Red Bow Cliff Dwelling; maximum time allowance 1275-1450, most probable temporal span 1325-1400 (Canyon Creek Phase). The earlier Mogollon-Pueblo and first occupation is assigned a maximum time allowance of 900-1150, with a probable temporal span of 950-1100 (Nantack and Reserve phases). The time periods given are overall estimates based on ceramic dating and actual occupations and building activities in all likelihood took place at specific times within what have been termed "most probable" temporal spans. Exact beginning and ending date or the exact number of years covered during an occupation cannot be determined.

The triple occupation described for Tule Tubs Cave and typical of lower caves did not extend to the upper caves. As a reason for this circumstance it is suggested that the population in this immediate district during the early period and finally in Apache times did not involve as many people as was the case in the later Mogollon-Pueblo period. As a result, enough room for dwellings was found in lower caves and those considered upper caves were not used because upper caves are difficult to approach and water, building materials, and other necessities of life are far more easily obtained near the lower caves. During the Canyon Creek Phase or late period of Mogollon-Pueblo occupation, however, people were present throughout
the Nantack scarp district in numbers so great as to necessitate the use of every habitable cave, both upper and lower.

It has been emphasized that mixture of cultural materials within the cave fill was severe. This condition renders the dating of artifacts, other than pottery, highly speculative. A few artifact types are thought to belong primarily to Apache and are so designated; otherwise objects must, on the basis of evidence from this site alone, be considered Mogollon-Pueblo from either of the two occupation periods, 950-1100 or 1325-1400. No attempt has been made to place them in either time period.

STONE IMPLEMENTS

Pecked and Ground Stone Objects

<table>
<thead>
<tr>
<th>Classification</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mano special use.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mano with single grinding surface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type a</td>
<td>3</td>
<td>11.29</td>
</tr>
<tr>
<td>Type b</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Mano with two grinding surfaces</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>One-hand mano</td>
<td>3</td>
<td>4.84</td>
</tr>
<tr>
<td>One-hand mano with two grinding surfaces</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Rubbing stone</td>
<td>15</td>
<td>24.19</td>
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<tr>
<td>Polishing stone</td>
<td>6</td>
<td>9.68</td>
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<td>Type a</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Type b</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Hammerstone</td>
<td>21</td>
<td>33.87</td>
</tr>
<tr>
<td>Double-grooved hammer</td>
<td>1</td>
<td>1.61</td>
</tr>
</tbody>
</table>
Shaft smoother
Abrading stone

3  4.84
6  9.68
Total 62  100.00

Ornaments
Pendant

1

All artifact types recovered from this site but not discussed herein are similar to corresponding types at Red Bow Cliff Dwelling, and descriptive texts applicable to them may be found in the Red Bow Cliff Dwelling site report.

MANO WITH TWO GRINDING SURFACES: Of the three fragmentary specimens, one is a broken mano half section which has been put to a secondary use in that a slight round depression or pit (depth, 2 mm.; diameter, 21 mm.) is pecked into approximately the center of the flatter of two surfaces. The usefulness of this depression cannot be inferred as the edges of the broken mano half do not show special wear.

METATE: No complete metates were found at Tule Tubs Cave. The fragments which were recovered are too small to classify. The use of "ancient" metates is thought to be a characteristic of the Apache and it is possible that since there was an Apache occupation here, these people removed serviceable metates when they left the site.

MORTAR: Four bedrock mortars are worked into the
Figure 101 - Data synthesis chart for pecked and ground stone objects from Tule Tubs Cave.
<table>
<thead>
<tr>
<th>Classification</th>
<th>No. of Specimens</th>
<th>Length (mm)</th>
<th>Width (mm)</th>
<th>Thickness (mm)</th>
<th>Weight (oz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range</td>
<td>Mean</td>
<td>Range</td>
<td>Mean</td>
<td>Range</td>
</tr>
<tr>
<td>MANO WITH SINGLE GRINDING SURFACE Type a</td>
<td>3</td>
<td>Frags.</td>
<td>87-109</td>
<td>96.0</td>
<td>35-66</td>
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<tr>
<td>MANO WITH SINGLE GRINDING SURFACE Type b</td>
<td>1</td>
<td></td>
<td>97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MANO WITH TWO GRINDING SURFACES</td>
<td>3</td>
<td>Frags.</td>
<td>97-102</td>
<td>99.0</td>
<td>28-32</td>
</tr>
<tr>
<td>ONE-HAND MANO WITH TWO GRINDING SURFACES</td>
<td>3</td>
<td>98-113</td>
<td>103.7</td>
<td>97.0</td>
<td>34-53</td>
</tr>
<tr>
<td>RUBBING STONE Type a</td>
<td>15</td>
<td>58-136</td>
<td>94.3</td>
<td>52-107</td>
<td>25-70</td>
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<tr>
<td>RUBBING STONE Type b</td>
<td>3</td>
<td>Frags.</td>
<td>97-102</td>
<td>99.0</td>
<td>28-32</td>
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<td>POLISHING STONE Type a</td>
<td>2</td>
<td>37, 56</td>
<td>74.8</td>
<td>27, 44</td>
<td>20, 31</td>
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<td>4</td>
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<td>74.8</td>
<td>39-44</td>
<td>24-40</td>
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<tr>
<td>HAMMERSTONE</td>
<td>21</td>
<td>55-205</td>
<td>85.7</td>
<td>48-121</td>
<td>37-99</td>
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<tr>
<td>DRAFTSWORDER</td>
<td>1</td>
<td>98</td>
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<td>50</td>
<td>50</td>
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<tr>
<td>SHAFTSMOOTHER</td>
<td>3</td>
<td>77-103</td>
<td>90.3</td>
<td>64-76</td>
<td>30-47</td>
</tr>
<tr>
<td>ABRADING STONE Type a</td>
<td>6</td>
<td>62-96</td>
<td>78.7</td>
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<td>PENDANT</td>
<td>1</td>
<td>39</td>
<td>21</td>
<td>7</td>
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### TABLE 4. SUMMARY LISTING OF MATERIALS FROM WHICH PECKED AND GROUND STONE OBJECTS WERE MADE

<table>
<thead>
<tr>
<th>Classification of Object</th>
<th>Sandstone</th>
<th>Limestone</th>
<th>Mudstone</th>
<th>Quartzite</th>
<th>Andesite</th>
<th>Diabase</th>
<th>Diorite</th>
<th>Granite</th>
<th>Basalt</th>
<th>Tuff</th>
<th>Rhyolite</th>
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<tr>
<td>Mano</td>
<td></td>
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<tr>
<td>One-hand mano</td>
<td></td>
<td></td>
<td>1</td>
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<tr>
<td>Rubbing stone</td>
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<td>Polishing stone</td>
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<td>Hammerstone</td>
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<td>6</td>
<td>1</td>
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<td>Double-grooved hammer</td>
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<td>Abrading stone</td>
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<td>Pendant</td>
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</tbody>
</table>
flat rock surfaces of two natural shelves along the cave wall toward the rear of Room 1. Mortar holes are approximately 200 mm. deep and 140 mm. wide at the mouth and are shown in Figure 87b.

RUBBING STONE

Type a: It is suggested that six of these rubbing stones might be objects of Apache material culture because they seem to differ from the rest and from rubbing stones of this type found at Red Bow Cliff Dwelling. They tend to be smaller, flatter, lighter, more angular and irregular in shape, are unshaped, have a single rubbing surface, and for the most part show little indication of having been used for pounding. These distinctions are visual and highly subjective, but taken together it is possible that rubbing stones of this order are Apache. No positive identification can be made in this regard until an Apache lithic complex is established which is based on direct association with known examples of Apache material culture.

DOUBLE-GROOVED HAMMER: A natural stone of unusual shape was pressed into service as a grooved hammer; sub-rectangular in outline; almost square in cross-section; surfaces and poll not intentionally ground but are naturally smooth and poll is rounded; striking surface is the only portion that is intentionally modified; it is rounded and made smaller than the main body, appearing as
Figure 102. - Pecked and ground stone tools from Tule Tubs Cave. a-c, shaftsmoothers; d, polishing stone Type a; e, double-grooved hammer; f, g, abrading stones; h, k, rubbing stone Type a; i, j, hammerstones; l, mano with two grinding surfaces; m, one-hand mano with two grinding surfaces. Length of m, 113 mm.
a shoulder nubbin; grooves are full and completely encircle the mid-section; they are shallow, the lower being wider and more shallow than the upper; neither are worked in the true sense, being only scratched in an attempt to further define the groove; they are parallel but run diagonally across the face at a 30 degree angle from the horizontal.

SHAFTSMOOTHER: The three specimens were found together. Were it not for the shaftsmoother groove, they would, however, be considered well fashioned rubbing stones. Each has one smooth flat surface which serves as a base; on the opposite side in two cases the groove is worn into a smooth, moderately convex surface; one (A-16224) is oval in outline with smoothed edges; another (A-16225) is also oval but one edge is rough but straight, obviously this shaftsmoother was made from the broken end of what was once a larger rubbing stone; in both of these a single groove runs across the upper face; grooves are U-shaped, polished, smooth, 10-12 mm. in width, 2-3 mm. in depth. The last specimen (A-16226) is pear shaped in outline, triangular in cross-section with a ridge down the long axis on the upper face, each side of this ridge is a smooth, flat surface rounded off to meet the flat base; the groove is at right angles to the ridge and cuts off one end of it; initially the groove was a tilted crescent 30 mm. wide and 13 mm. deep but after it had been formed small objects had been rubbed in it to form a slight
secondary groove parallel to the first 2 mm. deep and 4 mm. wide.

Three arrow shaftsmoothers were obtained as a group from transitional Reserve-Tularosa of Hinkle Park Cliff-Dwelling. They seem, specimen for specimen, to almost exactly duplicate the three recovered from Tule Tubs Cave, even to the extent that one has a ridge at right angles to the groove (Martin, Rinaldo, and Bluhm 1954: 110, Fig. 59).

**ABRADING STONE**

**Type a:** One specimen differs from all others in this category by reason of its extremely thin, tabular nature and that its edges are worn at right or high angles to the flat surfaces.

**PENDANT:** One pendant was recovered; both faces are smooth but faint smoothing striations are present; corners and edges are, with one exception, rounded; shape is rectangular, 16 mm. wide at narrowest end; lower edge runs at a diagonal; upper edge is jagged and unfinished and contains a central notch which was broken, perhaps while drilling a suspension hole so that another biconical perforation was begun near the narrow end, but the object was lost or abandoned before even this hole was completely pushed through.
Discussion

At Tule Tubs Cave the majority of both manos and one-hand manos are of basalt, none were made from limestone. Fine-grained diorite and limestone are most abundantly represented in rubbing stones; limestone, quartzite, and basalt were used in about equal measure for hammerstones; limestone was used exclusively for shaftsmoothers.

Manos with single grinding surfaces far exceed in number those with two grinding surfaces. Hammerstones are the most abundant type of ground and pecked stone artifact present, closely followed by the rubbing stone category. The frequency of rubbing stones and hammerstones tends to bear out what has been said concerning the lithic complex at Red Bow Cliff Dwelling. Because an Apache occupation occurred at this site, the lithic complex may not be as completely represented, particularly with respect to manos, metates, rubbing stones, and projectile points, as it would be ordinarily.

Chipped Stone Objects

List of Artifacts

<table>
<thead>
<tr>
<th>Classification</th>
<th>Number</th>
<th>Percentage</th>
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<tr>
<td>Rough blade</td>
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<tr>
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<td>14.95</td>
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<tr>
<td>Type a</td>
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<td></td>
</tr>
<tr>
<td>Type d</td>
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<td></td>
</tr>
<tr>
<td>Type</td>
<td>Count</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-------------</td>
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<tr>
<td>Type f</td>
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</tr>
<tr>
<td>Type g</td>
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<td></td>
</tr>
<tr>
<td>Type h</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Type i</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Type j</td>
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<td></td>
</tr>
<tr>
<td>Type m</td>
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<td></td>
</tr>
<tr>
<td>Type n</td>
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<td></td>
</tr>
<tr>
<td>Type o</td>
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</tr>
<tr>
<td>Type r</td>
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<td></td>
</tr>
<tr>
<td>Type s</td>
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<tr>
<td>Type b</td>
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</tr>
<tr>
<td>Type c</td>
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<tr>
<td>Type d</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Type e</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**PROJECTILE POINT AND BLADE**

**Type h:** A shallow basal notch is present in the single specimen (Fig. 101d).

**Type i:** In one of the two specimens (Fig. 101e), two additional lateral notches occur at 2 mm. intervals above the normal one. In the other specimen, a single extra lateral notch was similarly placed 2 mm. above the normal one.

**Type m:** This obsidian projectile point (Fig. 101g)
Figure 103. - Data synthesis chart for chipped stone objects from Tule Tubs Cave.
## CHIPPED STONE OBJECTS
(Tule Tubs Cave)

### Data Synthesis Chart

<table>
<thead>
<tr>
<th>Classification</th>
<th>No. of Specimens</th>
<th>Length (mm)</th>
<th>Width (mm)</th>
<th>Thickness (mm)</th>
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<td>Mean</td>
<td>Range</td>
<td>Mean</td>
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<td>25, 25</td>
<td>13, 16</td>
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<td>15, 23</td>
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<td>5, 7</td>
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<td>23*</td>
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<td>5, 7</td>
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<td>5, 7</td>
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<tr>
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<td>15, 23</td>
<td>5, 7</td>
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<td>15, 23</td>
<td>5, 7</td>
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<td>23</td>
<td>15, 23</td>
<td>5, 7</td>
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<td>15, 23</td>
<td>5, 7</td>
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<td>5, 7</td>
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<td>36</td>
<td>15, 23</td>
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<td>34</td>
<td>15, 23</td>
<td>5, 7</td>
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<td>45</td>
<td>15, 23</td>
<td>5, 7</td>
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<td>Drill Type a</td>
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<td>Frag.</td>
<td>Frag.</td>
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<td>Scraper Type a</td>
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<td>30.3</td>
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<td>54.2</td>
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<td>79-134</td>
<td>103.0</td>
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* One or more specimens broken in this dimension; range and mean determined for complete specimens only.
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<th>Quartzite</th>
<th>Obsidian</th>
<th>Chalcedony</th>
<th>Rhyolite</th>
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<th>Limestone</th>
<th>Sandstone</th>
<th>Basalt</th>
<th>Tuff</th>
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</tr>
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<td>Core</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</tbody>
</table>

TABLE 5.- SUMMARY LISTING OF MATERIALS FROM WHICH CHIPPED STONE OBJECTS WERE MADE
was found as one object in a cache with three concretions and a painted jaw bone in Level 3 of Room 2.

**Type r:** Triangular shape; diagonal notched; parallel sided stem narrower than shoulder; distinctive rounded downcurved tangs; broad shoulder; slightly concave base; slightly convex edges; made of chert, (Fig. 104\(h\)).

**Type s:** Triangular shape; diagonal notched; broad shoulder; unusual stem and base which combine to form an inverted cone worked about the entire perimeter; base comes to a point sweeping down in an S-curve on either side from the notch; edges are convex; made of rhyolite, (Fig. 104\(k\)).

**HOE:** At Tule Tubs Cave, three complete hoes were recovered. Many small fragments also occurred which were too small for classification and analysis but even small pieces from hoe blades still could have been used as temporary cutting tools.

**MISCELLANEOUS CHIPS, FLAKES, AND SMALL CORE FRAGMENTS:** Obsidian chips were extremely rare, a situation in decided contrast to that at Red Bow Cliff Dwelling where at least a few obsidian chips were found in all sections of the cave. As might be expected, this is also reflected in the frequency of obsidian projectile points at Tule Tubs Cave. Flint chips, chunks, and small pieces of cores occurred in about equal measure in all levels of Room 2 and throughout Room 1. There were no particular concentrations of this
Figure 104. - Chipped stone projectile points and blades. 
a, rough blade; b-k, projectile points and blades; 
b, Type a; c, Type g; d, Type h; e, Type i; f, Type j; 
g, Type m; h, Type r; i, Type n; j, Type o; k, Type s. 
Length of h, 36 mm.
Figure 105. - a-g, scrapers; a-c, Type a; d-g, Type b; h-n, Type c; o, Type d; p, q, Type e; s, t, pulping planes; u, hematite lump; r, v, concretions. Length of a, 111 mm.
Discussion

Little can be said of this group of chipped stone objects except that all the main categories found at Red Bow Cliff Dwelling are represented. Two projectile point and blade types of unusual shape occurred, but no explanation for their presence can be advanced. Ceremonial objects are absent. Type c, as at other sites, is most prevalent among scrapers. The degree to which the Apache may have made inroads on the representation of various stone tool types at this site is difficult to assess, but their presence may have contributed to the scarcity of certain stone items.

Miscellaneous Unworked Objects of Stone

List of Artifacts

<table>
<thead>
<tr>
<th>Classification</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hematite</td>
<td>(23.5 ozs.)</td>
</tr>
<tr>
<td>Basalt stone with ground edges</td>
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</tr>
<tr>
<td>Concretion</td>
<td>4</td>
</tr>
</tbody>
</table>

PAINT PIGMENT: Of a total of 11 lumps of red hematite found in the fill of Rooms 1 and 2, seven showed rubbed surfaces. One of these (A-11846) has a concave, half-moon shaped worn surface (Fig. 105u) which makes it appear as though it had been rubbed on other objects, such as bows
or arrows for example, to impart a reddish color to them. This chunk of hematite is 73 mm. long, 49 mm. wide, 38 mm. thick, and weighs 5.5 ounces. A single piece of white kaolinite with two rubbed facets occurred on the surface of the site.

**BASALT STONE WITH GROUND EDGE:** Similar to basalt stones from Red Bow Cliff Dwelling in all respects except that several of the naturally irregular edges of the stone are abraded. Abrading must have been effected by rubbing an edge of the stone at a variety of angles to the rubbed surface because right angle, beveled, and rounded edges were formed. Length, 85 mm.; width, 55 mm.; thickness, 16 mm.; weight, 3.5 ozs.

**CONCRETION:** Four small, elongated, pointed stones with surfaces smoothed and edges rounded by natural agencies. Three of these stones (Fig. 105x, y) were found in a cache with other objects in Level 3, Room 2. Length: range, 37-83 mm.; width: range, 17-22 mm.; thickness: range, 11-17 mm.

**MISCELLANEOUS OBJECTS OF CLAY**

**List of Artifacts**

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<tr>
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<tr>
<td>Type d</td>
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</tr>
<tr>
<td>Type e</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

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WORKED POTSHerd

Type a - Round: Pottery types represented and condition of worked edge: 3-Alma Plain, 1 rough, 2 smooth (A-16956); 1-Reserve Red, rough. Maximum diameter: 56, 59 mm., two incomplete; thickness: range, 4-7 mm.; mean, 5.8 mm.

Type d - Triangular: One Reserve Black-on-white (A-16957); smooth edge; length, 51 mm.; maximum width, 40 mm.; thickness, 5 mm. (Fig. 106b).

Type e - Irregular: One Alma Plain (A-16958); rough edge; length, 86 mm.; maximum width, 70 mm.; thickness, 6 mm.

Type g - Pendant: A circular worked potsherd (Fig. 106a) is biconically drilled near one edge rendering it suitable for suspension. The edge is slightly smoothed on a few prominent points, but is otherwise rough. Reserve Red (A-16959); maximum diameter, 41 mm.; thickness, 7 mm.; perforation diameter, 2 mm.

CLAY CAKES: Two flat cakes of clay (A-16916, A-16917) were found together under the overhang area. Other than a slight size variation, both are identical (Fig. 106j) and
were probably made from the same batch of clay. Reddish brown clay was pressed firmly into a rectangular form with rounded ends and edges. The objects had been lightly set upon a grass surface to dry and one side of each retains a few grass or straw blade impressions. Surfaces are rough and bumpy and were not modified after being manipulated into shape by the fingers. The use for which clay cakes were intended has not been discovered. When dry they are heavy, durable objects (moisture causes disintegration). They are not blackened by smoke, battered, or scarred by use in any way which altered original surfaces. Perhaps they represent unused portions of potter's clay. Length: 174, 155 mm.; width: 124, 123 mm.; thickness, 52, 43 mm.

OBJECTS OF BONE AND HORN

List of Artifacts

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</table>
Antler flaker 1 5.26
Ornament of horn 1 5.26
Pendant of horn 1 5.26
Total 19 100.00

AWL WITH ARTICULAR HEAD UNMODIFIED

Type b - Metatarsal: The distal end of a Mountain sheep ulna was used, but the specimen is badly fractured and its point is missing. Length, incomplete; maximum width, 27 mm.; thickness, 15 mm.

AWL WITH ARTICULAR HEAD MODIFIED ONLY BY SPLITTING:
A short, thick, stubby awl (A-16973) with a fine, sharp polished point evenly tapered from the proximal end of a Mule deer metatarsal (Fig. 106c). Length, 116 mm.; maximum width, 22 mm.; thickness, 16 mm.

AWL WITH ARTICULAR HEAD REMOVED

Type b: Made of a split Mule deer metatarsal (Fig. 106d). Length, 126 mm.; maximum width, 8 mm.; thickness, 4 mm.; cat. no. A-16985.

AWL FRAGMENTS AND BROKEN TIPS: Although too small for type classification, they are identified as follows: Mountain sheep metatarsal—one from Room 2, Level 2; another from Room 2, Level 3; and a third from Room 1, fill. A split Mule deer metatarsal fragment from Room 2, Level 4 had been decorated by incised band lines which framed rows of small perpendicular incised lines.
Figure 106. - Miscellaneous objects of clay, bone, and horn. 

a, worked potsherd, Type g;  
b, worked potsherd, Type d;  
c, awl with articular head modified only by splitting;  
d, awl with articular head removed, Type b;  
e, unidentified bone object (patch?);  
f, bone whistle(?);  
g, painted jaw bone (red stripes);  
h, pendant of horn;  
i, antler rubbing tool;  
j, clay cake;  
k, antler flaker;  
l, ornament of horn.
BONE WHISTLE(?): The specimen is similar to, and may in fact be, a bone bead such as those from Red Bow Cliff Dwelling except that it has two deep cuts or notches side by side 7 mm. from one end. The cuts which produced the notches do not encircle the bone and one barely penetrates the tube forming a small hole. The object (A-16989) was made from a turkey tibiotarsus (Fig. 106f). Length, 29 mm.; maximum width, 11 mm.; thickness, 7 mm.

RING: Cut from a Whitetail deer femur(?), the ring (A-16990) is completely smoothed on all surfaces and edges, and the interior polished from wear. Only a broken half was recovered. Diameter, 18 mm.; width, 5 mm.; thickness, 1.5 mm.

PAINTED JAW BONE: A single Mule deer ramus was painted with at least two red stripes extending on the outside surface from tooth sockets to the lower edge of the jaw bone. Only a trace of one stripe appears along the cracked edge, the other is 7 to 9 mm. wide and 24 mm. long. The specimen shows no evidence of being worked. The coronoid and condyloid processes and the forward portion of the jaw are broken away, the teeth are missing. A similar specimen was found at Kinishba (Cummings 1940: 109, Pl. XXXV) and painted bones occurred at Hawikuh. In connection with them, Hodge felt they may have been painted with sacred paint on the occasion of a hunter's first kill as was
customary among the Zuni (Hodge 1920: 14). This jaw section (Fig. 106g) is 119 mm. long; 26-59 mm. high; 4-12 mm. thick; provenience, Room 2, Level 3; cat. no. A-17005. It was found in a cache associated with a small obsidian projectile point (A-16832) and three concretions (A-11857, A-11858).

UNIDENTIFIED BONE OBJECT: A slightly concavo-convex wafer thin section of a skull (A-17007) was roughed into an ovoid shape (Fig. 106e). Surfaces are not smoothed and edges are but lightly ground to reduce only the most ragged points. No markings are present other than eight small perforations (1 mm. in diameter) which were punched entirely through from the convex side and except for one side of the object, extend about the perimeter approximately 4 mm. in from the edge at intervals of 6 to 10 mm. The holes seem to be needle perforations and if so, the specimen may have been a patch of some sort (see leather patch, Red Bow Cliff Dwelling). It gives an appearance of having been sewed flat against something else. Length, 43 mm.; maximum width, 31 mm.; thickness, .5 mm.

ANTLER RUBBING TOOL: A short, stubby section of a Mule deer antler (A-16997) broken at one end and flattened on the other by rubbing at an angle perpendicular to the long axis (Fig. 106d). Length, 52 mm.; diameter, 20 mm.

ANTLER TINE IMPLEMENT: Two of these are central sections of Mule deer antler, broken at the butt end with
tips snapped off, perhaps through use. Another is 65 mm.
of a Mule deer antler tip slightly polished and chipped about the point. A fourth specimen (A-16998), representing the broken tip of an antelope horn core, has been used on two opposite sides of the tip. The two wear facets form a wedge-shaped point 12 mm. long which must have been produced by abrasion. Length, 56 mm.; maximum diameter, 17 mm.

**ANTLER FLAKER:** This specimen is the slim antler of a Whitetail deer (A-17000). The tip is rounded, not sharp, and is unmodified (Fig. 106k). The butt was reduced to a dull rounded point, less sharp than the tip, bluntly tapered by abrasion but not faceted. The entire implement is somewhat smoothed and battered through use. Length, 130 mm.; maximum width, 12 mm.; thickness, 10 mm.

**ORNAMENT OF HORN:** A section of Mountain sheep horn was cut so that the conical cavity penetrated through its entire length. A leather thong with its end knotted was then run through the cavity so that the knot caught in the narrowest portion of the object, thus providing a means for suspension. The thong broke where it emerged from the top of this truncated cone, with the knotted portion remaining in place (Fig. 106l). Surfaces and edges of the specimen are smoothed. There is little doubt that it was tied to clothing or some other object as an ornament. If secured with or next to others of a similar nature,
it would have made an excellent rattle such as adorn many ceremonial costumes among present day tribes. Smallest diameter, 15 mm.; largest diameter, 24 mm.; length, 50 mm.; provenience, overhang area; cat. no. A-17001.

**PENDANT OF HORN:** A thin sliver of unidentified horn was carved into a triangular pendant (Fig. 106h). The exterior horn surface is smoothed for the more finished side; the reverse surface is scraped down to the desired uniform thickness. The base is straight; edges smooth and slightly convex; corners rounded. The single hole is drilled biconically and located 4 mm. from the apex. One of the lower corners is broken and two shallow half circle notches occur evenly spaced along this edge. Length, 42 mm.; base width, 20 mm.; minimum width, 5 mm.; thickness, 2 mm.; provenience, Room 1, fill; cat. no. A-17010.

**CORDAGE**

At Tule Tubs Cave only single yarn yucca or bear-grass cordage was preserved and recovered. Cordage of this kind is never spun or twisted but served as it was cut from leaves. The sole preparation involved is maceration; all degrees are represented from the stiff, natural leaf sections to completely pliable material where all fibers are separated. Varying degrees of fiber separation also occur within single cord sections, possibly the
result of more use or wear at certain places. Short lengths spliced to form long cords, single short sections, loops and coils, and broken knot sections occurred abundantly. Knots are frequent in all kinds of pieces. Split yucca leaf sections range from 3 to 14 mm. in width. Bear-grass leaves average 4 mm. in width and were used without modification. None give any indication of the specific use to which it was put. This type of material, however, must have been the all purpose utility cordage of its time.

KNOTS

The various types of knots, temporary ties, and loops found in the cordage from all three cave sites are illustrated in Figure 57. Of these, the following occurred at Tule Tubs Cave:

- Figure 57a: overhand knot, 1 example
- Figure 57b: square knot, 16 examples
- Figure 57c: variation of the figure-of-eight knot, 1 example
- Figure 57d: loop tied with square knot, 1 example
- Figure 57e: lark's head, 1 example

TEXTILES

A single specimen of plain weave was recovered from Room 2, Level 2 (A-17034). It is a fragmentary strip 240 mm. long and 25 mm. wide, the weave is of single yarn
cotton thread, Z-spun, and each weft is over one and under one warp. There are 7.5 wefts per cm. and 10 warps per cm. All edges are frayed and no selvage remains.

PLANT ARTIFACTS

CORN COB MOUNTED ON A STICK: A single badly weathered specimen (A-17056) of the first type described for Red Bow Cliff Dwelling and similar to the one shown in Figure 69a was recovered. It is mounted on a rough stick, 65 mm. long and 4 mm. in diameter. Since it is broken, overall dimensions are not given.

UNIDENTIFIED FIBER BUNDLE: A small tight bundle of macerated hard fiber (A-17057), much like the fibrous kind of quid, is wrapped three times and tied with a single narrow yucca cord. There is a tubular hole through its center down the long axis which is the proper diameter to have accommodated a stick such as that used in mounting corn cobs. The fiber must have been moist and bound around the stick which was subsequently removed or which fell out, or else the hole would not have completely retained its shape. Length, 50 mm.; diameter, 27 mm.

WORKED GOURD FRAGMENT: One specimen from the overhang area is a fragment of the peduncle end of a hull; all but one small cut edge near the peduncle hole are broken; there are nevertheless several stitch holes along the cut
edge and an immediately adjacent edge, and a section of hard fiber reed stitching is still in place in four of the holes. It seems to be a mended portion of a container.

Two other specimens from the overhang area and Area B each have a worked edge and are probably broken gourd scraper segments. All three fragments are approximately 45 to 65 mm. in maximum width.

SAHUARO CALLUS RECEPTACLE:

"The sahuaro cactus (Cereus giganteus) repairs wounds by forming a hard, tough callus about the injury. Such wounds are often caused by woodpeckers in building nests in the cactus. When the plant dies and the trunk disintegrates, the tough callus is one of the few parts to remain." (Haury and others 1950: 424.)

A container of this sort was found in a crevice in the north wall of Room 3, 1.10 m. from the southwest room corner and at a depth of 10 cm. below the present surface. In it are two cut pieces of tanned leather. There are small areas of pinon pitch caked about the orifice on the exterior, an indication that it may at one time have been sealed. The article (A-17067) is shown in Figure 71a. It is boot-shaped; rough but rounded exterior; 112 mm. long; 70 mm. wide; 91 mm. high; orifice diameter, 30-43 mm.

The place where it was found, its leather contents, and presence of pinon pitch make it very possible that it is Apache, but the evidence is not conclusive and must necessarily be a suggestion. It could also have been hidden during the final Mogollon-Pueblo occupation. We
have, however, the following ethnographical note from a Yavapai "Apache" informant:

"Well, where the giant cactus has a hole in it - a bird or something has gone into it, it makes a big bulb. Then when it dies, it stays the same, and they would cut it off and use it to store fruit and things in." (Heider 1955: Field notes.)

**CANE SHAFT CACHE:** An untied bundle of long cane shafts was neatly stacked and buried immediately adjacent to the east wall of Room 1 at about the midpoint in its length. The shafts had been harvested and deftly trimmed to the same length, in each case by two strokes of a sharp tool, one from each side which join in an acute V, flat pointing the shafts at both ends. Evidence that the trimming was done at the site remains in the profusion of cane shaft stubs (60-120 mm. in length) about the cave which have an end trimmed as do the shafts but with the V cut in the opposite direction. There are many more stubs than shafts in the cache so it must be supposed that numerous shafts not recovered were trimmed here. With few exceptions, stub ends opposite the V cut are extremely ragged and show that harvesting was just a matter of breaking off the stalk at the base.

The 18 shafts in the cache are within a relatively narrow range as to dimensions. Length: range, 800-890 mm.; diameter: range, 7-12 mm. Two are of solid soft wood peeled and cut to the size of the cane. All
others are carrizo cane (Phragmites communis) and were evidently selected for their size and uniform straightness; they are unmodified except for end trimming. The obvious conjecture is that these shafts were destined for use in arrow making but if cut into short lengths, could also have been fashioned into cane cigarettes. The occurrence represents a cache of material.

WOVEN PLANT ARTIFACTS

PLAITED SANDAL MADE WITH WIDE ELEMENTS: Four specimens, the only sandals recovered from Tule Tubs Cave, are similar to this type at Red Bow Cliff Dwelling and are all prepared of single wide unmacerated yucca leaves, woven over-two-under-one. Two are complete; two are fragments; two of these are square-toed; one is round-toed; thickness: 19, 8, 16, 9 mm.; width: 104, 78, 97, 102 mm.; length: 230 mm., incomplete, 205 mm., incomplete; width of elements: 15, 13, 17, 8 mm.

COILED BASKETRY: Fragments from the bottom of one bowl-shaped basket (A-17093) are three-rod foundation, bunched, simple stitch, uninterlocking, in a / slant; stitching splints are close together in a tight weave; 2 coils and 2.5 stitches per cm.; a normal center is present; foundation rods are long, slender, round sections of solid wood; the wall technique is illustrated in
OBJECT OF LEATHER

LEGGING: Three specimens are the tattered and fragmentary remains of a buckskin(?) legging probably used as a sheath covering for the lower part of the leg. Because the fragments are in such poor condition, it cannot be adequately reconstructed. The leather was tanned, cut to the proper size to fit as a cylinder and sewed up the cut side with a leather thong in an overcast stitch. It must have been about 70 mm. in diameter. So little remains that the identification of this piece is questionable, it could also have been the upper part of a boot type moccasin. Those who made and wore it are equally in doubt, but I am inclined to suspect the Apache.

SUMMARY DISCUSSION

Tule Tubs Cave is representative of lower caves in the Nantack scarp in terms of its three periods of occupation. In this respect and with regard to the relationship of this site to the total population of the region during any of these periods, it is comparable to Pine Flat Cave. The recognition of a Mogollon-Pueblo occupation during Nantack and Reserve phases in addition to the Canyon Creek Phase period in cave sites (lower)
### FIGURE 107. - SUMMARY PROVENIENCE CHART FOR ARTIFACTS FROM TULE TUBS CAVE

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<td>Worked potsherd Type g</td>
<td>1</td>
<td>1</td>
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<td>Clay cake</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Bone awl with articular head unmodified Type b</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Bone awl with articular head modified only by splitting</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Bone awl with articular head removed Type b</td>
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<td>1</td>
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<td>Awl fragments and broken tips</td>
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<td>Bone whistle(?)</td>
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<td>1</td>
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<td>Bone ring</td>
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<td>1</td>
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<td>Painted jaw bone</td>
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<td>unidentified bone object (patch?)</td>
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<tr>
<td>Antler tine implement</td>
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<td>Ornament of horn</td>
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<tr>
<td>Pendant of horn</td>
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<td>1</td>
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<tr>
<td>Plain weave textile fragment</td>
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<td>Corn cob mounted on a stick</td>
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<td>Worked gourd fragments</td>
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<td>1</td>
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<td>Seashore callus receptacles</td>
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<td>1</td>
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<tr>
<td>Cave shaft cache (15 shafts)</td>
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<td>1</td>
<td>1</td>
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<tr>
<td>Plaited sandal made with wide elements</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Coiled basketry</td>
<td>2</td>
<td>1</td>
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<tr>
<td>Leather legging</td>
<td>1</td>
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south of the Nantack Ridge is a significant contribution to the regional archaeological picture. It is an indication that the population near Point of Pines was spread over a wider territory than at times previous to A.D. 950, and that there was a shift away from the Nantack scarp territory during late Reserve Phase times. Red Bow Cliff Dwelling provides a more complete definition of the Canyon Creek Phase occupation.

Tule Tubs Cave also adds information to the Apache Phase at Point of Pines. The cultural affinities of many of the artifacts, particularly in the categories of stone and bone, are suspect when it can be demonstrated that the Apache made use of a site. We have little knowledge of what should be expected within an Apache archaeological complex and therefore all objects for which they might have been responsible cannot be identified. Some tools may be common to both Mogollon-Pueblo and Apache tool configurations but as matters stand, would be identified as exclusively Mogollon-Pueblo. It is suggested that at Tule Tubs Cave, Apache Plain pottery, a subtype of abrading stones, a sahuaro callus receptacle, and possibly a buckskin legging are Apache artifacts. Others in the total assemblage might, however, have been made or reused (metates) by these people. Careful description of all individual artifact types and documentation of those evidences of Apache occupations which can be identified...
at every site, will eventually lead to the successful solution of this problem.
PINE FLAT CAVE
(Arizona W:10;42)

THE SITE

Pine Flat cave was visited during the initial survey made by Haury and Sayles in 1945. As part of the University of Arizona Archaeological Field School session of 1946, limited testing was conducted at the site. Evidence from these tests and surface indications made it clear that, despite the small size of the cave, there was a Mogollon-Pueblo occupation which sherd material tentatively dated from A.D. 950 to 1400. Fragments of twined basketry were evidence that occupation of the cave by Apache Indians might also be determined.

Pine Flat Cave is located in a canyon five miles east of Point of Pines (Fig. 4). Willow Creek drains from west to east across Circle Prairie and descends nearly a thousand feet before it joins Eagle Creek. In achieving this descent a deep canyon from Circle Prairie to Eagle Creek Valley is cut by Willow Creek through the extreme east end of the plateau. All the small intermittent streams which constitute Willow Creek tributaries at the east end of Circle Prairie also cut canyons. They are shallow and accessible where they headwater on the north side of Nantack Ridge, but grow steadily precipitous as they progress toward Willow Creek.
Figure 108. - Sketch map showing Pine Flat Cave in relation to the surrounding terrain.
Figure 109. - Pine Flat Cave as seen from the west across the canyon in which it is situated, and as it appeared before excavation. Trash extends down the slope in front of the cave opening. The cliff above is unusually sculptured and fluted by erosion.
Pine Flat Cave is situated in the east wall of a small canyon (Fig. 109), and has been formed at a place where conditions are unique. A short intermittent stream, the only one known to flow in a north to south direction in the southern drainage of Willow Creek, joins a normal intermittent stream flowing south to north (Fig. 108). The junction of this north to south flowing stream bed with a normal one at the particular point where the drainage system commences to incise, has produced the bluff into which the cave was formed. The cave was hollowed out by agencies of erosion, wind and water, at a contact in the canyon wall between beds of volcanic ash and volcanic agglomerate. The lower bed of volcanic ash appears to have been reworked by water and wind action into a stratified series of cross-bedded volcanic sandstone layers and covered at a later time by more volcanic ash. This entire bed was then covered by volcanic agglomerate of a highly consolidated nature. Consolidation may have been caused by the heat and pressure of later lava flows over this area.

The cave is at an estimated altitude of 5,800 feet and exposure is to the south. Immediately above it, a cliff which has been peculiarly eroded by water into vertical sheets rises 50 feet. From the base of the site, a talus slope covered by trash accumulations extends about 100 feet down to the creek bed (Fig. 109).

Today, water is present in this creek during the summer
months only after a heavy rain. During the early months of the year, it offers a more constant supply. A very slight increase in the general precipitation would have transformed this creek into a water supply available the year round. At present, the nearest constant source of water is a group of pools fed by springs one mile down the canyon toward Willow Creek. Arable land is available at varying distances away from the rough, rocky terrain immediately surrounding the canyons. The country in the vicinity of Pine Flat Cave is somewhat more suited to hunting and gathering rather than to agriculture; however, there are areas where crops might have been grown. Remains of agricultural products were among the refuse in the cave.

Evidence indicates the cave was in use at a time contemporaneous with the occupation of larger surface pueblos near Circle Prairie from which corn and similar products could have been obtained by the people living at the cave, perhaps in exchange for items of a hunting and gathering economy.

A half mile from the cave up the principal stream bed toward Nantack Ridge at the road crossing from Point of Pines to Eagle Creek, present day Apache have built a cattle holding pen. The holding pen and the flat area where it is located is known locally as Pine Flat, from which the ruin takes its name.

Transitional flora is characteristic of this portion
of the Point of Pines region. Ponderosa pine, juniper, piñon, and oak grow on the steep sides of the valley. On the canyon floor closer to water, walnut and willow occur. Trees and bushy plants of this order are the essentials of a gathering economy while such plants as the yucca, bear-grass and long-tongue muhly grass yield the raw material for woven plant artifacts and other utilitarian items.

Only two rooms were discernible from architecture visible at the surface. These are protected by the cave overhang. Other rooms were revealed during excavation. The number of rooms occupied at any one time apparently did not exceed three, although a total of nine architectural units ultimately became evident. The site represents only a series of small settlements, and at the peak of occupation all space offered by the cave was utilized.

In describing the results of our work at Pine Flat Cave, architectural rooms are placed together into groupings termed building periods, which are separate from each other stratigraphically. More precise time values are given to the components of the architectural series by virtue of an analysis of the sherd material recovered in direct association with the architecture.
MOGOLLON-PUEBLO ARCHITECTURE

The elements of culture found in Pine Flat Cave are classified into two overall categories. Material which was the product of Mogollon-Pueblo peoples is grouped and considered as such while non-pueblo items are designated as Apache. Nothing in the way of architecture, as such, for which there was evidence can be related to the Apache. The Apache appeared merely to have made use of what had been left by the earlier inhabitants. All architectural features at Pine Flat Cave were built during successive stages of Mogollon-Pueblo occupation and are separated into what have been termed building periods, Mogollon-Pueblo Building Period One and Mogollon-Pueblo Building Period Two. These building periods are inclusive groupings, not meant necessarily to represent building in the cave at any particular moment or during any particular year. A building period is taken rather to include features which were erected over a number of years and grouped together. It is felt that, generally speaking, each of them represents the products of a people who occupied the cave during one continuous period of time. The architecture of one building period is recognizably distinct from that produced by a different group of individuals during a distinctly later time span. Building periods have been separated on the basis of architectural superposition and
the relationship of features, one to another. Nine living areas were detected in the two building periods and have been designated for descriptive purposes as R 1, R 2, etc. through R 9. The letter "R" is used in preference to the word "room" because, while some of these units may be thought of as true rooms, others are no more than storage areas, recognizable living areas, or work areas.

This building period includes the earliest architectural evidence found in the cave. If the site were visited or occupied to any great extent before this time, evidence of it was either destroyed by the users of the cave during Building Period One or not a great deal was left which could be recovered archaeologically. Therefore, in so far as we are able to determine, the prehistoric record at Pine Flat Cave begins with the architecture of this building period and such items as are in direct association with this architecture. Five units can be assigned to Building Period One; R 5, R 6, R 7, R 8, and R 9. The horizontal and vertical relationship of these units is shown in Figures 110, 111, and 112.

Unit 6 (R 6): R 6 is the oldest architectural unit in the cave. Of this room, only the east wall footings and the eastern section of the plastered floor were undisturbed. The remainder, including the upper portion of the
Figure 110. - Plan of Pine Flat Cave during Mogollon-Pueblo Building Period One. A, B, C, D, and E are storage jars, subfloor -R 8: A - Pine Flat Neck Corrugated (A-11811); B - Alma Plain (A-11812); C - Tularosa Patterned Corrugated (A-11815); D - Three Circle Neck Corrugated (A-11814); E - Reserve Incised Corrugated (A-11813).
VOLCANIC AGGLOMERATE OVERHANG AND CAVE BACKWALL

- Outline of cave at bedrock contact
- Outline of cave 1.5 meters above bedrock contact
- Outline of R6 features
- Perimeter of storage depression excavated into bedrock
- Indicates where wall plaster joins plastered flooring
- Sandstone slabs placed vertically

ASH  |  ADORNE MORTAR  |  SANDSTONE  |  BASKETRY

SCALE IN METERS

0  3  6  9  12  15  2
Figure 111. - Composite profile along the east-west axis of Pine Flat Cave through R 1, R 7, R 6, R 2, R 8 and significant associated features.
Figure 112. - Composite north-south profile of Pine Flat Cave through R 1, R 9, and significant associated features. The cross-section is parallel to the outside of R 3 west wall.
east wall, was removed when R 7 and R 8 were originally constructed. The east wall of R 8 (East wall footing - R 8) cuts the floor of R 6 and the floor of R 7. The floor of R 7 also overlies the east wall of R 6. Four unshaped volcanic agglomerate rocks aligned along the eastern margins of the floor and several rocks rounding the curves of the corners, are all that remain of the walls of R 6. The floor is evenly plastered and lipped up to meet the walls. So little is left of this room it is difficult to judge its actual character. Evidently it was not large, 1.5 m. wide; portions of bed rock were excavated to afford a smooth floor. The nature of the east wall footings suggests that the sides of the room never reached any great height, probably not over 1.5 m., and acted as low retaining walls to keep cave debris which had accumulated on the higher surrounding portions of the cave from rolling into the room. These walls also served to give the floor a precise boundary. Since R 6 is well under the overhang, no roof was necessary and no evidence of roofing material was found.

R 5, R 7, R 8, and R 9 are grouped together and are contemporaneous; R 7 and R 8 because their adjoining walls were built into one another; R 5 and R 9 because the sherd samples from these living areas contain types which are the same as those from R 7 and R 8. Furthermore, all of these units mutually underlie architectural units of Building Period Two.
Unit 5 (R 5): R 5 is a small room, 2.5 m. long and 1.5 m. wide, and is tucked under the low overhang of the eastern curve of the cave (Fig. 113a). Maximum clearance in this room does not exceed 1.75 m. Such masonry as is present represents an uncoursed variety constructed of unshaped volcanic agglomerate rocks and boulders of varying sizes heavily mortared with adobe. Building rocks are always positioned in the wall so that the smoothest side faces the room interior, opposing ends extend back into the trash and natural soft bedrock which surrounds the room. No effort was expended in truing up the exteriors of these walls. Walls probably extended up to the overhang and enclosed the room on three sides, a natural eastern curve of the cave providing the east wall, with some type of entrance in the west wall. R 5 is in an area intentionally excavated into bedrock. The people preferred excavating into bedrock to make use of the overhang, at the expense of the room size and clearance, rather than build a larger, roofed structure out from under the protection of the cliff. This was not any great task, however, since bedrock is a soft volcanic ash which crumbles and could have been hollowed out with relative ease using a stone implement. There were no indications of constructed ceilings for this building period and the matter of using a natural roof in preference to erecting one may have been decisive in the placement of R 5. The floor of
Figure 113. - R 5 architectural features. a, wall construction, plastered flooring and hearth; b, sandstone slab-lined box hearth containing ash.
R 5 was well plastered and curved up in a few areas joining what remained of wall plaster. A box hearth (Hearth -R 5) was located against the west wall (Fig. 113b); length, 35 cm.; width, 25 cm.; depth, 15 cm.

Unit 8 (R 8): R 8 is similar in construction to R 5 in that the masonry is the same and it must have involved some clearing of debris and possibly a limited amount of bedrock excavation to place it conveniently in the western portion of the cave. Wall footings (East wall footings -R 8) are single rows of large unshaped agglomerate rocks mortared into place. Footings and rocks built on top of them outline the room on the east and south sides. These wall bases are uniformly narrow and constructed so that smooth rock surfaces face the interior of the room and the more uneven surfaces extend out into trash and soil. They are mortared only on the room side. This type of footing suggests that the original walls were not of any great height and as in R 6, acted primarily to keep trash, rubble, and cave debris from rolling into the room. It is possible that they were about 1.5 to 2.0 m., just high enough to extend a little above the adjacent surface and provide a separation between R 8 and R 7 and its related living area, R 9. Two overlapping sandstone slabs in the south wall suggested a door sill (Door sill -R 8) but as to the actual nature of the door, no evidence was present. No floor was found in R 8. The fill included many ill-defined
living areas; the most pronounced of which occurred 20 cm. below R 2 floor level. Large lenses of ash, varying from 2 to 5 cm. in thickness, were frequent. Two large box hearths (Hearth A -R 8, Hearth B -R 8) constructed of sandstone slabs were found filled to the brim with white ash. Each of these two hearths was 40 cm. square on the inside and approximately 25 cm. in depth. They occurred at different levels in the fill and apparently were not associated.

Along the east wall and in the southwest corner of the room, the volcanic ash bedrock had been scooped out to a depth of 50 m. providing a repository for five large storage jars (Storage jars, subfloor -R 8). Four of the jars were set side by side in a cluster (Fig. 114); the largest of which (Storage jar A), showing indented neck corrugation and a pointed base, was covered by a sandstone slab. The slab was removed for photographs because it obscured the pottery. Three miniature pottery jugs and two manos had been placed in the large Alma Plain jar (Storage jar B), evidently for safe keeping; otherwise the big jars contained only loose sand. All four of them were placed deep enough so that their rims came flush with the lowest limit of R 8 trash accumulations at contact with bedrock. The bedrock excavation was purposely hollowed out for these vessels alone, as they fit snugly in each case. This identical method of placement, complete with sandstone
Figure 114. - Storage jars, subfloor -R 8. Left to right: B - Alma Plain (A-11812), A - Pine Flat Neck Corrugated (A-11811), C - Tularosa Patterned Corrugated (A-11815), D - Three Circle Neck Corrugated (A-11814). Height of B, 49 cm.
slab lids had been reported for the Kayenta region (Kidder and Guernsey 1919: 24).

Although located a short distance from the others, a fifth jar (Storage jar E) was still in a part of the hollow depression below the natural bedrock surface which was irregularly extended toward the north, a space being left between jar E and the group. Although it contained only fine dirt, the manner in which the orifice was covered is of interest; first with a section of twilled matting, secondly by a layer of grass, and finally by a sandstone slab, the top side of which was even with the original bedrock surface.

At the same level and in association with this building period, a large Reserve Red storage jar was found buried outside the south wall of R 8 (Fig. 115). The level of the jar rim was 5 cm. below the top of R 8 south wall stubs (Leveled wall stubs -R 8). If our judgment of the original nature of R 8 south wall is correct, this storage jar is sunk so that its mouth is just below the top of the retaining wall and on a level with the door sill (Door sill -R 8) in this wall.

Since the association of this Reserve Red jar is important evidence in the chronological ordering of units within the site, the circumstances of the find are reviewed. A large Reserve Red jar, buried in and surrounded by soil not high in trash content, is situated outside the remnants
Figure 115. - Reserve Red storage jar located outside R 8 showing relationship of this jar to overlying architecture of R 2.
of a room wall; the jar orifice is at the same level as the
door sill in the room wall; this wall underlies a wall
constructed at a later time which in turn projects over the
storage jar to a limited extent. The interpretation of
this evidence is as follows. The position and level at
which the jar was placed are indications that the people
who constructed the wall which has its foundation over the
edge of the jar were not aware of its presence. It would
not have been useful to them as situated if they had placed
it there themselves. On the other hand it bears a func-
tional relationship to the lower room, being at hand
immediately on the outside of the low retaining wall and
on the same level as the doorway. This jar is, therefore,
considered in association with Building Period One. It is
also reasonable to suppose that the occupants of R 8
deposited their storage jars for dry material inside the
room below living area level and their water storage con-
tainer outside buried in soil. By an arrangement of this
kind, the water supply would keep cool and not be subject
to as great an evaporation loss as would occur in a jar on
the surface. It has been observed that red ware pottery
may have been made in the Point of Pines region specifi-
cally to serve in the domestic use of water (Wheat 1952:
194).

Unit 7 (R 7): R 7, because of its size and location,
is considered a storage or work area. It contained no
fire hearth, was 30 cm. deep, and small in overall extent. For these reasons, it does not appear as a room in itself, but rather as an annex to R 9, with R 9 living area situated in front of it toward the mouth of the cave. Along its western perimeter was a low retaining wall, 2 m. long, similar to those of R 8. To the north, the rear of the cave was plastered smooth to provide a wall; to the east, a natural bench was shored up and plastered over for a wall; and to the south facing the living area, three sandstone slabs (South wall -R 7) were placed end to end in upright positions and mortared in place to make a step 25 cm. high and 2 m. long between R 7 and the living area (R 9). The tops of the sandstone slabs were even with the surface of R 7. The floor of R 7 was plastered but became churned due to activities of later occupants. What remained of the plaster had, on its under surface, impressions as if the floor plaster, while still damp, had been pressed onto a horizontal layer of reeds. In the northeast corner a storage bin (Storage bin -R 7) was located, faced on its two R 7 sides with sandstone slabs and lined with a section of twilled matting (Fig. 123a). The bin measures 60 by 20 cm. on the inside and is 20 cm. deep.

Unit 9 (R 9): The space under the overhang between R 8, R 7, and R 5 was evidently used as a living area in conjunction with R 7 and is referred to as R 9. No formalized floor or walls were associated with this area.
Sandstone slabs formed three of the four walls of a box hearth (Hearth -R 9), also lenses of ash and general trash layers occurred throughout this portion of the cave. The cave roof in this section rises and bedrock is at a higher general level so that retaining walls were not necessary to a good living area. The same natural bench referred to as an east wall for R 7 was further modified with the vertical placement of a large slab of agglomerate; the area behind it was filled in with rubble and plaster was applied to the front to provide a smooth wall and bench 1.6 m. long and .60 m. high on the north side and to the back of R 9.

Mogollon-Pueblo Building Period Two

Building Period Two represents the major building effort at Pine Flat Cave. The arrangement of rooms and their general organization indicate a more developed occupation than that which came before it. The rooms were constructed with a greater care that suggests intended permanence.

Because the units of Building Period Two make use of all the wall bases that were constructed during Building Period One, these wall stubs must have been plainly evident to the people of Building Period Two. However, the large storage jars, as well as many of the floors and associated floor features laid down in Building Period One, were
Figure 116. - Plan of Pine Flat Cave during Mogollon-Pueblo Building Period Two.
Figure 117. - Profile of Pine Flat Cave parallel to the outside of the south walls of R 2, R 1, and to the inside of the north walls of R 3, R 4, and R 5.
Figure 118. - Southeast corner of R 2. Masonry typical of Building Period Two is shown in the east wall -R 2 (left); leveled wall stubs -R 8 (lower right); south wall -R 2 overlying leveled wall stubs (upper right); floor -R 2 (foreground); broken end of warp peg plastered into the floor (center foreground).
undisturbed by the later occupants, even though upper portions of the early walls were extensively remodeled. This indicates there must have been a lapse of time between the occupations which produced these two distinct architectural periods. Enough time must have transpired to have allowed fill to accumulate over floors and related features to a depth great enough to obscure them to the extent that the people of Building Period Two did not realize they were there. The length of time involved cannot be exactly determined from architectural evidences but is discussed under the subject of dating.

Four units can be assigned to Mogollon-Pueblo Building Period Two: R 1, R 2, R 3, and R 4. All four of these units seem to have been originally constructed with reference to one another and the primary layout indicates architectural contemporaneity. The horizontal and stratigraphic relationships of these units is shown in Figures 116, 117, 122, and also 111 and 112.

Unit 2 (R 2): R 2, which occupies the entire western half of the cave, is the largest room of this group. It is 5.8 m. in length and averages 3 m. in width. Floor level was .85 to .90 m. from the surface before excavation and allowed a clearance in the room which ranged from 1 to 3 m. This amount of clearance left standing room in most of the area but made it necessary to lay the floor on the east and south within the confines of the older R 8. R 8 wall stubs
(Leveled wall stubs -R 8), as a result, were leveled off on these two sides and the new R 2 east and south walls built on these foundations. The new walls (East wall -R 2, South wall -R 2) were not built to exactly coincide with the older ones but are off center by as much as 30 cm. on the south toward the cave front and 2 to 5 cm. on the east (Fig. 118). This provided a shelf on the south, the union of the eastern walls was plastered smooth. Wall thickness averaged 45 cm. in the south wall, 35 cm. in the east wall. The junction of the south and east walls of R 2 is bonded. The masonry of the more recent upper portion of the south wall and the dividing wall between R 1 and R 2 is consistent. It is constructed of roughly shaped agglomerate blocks arranged so that smooth surfaces face the room interior. Masonry is irregularly coursed and blocks held in place by liberal use of adobe mortar (Fig. 118). Deeply impressed finger marks in mortar between building block joints is common. Wall interiors were at various times coated with plaster, first applications were rough and uneven, while the final layers are uniformly smooth.

To the north and the rear of the cave, the floor (Floor -R 2) did not extend to the cave wall but terminated 1.5 m. short and lipped up slightly. Quantities of rubble, broken-up plaster, and building rocks, some of which still have plaster adhering to them, indicate that this back portion, the north side of the room, was either walled up to
a certain height or benched, the feature having been
knocked down by subsequent occupants. The western extremity
of R 2 made use of the cave wall on this side to bound the
room.

The floor was well plastered and smooth over much of
the area (Fig. 118). The doorway, with a sandstone slab
for a sill (Door sill -R 2) was placed directly over what
must have been the door to R 8. Not enough remained, how­
ever, to state the nature of R 2 doorway. Other floor
features included a small, stubby piece of wood 7 cm. long
and 2 cm. thick imbedded vertically in the floor plaster
in the southeast corner of the room (Fig. 118), possibly
having some relation to weaving and called a warp peg as
described elsewhere; and a fire area (Hearth area -R 2)
over which were scattered the broken remnants of a box
hearth constructed of sandstone slabs. A few of the
slabs maintained their proper vertical position in the floor.

The fill of this room may be described from surface
to floor level as follows. Depth, .85-.90 m. Upper level
(0.0-.25 m.) includes extremely mixed material, fine dust
and sand, grass bedding areas, rocks, as well as evidence
of cowboy or Apache use (tin cans, wood, rocks piled in
corners, and horse manure). Middle level (.25-.65 m.)
includes Apache grass-lined storage areas, grass bedding
areas, pieces of twined basketry, fragments and remnants
of bark storage bins, loose rocks, ash areas, sherd
material and general trash. Lowest level (0.65–0.90 m.) is very similar in content to the level just described except that grass bedding layers were continuous at about 0.75 m. and Mogollon-Pueblo cultural debris was heavy between the grass lenses and floor level.

Unit 1 (R 1): R 1 occupies the eastern portion of the cave proper. Masonry for the west wall which served as a dividing wall between R 1 and R 2 has already been described under R 2. This wall extends to the cave ceiling but has, in the course of time, settled away from the roof about 5 cm. In the northwest corner apparently the rear of the cave served as wall while the remainder of the north portion of the room was bounded by the bench described under R 9. The bench was replastered when R 1 was built but otherwise appeared little modified by this occupation. The bench plaster was continued around and served to face the cave wall in the eastern portion of the room, finally joining the plastered interior surface of the south wall. The south wall is constructed of large agglomerate blocks heavily mortared with adobe. Masonry is not coursed but was merely built up to the cave roof as the rocks fitted one on top of another. The south and west walls of R 1 abut against each other and are not bonded, the junction being smoothed over with plaster. The exterior of R 1 is shown in Figures 117 and 119, which also convey an idea of the prevailing masonry at Pine Flat Cave during this period.
Figure 119. - A view looking north into the cave shows the masonry of south wall -R l and T-shaped doorway -R l; surface level before excavation may be seen in the left foreground.
Figure 120. - Details of T-shaped doorway -R 1 shown from the exterior; note original rectangular outline was modified to a T-shape which was subsequently completely plugged during the Apache occupation.
A doorway for R 1 was constructed in the south wall. At the time of original construction the door was rectangular, .75 m. wide at the base; later it was modified into a T-shaped doorway and provided with a step (Step -R 1). After remodeling, the narrow bottom part of the T had a sandstone slab sill and measured 30 cm. in width. The portions of the doorway converting it from a rectangular form to a T-shape and the step on the outside are separate from the original wall but are joined to it by plaster. How much time elapsed between original rectangular construction and T-shape remodeling cannot be discerned from the evidence. Finally the door was plugged to the level of the fill surface with stones and thick heavy mortar unlike that used for plaster. The way in which the mortar was stuffed in between the plugging rocks indicated that the door was stopped up from the inside. In all probability this action took place when the Apache moved in to use R 1 as a living area. The details of this doorway and successive stages in its construction may be observed in Figure 120.

The floor (Floor -R 1) had originally been well plastered. Areas of it still remained in tact near the walls, but throughout most of the room, construction of Apache bark bins and grass-lined storage areas destroyed much of the floor, including most other features that might have been associated with the last Mogollon-Pueblo occupation. An ash area (Fire area -R 1), located approximately
in the center of the room, was all that remained of any hearth. Toward the back of the cave along the west wall of R 1 at its junction with the floor, two large Gila Polychrome sherds (Baffle sherds -R 1) and a small sandstone slab were mortared into the floor and wall in such a way that the sherds formed a basin and the slab made a partition between the wall and a depression in the floor plaster running parallel to the wall. This depression undoubtedly held a metate and the entire group formed a mealing bin; its axis north-south and inclined downward toward the front of the cave so that a woman grinding would face the light.

The final coats of floor and wall plaster, the ash area, the mealing bin, perhaps the T-shaped part of the doorway and step, may be attributed to the last Mogollon-Pueblo renovation sometime during Canyon Creek Phase (Seasonal Mogollon-Pueblo Occupation). These features do not coincide with construction of the original walls.

In the northeast portion of the room, two willow reeds, 8 and 9 cm. in length, were found plastered vertically in the floor so that they extended 5 cm. above the floor. The two had an east-west alignment. About the base of the westernmost of the two reeds, a ball of human hair yarn was buried so that it was completely encased in floor plaster. It has been postulated that the reeds were warp pegs, associated with weaving and the ball of cordage
was a ceremonial placement.

The fill of R 1 averaged .70 m. in depth. Some evidence of recent cowboy or Apache use was found high in the fill; grass-lined storage areas, grass bedding areas, twined basketry, cordage, sherd material and other cultural debris were encountered throughout. A grass layer 15 cm. thick at R 1 floor level surrounding a formalized Apache hearth represents the clearest Apache living area at the site.

Unit 3(R 3): R 3, with the exception of its annex R 4, lies outside the protective overhang of the cave. It adjoins R 1 immediately to the east of R 1 doorway. Along the inside, the west wall measures 3.4 m.; along the inside, the south wall measures 2.5 m. The west wall (West wall -R 3) where it joins but is not bonded with the south wall of R 1, is exactly like the south wall in construction. It continues in this manner for .60 m. until the nature of the soil on which it is built becomes very soft and sandy. At this point, large sandstone slabs were imbedded vertically in the loose soil and sub-architectural trash to provide a footing and outline the west wall on both interior and exterior surfaces. Smaller rocks were then placed in behind the sandstone slabs to build it up so that larger building rocks could be placed higher in the wall. The south wall of R 3 also has large sandstone slabs employed on the inside as footings about half its length.
Figure 121. - Plan of building units R 3, R 4, and R 5 at Pine Flat Cave
ADOBE MORTAR SANDSTONE SLABS, END VIEW

INDICATES WHERE MORTAR JOINS PLASTERED SURFACE

SCALE IN METERS
Figure 122. - View of R 3 interior, southwest corner, showing large sandstone slabs imbedded vertically as wall footings and floor. Hearth - R 3 in foreground has a notched sandstone slab to receive a pot rest log.
from where it joins the west wall. The remainder of the south side of R 3 is built up of large blocks placed to form a wall on the interior but to project irregularly into the hillside outside the room. Mortar was used to cement the sandstone slabs together and as chinking. These R 3 masonry features are shown in Figures 121 and 122.

Since the cave overhang does not protect this room, the walls probably extended up to a height necessary to give adequate standing room inside and the structure roofed. Two holes are worked into the cliff above R 3; one 20 cm., the other 30 cm. in diameter. These could have been sockets for roof beams extending out over the room. In all other rooms at the site portions of the cave ceiling served as a roof. Only very small sections of floor plaster were found curving up to a few sections of the wall. Floor level was .90 m. below surface. A box hearth (Hearth -R 3), 30 cm. square and 20 cm. deep, was associated with this floor level (Fig. 122). The slab forming the south-west wall of the hearth is notched, possibly to receive a log used as a pot rest in cooking (Wendorf 1950: 29).

**Unit 4 (R 4):** R 4 was constructed below, but as a part of R 3 (Figs. 121, 123, 124) and is built within the confines of the older R 5 previously described as a unit of Building Period One (compare with Fig. 110). R 4 is a small room, roughly rectangular (2.3 by 1.7 m.) with rounded corners. The south, west, and north walls were
Figure 123. - a, storage bin -R 7, built against the east wall of R 7, it is surrounded on two sides by sandstone slabs. Front sandstone slab was removed to show twilled matting used for a bottom lining; b, view of R 4 showing the cave overhang, wall construction, sandstone slab flooring and R 3 floor level in the foreground.
built to coincide with the same walls in underlying R 5 and may have been the original R 5 walls restored. Masonry was not coursed but is of unshaped agglomerate rocks laid up irregularly and mortared in place, smoothest side toward the room interior. The south and west walls may not have been higher than R 3 floor level so that one could have stepped down from one room to the other, a matter of 45 cm. The junction of the west and north walls with the wall separating R 1 and R 3 forms a very crude bond. These three walls appear simply to run into each other and become one. The east wall of R 4 is very low and is only a single course of building rocks mortared into place far back under the overhang. The floor in this room is unusual since it is entirely made up of sandstone slabs fitted together and mortared in place to evenly cover the area bounded by the room walls (Figs. 121, 123). No other floor features were present or indicated. The use of such a small annex sunk under a low overhang below the level of the main room with a specially constructed floor could not be determined. At most, the clearance is not over 1.5 m. and this only along the western edge. Toward the eastern wall, the cave roof is within 40 cm. of the floor. Storage bins having flagstone floors like that of R 4 were found in the southeast corner of Room 13A at Canyon Creek Ruin (Haury 1934: 49, Pl. XXXIV).

The fill of R 3, R 4, and R 5 was taken out in levels
and is described by the profile section (Fig. 124). It is
of particular interest to notice that the topmost levels
were free of any trace of grass-lined storage areas, bark
bins, and other Apache features which appeared so copiously
in the fill of R 1 and R 2. This is an indication that the
fill gathered in place before Apache began using the ruin.
Apache sherd material occurred only in Level 1. In the fill
immediately above R 3 floor level, manos, large portions of
utilitarian vessels and numerous sherds were found mixed
with and overlain by burned clay, charcoal, ash and other
carbonized material. The fill of R 4 also contained
quantities of burned debris. This may indicate that the
R 3, R 4 combination caught fire at the time of abandonment
or shortly thereafter, causing the roof to fall, shattering
floor artifacts as well as any items on the roof and all
but obliterating the surface of R 3 floor. There were
several sandstone slabs in the fill above R 3 floor level
which bore no direct relationship to any of the features
present at the time of excavation. Since there was no
evidence of any opening or doorways in the walls, it may
be that the slabs were used to line a roof entryway
(Wendorf 1950: 25).

Agglomerate rocks and boulders used in all the masonry
at Pine Flat Cave could have been obtained in the immediate
vicinity of the cave. Such rocks are abundant on neigh­
boring slopes where they have weathered from numerous
Figure 124. - Vertical section showing significant features and the relationship of building units R 3, R 4, and R 5 at Pine Flat Cave.
outcroppings. The creek beds near Pine Flat are also filled with chunks of this volcanic rock. Sandstone slabs were probably obtained from exposed strata between a quarter and a half mile from the cave up the main water course of this area. Here lenses of the same volcanic sandstone occur, yielding the durable type of stone necessary for fire hearths, flat cooking rocks, sharpening stones, wall footings, door sills, floorings, and jar covers. Pine Flat could have been the source of supply for the sandstone also found in the larger pueblos near Point of Pines (Wendorf 1950: 21-35). Outcroppings of sandstone begin to appear near Pine Flat and thereafter to the east, but none has been observed any closer to Point of Pines.

The final period of occupation which is evident at Pine Flat Cave is the Apache Occupation Period. Features directly related to the Apache and further details concerning the relation of this occupation to the Mogollon-Pueblo architecture will be considered at a later time.

Test Trenches

Two cross-trenches were dug into talus and trash accumulations directly in front of the cave. Each was one meter wide and cut from surface to bedrock. They are designated as Cross-trench 1 and Cross-trench 2. Cross-trench 1 runs the north-south axis of the site commencing in front of the doorway to R.I. Cross-trench 2 runs the east-
west axis parallel to the outside of the south walls of R 1 and R 2. The purpose of these trenches was twofold; to detect any discernible differences in deposition of the talus and to facilitate the removal of room fill from the cave interior by using the trenches as wheelbarrow runways. An analysis of the sherd material collected from these excavations is given in the section concerned with the dating of Pine Flat Cave. Profiles resulting from the cross-trenches did not furnish definitive sections.

A block of talus 1.5 m. on a side was removed in 25 cm. levels at the junction of the two cross-trenches as a stratigraphic test. The results of this test are also tabulated in the section on dating. From surface to bedrock, soil and rain-washed volcanic sand graded into carbon-rich levels of trash. At a greater depth toward contact with volcanic ash bedrock, the consistency changed and became high in volcanic sand, although a very light percentage of human culture continued to appear to the contact zone.

POTTERY

Painted Types

SPRINGERVILLE POLYCHROME (New Type): Polychrome of this type is one of the Red Series of the Shiwanna Red Ware (Colton 1955: 9). Springerville Polychrome in name
only appears for the first time in a pottery type sequence chart prepared by Stubbs where it follows St. Johns Polychrome and precedes Pinedale and Heshotauthla Polychromes. It is equated with a Pueblo III time period of approximately 1125-1275 (Stubbs and Stallings 1953: Fig. 70). A more extensive type description is planned in connection with reports concerning Reserve and Tularosa phase sites (Alan P. Olson, in preparation) of the Point of Pines region. The description given here cannot be considered a type description because it is based upon a single restorable vessel. Vessel form, rim shape, and both interior and exterior designs are illustrated. The principal visual criteria for distinguishing Springerville and St. Johns Polychromes is in the use of white in interior designs and/or in the use of black in exterior designs on Springerville Polychrome. In St. Johns Polychrome, black is generally used exclusively in interior designs and white exclusively in exterior designs. Paste color is white or light gray (5YR 7/1). Texture is fine with angular medium particles of quartz with other light colored minerals employed as temper; both exterior and interior surfaces are slipped and polished to a smooth texture; fine cracklings appear throughout portions of the slipped surfaces; fire clouding occurs; core and slipped surface contrast; slip is a bright light red (2.5YR 6/8) but grades to a dark gray-brown (10YR 4/2) on certain poorly fired exterior
Figure 125. - Springerville Polychrome bowl decoration (Cross-trench One, A-16923).
SPRINGERVILLE POLYCHROME

EXTERIOR

INTERIOR

DESIGN PARTIALLY RESTORED
sections; black pigment is a dull mat black which has a tendency to thin out and allow the light red slip to show through; white is thin in a similar manner.

Illustration: restorable vessel; (Figs. 125, 128a); Provenience: Cross-trench One; Data: bowl; orifice diameter, 28 cm.; maximum diameter, 30.5 cm.; height, 15 cm.; vessel wall thickness, 5 mm.; cat. no. A-16923.

GILA POLYCHROME (Haury 1945b: 63-80): Poorly executed geometric designs with an absence of curvilinear or exterior decoration. Vessel wall thickness, 5-9 mm. Sherds from a single jar and rim sherds of five bowls are present, remaining sherds are body sherds from bowls.

PINTO BLACK-ON-RED (Provisional Type): The sample from this site conforms to the description given for the type under Red Bow Cliff Dwelling. To that may be added data and illustrations given below for a restorable vessel recovered from Pine Flat Cave.

Illustration: restorable vessel; (Figs. 126, 128b); Provenience: Room 3, Levels 4, 5; Data: bowl; portions of interior badly burned by secondary firing obscuring sections of the design; maximum diameter, 19.8 cm.; height (estimated), 9 cm.; vessel wall thickness, 3.5-4.5 mm.; cat. no. A-16909.

BROAD LINE RED-ON-BROWN (Provisional Type): This type has thus far not been found in any quantity at Point of Pines and as a result cannot as yet be adequately
Figure 126. - Pinto Black-on-red bowl sherd decoration (Room 3, Levels 4 and 5).
defined and described. It appears to have been a type most popular during a phase in the Point of Pines chronology about which very little is known (Dry Lake Phase, A.D. 800-900) and may represent local attempts to imitate red-on-brown pottery of other areas. A number of Broad Line Red-on-brown sherds also occurred at Nantack Village (Breternitz 1956: 43, Pl. XIII), a Nantack Phase site at Point of Pines. At Pine Flat Cave, vessel wall thickness range is 5 to 7 mm.; only bowls are represented.

**UNIDENTIFIED (White slipped interior):** Sherds of this kind are almost identical to what Pinto Polychrome would be without any interior black design. Exterior surfaces are in the Pinto tradition, and interiors are slipped and polished a chalky gray-white; vessel wall thickness, 4-7 mm.; only bowl forms are present.

Utility Types

**TULAROSA FILLET RIM** (Wendorf 1950: 121; Martin and others 1952: 65): A majority of the body sherds in the sample are a brick red on the exterior with glossy smudged black interior surfaces. Red exterior surface color is apt to turn brown and blacken toward the rim. Fillet rim decoration is made up of from two to four indented coils, three being the most used number; some examples are lightly smoothed. Vessel wall thickness, 4-8 mm., with an average of 6 mm. Only bowl forms are represented.
Figure 127. - Rim sections among pottery types represented at Pine Flat Cave.
GILA POLYCHROME
PINTO B/R
BROAD LINE R/BR
UNIDENTIFIED (WHITE SLIPPED INTERIOR)

TULAROSA FILLET RIM
TULAROSA W/R
POINT OF PINES PUNCTATE
RESERVE RED
SAN FRANCISCO RED

MCDONALD PATTERNED CORRUGATED
POINT OF PINES OBLITERATED CORRUGATED

POINT OF PINES OBLITERATED CORRUGATED
PINE FLAT NECK CORRUGATED

ALMA PLAIN

VESSEL EXTERIOR (LEFT)
VESSEL INTERIOR (RIGHT)

BOWL FORMS
RIM SECTIONS
JAR FORMS
APACHE PLAIN
Figure 128. - Vessel forms from Pine Flat Cave.  a, Springer-ville Polychrome;  b, Pinto Black-on-red;  c, Tularosa Fillet Rim;  d, e, h-k, Point of Pines Obliterated Corrugated;  f, Reserve Smudged;  g, Reserve Red;  l, Tularosa Patterned Corrugated;  m, Reserve Incised Corrugated;  n, o, Alma Rough;  p, s, Alma Plain;  q, Pine Flat Neck Corrugated;  r, Three Circle Neck Corrugated.
Figure 129. - Miniature vessel forms from Pine Flat Cave.

a. Reserve Plain Corrugated;  b. Reserve Indented Corrugated;

c, d, Three Circle Neck Corrugated.
Illustration: restorable vessel; (Fig. 128c); Provenience: Room 3, Levels 4, 5, 6; Data: bowl, smudged interior; maximum diameter, 29.8 cm.; height, 13.5 cm.; 3.5 indentations per 2 cm.; number of indented coils, 3; vessel wall thickness, 6 mm.; cat. no. A-16908.

TULAROSA WHITE-ON-RED (Rinaldo and Bluhm 1956: 173-181): Conforms to the type as described by Rinaldo and Bluhm and is essentially Tularosa Fillet Rim with white decoration. The white paint used in painted designs does not resist weathering well and tends to flake away, scaling off tiny sections of the vessel surface in the process. Occasionally all that remains of the design are roughed areas which contrast with the smooth polished exterior vessel surface. Fillet rim decoration is made up of two or three indented coils, some examples are lightly smoothed. Vessel wall thickness, 4-7 mm, with an average of 6 mm. Only bowl forms are represented.

POINT OF PINES PUNCTATE (New Type): The description given under Tule Tubs Cave also covers this sample. A sherd from Pine Flat Cave is shown in Figure 131a. Vessel wall thickness, 4-5 mm. Jar forms only are represented. An estimated orifice diameter of 7.8 cm. is derived from one jar rim sherd.

SAN FRANCISCO RED (Haury 1936: 28): The present sample does not differ in any significant way from the type as previously described and Wheat's (1954a: 88-89)
remarks concerning San Francisco Red at Crooked Ridge Village are applicable here in a general way. There occurred a single sherd, representing the bottom portion of a vessel, of what is termed a coiled exterior variety of San Francisco Red in the Reserve area (Martin, Rinaldo, and Bluhm 1954: 73). This variety was also represented at Nantack Village (Breternitz 1956: 35). Both jar and bowl sherds are present.

RESERVE RED (New Type): A type which has long been recognized but has not received detailed description. "Along the San Francisco and Tularosa Rivers, in ruins of the Reserve Phase, a redware occurs which was developed from this (San Francisco Red) type." (Haury 1936: 30.) It was later found and named by Nesbitt at Starkweather Ruin (1938: 99, 140) but it was here confused to some extent with Tularosa Fillet Rim and San Francisco Red and not described. Reserve Red is the diagnostic red ware of Nantack and Reserve phases and, as indicated above, finds its origin in San Francisco Red which also survives with it during these phases. Eventually in Pinedale and Canyon Creek Phase times Kinishba Red evolves from it but during the intervening Tularosa Phase, corrugated and fillet rim types become so popular as to reduce red types to a minor status in the ceramic picture. Examples of Reserve Red from Pine Flat Cave are illustrated in Figures 130b, 134b, and also 128g.
Description - Construction: Coiling followed by scraping. Firing: Oxidizing atmosphere. Paste: Color may range, exterior to interior, from red (2.5YR 5/6) through reddish brown (2.5YR 5/4) to black, because jar interiors are often smudged. Paste color may also be one of several dark gray tones (2.5YR 4-3/0) with a thin band of reddish brown toward exterior and interior surfaces, or more rarely, may shade from reddish brown (2.5YR 5/4) to weak red (2.5YR 5/2), exterior to interior. Temper is composed of numerous fine to medium rounded particles which are predominantly quartz. Other rounded light colored mineral particles also occur and rarely, a coarse fragment of tuff. Paste texture is uniformly fine and fracture is apt to be clean and straight with no tendency to crumble. Surface finish: Interior and exterior surfaces were evidently wiped after scraping with bunches of grass or other material characteristically leaving scoring or scratch marks. For the most part, scratches are obliterated on exterior surfaces by final stone polishing but sometimes remain visible. Exterior surfaces are always slipped and smoothly polished to exhibit a high sheen, with stone polishing marks much in evidence. Surface texturing, finger denting or dumpling often found in San Francisco Red does not occur in Reserve Red. Interior surfaces are lightly polished in varying degrees but usually not so much as to obliterate scoring and scratch marks which are
Figure 130. - a, Alma Plain bowl (A-16907); 
b, Reserve Red jar (A-11816).
sometimes quite pronounced. Interiors are often but not always smudged and slip usually extends only to the rim on exterior surface, or if extended over the rim is terminated in a sharp line several centimeters from the rim on the interior. Slip does not craze or crackle and seems highly durable. Exterior surface is uniformly red (10R 4/4-6) rendered bright by polishing. However, flecks or small splotches of metallic steel blue-gray may be found scattered irregularly over exterior surface, probably the result of impurities in the hematite slip. Interior surfaces vary from very pale brown through tones of gray to dull smudged black (10YR 7/3, 6/1-2, 5/1-2, 4/1-2, 3/1, 2/1). Fire clouds are present. Form: The distinctive jar form is most characteristic and is illustrated (Figs. 128g, 130b). All sherds from Pine Flat Cave were from jars of this form and represented a number of different vessels. Reserve Red bowls will probably be described from other sites. There is, however, a distinct possibility that for the most part, the ceramic place normally occupied by Reserve Red bowls was filled by Reserve Smudged and Reserve or Tularosa Fillet Rim (Rinaldo and Bluhm 1956: 153) bowls which occur abundantly in association with Reserve Red, especially during Reserve and Tularosa phases. Rim forms are also illustrated. Range in vessel wall thickness: 5-8 mm.; average thickness (30 sherds), 6 mm. Characteristics which tend to distinguish Reserve Red from San Francisco Red
include larger jar form of singular shape, greater vessel wall thickness, harder more durable construction, thicker slip, and smooth polished surface unmodified by manipulations or dimples.

Illustration: whole vessel; (Figs. 128g, 130b); Provenience: Cross-trench Two; Data: jar; orifice diameter, 15.5 cm.; maximum diameter, 31 cm.; height, 37.5 cm.; vessel wall thickness, 6 mm.; cat. no. A-11816.

Unfortunately when original sherd counts were made in 1952 with respect to provenience within Pine Flat Cave, certain types which are now recognized and which were separated in the material from Red Bow Cliff Dwelling and Tula Tubs Cave were not tabulated as separate categories but were lumped under more general type designations. Alma Plain included Alma Plain, Reserve Smudged, and Tularosa Smudged. McDonald Corrugated included McDonald Painted Corrugated and McDonald Patterned Corrugated. Plain Corrugated included both Point of Pines and Reserve Plain Corrugated and Indented Corrugated included both Point of Pines and Reserve Indented Corrugated types. Patterned Corrugated included Point of Pines Patterned Corrugated and Tularosa Patterned Corrugated. Neck Corrugated included Pine Flat Neck Corrugated and Three Circle Neck Corrugated. Notes as to the quantitative presence within the site as a whole of types now recognized from the broader categories.
appearing on the sherd tabulation chart will be found under the appropriate pottery descriptive section.

**MCDONALD CORRUGATED:** Of the sample, 28 sherds are McDonald Painted Corrugated, 101 are McDonald Patterned Corrugated (Breternitz, Gifford, and Olson: 1957). Remarks concerning the McDonald Corrugated Series at Tule Tubs Cave are applicable here. With respect to design technique, designs are executed in the indented corrugated technique and therefore stand in contrast to the plain overall corrugation of vessel exteriors. Vessel interiors are generally smudged glossy black and bowl forms predominate.

**PLAIN CORRUGATED:** Of the total sample, 188 sherds are Reserve Plain Corrugated and 366 sherds are Point of Pines Plain Corrugated. That portion of the sample which is placed in the Point of Pines Plain Corrugated category shows a weak representation of Point of Pines corrugated traits and a majority of this segment of the sample therefore should probably be considered as representing the early portion of the time span embraced by the Point of Pines Corrugated Series. This is in keeping with architectural evidence that indicates great building activity at early stages and a less intense sporadic seasonal Mogollon-Pueblo occupation during later times of occupation at this site.

**Illustration:** whole vessel; (Figs. 129a, 135c); **Provenience:**
Room 8, Fill; Data: Reserve Plain Corrugated miniature jar with lip handle; orifice diameter, 4.8 cm.; maximum diameter, 6.9 cm.; height, 6.8 cm.; coiling begins 1.2 cm. below the rim; 6 coils per 2 cm.; exterior surface not smoothed; vessel wall thickness, 4 mm.; cat. no. A-11817.

**INDENTED CORRUGATED:** Of the total sample, 82 sherds are in the Reserve Indented Corrugated category; the remaining portion is of a nature which makes typological separation difficult in that traits of Reserve Indented Corrugated and Point of Pines Indented Corrugated mingle to produce a hybrid sample. Such a sample would be typical of the temporal middle ground where the technical transition from the Reserve Corrugated Series and Point of Pines Corrugated Series occurs. For a long period of time, late Tularosa, Pinedale and early Canyon Creek Phase times, neither type predominated and as the technological change was a gradual shift, specimens made during this time span often exhibit characteristics of both series. Three sherds in the sample are slipped red. There are also five sherds (from a single vessel) of a rare kind (Fig. 131e) which is described from the Reserve area as being of a double vessel with a jar top set into a bowl bottom with the bowl overlapping upward at the seam. The edge of the bowl was finished before the jar top was built up (Rinaldo and Bluhm 1956: 59). The sherds from Pine Flat Cave are smudged but not polished on interior surfaces; 3.5 coils
Illustration: whole vessel; (Figs. 129b, 135d); Provenience: Room 8, contained in subfloor storage, jar B; Datar Reserve

Indent Coronated miniature jar; orifice diameter, 8.3 cm.; maximum diameter, 11.5 cm.; height, 9.6 cm.; ceiling begins immediately at the rim; 3 coils per 2 cm.; 2.5 indentations per 2 cm.; exterior surface not smoothed; vessel wall thickness, 6 mm.; a small portion of the rim has been broken out and the surrounding surface indicates a small lip handle once have been attached at this point; the first three coils of indentations on vessel bottom are obliterated by sharp fingernail impressions; cat. no. A-11819.

POINT OF PINES OBLITERATED CORRUGATED (Breternitz, Gifford, and Olson 1957): The occurrence of this type at Pine Flat Cave is proportionately high. Sherds of this kind of pottery show that it was also of unusually poor quality. Surface treatment, even for a type as homely in appearance as Point of Pines Obliterated Corrugated, was substandard in that extremely bumpy, uneven, coarse exterior surfaces were tolerated. Coiling and indentations were obliterated unevenly and exterior surfaces present an unfinished aspect. Interior surfaces are roughly smooth and occasionally polished. Paste is brown or reddish brown and fine grained. Temper is predominantly sand mixed
with larger, angular particles of tuff and quartz. This mixture, together with the fact that vessels were poorly fired, produces a pottery which breaks easily and has a crumbly fracture. Clays and tempering material were apparently gathered in the vicinity of the cave and the pottery locally manufactured. Why this type should be of such extraordinarily poor quality in contrast to others found at the site is not known. It is almost as if Pine Flat Cave was host to the most inept potter in the entire region. The possibility presents itself that a high breakage may have been in effect due to low manufacturing standards and may account for the large number of sherds. Vessel wall thickness, 5-12 mm., with an approximate average of 8 mm. Thickest portion of vessels is usually immediately below the rims. Both jar and bowl forms are present. Fragments of several miniature bowls are also present. Under ordinary circumstances, some specimens of Point of Pines Obliterated Corrugated are almost indistinguishable from specimens of companion types, Point of Pines Plain and Point of Pines Indented Corrugated. A very simple arbitrary method of distinguishing such specimens was adopted. If the number of indentations or fillets is distinct and observable enough to be measured, the specimens are either Point of Pines Plain or Point of Pines Indented Corrugated, but if the indentations or fillets have been obscured or obliterated to the point where they
cannot be measured, specimens are typed as Point of Pines Obliterated Corrugated. The range in vessel shapes for the following illustrative examples is shown in Figure 128d, e, h-k.

Illustration: restorable vessel; Provenience: Room 3, Level 4; Data: jar; orifice diameter, 19.5 cm.; maximum diameter, 23 cm.; height (estimated), 19 cm.; vessel wall thickness, 7-11 mm.

Illustration: restorable vessel; Provenience: Room 3, Level 4; Data: jar; orifice diameter, 28 cm.; maximum diameter, 31 cm.; height, 16.5 cm.; vessel wall thickness, 5-8 mm.

Illustration: restorable vessel; Provenience: Room 3, Levels 3, 4; Data: bowl; maximum diameter, 28 cm.; height (estimated), 14 cm.; vessel wall thickness, 8-10 mm.

Illustration: restorable vessel; Provenience: Room 2, Level 4; Data: bowl; maximum diameter (estimated), 26.5 cm.; height (estimated), 10 cm.; vessel wall thickness, 6-7 mm.

Illustration: restorable vessel; Provenience: Room 3, Level 4; Data: bowl; maximum diameter, 25.5 cm.; height, 8 cm.; vessel wall thickness, 6-7 mm.

Illustration: restorable vessel; Provenience: Room 3, Level 4; Data: bowl; maximum diameter, 16 cm.; height, 12.5 cm.; vessel wall thickness, 6-7 mm.

Illustration: restorable vessel; (Figs. 128k, 131d); Provenience: Room 3, Level 4; Data: plate; maximum diameter,
Figure 131. - Sherd examples of certain pottery types from Pine Flat Cave.  a, Point of Pines Punctate;  b, Encinas Red-on-brown;  c, Alma Rough;  d, Point of Pines Obliterated Corrugated plate (A-18906);
16.2 cm.; height, 14 cm.; vessel wall thickness, 6-8 mm.; a small hole 4 mm. in diameter was punched slightly off center through the bottom of this vessel while the clay was still wet; cat. no. A-16906.

**TULAROSA PATTERNED CORRUGATED** (Rinaldo and Bluhm 1956: 169): Small body sherds from jar forms comprise the sample. Sections of decorative patterns are present and these were produced by using the indented corrugation technique within certain limited areas such as diamonds, triangles, and bands on an overall surface of plain corrugation. Patterns executed in this manner are neat and precise within the limits of the technique.

*Illustration*: whole vessel; (Figs. 1281, 132a); *Provenience*: Room 8, subfloor storage jar C; *Data*: jar; orifice diameter, 20.2 cm.; maximum diameter, 32 cm.; height, 27 cm.; coiling begins 1.6 cm. below the rim; 4.5 coils per 2 cm.; 3 indentations per 2 cm.; corrugation extends 10.4 cm. down vessel body from rim; exterior corrugated surface not smoothed; vessel wall thickness, 6 mm.; cat. no. A-11815.

**SMUDGED CORRUGATED**: This sample is composed of two type variants, 10 sherds of Reserve Indented Corrugated, Smudged Interior Variety and seven sherds of Reserve Plain Corrugated, Smudged Interior Variety (Rinaldo and Bluhm 1956: 157-161). All are from bowl forms.

**CORRUGATED (Red slipped interior)**: Sherds of this sample are from vessels exhibiting corrugated exteriors,
both plain and indented, wide and narrow fillets, with interiors which have been smoothed, slipped red and polished. This type also occurs in the Reserve area where it is listed as a polished red interior variety of Reserve Indented and Plain Corrugated (Martin, Rinaldo, and Bluhm 1954: 72-73). These variants are never abundant and may possible be early trials in the transition from Alma Plain and San Francisco Red to later corrugated types. A plain, unpolished red interior variety of Alma Plain and a coiled exterior variety of San Francisco Red are also reported from the Reserve area (Martin, Rinaldo, and Bluhm 1954: 72-73). Single sherds of each of these types occurred at Pine Flat Cave and as types probably represent forerunners of corrugated vessels with red slipped interiors.

RESERVE INCISED CORRUGATED (Rinaldo and Bluhm 1956: 164-167): No significant variation from the sample described from Tule Tubs Cave seems present. All sherds are from neck corrugated jars.

Illustration: whole vessel; (Figs. 128m, 132d); Provenience: Room 8, subfloor storage jar E; Data: jar; orifice diameter, 16.8 cm.; maximum diameter, 33.7 cm.; height, 38 cm.; coiling begins 2.9 cm. below the rim; 4 coils per 2 cm.; decorative incisions, 1 mm. wide, 1.5 mm. deep; corrugation extends 12.8 cm. down vessel body from rim; exterior corrugated surface not smoothed; vessel wall thickness, 7 mm.; cat. no. A-11813.
Figure 132. - At Pine Flat Cave volcanic ash bedrock was scooped out to provide a repository below R 8 for a series of large corrugated and plain storage jars; (Storage jars, subfloor -R 8); a, Tularosa Patterned Corrugated jar (A-11815); b, Three Circle Neck Corrugated jar (A-11814); c, Alma Plain jar (A-11812); d, Reserve Incised Corrugated jar (A-11813). Height of c, 49 cm.
NECK CORRUGATED: Sherds of this category may be divided into two types, Pine Flat Neck Corrugated and Three Circle Neck Corrugated. The latter seems to be sparsely represented by only 33 sherds, the former being represented by 108. In the case of Three Circle Neck Corrugated, however, such figures are deceptive because only sherds showing the body junction of fillet and plain sections will be recorded in the name of this type. The remainder will generally be placed either in a plain ware category or Reserve Plain Corrugated category. In the case of Pine Flat Neck Corrugated, corrugated sherds can readily be distinguished from Reserve Indented Corrugated but body sherds again will inevitably be placed in a plain ware category. Sherds counted in this type therefore represent only upper portions of vessels. Whole vessels or very large sherds, however, are easily identified.

PINE FLAT NECK CORRUGATED (Breternitz 1956: 36-39): Pine Flat Cave is the site from which the name for this type was drawn because the first known complete vessel was recovered here. Sherds of Pine Flat Neck Corrugated were subsequently found in some quantity at Nantack Village and a type description written in connection with a report on that site (Breternitz 1956: 36-39). Pine Flat Neck Corrugated was evidently not found in the Reserve area where Three Circle Neck Corrugated entirely takes its place. As a type, it seems, therefore, to be a local development at
Point of Pines and most abundant during the Nantack Phase (900-1000). The fact that an indented neck corrugated type may definitely be ascribed to this time period is not without significance. It has been noted that indentation in the Pine Lawn Branch postdates the introduction of locally made black-on-white types (Barter 1955: 17). With the discovery of Pine Flat Neck Corrugated in indisputable Nantack Phase context and evidence of its possible extension back in time into Dry Lake Phase in the Point of Pines region, the supposition that the Anasazi first developed the technique of indentation may be open to question. Nevertheless, as work progresses relative to the archaeological picture during these years of cultural transition in the Southwest, the argument shifts from one side to the other and it has recently been shown that Exuberant Corrugated appears to the north during Wingate Phase and becomes abundant during Red Mesa Phase (Olson and Wasley in Wendorf and others 1956: 371, 377, 385). Exuberant Corrugated is probably the earliest indented corrugated in the northern territory. An evaluation of this problem cannot be made, however, until a detailed study of corrugated pottery throughout the Southwest has been conducted.

The sherd sample from Pine Flat Cave may be described as follows: **Paste:** Color varies from light gray, gray, pinkish gray, reddish gray, light reddish brown to reddish
brown (10YR 7/1, 7.5YR 6/0-2, 7.5YR 5/0; 5YR 6/1-4, 5YR 5/1-4); temper, certain specimens contain only fine sized grains (tendency in these is toward gray colors) which include quartz particles and may be ground tuff, other specimens occur (tendency in these is toward brown colors) in which the temper particles are of all sizes—fine, medium, coarse, and even chunks which are very coarse—and range from rounded to angular fragments of quartz, feldspar, mica, and other minerals. Temper of this kind resembles sand eroded from volcanics which is abundant in stream beds near the site. Carbon streak sometimes occurs. Paste texture also runs a range from fine to rough and fracture is generally irregular or rough but not crumbling. Surface finish: Exterior surface is generally smoothed and polished on lower plain surfaces. Exterior surface color varies throughout a block of colors—gray, reddish gray, reddish brown, brown to dark and very dark tones of these colors to black (5YR 5/1-3, 4/1-3, 3/1-2, 2/1-2, 7.5YR 5/2, 4/2, and rarely 10YR 6/2). Many of these colors occur over differing portions of the same vessel. Interior surface color displays the same range as exterior but in some cases is a darker tone than that of the exterior on the same specimen. Interior surfaces are smoothed or wiped, polishing however usually extends down interior neck surfaces a short distance until the shoulder curve becomes
Figure 133. - Pine Flat Neck Corrugated jar (A-11811); storage jar A, subfloor -R 8. Height, 45.7 cm.
Figure 134. - Type sherds of a, c-g, Pine Flat Neck Corrugated and b, Reserve Red.
accentuated. Fire clouds are sometimes present. Only jar forms occur. Form (Fig. 128g) and rim shapes (Fig. 127) are illustrated. The pointed bottom and extraordinary size of the whole vessel (Fig. 133) found at Pine Flat Cave (Fig. 114) are unique characteristics of Pine Flat Neck Corrugated. Range in vessel wall thickness: 5-12 mm.; average thickness (35 sherds), 6.7 mm.

Both coils and indentations are large in comparison with other corrugated types (Fig. 134). Indentations are often further emphasized by allowing the thumbnail (in two sherds an awl point) to incise a slit in the lower two-thirds of the indentation at its start or by extra heavy thumb pressure applied to each indentation which imparts a wave effect to the coils. Indentations are not smoothed except occasionally along the few coils where corrugation joins body section. The range in large indentations is more completely described by Breternitz in connection with a larger sherd sample. Coiling begins 3-10 mm., average (15 rim sherds) 5 mm., below the rim; 1.5-3 coils per 2 cm., average (30 sherds) 2.2 coils; 2-3 indentations per 2 cm., average (30 sherds), 2.5 indentations.

Illustration: whole vessel; (Figs. 128g, 133); Provenience: Room 8, subfloor storage jar A; Data: jar; orifice diameter, 28.6 cm.; maximum diameter, 46 cm.; height, 45.7 cm.; coiling begins 10 mm. below the rim; 1.5 coils per 2 cm.; 2.2 indentations per 2 cm.; corrugation extends 15.5 cm.
down vessel body from the rim; exterior corrugated surface not smoothed; vessel wall thickness, 7-9 mm.; cat. no. A-11811.

THREE CIRCLE NECK CORRUGATED (Haury 1936: 36): The sherd sample is of little value for descriptive purposes, data given for whole vessels presents a more satisfactory picture.

Illustration: whole vessel; (Figs. 129c, 135a); Provenience: Room 8, contained in subfloor storage jar B; Data: miniature jar; orifice diameter, 6.5 cm.; maximum diameter, 10.2 cm.; height, 9.8 cm.; coiling begins 1.5 cm. below the rim; 4.5 coils per 2 cm.; corrugation extends 3.7 cm. down vessel body from rim; exterior corrugated surface not smoothed; vessel wall thickness, 6 mm.; cat. no. A-11820.

Illustration: whole vessel; (Figs. 129d, 135b); Provenience: Room 8, contained in subfloor storage jar B; Data: miniature jar with lip handle; orifice diameter, 5.7 cm.; maximum diameter, 8.9 cm.; height, 9.6 cm.; coiling begins at rim; 3.5 coils per 2 cm.; corrugation extends 3.8 cm. down vessel body from rim; exterior corrugated surface is smoothed; vessel wall thickness, 6 mm.; cat. no. A-11818.

Illustration: whole vessel; (Figs. 128r, 132b); Provenience: Room 8, subfloor storage jar D; Data: jar; orifice diameter, 19 cm.; maximum diameter, 29.5 cm.; height, 30.2 cm.; coiling begins 1.2 cm. below the rim; 4 coils per 2 cm.; corrugation extends 12.1 cm. down vessel body from rim;
Figure 135. - Miniature vessels recovered from Pine Flat Cave: a, b, Three Circle Neck Corrugated jars (A-11820, A-11818); c, Reserve Plain Corrugated jar (A-11817); d, Reserve Indented Corrugated jar (A-11819). Height of b, 9.6 cm.
exterior corrugated surface not smoothed; vessel wall thickness, 7 mm.; cat. no. A-11814.

**ALMA PLAIN:** Generally speaking the sample is much like that of Tule Tubs Cave and Red Bow Cliff Dwelling with a few exceptions; the presence in minor quantities of such textured types as Alma Punched, Alma Rough (Fig. 131c), and Alma Fingernail Incised, no doubt occasioned by the more intense Nantack-Reserve Phase occupation than at Tule Tubs Cave; the presence of one complete and numerous fragments of wide-mouthed jars of extraordinary size which, judging by the in situ association of the single whole vessel (Fig. 114) must also be of Nantack-Reserve Phase times; the presence, as has been noted in the case of Point of Pines Obliterated Corrugated, of some sherds of a kind which is thick-walled, crumbly, heavily tempered with sand and large angular fragments of tuff, poorly constructed, and undoubtedly manufactured in the immediate vicinity. Fragments of miniature vessels and one sherd of a variety of Alma Plain with polished red interior (Martin, Rinaldo, and Bluhm 1954: 72-73) occurred. Some specimens of Tularosa Smudged and Reserve Smudged (Fig. 128f) were found at Pine Flat Cave and were also included in the category Alma Plain. Both jar and bowl forms were present throughout.

**Illustration:** restorable vessel; (Figs. 128o, 131c); Provenience: Room 3, Level 4; Data: small Alma Rough bowl; maximum diameter, 11 cm.; height, 7.4 cm.; no smoothing
interior or exterior; vessel wall thickness, 4-6 mm.

Illustration: restorable vessel; (Fig. 128f); Provenience: Room 3, Level 7; Data: small Alma Rough bowl; maximum diameter, 9.5 cm.; height (estimated), 4.4 cm.; no. A-11812. Smoothing: interior or exterior; vessel wall thickness, 5-8 mm.

Illustration: restorable vessel; (Fig. 128c); Provenience: Room 3, Level 7; Data: Alma Plain bowl; orifice diameter, 17.6 cm.; maximum diameter, 19 cm.; height, 7 cm.; interior smoothed; no of smudged and polished; vessel wall thickness, 5-6 mm.

Illustration: restorable vessel; (Figs. 128g, 130b); Provenience: Room 2, Fill and Cross-trench One; Data: Alma Plain bowl; orifice diameter, 17.6 cm.; maximum diameter, 19 cm.; height, 7 cm.; surface roughly smoothed, slipped brown; vessel wall thickness, 4 mm.; cat. no. A-16907.

Illustration: whole vessel; (Figs. 128g, 132a); Provenience: Room 8, subfloor storage jar B; Data: Alma Plain jar; orifice diameter, 28.8 cm.; maximum diameter, 42 cm.; height, 49 cm.; vessel wall thickness, 8 mm.; cat. no. A-16920.

Restorable vessel; Provenience: Room 3, Level 7; Data: plate; maximum diameter (estimated), 17 cm.; height (estimated), 3.8 cm.; vessel wall thickness, 7 mm.; cat. no. A-16920. Restorable vessel; Provenience: Room 3, Level 7; Data: plate; maximum diameter (estimated), 19.5 cm.; height; A-16920.
(estimated), 4 cm.; vessel wall thickness, 8 mm.; cat. no. A-16921.

**APACHE PLAIN** (New Type): The following description is based on 151 sherds found at Pine Flat and Tule Tubs caves. Of that number, 33 are rim sherds. The sample as a whole seems to be entirely from jars or what have been described among the Navajo as "cooking pots" (Tsohopik 1941: 8).

Many similarities exist between Apache Plain and Navajo "cooking pots," such as surface color, shape, evident use of pitch to coat vessel surfaces, and rim treatment. Vessel walls, however, seem to be thinner and the use of decorative neck or rim fillets not so popular as in Navajo pottery. Among the sherd sample, no rim fillets occurred. If sherds from these sites could be reconstructed into whole vessels, there is every indication such vessels would resemble, to the point of being identical with, certain complete examples in the Arizona State Museum identified as White Mountain Apache pottery collected ethnographically by the late Grenville Goodwin within the past 50 years. Pine Flat Cave (Arizona W:10:42) may be considered the archaeological type site.

In a sample of plain sherds known to have come from a site in use over a long period of time, including Mogollon-Pueblo occupation periods, it is not easy at first to discern Apache Plain because of a lack of visual characteristics which immediately set apart this type. Rim sherds,
however, are easily picked from the group as in general they have no counterpart among Mogollon or Anasazi plain types. Body sherds are difficult to recognize but sorting may be accomplished by beginning with recognizable rim sherds and choosing plain sherds to match body portions of these rim sherds. In this process, several negative traits become evident. Apache Plain sherds from Pine Flat and Tule Tubs caves are never polished or purposely smudged, as in Tularosa Smudged, and rarely brown or well-smoothed in the manner of late forms of Alma Plain. Apache Plain is almost always very dark in color; surfaces are rough, irregularly smoothed with pieces and patches of carbonized and weathered pinon gum scaling off; the paste is friable, and at a fresh break takes a diagnostic appearance similar to a chipped piece of charcoal or dark compacted ash. A group of type sherds is illustrated in Figure 136.

**Description - Paste:** One of the most important characteristics of Apache Plain is the color of its paste, which is almost always a dull carbon black through a complete cross-section. Rarely it shades into a thin band of light reddish brown, or reddish brown (5YR 6/3-4, 5/3-4) toward an exterior surface or light gray (5YR 7/1-2) toward an interior surface or very rarely (perhaps accidentally) does the above reddish brown color occur entirely through the core. Temper particles are not ordinarily abundant. Those which occur are fine, angular pieces of quartz. Several
Figure 136. - Apache Plain type sherds recovered from Pine Flat Cave. Note various rim treatments.
individual sherds depart from the usual in having a scattering of very coarse pieces of tuff and fine mica specks in addition to quartz fragments. Megascopic inspection suggests the use of organic tempering materials in all vessels but more intense examination is necessary for a conclusive evaluation. Paste texture is uniform and fine. Pieces of this pottery do not break evenly or straight through but tend to fracture erratically at odd angles to the vessel surface leaving a somewhat friable edge. Vessel walls are rather easily broken with pressure but are nevertheless durable. **Surface finish:** Interior and exterior surfaces are finished to about the same degree. Careless irregular scraping, smoothing, and wiping results in an uneven surface which often shows irregular crisscrossed scratches and scorings left by the wiping materials. Interior surfaces are apt to exhibit a more uneven, kneaded or finger pushed appearance which is the result of the fingers and hand being used on the inside of the vessel while shaping the exterior surface. Vessels are not slipped nor are surfaces ever stone polished. Surfaces do, however, still show (especially in this cave sample) areas and patches coated with a charred substance, presumably pinon gum. It is probable that many vessels were entirely coated with pinon gum as is the custom among the Navajo with respect to their "cooking pots." Surface color tends to be uniformly dull and dark ranging from dark gray to
black. Very rarely (perhaps the result of fire clouding or misfiring) light brown or brown (7.5YR 6/4, 5/2-4)
occurs. Forms: Jars alone seem to be represented among the sherds. No sherd was large enough to reconstruct an entire form. Rim sherds are illustrated in Figures 127 and 136 which show rim cross-sections and the various rim manip-
ulations. Rim treatment is distinctive and brings to mind similar Navajo techniques. Most popular is the notched rim (saw tooth in appearance) with a 3 to 5 cm. interval between peaks. A variation of this is a series of simple shallow incisions at right angles to the vessel surface extending around the rim surface at 3 to 8 cm. intervals. A few sherds show a pinching of the final coil on the next lower coil making the rim the thickest portion of the vessel, and a pinching of the final coil which thickens it and produces an uneven, bumpy final rim coil that has an undulating rim surface. Plain, slightly everted rim forms are also present. In many cases, whether the rim was subsequently notched or not, the rim surface was beveled almost as if the clay had been sliced away to form a rim edge. Appliqued fillet neck decorations so common among Navajo "cooking pots" are not present in this sherd sample. However, one example of a decorative band below the rim was produced by a single series of fingernail indentations. Range in vessel wall thickness: 4-7 mm., average thickness (50 sherds), 5.7 mm.
DATING PINE FLAT CAVE

Following the pattern set in dating previously described sites, the entire sample of pottery is tabulated in chart form (Fig. 137) showing by type the number of sherds recovered from all portions of the cave. Restorable and whole vessels are also tabulated (Table 6) and must be considered with sherd counts in evaluating the relative abundance of pottery types.

The situation regarding successive prehistoric occupations at Pine Flat Cave is similar to that which was found at Tule Tubs Cave. The method of arriving at dates for the occupation is therefore exactly the same as at Tule Tubs Cave and Red Bow Cliff Dwelling. For this reason, the dating procedure as outlined here is abbreviated and the results rather than the mechanics are emphasized.

If, as in the cases of the two previously described sites, the entire pottery sample from Pine Flat Cave is taken by type and compared with ceramic complexes indicative of phases at Point of Pines, the original Pine Flat Cave sample may be broken up into type groupings which equate themselves with the known complexes. This has been done and the results are presented in chart form (Fig. 138). Pottery types listed represent a complete inventory of types from Pine Flat Cave arranged into a series of three ceramic complexes which have been given temporal value as
Figure 137. - Sherd tabulations from Pine Flat Cave.

Certain of those among the utility types listed have been reclassified into two or more types recognized since Pine Flat Cave was excavated and the sherd material analyzed. McDonald, Plain, Indented, Smudged, and Neck Corrugated types are examples. These reclassifications are explained in the pottery section under the appropriate type discussion and original sherd counts are not altered thereby.
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TABLE 6. - LISTING OF WHOLE AND RESTORABLE VESSELS FOUND AT PINE FLAT CAVE

Springerville Polychrome bowl (1), restorable (A-16923)
Pinto Black-on-red bowl (1), restorable (A-16909)
Tularosa Fillet Rim bowl (1), restorable (A-16908)
Reserve Red jar (1), whole (A-11816)
Reserve Plain Corrugated miniature jar (1), whole (A-11817)
Reserve Indented Corrugated miniature jar (1), whole (A-11819)
Point of Pines Obliterated Corrugated jars (2), restorable
Point of Pines Obliterated Corrugated bowls (4), restorable
Point of Pines Obliterated Corrugated plate (1), restorable (A-16906)
Tularosa Patterned Corrugated jar (1), whole (A-11815)
Reserve Incised Corrugated jar (1), whole (A-11813)
Pine Flat Neck Corrugated jar (1), whole (A-11811)
Three Circle Neck Corrugated miniature jars (2), whole (A-11820, A-11818)
Three Circle Neck Corrugated jar (1), whole (A-11814)
Alma Rough bowls (2), restorable
Alma Plain bowl, smudged interior (1), restorable
Alma Plain bowl (1), restorable (A-16907)
Alma Plain jar (1), whole (A-11812)
Alma Plain plates (2), restorable (A-16920, A-16921)
Alma Plain miniature ladle (1), restorable (A-16922)

Provenience is given under appropriate type discussion within pottery section. Vessels may be correlated by cross-checking catalogue numbers.
Figure 138. - Secondary ceramic dating of occupation periods at Pine Flat Cave by arranging pottery types into a series of sherd complexes which are assigned temporal values.
Complete pottery sample from Pine Flat Cave arranged into a series of sequent sherd complexes which are assigned to time periods.

Phase sequence for the Point of Pines region.

Apache Plain

Fourmile Polychrome
Cedar Polychrome
Pinedale Polychrome
Pinedale B/R
Gila Polychrome
Pinto B/R
Identified - white slipped interior
Tularosa Fillet Rim
Point of Pines Punctate
Reserve Red
McDonald Corrugated
Plain Corrugated
Indent Corrugated
Point of Pines Obliterated Corrugated
Tularosa Patterned Corrugated
Alma Plain

Springerville Polychrome
Pinto B/R
Tularosa B/W
Reserve B/R
Mimbres B/W
Enchinas R/B
Broad Line R/B
Tularosa Fillet Rim
Tularosa W/R
Point of Pines Punctate
Reserve Red
McDonald Corrugated
Plain Corrugated
Indent Corrugated
Point of Pines Obliterated Corrugated
Tularosa Patterned Corrugated
Smushed Corrugated
Reserve Incised Corrugated
Reserve Punched Corrugated
Alma Plain

Springerville Polychrome
Tularosa B/W
Reserve B/W
Mimbres B/W
Mimbres Bold Face B/W
Enchinas R/B
Broad Line R/B
Tularosa Fillet Rim
Point of Pines Punctate*
Reserve Red*
San Francisco Red*
McDonald Corrugated
Plain Corrugated*
Indent Corrugated*
Tularosa Patterned Corrugated*
Smushed Corrugated*
Corrugated-Red Slipped Interior
Reserve Incised Corrugated*
Reserve Punched Corrugated
Pine Flat Neck Corrugated*
Three Circle Neck Corrugated*
Alma Textured Series
Alma Plain*
indicated by gathering lines to the phase sequence.

There is present at Pine Flat Cave, a well defined occupation during Tularosa Phase which was not in evidence at Tule Tubs Cave. This occupation is even more apparent from the architectural sequence than from the ceramic types present. Nevertheless, types diagnostic of Tularosa Phase occurred and are shown (Fig. 138) as a Tularosa Phase complex (Ceramic Complex Two).

In the discussion concerning architecture, the use of specific dates has been avoided in favor of four broad designations: Mogollon-Pueblo Building Period One, Mogollon-Pueblo Building Period Two, Seasonal Mogollon-Pueblo Occupation, and Apache Occupation Period. Because extensive mixture of the fill also occurred at this site, the cultural remains can only be assigned to the general categories, Mogollon-Pueblo or Apache. Having established ceramic complexes from the sherd material which have a time value, these are equated to the architectural and occupation periods and by this means estimated dates are assigned the principal stages of occupation.

Level 7 of R 3 contained a sherd sample which was, in effect, trapped between two solid floors. Floor R 4 formed the top of this level and Floor R 5, the bottom, as shown in Figure 124. Since Floor R 4 was not broken through in any way, it is assumed that this sherd sample is representative of the period immediately following the construction
of R 5 and contemporaneous with this unit and related architecture as well as with the storage jars found in association with R 8. The pottery types represented by the storage jars and the sherd sample from R 3, Level 7, are starred in the Nantack-Reserve sherd complex (Ceramic Complex One) of the dating chart (Fig. 138). The sherd sample from R 3, Level 7, is also shown quantitatively in the sherd tabulation chart (Fig. 137) for the site. These types are taken as a starting point, a nucleus in the formation of this ceramic complex. Their association with Building Period One is evident. From the complete sherd sample of the site, several types are added which complete Ceramic Complex One.

Pottery types of the Tularosa Phase are present, some of these in quantities sufficient to suspect a stable occupation of some duration must have been the causal factor. The architecture of Building Period Two lies directly over that of Period One, and is consequently associated with the ceramic complex immediately following that which was associated with Building Period One. It has been demonstrated by the stratigraphic relationship of units of these architectural periods that an occupational hiatus occurred between them. This lapse of time is reflected in the way occupation periods are blocked into the phase sequence of the dating chart.

Following Building Period Two, there is architectural
remodeling of existing structures at the site but evidently no entirely new elements were built. In accord with what appears to be a reduction in use of the cave, principal pottery types of the Pinedale-Canyon Creek Phase ceramic complex (Ceramic Complex Three) are not heavily represented. A Seasonal Mogollon-Pueblo Occupation for hunting, gathering, and limited agricultural purposes is therefore postulated for this period.

Apache Plain sherds always display their highest frequency in the topmost levels. This occurs in every instance and is best illustrated by R 3 (Fig. 137). There can be no doubt that Apache Plain was the final pottery type used at this site and in all probability, judging from the results of the stratigraphic test and R 3 (Fig. 124), was used some time after fragments of other types had ceased being dumped out with trash related to Mogollon-Pueblo occupation. Additional reasons for thinking the Apache occupation to be post A.D. 1800 are cited in later discussions.

The following resume is given on the basis of ceramic dating at the site and on the basis of evidence presented in sections concerned with individual architectural periods. Mogollon-Pueblo Building Period One and Ceramic Complex One are associated and may be placed within Nantack and Reserve Phase times (A.D. 950-1100). This period is terminated and time elapses before the cave is again
occupied.

Mogollon-Pueblo Building Period Two is associated with Ceramic Complex Two and may be placed within late Tularosa Phase times (A.D. 1200-1275). This period merges with that which follows it.

Seasonal Mogollon-Pueblo Occupation is associated with Ceramic Complex Three and continues throughout Pinedale and Canyon Creek Phase times (A.D. 1275-1400). This period terminates and time elapses before the cave is again occupied.

Apache Occupation Period and Apache Plain pottery are associated and may be considered as representative of the Apache Phase (A.D. 1800-1945).

STONE IMPLEMENTS

Pecked and Ground Stone Objects

List of Artifacts

<table>
<thead>
<tr>
<th>Classification</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Mano with single grinding surface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type c</td>
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</tr>
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<td>One-hand mano with two grinding surfaces</td>
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<tr>
<td>Grinding slab</td>
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<td>4.60</td>
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<tr>
<td>Rubbing stone</td>
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<td>9.20</td>
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<tr>
<td>Type a</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Type b</td>
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</table>
Polishing stone
Type b ........................................... 5
Pestle
Pestle
Hammerstone ........................................... 12
3/4 Grooved axe, reused as hammer .......................... 1
Abrading stone
Type a ........................................... 15
Type b ........................................... 1
Grooved abrading stone ........................................... 9

Total ........................................... 87

Pendant ........................................... 4
Pendant blank ........................................... 6
Figurine(?) ........................................... 1
Bead ........................................... 1
Type a ........................................... 1
Disc ........................................... 7
Stone cylinder ........................................... 2

All artifact types recovered from Pine Flat Cave but not discussed herein or not dealt with in detail are similar to corresponding types at Red Bow Cliff Dwelling, and descriptive texts applicable to them may be found in the Red Bow Cliff Dwelling site report.

MANO WITH SINGLE GRINDING SURFACE

Type a: In one specimen a groove is pecked along the median of one edge which could have served as a finger grip. Another specimen contains hematite particles wedged into vesicles on the grinding surface. It is a three-quarter section of a broken mano, probably reused to grind paint. Two of the manos in this category were among those artifacts cached in the large Alma Plain jar (Storage jar B,
Figure 139. - Data synthesis chart for pecked and ground stone objects from Pine Flat Cave.
### PICKED AND GROUND STONE OBJECTS
(Fine Flat Cave)

#### Data Synthesis Chart

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<thead>
<tr>
<th>Classification</th>
<th>No. of Specimens</th>
<th>Length(mm)</th>
<th>Width(mm)</th>
<th>Thickness(mm)</th>
<th>Weight(oz)</th>
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<tbody>
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<td>Mean</td>
<td>Range</td>
<td>Mean</td>
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<td>109,112</td>
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<td>115-154</td>
<td>137.2</td>
<td>95-117</td>
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<td>89.8</td>
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<td>135-163</td>
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<td>56-143</td>
<td>97.1</td>
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<td>21.3</td>
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<td>28-48</td>
<td>35-31</td>
<td>19.7</td>
<td>3-6</td>
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<td>17.19</td>
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* One or more specimens broken in this dimension; range and mean determined for complete specimens only.
TABLE 7. - SUMMARY LISTING OF MATERIALS FROM WHICH PECKED AND GROUND STONE OBJECTS WERE MADE

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<tr>
<th>Classification</th>
<th>Sandstone</th>
<th>Quartzite</th>
<th>Diabase</th>
<th>Diorite</th>
<th>Basalt</th>
<th>Tuff</th>
<th>Dacite</th>
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<td>Grinding slab</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pestle</td>
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<td></td>
<td></td>
<td></td>
<td>2 1</td>
<td></td>
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<td>Hammerstone</td>
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<td></td>
<td>2 3 7</td>
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<td></td>
</tr>
<tr>
<td>3/4 Grooved axe</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Grooved abrading stone</td>
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</tr>
<tr>
<td>Pendant</td>
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</tr>
<tr>
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<td></td>
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</table>
METATE: No complete metates were found at Pine Flat Cave. Only fragments too small to classify occurred. Extensive use was made of the cave by the Apache during the 19th century, and as in the case of Tule Tubs Cave, the absence of these artifacts at this site may be due to the Apache. The use of prehistoric metates by the Apache has been discussed in the summary of pecked and ground stone in connection with Red Bow Cliff Dwelling.

GRINDING SLAB: One specimen is the exception to the rule in that it is well shaped and smoothed, containing particles of blue azurite in various tiny holes in the grinding surface. Paint particles do not occur in any of the other three specimens.

WORKED SLAB (Not Tabulated): At Pine Flat Cave a number of worked sandstone slabs occurred. Outline usually rectangular; primary use seemed to be as door sills and hearth walls; one found in place as a storage jar cover; these slabs are not grooved and the surfaces are unmodified. Data concerning one specimen are given to serve as an example: outline rectangular; surfaces parallel; surfaces flat but unmodified by use or shaping; edges carefully pecked to achieve rectangular shape; length, 248 mm.; width, 132 mm.; thickness, 37 mm.; use unknown.

RUBBING STONE

Type a: Hematite particles and stains are retained in
Figure 140. - Pecked and ground stone objects from Pine Flat Cave. a, b, h, abrading stone Type a; c, rubbing stone Type b; d, e, polishing stone Type b; f, rubbing stone Type a; g, Figurine?; i, one-hand mano with two grinding surfaces; j, one-hand mano with single grinding surface; k, l, grinding slabs. Length of h, 126 mm.
the grinding surface of one specimen.

Type b: Pitted rubbing stone; discoidal in shape; rough on bottom surface; brought to a round outline by pecking; flat grinding surface; grinding surface centrally pitted, depth, 6 mm.; diameter, 28 mm. (Fig. 140c)

PESTLE: Shape roughly round, multifaced with flattened sides which are smoothly worn and somewhat rounded; elongated and slightly tapered; ends rounded through use; end fragments only were recovered.

THREE-QUARTER-GROOVED AXE, REUSED AS HAMMER: Groove is rounded but very shallow and continuous on both faces; slightly deeper on outer side; shaped by pecking with a slight depression on inner side of groove; ridges are absent; poorly polished; poll is rounded and slightly battered; bit is badly broken and battered on the edge.

ABRADING STONE

Type b: At Pine Flat Cave odd chunks of a particular type of locally abundant pumice-like sandstone were used for abrading. This material is very soft and the pieces used for abrading are not formalized tools. Generally speaking, one or two surfaces of such a chunk show that it had been used to rub against something else and then left without further use. The best example is rounded on all sides through use; is oblong in outline; it can be scratched with the fingernail but particles of the material are extremely abrasive; surfaces are not flat but are
irregularly rounded; this particular example must have served as a sandstone block serves today's craftsmen. (Fig. 141a)

**GROOVED ABRADING STONE:** Irregular pieces of fine-grained, loosely consolidated sandstone, often with at least one flat surface, contained one or several grooves which are caused in the manufacture and sharpening of tools such as bone or wooden awls (Fig. 141c, d, f). Grooved abrading stones show no intentional shaping; the grooves display considerable variance as to size and number; are straight, often tapered toward one or both ends; often they are worn into two opposite flat surfaces; in some cases grooves extend longitudinally entirely across the flat face; in others the grooves are short, crisscross, or run at odd angles across the surface; groove dimensions range, width, 3-17 mm., depth, 2-6 mm. One specimen differs from the others in that it has two flat surfaces, each quartered by two grooves at right angles to each other; grooves on each surface correspond with one another and on the short axis continued around the edges to join. Measurements for the entire category are remarkably similar to those of the abrading stone Type a group (Fig. 139) and grooved abrading stones are probably no more than the former type with grooves in them. Nevertheless grooves indicate a different use for them was intended and therefore they constitute a tool type.
Figure 141. - Pecked and ground stone objects from Pine Flat Cave. a, b, hammerstones; c, d, f, grooved abrading stones; e, abrading stone Type b. Length of e, 178 mm.
PENDANT: Of this group, three are similar in shape; thin, flat, tabular, rectangles; smoothed surfaces; edges worked and smoothed at approximately right angles to faces; single perforation (2-4 mm. in diameter) at one end; no decoration of any kind. A fourth pendant is trapezoidal in shape, almost as thick as it is wide; faces and edges are smoothed and at approximately right angles to one another; a single shallow groove completely encircles the pointed end; providing a means for suspension.

PENDANT BLANK: Exactly like the pumice pendants previously described except no perforation or other means of suspension is present. Objects of this kind are probably unfinished pendants but might also have conceivably served as counters, dice, or other gaming pieces. They are thin, flat, tabular, rectangles; surfaces smoothed; edges worked and smoothed at approximately right angles to faces; corners sometimes slightly rounded; no decorations or markings of any kind.

FIGURINE(?): A cylindrically shaped piece of soft sandstone which is carved. Because both ends are broken it is not possible to ascertain its likeness or that it was in reality a figurine, but the carving which remains on one side makes the object appear as thought it were part of a figurine. (Fig. 140g)

DISC: Flat, discoidal objects with smoothed surfaces and round edges; in two examples a portion of a central
perforation hole remains, others are not perforated; all are broken sections but fragments are large enough to permit valid measurement; these specimens closely resemble the disc-shaped worked sherds with and without center holes which are so commonly found throughout the Southwest. It has been suggested that disc sherds in some cases served as game counters, perhaps these stone discs were so employed; those with a central hole could nevertheless have served as spindle whorls. Rough, not perfectly round; sides vary from straight to slightly concave; ends convex, rounded into sides. Perhaps a dozen, irregular, unshaped pumice stones occurred which showed one or more surfaces or edges worn smooth by abrading. These stones were probably used for odd jobs such as finishing or shaping other objects and then cast aside. No effort was expended to make formalized tools out of any of them.

Discussion

The majority of manos show a single grinding surface and are made of basalt. Basalt is also preferred for use as one-hand manos, pestles, and hammerstones. Sandstone
one-hand manos are highest in frequency in that order.

Again the presence of an Apache occupation casts a shadow on generalizations concerning the lithic sample. Knowing the propensity of the Apache to reuse or carry away stone tools it is difficult to evaluate what remains at the site because it is not known what "ancient" tools they did actually prefer, to what degree, and under what circumstances. Neither is it known what types of pecked and ground stone tools they manufactured of their own accord. The particular abundance of sandstone abrading (Type a) and grooved abrading stones, poorly manufactured of small, irregular chunks of flat sandstone as opposed to their proportionately subordinate occurrence or absence at other cave sites may indicate that the Apache had some special use for these artifacts. There is, however, no direct evidence to support this suggestion.

Because of the limited size of the sample and number of tool types represented, it is not possible to point firmly to where economic emphasis lay as reflected by the lithic complex. Nevertheless, there is no reason to suppose that the economic pattern reconstructed for the Mogollon-Pueblo occupation at Red Bow Cliff Dwelling did not also hold true for Mogollon-Pueblo occupations at Tule Tubs and Pine Flat caves.
Chipped Stone Objects.

List of Artifacts

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<tr>
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<td></td>
</tr>
<tr>
<td>Type c</td>
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</tr>
<tr>
<td>Hoe</td>
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<td>35.71</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100.00</td>
</tr>
</tbody>
</table>

**PROJECTILE POINT AND BLADE**

*Type a:* This specimen represents an unfinished blade.

*Type k:* Leaf-shaped; lateral notched; expanding stem as wide as shoulder; convex base; l-rhyolite.
Figure 142. - Data synthesis chart for chipped stone objects from Pine Flat Cave.
## CHIPPED STONE OBJECTS
(Pine Flat Cave)

### Data Synthesis Chart

<table>
<thead>
<tr>
<th>Classification</th>
<th>No. of Specimens</th>
<th>Length (mm)</th>
<th>Width (mm)</th>
<th>Thickness (mm)</th>
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<tr>
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<td>Mean</td>
<td>Range</td>
<td>Mean</td>
</tr>
<tr>
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<td>32</td>
<td>15</td>
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<td>Projectile point and blade Type g</td>
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<td>5</td>
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<tr>
<td>Projectile point and blade Type n</td>
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<td>27*</td>
<td>18-22</td>
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<td>Projectile point and blade Type p</td>
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<td>20-21</td>
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<td>26, 34</td>
<td>8, 8</td>
<td>4, 5</td>
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<tr>
<td>Drill Type b</td>
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<td>12, 36</td>
<td>6, 7</td>
</tr>
<tr>
<td>Drill Type c</td>
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<td>26, 31</td>
<td>13, 16</td>
<td>5, 5</td>
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<td>Scraper Type a</td>
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<td>Scraper Type e</td>
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<td>Pulping plane</td>
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<td>117.6</td>
<td>8-24</td>
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* One or more specimens broken in this dimension; range and mean determined for complete specimens only.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Chert</th>
<th>Quartzite</th>
<th>Obsidian</th>
<th>Chaledony</th>
<th>Rhyolite</th>
<th>Jasper</th>
<th>Basalt</th>
<th>Andesite</th>
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<tbody>
<tr>
<td>Rough blade</td>
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<td></td>
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<td></td>
<td></td>
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<td>Projectile point and blade</td>
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<td></td>
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<td>Scraper</td>
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<td>1</td>
<td>4</td>
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<td></td>
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</tr>
<tr>
<td>Graver</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
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<td>Pulping plane</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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<td></td>
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</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hoe</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
Type 1: Leaf-shaped; shallow lateral notched; expanding stem narrower than shoulder; concave base; convex, slightly serrated edges; 1-chalcedony; (Fig. 143a).

Type 2: The obsidian used in this specimen is of a clear variety seldom employed for tools; (Fig. 143f).

Type 3: Triangular shape; diagonal notched; expanding stem narrower than shoulder; sharp, downward tangs; straight base, straight edges; 2-obsidian; (Fig. 143g).

Hoe: Two are of basalt rather than the sheet-like impure quartzite from which all other stone hoes were made and therefore they take on a somewhat different appearance, being much rougher and not as thin; they were probably put to the same uses as the others, representing only a cruder manifestation of this tool type.

MISCELLANEOUS CHIPS, FLAKES, AND SMALL CORE FRAGMENTS: Obsidian and other chips and scraps occurred at Pine Flat Cave in less abundance than at Red Bow Cliff Dwelling and yet in greater quantity than at Tule Tubs Cave.

Discussion

The majority of chipped stone tools from Pine Flat Cave are made from chert, obsidian, or quartzite, chert being most popular. Considering the size and length of occupations at this site, chipped stone implements are few in number. Types of tools within their category are about equally distributed except for scraper Type c which, as
Figure II. - Chipped stone objects from Pine Flat Cave.  
a, rough blade;  b-g, projectile points and blades;  
b, Type b;  c, Type g;  d, Type j;  e, Type l;  f, Type n;  
g, Type q;  h-k, drills;  h, Type a;  i, Type c;  j, k,  
Type b.  Length of k, 53 mm.
always, is plentiful but by no means as much so as at Red Bow Cliff Dwelling. Pulping planes, choppers, and hoes are scarce and two of the hoes are of an atypical character.

Miscellaneous Unworked Objects of Stone

List of Artifacts

<table>
<thead>
<tr>
<th>Classification</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Hematite</td>
<td>(4.5 ozs.)</td>
</tr>
<tr>
<td>Malachite</td>
<td>(2.0 ozs.)</td>
</tr>
<tr>
<td>Concretions</td>
<td>17</td>
</tr>
</tbody>
</table>

PAINT PIGMENT

Hematite (red): A total of 14 lumps; six show rubbed facets; total weight of sample, 4.5 ounces; provenience, fill of Rooms 1, 2, and 3. Two of these lumps are unusual in that surfaces of each are crossed and crisscrossed by irregular, fine grooves which were executed by running a sharp pointed object back and forth. Data concerning these two specimens: length, 48, 26 mm.; width, 29, 25 mm.; thickness, 14, 12 mm.; weight, 1.0, 0.5 ozs.; cat. nos. A-11847, A-11848.

Malachite (green): A total of 12 lumps; three show rubbed facets; total weight of sample, 2.0 ounces; provenience, fill of Rooms 1, 2, and 3. One small calcite crystal was also found in Room 2, Level 5.
CONCRETIONS AND MISCELLANEOUS NATURAL STONE OBJECTS

A number of odd shaped and unusual stones were picked up by the Indians and brought into Pine Flat Cave. Whether such items were merely considered interesting or out of the ordinary or had a deeper significance attached to them cannot be ascertained from the objects themselves.

Two concretions resemble miniature bowls and are hollow halves of broken nodules. Surfaces are rough and neither show evidence of having contained anything. Length: 40, 43 mm.; width: 38, 37 mm.; thickness: 32, 24 mm.; tuff, quartz geode.

Seven round cylindrical stones with pointed or tapered ends are a concretionary aspect of sandstone produced by selective cementation. Surfaces are naturally pitted and rough. These stones bear a superficial resemblance to stalactites. All were found in the fill of Room 2, only two examples are tabulated. Length: 64, 42 mm.; width: 22, 28 mm.; thickness: 20, 27 mm. Three pieces of brilliant chalcedony also occurred in the fill of Room 2.

Three chunks of what has been identified as melted and solidified slag were recovered from the site. They resemble slag produced at modern ore processing plants near Clifton or Globe but might have come about through volcanic action. Their origin and source was not determined.

Two small solid balls occurred; one, 32 mm. in diameter, is a smooth volcanic concretion with little dome-like bumps
over its surface which resembles botryoidal limonite, the other is a small marble of quartz, 21 mm. in diameter.

**PUMICE:** Numerous pieces and chunks of pumice ranging from 30 to 200 mm. in length had been brought into the cave and kept as raw material. Being a soft abrasive substance, it was probably useful both to fashion objects of such as discs and pendants, or to abrade and shape other items.

**OBSIDIAN NODULES:** Nodules of obsidian occurred with considerable frequency at Pine Flat Cave. Although only an isolated few were found at the other cave sites, complete examples are common at larger surface ruins. These nodules are the raw material from which the numerous small obsidian blades, projectiles, drills, and scrapers are fashioned. Although they vary in shape, the average is approximately 40 by 30 by 25 mm. in length, width, and thickness. The lump size therefore imposes certain limitations on the dimensions of an artifact made from them. This situation is reflected in the entire lithic sample from caves in the Point of Pines region where obsidian chipped stone implements are uniformly small. All larger tools are made of a different material.

Obsidian nodules always occur individually when found at a site. Very small bits of matrix occasionally still adhere to surfaces but no real matrix specimens have been found at Point of Pines. Where the source location for these particular specimens is, remains unknown. Actual
Figure 144. - Obsidian nodule in perlite matrix from the vicinity of Globe, Arizona (left); individual obsidian nodule from Pine Flat Cave (right).
outcroppings and deposits which produce obsidian similar in all respects, including matrix, do occur in the vicinity of Clifton to the east and Globe to the west. A sample of matrix containing obsidian nodules from Globe is illustrated together with an individual nodule from Pine Flat Cave (Fig. 144). The matrix is identified as pearlite.

The great number of nodules and broken fragments found at sites near Point of Pines leads one to suspect the Indians knew of a source more readily available.

---

**MISCELLANEOUS OBJECTS OF CLAY**

List of Artifacts

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<thead>
<tr>
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<td>Worked potsherd</td>
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<tr>
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<tr>
<td>Type b</td>
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<td></td>
</tr>
<tr>
<td>Type c</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Type e</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Type f</td>
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<td></td>
</tr>
<tr>
<td>Type h</td>
<td>17</td>
<td></td>
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<tr>
<td>Animal figurine</td>
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<td>Pot cover</td>
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<td>3.03</td>
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<tr>
<td>Unidentified clay objects</td>
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<td>4.55</td>
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<tr>
<td>Apache(?) pipe</td>
<td>1</td>
<td>1.51</td>
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</table>

Total: 66 100.00

In this section the pottery was sorted into the following types:

**MINIATURE VESSEL:** With the exception of the miniature ladle, all are crudely pressed from lumps of clay (Fig. 145d-e). Three are extremely small and surely were toys, but the others could have been functional receptacles. All
are smoothed to varying degrees on interior surfaces but exteriors are unmodified after initial shaping. Six are bowls, the seventh is a small, heavy-based jar with constricted sides and flaring rim no wider than the base (Fig. 145d). In the single ladle specimen (A-16922), surfaces are smoothed, bowl is rectangular, handle trough shaped (Fig. 145a). Although the bowl wall intervenes to terminate the handle trough, handle and bowl are made as one. It is 133 mm. in overall length; bowl (small section missing), 29 mm. deep; vessel wall thickness, 5 mm.; handle, 76 mm. long, 25 mm. wide, and 19 mm. thick; provenience, R 3, Level 7. All miniature vessels are plain pottery, fired and unslipped. Measurements (ladle excepted): height: range, 9-51 mm.; mean, 28 mm.; maximum diameter: range, 25-72 mm.; mean, 48 mm.; vessel wall thickness: range, 3-6 mm.; mean, 5 mm.

WORKED POTSHARD

Type a - Round: In all specimens edges are smoothed; 2-Reserve Red (A-16954, A-16955-X1), in one of these the red surface is scratched irregularly by fine crisscrossed lines; 2-Tularosa Smudged; 1-Indented Corrugated (A-16933), in this specimen the convex surface is the corrugated surface and the point of maximum convexity was abraded flat by some mechanism after the disc was made; 1-Plain Corrugated (A-16955-X2) is the bottom portion of a vessel with the small spiral beginning coil at the center. Maximum
Figure 145. - Miscellaneous objects of clay from Pine Flat Cave. a, miniature ladle; b-e, miniature vessels; f, Apache(?) pipe; g-m, worked potsherds; g, Type a; h, i, Type c; j, Type b; k, Type e; l, m, Type f; n, r, unidentified clay objects; o-q, animal figurines; s, t, pot covers. Width of s, 150 mm.
diameter: range, 17-71 mm.; mean, 48 mm.; thickness: range, 4-7 mm.; mean, 6 mm. Figure 145g is an extremely small example of this type.

**Type b - Oval:** In all specimens edges are smoothed.
- 1-Reserve Red (A-16946); 1-Tularosa Smudged (A-16945-X1);
- 1-Alma Plain (A-16945-X2); Length: 93 mm., two incomplete; maximum width: 65, 63, 47 mm.; thickness: 5, 6, 6, mm.; (Fig. 145j).

**Type c - Rectangular:** In all specimens edges are smoothed; 3-Reserve Red (A-16948-X1-2, A-16947); two of these are narrower at one end than at the other, keystone shape; all edges are gently curving to straight; 2-Alma Plain; 1-Mimbres Black-on-white. Length: range, 52-97 mm.; mean, 71 mm.; maximum width: range, 30-49 mm.; mean, 39 mm.; thickness: range, 4-7 mm.; mean, 5 mm.; (Fig. 145h, i).

**Type e - Irregular:** Specimens of this type have one or more totally unworked edges and were probably used as scraping tools, perhaps in the manufacture of pottery. It is apparent, however, that no preconceived form was necessarily adhered to and that the utility of the artifacts centered about any edge useful in scraping or rubbing. The worked edge is therefore a product of use. Two specimens are rim sherds but the rim edges were not used despite the fact that they were already rounded. This fact indicates that in these tools a rough, scraping surface was the initial wish of the worker which, through use, became smooth.
In these specimens worked edges are not usually beveled; 1-Alma Plain (A-16952); 1-McDonald Patterned Corrugated (A-16951); 1-Pinedale Black-on-red (A-16950); 1-Tularosa Smudged; length: 94, 67, 76, 54 mm.; maximum width: 63, 59, 72, 51 mm.; thickness: 5, 6, 6, 5 mm.; (Fig. 145k).

Type f - Round, central perforation: In all examples the central hole is biconically drilled, with no effort made to ream out the central constriction. The circular edge of each is smoothed to varying degrees of perfection; 1-Reserve Black-on-white (A-16943-X1); 1-McDonald Painted Corrugated (A-16943-X2), in this specimen drilling from both sides met imperfectly in the center causing an irregularly shaped hole; 2-Reserve Red (A-16942-X1, A-16944-X2); 1-Mimbres Black-on-white (A-16944-X1); 4-Alma Plain. Maximum diameter: range, 35-64 mm.; mean, 51 mm.; thickness: range, 4-8 mm.; mean, 6 mm.; perforation diameter: range, 4-8 mm.; mean, 6 mm.; (Fig. 145l, m).

Type h - Fragments: Of these, 10 are Reserve Red and seven Alma Plain, each representing an edge piece of a different worked potsherd. They are all, however, too small for further classification.

ANIMAL FIGURINE: Four are broken remnants of unclassified quadruped animals. These are pinched from lumps of clay to crudely resemble the creature desired. Three (provenience R 3, Level 3; R 3, Level 6; R 2, Level 5)
are leg or torso fragments broken too small for any further recognition. No figurines of this kind were found at Red Bow Cliff Dwelling and the specimens here are probably the product of the pre-Canyon Creek Phase occupants. It has also been noted in connection with larger surface sites of the region, that such animal figurines are far more prevalent during Reserve and Tularosa phases. All are fired, unslipped, plain brown or gray clay. Data concerning the three most complete examples are as follows.

Length: 45, incomplete, 52 mm.; width: 17, 16, 18 mm.; height: 34, 37, 29 mm.; provenience: R 2, Level 3; R 2, Level 1, R 1, Level 3; cat. nos. A-16965, A-16966, A-16967; shown as Figure 1452, p. 2.

POT COVER: One specimen is no more than an unfired lump of dirt-impregnated clay which, while moist, had been pressed into the mouth of a jar to plug and seal it. The underside is rough with a few faint root or twig impressions; edge is smooth and depressed all the way around where it came into contact with the jar rim; the upper surface is smooth and bumpy due to finger pressure in its formation. The texture is fine but the specimen, due to the poor quality clay, is quite crumbly and easily scarred. Diameter, 92 mm.; maximum thickness, 33 mm.; provenience, R 2, Level 5; cat. no. A-16918; (Fig. 1451).

The other specimen is of special interest because of its underside. The jar which originally called for this
cover already had its contents protected up to rim level by a layer of small broken sherds placed flat and overlapping each other and completely covering the surface enclosed by the vessel orifice. A large lump of clay was mounded up over this layer to extend higher than the rim and slightly overlap it. When applied, the clay was wet enough to pick up and retain four of the sherds in its lower side. As indicated by smooth convex clay surfaces at different levels, the remainder of the underside only made contact with and pressed down between sherds lying under those which adhered. The jar rim left a groove about the perimeter on the underside. An extremely snug fit must have been attained in this process. In cross-section, a dome shape with a concave base resulted as the clay was pressed from the top center area and thinned down toward the rim. The upper side was roughly smoothed in this process. The clay contained very coarse temper particles and although apparently never burned, it dried very hard. Diameter, 150 mm.; maximum thickness, 35 mm.; provenience, R 6, 10 cm. above floor level; cat. no. A-11830; (Fig. 145e).

UNIDENTIFIED CLAY OBJECTS: The first specimen is solid except for a tubular hole (8 mm. in diameter) running its entire length through the center. The hole evidently was made by shaping the clay around a cylindrical stick or cane section, the cylinder being drawn out before firing to
leave a cavity. The entire object is rectangular in plan view and triangular in cross-section. Sides are slightly concave; each edge and ends are rounded; surfaces smoothed. All edges, ends, and sides are alike, offering no clue as to its use. Length, 67 mm.; width, 41 mm.; thickness, 36 mm.; provenience, R 2, Level 5; cat. no. A-16929; (Fig. 145r).

The second is but a fragment of what was once a larger fired clay object. Unbroken surfaces are smoothed and intentionally shaped. A remote idea of the broken remnant may be gained if the tapered portion of an airplane fuselage is visualized where it joins the tail assemblage. Length, 57 mm.; width, 33 mm.; thickness, 43 mm.; provenience, R 3, Level 7; cat. no. A-16919; (Fig. 145p).

A third is merely a rod of clay, circular in cross-section, slightly smoothed on its surfaces, one end rounded, and other broken, and fired. In appearance it resembles a solidified coil end broken off in the manufacture of a large thick-walled vessel where one coil had been too long. Length, 108 mm.; width, 21 mm.; thickness, 19 mm.; provenience, R 3, Level 5.

All three specimens are plain, unslipped pottery.

**APACHE(?) PIPE**: A conical shaped clay object; interior hollow; pierced at constricted end by a hole punched from the outside with a twig or straw while clay was wet; surfaces and rim roughly rounded and smoothed; color, dark
gray to black; clay is fired and similar to that employed in Apache Plain pottery; bowl contains remnants of cake.

Length, 36 mm.; maximum diameter, 18 mm.; wall thickness, 4 mm.; perforation diameter, 3 mm.; provenience, R 1, Level 1; cat. no. A-17028; (Fig. 145f).

### List of Artifacts

<table>
<thead>
<tr>
<th>Classification</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone awl</td>
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</tr>
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<td>Awl with articular head unmodified</td>
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</tr>
<tr>
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</tr>
<tr>
<td>Awl with articular head modified</td>
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<td></td>
</tr>
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<td>only by splitting</td>
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</tr>
<tr>
<td>Awl with articular head removed</td>
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<td></td>
</tr>
<tr>
<td>Type b</td>
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<td>Awl fragments and broken tips</td>
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<td>Painted scapula</td>
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<tr>
<td>Antler tine implement</td>
<td>1</td>
<td>6.25</td>
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</tbody>
</table>

Table 10. Artifacts from Levels 1, 2, and 3; from sidewalks on South Quarter.

**AWL WITH ARTICULAR HEAD UNMODIFIED**

**Type a - Ulna:** One (A-16970) is of the proximal end of a Mule deer ulna and is short, stubby, with a sharp point that quickly tapers (Fig. 146a). The other (A-16971) is unidentified and tapers gradually to a dull, slightly fractured point from a slender proximal end (Fig. 146b).

Length: 98, 128 mm.; maximum width: 30, 12 mm.; thickness:
AWL WITH ARTICULAR HEAD MODIFIED ONLY BY SPLITTING:
A sturdy, broad-bladed specimen made from a Mountain sheep metatarsal; point is missing. Length, incomplete; maximum width, 15 mm.; thickness, 12 mm.

AWL WITH ARTICULAR HEAD REMOVED
Type b: Both made from split Mule deer metatarsals.
Length: 168, 125 mm.; maximum width: 12, 8 mm.; thickness: 7, 4 mm.; cat. nos. A-16983, A-16984; (Fig. 146d, e).

AWL FRAGMENTS AND BROKEN TIPS: Too small to be classified as to type, but identified as follows: a Mule deer pelvis fragment from R 3, Level 4, with a chisel-like point; and a split Mountain sheep metatarsal. Three broken tips from R 3, Level 4 are too fragmentary for identification.

BONE BEAD: One (A-16987) is conical in cross-section but its surfaces are badly chewed by rodents making further identification impossible. Another is only a half section, smoothed but otherwise unmodified after cutting. A third (A-16988) specimen is the discarded end of a long hollow-shafted bone from which bone beads or rings were cut.
Length: 23, 17, 28 mm.; maximum width: 13, 14, 32 mm.; thickness: 11, incomplete, 23 mm.

RING: One fragment (A-17008) of a ring probably fashioned from a deer femur has edges and surfaces completely ground and polished. Diameter, incomplete; width, 4 mm.;
Figure 146. - Objects of bone, horn, and shell from Pine Flat Cave.  
a, b, awls with articular head unmodified Type a;  
c, antler tine implement;  
d, e, awls with articular head removed Type b;  
f, shell bead;  
g, painted scapula;  
h, shell bracelet. Length of d, 168 mm.
PAINTED SCAPULA: A small Mule deer scapula bone (A-17002) was at one time entirely painted red (Fig. 146g). Most of the pigment has since disappeared but red particles still remain lodged in many tiny surface holes. The articular end was cleanly severed. This edge and other surfaces are smooth. The lower edge is now broken away. Otherwise the specimen is unmodified; its use is not known. Length, 63 mm.; maximum width; 24 mm.; thickness, 6 mm.

ANTLER TINE IMPLEMENT: One Mule deer antler tine was found which exhibits two opposite wear facets beveled to a wedge-shaped point within 10 mm. of the sharp end (Fig. 146g). The absolutely flat wear surfaces were abraded by pushing down at the tip at an angle and back and forth with the long axis of the tool. Surfaces of the entire tool are worn from much handling. Its length is 100 mm.; maximum diameter, 16 mm.; provenience, R.1, Level 3; cat. no. A-17009.

OBJECTS OF SHELL

BRACELET: A single fragment of a Glycimeris shell bracelet (A-17027) came from Pine Flat Cave (Fig. 146h). Its surfaces are smoothed, in some places ground flat; color, white; umbo was probably not perforated but breakage
makes this observation uncertain. The bracelet is thin, a type considered early among the Hohokam. Diameter, 60 mm.; width, 5 mm.; thickness, 4-6 mm.

**BEAD:** One shell bead (A-17026) is represented (Fig. 146f) which resembles bi-lobed shell beads and was probably similarly used but is not centrally constricted. Surfaces are flat, parallel and, with edges, smoothed and polished; perforation, 1.5 mm. in diameter and biconically drilled; color, pink. Length, 10 mm.; width, 5 mm.; thickness, 2 mm.

**CORDAGE**

Data concerning 30 specimens of cordage from Pine Flat Cave are presented in Figure 147. The same method of presentation and terminology used for Red Bow Cliff Dwelling cordage is employed here. The sample is only about one-eighth the size of the Red Bow Cliff Dwelling sample, therefore generalizations of a similar order are not made. The overall pattern of specimen occurrence and frequency is nevertheless similar, and remarks made in connection with Red Bow Cliff Dwelling cordage are not contradicted and may, for the most part, be extended to cover these specimens. This is especially true with regard to initial spinning differentiations; cotton is Z-spun, bast and hard fibers almost exclusively S-spun.
Figure 147. - Data concerning cordage specimens from Pine Flat Cave.
<table>
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<th>COTTON FIBER</th>
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* per 5 cm.

DATA CONCERNING CORDAGE FROM PINE FLAT CAVE
COTTON: A few specimens of cotton cordage were dyed as follows: natural white, 4; brown, 2; yellow, 1; blue, 1. The blue strand is alternated with a white one to form a 2-yarn, Z-S-twisted cotton cord 1.5 mm. in diameter.

BAST FIBER: One unusual specimen is from R 1, Level 2 (two additional fragments of the same cord from Level 3). It is 2.5 mm. in diameter; medium maceration; 2-2-2-yarn strands; S-Z-S-Z-twined; 2-S-spun yarns of bast are first Z-twisted into 2-yarn strands (2 yarns), 2 of these are then twined into S-twined multiple strands (4 yarns), finally 2 of these are Z-twined into the final cord (8 yarns).

HARD FIBER: As at Tule Tubs Cave, single yarn yucca cordage was used extensively in short sections and in longer spliced and knotted pieces. Some of these are straight and others are looped and coiled. Corn husking was also employed. Pieces in all stages of maceration are present in a wide variety of lengths and widths. Broken knot sections of this material with short ends extending out in different directions are common. Specimens of this kind are never spun or twisted.

FUR CORDAGE: Three cordage specimens of this type and two small cut strips of fur were recovered. Two of the specimens are from the same cord; therefore two pieces are actually present, each manufactured in a slightly different way. The techniques are shown in Figure 148. (After Haury and others 1950: Fig. 93.)
Figure 148. - Types of fur cordage from Pine Flat Cave.
The first type (Fig. 148a) is extremely simple in that strips of rabbit fur are wound tightly around the outside of a 2-yarn bast fiber strand, S-Z-twisted, 3 mm. in diameter. The skin must have been wound while moist because it is hardened in place. No supplementary method is employed to link it with base yarns.

The second type (Fig. 148b) is a modification of the first in order to make the fur strips an integral part of the cord. A single bast fiber yarn, Z-spun, is wound in a Z-twist with a strip of rabbit fur skin, new strips being added as old ones are depleted. The resulting strand is then S-twisted with a plain single bast fiber yarn similar to the base yarn to form the final cord which is 4-5 mm. in diameter.

HAIR CORDAGE: One short section is a 3-2-yarn multiple cord, S-Z-S twined, 6 mm. in diameter, with 30-40 hairs per yarn from R 2, Level 2. This specimen may be Apache because it seems to be made of horse hair.

The other specimen is unusual in several respects and the nature of its occurrence in R 1, Level 3 is most interesting. At the eastern end of R 1, close to, but aligned perpendicular to, the wall (Fig. 116) two small sticks or pegs protruded from floor plaster and were broken off 4-5 cm. above the floor. Similar pegs have been discussed in connection with their occurrence at Red Bow Cliff Dwelling and there is reason (ethnological comparisons)
to believe they may have been warp pegs and be connected with weaving.

The pegs in the floor of R 1 were not far from one another and when unbroken could easily have been warp pegs. This or some other aspect of weaving must certainly have been associated with them because the long piece of human hair cordage here considered was wrapped loosely about the base of the western-most of the pegs and together with the base of the peg was completely encased and buried in floor plaster. Obviously the cordage specimen had been deposited in this manner to insure the successful use of the pegs.

This basic cord of human hair is a 3-2-yarn multiple cord, S-Z-S twined, 3 mm. in diameter with 35-45 hairs per yarn; the final multiple cord is not tightly twined. The specimen (A-16888) is put together in an unexpected way. When stretched to its full length it is 175 cm. long, but throughout this length it is knotted at six points, two of the knots being slip knots on a single main cord. The purpose of the knots is to allow from two to four strands of the basic multiple cord to run parallel to each other between them. The greatest distance, 55 m., between two knots is in the center portion which also has the largest number, 4, of parallel cords. Whether or not this arrangement was functional, as part of a snare or other utilitarian object, before its burial or whether it is merely an idle contrivance used as a ceremonial offering
because it was fine hair cordage is not known.

A plain hank of human hair 120 mm. long was also recovered. It is not bound or tied in any way but must have been purposely saved, otherwise the individual hairs would have become separated and scattered.

KNOTS

The various types of knots, temporary ties, and loops found in the cordage from all three cave sites are illustrated in Figure 57. Of these, the following occurred at Pine Flat Cave.

Figure 57a: overhand knot, 6 examples
Figure 57b: square knot, 26 examples
Figure 57c: carrick bend, 5 examples
Figure 57d: 1 example
Figure 57e: granny knot, 1 example
Figure 57f: 3 examples
Figure 57g: loops in varying diameters tied with knot, 3 examples
Figure 57h: 2 examples

The square knot was again the type of knot most often employed; overhand knots and carrick bends are second and third in frequency.

TEXTILES

PLAIN WEAVE: At Pine Flat Cave, plain weave fragments were the only kind of textile recovered. Of these, five are cotton, the remainder bast fiber. All of the cotton
specimens are woven from single yarn thread which had been Z-spun in the elementary fashion which brings each weft over one and under one of the warps. Weft threads are somewhat thicker than warp threads. Number of wefts per cm.: 6, 8, 8, 8, 6. Number of warps per cm.: 14, 13, 19, 9, 8. Each is an incomplete torn textile section with frayed edges, with the exception of one specimen (A-17035-X1) which still retains a portion of one side selvage, 3-yarn, S-twist of Z-spun yarn. Another long thin piece (A-17035-X5) shows no selvage but loose threads at one end are gathered into a knot as if the torn strip had been used as a band or strap. Size of fragments: maximum width: 30, 15, 75, 20, 35 mm.; maximum length: 290, 50, 130, 70, 640 mm.

Remaining plain weave textile fragments are distinct because the threads are bast fiber, single yarn, S-spun. No cotton thread in any textile fragment is S-spun. The sample consists of five sections (A-17036-X1-X5), one being much larger than the others. Since the provenience as well as weft, warp, and overall characteristics are exactly the same for all, the smaller bits are considered as having torn off the larger. A description of the largest: maximum length, 360 mm.; maximum width, 295 mm.; weave is one weft over one and under one warp; 5 wefts per cm.; 7 warps per cm.; edges are frayed, no selvage portions remain; provenience, R 1, Level 3.
COTTON SASH: A single specimen is a complete end section of what was probably a sash (Fig. 149). Its resemblance to an end fragment of a sash from Hidden House (Dixon 1956: 21-22) is great except that the band of decoration is not present in color. Instead, the Pine Flat Cave example is decorated with a band by using wider weft threads, thereby introducing a zone near the sash end which contrasted to finer weave on either side. The specimen is of cotton, is a uniform tan color, and is plain weave throughout, also the same warps are used despite the fact that the central section is set apart. The bottom or end zone of 18 mm. is exactly like the upper 20 mm. which is bordered by the only frayed edge, 12 wefts per cm. and 17 warps per cm. The 17 mm. band between these is differentiated by the use of thicker weft elements almost twice the diameter of those used elsewhere, producing 7.5 wefts per cm. and 17 warps per cm. This has produced a slight width constriction in this area which is never compensated for in the weaving but brings about small folds on up the sash. The weave is entirely one weft over one and under one warp and threads are single yarn Z-spun. The finished end of the sash is selvaged with one Z-turned strand of three 2-yarn strands which were S-twisted of Z-spun yarns, self selvages were employed along both sides. Selvage strands and a few warps are knotted to form one corner; the other has been torn away. Overall dimensions: length,
Figure 149. - The end section of a plain weave tan cotton sash, decorated by using a band of thicker weft threads. Width at finished bottom edge, 59 mm.
57 mm.; frayed end width, 43 mm.; finished end width, 59 mm.; provenience, R 1, Level 2; cat. no. A-17033.

**MACHINE CLOTH:** Two specimens of machine manufactured plain weave cotton cloth were found (A-17035-X1-X2). Both are small, flat torn fragments with all edges frayed so that no idea is given of the original piece. They are undoubtedly remnants of textiles used by the Apache in historic times.

**PLANT ARTIFACTS**

**NEEDLE:** A single yucca leaf spine needle (A-17039) was recovered from this site. It is a thin, slender variety and the leaf fiber is S-Z-twisted into a 2-yarn cord. Length of needle, 42 mm.; overall specimen length, 75 mm.; needle width at base, 2 mm.

**CANE CIGARETTE:** The sample of cigarettes from Pine Flat Cave cannot be compared with that from Red Bow Cliff Dwelling from the standpoint of quantity or circumstances of occurrence. Of the 39 specimens, 33 are from R 1, Level 4 but they were scattered about within the level. The specimens are no different, however, in the way they were made or in their appearance. Total length: complete range, 20-67 mm. (23 specimens, 59 percent, 31-46 mm.); length of butt: complete range, 5-31 mm. (20 specimens, 51 percent, 8-12 mm.); diameter of butt: complete range,
5-14 mm. (21 specimens, 54 percent, 4-7 mm.); in 15 percent the septum is not pierced; in 13 percent no packing remains; not a single example is burned or charred. One painted cigarette (A-17022) is present, red; total length, 46 mm.; length of butt, 7 mm.; diameter of butt, 9 mm. One small, slender cigarette (A-17047) wrapped and knotted just above the node with a piece of thin hardfiber cord is also present. Similarly wrapped specimens from Red Bow Cliff Dwelling are classified as paho cigarettes; total length, 30 mm.; length of butt, 6 mm.; diameter of butt, 5 mm.

**SPLIT CANE DIE:** The one specimen found is a simple gaming piece made by splitting a segment of carrizo cane down the middle, cutting one of the split halves to a 68 mm. length and slightly smoothing the cut edges. The piece is marked at the midpoint of the round side with four crudely scratched lines across the diameter. There is also a dim suggestion of a blackened area at the midpoint of the opposite or concave face. The die is 9 mm. wide. Split cane dice are commonly used in sets throughout the Southwest (Culh 1907).

**CANE DIE:** A single specimen (A-17049 was recovered from R.1, Level 3. It is like those from Red Bow Cliff Dwelling except that most of the septum wall is carved out and cut edges are smoothed. It is decorated toward one end by burned lines which form two rows of small, contiguous squares with a dot in the center of each. Length, 25 mm.;
maximum width, 13 mm.

**Gourd Scraper:** One specimen (A-17065), a large oblong piece of gourd rind; the edge at one end is ragged but smoothed by much handling; the edge at the other end is a sharp arc, almost pointed at the apex, with an evenly smoothed and beveled edge brought about by scraping other objects. A tool of this kind would be an excellent pottery scraper. Length, 92 mm.; width, 77 mm.; thickness, 4 mm.

**Worked Gourd Fragments:** Two specimens, both from R 1, Level 1; each has one broken edge; remaining curved edges are smoothed and beveled. They are undoubtedly broken pieces from gourd scrapers.

**Arrow:** No foreshafts were found at Pine Flat Cave, but 11 proximal ends were recovered. In each case, these are nocked carrizo cane shaft ends prepared for the bow string and feathered with sets of three in precisely the same way as at Red Bow Cliff Dwelling. Six are stabilized to prevent splitting by filling the hollow proximal end with a wooden plug, having the nock cut into the wood; and five are stabilized by making the proximal end cut immediately above a node and nocking the cane. Feather and nock end binding is always sinew. Decoration beneath feathering is present and is simple black banding and fine line work. All specimens are broken ends, the longest 288 mm.; the shortest, 60 mm. They range in diameter from
WOVEN PLANT ARTIFACTS

P La I T E D S A N D A L M A D E  W I T H  W I D E  E L E M E N T S: Sandals of this kind found at Pine Flat Cave do not differ from those from Red Bow Cliff Dwelling in any way other than as to numerical frequencies and actual measurements which are here summarized. Of the nine specimens recovered, only one is complete. All are made of single, wide, unprepared yucca leaves. Only two retained toe segments and these are round, woven over-two-under-one. Thickness: range, 6-11 mm., mean, 8 mm.; width: range, 57-95 mm., mean, 80 mm.; length: one specimen only, 242 mm.; width of woven elements: range, 9-25 mm., mean, 14 mm.

WICKERWORK SANDAL: The one specimen present is fragmentary and merely represents the heel portion. It is exactly like the two-warp wickerwork sandal recovered at Red Bow Cliff Dwelling. Thickness, 15 mm.; width, 71 mm.; cat. no. A-17090.

TWILLED MATTING: Four specimens are from this site. Two are small fragments originally from the same large piece, woven of bear-grass elements 4 mm. wide in an over-three-under-three method. A third specimen (A-17100) is a corner section of a mat and as such is self selvaged on two adjoining sides, the top being the terminating selvage.
as indicated by the cutting of elements after their final turn over is followed by exactly under one, over two, and under one and no more. The mat proper is woven of uniform elements about 6 mm. wide which appear to be long split sections of corn plant leaves. They are patterned in an over-two-under-two technique. The fragment is approximately 150 by 150 mm. and is 4 mm. thick.

The final specimen (A-11824) is much larger than the rest, is long and slender and is curved with the short axis. It is woven entirely of unmodified bear-grass leaves 5 mm. wide in a reasonably tight over-three-under-three technique. A side edge segment shows simple self selvage, and a longer end edge is also self selvaged but the final three rows of twilled pattern are turned at right angles to that of the mat proper. The method employed along this edge is shown in Figure 150. Neither of these selvages is the terminal one. Maximum length, 680 mm.; maximum width, 295 mm.; thickness, 4 mm. This piece of twilled matting had been last employed and was found in situ as the bottom lining for a small storage bin in R 7 (Fig. 123a). The storage bin was against the east wall of R 7 and was surrounded on two sides by sandstone slabs (Fig. 110). Sections of twilled matting of this size, shape and general appearance have often been found as cradle linings at other sites. Particularly similar specimens are illustrated by Cosgrove (1947: Fig. 109) from Mule Creek Cave and by Haury (1934:
Pl. XLIII from Canyon Creek Ruin.

**COILED BASKETRY:** A single bottom section 127 mm. in diameter from a bowl-shaped basket (A-17091) is two-rod-and-bundle foundation, bunched, simple stitch, uninterlocking, in a / slant; stitching splints are very close together in a tight weave; 2.5 coils and 6 stitches per cm.; splints are narrow by comparison to those used in examples at Red Bow Cliff Dwelling; a normal center is present; foundation rods are round, slender, solid lengths of wood; bundles are grass; the wall technique is shown in Figure 75.

**APACHE TWINED BASKETRY:** From cave sites in the Point of Pines region, including Arizona W:9:77 surveyed in 1951, nine specimens of Apache twined basketry were recovered. With the exception of a small twined bottle basket, all are fragments, large and small, from burden baskets or pitched water jars. The nature of these specimens is shown by examples in Figures 150, 151, and 152. Judd also illustrated three Apache twined baskets recovered by him from caves in the Nantack scarp (1932: Fig. 124). Fortunately, ethnological literature is especially instructive with respect to this kind of basketry and its manufacture and general characteristics are dealt with in precise detail by a number of authors (Roberts 1929; Reagan 1930: 297; Beals 1934: 24-27; Douglas 1940: 193-196).

Specimens recovered from the cave sites do not differ in any way from these fundamental descriptions and a
Figure 150. - Miscellaneous objects from Pine Flat Cave.  
a, arrow fragment, carrizo cane arrow shaft and proximal end showing method of feathering and sinew binding;
b, twilled matting section woven of bear-grass, twilled pattern is turned at right angles to that of the mat proper to form a self selvaged edge (bottom lining, storage bin R 7, A-11824);  
c, wooden die;  
d, leather ornament;  
e, split cane die;  
f, effigy paho(?);  
g, wooden implement (scraping or rubbing tool?);  
h, brand which appeared on section of hide folded and used as a covering for an Apache grass-lined storage area in R 2, Level 4.  
Length of f, 407 mm;  
b and h not to scale.
reference to them provides a description of the present sample. No thong tassels or metal ornaments were employed in cave specimens, but strips and pieces of leather are used as reinforcement and patching; exterior surface areas of water jars retain pitch particles, and traces of red decorative bands about burden basket diameters are present.

Six burden baskets; one large wall fragment, R 1, Level 1, 430 by 380 mm. (Fig. 151); one large wall fragment, R 2, Level 1, 493 by 328 mm. (Fig. 152a); one bottom section and one wall section, R 1, Level 1, under 200 mm. in longest dimension; one small wall fragment, R 1, Level 2, under 115 mm. in longest dimension; two large wall sections from two different baskets, baskets were 240-260 mm. in diameter, height of fragments, 200-250 mm., both were collected from the surface of Arizona W:9:77 in the Nantack scarp.

Two pitched water jars; five fragments from one specimen, retain areas of pitch on exterior surfaces, R 2, Level 1, all fragments are under 140 mm. in longest dimension; one large wall fragment, surface of Arizona W:9:77, diameter of jar, 190 mm., height of fragment, 340 mm.

One small bottle basket; complete specimen (Fig. 152c), no; pitch coating; orifice diameter, 72 mm.; maximum diameter, 164 mm.; height, 203 mm.; provenience, R 7.
Figure 151. - An entire side section of a twined Apache burden basket used as a covering for a grass-lined storage area in R 1 at Fine Flat Cave. Height of specimen, 380 mm.
Figure 152. - Apache artifacts from Pine Flat Cave.  
a, rim section of a twined Apache burden basket;  
b, hide bag which contained kernels of corn and was  
cached beneath the hide covering of a grass-lined  
storage bin within R 2;  
c, small twined bottle basket  
with pointed base.  
Width of a, 493 mm.; height of  
c, 203 mm.
EFFIGY PAHO: A thin, split section of wood is carved into a wooden figurine with human characteristics (A-17103). It is shown in Figure 150. The portrayal is stiff and devoid of flamboyant characterizations. The object is called an effigy paho because of its unmistakable resemblance to carved wooden staves "portraying human attributes" (Haury 1945b: 198, Fig. 128) found in Double Butte Cave. Haury feels that his specimens may have been kachina prototypes. Despite its appearance, however, there is some doubt that the present specimen is of Mogollon-Pueblo origin because carving marks left along cut edges appear to have been made with a steel knife blade. In this event, the object would be Apache. It was found on the surface of R 1. Length, 407 mm.; width, 43 mm.; thickness, 8 mm.; flat surfaces are convex with the width; a 120 mm. band about the mid-section is painted black.

WOODEN IMPLEMENT: One specimen (three fragments); carved into the shape of a flat, elongated triangle with a rounded apex and base but with straight sides (Fig. 150); surfaces are smoothed, edges rounded; the object is slightly concavo-convex with the long axis; length, 152 mm.; base width, 55 mm.; apex width, 25 mm.; thickness, 4 mm. Artifacts which seem to be similar in most respects to this specimen are illustrated and classed as wooden scraping and
rubbing tools by Kidder and Guernsey (1919: 120, Pl. 49b, c).

**WOODEN DIE** One small, unmarked gaming piece was found which is made of soft wood cut into a thin little rectangle; edges are smooth and faces slightly convex; length, 28 mm.; width, 9 mm.; thickness, 4 mm.

**TWIGS TIED IN LOOPS** As was the case at Red Bow Cliff Dwelling, twigs and thin branches of wood were twisted and looped into crude ties of various kinds. Two specimens are broken half circles in the shape of wall or floor anchor loops, another example is knotted into a coil 115 mm. in diameter.

**OBJECTS OF LEATHER SECTIONS OF HIDE** One of these specimens is of particular importance because it occurred folded as a covering for a grass-lined storage area in Level 4 of R 2 (Fig. 155b) and was branded. The brand is shown in Figure 150. A hide bag containing corn kernels was cached beneath the hide. It is a large portion of a cow hide, 1.40 by 1.50 m.; edges are trimmed, with stretching loops cut at intervals about the perimeter; surfaces are scraped and rough scrape marks are evident, patches of hair remain; stretching loops are distended and the skin is stiff as if it had been hung up and dried shortly before folding and placement in the grass-lined storage area. Two other
pieces of cow hide were also found in grass-lined storage areas of R 1. One is an irregular chunk, 1.10 by .80 m. when flattened, with one edge cut and prepared withstretching loops (two of these retain remnants of corn huskcordage), the other edges are torn; when found it had beenfolded into a .50 m. square. The final piece is a smallirregular fragment with hair, 30 by 40 cm. Theseoccurrences are similar to a cache of Apache material foundon the surface of Cordova Cave (Martin and others 1952:481-482).

HIDE BAG: Also recovered from the same grass-linedstorage pit with the branded cow hide, this bag (Fig. 152b)is 260 mm. high, 270 mm. in maximum width, and 50-60 mm.thick. It is made of a single piece folded over at thebottom, sewed up the sides from the inside, wadded togetherand tied at the top with a single narrow leaf yucca cordwhich is also wrapped and tied once around the verticalaxis of the bag. The bag contained a quantity of cornkernels which is described by Cutler in Appendix A.

LEATHER ORNAMENT: A triangular piece of hide, 70 mm.on an edge, is centrally perforated by a triangular hole;edges are ticked with V-shaped notches at 5 mm. intervalsentirely about the perimeter; the remnant of a leatherthong is attached to one corner; surfaces display a reddishtinge as if once colored; surfaces are reduced to a suede texture. This object resembles a saddle ornament.
FIGURE 153. - SUMMARY PROVENIEHCE CHART POT ARTIFACTS PROM PINS FLAT CAVE

n m o with Single grinding surface
Type a
Type e
Nano with two grinding surfaces
One-hand nano with single grinding
surface
One-hand nano with two grinding

surfaces
Grinding slab

Rubbing stone Type a
Rubbing stone Type b
Polishing stone Type b
Pestle
Hammer stone

3 A grooved axe, reused as hammer
Abrading stone Type a
Abrading stone Type b
Grooved abrading stone
Pendant
Pendant blank
F i g u r i n e (?)

Bead Type a
Stone disc
Stone cylinder
Rough blade
Projectile point
Projectile point
Projectile point
Projectile point
Projectile point
Projectile point

Projectile p o i n t ------- Projectile point and blade Type n
Projectile point and blade Type p
Projectile point
“
Drill Type a
Drill Type b
Drill Type o
Scraper
Scraper
Scraper
Scraper
Graver
Pulping
Chopper

Type
Type
Typ#
Type

a
b
o

e

plane

Core
Hoe
Grooved hematite

Calotte crystal
Concretion
Sla g
Stone ball
Miniature vessel
W o r k e d potsherd Type a
Wor k e d potsherd Type b
W o r k e d potsherd Type c
W o r k e d potsherd Type e
W o r k e d potsherd Type f
Clay animal figurine
Clay pot c o v e r .
Unidentified clay objects
A p a c h e (?) clay pipe
Bone awl with articular head
unmodified Type a
Bone awl w i t h articular head
m o d i f i e d only b y splitting
Bone awl w i t h articular head
r e m o v e d Type b
A w l fragments end broken tips
Bone bead
Bone r i n g

Fainted scapula
A n t l e r tine Implement
S h e l l bracelet
Shell bead
F u r cordage

Hair cordage
H a n k o f himan hair
P l a i n weave cotton textile fragments
P l a i n weave bast textile fragment
P l a i n weave sash end

Cactus leaf spine needle
C a n e cigarette
S p l i t cane die
C a n e die
G o u r d scraper

Worked gourd fragments
Arrow

(proximal end)

Plaited sandal made with
wide elesmnta
Wickerwork sandal
Twilled matting
Colled basketry
Apache twined basketry
Wooden effigy paho
Wooden Implement
Woo d e n die
Twigs tied in loops
Sections of hide
Hide bag
Leather ornament
Leather fragments


LEATHER FRAGMENT: Nine small irregular pieces of worked animal skin were found throughout the cave. Two are from small rodents, the remainder are cowhide trimmings no doubt left over from working larger sections.

THE APACHE OCCUPATION PERIOD AT PINE FLAT CAVE

Within the pre-existing architectural confines of R1 and R2 there was a great deal of evidence that an Apache family or families had made Pine Flat Cave their home for a number of years. Deep disturbances of the Mogollon-Pueblo room fill due to the presence of the Apache were extensive but modification of existing architecture was, with one exception, not attempted by them. The exception is the plugging of T-shaped doorway -R1 to the level of the room fill with stones and thick heavy mortar from the inside. The Apache probably did this to complete the enclosure of their living area in R1. The modification of this doorway is described in detail with R1 (Fig. 120).

Several features are associated with Apache living areas. Often individual examples of these features are superimposed stratigraphically, indicating people came and went from the site during different time intervals throughout the total Apache occupation. Three distinct elements were built and used as part of a living area: a bark storage bin, an Apache hearth, and a grass-lined
Figure 154. - Plan of Pine Flat Cave during the Apache Occupation Period. Note the arrangement pattern of the three Apache features; bark storage bins, Apache hearths, and grass-lined storage areas.
storage area. As can be seen in the plan of Pine Flat Cave during the Apache Occupation Period (Fig. 154) a consistent arrangement of these three features is repeated three times. The profile of the cave (Fig. 111) shows the depth at which they were encountered. It also indicates the three groupings are each at differing levels but that individual features within each are very nearly at corresponding depths, there being a step-like placement from bark storage bin to Apache hearth, to grass-lined storage area. The horizontal arrangement pattern and vertical step-like placement is no doubt functional in the Apache configuration. The arrangement itself is most important. Facing the back of the cave, a bark storage bin is to the right and slightly to the front, an Apache hearth is in the center and a grass-lined storage area is to the left and slightly in back of the Apache hearth. Bark storage bins and Apache hearths occurred only as part of these three patterned groups, but additional grass-lined storage areas occurred at random throughout the living areas.

**BARK STORAGE BIN:** The classification of this feature is no more than a name since there is no positive indication as to the way in which it was actually used. A bark storage bin is approximately 40 cm. square, with rounded corners and is constructed of large slabs of ponderosa pine bark. The bark sections are not modified but are used as they come from the tree. The pieces are
laid flat so that they overlap each other to form a bottom and are gradually built up to provide vertical sides approximately 15 cm. high. The entire bin is held together because of its placement in a depression scooped out of the fill and because when completed, loose fill is tamped in about the outside to the level of the brim. No glue or mortar is used in construction, consequently bins are easily destroyed and all but one was fragmentary.

APACHE HEARTH: This kind of hearth is simple and is usually no more than a circular ash area approximately .50 m. in diameter. Occasionally there is evidence that a hearth depression was at first lined with clay and clean adobe but this is not conclusive.

GRASS-LINED STORAGE AREA: Seven of these were complete and could be identified without question. Suggestions of many more were present. The inside diameter range is from 35 cm. to 1.10 m. and the depth varies from .30 to .60 m. A grass-lined storage area is built by shaping a huge mass of grass into a basin. The grass is not woven but bunches of it are laid neatly, placed around, over, and against each other to line a depression that has been dug into the fill. Copious quantities of grass are used so that a great deceptive mass is produced which makes it very difficult to unentangle any contents. Three of these were empty and remained as large basins made of grass (Fig. 155b). However, four still retained their contents and in each case,
Figure 155. - Apache grass-lined storage areas located along the back wall of R 2 at Pine Flat Cave; a, contains a large piece of cow hide as a lining and covering.
basic method of placement was the same. Either a large section of hide or a piece of twined basketry was folded over to provide a bottom and top. Within this protection corn was stored; no doubt other articles were also included during the occupation. The entire storage area was always covered over and concealed by loose grass. A grass-lined storage area containing a piece of hide is shown in Figure 155a. It was located along the north or back wall of R 2.

**GRASS BEDDING AREAS:** Throughout the fill of R 1 and R 2 to a depth of about .75 m., lenses of grass sometimes a meter in areal extent frequently occurred. They are not formalized in any way, but are areas where grass has been spread out evenly to a thickness of about 10 cm. Grass areas of this kind are soft and may have been used for sleeping.

In addition to these constructed elements there are several items of material culture which have tentatively been associated with the Apache Occupation Period. Placed together, they represent a trait list for the Apache Phase in the Point of Pines region based upon materials recovered from Pine Flat Cave and Tule Tubs Cave.
Apache Phase

<table>
<thead>
<tr>
<th>Site</th>
<th>Occupation Period</th>
<th>Important Finds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pine Flat Cave</td>
<td>Apache hearth</td>
<td>Bark storage bin, Apache hearth</td>
</tr>
<tr>
<td>Tule Tubs Cave</td>
<td>Majolica-type</td>
<td>Tule Tubs Cave: Apache Plain pottery, Majolica-type</td>
</tr>
</tbody>
</table>

The propensity of the Apache for stone tools from ancient ruins has been discussed in connection with the lithic material from various sites. This Apache trait (preference for ancient lithic material for use in their material culture configuration rather than manufacturing new Apache stone tools) has been noticed and recorded in ethnographic accounts of the Western Apache (Reagan 1930: 291; Opler 1941: 384, 385), and is an extremely important Apache attribute when dealing with these people archaeo-
logically. In assigning a date of A.D. 1800-1945 to the Apache Occupation Period at Pine Flat Cave, and for present purposes to the Apache Phase, several aspects are considered. Most important perhaps is the hide which was contained in a grass-lined storage area located along the back wall of R 2 at a depth of 0.55 m., below the surface of room fill before excavation. This is a cow hide which was branded as previously noted. It occurred in one of the deepest Apache features, and it is therefore safe to assume that other Apache features deep in the fill are roughly contemporaneous with it and not necessarily extremely old because of their fill depth alone. The San Carlos Reservation was established by Executive Order of December 14, 1872 (Stanford Research Institute 1955). This marks the first organized use of lands within the Reservation for cattle operations by non-Indian cattle operators. For several years prior to this time, cattle had been ranged on smaller portions of the Reservation because representatives of the United States Army encouraged the raising of small herds to be used as food by soldiers stationed at San Carlos. 1894 marks the first organized entry of Indians into any cattle operations and this gives the initial time of record for any Indian herds (H. T. Getty 1956: personal communication).

The occurrence of Apache Plain potsherds in a very
well-defined stratigraphic relationship to older Mogollon-Pueblo trash levels in R 3 (Figs. 124, 137) is explained in the dating of Pine Flat Cave. There is little doubt that considerable time elapsed between the deposition of Mogollon-Pueblo trash and levels containing Apache Plain potsherds. Beals states that "the Apache are said to have abandoned pottery making about 1885" (1934: 30), but Grenville Goodwin collected a few surviving examples of Apache Plain pottery for the Arizona State Museum within the past fifty years. Texts can also be found about the Apache. In addition to these evidences, the use of cow hide, machine-manufactured plain weave cotton cloth, horse hair cordage, and majolica pottery at Tule Tubs and Pine Flat caves also tend to indicate a date during the nineteenth century (1800-1900) for Apache occupations in the Point of Pines region. Many thousands of cens have been...
APPENDIX A

CORN AND CUCURBITS

Hugh C. Cutler and Leonard W. Blake

CORN

Cultivated plants, like textiles, pottery and projectile points, are artifacts. Man selects his plants, keeps them alive and carries them with him. A close study of these cultivated plants can tell us a lot about the people who grew them. Of all the cultivated plants, corn is the most useful tool for the student of man. Large quantities are usually grown and brought home as entire ears and the most durable part, the cob, is usually discarded near the place the grains are used. From archaeological sites, many thousands of cobs have been dug.

Practically all varieties of corn will hybridize readily, so when new varieties are brought into a region, by travel and commerce of the residents or by movement of new people to the region, the local corn changes. Even

* Mr. Blake headed a group of members of the St. Louis Archaeological Society, Joseph Berta, John W. Bower, Jr., Winton O. Meyer, and W. Edward Smyth, who identified, sorted, and measured this large collection of cultivated plant materials.
when there are barriers to crossing, such as the practice of growing varieties in isolated fields or at distinct times of the year, enough hybridization occurs within a few years to make some changes in the corn. With rigorous selection of seed ears this change is not eliminated because differences in the structure of the cob are not apparent when an entire ear is examined, but are readily observed when the cob is studied carefully. Corn cobs are durable and accurate records. Methods which have been devised in the past few years enable us not only to detect differences in the corn, but to obtain a good index of the extent of changes which have taken place in a community. These changes may be the result of climatic conditions or of evolution of crop varieties within the community, but the greatest changes recorded appear to be the result of movements of people who brought their varieties of corn into or through an area.

From previous work it has been possible to identify some of these times of change in the Southwest and adjacent regions (Martin and others 1952: 484, 496-499). Evidence is accumulating to show that crop plants move rapidly during these times of change and very slowly between these periods. With corn these changes are complicated by hybridization and by the large number of varieties involved. In the squashes the movements are obvious because crossing of the three distinct species of the Southwest with wild
relatives and among the species rarely occurs. Between A.D. 1250 and 1350 there was another period of change in the cultivated plants and the great difference in the corn of Levels 1 and Levels 2 of Blocks E and K of Room 1 of Arizona W 9:72 is evidence that this site was occupied at the time of this great change.

There are several ways to study the corn of any community. For practical reasons it is best to study the corn of a certain time period, as one would study the harvest of one year in a modern village or the corn of a single level or phase of an archaeological site. The corn can be studied as a whole and the corn of the community presented as a general average (but what average is there for white and red, for flour, flint and dent?), or as an assemblage of kinds of corn studied as varieties and later as parts of a whole. The general average is a convenient figure to use in tables and graphs (Carter and Anderson 1945: 304–308; Nickerson 1953: 88-95) which are the basis for broad comparisons. When our materials are scanty, or cannot be separated into differing kinds, the general average must be used. Where we have enough collections, now that techniques for studying the individual specimens have improved, we can often go on and study the corn of a community as an aggregation of varieties. We can make comparisons with corn from other communities or from different periods of the same site.
The modern Hopi of any one village, for example, have about the same varieties of corn as some of the Rio Grande Pueblos, yet a random sample of all the Hopi corn would have a general average for most characters which is very different from that for the corn from a Rio Grande Pueblo. In many respects the Hopi average would differ in the direction of the average for corn of the Papago and Mohave. If we make a study of the varieties grown by a Hopi community and by a Rio Grande Pueblo, we find that the Rio Grande Pueblo communities grow many large-cobbed Pueblo race varieties (Anderson and Cutler 1942: 84-85) and relatively few slender-cobbed Pima-Papago race varieties in comparison with the Hopi communities. In addition, almost any variety which is grown by the Hopi usually differs in the direction of the Pima-Papago race from the similar variety grown by the Rio Grande Pueblos. For example, the soft blue flour corn of the Hopi has a lower row number and smaller and thinner grains than blue corn of the Rio Grande Pueblos and the adjacent Spanish-speaking villages (Martin, Rinaldo, Bluhm, and Cutler 1956: 176-177, Fig. 81).

Other clues to the direction of movement of cultivated plants become evident when varieties or races are studied. The Keresan Pueblos of Acoma, Jemez and Laguna grow some tapered dent corns which are rarely found in the Tanoan Pueblos (Cutler, unpublished data) and resemble the Mexican Pyramidal type ears found in caves in Yampa Canyon,
Colorado (Anderson 1948: 91-92, Pl. 22) and some southern dent corns more than they resemble any other kind of corn from the United States. We need more collections before we can learn the way Keresan and Yampa Canyon dents came north from the Mexican center of these dent types. These collections will have to be studied by comparing varieties rather than general averages for the total corn of a community.

Unfortunately, it is seldom possible to place each cob or kernel in a varietal classification. It is usually possible to place specimens in large categories which correspond roughly to a race, as the term is used by Anderson and Cutler (1942: 71-72) and which may contain several related varieties.

Two useful characters to use for roughly placing ears in distinct and somewhat natural groups are number of rows of grains on an ear and the thickness of the cob and ear shank. Most of the old kinds of corn have about 14 rows of grains and slender cobs and shanks, while most of the more recent kinds have fewer rows of grain (except in the Pueblos) and much harder and thicker cobs and shanks (with the exception of a few varieties).

Width of the cupula is another useful character in comparing cobs, although on entire ears or cobs it is necessary to break the specimen or to dig out a few grains or some of the glumes before measurements can be made. The
cupule is the small pocket associated with a pair of spikelets which are borne a pair of grains (Nickerson 1953: 82). The width of a cupule is measured across the cupule from the outside edge of one of the ear-like rachis flaps to the outside edge of the other. In the Southwest, large cupules are usually found in varieties which have large cobs and shanks, small cupules in varieties of corn with small cobs and shanks.

Unfortunately, with a single grain it is not possible to obtain any measurement which can be used in comparisons with cupule width. From a single grain one can, however, estimate very closely the number of rows on the ear from which it came (Martin, Rinaldo, Bluhm, and Cutler 1956: 176-178). A useful but not always accurate comparison of corn collections can be made using the number of rows of grain and the thickness of the grains, characters which can be measured or estimated on whole ears, cobs, or most kernels and naked cobs are found in a site and it is desirable to find out what an entire ear is like.

The only material examined consisted of 22 cobs and fragments with numbers of rows of grains as follows:
All the cobs have the moderately large cob and shank of recent Hohokam-Mogollon area corn. Nine cobs of corn so white usually found on undamaged ears, 27 white, and 20 cob.

**CORN FROM ARIZONA: W:10:42.**
Pine Flat Cave

**Room 1, Level 1:**

8 rows 10 rows 12 rows 14 rows 16 rows 18 rows
6 cobs 10 cobs 5 cobs 1 cob

8 rows 10 rows 12 rows 14 rows 16 rows 18 rows
30 cobs 17 cobs 3 cobs 0 cobs 2 cobs 1 cob

Surface survey: The husks of eight ears of corn are tied together with strips of yucca so that four ears hung on each side of the tie. The ears are gone but examination of the four remaining shanks and the husks indicate that all ears probably were of a single variety. The shank diameters are (the smallest and largest diameters at the point of attachment to the ear): 12 x 18 mm.; 12 x 15 mm., 13 x 19 mm., and the husks indicate that these ears were similar to modern Papago flour corn.

The cobs gathered on the surface are a mixed lot with a few of the slender-shanked and cobbled varieties which are discussed later on and considered as relatively old varieties, some of the low row number varieties of prehistoric times, some Papago-flour-like cobs, and some large shanked Pueblo cobs.
large-cobbed ones than were found on the surface.

Three cobs were rust-color, seven with the flecks of rust on white usually found on variegated ears, 57 white, and the color of 13 could not be distinguished.

Room 1, Level 2: All of the cobs have large shanks like those of a Papago flour corn with some Pueblo inter-mixture. One cob is rust-color, two have slight flecks of color which suggest they bore calico grains, and the rest are white.

Room 1, Subfloor, Apache Storage Pit B: A cache of corn-kernels from at least six ears, has the following distribution of colors:

- About 85 white grains
- 7 blue
- 10 medium cherry red
- 6 deep cherry (the "Kokoma" of the Hopi)
- 9 large brownish orange
- 4 small pink orange
- 2 small blue-cherry
- 7 flint, white striped with red
- 5 pale pink

Most grains are flint or hard flour, a few slightly dented. All the cobs were white except for occasional streaks of pale red, the markings often found on cobs of calico corn. Although many of the kernels were so irregular in shape that a reliable estimate of the number of
rows could not be made, the average row number appears to be about 12 or 14, the corn similar to the Pueblo race of corn still grown by the Apache and Navajo. Because so many kinds of corn are found in this cache, it is not likely this is seed selected for planting.

Room 2, Level 1: Firm moderately large cobs and shanks and harder glumes show a mixture with the Pueblo race of corn. There are a few cobs with small cobs but the fact that the most of the cobs with high row numbers have broad cupules and large firm cobs is evidence of a strong Pueblo corn mixture.

<table>
<thead>
<tr>
<th>Rows</th>
<th>Cobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
</tr>
</tbody>
</table>

A bundle of the husks remaining from seven ears, three on one side and four on the other, is tied with yucca strips. Five of the shanks remain attached to the husks. The average diameters of each of these five (13, 16, 19, 21 mm.) suggest they are Pueblo race corn, not the extreme big cob, big shank varieties but the kinds some Hopi, Zuni, western Navajo, and Apache still grow.

Room 2, Level 2: Another bundle of husks from eight ears is tied with yucca strips, four ears on each side. The shanks remaining are all large like those of the bundle of Level 1.

A bundle consisting of the husks which once held 22 ears is tied with strips of yucca leaf so that ten ears
were on one side, twelve on the other. All the shanks are small, the remaining ones 8, 10, 10, 11, 12, 12, 15 mm. in average diameter, and this fact, together with the character of the husks, indicates the ears were very similar to modern Papago flour corn, a type still grown by the Papago and Mohave as their most important native corn, and by the Hopi, Zuni, Apache; and Navajo in recent years as a minor variety. It is possible that all the bundles are comparatively recent, perhaps Apache. There were only five cob fragments, all of moderately large diameter.

**Room 2, Level 3**: Although practically all of the ears had moderately large cobs quite similar to those of Room 1, Level 2, there were a few quite slender ones and a few of the hard-glumed, pineapple-shaped kind found in lower levels of Tularosa Cave (Martin and others 1952: 465) and in parts of Arizona W:9:72, to be discussed later.

<table>
<thead>
<tr>
<th>4 rows</th>
<th>6 rows</th>
<th>8 rows</th>
<th>10 rows</th>
<th>12 rows</th>
<th>14 rows</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cob</td>
<td>3 cobs</td>
<td>48 cobs</td>
<td>25 cobs</td>
<td>12 cobs</td>
<td>1 cob</td>
</tr>
</tbody>
</table>

In this same level were two mature fruits of jimson weed (Datura sp.) and a single fruit with seeds was found in Room 1, Level 2. The seeds of jimson weed have been used by recent Indians as a narcotic, in witchcraft, and in ceremonies.

**Room 2, Level 4**: A hide bag, possibly Apache, contained about 800 kernels, the majority of which are of
Pueblo varieties of corn and only a small number similar to the Pima-Papago variety of flour corn. Most of the kernels are soft flint and white, some are slightly dented. Many kernels are bright cherry red, some blue, and some yellow. The row number is quite low for Pueblo varieties, between 10 and 12.

In general, the corn from Arizona W:10:42 is mixed, with a large amount of recent Apache and some corn typical of the region in late prehistoric times. The cobs which resemble those of earlier periods are so scarce that they may be aberrant ears in fields of related later varieties.

CORN FROM ARIZONA W:9:72
Red Bow Cliff Dwelling

For convenience, the row numbers of cobs examined from all parts of this site are tabulated in Figure 156.

Room 1, Block C: About 200 kernels, practically all of the blue variety common among the Pueblo, and among the Navajo and Apache; from at least six ears; one cob rust colored, the other five or more white.

Room 1, Block E, Level 2: About 160 large kernels, most of them white but some pink and a few blue. There are far more cobs with small shanks and small diameters in Level 2 of this block than in Level 1.
Figure 156. - Distribution of cobs in Arizona W:9:72.
### Distribution of Cobs in Arizona W:9:172

**L** - Large cob type  
**S** - Small cob type

<table>
<thead>
<tr>
<th>Rows</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>14</th>
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<td>4L</td>
<td>4L</td>
<td>2L</td>
<td>2L</td>
<td>3s</td>
<td>3s</td>
</tr>
<tr>
<td>H, L1</td>
<td>1L</td>
<td>1L</td>
<td>1L</td>
<td>1L</td>
<td>1L</td>
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<td><strong>Room 2</strong></td>
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<tr>
<td></td>
<td>9L</td>
<td>12L</td>
<td>3L</td>
<td>9s</td>
<td>9s</td>
<td>2L</td>
<td>2L</td>
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<td><strong>Room 3</strong></td>
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</tr>
<tr>
<td></td>
<td>5L</td>
<td>6L</td>
<td>1L</td>
<td>5s</td>
<td>5s</td>
<td>4s</td>
<td>4s</td>
</tr>
<tr>
<td><strong>Room 4</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Wall Section</td>
<td>1</td>
<td>25</td>
<td>22</td>
<td>16</td>
<td>7</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>North Wall Section</td>
<td>7L</td>
<td>88</td>
<td>47</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Center Section</td>
<td>2L</td>
<td>27L</td>
<td>27L</td>
<td>9L</td>
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</table>

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Note: The table represents the distribution of cobs in various rooms and sections, with each cell indicating the number of cobs found in that area. The columns represent different rooms and sections, while the rows may represent different types or groups of cobs. The last column indicates the number of cobs found in each area, with 's' indicating smaller numbers.
Figure 157. - Measurements of typical ears from Arizona W:9:72, Room 1, Block E, Level 2.
Measurements of typical ears from Arizona W:9:72
Room 1, Block E, Level 2

Large shank and cob group

<table>
<thead>
<tr>
<th>Rows</th>
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<th>Cupule Width</th>
<th>Cupule Depth</th>
<th>Shank Diameters</th>
</tr>
</thead>
<tbody>
<tr>
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<td>9 mm.</td>
<td>-0.5 mm.</td>
<td>7.5--8 mm.</td>
</tr>
<tr>
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<td>5</td>
<td>9</td>
<td>-0.7</td>
<td>7--8</td>
</tr>
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<td>9.5</td>
<td>-0.7</td>
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</tr>
<tr>
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<td>9--12</td>
</tr>
<tr>
<td>12</td>
<td>4.7</td>
<td>7</td>
<td>-0.8</td>
<td>9--10</td>
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Small shank and cob group

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<th>Shank Diameters</th>
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<tr>
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<td>4</td>
<td>6</td>
<td>-1.2</td>
<td>4--5.5</td>
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<td>4</td>
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Room 4, Entryway section: Most of the 135 grains are white flour or soft flint, some are cherry red, red-striped, pink, and only one is blue. Four grains are slightly dented. These are like grains from recent Pueblo varieties, although a few of the white grains may have come from Pima-Papago flour corn.

Room 4, Ceremonial area: The few cobs represent nearly all the kinds of corn found in the site with the exception of some of the extreme Pueblo kinds which might have been left in the site by the Apache or perhaps be due to northern influence in late prehistoric times. The few kernels in the ceremonial area are quite large, probably from the Pima-Papago flour corn variety, and discolored. They probably were white flour corn. Two ear shanks have minimum and maximum diameters of 10 and 14 mm.

Room 5, General fill: Six white flour, four yellow flint, three blue flour, and one red or pink flour kernels were found here. All the kernels are of medium size.

Discussion and Conclusions

An Unusual Kind of Corn

There is a slender-cobbled kind of corn common in deeper parts of Arizona W:9:72 which is scarce in other sections. In Level 2 of Blocks E and K of Room 1, for example, there are many of these slender-cobbled specimens but in Level 1
of the same blocks, there are comparatively few. This kind of corn is not found in the extensive collections of corn from recent and contemporary Indians of Arizona which are in the collections of the Missouri Botanical Garden. The same variety is found in older strata of Tularosa Cave, Bat Cave, and some caves of northern Mexico (Martin and others 1952: 464-469; Manglesdorf and Smith 1949: lowest level ear in Pl. XXIII, Fig. C of Pl. XXIV, Cobs D-H of Pl. XXVI, Pl. XXVII). In many respects these ears resemble the inflorescences of some grasses. They have small shanks, small flexible cobs, kernels not quite as thick as wide; cupules narrow and relatively deep, flaps large and quite soft, glumes large and papery or leathery, approaching those of pod corn, the lower glume dark tan in color (Fig. 160). The average row number is higher than that of recent Pima-Papago corn or the majority of the cobs found in Arizona W:9:72. This is a very distinct kind of corn, similar in some respects to some of the early corn from sites in South America and some still grown there in the highlands (Anderson 1943: 467-475; Cutler 1946: 281).

For convenience, we have called this race of corn Small Cob. This descriptive name is used to avoid confusion like that which was caused by lumping eight-rowed, flat-kerneled, thick-cobbled ears into a category called "Eastern Flints" during the early period of study of the races of corn. This term was used as a convenient designation but
unfortunately has been used in literature and has given the impression that the presence of eight-rowed ears in the Southwest is evidence for a movement of corn from the East when actually it is not. There are several very definite eight-rowed, flat-kerneled, thick-cobbed kinds of corn in western Mexico, others in Guatemala, and the eight-rowed types in southern Arizona and New Mexico undoubtedly came from that region because they appear at the same time as did some other cultivated plants, like cotton, tepary beans, lima beans, the jack bean, and the moschata squash. These cultivated plants have never been found in most of the area associated with the true eastern flint and flour corns.

Harinoso de Ocho, one of the eight-rowed Mexican varieties, is very likely one of the ancestors of modern Pima-Papago flour corn and of most of the corn of Arizona Ws9:72 (Fig. 158).

So far it has not been possible to fit Small Cob clearly into the picture of the spread of corn in North America. Two possibilities must be considered. First, the corn may be a very old and primitive kind. That it has many grass-like characteristics and is found in some of the very old levels of Bat Cave, Tularosa Cave and some caves of northern Mexico support this possibility. Nal-Tel, a Mexican race considered to be very ancient in Mexico (Wellhausen, Roberts, and Hernandez 1952: 60–61) and the race to which some corn found in the lowest levels of Tularosa
Cave, in sites from southern Utah and Colorado, western New Mexico, and northeastern Arizona, belongs, may be a close relative of Small Cob and be more recent.

It is also possible that Small Cob is more recent than Nal-Tel and may be the result of crossing of Nal-Tel or a similar kind of corn with teosinte or Tripsacum, grasses closely related to corn. Some of the Small Cob cobs are almost identical with extremes of Reventador (Anderson 1944: 467-475), a kind of corn from northwestern Mexico which is considered by Wellhausen and his associates to be the result of crossing of another Mexican corn, Chapalote, with teosinte (Wellhausen, Roberts, and Hernandez 1952: 94). It is likely that Chapalote itself is the result of hybridization of Nal-Tel with teosinte or Tripsacum. Since ears like those of Nal-Tel are found in several early sites of the Southwest and Mexico, there would have been time for the cross to occur. If we make a scale, we find that the measurements and characteristics of cobs of Chapalote lie about midway between those of Nal-Tel and Reventador. Evidence from chromosome knobs (Wellhausen, Roberts, and Hernandez 1952: 57) tends to support this position. Figure 158 illustrates the possible relationships of Small Cob and several other kinds of corn of the region.

It has long been recognized that there are at least two distinct sources for the major variations in corn
Figure 158. - Diagram of probable relationships of some corn of the Southwest.
DIAGRAM OF PROBABLE RELATIONSHIPS OF SOME CORN OF THE SOUTHWEST
(Mangelsdorf and Cameron 1942: 218-219; Cutler 1946: 263-264). One of these sources is an unknown grass, the other probably is some species, or several species, of Tripsacum. Corn must have been domesticated at least 5,000 years ago in Mexico, Central America, or near the eastern margin of the Andes of Ecuador, Peru, or Bolivia. Studies of modern corn support an origin near the eastern margin of the Andes but the very early corn-like pollen grains from the Valley of Mexico must still be explained. Corn apparently then hybridized with Tripsacum. In Mexico and Guatemala this cross produced teosinte which continues to grow as a weed and to cross with corn. Most of the variability of corn in North and Central America is the result of this hybridization. It is likely that corn also crossed with the South American species of Tripsacum because lowland South American corn differs from the highland races in ways which suggest such a mixture.

Unfortunately, some corn-teosinte hybrids produce ears and plants similar to types which can be considered primitive. This is to be expected since Tripsacum and the ancestors of early corn must be quite closely related and must have evolved from the same grass stock. Until we have more material and have analyzed it carefully, it is better to consider both possibilities for the origin of Small Cob.
Corn Similar to That Grown by the Papago in Recent Years

Most of the corn is similar or identical to that still grown by the Pima, Papago and peoples of adjacent Mexico in recent years and now. The most common variety is the ordinary Pima-Papago race described by Anderson and Cutler (1942: 84). This is the native soft flour corn still to be found (in 1953) among the Pima, Papago, Cocopah, Mohave, Yuma, Maricopa, peoples of the Mexican border, and, in a less pure state and as a little grown kind, among the Hopi and Zuni, and even in some of the Rio Grande Pueblos (Fig. 161a, b, c; Fig. 162a, b, d). Among the Hopi, Zuni, Navajo, and in the Rio Grande Pueblos this flour corn usually has a yellow aleurone. This color is occasionally found in the flour corn of the other groups mentioned above but more commonly the corn is an off shade of white which tends to readily turn tan or brown with age. The darkening is mainly in the aleurone layer and suggests that there is a slight degree of pigmentation in the off-white ears.

In all these groups there are occasional red, blue, or deep cherry colored ears of this kind of flour corn. Some of the purple dye corn of the Hopi, with water-soluble red-violet color in the cob, glumes and grains, is of this kind, and even as far east as the Rio Grande Pueblos the purple dye corn varieties usually have characters which suggest a strong mixture with the Pima-Papago race.

From a collection of ears gathered thirty years or
more ago among the Papago, one can arrange a graded series ranging from the soft flour Pima-Papago type, through soft flints, larged-grained hard flints, smaller-grained and higher row number flints, to the extremes of Chapalote and Reventador. The extreme of this series would be Small Cob but it has not been found in recent collections. Ears which are essentially similar to Pima-Papago flour but have flint grains and a slightly higher row number appear to have been kept as a distinct variety. This is called Onaveno in northwestern Mexico (Wellhausen, Roberts, and Hernandez 1952: 198-199).

A smaller variety with slightly higher number of rows of grains is similar to Reventador. Frequently there are sugary kernels on this variety. There have been reports of sweet corn among the Papago but no ears are in our collections although sweet corn ears have been collected in Mexico in the area once reached by the Papago.

There are a few large, hard flint kernels so the people of Arizona W:9:72 grew a kind of corn like Onaveno. There are some cobs of Chapalote and Reventador in the upper levels, more in the lower levels. It is likely that ease of grinding the soft flour corn caused the Indians to abandon the hard flints. No sweet corn kernels were discovered and there is no way to distinguish sweet corn cobs.

One must not be misled by the apparent uniformity of Pima-Papago corn. It is the end result of an extremely
complicated mixing of very different kinds of corn. In his work on the glumes of the tassel of corn varieties, Alava (1952: 86) said that in the relatively scant material he had from only upper levels of Bat Cave, "the variability... is as great as that of several different varieties of modern maize," and more variable than that from sites on the west coast of South America. This is to be expected because in Bat Cave, as in Tularosa Cave and Arizona W:9:72, there is corn which carries characters derived from Tripsacum as well as the pure maize characters which are found almost pure in much modern and practically all ancient corn of the Andes and the South American west coast.

This same diversity of corn was found in 75 cobs of corn from Arizona W:10:50 which were studied by Nickerson. In his diagram (Nickerson 1953: 85, Fig. 5) it is possible to readily see the diversity of the material he measured, although it includes relatively few of the more fragile Small Cob specimens. Our examination of the corn from Arizona W:10:50 showed that the original composition probably was very like that of Arizona W:9:72 but there were practically none of the extremes of the Small Cob corn or of the very recent varieties of the Pueblo corn race to be discussed later. Most of the corn from Arizona W:10:50 was in the form of entire ears complete with two or three of the inner husks, some of it stored in loose piles or in containers (the corn thrown in at random), the rest in
stacks with the ears laid side by side and neatly piled like cordwood. There would naturally be a larger sample of entire ears of the soft flint or slightly dented ears of Pima-Papago race which had been contaminated by Pueblo corn (the dense aggregation to the right of Nickerson's diagram of Point of Pines corn), and relatively pure Pima-Papago race (the more open block of points to the center and left). The grains on these soft corns swell when heated but do not expand and pop violently. They stay and protect the cob and keep it in the mass. On the other hand, kernels of popcorn or extremely hard flints often pop right off of the cob when heated and the number of intact ears for study would have little relation to the number which were grown or stored by the people of the site. There are only three ears in Nickerson's diagram of his 75 specimens which appear to be Small Cob specimens or small forms of Reventador.

The small size and fragile nature of Small Cob accounts for the few ears of this kind and the many eight-rowed ears recorded for the lowest level of Square 2R2 of Tularosa Cave (Martin and others 1952: 467) and for the fact that the average number of rows of grains for the lowest levels of Bat Cave (Mangelsdorf and Smith 1949: 221) was not higher. The lowest levels of cave sites are often the dampest and usually the oldest levels, and the small and soft Small Cob specimens are the first to be destroyed.
Even if they are not completely destroyed, they are often so fragile when excavated that the usual procedures of sifting break them up or leave them in a condition which makes it difficult to obtain good series of measurements.

If we compare the material of Arizona W:9:72 with that from Ventana Cave (Haury and others 1950), we find that most of the cobs from the two sites are similar and are of the Pima-Papago corn race. Ventana Cave lacks the recent Pueblo extremes and has fewer of the Pima-Papago and Pueblo intermediates, has none of the extremes of Small Cob, but has Reventador. There are a few extremely hard and woody cobs in the Ventana Cave material which are not duplicated in Arizona W:9:72 and are most like some ears from western Mexico.

Pueblo Race Corn

There are some cobs and many kernels which belong to the Pueblo race of corn (Anderson and Cutler 1942: 84-85). Most of these specimens could be very recent, and may have been deposited by Apache or other late occupants of the site. It is also possible that this type of corn could have been brought in during prehistoric times.

There are many ears which are mixtures of the Pima-Papago race and the Pueblo race and these are slightly less abundant than they were in the Arizona W:10:50 material mentioned earlier which, however, came from a single room
and may not be a reliable index to the corn of the entire site. There is enough of the large cob, large shank, wide cupule, hard glume complex present in Arizona W:9:72 to indicate that there was considerable northern influence although the paucity of material from sites of southern Arizona and northern Mexico makes it difficult to be certain that these characters might not also come in from the south.

SQUASHES, PUMPKINS, AND GOURDS

More kinds of squash and pumpkins were found in Arizona W:9:72 than in any other site which has been excavated in the Southwest. Three cultivated species, Cucurbita pepo, C. moschata, and C. mixta are represented, as well as remains of the wild gourd (Cucurbita foetidissima) and the cultivated gourd (Lagenaria siceraria).

This material is evidence that the people who lived in, or in the region of, Arizona W:9:72 accepted new kinds of squashes which were moving into or through this region in the period of about A.D. 800 to 1200 and continued to grow the older kinds. This suggests that these people, or their predecessors or ancestors, not only were willing to try these new foods but had a well developed agriculture with land enough for the new crops. The most ancient kind
of squash, *pepo*, is the least common in the plant remains of Arizona. We will be able to tell more from these collections when techniques for studying them are improved and more specimens from other sites and from recent Indian groups are available. Recently, a grant from the John Simon Guggenheim Foundation and the cooperation of archaeologists and curators in many museums and universities made it possible to study a large number of the squash, pumpkin, and gourd collections in this country. Many of the published identifications of these plants are wrong, mainly because simple and practical descriptions of them were unavailable until 1950 when Whitaker and Bohn's illustrated review appeared (1950: 52-81). In 1946 when Carter wrote his paper on the origins of American Indian agriculture, there was so little information published that he was led to say, "By use of archaeological evidence it can be shown that *moschata* appears first in the northern part of the Southwest and spread southward." (Carter 1946: 15.) Actually the evidence shows that the reverse is true (Cutler and Whitaker, unpublished data) and that *C. moschata* and *C. mixta* entered from the south about the same time as new kinds of corn, the tepary and lima bean, and cotton.
The Wild Gourd (Cucurbita foetidissima)

The wild gourds were the first of the cucurbitaceous plants to be used as food. Their seeds can be eaten (usually roasted) and their fruits and roots are reported to have been eaten and to have been used in washing (they contain a saponaceous substance). *C. foetidissima* is spread over most of the Southwest and northern Mexico and is the wild species which is usually found, but there are several other species belonging to the same genus. Two of the most common ones are *C. digitata*, found in southern Arizona and adjacent Mexico, and *C. palmata*, of western Arizona and adjacent California and Mexico. *Apodanthera undulata* has edible seeds and is sometimes called a wild gourd although it belongs to a very different group than the *Cucurbita* species. Remains of *C. foetidissima* are found in sites once occupied by non-agricultural people and many of the recent non-agricultural people collected or still collect wild gourds, so we can assume that this food was gathered before the beginnings of agriculture.

During the Georgetown Phase at Tularosa Cave (Martin and others 1952: 470) a significant increase in the proportion of gourd fragments and other gathered food materials suggests that difficulties with agriculture made it necessary to resort to these wild plant foods. Some of the wild gourds grow well in disturbed soils and are so aggressive that they may be called weeds. It is likely
that one or more of the wild gourds is an ancestor of our squashes and pumpkins.

**Squash and Pumpkin (Cucurbita pepo)**

This is the oldest of the cultivated squashes and pumpkins of North America. It is found in the lowest levels of the Ocampo Caves of Tamaulipas, Mexico (Whitaker, Cutler, and MacNeish 1957), estimated to be more than 4800 years old. It is also found, with common beans, corn, and the cultivated gourd, in the lowest levels of Tularosa Cave, New Mexico (Martin and others 1952: 470) which are probably more than 2200 years old.

Most of the peduncles (or fruit stems) of *C. pepo* from Arizona W:9:72 are large and quite uniform in shape and size. They closely resemble the commonest kind from Tularosa Cave and the Ocampo Caves. A few of the peduncles are shrunken like ones which have been picked while the fruit was still immature and there are some small and very shriveled peduncles, undoubtedly from fruits which were picked long before they were ripe. The ratio of mature to very immature peduncles is roughly the same as that for Tularosa Cave but there is not enough material to make a valid comparison. In Mexico and among the Pueblo Indians some squashes are still gathered while very young and tender. Since the food value of very young squashes is low and the fruits appear at a time when there are usually
plenty of easily gathered wild greens, this may be an indica-
tion that there was enough other food available to permit
such extravagance. On the other hand, by picking the
earliest fruits, it is possible to induce squash plants to
continue to flower and bear fruit over a long period and
the people of Arizona W:9:72, Tularosa Cave and the Ocampo
Caves may have been observant enough to have discovered this.

The few seeds of *C. pepo* which were found are very
uniform in shape and size.

**Squash (Cucurbita moschata)**

Moschata appeared in the Southwest long after pepo. In
the Ocampo Caves good specimens were found in levels
estimated to be between 1800 and 2300 years old, at least
700 years older than the oldest specimens we have seen
from the Southwest. The variation in the peduncles and the
seeds from Arizona W:9:72 is well within the range of vari-
ability for a single cultivated variety. There are a few
seeds which we have identified as moschata from Arizona W:
9:72, Room 4, north wall and west wall sections, which
approach the Green-Striped Cushaw type of mixta in size and
shape. This fact, coupled with variations in some of the
seeds identified as mixta, suggests that there may have
been some hybridization between these species.

**Squash (Cucurbita mixta)**

The most interesting squash material in this collection
belongs to this species. The center of mixta lies in central Mexico and this squash did not spread out until relatively late. It appears in the Ocampo Caves about a thousand years after moschata, about 900 to 1300 years ago, but up to now no specimens from the Southwest which are more than 900 years old or can be definitely dated as earlier than A.D. 1050 have been found. C. mixta was not described until 1930 (Pangalo 1930: 253-265) and very little comparative material was available until recently. The species name was given in recognition of the fact that mixta combines characters which are found in C. moschata and the South American C. maxima (the Hubbard, banana, and turban squashes belong to this species).

Because the greatest mass of archaeological remains of cultivated plants comes from Pueblo sites in northern Arizona and adjacent areas, and because some mixta was present, it was at first thought that mixta was rare in southern Arizona. A re-examination of many collections and the study of recent collections shows that mixta is more common and earlier in sites in southern Arizona than it is in more northern sites (Cutler and Whitaker, unpublished data). Two squash stems from Ventana Cave (Haury and others 1950) are C. mixta.

It is possible to readily distinguish several kinds of mixta by their seeds (Cutler and Whitaker 1956: 256). Most specimens from the Southwest, archaeological and
recent, belong to a group characterized by the Green-Striped Cushaw, a variety grown by the people of Arizona W:9:72, of Arizona W:10:50 (charred seeds in Room 71, Level 3), and by many of the Pueblos of northern Arizona and the Rio Grande Valley in prehistoric and modern times. The flesh is used for food and the shell is hard enough to serve as a container, or even, as we have been told, as a musical instrument among the Hopi. There is some variation in seed size in Arizona W:9:72, and on some of the seeds part of the corky white surface is absent. This may have been removed when the seeds were cleaned or in storage or it may be the result of hybridization with moschata. The seeds of mixta-moschata hybrids frequently have irregularities in the corky surface, although most of these hybrid seeds are not as plump as those in this collection. Some of the seeds of the Green-Striped Cushaw type of mixta, especially those in a cache of about 340 from Arizona W:10:42, Room 2, Level 3, have practically no corky surface left but the roughened margins suggest that this is the result of cleaning operations.

Two mixta seeds from Arizona W:9:72, Room 1, Block K, Level 2, are broad and have blunt ends, and resemble in shape the seeds of the cultivated perennial C. ficifolia of the American tropics. With only two seeds this is more likely to be a minor variation in growth than an indication of a distinct variety or any hybridization.
In the entryway section of Room 4 of this site, seven Green-Striped Cushaw type seeds were large (20 x 11.5 mm.) and 21 were small (17 x 9.5 mm.), a difference similar to that found between strains of this variety which are grown today.

Some of the 90 seeds of the same type found in the west wall section of the same room have zig-zag markings unlike usual rodent tooth markings (which are often found on seeds and occasionally reported to be man-made) but probably made by animals.

Very similar to the Green-Striped Cushaw type is a group of varieties still grown today in the South and about some Rio Grande Pueblos. We name this group after the best known variety, Japanese Pie. This group of varieties has larger, thicker, corkier and more-furrowed seeds and larger and corkier peduncles. Some of the seeds from the west wall section of Room 4 of Arizona W:9:72 and from Level 3 of Room 71 of Arizona W:10:50 belong to this group.

There is a very distinct type of mixta which up to now has been known only from recent material. It is called the Taos variety after the place it was first found. The seeds are about the same size as those of the Green-Striped Cushaw but they have shiny, smooth, brown surfaces with tan edges. In appearance the seeds are almost identical with those of some of the banana squashes, which belong to a completely distinct species, C. maxima, found only in
South America in prehistoric times. A single seed was found in the general fill of Room 5 of Arizona W:9:72 with ten seeds of the Green-Striped Cushaw variety. This is the first archaeological specimen of the Taos variety.

Unfortunately, it is impossible to identify most of the numerous fragments of squash rinds. Occasionally a fragment which shows the place the peduncle was attached will enable one to make a reasonably accurate identification or a large enough piece of the neck of a mixta fruit will show warty ridges well enough to identify this species. Generally it is possible to separate rinds into those of the cultivated gourds (corky rinds, usually quite thick but sometimes thin), the wild gourds (with a thin hard rind, the fruits of small diameter), and the cultivated squashes and pumpkins (many with thin rinds, the ones with thick rinds usually hard). Even with experience it is often necessary to cut a rough freehand slice off the margin of a piece of rind and examine the cell structure in order to separate the squashes from the cultivated gourds. This will serve to explain why, in the table, no rind specimens are listed under pepo or moschata although they comprise the largest part of the material under C. foetidissima, unidentified Cucurbite, and Lagenaria siceraria (the cultivated gourd).
Figure 159. - Cucurbit material identifications.
## Cucurbit Material Identifications

*R* - Rind or shell of fruit; *S* - Seed; *P* - Peduncle or fruit stem

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<th>Cucurbita <em>moschata</em></th>
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Figure 160. - Cobs from Arizona W:9:72.  a, 8-rowed Small Cob;  b, 8-rowed Pima-Papago;  c, d, 10-rowed Small Cob;  e, 10-rowed Pima-Papago.
Figure 161. - Ears collected on the Papago Reservation about 1912.  

a-c, Pima-Papago (flour corn);  
d, Onaveno (flint);  
e, Chapalote (flint);  
f, Reventador (pop, not pure Reventador);  
g, Reventador mixed with other corn and showing occasional sweet grains.
Figure 162. - Ears with grains.  a, Ariz. W:9:72, Block K, Level 2, a floury form of Chapalote, similar to kinds grown until recently by the Papago;  b, c, Ariz. W:9:72, Block H, belong to the Pima-Papago race of corn;  d, Ariz. W:10:42, R 1, Level 2, Pima-Papago;  e, Ariz. W:10:42, R 1, Level 1, an intermediate of Pima-Papago and Pueblo races of corn but close to Pima-Papago;  f, Ariz. W:10:42, R 2, Level 4, a rust-colored Pueblo race ear with slight admixture of Pima-Papago.
SUMMARY

1. Most of the corn is identical to that grown in recent times by the Pima and Papago and belongs to the corn races called Pima-Papago, Onaveno, and Reventador.

2. An unusual kind of corn with small cobs may be a primitive kind or, more likely, a race related to Reventador. It is called Small Cob and is older than other kinds in Arizona W:9:72 and has been found in earlier levels of Mogollon sites.

3. There are some ears of mixtures involving northern corn (Pueblo race) and a small number of cobs and kernels of pure Pueblo race which may be considered as being recent deposits or the result of northern contacts in prehistoric times.

4. All species of squashes (pepo, moschata, and mixta) and Phaseolus beans (common, lima, and tepary) known from archaeological sites in the Southwest were present. The jack bean (Canavalia ensiformis, known from a few sites in central and southern Arizona) and the scarlet runner bean (Phaseolus multiflorus, for which we have no archaeological specimens) were not found.

5. The corn indicates that Arizona W:9:72 was occupied during a period of great change and movement. Most of the changes appear to have come from northern Mexico. There is evidence of northern influence in the corn sample but
this is not strong and the northern kind of corn could be attributed either to an intense or direct northern influence or to a late, perhaps Apache, occupation.

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BEANS FROM ARIZONA W:9:72 AND W:10:42

Lawrence Kaplan

The bean materials analysed here consist mainly of seeds in good condition, neither charred nor parched. There are several seed fragments and parts of bean pods. The species represented are: common beans (Phaseolus vulgaris), lima beans (Phaseolus lunatus), and tepary beans (Phaseolus acutifolius var. latifolius); these are the only cultivated Phaseolus species which have been reliably reported from prehistoric Southwestern sites. The classification of bean types is made with reference to the typology for beans in Kaplan (1956). In designating the types, "C" stands for common beans, "T" for teparies, and "L" for limas.

ARIZONA W:9:72
Red Bow Cliff Dwelling

Room 1, Block C: One lima bean seed, Type L1 and one tepary bean seed, Type T6.

Room 1, Block E, Level 1: One common bean seed, Type C31 - new type: 1.47 (length) x .78 (width) x .60 cm. (thickness), anterior end sub apiculate, form sub cylindrical, color medium red-brown with light red-brown and
dark flocks, moderately glossy.

Room 1, Block E, Level 2: One lima bean seed, Type L1 and one lima bean seed, Type L7 - new type: 1.60 (length) x .93 (width) x .73 cm. (thickness), anterior end slightly attenuate, posterior end truncate, testa veining indistinct, color-dark plum purple. This is possibly an extreme variant of lima type L1, however, the spherical form is strongly suggestive of so-called Caribbean lima types which are also found in Mexico. Southwest lima beans are of the sieva type as distinguished from the larger seeded Peruvian varieties and tend to be flat rather than spheroid.

Room 1, Block G: Three tepary bean seeds, Type T3 and one common bean seed, Type T32 - new type: 1.29 (length) x .83 (width) x .39 cm. (thickness), ends slightly truncate, seed flat laterally, color medium red-brown with thin dark longitudinal stripe, hilum small relative to size of seed, moderately glossy.

Room 4, Entryway section: One lima bean seed, Type L1.

Room 4, West wall section: One tepary bean seed, Type T3. The three common bean seeds, Type C32, are immature seeds in a fragmentary pod.

Room 5, Bench fill: Two tepary bean seeds, Type T7.
Fragments of lima bean pods occurred in Room 1, Level 1 and three common bean pods in Room 2, Level 3.

In these sites are found beans characteristic of all of the major culture areas of the prehistoric Southwest. Although the array of bean types here is highly diverse, the pattern of distribution of the types is suggestive of greater influence from the western New Mexico Mogollon and the Verde Valley than from the northern Arizona or San Juan Anasazi. Apparent Verde Valley sources for Point of Pines caves tepary and lima beans may actually be an expression of southern Arizona Hohokam influence in both areas.

The new types of common and lima beans may have been recent introductions from Chihuahua or Sonora or other specimens of the same types simply may not yet have been excavated.

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Kaplan, Lawrence
**FREQUENCY AND TYPES OF COMMON BEANS**

**FROM ARIZONA W:9:72**

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*No. - Number of seeds  
Ty. - Type of bean  
* - Fragmentary*
Figure 164
DISTRIBUTION AND AFFINITIES OF BEAN TYPES FROM POINT OF PINES CAVES

Distribution in other Prehistoric Culture

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PLANT REMAINS

Plant remains from caves of the Point of Pines region are summarized in tabular form (Fig. 166). Cultivated food plants were identified by H. C. Cutler, Acting Director of the Missouri Botanical Garden, and his colleagues with a separate study of beans by Lawrence Kaplan, Department of Biology, Roosevelt University, Chicago; these aspects have been discussed previously. Cotton specimens were identified by the late R. H. Peebles, Agronomist, U.S. Department of Agriculture, Sacaton Field Station, Arizona, and uncultivated plant remains by C. T. Mason, Jr., Director of the Herbarium at the University of Arizona.

CORN: Ten bundles of corn husks were recovered from Pine Flat Cave. Each was bound and tied tightly around the center with yucca strips so that ears hung down on either side. Ears are no longer present, however, and only shanks and husks remain. Of these, three were examined and reported on by Cutler. It is his opinion that they could be recent Apache. The remaining seven are similar. In as much as many of the bundles were on or near the surface,
and those deeply buried in Room 2 were close to other identifiable Apache materials such as the numerous grass and hide-lined storage pits, I feel that corn husk bundles can be attributed to the Apache. No bundles of this kind were found at Red Bow Cliff Dwelling which was solely occupied by Mogollon-Pueblo.

Since the archaeological evidence argues for a single Mogollon-Pueblo occupation in Red Bow Cliff Dwelling with no evidence of Apache material, it is obvious that none of the corn from this site is likely to be Apache. Cutler nevertheless notes the presence of some extreme Pueblo kind of corn at this site which he thought might be due to Apache. If this had occurred at Pine Flat or Tule Tubs Cave such an explanation would be possible, but at Red Bow Cliff Dwelling some other reason must be sought. In the history of Arizona W10:50 at Point of Pines we know that between 1265 and 1290, a group or groups of migrant people arrived from the Kayenta region of northern Arizona bringing with them pottery and other objects of the Kayenta complex. I believe that in the light of such evidence, there is good reason to suppose that these people may also have brought some of their native corn with them. If this were the case, northern corn would be introduced into the Point of Pines region and in all probability show in samples of corn from years following the arrival of these people and perhaps be in evidence after their absorption or disappearance. Red
Bow Cliff Dwelling was occupied within 75 years after the Kayenta group first came to Point of Pines and it is therefore possible that the extreme Pueblo kind of corn may be due to this northern influence. This suggestion is advanced with extreme caution, however, because other influences, archaeological or botanical, of which we are not now aware might also have been responsible. A forthcoming analysis of burned corn from Kayenta group rooms at Arizona W:10:50 should enlighten the problem.

Cutler also found "an unusual kind of corn" which he called Small Cob, race of corn with high frequency in Levels 2 of Blocks E and K of Room 1. Small Cob also occurred in other areas of the cave, particularly Room 4, center section. It is slender-cobbed and resembles corn from older strata of Tularosa and Bat caves. He points out that this kind of corn is rare in Levels 1 of these blocks and not as abundant in most of the remainder of the cave. As is shown in the archaeological analysis, there is no indication of any occupation at this site other than the single Mogollon-Pueblo, Canyon Creek Phase habitation. There is no definite archaeological explanation at present for the presence of this kind of corn unless the material culture of a light pre-ceramic occupation was, with this exception, completely obliterated by that of the Mogollon-Pueblo (this seems very unlikely). It is nevertheless possible that certain old types of corn were retained here
in later periods for special reasons and this site was occupied at the very time the retention of older corn types went out of favor. The best hypothetical solution of the problem is in this line of thinking. It is not unreasonable to suppose that certain old strains of corn were selected, grown, and harvested for limited ritual use. Ethnographical studies often indicate a conservatism and a retention of old ways, old ideas, and old material objects in connection with ceremonial aspects of life. On the other hand, presently unknown or unrecognized botanical reasons may ultimately come forth to clarify the situation in this way. Cutler is certain of his identification, and as a result it poses an extremely interesting problem.

At both Red Bow Cliff Dwelling and Pine Flat Cave, kernels of corn often occurred in groups buried in various places throughout room fill. With the exception of the contents of a hide bag and an Apache grass-lined storage pit, such clusters of kernels were not contained in receptacles. It nevertheless seemed to us that they had been buried as caches, but Cutler feels that due to the diversity in kinds of corn represented in these kernel samples, if they were intentionally cached, it was not as selected seed corn. This is also true of clusters of squash seeds found under similar circumstances in the fill of rooms.
BOTTLE GOURD: In addition to rind fragments scattered through cave fill, one complete hollow hull was found in the center section of Room 4. Height, 24.6 cm.; diameter, 18.7 cm.

COTTON: At Red Bow Cliff Dwelling, cotton lint, seeds, and bolls were found. In some instances, pieces of plant stems were still attached to bolls; and a number were recovered whole and unopened. Portions of cotton plant also occurred at random in the fill of Rooms 1 and 4, but only as short sections of the stalk and in no case were leaves, bolls, or roots still attached. Cotton plant fragments were collected from room fill along with a great mass of other twigs, sticks, and plant sections and were not distinguished as pieces of the cotton plant until the laboratory analysis was made. Therefore no special care was taken to gather stalk fragments from areas other than those screened, and in all probability, only a fraction of the true amount of cotton stalk was collected. The presence of cotton stalks, bolls, seeds, and lint as well as more refined products is important in that this evidence would indicate that cotton was harvested before the bolls were quite mature, the entire stalks with bolls, being picked and brought to the cave for use rather than allowing the bolls to mature and crack open on the plants only to harvest the cotton lint and seeds. It has been observed that "Early accounts of the Pimas contain references to
their fields of cotton, which was picked and spread on the roofs of their arbors to dry in the pod." (Russell 1908: 149-150.) The presence of so much of the plant lends itself to the argument that cotton was grown in the immediate vicinity of the Nantaek caves. It may or may not be significant that only a wad of unprocessed cotton lint and seed was recovered from Pine Flat Cave lying on the northern side of the Nantaek Ridge. It is possible that one of the reasons for Nantaek scarp cave use and occupation might have been that cotton was more easily and successfully grown on the south side of the Nantaek Ridge on Ash Flat. The altitude is less and conditions may have been more favorable for cotton growing than at Point of Pines. Hough specifically remarks that cotton seeds were not present in the caves he examined. He points out that although Tularosa Cave afforded the best chance of their being found, none were recovered, Tularosa Cave being "at too great an elevation for the raising of cotton, but the lower Blue and Gila have a suitable climate, and, without doubt, cotton was anciently raised there." (Hough 1914: 9.)

In Red Bow Cliff Dwelling the largest sample of cotton came from the entryway section of Room 4. Along the side of the entryway, sticks had been imbedded upright in the plaster just inside the doorway, but had been snapped off about 10 cm. above the floor. These sticks as well as others of a similar nature in different sections of the
cave are thought to have been connected with aboriginal weaving.

The cotton from cave sites has been identified by Peebles as *Gossypium hopi*. Of the samples, he reports that

"...all correspond well with what is called Hopi cotton. Several unginned seeds were so well preserved I was able to comb two of them for comparison with two modern Hopi Sacaton combed seeds. The modern fiber happens to be slightly shorter, but both it and the prehistoric cotton are within the normal staple range. The only difference I could see was a slight discoloration of the fiber and the tip of seed fuzz in the prehistoric material. The carpels look about the right size for Hopi and do not differ in any other respect. The photograph compares prehistoric Hopi cotton from Arizona W:10:42 with modern Hopi (Hopi Sacaton, 1955 crop), the resemblance is remarkable." (Fig. 165.)

"With regard to the stems, your material shows that the prehistoric people may have picked the seed cotton from the early bolls, but they most certainly carried the plants to their caves and removed the seed cotton as the bolls opened from desiccation. They may have cracked open the most immature bolls." (Peebles 1955: personal communication.)

Although only the specimen from Pine Flat Cave is illustrated, it is typical of all that came from Red Bow Cliff Dwelling. No bolls or plant fragments were found at Pine Flat and Peebles' remarks in connection with cotton plants are applicable to the sample from Red Bow Cliff Dwelling alone.

Cotton stem fragments were more abundant in the north wall section of Room 4. Cotton bolls occurred as follows:
Figure 165. - Prehistoric Hopi cotton from Pine Flat Cave identical to that also recovered from Red Bow Cliff Dwelling (left); modern Hopi cotton (Hopi Sacaton), U.S. Field Station, Sacaton, Arizona. 1955 (right). Photograph by R. H. Peebles - 3/4 natural size.
Room 4, entryway section, 61; west wall section, 32; center section, 18; Room 1, Block C, 4; Block E, 16; Block F, 1; Block G, 4; Block H, 2; Block K, 1; Room 5, fill, 10; Frontal Area, 2.

**JUNIPER SEEDS:** Loose juniper seeds occurred abundantly in the fill at Red Bow Cliff Dwelling. A hole was punctured through the center of some seeds and they were strung parallel to the long axis as beads. That they were ground for food is evidenced by fragments of seeds in the vesicles of the grinding surface on a one-hand mano from the entryway section of Room 4. A mano fragment from Room 2, Level 1 of Tule Tubs Cave also has seeds wedged into vesicles on its grinding surface. The two mano specimens are similar to one found at Hinkle Park Cliff Dwelling which had "dried juniper berry seeds and pulp in the interstices of its porous grinding surface" (Martin, Rinaldo, and Bluhm 1954: 100). Loose seeds were not recovered from Tule Tubs or Pine Flat caves where only a few whole juniper berries were found.

Cutler indicates "juniper seeds are often used as food and there were large numbers of them in the remains of a basket from the Higgins Flat site. Tularosa Cave had many juniper berries struck on small sticks and a considerable number of loose ones. Hopi and Navaho children often chew juniper berries and spit out the seeds." (Cutler
JIMSON WEED: Fruits were recovered from Pine Flat Cave and a number of the small masses of seeds from inside fruit pods were found at Red Bow Cliff Dwelling. The seeds of jimson weed are often used by Indians in ceremonies and curing activities. Roots and other parts of the plant are narcotic.

WALNUTS AND ACORNS: Both were gathered and appeared abundantly throughout the fill in all cave sites. Walnuts in particular, when in season, must have been heavily relied upon as a food source.

OAK GALLS: These small round balls were numerous at Red Bow Cliff Dwelling. They are light and range in diameter from 17 to 34 mm. Many are almost perfectly round with a smooth surface. A single specimen had been decorated with lines burned into its surface (Fig. 69b) and for this reason it is supposed that they were purposely gathered by children for use as play things or perhaps to be employed in the pursuance of a game. Oak galls of this kind are formed on twigs of the Emory oak (Quercus emoryi). They are plant tissue built up by the tree to surround a larval cell of the Gall wasp (Cynipidae-Amphibolips trizonata). Upon maturation the wasp larva bores a hole to escape leaving behind a ball of plant tissue which turns
brown and hardens.

**PINYON NUTS:** These nuts were more abundant at Pine Flat Cave than at Red Bow Cliff Dwelling where five lumps of resin, probably of the pinyon, were also found. The Apache at Pine Flat Cave may have, as they do today, gathered this nut in some quantity.

**CACTUS LEAVES:** Sections of dried and shriveled leaves of the prickly-pear and other cacti were found. Although not numerous, it is possible they may have been used in limited quantities as food.

**DEVILS-CLAW:** Young pods are occasionally eaten and split sections of the mature pods are generally used in the manufacture of basketry, particularly for any black design. Pods were abundant at Red Bow Cliff Dwelling, rare at other sites.

**BEAR-GRASS:** Leaves of this plant are most often used in twilled matting and other woven products in the twilled technique. Although not abundant at either Tule Tubs or Red Bow Cliff Dwelling, a bunch of 31 leaves, cut and gathered, was stored in the fill of Room 1, Block H of the latter site.

**YUCCA:** Seeds occurred frequently at Red Bow Cliff Dwel-
Dwelling and were undoubtedly gathered for food. Fruit pods were not common. Leaves were abundant except at Pine Flat Cave where, like bear-grass and agave, only a few specimens were found. This may be because of a higher altitude at this site and a consequent scarcity of the plant. Leaves are cut from the plants across their broad base and used to provide fiber for woven objects and cordage. They were also chewed as quids. With the maceration of appended leaves, needles of both yucca and agave served as ready-made sewing tools.

In the top levels of benches in Rooms 2 and 5 at Red Bow Cliff Dwelling, yucca leaf sections were spread in layers, the leaves of one layer at an angle to those in other layers, but not interwoven. Grass was also included. The purpose of the entire mass was evidently to provide a soft fill above rubble along the bench top which became part of and increased the strength of surface plaster lessening its tendency to crack.

At Red Bow Cliff Dwelling, a number of the round, hard woody yucca plant bases occurred. Fragments of these also appeared at the other two sites. This is positive evidence that in some cases, at least, the entire plant was brought to the site. Basal portions of the plant are useful in themselves and by having the whole plant, leaves could have been removed as needed. Most of the yucca found is *Yucca baccata.*
AGAVE: Leaves of this plant were very numerous at Red Bow Cliff Dwelling and at Tule Tubbs Cave. Basal center sections of the plant also occurred at Red Bow Cliff Dwelling as did many needles cut off below the needle base. In most of these instances fiber remaining on needles was not macerated or twisted, indicating these may not have been used for sewing purposes as much as yucca needles and that sections of the agave leaves themselves were most important.

PONDEROSA PINE: Fragments of bark, cones and needles were present. At Pine Flat Cave thick rectangular sections of Ponderosa pine bark were selected and built into bark bins by the Apache.

CARRIZO CANE: At these sites, sections of carrizo cane were extensively used in the manufacture of arrows and cane cigarettes. This was especially true at Red Bow Cliff Dwelling where broken cane occurred in quantity in Rooms 1 and 4. Over one thousand broken unworked sections of cane were found in Room 4, north wall section, and nearly five hundred in the ceremonial area. If, however, both worked and unworked cane are considered together, the amount scattered over the ceremonial area would have exceeded that in any other portion of the cave.
GRASS: Grasses and low shrubby plants were used at Pine Flat Cave by the Apache in the preparation of bedding areas. Plants were pulled up by the roots, brought to the cave in bunches, and spread out as desired. In some cases roots were cut off but still included in bedding areas, the purpose of removing them was evidently only to reduce bunch lengths. The principal grass used was Longtongue muhly but Aristida plants, pine needles, and shredded juniper bark also occurred sparingly.

Generally speaking at Red Bow Cliff Dwelling most types of plants were represented in almost all portions of the cave. A limited amount of selectivity seems to have taken place in the deposition. The ceremonial area of Room 4 was relatively devoid of plant and animal remains. Miscellaneous fragments of plants, yucca, agave, and walnuts were most common in the west and north wall sections of Room 4, and in Blocks G and H of Room 1. These locations are to the back and sides of the rooms and no doubt were convenient areas to throw portions of plants after removal of desired parts. Devils-claw was most common in the center section of Room 4.

From an overall viewpoint, the entire collection of food plants is large when compared to the sample of unworked bone presumably representative of the animals eaten by cave inhabitants. Emphasis seemed to lay heavily
### Figure 166. - Summary Tabulation of Plant Remains From Cave Sites in the Point of Pines Region

#### PLANT REMAINS

<table>
<thead>
<tr>
<th>PLANT NAME</th>
<th>Red Bow Cliff Dwelling</th>
<th>Tule Tubs Cave</th>
<th>Pine Flat Cave</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zea mays - corn</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Cucurbita pepo - pumpkin, squash</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Cucurbita moschata - pumpkin, squash</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Cucurbita mixta - pumpkin, squash</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Cucurbita foetidissima - wild gourd</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Lagenaria siceraria - bottle gourd</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Phaseolus vulgaris - common bean</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Phaseolus lunatus - lima bean</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Phaseolus acutifolius - tepary bean</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gossypium hilo - cotton</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Juniperus deppeana - juniper seeds</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Datura sp. - jimson-weed (fruit)</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Juglans major - walnut</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Quercus Emoryi - acorns (Emory oak)</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Quercus Emoryi - oak galls</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Pinus edulis - pinyon nuts</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Allium sp. - wild onion</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Opuntia sp. - prickly-pear cactus</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Proboscidea parviflora - devils-claw</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Nolina microcarpa - bear-grass</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Yuca sp. - yucca seeds</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yuca sp. - yucca leaves</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Agave Palmeri - agave</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Pinus ponderosa - Ponderosa pine</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Phragmites communis - carrizo cane</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Muhlenbergia longiligula - longtongue</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
on the primary use of corn, followed by squash, gourds, beans, yucca and agave, walnuts, acorns, and cotton; the consumption of meat (hunting), judging from the relative size of the amounts recovered, must have been subordinate and only supplemented the vegetable diet. The cliff in front of the cave was a convenient, and no doubt often used, place for trash disposal but there is little reason to suppose that there was selective trash disposal which could have accounted for the lack of animal bones.

Tule Tubs Cave furnished a rather small sample of plant remains. It was, however, a smaller cave and conditions were poor for the preservation of perishable material. At Pine Flat Cave, the presence of an Apache occupation should be kept in mind. It is certain that some of the corn and much of the grass and Ponderosa pine bark was brought to the cave by these people. To what extent the presence of Apache influenced the remaining sample is not known.

A myriad of twigs and bits of wood occurs at all cave sites. They are unworked but, of course, were carried into the caves for some purpose. Many are burned and were probably used for kindling and as fire pokes. The presence of the remainder may parallel the unworked chips of stone found in such abundance at all sites, purposely accumulated but unused. In both cases, bits of wood and chips of stone probably represent remnants in the manufacture of tools.
That wooden objects were as much a part of prehistoric material culture as most other aspects is amply demonstrated in cave sites but scarcely shown in open ruins.

**QUIDS:** Fiber masses which are shredded, doubled over, pressed, and entangled into small bundles or wads are classified as quids (Fig. 169). A good many now show no evidence of chewing or wear and are no more than a roll of almost clean fibers tangled together in a stiff wad. Others are hardened masses of pulp and fiber which exhibit teeth marks. All stages between these two extremes are present (Fig. 169). About an equal number of quids represent both extremes, the vast majority being at some point in between. Approximately 25 percent appear to be corn husk, a few other plants are represented, and the remaining major portion are yucca.

At Red Bow Cliff Dwelling 1513 quids were found and measurements were taken on the entire sample. These measurements are tabulated (Fig. 167), and quid distribution in this and the other two cave sites is given (Fig. 168). By examination it became clear that almost all quids are roughly the same shape, a flattened ovoid with one diameter greater than the other and a long axis significantly greater than either in about a (greatest frequency) 25-15-10 mm. ratio. Of the measured Red Bow Cliff Dwelling sample, 930 are between 17-36 mm. in length
and 12-26 mm. in width and a majority of these are 7-11 mm. in thickness. Some are longer and slimmer, and others shorter and more stout, but for the most part the basic shape is consistent. This is interesting in that a greater variation in shape and certainly more spherical forms would result if quids were moved around and rotated in the mouth as in chewing a piece of gum.

In Red Bow Cliff Dwelling the greatest concentration of quids occurred in Blocks G and H of Room 1 (533) and in the north wall section of Room 4 (449). Both of these areas are to the very rear of their respective rooms and under low overhangs. They were definitely trash areas where garbage was tossed to get it out of the way and keep living and more useful parts of the room unencumbered. No quids were found in the ceremonial area. This evidence argues that at this site no ceremonial function was associated with the chewing of quids, that this activity was indulged in in a normal day to day fashion, and that the remains were treated as garbage. Surely if any ceremonial implications were connected with quid chewing, they would have occurred in greater abundance throughout Room 4 and not have been so plentiful in Room 1 where all other evidence reflected only activities of a domestic nature. In speaking of mescal used as a food among the Pima, Russell says, "It is eaten by chewing until the juice is extracted and rejecting the fiber." (1908: 70.)
Figure 167. - Frequency distribution of quid dimensions from Red Bow Cliff Dwelling.
**Thickness as shown**
in each square:

| Width in mm. | Length in mm. | 2-6 | 7-11 | 12-16 | 17-21 | 22-26 | 27-31 | 32-36 | 37-41 | 42-46 | 47-51 | 52-56 | 57-61 | 62-66 | 67-71 | TOTALS |
|--------------|---------------|-----|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| 7-11         |               |     |      |       |       |       |       |       |       |       |       |       |       |       |       |         |
| Th.          | 8|9  | 17|12 | 30|17 | 29|11 | 12| 4 | 4|1  | 1|1  | 2|1  | 1|58  | 158 |
| 12-16        | 10  | 109 | 212 | 145 | 99  | 43  | 27  | 7  | 4  |       |       |       |       |       |       |       |   656 |
| Th.          | 5|5  | 18|68|3 | 90|113 | 8|1  | 66|75 | 4|42 |53|4 | 18|23 | 2 | 15|12 | 2|5 | 1|1|2 | 479 |
| 17-21        | 27  | 149 | 134 | 82  | 38  | 31  | 10  | 7  | 1  |       |       |       |       |       |       |       |         |
| Th.          | 8|15|4  | 35 | 90|23|1  | 15|81|17|1  | 26|49|7 | 8|21|7 | 11|12|8 | 18|2 | 1|4|2 | 1|1 | 479 |
| 22-26        | 15  | 41  | 48  | 30  | 15  | 10  | 3   | 2   | 3   |       |       |       |       |       |       |       |         |
| Th.          | 2|8 |5  | 8|22 |9 |2  | 1|25|9|4 | 2|10 |10 | 3|5|5|2 | 1|5|4 | 1|2 | 2|1 | 1|1 | 167 |
| 27-31        | 1   | 5   | 9   | 8   | 7   | 5   | 4   |     |       |       |       |       |       |       |       |       |         |
| Th.          | 1|1 |2 | 1|2 | 1|6|2 | 5|2 | 1 | 1|3|2 | 4|1 | 2|2 | 2|1 | 1|1 | 39 |
| 32-36        | 5   | 1   | 2   | 2   | 1   |     |       |       |       |       |       |       |       |       |       |       |         |
| Th.          | 1|3 |1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 13 |
| 37-40        | 1   |     |     |     |     |     |       |       |       |       |       |       |       |       |       |       |         |
| Th.          |     |     |     |     |     |     |       |       |       |       |       |       |       |       |       |       | 1 |

**TOTALS** 27 165 424 365 259 125 84 34 20 4 3 3 1513

**FREQUENCY DISTRIBUTION OF QUID DIMENSIONS FROM RED BOW CLIFF DWELLING**
DISTRIBUTION OF QUIDS

<table>
<thead>
<tr>
<th>Provenience</th>
<th>Number of Quids</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED BOW CLIFF DWELLING (Arizona W:9:72)</td>
<td>1513</td>
</tr>
<tr>
<td>Room 1</td>
<td></td>
</tr>
<tr>
<td>Blocks A and B</td>
<td>2</td>
</tr>
<tr>
<td>Block C.</td>
<td>20</td>
</tr>
<tr>
<td>Block E.</td>
<td>87</td>
</tr>
<tr>
<td>Block F.</td>
<td>9</td>
</tr>
<tr>
<td>Block G.</td>
<td>196</td>
</tr>
<tr>
<td>Block H.</td>
<td>337</td>
</tr>
<tr>
<td>Block K.</td>
<td>14</td>
</tr>
<tr>
<td>Room 2 - Fill</td>
<td>13</td>
</tr>
<tr>
<td>Room 3 - Fill</td>
<td>7</td>
</tr>
<tr>
<td>Room 4</td>
<td></td>
</tr>
<tr>
<td>Entryway section</td>
<td>142</td>
</tr>
<tr>
<td>South wall section</td>
<td>48</td>
</tr>
<tr>
<td>North wall section</td>
<td>449</td>
</tr>
<tr>
<td>West wall section</td>
<td>37</td>
</tr>
<tr>
<td>Center section</td>
<td>8</td>
</tr>
<tr>
<td>Room 5</td>
<td></td>
</tr>
<tr>
<td>Fill</td>
<td>131</td>
</tr>
<tr>
<td>Bench fill</td>
<td>82</td>
</tr>
<tr>
<td>Frontal Area</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>TULE TUBS CAVE (Arizona W:9:69)</td>
<td>193</td>
</tr>
<tr>
<td>Room 1 - Fill</td>
<td>51</td>
</tr>
<tr>
<td>Room 2</td>
<td></td>
</tr>
<tr>
<td>Level 1.</td>
<td>18</td>
</tr>
<tr>
<td>Level 2.</td>
<td>9</td>
</tr>
<tr>
<td>Overhang area</td>
<td>71</td>
</tr>
<tr>
<td>Room 3 - Surface</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>PINE FLAT CAVE (Arizona W:10:42)</td>
<td></td>
</tr>
<tr>
<td>Room 1</td>
<td></td>
</tr>
<tr>
<td>Level 1.</td>
<td>26</td>
</tr>
<tr>
<td>Level 2.</td>
<td>4</td>
</tr>
<tr>
<td>Level 3.</td>
<td>65</td>
</tr>
</tbody>
</table>

Figure 168. - Provenience distribution of quids from caves in the Point of Pines region.
Figure 169. - Quid specimens from Room 1 of Red Bow Cliff Dwelling.
In the sample from Tule Tubs Cave, a number of examples exceeded in size the largest quid from Red Bow Cliff Dwelling. These massive specimens resemble pads of yucca fiber more than quids and none of them show marks of chewing. As an example, one is 82 (length) x 61 (width) x 48 mm. (thickness). Any one of them is, in fact, so large as to practically fill the mouth of a person disposed to attempt chewing it.

Cutler expressed doubt about many of the quids from Tularosa Cave in that he felt some were scouring pads used to clean pottery (Martin and others 1952: 471). Evidence of wear seems lacking in the sample from Tule Tubs Cave, but it is questionable if all of the examples served as quids. At Tule Tubs Cave all specimens recovered are of yucca.

UNWORKED ANIMAL BONE

There is no question that the volume of bone from these cave sites is extremely small in comparison with what might be expected if the consumption of meat formed a basic or primary part of the diet as did plant food. The small quantity of bone is in sharp contrast to the larger sample of plant remains, the two having been collected under exactly the same excavation procedure. This is particularly the case at Red Bow Cliff Dwelling and is true to a
somewhat lesser degree at Pine Flat Cave. At Red Bow Cliff Dwelling, from the standpoint of quantity, Room 1 had the largest and most varied sample; this is added evidence that Room 1 was primarily used for domestic purposes.

As is the case in other ruins throughout the Southwest, long bone fragments occurred which have been split, perhaps to extract marrow. No actual count of identifiable fragments is given because bones are broken and in such small pieces that figures would be misleading.

Despite the limited quantity of bones, a variety of animals and birds are represented. Most interesting is the presence of bison, beaver, mountain sheep, antelope, and Sonora deer which are not seen in the Point of Pines region today. The dog and perhaps turkey were probably the only types domesticated by the Indians. Some of the birds may have been taken primarily for their plumage and in addition to the present list, a summation of feathers found in the cave sites is given elsewhere. Cow bones were recently deposited and represent either range cattle or Apache occupation. Mule deer was the animal most abundantly represented. The identifications were made by Milton A. Wetherill of the Museum of Northern Arizona and are tabulated in Figure 170.
Figure 170. - Summary tabulation of unworked bone material from cave sites in the Point of Pines region

**UNWORKED BONE**

By Milton A. Wetherill

<table>
<thead>
<tr>
<th>Antilocapra americana - antelope</th>
<th>Red Bow Cliff Dwelling x</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bison bison - bison.</td>
<td>Tule Tubs Cave x</td>
</tr>
<tr>
<td>Bos taurus - cow</td>
<td>Pine Flat Cave x</td>
</tr>
<tr>
<td>Canis familiaris - dog</td>
<td>x</td>
</tr>
<tr>
<td>Canis latrans - coyote</td>
<td>x</td>
</tr>
<tr>
<td>Castor canadensis frondator - broad-tailed beaver.</td>
<td>x</td>
</tr>
<tr>
<td>Cynomys ludovicianus arizonensis - prairie dog</td>
<td>x x x</td>
</tr>
<tr>
<td>Erethizon dorsatum covesi - Arizona porcupine</td>
<td>x x x</td>
</tr>
<tr>
<td>Lepus californicus canescens - jack rabbit</td>
<td>x x x</td>
</tr>
<tr>
<td>Lynx rufus baileyi - bobcat.</td>
<td>x</td>
</tr>
<tr>
<td>Neotoma sp. - wood rat</td>
<td>x</td>
</tr>
<tr>
<td>Odocoileus covesi - Sonora deer.</td>
<td>x</td>
</tr>
<tr>
<td>Odocoileus hemionus - mule deer.</td>
<td>x x x</td>
</tr>
<tr>
<td>Odocoileus virginianus - whitetail deer.</td>
<td>x x x</td>
</tr>
<tr>
<td>Ovis canadensis - mountain sheep</td>
<td>x</td>
</tr>
<tr>
<td>Peromyscus sp. - white-foot mouse</td>
<td>x</td>
</tr>
<tr>
<td>Spilogale arizonea - Arizona spotted skunk</td>
<td>x</td>
</tr>
<tr>
<td>Sylvilagus auduboni - cottontail rabbit</td>
<td>x x x</td>
</tr>
<tr>
<td>Taxidea taxus - badger</td>
<td>x</td>
</tr>
<tr>
<td>Thomomys sp. - pocket gopher</td>
<td>x</td>
</tr>
<tr>
<td>Urocyon cinereargenteus scotti - gray fox</td>
<td>x x</td>
</tr>
<tr>
<td>Vulpes velox velox - kit fox</td>
<td>x</td>
</tr>
<tr>
<td>Buteo sp. - hawk</td>
<td>x</td>
</tr>
<tr>
<td>Buteo borealis calurus - western red-tailed hawk</td>
<td>x</td>
</tr>
<tr>
<td>Callipepla sp. - quail</td>
<td>x</td>
</tr>
<tr>
<td>Cathartes aura septentrionalis - turkey vulture</td>
<td>x</td>
</tr>
<tr>
<td>Circus hudsonius - marsh hawk.</td>
<td>x</td>
</tr>
<tr>
<td>Meleagris gallopavo merriami - merriams turkey</td>
<td>x x</td>
</tr>
<tr>
<td>Otocoris sp. - horned lark</td>
<td>x</td>
</tr>
<tr>
<td>Zenaidura macroura marginella - mourning dove</td>
<td>x</td>
</tr>
<tr>
<td>Reptile vertebrae (two specimens)</td>
<td>x</td>
</tr>
</tbody>
</table>
BURIALS

The absence of formalized burials or mummies in these three caves conforms with evidence suggested by the work of Martin and his colleagues in caves of the Reserve area (Martin, Rinaldo, and Bluhm 1954) and Tularosa and Cordova Caves (Martin and others 1952: 459-460). Interments were absent at all six excavated cave sites in the Reserve except Tularosa Cave. From that site Martin recovered two which he felt should be assigned prior to A.D. 600, and Hough (1914: 132) reported two infant mummies and one burial. It seems therefore, that as a general rule, Mogollon-Pueblo groups at both Point of Pines and Reserve did not ordinarily take advantage of available caves in disposing of their dead. This is in contrast to practices in northern Arizona where crevices, hidden areas, and deep soft cave fill were very often chosen as ideal to place elaborately furnished mummies or burials.

Human bones were scarce at cave sites in the Point of Pines region. The few recovered were identified by David A. Breternitz of the Museum of Northern Arizona and may be enumerated as follows: one left femur, adult, Arizona W:9:72, Room 1, Block C; one skull fragment (burned), adult, and one femur fragment, child, Arizona W:9:69, Room 1, fill; one pelvic girdle (ilium, ischium, pubis, sacrum) and the left and right femurs with desiccated skin, prepubescent
adolescent (ca. 12-13 years), no associated artifacts, not a formalized burial, Arizona W:10:42, southwest corner of R.1, Level 2.

FEATHERS

Feathers from various kinds of birds were tied together in small bunches as pahos and individual ones were split for use on arrow shafts. Specimens of feather cordage were also found at Red Bow Cliff Dwelling, indicating feathers were used at that site in the manufacture of textiles. Tail and wing feathers from the red shafted flicker were most often those attached to arrows. Their stiffness and the comparative ease and satisfactory manner in which they split were probably factors in their almost exclusive selection for this function.

Feathers were found loose in cave fill. These specimens are identified by Allan R. Phillips of the Museum of Northern Arizona. Three kinds are most abundant in the following order: red shafted flicker (Colaptes cafer); green-tailed towhee (Oneospiza chlorura); and western bluebird (Sialia mexicana occidentalis). Of particular interest is the occurrence of three small parrot or macaw (Ara macao) feathers.
Adams, W. Y.  

Bandelier, A. F.  

Barter, E. R.  

Beals, R. L.  

Breternitz, D. A.  

Breternitz, D. A., J. C. Gifford, and A. P. Olson  

Brew, J. O.  

Colton, H. S.  

Colton, H. S. and L. L. Hargrave

Cosgrove, C. B.

Culin, Stewart

Cummings, Byron

Daugherty, R. D.

Di Peso, Charles C.

Dixon, Keith A.

Douglas, F. H.

Feth, J. H.
Fewkes, J. W.


Forde, C. D.

Fulton, W. S.

Gifford, James C. (editor)

Gifford, J. C., J. F. Hall, and A. P. Olson

Gladwin, H. S., E. W. Haury, E. B. Sayles, and N. Gladwin

Gladwin, W. and H. S. Gladwin

Guerney, Samuel J. and A. V. Kidder

Hack, J. T.
Haury, Emil W.
Menasha.

Globe.


Haury, Emil W. and L. L. Hargrave

Haury, Emil W. and others
Heider, K. G.

Heindl, L. A.

Hodge, F. W.

Hough, W.

Judd, N. M.

Kelly, I. and A. Palerm

Kidder, A. V.
Kidder, A. V. and S. J. Guernsey

Kroeber, A. L.

Lambert, M. F.

Martin, P. S. and J. B. Rinaldo


Martin, P. S., J. B. Rinaldo, and E. A. Bluhm

Martin, P. S., J. B. Rinaldo, E. A. Bluhm, and H. C. Cutler


Martin, P. S. and E. S. Willis

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Wendorf, F.

Wheat, J. B.


Woodbury, R. B.